

## MEMORANDUM

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**Date:** February 9, 2017 **TG:** 16090.00

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**To:** Joel Pfundt, City of Kirkland  
Angela Ruggeri, City of Kirkland

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**From:** Jeanne Acutanza, Josh Steiner, Paul Sharman, Transpo Group

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**cc:** Deborah Munkberg, 3SquareBlocks  
Jeff Arango, BERK

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**Subject:** Houghton / Everest Neighborhood and 6th Street Corridor - Proposed Land Use  
Trip Generation Comparison and Methods

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### Purpose and Background

The purpose of this memorandum is to summarize the baseline scenario of 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. 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 are being studied in comparison to the current 'maximum' zoning allowed under the comprehensive plan (2035 Comp Plan Scenario). 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). This memorandum outlines the effects of the Greater Change Scenario against the future baseline scenario of planned growth represented by the 2035 Comp Plan Scenario. These are also reflected against anticipated 2035 land use conditions and anticipated background infrastructure investments. These conditions of an assumed 2035 timeframe with and without growth in the Center are also compared to potential investments that could be in place if this greater development occurred. This memorandum describes the methods and results applied.

### Trip Generation Methodology

Trip generation estimates have been prepared for the project based on trip rates identified using the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition (2012). The methodology used in this analysis also accounts for pass-by trips, which are those trips that are attracted to the land use but are not directly generated by the land use. Pass-by trip rates are provided in the ITE *Trip Generation Manual*, 9th Edition (2012) only for the PM peak hour and certain land uses, which in this study are ITE 850 Supermarket and ITE 851 Convenience Store.

Trip generation was calculated for the PM peak hour and Daily for each of the development scenarios. Substitutions needed to be made to account for the ITE manual not containing all the same daily land uses as the PM period. These substitutions include replacing ITE 223 Mid-Rise Apartment with ITE 220 Apartment and ITE 936 Coffee/Donut Shop without Drive-Through Window with ITE 932 High-Turnover (Sit Down) Restaurant. Consideration was given to the similarity in land use type when deciding on a land use alternative. ITE also provides rates for the proportion of vehicles entering and exiting the land use during the study period. These rates are

different based on the study period; however, daily rates are not available so a 50%-In/50%-Out split was assumed. This represents a vehicle both entering and exiting the land use each day. Existing (2016) trips are based on volumes in the City's travel demand model. Existing Zoning (2035) calculated trips were added to the Existing (2016) volumes to arrive at 2035 baseline (Existing Zoning) volumes. Modest and Greater Change are compared to the 2035 baseline.

## Development Land Use

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 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 1 and reflects changes in the number of dwelling units. These are assumed to be multi-family housing above ground level office and retail.

**Table 1. Houghton Everest Neighborhood Land Use**

Scenario	Existing	2035 Comp Plan	2035 Modest Change	2035 Greater Change
			35 ft.	55 ft.
<b>Residential (Dwelling Units)</b>	39	360	574	862
<b>Retail (Square Feet)</b>	105,092	113,480	113,480	113,480
<b>Office (Square Feet)</b>	38,034	122,476	122,476	122,476

## Trip Generation Results for each Land Use Scenario

Trip generation rates for each land use in the Houghton / Everest Neighborhood Center were multiplied by the existing and proposed number of development units to arrive at PM and Daily trips generated for each land use. Table 2 summarizes the resulting net new weekday daily and PM peak hour vehicle trip generation for each scenario.

**Table 2. Trips Generated by Houghton Everest Neighborhood Center by Scenario**

Scenario	Daily	PM Peak Hour
<b>Existing Trips</b>	<b>10,994</b>	<b>713</b>
<b>2035 Comp Plan</b>	<b>15,200</b>	<b>1,031</b>
Increased Trips	4,206	318
<b>Percent Change over Existing</b>	<b>38%</b>	<b>45%</b>
<b>2035 Modest Change</b>	<b>16,622</b>	<b>1,114</b>
Increased Trips	1,423	83
<b>Percent Change over Comp Plan</b>	<b>9%</b>	<b>8%</b>
<b>2035 Greater Change</b>	<b>18,538</b>	<b>1,227</b>
Increased Trips	3,338	196
<b>Percent Change over Comp Plan</b>	<b>22%</b>	<b>7%</b>

Notes: Vehicle volumes are Total Entering Volume (TEV) which account for vehicles entering the intersection.

Existing Zoning (2035) assumes PM peak hour growth rate applied to Existing (2016) volumes.

PM Volumes are derived from the City's comprehensive plan model.

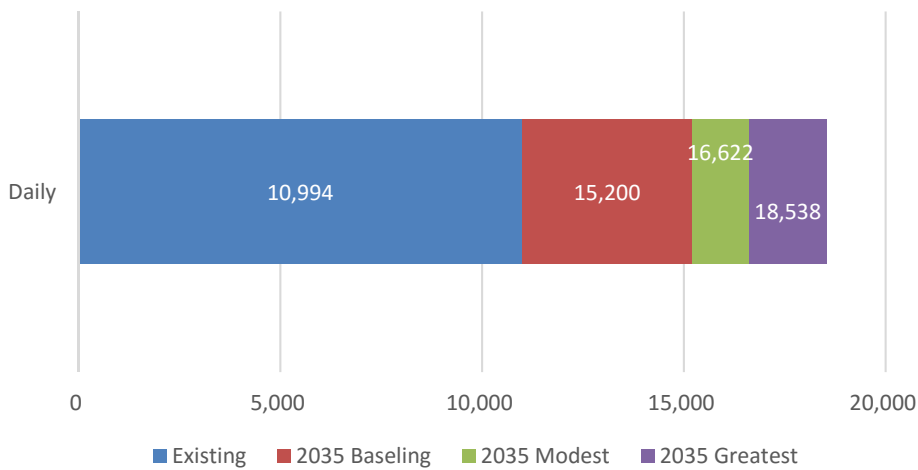
Daily volumes assume 12% increase over Existing (2016), consistent with average change in PM Peak Hour volumes

More extensive trip generation summaries broken out by specific land uses can be found in **Attachment A**.

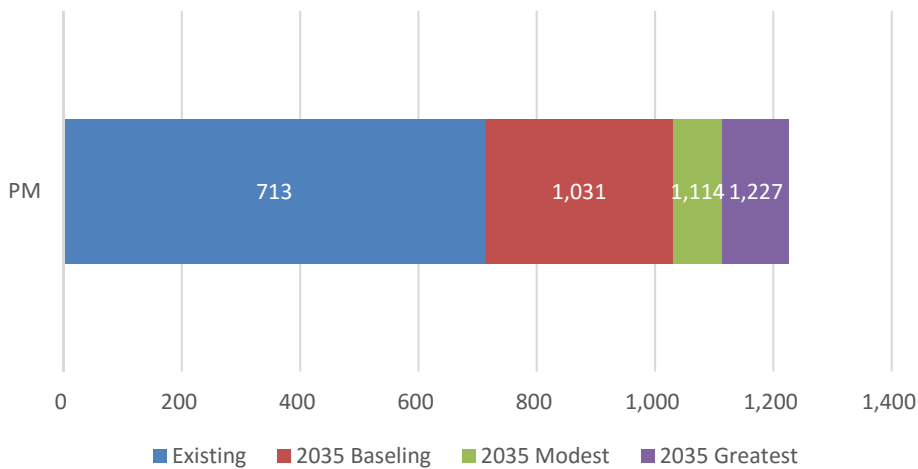
As shown in Table 2, the development is anticipated to generate up to 3,338 new daily trips, and 196 PM peak hour trips in the “Greater” scenario compared to the Existing Comp Plan (2035) scenario. A lesser number of trips are expected to be generated in the “Moderate” scenario.

Figures 1 and 2 highlight the daily and PM peak hour number of trips traveling to and from the development, respectively, by scenario. In future growth scenarios, the baseline growth accounts for the majority of trip growth between existing and all future scenarios.

**Figure 1 - Daily Trips to/from Development**



**Figure 2 - PM Peak Hour Trips to/from Development**



## Impact on Corridor

In order to understand the relative impact of the greater development scenario as compared to the future Comprehensive Plan, we have analyzed the impacts of these development scenarios assuming future infrastructure investments along the 6th / 108th corridor.

Table 3 compares intersection operations at NE 68th Street & 108th Avenue for Existing, Baseline 2035 and the 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.

**Table 3. NE 68th Street & 108th Ave NE Intersection Operations by Scenario**

Scenario	LOS	Delay (sec/veh)	Worst Movement	Total Entering Vehicles
<i>Existing – 2016</i>	E	62	SB	2,520
<i>Baseline – 2035</i>	F	142	SB	3,855
<i>Greater Change Development - 2035</i>	F	122*	SB	4,000

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, adding on-street, retail level parking and closing all driveways while adding a new signal at 106th Avenue NE. A southbound right-turn lane would also be assumed as part of the “Greater Change” option and is reflected in the operations noted in Table 3 above. **Attachment B** includes conceptual images of NE 68th Street currently in 60’ of right of way and with the Greater Change and an 80’ wide right of way.

Corridor travel times were also simulated using VISSIM for operations with and without the transit investments (68th Street NB BAT lane and 60th Street NB queue jump). The corridor results are summarized in Table 4.

**Table 4. 6th Street Corridor Operations with and without Transit Investments**

Scenario	GP NB Travel Time (minutes)	NB Transit Travel Time
<i>Existing</i>	11:34	12:11
<i>With Improvements</i>	8:21	9:24
<b>Delta</b>	<b>-3:13 (-28%)</b>	<b>-2:48 (-23%)</b>

This reduces the total person delay across the corridor by 5 person-hours across the PM peak hour which equates to a 2.5% travel time savings.

**Attachment C** provides a concept of this transit signal priority and queue jump for Northbound Transit on 108th Avenue that requires right of way and property acquisition.

## Potential background investments

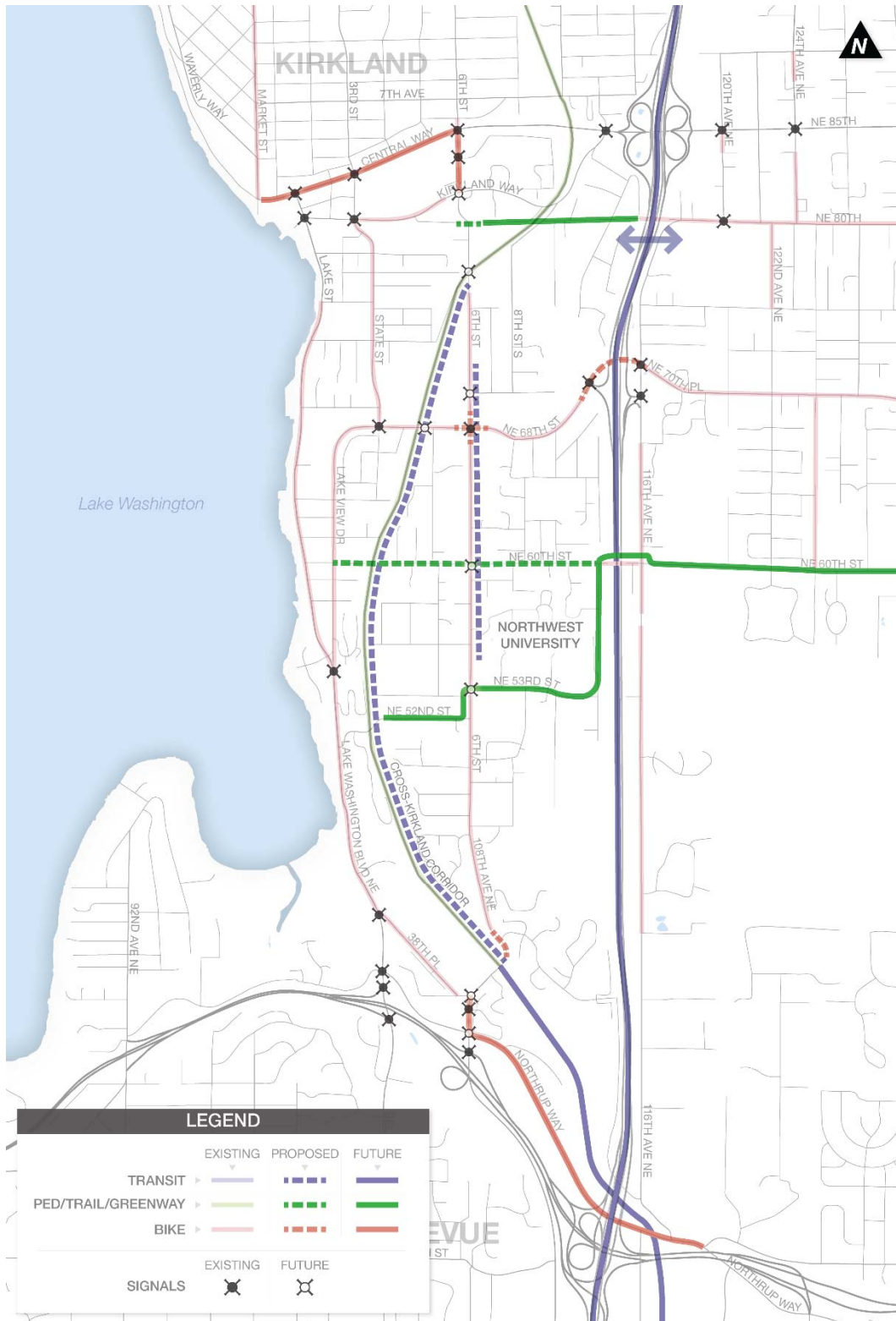
The corridor study is proposing potential solutions that meet community values as developed during a community workshop and feedback throughout the course of this project. These values were described as moving people, connecting communities and accommodating future growth. An initial set of solutions and a preferred set of recommendations is described in a previous memorandum. Table 5 provides a brief summary of the solutions recommended including the improvements on NE 68th Street to improve access (shown in **Attachment B**) and the transit signal priority concept (shown in **Attachment C**).

**Table 5. Potential Infrastructure Investments by Mode**

Transit Improvements	Pedestrian Improvements	Bike Improvements	Vehicular Improvements
<p>1A. Transit Signal Priority at 6th Street and Kirkland Way</p> <p>3A. Bus Rapid Transit on the Cross Kirkland Corridor (CKC)</p> <p>3B. Bus Intersection at 6th Street &amp; CKC</p> <p>5B. Houghton Park and Ride lease for Private Shuttle Use</p> <p>7E. Widen 108th to provide the maximum level of queue jump &amp; install new signal at 60th</p> <p>11A. Install new signal at 53rd and relocate &amp; improve existing bus stop</p> <p>12A. Park and Ride permitting for transit users at S Kirkland Park and Ride</p> <p>12B. Improve Access / Egress from S Kirkland P&amp;R</p> <p>12C. New signal controlled access to S Kirkland P&amp;R</p> <p>12F. Install real time parking occupancy at S Kirkland P&amp;R</p> <p>E1. Education Campaign promoting the value of Transit in Kirkland</p> <p>E2. Monitor Performance (in person throughput) along 6th Street to understand need for transit investment</p>	<p>1C. Crosswalk Improvements at 6th Street &amp; Kirkland Way Intersection</p> <p>9A. Improve CKC trail access (also for bikes), especially at 60th St.</p> <p>12D. Connect the CKC trail to the back of the S Kirkland P&amp;R</p> <p>P4. Develop land use policies promoting "trail oriented development"</p> <p>E3. Greenway promotion of 60th Street as well as other corridors across the city.</p>	<p>7C. Continue and complete Bike Network connections along 108th Ave.</p> <p>8D. Full Bicycle Intersection at 68th St &amp; 108th Ave Ne</p> <p>8E. Install green bike boxes in intersection to allow safer bike left turns</p> <p>10A. Designate 60th St as Neighborhood Greenway</p> <p>12E. Install bike racks or bike share at S Kirkland P&amp;R</p>	<p>1B. Signal Coordination along 6th Street</p> <p>2A. Kirkland Way and Railroad Ave Intersection Improvements</p> <p>4A. Reassess installation of planned signal improvement at 6th Street &amp; 9th Ave</p> <p>5A. Improve and expand 70th Street Overpass</p> <p>7D. Install "don't block the box" pavement markings at Fire Station Exit on 108th</p> <p>8A. Driveway consolidation around 68th St / 108th Ave businesses</p> <p>8C. Reduce business access on 68th &amp; 108th to signalized intersections and install new signal at 106th.</p> <p>P3. Citywide Parking Management strategies such as shared parking and joint parking use.</p>

How these investments improve the transportation network are shown in Figure 3, below. Each color denotes a specific modal priority given to that corridor. Dashed lines represent classifications proposed as a result of this project. The primary proposed network changes include classifying the Cross Kirkland Corridor as a Transit facility, creating a neighborhood greenway on 60th Street, investing in transit improvements along the 6th Street corridor and finish bike network connections throughout the 6th Street corridor where they are lacking.

Figure 3 - Proposed Transportation Network



The major transit investment along the 6th Street / 108th Ave corridor is the addition of two transit queue jumps at 60th Street and 68th Street. Conceptual drawings of how these queue jumps would operate are attached in **Attachment B**. In order to understand the benefit provided by these queue jumps, VISSIM was used to simulate travel time savings for transit users with and without transit queue jumps.

**Table 6. PM Peak Hour Transit Travel Speed Comparison with Transit Investments**

6th St Travel Time (mm:ss)	Existing	With Improvements	Change
<b>Northbound</b>			
NE 62nd St to 9th Ave S	04:56	03:37	- 01:20 (-27%)
NE 48th St to Kirkland Way	12:11	09:24	- 02:48 (-23%)
<b>Southbound</b>			
9th Ave S to NE 62nd St	02:29	02:25	- 00:04 (-3%)
Kirkland Way to NE 48th St	09:36	09:17	- 00:19 (-3%)

## Conclusion

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 in the PM peak hour. By investing in multi-modal transportation solutions, especially those that meet the community values, we can help to relieve the new demands on the transportation system. Investing in transit infrastructure along 6th Street / 108th Ave or, in the long term, on the Cross Kirkland Corridor will have the biggest impact on congestion relief and the ability to move more people. Additionally, with further pedestrian and bicycle network improvements we can make the 6th Street / 108th Ave corridor attractive for all users.

## ATTACHMENT A – Trip Generation by Scenario



ATTACHMENT A

**Daily Trip Generation:**

Existing		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Land Use						
Mid-Rise Apartment	39	Dwelling Units		130	130	259
Office	38,034	ft <sup>2</sup>		210	210	420
Retail	34,826	ft <sup>2</sup>		772	772	1543
Supermarket	65,391	ft <sup>2</sup>		3,343	3,343	6686
Convenience Store	2,400	ft <sup>2</sup>		886	886	1771
Coffee Shop	2,475	ft <sup>2</sup>		157	157	315
<i>Retail LU Total</i>	<i>105,092</i>					
<b>Total</b>				<b>5,497</b>	<b>5,497</b>	<b>10,994</b>

**2035 Baseline:**

Land Use		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Mid-Rise Apartment	360	Dwelling Units		1,197	1,197	2394
Office	122,476	ft <sup>2</sup>		675	675	1351
Retail	29,961	ft <sup>2</sup>		664	664	1328
Supermarket	78,644	ft <sup>2</sup>		4,020	4,020	8041
Convenience Store	2,400	ft <sup>2</sup>		886	886	1771
Coffee Shop	2,475	ft <sup>2</sup>		157	157	315
<i>Retail LU Total</i>	<i>113,480</i>					
<b>Total</b>				<b>7,600</b>	<b>7,600</b>	<b>15,199</b>
<i>Growth (2035 - Existing)</i>				<i>2,103</i>	<i>2,103</i>	<i>4,205</i>

**Modest Development:**

Land Use		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Mid-Rise Apartment	574	Dwelling Units		1,909	1,909	3817
Office	122,476	ft <sup>2</sup>		675	675	1351
Retail	29,961	ft <sup>2</sup>		664	664	1328
Supermarket	78,644	ft <sup>2</sup>		4,020	4,020	8041
Convenience Store	2,400	ft <sup>2</sup>		886	886	1771
Coffee Shop	2,475	ft <sup>2</sup>		157	157	315
<i>Retail LU Total</i>	<i>113,480</i>					
<b>Total</b>				<b>8,311</b>	<b>8,311</b>	<b>16,622</b>
<i>Growth (Modest - 2035)</i>				<i>712</i>	<i>712</i>	<i>1,423</i>

**Greatest Development:**

Land Use		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Mid-Rise Apartment	862	Dwelling Units		2,866	2,866	5732
Office	122,476	ft <sup>2</sup>		675	675	1351
Retail	29,961	ft <sup>2</sup>		664	664	1328
Supermarket	78,644	ft <sup>2</sup>		4,020	4,020	8041
Convenience Store	2,400	ft <sup>2</sup>		886	886	1771
Coffee Shop	2,475	ft <sup>2</sup>		157	157	315
<i>Retail LU Total</i>	<i>113,480</i>					
<b>Total</b>				<b>9,269</b>	<b>9,269</b>	<b>18,538</b>
<i>Growth (Greatest - 2035)</i>				<i>1,669</i>	<i>1,669</i>	<i>3,338</i>

**PM Peak Hour Trip Generation:**

Existing		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Land Use						
Mid-Rise Apartment	39	Dwelling Units		9	6	15
Office	38,034	ft <sup>2</sup>		10	47	57
Retail	34,826	ft <sup>2</sup>		42	53	94
Supermarket	65,391	ft <sup>2</sup>		202	194	397
Convenience Store	2,400	ft <sup>2</sup>		25	24	49
Coffee Shop	2,475	ft <sup>2</sup>		50	50	101
<i>Retail LU Total</i>	<i>105,092</i>					
<b>Total</b>				<b>338</b>	<b>375</b>	<b>713</b>

**2035 Baseline:**

Land Use		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Mid-Rise Apartment	360	Dwelling Units		81	59	140
Office	122,476	ft <sup>2</sup>		31	151	182
Retail	29,961	ft <sup>2</sup>		36	45	81
Supermarket	78,644	ft <sup>2</sup>		243	234	477
Convenience Store	2,400	ft <sup>2</sup>		25	24	49
Coffee Shop	2,475	ft <sup>2</sup>		50	50	101
<i>Retail LU Total</i>	<i>113,480</i>					
<b>Total</b>				<b>467</b>	<b>564</b>	<b>1,031</b>
<i>Growth (2035 - Existing)</i>				<i>129</i>	<i>189</i>	<i>318</i>

**Modest Development:**

Land Use		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Mid-Rise Apartment	574	Dwelling Units		130	94	224
Office	122,476	ft <sup>2</sup>		31	151	182
Retail	29,961	ft <sup>2</sup>		36	45	81
Supermarket	78,644	ft <sup>2</sup>		243	234	477
Convenience Store	2,400	ft <sup>2</sup>		25	24	49
Coffee Shop	2,475	ft <sup>2</sup>		50	50	101
<i>Retail LU Total</i>	<i>113,480</i>					
<b>Total</b>				<b>515</b>	<b>599</b>	<b>1,115</b>
<i>Growth (Modest - 2035)</i>				<i>48</i>	<i>35</i>	<i>83</i>

**Greatest Development:**

Land Use		Size	Units	Inbound Trips	Outbound Trips	Total Trips
Mid-Rise Apartment	862	Dwelling Units		195	141	336
Office	122,476	ft <sup>2</sup>		31	151	182
Retail	29,961	ft <sup>2</sup>		36	45	81
Supermarket	78,644	ft <sup>2</sup>		243	234	477
Convenience Store	2,400	ft <sup>2</sup>		25	24	49
Coffee Shop	2,475	ft <sup>2</sup>		50	50	101
<i>Retail LU Total</i>	<i>113,480</i>					
<b>Total</b>				<b>581</b>	<b>646</b>	<b>1,227</b>
<i>Growth (Greatest - 2035)</i>				<i>114</i>	<i>82</i>	<i>196</i>

## **ATTACHMENT B – NE 68th Street Concepts for Consolidating Access**

8 A NE 68th Street existing 60' Right of Way

8 C Greater Change and 80' Right of Way

# NE 68th Street Existing 60' Right of Way



## NE 68th St - Improvement Concept A

Kirkland 6th Street Corridor

January 25, 2017

FIGURE 8A



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# NE 68th Street Greater Change and 80' Right of Way



## NE 68th St - Improvement Concept C

Kirkland 6th Street Corridor

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January 25, 2017

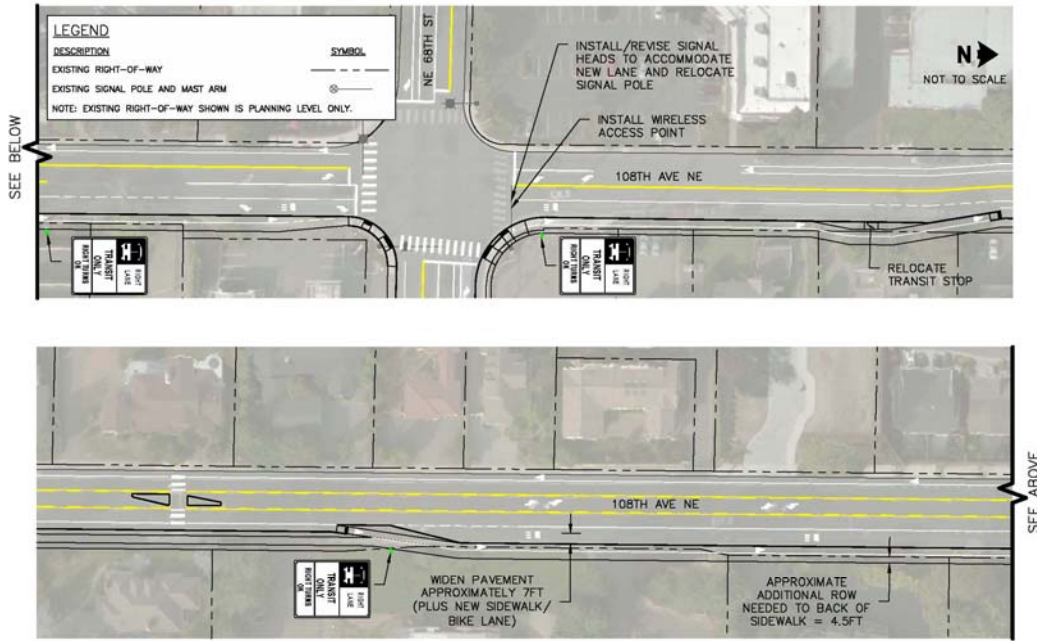


FIGURE 8C

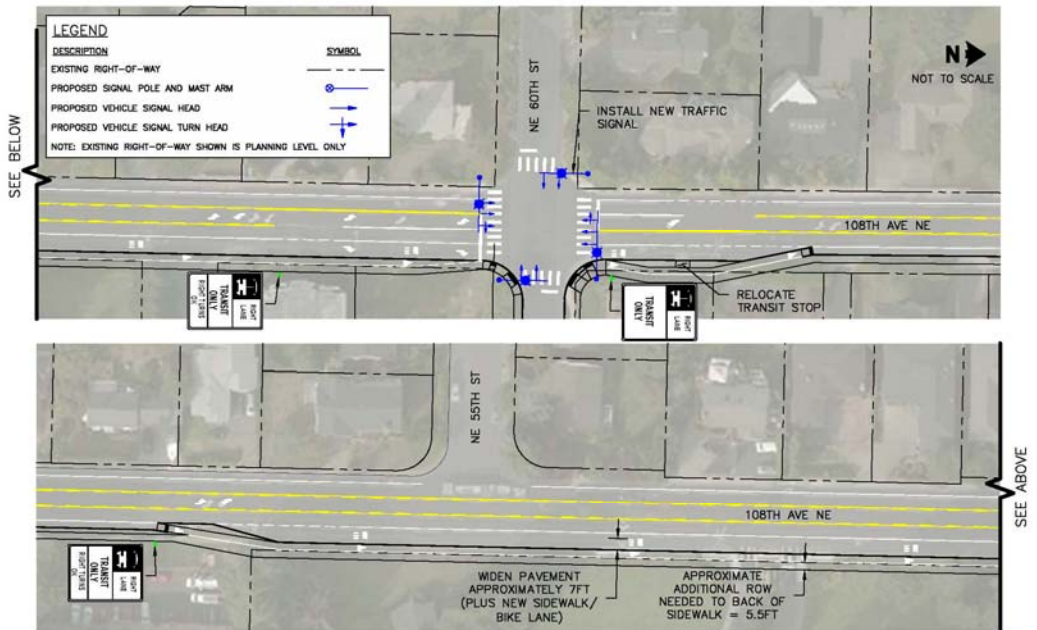


# **ATTACHMENT C – 108th Avenue NE Transit Signal Priority and Queue Jump Concept**

# 108th Avenue Transit Signal Priority & Queue Jump NE 68th to NE 53rd



108th Ave NE and NE 68th St - Transit Signal Priority Improvement Concept F February 9, 2017 **FIGURE 7F**  
 Kirkland 6th Street Corridor **transpogroup**



108th Ave NE and NE 60th St - Transit Signal Priority Improvement Concept E February 10, 2017 **FIGURE 7E**  
 Kirkland 6th Street Corridor **transpogroup**