



HE·6th

- HOUGHTON / EVEREST NEIGHBORHOOD CENTER
- 6TH STREET CORRIDOR

CITY OF KIRKLAND

6th Street Corridor

Prepared for The City of Kirkland
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EXECUTIVE SUMMARY



Current Corridor Context

The City of Kirkland's natural north-south orientation relies heavily on north-south corridors including 6th Street S/108th Avenue NE, Interstate - 405, and Lake Washington Boulevard. The 6th Street corridor extending from Kirkland Avenue south to the South Kirkland Park-and-Ride and parallel corridors are subject to significant recurring peak period congestion impacting the livability of the community and ability to meet future growth needs.



Growth and Land Use

The City of Kirkland anticipates both population and employment growth in the next decade and has developed a 2035 Comprehensive Plan and Transportation Master Plan to address growth and provide for mobility of people and goods. These plans define the importance of the 6th Street Corridor for all modes of transportation and convey core values for the City being walkable, vibrant, livable, connected, and green. This corridor study also provided information to support the Houghton Everest Neighborhood Center land use evaluation.



Developing Solutions

The study included data collection, community outreach, analysis, and development and evaluation of a broad range of transportation solutions from education and policies to capital investments in improvements to meet current and future transportation needs. Key tasks for the study included data collection, public outreach, analysis of current and future conditions, analysis of land use options with the Houghton Everest Neighborhood Center, development of potential solutions, and description of recommended solutions with implementation plans.



Conclusion

This corridor suffers peak period congestion, adding delay and increasing frustration for users. For the neighborhoods adjacent to the corridor, it is central to their community and the function of the corridor impacts their quality of life. With investments, largely in transit, to help improve regional mobility, the corridor can start to address future demands. Investing in pedestrian, and bicycle improvements can also further improve the quality and livability of the corridor.

CURRENT CORRIDOR CONTEXT

To begin to address potential improvements to meet transportation needs in the corridor requires an in-depth review of the corridor operations including the all modes, collecting data and collecting the perspectives of the community.

The 6th Street Corridor study area will include 6th Street South/108th Avenue NE from at least as far north as Kirkland Avenue to at least the south edge of the commercial area, and potentially from Central Way to NE 52nd Street. The actual limits of the study will be determined as part of the study scope.

The study area for the Neighborhood Center is located within two designated neighborhoods in the City of Kirkland – the Everest Neighborhood on the north side of NE 68th Street and the Central Houghton Neighborhood on the south side. The commercial area or business district at the NE 68th Street/6th Street S – 108th Avenue NE intersection is designated a Neighborhood Center in the City’s Comprehensive Plan. NE 68th Street /NE 70th Street and 6th Street South/108th Avenue NE are two minor arterials that serve the commercial area and the two neighborhoods. They also provide connections to downtown Kirkland (through the Moss Bay Neighborhood), I-405 and SR 520. The Cross Kirkland Corridor (CKC) is directly adjacent to the neighborhood center on the western boundary.

The 6th Street Corridor Study was conducted with the land use study, because of the need to link land use and transportation improvements. As part of the Comprehensive Plan update, a Transportation Master Plan was developed and its goals and objectives were subsequently incorporated into the Transportation Element of the Comprehensive Plan. The goals and objectives of the Transportation Master Plan will be used to guide the outcomes of the 6th Street Corridor Study portion of the work.

Study Limits and Function



Figure 1 illustrates the project corridor and surrounding vicinity and the parallel corridors. A broad range of data already existed through other providers or projects and Transpo

aimed to maximize this as much as possible. Transpo leveraged existing turning movement count data, bicycle and pedestrian counts on the Cross-Kirkland Trail, and daily volumes on the 6th Street corridor. Where data did not exist, Transpo collected parking and travel time data, and used StreetLight to obtain origin-destination data.

Study Limits and Parallel Corridors

For the purposes of the study Transpo cast a broader net for data collection for a study area generally bounded by NE 85th Street/Central way to the north, 116th Avenue to the east, Lake Washington Boulevard/Lake Street to the west and SR 520 to the south. The primary focus was on 6th Street/108th Avenue and to a lesser degree the parallel facilities that make up this transportation corridor including:

- 116th Street 85th to Northup Way
- Lake Washington Boulevard SR 520 to Northern Terminus
- Lake Street Southern Terminus to Kirkland Ave
- State Street 68th Street to Kirkland Ave,
- Interstate 405 SR 520 to NE 85th
- CKC108th Avenue to 85th

Facilities between Kirkland Way and Northup Way were studied but greater attention and depth of analysis was provided on 6th Street/108th Avenue.



Figure 1 - Study Area

Study Analysis Years and Time Periods

For the purposes of this study the focus was on PM peak period (identified as the most congested) and focused on analysis years of 2016 (existing), 2025 (near term) and 2035 (long term). The 2035 horizon year aligns with the City Transportation Master Plan and modeling.

Data Goals and Measures of Effectiveness

In defining the type and expanse of data to be collected, data collection is intended to support expected performance measures that align with the goals of this study. These goals included

- developing a short- and long-term multimodal transportation project, programs,
- strategies to improve existing and anticipated conditions
- align with the goals of the Transportation Master Plan.

Notably, this study required broad public outreach that helped refine goals. Data collected was intended to address comments heard including:

- movement of people
- operations and access of all modes
- growth
- access
- travel times

Current Corridor Characteristics



The transportation system supporting this corridor serve vehicle, transit buses, pedestrians and bicyclists. Currently the 6th Street S and 108th Avenue serves as an arterial

connecting many neighborhoods in Kirkland (Moss Bay, Norkirk, Highlands, Downtown in addition to Everest, Houghton). For much of its roughly 2.5-mile length the corridor provides 2 travel lanes, sidewalks and bicycle lanes. South of NE 68th Street the corridor includes a two-way center left-turn lane. North of NE 68th Street the corridor includes some segments with on-street parking and some two-way center left-turn lanes. Mid-block crosswalks are located throughout the corridor with raised center medians, and protected with Rectangular Rapid Flashing Beacons. This type of protection is provided at the CKC interim trail crossing near 5th Place S.

Transit service is an important use along the corridor with Metro and Sound Transit service connecting the City and South Kirkland Park and Ride with regional destinations including University of Washington, Downtown Seattle and Redmond. Transit stops are located every ¼ mile along the corridor; however, almost half of the riders using regional service in the corridor board the bus at the South Kirkland Park-and-Ride. While this park-and-ride was expanded from 596 spaces to 785 spaces in 2015, it is still generally full (see **Figure 2**).



Figure 2 - S Kirkland Park-and-Ride Use

Figure 3 shows the home locations of license plates observed at the Park-and-Ride. It is notable that Metro’s Route 255 and Sound Transit’s Route 540 that serve the South Kirkland Park-and-Ride also pass by many of the homes using the Park-and-Ride. Throughout the corridor buses stop in lane to serve bus stops blocking general traffic. Private company shuttles from Google and Facebook also travel the corridor providing service for their employees.

S. Kirkland Park & Ride Origin Map

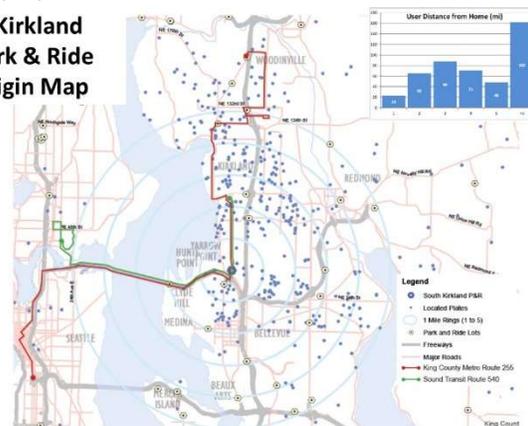


Figure 3 - Kirkland P&R Routes and Origins

Parallel corridors to the 6th Street Corridor include I-405 and Lake Washington Boulevard/Lakeview Drive/State Street. I-405 is a multi-lane interstate with two express toll lanes and three through lanes in each direction. Lake Washington Boulevard is a principal arterial with two lanes in each direction for a portion of its length narrowing to one lane in each direction south of NE 38th Place. A relative comparison of volumes for the parallel corridors is provided below in **Figure 4** reflecting the proportion of daily traffic on the three corridors. Only 5 percent of the over 222,500 daily trips use 6th St. S/108th Ave. NE.



Figure 4 - Parallel Corridor Roadway Volumes

The CKC (CKC) is also a parallel transportation corridor that currently consists of an interim trail. The CKC is envisioned as a multimodal corridor with a regional trail and high capacity transit. It utilizes a former rail corridor and is part of a regional trail system. It runs parallel to the 6th Corridor, crossing it at 5th Place S.

This 2.5 -mile long corridor is unique in that there are very few traffic signals to introduce delay. The 108th Avenue NE segment between the South Kirkland Park and Ride and NE 68th Street is 1.68 miles long. During peak periods congestion extends along the entire corridor in the peak direction. Queues were observed to extend over a mile. These long queues increase overall travel time and block access from side street intersections.

The land use around the corridor is integral to the effectiveness of the transportation system. The land use surrounding the corridor is generally single family residential neighborhoods with supporting retail and small amounts of commercial and industrial uses.

The Houghton Everest Neighborhood Center consisting largely of retail with some office and high density residential occupies the land surrounding the intersection of NE 68th Street/108th Avenue NE/6th Street S. Access into and out of this center is unorganized and poorly managed. Driveways are close to the intersection creating confusion for drivers with too many decision points, multiple driveways are provided onto the arterials and a midblock crosswalk on NE 68th Street provides further confusion and potential conflicts with pedestrians. The excessive number of conflict points are noted in **Figure 5** and suggest the potential for collisions.



- Conflicts NE 68th Street**
- 55 Vehicle - Vehicle
 - 25 Vehicle - Ped/Bike

- Conflicts 108th Ave NE**
- 69 Vehicle - Vehicle
 - 24 Vehicle Ped/Bike Conflicts

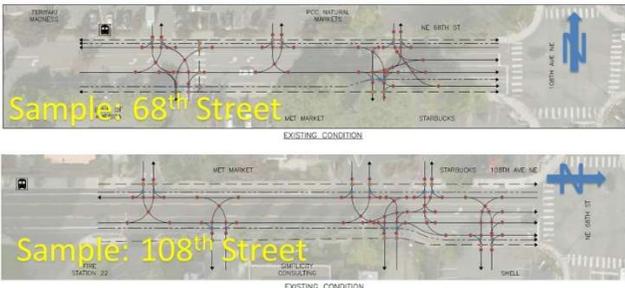


Figure 5 - Corridor Conflict Points

Two large land uses in the study area are the Northwest College, which is updating their Master Plan and Google which has some planned expansion. A large multi-use development at the north end of the corridor (Kirkland Urban) is currently under construction. Fire Station 22 is located on 108th Avenue just south of the NE 68th Street intersection. Notably, the study area also includes several schools and the corridor provides important access and circulation for students walking to schools. In these neighborhoods, there is not a grid of connected local streets.

The roadways that do provide secondary circulation and some level of connection, are protected from cut-through traffic with traffic calming strategies like speed humps and traffic circles. Two routes with traffic calming strategies to address cut-through traffic are 9th Avenue S to 8th Street S to Railroad Avenue to Kirkland Way, in Everest, and NE 60th Street to 106th Avenue NE to NE 68th Street, in Houghton. During afternoon peak periods, these cut-through routes are considered problematic.

Arterials that cross the corridor include NE 68th Street/NE 70th Street, Kirkland Way and Central Way/NE 85th Street. These arterials include sidewalks, and serve transit. Sidewalks and bike lanes are provided or planned on these arterials and provide connections to other trails. The arterials crossing the corridor have a single travel lane in each direction with some medians and paring, except for Central Way/NE 85th Street, which is a five-lane arterial.



Since the opening in 2015 of the interim trail on the CKC, pedestrian and bicycle activity has increased not only along the trail but along the corridors connecting to the trail.

Pedestrian facilities including sidewalks are present along all major, minor and collector streets along with many neighborhood streets. Sidewalks provide an important system for school children and their caregivers while walking to the many schools in the corridor. Sidewalks, especially in higher volume areas adjacent to the retail center are of minimum width and do not promote walking more than two abreast. Some linkages for pedestrians are provided through or between parcels providing additional pedestrian connections including connections to or through the CKC, the Northwest College Campus, the five parks in the study area (Everest Park, Terrace Park, Phyllis A. Needy Park, Carillon Woods and Watershed Park), the pedestrian crossing of I-405 at NE 60th Street and adjacent to the fire station linking to NE 66th Place.



Data Collection

The transportation system supporting this corridor serve vehicle, transit buses, pedestrians, and bicyclists.

Currently, the 6th Street S and 108th Avenue NE roadway carries 10-13,000 vehicles per day. **Figure 6** shows that in the last 17 years, daily volumes have remained relatively constant. The corridor is highly directional with peak traffic southbound in the morning and northbound in the afternoon. Afternoon peak northbound queues on the corridor were measured on 108th Avenue NE south of NE 68th Street as 1.25 miles or roughly 250 cars long. Northbound PM Peak period queues on 6th Street,

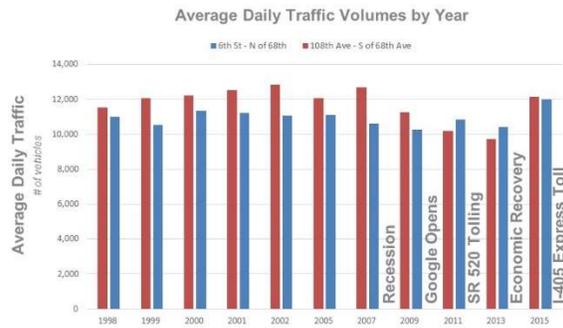


Figure 6 - Daily Volumes Historic Trend

south of Kirkland Way queuing has been increasing and has been observed to extend 4,000 feet. Extensive queuing lasts for no more than two hours but increases corridor travel times by as much as 15 minutes. Afternoon peak hour intersection operations were calculated applying methods in the most recent (2010) Highway Capacity Manual. **Figure 7** provides a summary of intersection level of service. Level of service is a quantitative measure reflecting the relationship of demand to capacity and delays encountered. Level of service A reflects free flow conditions, while F reflects congested operations. As noted in the figure most signal controlled intersections operate poorly LOS D-E. The side-street stop-controlled intersection of 9th Avenue S at 6th Street S currently operates at LOS F due to delays on the side street.



Figure 7 - Existing PM Intersection LOS

Transit including private shuttles, Sound Transit's route 540 and Metro's route 255 and 245 all use the corridor and are also subject to this congestion. The 255 provides frequent all-day service to downtown Seattle and to North Kirkland. The Route 540 provides peak period direct service to the University of Washington and the 245 provides all day service to Factoria. King County Metro (and ST) provided Automatic Vehicle Location (AVL) data for the transit routes serving the corridor from an average week in the Spring of 2016.

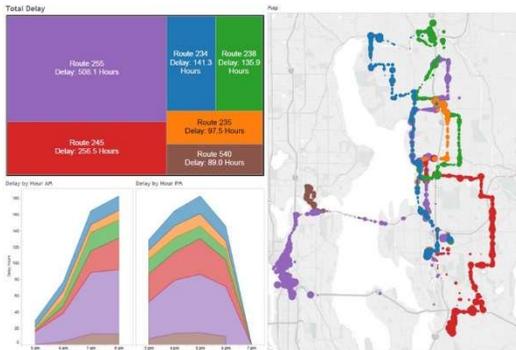


Figure 9 - Transit Delay (Spring 2016)

Figure 9 provides a visual display noting where delays occur for all the routes using the corridor. Most of the delay is related to passenger boarding and alighting and stopped delay at intersections. As shown, the Route 255 accumulates the most delay including delay in the City of Seattle. The route 540 operated by Sound Transit connects Downtown Kirkland and the University of Washington with less frequent peak service. Finally, Metro's route 245 connects Kirkland and Factoria with all day service and half hour headways. Private shuttles also use this corridor serving employers in Seattle as well as Google in Kirkland. Google which is a CTR affected site operates shuttles north for commuters (two in the morning and two in the evening) and south every hour between the Google offices in Kirkland and Seattle. Automatic Passenger Count data from the Spring of 2016 suggests that nearly half of the bus volumes board and alight at the South Kirkland Park-and-Ride.

Bicycle use within the study area has also increased. This could in part be due to the opening of the interim trail in 2015, and increasing overall bicycle demand. Automatic bicycle counters were installed along the corridor and counts of pedestrian and bicycles are shown in **Figure 8**.

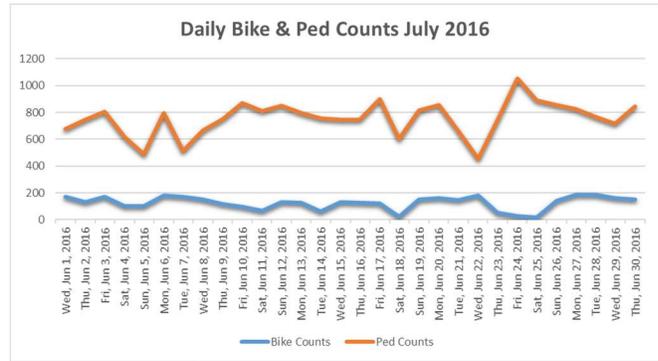


Figure 8 - July 2016 Ped & Bike Counts

Parking utilization counts were collected on a weekday and indicated parking was adequate with less than 50 percent of available spaces occupied (or utilized) on street and less than 80 percent (utilized) in the retail areas with the larger market lots under 60 percent. These are shown in **Figure 10**.



Figure 10 - Parking Utilization

Collision and Safety

Collision data from the City were evaluated for the period from 2012 through 2015.

Figure 11 provides a summary of collisions along the corridor. Over the last three years there were 97 collisions on



6th Street / 108th Avenue between Central Way/ NE 85th and the southern City Limits. Of these 6 (or 6 percent) involved pedestrians and 2 (or 2 percent) involved bicycles. On NE 68th Street between Lakeview Drive and I-405 there were 46 collisions of which 1 involved a pedestrian (or 2 percent) and 2 involved bicycles (or 4 percent). One of the pedestrian related collisions occurred in the NE 68th Street mid-block area noted for high number of conflict points including a mid-block crosswalk. Of the 23 collisions at the intersection of NE 68th Street/108th Avenue NE 4 collisions involved bicycles or pedestrians. Also at this intersection, 10 collisions or almost half were rear ends, typically associated with congestion.

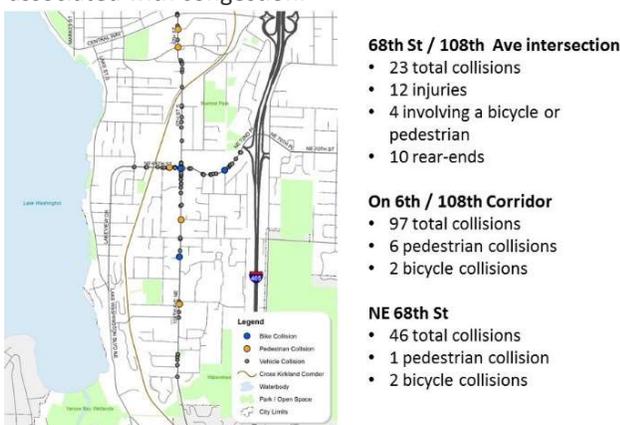


Figure 11 - Safety Data Collection

Other data and information used for the corridor study included information and forecasted growth from the Comprehensive Plan travel demand model, Inrix fused data of vehicle speeds, and vehicle origin-destination data from StreetLight.

Comprehensive Plan Context

The Transportation Master Plan provides an overview of existing conditions and transportation facilities and identifies a future transportation system to address growth.

The TMP defines a hierarchy of the roadway network that prioritizes movement of vehicles in contrast to access. It also identifies facilities emphasizing other modes.

The general study area is shown in **Figure 1**. The Functional Classification of Streets within the Transportation Master Plan (TMP) defines the following classifications within the study area:

State Routes

- I-405 – Interstate

Principal Arterial

- Lake Washington Boulevard
- NE 85th Street/Central Way

Minor Arterial

- 6th Street S
- 108th Avenue NE
- Lakeview Drive
- NE 68th Street/NE 70th Street
- Kirkland Way

Collector

- 9th Avenue S
- 8th Street S
- NE 52nd Street
- NE 53rd Street

The TMP also includes the CKC as a regional trail with an existing interim trail. It is envisioned to serve as a multimodal transportation corridor connecting with other segments of the Eastside Rail Corridor. The CKC Master Plan defines objectives for the corridor potentially incorporating high capacity transit. The TMP and CKC Master Plan define existing and planned locations for access to the CKC

The Bicycle Network also includes the CKC. An important missing link connection between the CKC and the SR 520 bike lanes is being constructed along Northup Way in Bellevue.

To support bicycling in the city the TMP defines a Bicycle Network noting existing bike lanes, recommended bike lanes and recommended greenways. Greenways are lower volume, lower speed roadways that may be more ideal for bicycling for the broader community including those that are not as comfortable biking. A list of each type of facility in the study area is listed below:

Existing Bike Lanes

- 6th Street S
- 108th Avenue NE
- Lake Washington Boulevard
- Lakeview Drive
- NE 68th Street/NE 70th Street
- Kirkland Way (West of 6th Street)
- Central Way (westbound)

Recommended Bike Lanes

- NE 85th Street/Central Way (eastbound)
- Kirkland Way (East of 6th Street)

Recommended Greenways

- NE 60th Street
- NE 52nd Street
- NE 53rd Street

The TMP defines a Transit Network including a Primary Transit Network, Secondary Transit Network and Other Services. Within the Study area, these routes are classified as part of the Transit Network:

Primary Transit Network

- 6th Street S
- 108th Avenue NE
- NE 8th Street/Central Way
- Kirkland Way
- NE 70th Street (East of 108th Avenue NE)

Secondary Transit Network

- 3rd Street
- Lake Street S
- NE 68th Street (State Street to 108th Avenue NE)

Other Services

- Lakeview Drive
- Lake Washington Boulevard

Parking

Parking issues were identified by community members including the neighborhood community organizations. Parking was defined as an issue specifically in four areas:

- Parking at the retail center was described as over capacity with parking spilling over to the streets.
- People complained that on street spaces are used for retail employees.
- Neighbors complained of people parking on neighborhood streets to access transit (due to crowding at the park-and-ride)
- Neighbors complained of people parking on neighborhood streets to access office jobs.

Parking utilization surveys were collected in various areas and the neighborhood center but as noted in **Figure 10** did not suggest parking was over capacity.

Public Outreach

The City of Kirkland encourages broad and creative opportunities to reach out broadly to the community. The outreach for this corridor study also covered the Houghton Everest Neighborhood Center land use study including creating a study identity through branding. Outreach for this effort consisted of the following:

- Key stakeholder interviews with neighborhood community organizations
- Outreach at events like the community picnics (see image)
- Providing information to businesses
- A broad public survey including outreach at fairs, neighborhood meetings and through City media.
- Outreach with transportation partners including Metro and City of Bellevue
- A community workshop that defined issues, key values and potential solutions in Nov 2016

- Signs were placed throughout the corridor with information and updates (see right)

- Staff workshops to garner ideas

- Review and guidance by the Transportation Commission, Planning Commission and Council

Results of the survey, prior to the Community Workshop were summarized in a survey report (see Appendix C). They suggested that the community



was most interested in addressing and “fixing” regional congestion but not expanding the corridor. There was interest in creating livable and walkable community solutions, specifically to address pedestrian needs.

Observations and Issues Summary

Review of the corridor through data collection and outreach helped frame the overall issues within the 6th Street S / 108th Avenue Corridor as follows:

Regional Traffic During Peak Periods Dramatically Impacts the City and Neighborhood

Peak period/peak direction congestion is a growing problem that is influenced by regional congestion and exacerbated by the lack of a connected grid network. The corridor is constrained by its current capacity specifically during the PM peak period. Long queues and congestion increases travel times, blocks access to neighborhoods and impacts emergency response times.

Because roadway widening is not considered to be feasible for addressing peak period congestion, **moving more people on regional transit connections is important.** More cars could be removed from the corridor if more people stayed on the bus north of the South Kirkland Park-and-



The CKC and 6thSt / 108th Ave are parallel transportation corridors

Ride to get to their homes. For example, moving transit more efficiently to improve speed and reliability is a priority.

The CKC, with the interim trail, is an underutilized regional transportation asset. There are substantial obstacles for expanding the CKC as a transportation corridor including cost and the community resistance to changes.

Protecting the accessibility and enhancing connectivity of the neighborhoods is key to preserving livability of the community.

Arterials adjacent to the retail center have poorly defined and managed access/driveways that contribute to congestion and increase conflict-points, particularly with pedestrians.

There is very **high interest by the community to improve the walkability of the area**, especially for walking school children. The TMP does not identify large gaps in sidewalks in this area. But this does suggest the desire for improved protected pedestrian connections, protected cross-walks, wider sidewalks, fewer conflicts and removal of barriers, and safety enhancements for bicycling.

Facilities like the CKC promotes bicycle use on the trail as well as connected facilities including the S. Kirkland Park-and-Ride. Most arterials include bike lanes; however, lanes don't extend through signal controlled intersections.

Parking data does not suggest parking is currently a problem on-street or in the retail center; however, **improving education and management related to parking could improve understanding** and reduce conflicts

While cut-through traffic was noted from the public, data fused from vehicles using the area (Streetlight) suggested very low use of these routes.

GROWTH AND CHANGES

This section describes growth and future conditions within the identified study area. This includes the adjacent roadway network, planned improvements, and future traffic volumes, traffic operations, traffic safety, non-motorized facilities, and transit.

Forecasted Growth

The City's Comprehensive Plan and Transportation Master Plan imagines a future horizon year of 2035 guided by the vision of a walkable, vibrant, livable, connected, and green community. The Puget Sound Region is experiencing tremendous growth. Between 2010 and 2040 the region's population will increase by 35 percent and employment will increase by 57 percent. Within the City of Kirkland, population is anticipated to grow by 13 percent and employment doubling by growing over 117 percent between the years 2010 and 2035.

Planned and Programmed Improvements



This study defined data collection and methods in the Appendix A. Specifically, it defined a future design horizon year

of 2035 that aligns with the Comprehensive and Transportation Master Plan. Improvements are identified and planned in the corridor including future traffic signals at the intersections of 9th Avenue at 6th Street S, Kirkland Way at 6th Street S, and NE 53rd Street at 108th Avenue NE. Other infrastructure improvements in the area include completion of the SR 520 Bridge Replacement and modifications in transit service assumed to be in place with regional investments identified and assumed to be in place by 2035 from the Sound Transit 2 and 3 plans. Most notably these include extension of Light Rail to Bellevue, Overlake and downtown Redmond by 2024 and BRT on I-405. The transit service, largely provided by King County Metro is defined in the 2025 METRO CONNECTS service plan that identifies RapidRide Service through Kirkland.

While the CKC Master Plan includes expansion with a fully developed regional trail and some form of

high capacity transit, there is no current funding identified that would advance these plans. It was assumed in the future that the Interim trail remained in place as a base case. Additionally, King County has developed the Eastside Rail Corridor Master Plan, of which the CKC is a central segment. The County will continue to develop trail segments as funding becomes available.

Land use changes will be consistent with the Comprehensive Plans for Kirkland; however, this study will also address potential land use options related to the Houghton Everest Neighborhood Center. This analysis is provided in the last section of this report. Within this Comprehensive Land Use significant development includes completion of the Kirkland Urban mixed-use development, and infill residential and office developments. The large Totem Lake re-development is underway in the north half of the City, outside the study area. Northwest University has also proposed a Master Plan for their Campus along the corridor. This 20-year Master Plan is not approved and is still in review so was, therefore, not included in the development baseline future development. It identifies expansions with a net new number of parking spaces of up to 350.

Land Use in Houghton Everest Neighborhood

As part of the corridor study the analysis will also be applied to an area within the corridor to assess potential land use changes in the Houghton Everest Neighborhood Center. These land use changes, above those proposed in the Comprehensive Plan and Transportation Master Plan slightly increase travel demand on the corridor.

The neighborhood center area is shown in **Figure 18** and analyzed in the last section of this report.

The full memo analysis is provided in Appendix E.

Traffic Volumes

Comparative PM peak hour growth on the 6th Street/ 108th Avenue NE corridor is provided in Figure 12. Constraints on the corridor capacity result in limited growth on the corridor with the most notable peak hour growth on Northup Way.



Bicycle and Pedestrian Changes

Future expansion of regional trails includes implementing elements of the Eastside Rail Corridor (ERC) and completion of the SR 520 Bridge Replacement with a bike and pedestrian trail connection across Lake Washington to University of Washington.



Transit Service Changes

One of the most dramatic changes that may occur in the region is the investment in transit infrastructure and service. Sound Transit long range plans ST2 and ST 3 are funded regional transit expansions. In Kirkland, investments include the I-405 and SR 522 Bus Rapid Transit System, and Light Rail expansions to Redmond, Federal Way, and Lynnwood which will be in place by 2035. Beyond the 6th Street Corridor Study Plan year of 2035, the ST 3 Plan includes extension of light rail between Issaquah and the South Kirkland Park and Ride as well as High Capacity Transit studies along the CKC/ERC and SR 520.

METRO CONNECTS is a long-range vision of service for the years 2025 and 2040 to meet future transit needs in King County and to integrate with planned and programmed light rail as it expands throughout the region. In Kirkland, METRO CONNECTS includes expansion of RapidRide with frequent service connections for Kirkland from Kingsgate to Eastgate by way of Downtown Bellevue. METRO CONNECTS will require additional resources beyond current King County Metro revenue sources to implement. As such, the service network depicted does not represent a revenue-backed service plan, and refinements to this vision through plan updates and service processes are expected.



Capital Improvements

Recent improvements in the corridor have included new sidewalks on the west side of 6th Street south of 5th Place to provide an important missing link, and on-street parking. Capital infrastructure investments that are planned or programmed for the corridor include installation of traffic signals at three locations (6th

Street S at Kirkland Way, 6th Street S at 9th Avenue S, and 108th Avenue NE at NE 53rd Street), a left-turn pocket on Kirkland Way to Railroad Avenue and ITS improvements throughout the City. King County Metro has also discussed the potential need to provide traffic signals at the entrance to the South Kirkland Park-and-Ride on 108th Avenue. These new signals will reduce signal spacing along the corridor (currently there are 2 signal controlled intersections and in the future, there could be 5). With increased signals, it will be important to coordinate the signals to make sure they are optimized and efficient.

Regional improvements to be completed in the corridor include completion of the SR 520 Bridge Replacement and eventual completion of the I-405 Corridor Master Plan.

As noted in the last section of this report, with development and land use changes in the Houghton Everest Neighborhood Center there are opportunities for infrastructure investments as part of development approvals. These improvements include but are not limited to:

- Consolidate or close driveways to better manage access as parcels develop
- Combine parcels and improve internal site circulation to help better manage traffic
- Contribute right-of-way to consolidate driveways, widen sidewalks, remove mid-block crosswalks, provide medians to better manage access.
- Install a traffic signal or other traffic control that accommodates safe signal controlled pedestrian access on NE 68th Street at 106th Avenue.
- Combine parcels and improve internal site circulation

Emerging Trends

The way transportation and mobility is delivered in the United States is destined to change dramatically due to new trends and technologies. These emerging trends may modify future transportation in ways that are currently not fully understood. These trends and technologies are described below:

Changing travel behavior – Changing travel behavior among millennials (defined as those reaching adulthood in the early 21st century) suggests this generation may be choosing alternatives to driving alone for travel. A study by the University of Michigan Transportation Research Institute indicates that driver licensing for teens and young adults is declining. For example, the number of 19-year-olds with drivers' licenses dropped from 87% in 1983 to 69% today.¹ Availability of a range of travel choices will support this trend.

Smart Signal Technology – Traffic signal operations and control are being improved through better real-time information, data fusion that improves understanding of travel patterns, and improved operations of traffic signals to better respond to actual traffic patterns and vehicle types. The City of Kirkland has developed an Intelligent Transportation System strategy and owns, manages, and operates traffic signals around the City. The City is implementing ITS with traffic signals throughout the city to reduce delays and meet other objectives.

Shared-Use Mobility and Auto Transportation Network Companies – While rideshare programs through transportation network companies (TNCs) like Lyft and Uber and carshare programs like Car2Go, Zipcar, and ReachNow are popular and gaining in popularity, there are limited data related to these programs' impact or effectiveness in reducing drive-alone behavior. Ride hail services like Lyft and Uber are currently available in the City of Kirkland to enhance mobility.

Bike Share – A cycle-share program, Pronto, was implemented in the City of Seattle in 2015 with mixed success. The program, which included memberships for short- and long-term bicycle rental, ended in March 2017. The future of bikeshare is uncertain; however, there is on-going interest in developing bikeshare programs in the future as the technology improves. Funding has been identified in the Connecting Washington Partners program for additional bike share. A bike share program could be expanded with development of other bike and trail investments such as the CKC an Eastside Rail Corridor.

Autonomous and Semi-Autonomous Vehicles

There are projections that in the next 20 years, autonomous vehicles may broadly replace the automobile fleet. Semi- autonomous vehicles are already on the market, assisting drivers and helping avoid crashes. In the future, these vehicles could be completely autonomous and potentially reduce congestion (vehicles are expected to operate safely with reduced distance between vehicles and potentially higher speeds). Autonomous vehicles have been proposed to operate cleanly (potentially electrically), for a variety of vehicle types—buses, trucks, and passenger vehicles—and potentially for shared use, thus further reducing the need for automobile ownership. As the technology evolves, autonomous vehicles may become part of fleets such as transit that deliver people and goods. Space may be needed to accommodate drop-offs and storage.

Summary

In the corridor, regional and localized land use will increase travel demand; however, there is limited expansion of roadway capacity. Delays and congestion are likely to increase or extend the peak period. There is significant planned increased investment in transit. This investment in transit aligns with the Comprehensive Plan vision for a more green and sustainable community. Moving transit efficiently, encouraging transit service and flexibility and maintaining investments in transit service will be important for regional mobility.

Within the corridor there are some planned changes to increase local access to the corridor through installation of traffic signals. While new signals create safe and controlled crossing of 6th Street, there could be more improvements to increase the connectedness and livability within and parallel to the corridor.

¹ <http://www.umtri.umich.edu/what-were-doing/news/more-americans-all-ages-spurning-drivers-licenses>, 2016.

Forecast Conditions

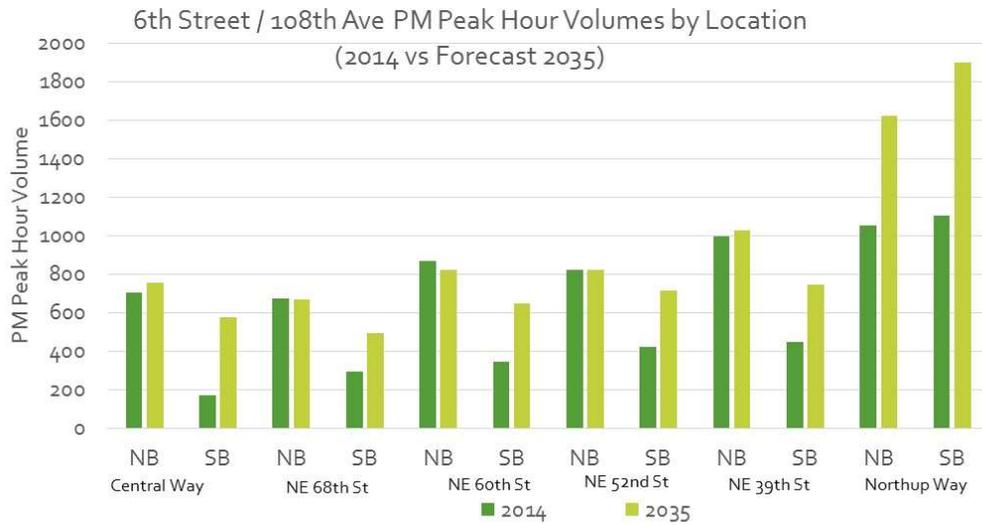


Figure 12 - 6th Street / 108th Ave Growth at Various Locations

POTENTIAL SOLUTIONS

This section describes the development of solutions to address needs in the corridor. Solutions were developed to meet needs according to community values.

Workshop Feedback

The corridor study offered numerous opportunities to provide feedback and help define potential solutions. Solutions were developed to address issues and challenges defined in the corridor context setting and review of growth.

Solutions were defined to address bottlenecks throughout the corridor, move transit more efficiently, and improve community connections for all modes.

An initial set of ideas and solutions was developed as part of the November 17, 2016 Community Workshop held at Northwest College. The workshop reviewed initial survey result (as summarized in Appendix C), and reviewed the initial baseline and future conditions. While regional congestion was identified as a major challenge, ***most constituents were opposed to widening the corridor beyond its current three lane configuration***. Community members worked in small groups to define potential solutions. The workshop also gained feedback about community values and priorities. When asked, the group agreed that the 6th Street/108th Corridor must:

- be designed to reduce congestion
- move people (not just vehicles) efficiently throughout the entire corridor (not just 6th/108th) now and into the future
- connect community and neighborhood destinations, safely

Potential Improvements

The solutions raised by community members included improvements to eliminate bottlenecks, improve transit, improve connections for pedestrians and bicycles. The initial list of improvements identified at the workshop are listed in **Table 1** on the next page and keyed to **Figure 13** in the map.

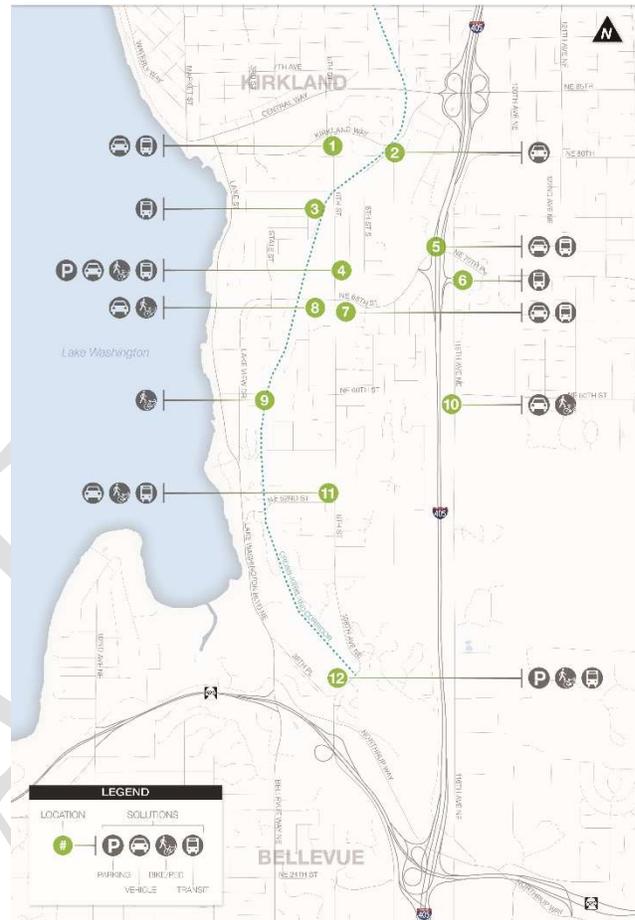


Figure 13 - Improvement Locations

Connection to Values

Solutions were evaluated for their ability to meet the values of the community specifically to address regional congestion and move people, improve the livability of the community by improving connections within and between the neighborhoods and addressing the needs of the future.

Evaluation and Feedback

Solutions were evaluated considering their effectiveness at meeting future demands, cost effectiveness, and effectiveness at connecting the community and increasing livability and overall feasibility. These solutions were further refined and adjusted to best meet values of the community.

Table 1. Recommended Corridor Improvements

Numbers	Potential Solution Ideas	Type
12A	Park-and-Ride permitting for transit users	Transit
12B	Improve Access/Egress from Park and Ride for Buses - Speed/Radar - Pavement Marking	Transit
12C	Signal control at S. Kirkland Park-and-Ride Access (City of Bellevue)	Transit
12D	Improve trail access to S. Kirkland Park-and-Ride	Transit and Bikes
11A	Signal at NE 53rd Street (proposed by Northwest University) Relocate and improve bus stop with and adjust crosswalk with Metro	Peds Transit
10A	Enhanced Vehicle Access crossing I-405 at NE 60 th Street - Grade separation of 114 th - new signal 60 th /108 th	Vehicles
10B	Enhanced pedestrian and bike access for NE 60 th Street creating a Greenway	Peds and bikes
9A	Improved trail access / connection for Bikes (at NE 60 th Street)	Bike/Ped
7A	Transit Signal Priority and queue jump (108 th Avenue NE) - Left turn lane for transit only - Overhead signs time of day - C-Curb to restrict driveways	Transit
7B	Transit Signal Priority for left turns - combines bus and lefts	Transit
6A	Access Management and Multimodal Access on NE 68 th Street and 108 th . - Median Control - Driveway Consolidation - Wider sidewalks	Roadway Vehicular Pedestrians and Bikes
6B	Access Management and Multimodal Access on NE 68 th Street and 108 th - New full access signals 500' (106 th) - Consolidate Driveways - Wider Sidewalls	Roadway Vehicular Pedestrians and Bikes
6C	Access Management NE 68 th Street - Selectively close driveways	Roadway Vehicular Pedestrians and Bikes
6D	Full Bicycle Intersection at 6 th Street /108 th Avenue NE	Pedestrians and Bikes

6E	Green Bike Boxes 6 th Street S / 108 th Avenue NE	Bikes
3A	Bus Rapid Transit on CKC bypass 108th to S Kirkland Park-and-Ride	Transit
3B	Bus Intersection with queue jump at 6 th Street and CKC	Transit
2A	9th and Railroad at Kirkland Way Intersection Safety - Radar Speed	Safety
1A	Transit Signal Priority northbound on 6 th Street S at Kirkland Way - Peak Hour - Left-turn lead lag	Transit
1B	Signal Coordination (Intelligent Transportation System) along S 6th Street between Central Way and Kirkland Way	Operations
6A	Lease for Houghton Park-and-Ride for private shuttles	Transit
5A	Improve expand 70th Overpass to widen and rechannelize	Vehicular
5B	Bus Rapid Transit Planning near 70th with Park-and-Ride	Transit
P1	Residential Parking Zones to eliminate casual and long-term parking by retail employees	Parking
P2	On-Street parking time limits or management to reduce park-and-ride	Transit / Parking
E1	Education campaign on the value of transit in Kirkland's Mobility Future	
E2	Monitor person movement speed/efficiency	Transit Vehicles
E3	Greenway promotion of 60th and other connections	Peds and Bikes

CORRIDOR IMPROVEMENTS

Through community and City feedback solutions were further refined and adjusted. Some more complex ideas were developed further and are summarized in Appendix F as project pages

Capital Improvements

This list of recommended corridor improvements builds on feedback through stakeholder outreach to the community and public, an evaluation of data from a wide range of sources, a workshop with City staff, and reviews by the Transportation Commission and Council. The resulting solutions that were agreed to are listed below and are also shown as part of modal (transit, bike and pedestrian) and total transportation systems on the following maps. These solutions were evaluated against values defined by the community. More details of this effort are provided in Appendix D. *Improvements listed improve regional mobility through transit enhancements that move people and improve community connections through new and improved connections for pedestrians and bicycles that enhance livability.*

Potential Solutions

Through stakeholder outreach and understanding of data and analysis, a set of solutions was developed and shown below in **Table 2**. These investments are located throughout the corridor as shown in the following system maps. This list of solutions is intended to be practical and achievable and emphasizes community interest. Solutions were identified to promote use of transit as a way to increase the capacity of this corridor, better connect the community especially for pedestrians and bicyclists and improve/enhance safety through better management of access, specifically in the neighborhood center.

Evaluation and Values

Values were discussed with the public at the community workshop meeting and were used to evaluate solutions. These values emphasize movement of people, better connection of the community and considering capacity for the future. Appendix D provides a summary of a draft

evaluation of solutions with recommendations on solutions to be carried forward and for discussion with the Transportation Commission.

Policies

Two policy/strategies were recommended.

Parking management strategies (shared parking and joint parking) to maximize use. Look for opportunities for shared parking where parking is available for example at Seventh Day Adventist Church where parking is generally used only on the weekends. A suggested example included shared parking of church for market employees.

Trail oriented development which includes development of land use and regulatory policies that support lower parking use through access to regional trails. This includes promotion and prioritization of shared use mobility strategies – Car share (car to go), bike share and Transportation Networking Companies (TNCs)

Education

Three education strategies were recommended including:

Developing a campaign to help convey the value of transit in moving people in Kirkland.

Consider performance monitoring and develop a performance monitoring system and promote the results to educate the value and benefits of transit in moving people. Develop performance measures, such as person travel times.

Education campaign to promote the use and benefits of the Greenways program including working with neighborhoods, schools, and youth organizations to promote the connectivity and benefits of Greenways using maps, brochures, school education program and other promotions

Next Steps

Implementation of these recommended corridor solutions requires additional design, cost estimates, an assessment of right-of-way needs or other impacts, and outreach to communities with environmental review. Coordination with agency partners would be required for transit investments and investments affecting state facilities.

Table 2. Recommended Corridor Improvements

Num bers	Solution Ideas	Type	Description
1. 6th Street at Kirkland Way			
1A	Transit Signal Priority Northbound - Peak Hour - Left turn lead lag	Transit	The City is in the process of designing and implementing traffic signals at the intersection of 6th Street and Kirkland Way. Metro’s heavily used route 255 turns northbound left at this intersection and eastbound right. Transit signal priority at this intersection for the Northbound Lefts could provide a short travel time advantage for transit.
1B	Signal Coordination along 6th Street with future increased demand	Vehicles	To better and more efficiently travel along the 6th Street corridor between Central Way and Kirkland Way. Interconnecting the signals (including the signal at 4th) could improve the efficiency, reduce stops and delays.
1C	Crosswalk improvements	Ped	To improve access across 6th Street for pedestrians, put in place Rectangular Reflecting Flashing Beacon crossing.
2. 9th and Railroad Avenue			
2A	9th and Railroad at Kirkland Way Intersection Safety - Radar Speed - Left turn lane	Vehicles	A safety concern for neighborhoods include sight distance near the existing CKC trestle over Kirkland Way at Railroad Avenue and 9th Street. Radar speed signs may help reduce speeds and improve safety for accessing Kirkland Way. There may be the opportunity to add a westbound left turn pocket at railroad Avenue to improve turning movements.
3. CKC for Transit			
3A	BRT on CKC bypass 108th to S Kirkland Park-and-Ride	Transit	To reduce transit delays incurred on 6th Street and 108th Avenue, especially northbound during PM peak periods, constructing transit lanes within the CKC, similar to the Master Plan. Transit on the CKC, especially in this segment could still connect to local neighborhoods but would dramatically increase overall transit travel times. Construction of this facility would be very expensive including structures over NE 68th Street and development of stations/stop, and take years to implement.
3B	Bus Intersection at 6th Street and the CKC	Transit	Transit signal priority at the CKC trail intersection on 6th Street. This would require a new signal, removal of on-street parking, and existing crosswalk with a signal controlled crossing to give transit a bypass to northbound queues that can be over 200 feet long.

Table 2. Recommended Corridor Improvements

Num bers	Solution Ideas	Type	Description
4. 6th Street at 9th Avenue S			
4A	Re-Assess the installation of traffic signals at 6th Street and 9th	Vehicles / Peds / Bikes / Transit	The City is in the process of designing and constructing a new traffic signal at the intersection of 6th Street and 9th. This signal could provide a shortcut for cut through traffic and may impact the adjacent intersection at NE 68th Street and 108th Avenue. This signal could support redevelopment of adjacent land uses. Deferral and delay of this signal might be helpful as a consideration of future development and rezone consideration.
5. 70th Street over I-405			
5A	Improve expand 70th Overpass	Vehicular	The existing NE 70th Street Corridor and structure over I-405 is curved, steep and constrained. Better organization and improvements in this corridor, could provide better and protected space for pedestrians and add space for cyclists which does not exist today. There is also a need to improve operations and access for transit and reduce delay for vehicles in the vicinity of I-405.
5B	BRT Planning near 85th/70th and Park-and-Ride	Transit	Passage of ST 3 includes development of Bus Rapid Transit on I-405 and potential station development within the freeway right of way near 85th. City transit planning would support coordination and integration with the local street system to most effectively connect these new stations to the local communities and other transit sources.
6. Houghton Park and Ride			
6A	Houghton Park-and-Ride lease for private shuttles	Transit	Private shuttles are operating in Kirkland for large employers including Google, Microsoft Connector and most recently Facebook and Amazon. Parking for employees meeting the shuttles currently use the S Kirkland Park and ride and other leased space. With underutilization at the Houghton (7th) park and ride, this space could be leased to these private shuttle operators leaving spaces in South Kirkland Park-and-Ride to meet Public transit demands.
7. 108th Avenue at NE 68th Street			
7C	Continue and complete bike lanes	Bikes	Complete the bike lanes along 108th Avenue NE where missing.

Table 2. Recommended Corridor Improvements

Num bers	Solution Ideas	Type	Description
7D	Install “Don’t Block the Box’ pavement markings at Fire Station Driveway	Vehicles	Install pavement markings that keep the fire station driveway clear of vehicle queues. (Will be included in the City Annual Striping Program)
7E	Widen to provide curbside Northbound Transit only lanes	Transit	Widen 108th Avenue to create an extensive Northbound through lanes for transit to bypass queues. May be adjacent to a bike lane and conflict with high volume of right turns at NE 68th Street
8. NE 68th Street at 108th Avenue NE (Access)			
8A	Access Management and Multimodal Access on NE 68th Street and 108th. <ul style="list-style-type: none"> - Median Control - Driveway Consolidation - Wider sidewalks - remove crosswalks - on street parallel parking 	Vehicles / Peds / Bikes	Closely spaced driveways and intersections, bike lanes, as well as crosswalks on NE 68th Street results in numerous conflict points between vehicles, pedestrians and bicycles. Access management strategies can include closing or consolidating driveways, using medians to separate conflicting movements and reorganizing development sites to better circulate and organize traffic off arterial streets. An initial set of strategies could include consolidation of driveways on NE 68th Street, removal of crosswalks, medians for the left turn pocket and wider sidewalks. A new traffic signal at 106 th Avenue and NE 68 th Street could help consolidate and improve safety at crosswalks and improve access. With redevelopment of the adjacent land uses this option includes widening sidewalks, extending bike lanes and adding on street parking.
8B	Access Management and Multimodal Access on NE 68th Street and 108th <ul style="list-style-type: none"> - New full access signals 500’ (106th) - Consolidate Driveways - Wider Sidewalks 	Vehicles / Peds / Bikes	Similar to 8A and includes installation of new full access traffic signals (for example at 106th Avenue to provide fully controlled access with pedestrian crossings. This would rely on redevelopment of adjacent land uses including improved circulation on-sites (off street).
8C	Access Management- Selectively close driveways	Vehicles / Peds / Bikes	Like 8A but without any redevelopment or widening, there could be some access management strategies implemented including closing or consolidating driveways and potentially removing the pedestrian crossing.

Table 2. Recommended Corridor Improvements

Num bers	Solution Ideas	Type	Description
8D	Full Bicycle Intersection at 6th/108th	Peds / Bikes	Bicycle lanes are provided on NE 68th Street and 108th Avenue and bicycle use is growing; however, these bicycle lanes do not continue through the intersection of 108th Avenue NE at NE 68th Street. One way to do this would be to create a bicycle intersection that extends bike lanes and protects bike movements. This type of intersection can also promote pedestrian safety with ped bulbs making pedestrians more visible.
8E	Green Bike Boxes	Bikes	Like 8D, Green Bike Boxes could enhance bike visibility by placing a painted green bike at the front of vehicle queues. This may require widening.
9. CKC Connectivity			
9A	Improved trail access and connection for Bikes	Peds / Bikes	As part of the Interim Trail development of the CKC, the City has developed key connections to the local street system from the trail to neighborhoods. Continuing to enhance some of these facilities as better bike connections would be desirable, for example where the NE 60th Street Corridor connects with the CKC.
10. NE 60th Street Connections			
10A	Enhanced ped and bike access for 60th Neighborhood Greenway	Peds / Bikes	The City of Kirkland Transportation Master Plan includes designation of a system of Neighborhood Greenways. These greenways promote safe, low volume, slow speed roadways to promote use by pedestrians and bicycles. One of these connections is NE 60th Street. This connection could be enhanced and promoted to reduce bicycle conflicts on arterial streets and promote places for less confident bike riders. NE 60th Street as a greenway can be a key connection across I-405 connecting Lake Washington Boulevard to Overlake.
11. Signal at NE 53rd (access to NU)			
11A	Signal at 53rd (proposed by Northwest University) Relocate and improve bus stop. Coordinate and adjust crosswalk with Metro	Peds / Transit	As part of expansion and permitting for new development at Northwest University, the University has proposed installation of a traffic signal on 108th Avenue at NE 53rd Street. Design and development of signals at this location is complicated with an offset alignment of NE 53rd and NE 52nd Streets, a protected crosswalk, and a busy transit stop serving the University, Emerson High School and the neighborhood. Installation of traffic signals would be implemented when engineering standards (per MUTCD signal warrants) are met.

Table 2. Recommended Corridor Improvements

Num bers	Solution Ideas	Type	Description
12. South Kirkland Park and Ride			
12A	Park-and-Ride permitting for transit users	Transit / Parking	The South Kirkland Park and Ride is often full. Prioritize park and ride spaces for transit riders through permitting. This could be the simplest strategy to promote transit. There will be different trade-offs.
12B	Improve Access/Egress from Park-and-Ride for Buses - Speed/Radar - Pavement Marking	Transit / Parking	Improve site operations by improving egress from the Park-and-Ride for buses. Metro has studied this and are working with the Cities. A potential solution includes using speed radar and pavement markings to improve sight distance for exiting buses.
12C	New signal control access Park-and-Ride Access (City of Bellevue)	Transit / Parking	As congestion increases and it becomes increasingly challenging to access the Park-and-Ride on 108th Avenue, traffic signals should be considered at the access. This signal would be within the jurisdiction of the City of Bellevue and would be most effective to be interconnected with the adjacent signals on 108th that are part of Bellevue’s adaptive signal system. Could be annexed into City of Kirkland.
12D	Improve trail access to Park-and-Ride (On hold)	Transit / Bike / Peds	The Cross Kirkland Corridor (CKC) runs adjacent to the South Kirkland Park-and-Ride, however there is a grade change and gap that limits access for bikes and peds along the Corridor to using the sidewalks and bike lane on 108th Avenue. As this volume increases, access to the adjacent park-and-ride structured garage would be desirable to more easily access transit. With the passage of Sound Transit 3, there is a planned light rail station at South Kirkland Park-and-Ride that may include amenities such as bike parking and an elevator. This connection from the CKC to the park-and-ride should be considered in the planning and development of a future rail station.
12E	Bike Share/Bike Racks at Park-and-Ride	Transit / Bikes	With the close proximity of the CKC to park-and-ride, increased use of bikes to access transit will result in the need for bike parking/racks and the potential desire for shared use bike, especially with an improved connection (12D).
12F	Park and Ride management strategies with real time information	Transit / Bikes	Advances in technology and pilot studies with Sound Transit and Metro to expand real time information on parking occupancy. There are opportunities with transit partners to look for improved management strategies. These strategies can increase efficiency of the facility for

Table 2. Recommended Corridor Improvements

Num bers	Solution Ideas	Type	Description
			moving people through strategies such as permit parking, premium/reservation parking, improved access to park-and-rides using shared use resources such as Bike Share and Car Share or Transportation Network Companies.
Policies (P) and Education (E)			
P3	Parking management strategies (shared parking and joint parking) to maximize use.	Parking	Look for opportunities for shared parking where parking is available for example at Seventh Day Adventist Church where parking is generally used on the weekends only. Example: Shared parking of church for market employees.
P4	Trail Oriented Development	Land Use	Development of land use and regulatory policies that support lower parking use through access to regional trails. Including promotion and prioritization of shared use mobility strategies – Car share (car to go), bike share and Transportation Networking Companies (TNCs)
E1	Education Campaign on the value of transit in Kirkland’s Mobility Future	Transit	Develop an education campaign to help convey the value of transit in moving people in Kirkland.
E2	Monitor person movement speed/efficiency	Transit	Develop a performance monitoring system and promote the results to educate the value and benefits of transit in moving people. Develop performance measures, such as person travel times.
E3	Greenway promotion of 60th and other connections	Peds / Bikes	Education campaign to promote the use and benefits of the Greenways program including working with neighborhoods, schools, and youth organizations to promote the connectivity and benefits of Greenways using maps, brochures, school education program and other promotions

Organizing these solutions by investment type, below are the investments that support **vehicular travel**.

- 1B. *Signal Coordination along 6th Street*
- 2A. *Kirkland Way and Railroad Ave Intersection Improvements*
- 4A. *Reassess installation of planned signal improvement at 6th Street & 9th Ave*
- 5A. *Improve and expand 70th Street Overpass*
- 7D. *Install “don’t block the box” pavement markings at Fire Station Exit on 108th*
- 8A. *Driveway consolidation around 68th St / 108th Ave businesses*
- 8C. *Reduce business access on 68th & 108th to signalized intersections and install new signal at 106th.*
- P3. *Citywide Parking Management strategies such as shared parking and joint parking use.*

Below and in **Figure 14** are the investments supporting connectivity for **pedestrians**.

- 1C. *Crosswalk Improvements at 6th Street & Kirkland Way Intersection*
- 9A. *Improve CKC trail access (also for bikes), especially at 60th St.*
- 12D. *Connect the CKC trail to the back of the S Kirkland P&R*
- P4. *Develop land use policies promoting “trail oriented development”*
- E3. *Greenway promotion of 60th Street as well as other corridors across the city.*

Below and in **Figure 15** are the investments supporting connectivity for **biking**.

- 7C. *Continue and complete Bike Network connections along 108th Ave.*
- 8D. *Full Bicycle Intersection at 68th St & 108th Ave Ne*
- 8E. *Install green bike boxes in intersection to allow safer bike left turns*
- 10A. *Designate 60th St as Neighborhood Greenway*
- 12E. *Install bike racks or bike share at S Kirkland P&R*

Finally, below and in **Figure 16** are the investments supporting regional mobility and **transit**.

- 1A. *Transit Signal Priority at 6th Street and Kirkland Way*
- 3A. *Bus Rapid Transit on the Cross Kirkland Corridor (CKC)*
- 3B. *Bus Intersection at 6th Street & CKC*
- 5B. *Houghton Park and Ride lease for Private Shuttle Use*
- 7E. *Widen 108th to provide the maximum level of queue jump & install new signal at 60th*
- 11A. *Install new signal at 53rd and relocate & improve existing bus stop*
- 12A. *Park and Ride permitting for transit users at S Kirkland Park and Ride*
- 12B. *Improve Access / Egress from S Kirkland P&R*
- 12C. *New signal controlled access to S Kirkland P&R*
- 12F. *Install real time parking occupancy at S Kirkland P&R*
- E1. *Education Campaign promoting the value of Transit in Kirkland*
- E2. *Monitor Performance (in person throughput) along 6th Street to understand need for transit investment*

The cumulative map of solutions is provided in **Figure 17**.

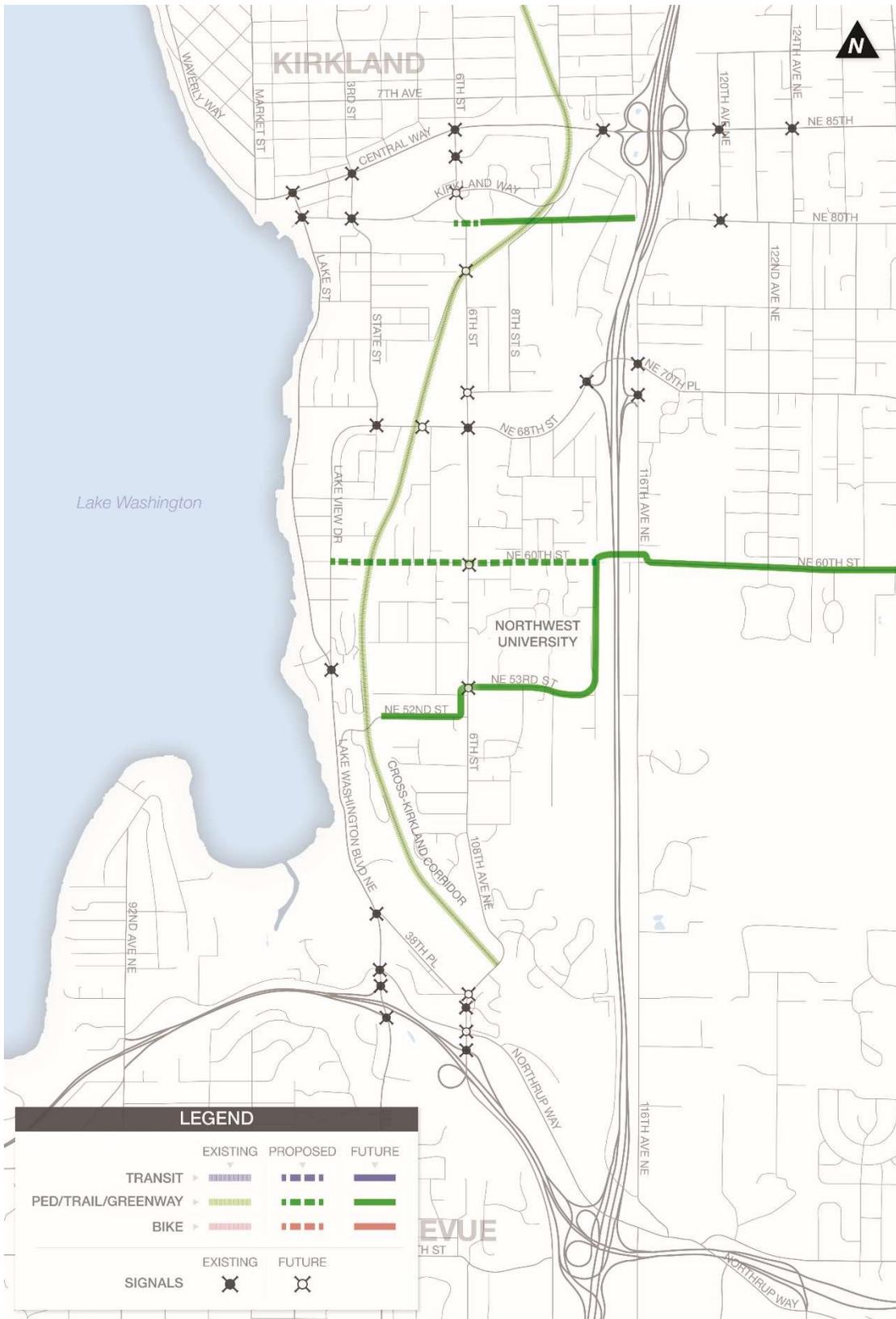


Figure 14 - Pedestrian and Trail Recommendations

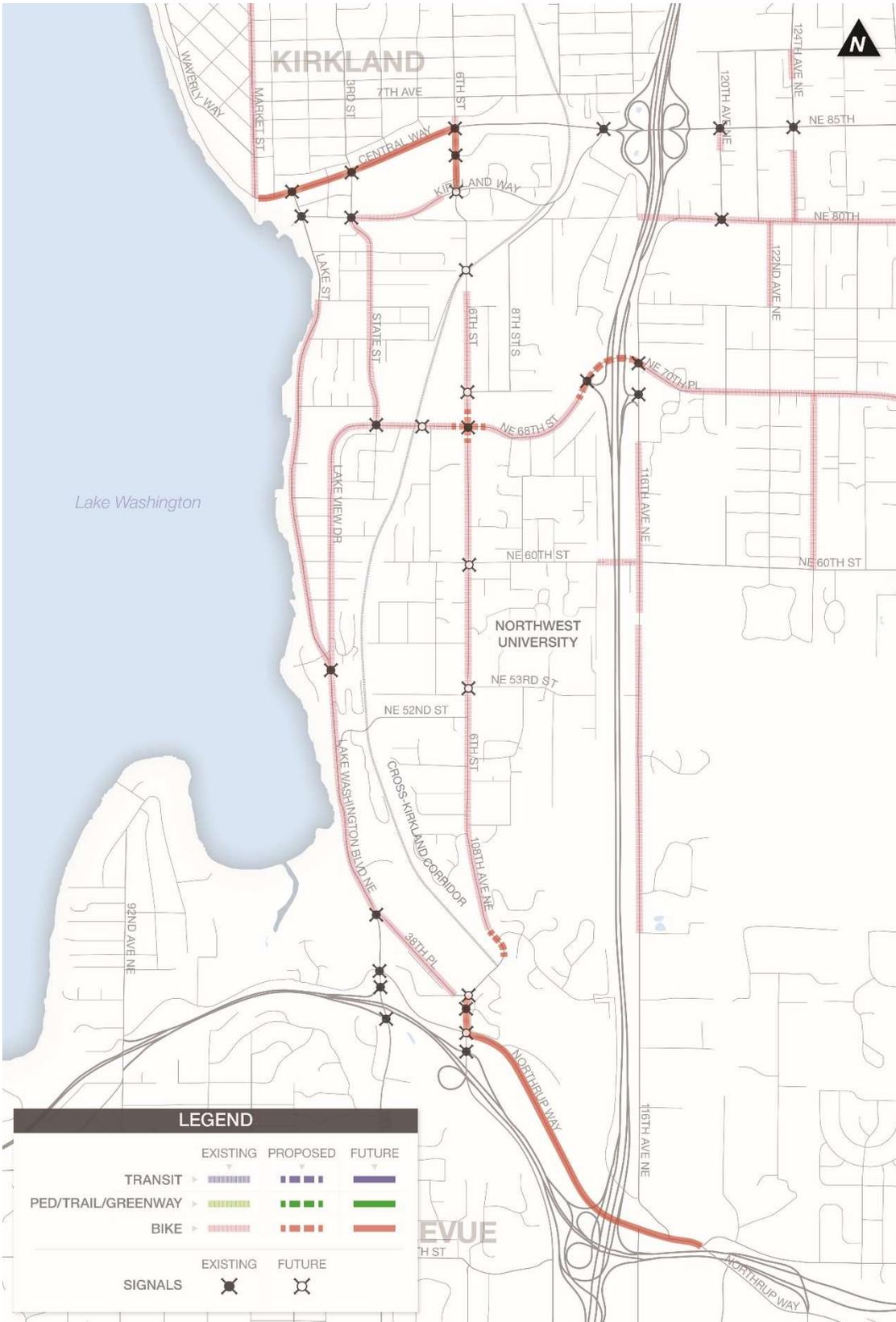


Figure 15 - Bike Recommendations

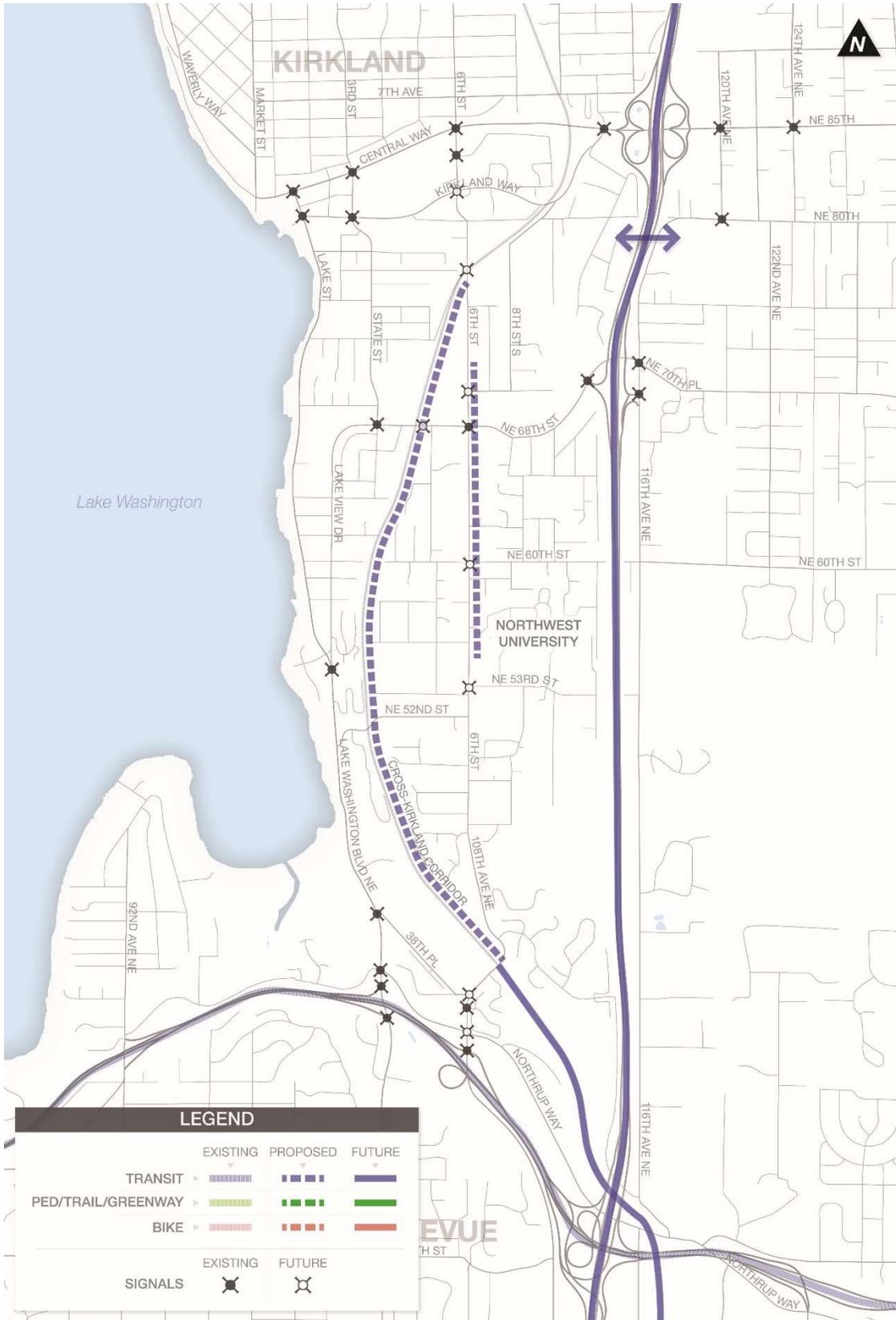


Figure 16 - Transit System Recommendations

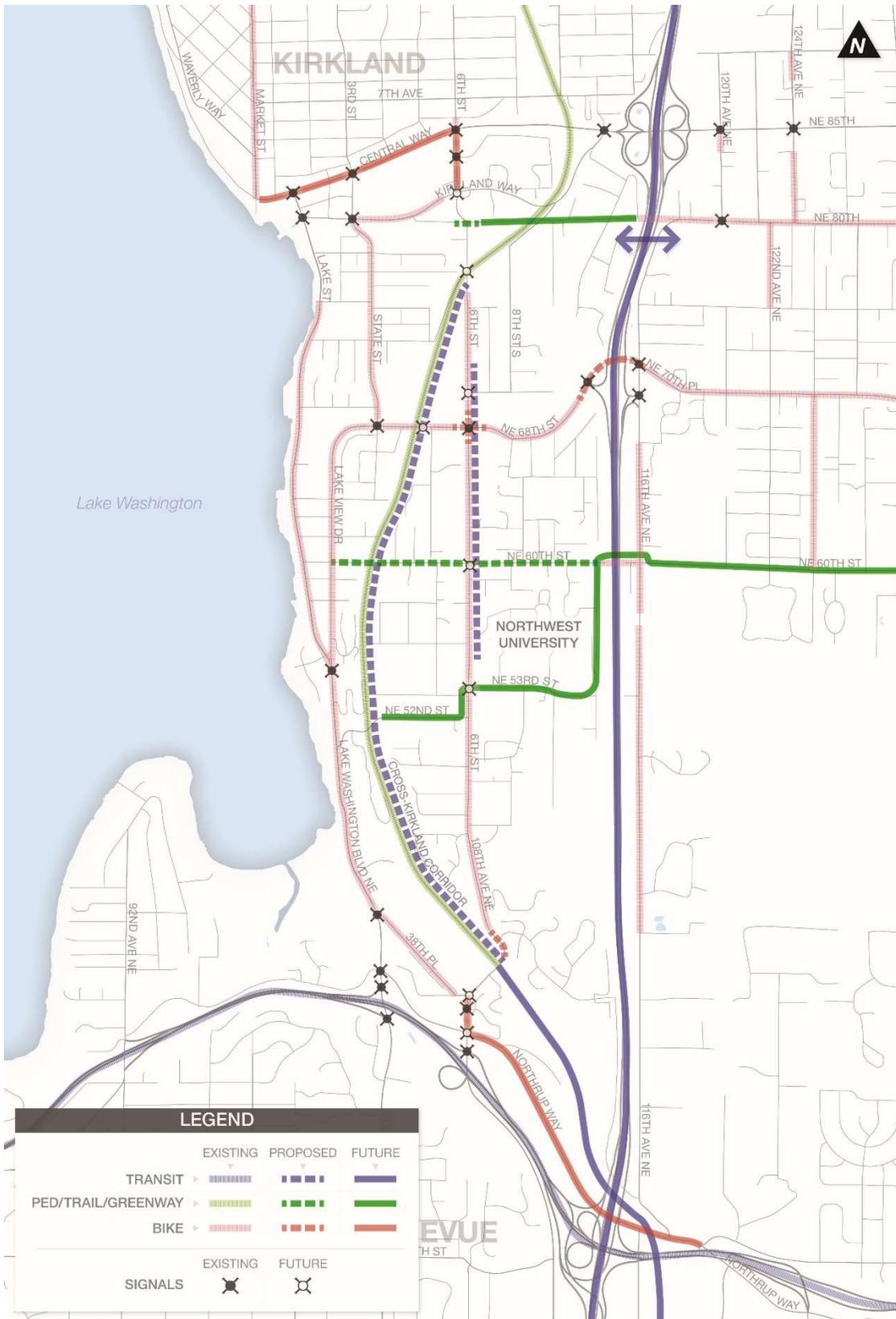


Figure 17 - Transportation System Recommendations

RELATIONSHIP TO LAND USE

HOUGHTON EVEREST NEIGHBORHOOD CENTER

This last section addresses the transportation effects of changes in land use at the Houghton Everest Neighborhood Center.

Houghton Everest Land Use

This last section of the report summarizes the baseline scenario development and potential investments against comparative growth scenarios in vehicle trips resulting from proposed land use options in the Houghton / Everest Neighborhood Center. The Houghton / Everest Neighborhood Center is located adjacent to 6th St S/108th Ave NE & NE 68th St intersection in Kirkland, WA (see **Figure 18**). As part of the Houghton / Everest Neighborhood Center and 6th Street Corridor Study, the City of Kirkland is evaluating land use alternatives for the center while evaluating transportation alternatives in the area to serve anticipated growth in vehicle, transit, pedestrian, and bicycle trips.

Two land use scenarios were studied in comparison to the current 'maximum' land use allowed under the comprehensive plan (2035 Comp Plan Scenario) with maximum height of 30 feet. The two other scenarios are: a modest development scenario with a maximum development height of 35 feet (Modest Change Scenario), and a greater development scenario with a maximum development height of 55 feet (Greater Change Scenario).

These conditions of an assumed 2035 timeframe with and without growth in the Center are also compared with potential investments in the corridor that could be in place. memo describing the trip generation and intersection level of service results is attached. This section summarizes the results and impact of different corridor investments.

Trip growth was calculated for four land use scenarios provided by BERK Consulting for the proposed development. These scenarios include existing "Existing 2016" conditions, "2035 Current

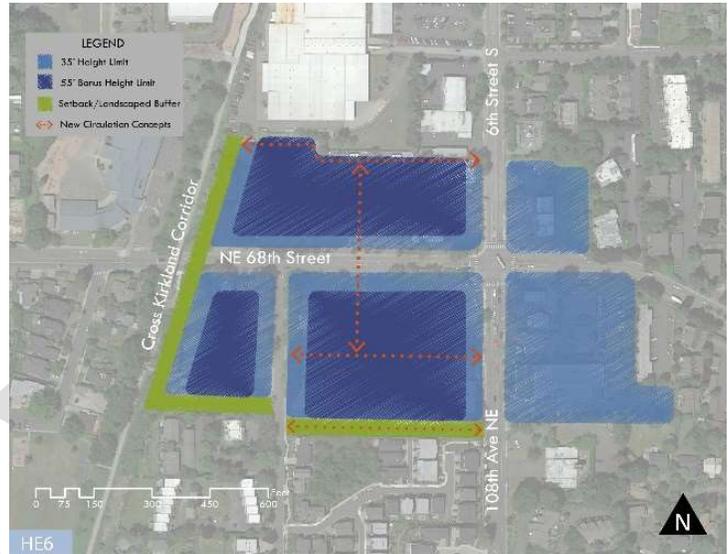


Figure 18 - Houghton Everest Neighborhood Center

Comp Plan," "2035 Modest Change," and "2035 Greater Change," which represent increases in development building height. The land uses contain a combination of apartments, office space, retail, supermarket, convenience store, and coffee shop land uses. Commercial land uses are consistent between the "Comp Plan," "Modest," and "Greater" scenarios, with the difference being the number of total residential dwelling units. Land use by scenario is shown in **Table 3** and reflects changes in the number of dwelling units. These are assumed to be multi-family housing above ground level office and retail.

Table 3. Land Use Comparison

Use	Existing	Comp Plan	Modest Change (35')	Greater Change (55')
Residential (Dwelling Units)	39	360	574	862
Retail (Square Feet)	105,092	113,480	113,480	113,480
Office (Square Feet)	73,150	122,476	122,476	122,476

Trip generation was calculated for the PM peak hour and Daily for each of the development scenarios using the ITE Trip Generation manual assuming the different land use types. As noted in the graphs below in **Figure 19** and **Figure 20**, trips for the daily and PM peak are highest with the Greater Change scenario with the least trips for existing conditions.

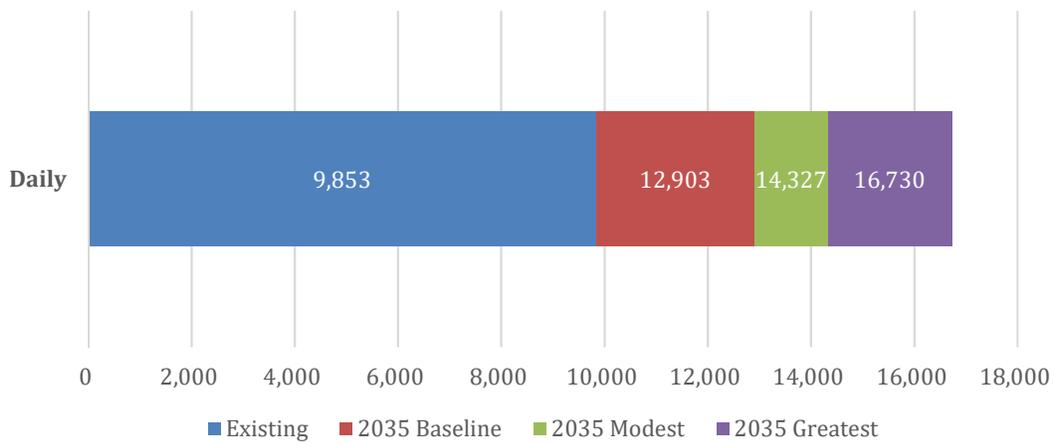


Figure 19 - Daily Trips to/from Development

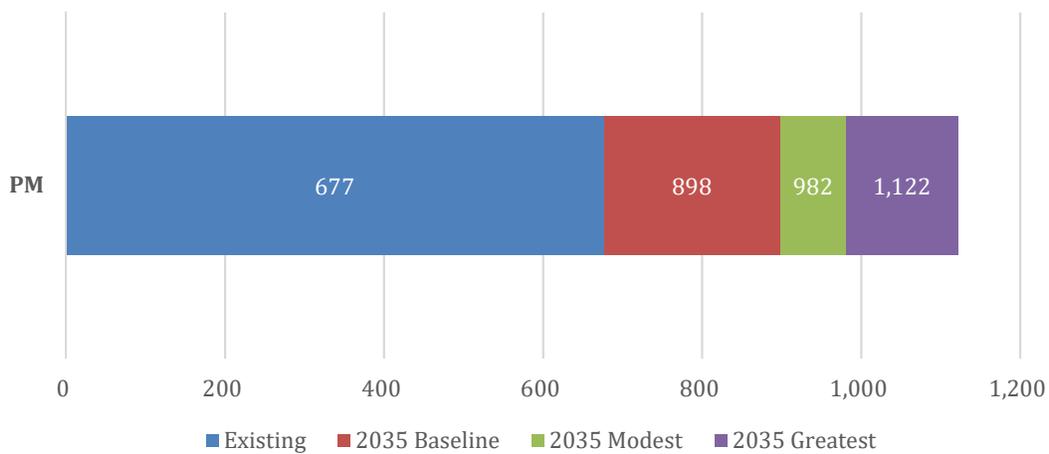


Figure 20 - PM Peak Trips to/from Development

Development Impact

In order to understand the relative impact of the trip generated by the development scenarios as compared to the future Comprehensive Plan, impacts of these development scenarios were analyzed assuming future infrastructure investments along the 6th / 108th corridor. A portion of the trips were distributed from future development on to existing operations. It is important to note not all development related trips use this central intersection as other routes are available for trips. It should also be noted that the baseline growth in 2035 assumes development on the site consistent with what is currently approved in the comprehensive plan.

Table 4 compares intersection operations at NE 68th Street & 108th Avenue for Existing, Baseline 2035, Modest Development Scenario and Greatest Development Scenario. Existing intersection level of service is at LOS E, which will grow to LOS F in the future baseline scenario. Future development will further increase the average delay per vehicle to well beyond reasonable intersection operations in all future cases. The Greater Change development assumes an added southbound right turn lane. This could be added to the intersection in any scenario that assumes redevelopment of the Northwest Corner parcel, as right of way is needed for this lane.

Table 4. Operations NE 68th Street /108th Intersection

Scenario	Level of Service	Average Delay in seconds per vehicle	Worst Movement	Total Entering Vehicles
<i>Existing – 2016</i>	E	62	SB	2,520
<i>Baseline – 2035</i>	F	142	SB	3,855
<i>Modest - 2035</i>	F	148	SB	3,920
<i>Greater Change Development - 2035</i>	F	119*	SB	4,025

Notes: * Assumes added southbound right turn lane as part of Greater Change option

It is expected that new development in the Houghton Everest Neighborhood Center would also provide an opportunity to improve NE 68th Street Corridor which currently has many conflicting movements and poorly controlled

access points. As part of the corridor study improving access to reduce conflicts was studied. Without any major changes or new development, the most that could be done would be to install medians, close driveways and reduce crosswalks. It was assumed that with the “Greater Change” option, additional roadway right of way (up to 80 feet) could be dedicated and would accommodate extending full bike lanes, adding a median, wider sidewalk and closing driveways while adding a new signal at 106th Avenue NE. A southbound right-turn lane is also assumed as part of the redevelopment in the “Greater Change” option and is reflected in the operations noted in **Table 4** above. Appendix E provides details on the

Corridor travel times (**Table 5**) were also simulated for future (2035) operations with and without the transit investments (68th Street northbound Business Access and Transit lanes / signal priority and 60th Street northbound queue jump).

Table 5. Travel Time Improvements

Scenario	GP Northbound Travel Time (minutes)	Transit Northbound Transit Travel Time
<i>Future Baseline</i>	11:32	11:59
<i>Future With Improvements</i>	8:57	9:37
<i>Delta (reduction)</i>	-2:35 (-22%)	-2:22 (-23%)

The corridor results above suggest that vehicles and transit could save 2 minutes for buses and people

Transportation analysis results anticipate increasing traffic volumes, which will impact operations along the 6th Street Corridor into the future. Potential infrastructure investments to meet growth as well as address other objectives such as connecting the community and moving people have a range of trade-offs. Significant forecasted growth in Kirkland's Comprehensive Plan along with anticipated regional growth outside of Kirkland will provide challenges for traffic across the entire 6th Street Corridor. Development in the Houghton / Everest neighborhood center would result in new businesses, residents and amenities in the neighborhood that could bring up to two hundred trips to and from the neighborhood center over current planned growth in the PM peak hour. By investing in multi-modal transportation solutions, especially those that meet the community values, some impacts on the transportation system can be alleviated. Investing in transit infrastructure along 6th Street / 108th Ave or, in the long term, on the CKC will have the biggest impact on congestion relief and the ability to move more people. Additionally, with further pedestrian and bicycle network improvements the 6th Street / 108th Ave corridor can be made more attractive for all users and improve the overall livability for the neighborhoods that rely on the corridor.

APPENDICES

The following Appendices contain supporting information and memos referenced throughout the Corridor Study. The memos served as interim products and supported in the development of this final report.

- A: Data Collection and Methods Memo
- B: Level of Service Descriptions
- C: Survey Summary
- D: Solutions Memo
- E: HENC Analysis Results
- F: Project Pages

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APPENDIX A: DATA
COLLECTION AND METHODS
MEMO

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APPENDIX B: LOS DEFINITIONS & WORKSHEETS

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LOS DEFINITIONS



Signalized Intersections

Signalized Intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle in experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table B1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board).

delay could mask deficiencies of minor movements. Table B2 shows LOS criteria for unsignalized intersections as described in the *Highway Capacity Manual 2010* (Transportation Research Board).

Table B1. Level of Service Criteria for Signalized Intersections

LOS	Avg. Control Delay (sec/veh)	General Description
A	≤10	Free Flow
B	>10-20	Stable Flow (slight delays)
C	>20-35	Stable Flow (acceptable delays)
D	>35-55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55-80	Unstable flow (intolerable delay)
F ¹	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board (TRB)

1. If the volume-to-capacity ratio for a lane group exceeds 1.0 LOS F is as-signed to the individual lane group. LOS for overall approach or intersection is determined by the control delay.



Unsignalized Intersections

LOS criteria can be further reduced into two intersection types: all-way stop and two-way stop control. All-way stop control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low

APPENDIX C: SURVEY SUMMARY

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APPENDIX D: SOLUTIONS MEMO

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APPENDIX E: HENC ANALYSIS RESULTS MEMO

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APPENDIX F: PROJECT PAGES

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