

Transportation Impact Analysis

C AND G PROPERTY

Prepared for:
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April 2013

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Frequently Asked Questions

This section provides an overview of the following report through responses to frequently asked questions (FAQs).

Where is the project located?

The proposed development is located north of NE 75th Street and east of 126th Avenue NE in the South Rose Hill Neighborhood. Access to the development is provided via NE 75th Street and NE 80th Street.

What is the project land use and trip generation?

The proposed development is located north of NE 75th Street and east of 126th Avenue NE in the South Rose Hill Neighborhood and would include the construction of up to 35 single family homes. The development is anticipated to generate 400 daily trips with 34 weekday AM peak hour trips and 41 weekday PM peak hour trips.

What are the existing and future without-project conditions in the study area?

All study intersections currently operate at LOS C or better during the weekday AM, afternoon school peak, and PM peak hour. In 2015 without the proposed project, all study intersections will continue to operate at the same LOS as defined in existing conditions.

Would the project have any transportation impacts?

All study intersections and the site driveway is anticipated to operate at LOS C or better during the weekday peak hours after the project is completed and occupied.

What mitigation measures are recommended?

Based on the results of this analysis all intersections are expected to operate at LOS C or better with the proposed project. As such all intersections comply with City of Kirkland operational standards and no off-site road improvements would be required of the project.

Introduction

The purpose of this transportation impact analysis (TIA) is to identify potential traffic-related impacts associated with the proposed residential development in Kirkland, WA. As necessary, mitigation measures are identified that would offset or reduce significant impacts.

Project Description

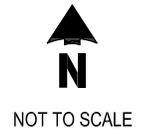
The proposed development is located north of NE 75th Street and east of 126th Avenue NE in the South Rose Hill Neighborhood and would include the construction of up to 35 single family homes. Access to the development is provided via NE 75th Street and NE 80th Street. The property is currently vacant. The proposed project is anticipated to be built and occupied by 2015. The site vicinity and the proposed site plan are illustrated in [Figure 1](#) and [Figure 2](#), respectively.

Study Approach

The scope and approach of this analysis was identified through coordination with City of Kirkland staff and complies with City of Kirkland requirements. Six off-site intersections during the weekday PM peak hour were identified for analysis. It should be noted that two intersections, 128th Avenue NE / NE 80th Street (site access) and 116th Avenue NE / NE 70th Street were identified as significant based on the City's proportional share impact worksheets shown in [Appendix A](#), although five additional study intersections have been included to review potential impacts associated with the current access proposal. **In total, the study intersections include:**

1. 128th Avenue NE / NE 80th Street
2. 116th Avenue NE / NE 70th Street
3. 128th Avenue NE / NE 75th Street
4. 126th Avenue NE / NE 73rd Street
5. 130th Avenue NE / NE 80th Street
6. 130th Avenue NE / NE 75th Street
7. 126th Avenue NE / NE 80th Street

In addition to the analysis of the weekday PM peak hour, an additional analyses was conducted for the weekday AM and afternoon peak hour periods at the site access intersection of 128th Avenue NE / NE 80th Street to assess the impacts of the proposed projects during those critical time periods.



Site Vicinity

C and G Property

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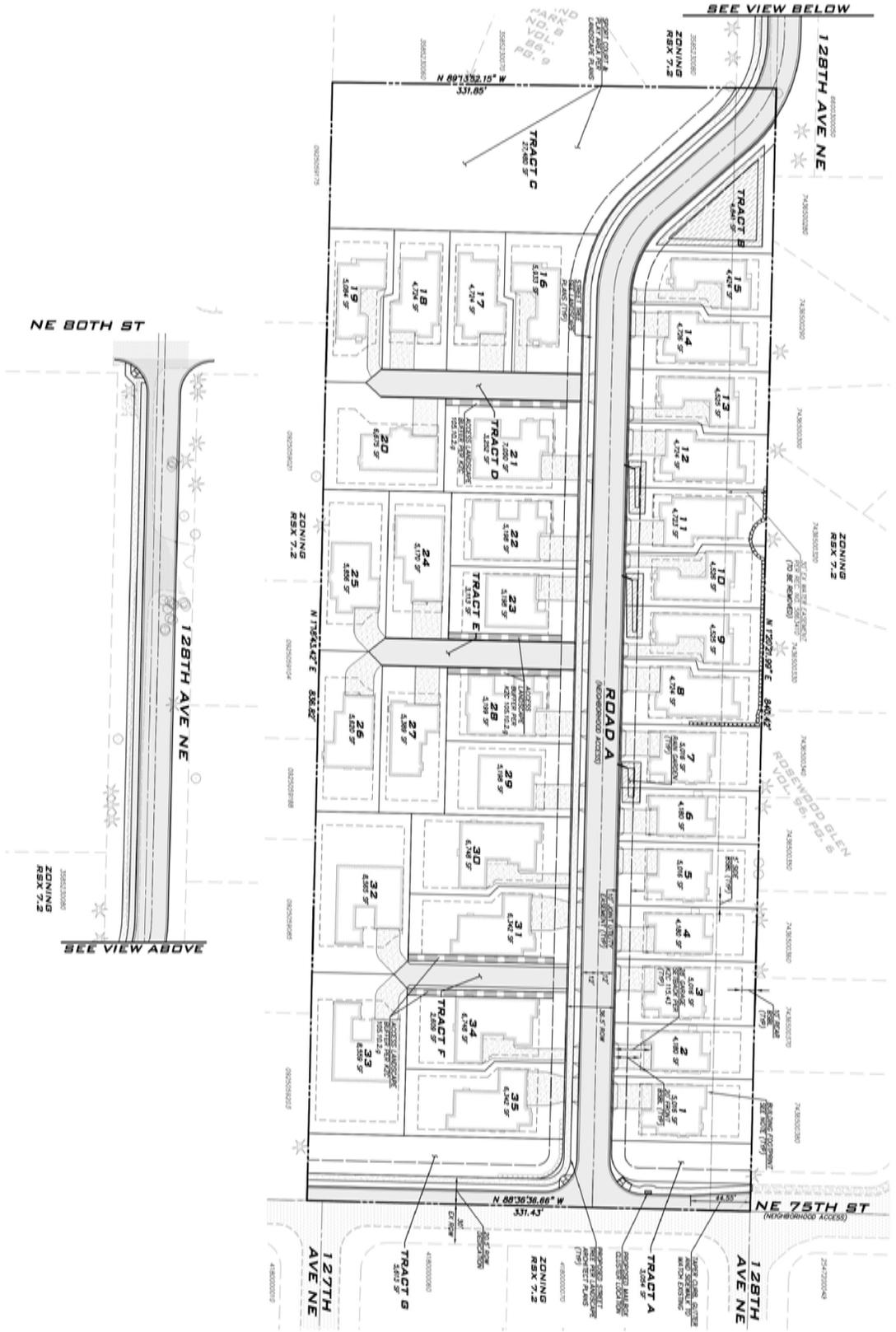


FIGURE

1



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Site Plan

C and G Property

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FIGURE

2



Existing and Without-Project Conditions

This section describes both existing and 2015 without-project conditions within the identified study area. Study area characteristics are provided for the roadway network, planned improvements, existing and forecasted without-project volumes, traffic operations, and transit and non-motorized facilities.

Roadway Network

The existing roadway network is discussed along with planned improvements that would likely be complete before the proposed project horizon year, if any. In general, the roadway descriptions given apply to the portions of the roadways within the study area of the proposed project.

The street system providing access to the site includes two-way streets, with on-street parking on the local streets and sidewalks typically provided on arterial streets. The primary roadways within the vicinity of the site are described in [Table 1](#).

Table 1. Roadway Network Existing Conditions Summary

Roadway	Street Classification	# Lanes	Pedestrian Facilities
128th Avenue NE	Collector	2	Sidewalks on both sides of street north of NE 80th Street
126th Avenue NE	Local	2	Sidewalks intermittent on the east and west side
130th Avenue NE	Local	2	Sidewalk located on west side
NE 73rd Street	Local	2	N/A
NE 75th Street	Local	2	Sidewalks on north side of street, except adjacent to site frontage
NE 80th Street	Collector	2	Sidewalks on north and south side. Eastbound and westbound bicycle lanes.
NE 70th Street	Minor Arterial	2-3	Sidewalks and bicycle lanes on both sides of roadway
116th Ave NE	Collector	2-3	Sidewalks south of NE 70th St; Bike lanes north of NE 70th St

Planned Improvements

The City of Kirkland *2011–2016 Capital Improvement Program* (CIP) was reviewed to identify transportation improvement projects planned for the study area. The CIP lists improvement projects that have been approved by the City and have identified funding sources within the next six years.

Based on this review, there are no street or intersection improvements in the project study area that are programmed to occur within the planning horizon for this analysis that would modify the channelization or increase the capacity at any of the study intersections.

Transit and Non-Motorized Facilities

In general, the project site is served by transit with one transit route (Route 238) operating within a short walking distance of the project site on NE 80th Street. Route 238 services Totem Lake, Kirkland, and Bothell with service provided approximately every 30 minutes on weekdays and every 60 minutes on weekends.

The project is located southwest of the Rose Hill Elementary School and pedestrian facilities between the project and the elementary school are provided. Pedestrian facilities exist on 128th Avenue NE north of the site and on NE 80th Street adjacent to the site and the school. In addition a marked crosswalk exists at the intersection of NE 80th Street / 128th Avenue NE, providing a pedestrian crossing between the proposed development and the school.

Limited pedestrian facilities exist within the neighborhood to the south, although pedestrian facilities are located on NE 75th Street east of the site. Sidewalks are also provided on 130th Avenue NE and 126th Avenue NE to the east and west of the site.

Traffic Volumes

Existing weekday PM peak hour traffic counts at study intersections were collected in February 2012 and 2013. Weekday AM and mid-day school peak hour counts were collected at the intersection of 128th Avenue NE / NE 80th Street in December 2012 while school was in session. The existing traffic volumes are shown in [Figure 3](#). Count sheets are provided in [Appendix B](#).

Consistent with City standards, 2015 without-project volumes were estimated by applying a general annual growth rate of 1.0-percent to existing volumes. This growth rate is consistent with the growth assumed in the concurrency model. In addition to the background growth rate, the City has requested that two pipeline projects be included, Potala Village and McCleod. [Figure 4](#) illustrates 2015 without-project weekday peak hour traffic volumes at the study intersections.

Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). Level of service for intersection operations is described alphabetically (A through F). LOS is based on the calculated average control delay per vehicle and is typically reported for the whole intersection for signalized and all-way stop-controlled intersections, and by movement for two-way, stop-controlled intersections. Control delay is defined as the combination of initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. [Appendix C](#) provides a more detailed explanation of LOS.

As described in the City of Kirkland's *Traffic Impact Analysis Guidelines*, the City requires project developers to mitigate intersections operating at LOS E when the project's proportionate share exceeds 15 percent of the intersection's total entering volume. For intersections operating at LOS F, projects are required to mitigate impacts when the project's proportionate share is greater than 5 percent of the total entering volume. Intersections operating at LOS A through D require no mitigation.

Existing and 2015 without-project peak hour level of service was calculated at study intersections based on methodologies contained in the *Highway Capacity Manual* (Transportation Research Board, 2000). *Synchro 8.0* was used for the calculations. Signal timing at the intersection of 116th Avenue NE / NE 70th Street was obtained from WSDOT. Results for the weekday AM, afternoon school, and PM peak hour are summarized in [Table 2](#). Detailed LOS worksheets are included in [Appendix D](#).

Table 2. Existing and 2015 Without-Project LOS Summary

Intersection	Existing (2012)			2015 Without-Project		
	LOS ¹	Delay ²	WM ³	LOS	Delay	WM
Weekday AM Peak Hour						
128th Avenue NE / NE 80th Street	C	16.5	NB	C	16.9	NB
Weekday Afternoon School Peak Hour						
128th Avenue NE / NE 80th Street	C	20.8	NB	C	22.9	NB
Weekday PM Peak Hour						
128th Avenue NE / NE 75th Street	A	8.9	EB	A	8.9	EB
126th Avenue NE / NE 73rd Street	A	9.4	WB	A	9.4	WB
126th Avenue NE / NE 80th Street	B	13.9	SB	B	14.0	SB
128th Avenue NE / NE 80th Street	B	13.6	NB	B	13.7	NB
130th Avenue NE / NE 80th Street	B	11.6	NB	B	11.7	NB
130th Avenue NE / NE 75th Street	A	8.5	EB	A	8.5	EB
116th Ave NE / NE 70th Street	C	31.0	0.83	C	31.0	0.88

1. Level of Service as defined in the *Highway Capacity Manual* (TRB, 2000)
2. Average delay per vehicle in seconds.
3. Worst movement or approach reported for unsignalized intersections.

As shown in [Table 2](#), during the existing and 2015 without project weekday AM, afternoon, and PM peak hour, all study intersections currently operate at LOS C or better.

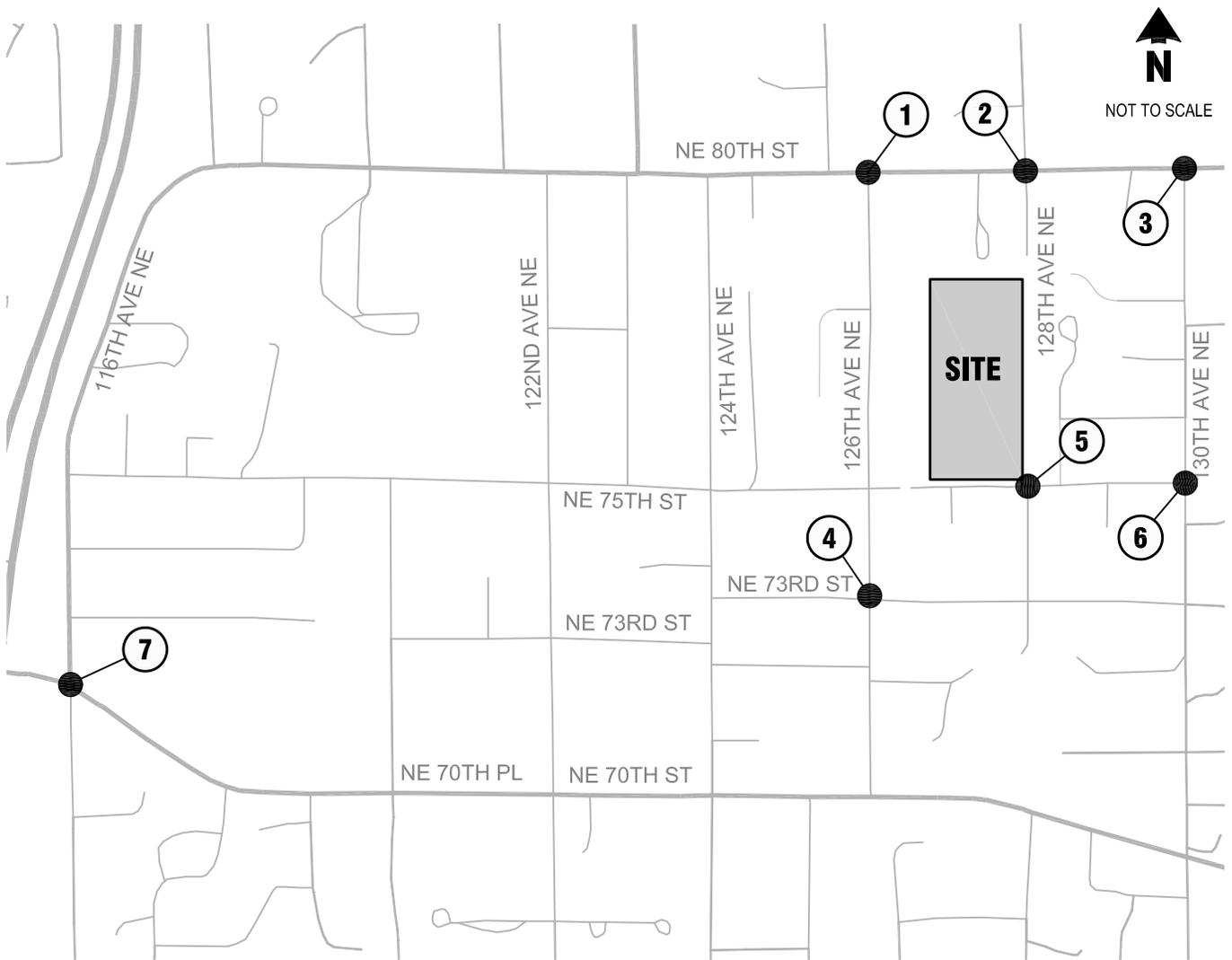
Traffic Safety

Recent collision records were reviewed within the study area to identify existing traffic safety issues. The most recent summary of collision data from the Washington Department of Transportation (WSDOT) is for the three-year period between January 1, 2009 and December 31, 2011. A summary of the total and average annual number of reported collisions at each study intersection is provided in [Table 3](#).

Table 3. Intersection Collision Summary

Intersection	Number of Collisions			Total	Annual Average
	2009	2010	2011		
128th Avenue NE / NE 75th Street	0	0	0	0	0
126th Avenue NE / NE 73rd Street	0	0	0	0	0
126th Avenue NE / NE 80th Street	1	0	0	1	0.33
128th Avenue NE / NE 80th Street	2	0	0	2	0.67
130th Avenue NE / NE 80th Street	0	0	0	0	0
130th Avenue NE / NE 75th Street	0	0	0	0	0
116th Avenue NE / NE 70th Street	9	6	12	27	9.0

As shown in [Table 3](#), during the study time period collisions were reported at three of the study intersections, 126th Avenue NE / NE 80th Street, 128th Avenue NE / NE 80th Street, and 116th Avenue NE / NE 70th Street. Over the three year study period one collision occurred at 126th Avenue NE / NE 80th Street and two collisions occurred at 128th Avenue NE / NE 80th Street. The collisions included rear end and entering at an angle from the side street. No injuries were reported for any of the collisions. At the intersection of 116th Avenue NE / NE 70th Street 27 collisions occurred over the three year period with the predominant collision type involving rear end collisions. No fatalities occurred at this intersection.

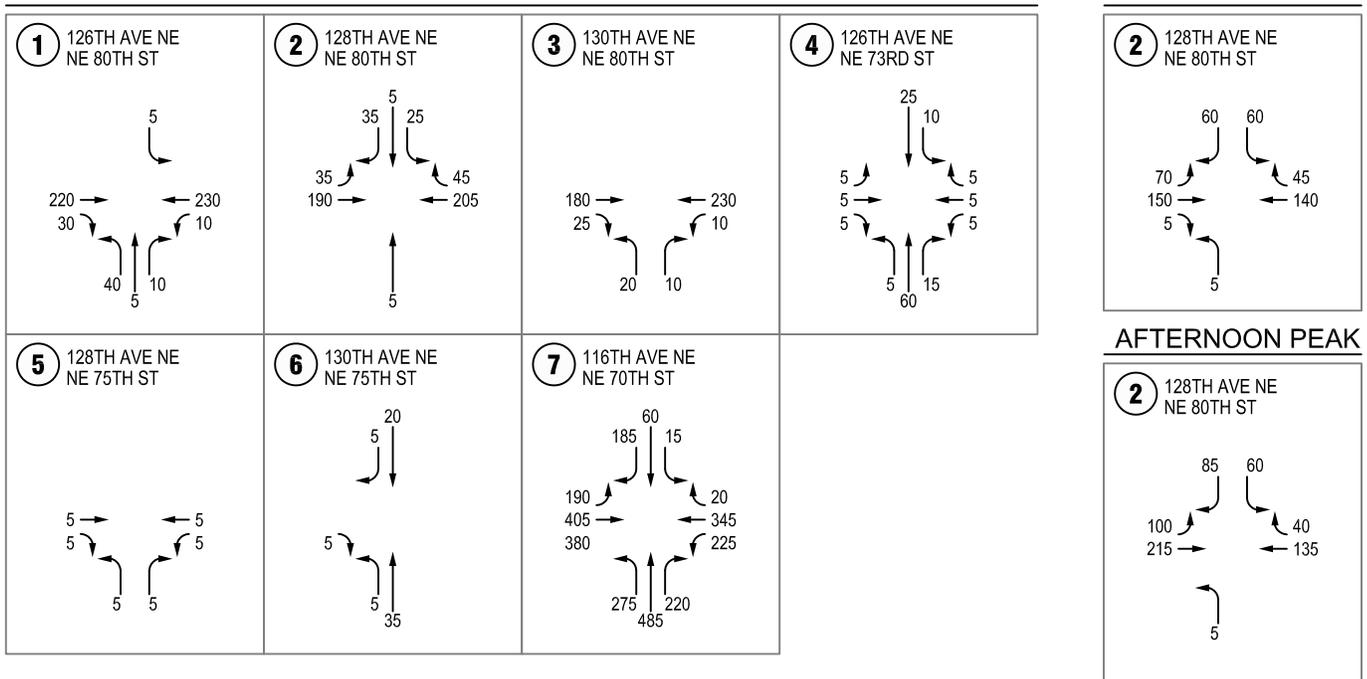


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PM PEAK

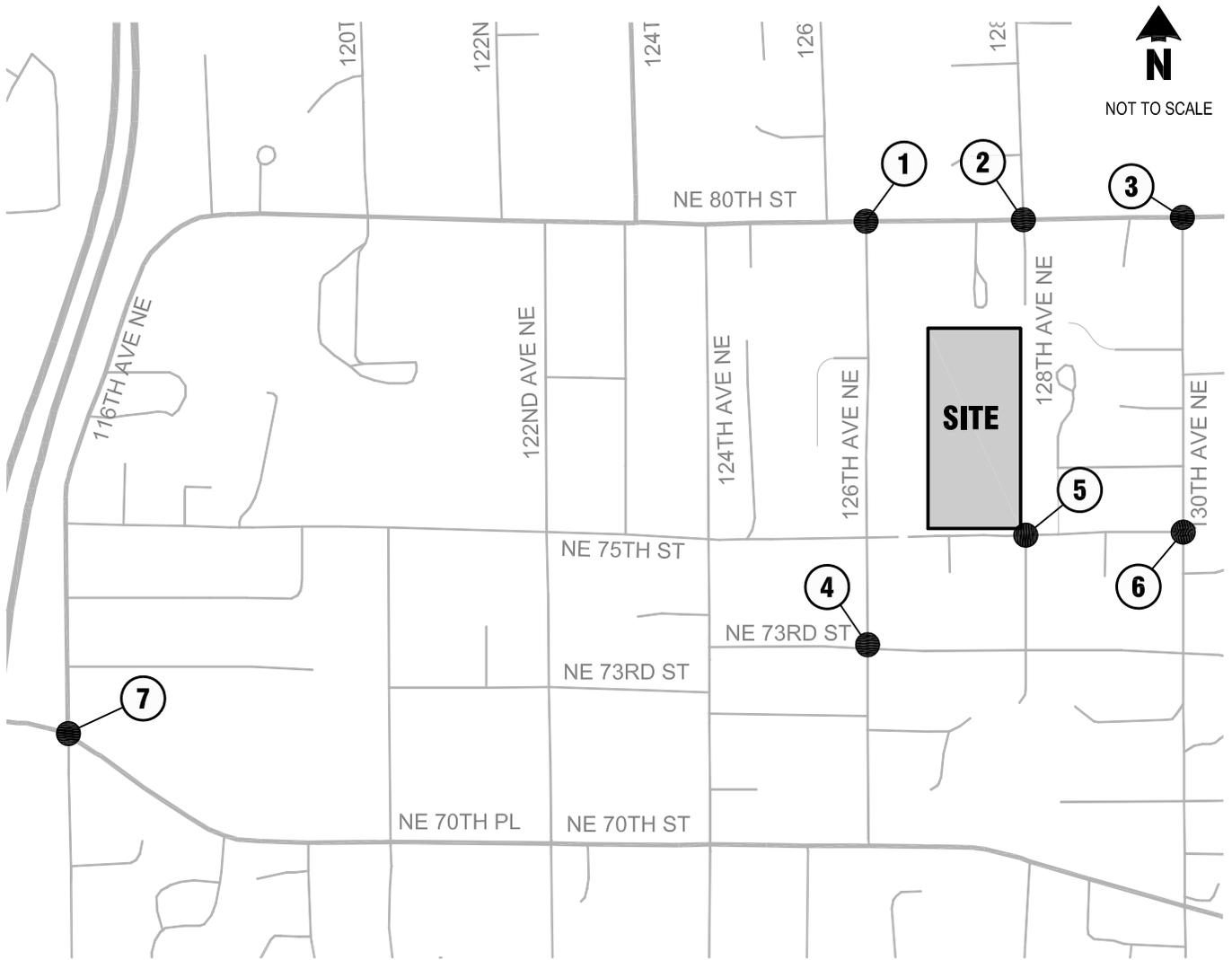
AM PEAK

AFTERNOON PEAK



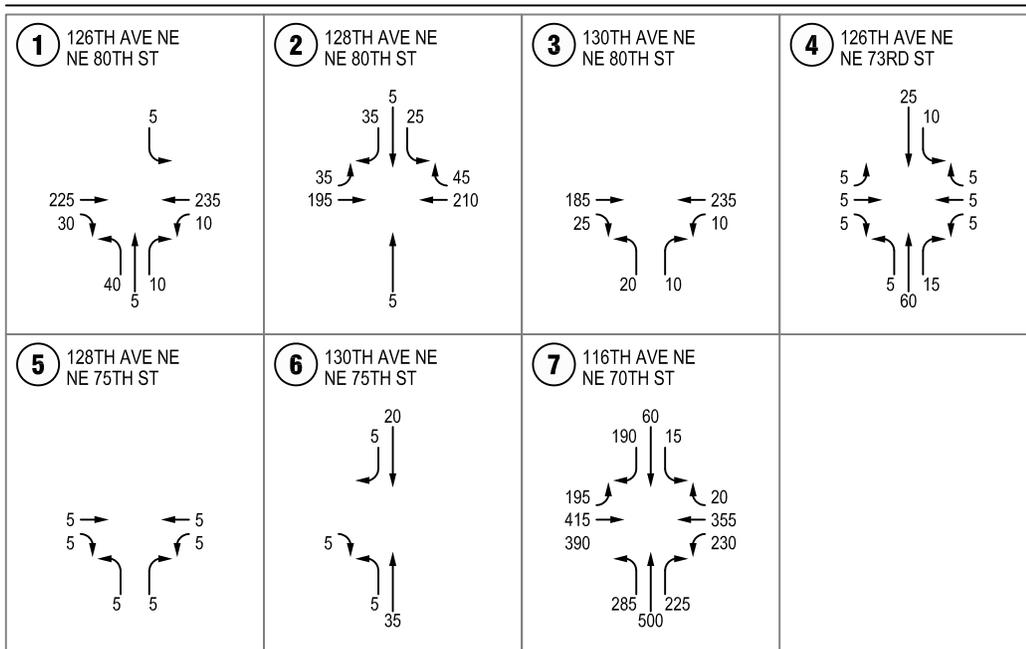
Existing Weekday Peak Hour Traffic Volumes

FIGURE



PM PEAK

AM PEAK



2015 Without-Project Weekday Peak Hour Traffic Volumes

FIGURE

C and G Property



Project Impacts

This section of the analysis documents project-generated impacts within the study area. First, peak hour traffic volumes are estimated, distributed, and assigned to adjacent roadways and intersections within the study area. Next, 2015 volumes are projected and the potential impact to traffic volumes, traffic operations, safety, non-motorized facilities, and transit are identified. Where intersections are shown to not comply with City of Kirkland standards, mitigation measures are identified.

Trip Generation

Project trip generation was estimated for the single family land use based on equations published by the Institute of Transportation Engineers (ITE) in *Trip Generation* (9th Edition, 2012). The estimated trip generation for the current proposal was based on ITE land-use code 210 Single Family Detached Housing. [Table 4](#) shows the resulting weekday AM and PM peak hour vehicle trip generation.

Table 4. Project Trip Generation Summary

Land Use	Size	Daily	Rate ¹	Primary Trips		
				Total	In	Out
Weekday PM Peak Hour²						
Single Family Detached (LU 210)	35 units	400	EQN	41	26	15
Weekday AM Peak Hour						
Single Family Detached (LU 210)	35 units	400	EQN	34	9	25

1. Rates based on ITE Trip Generation Manual, 9th Edition (2012).

2. Afternoon peak hour was conservatively assumed to be consistent with the weekday PM peak hour.

The development is anticipated generate 400 daily trips with 34 weekday AM peak hour trips and 41 weekday PM peak hour trips.

It should be noted that for the afternoon school peak hour analysis, no trip rate is provided in the ITE *Trip Generation*; therefore the weekday PM peak hour trip generation was used to provide a conservative analysis.

Trip Distribution and Assignment

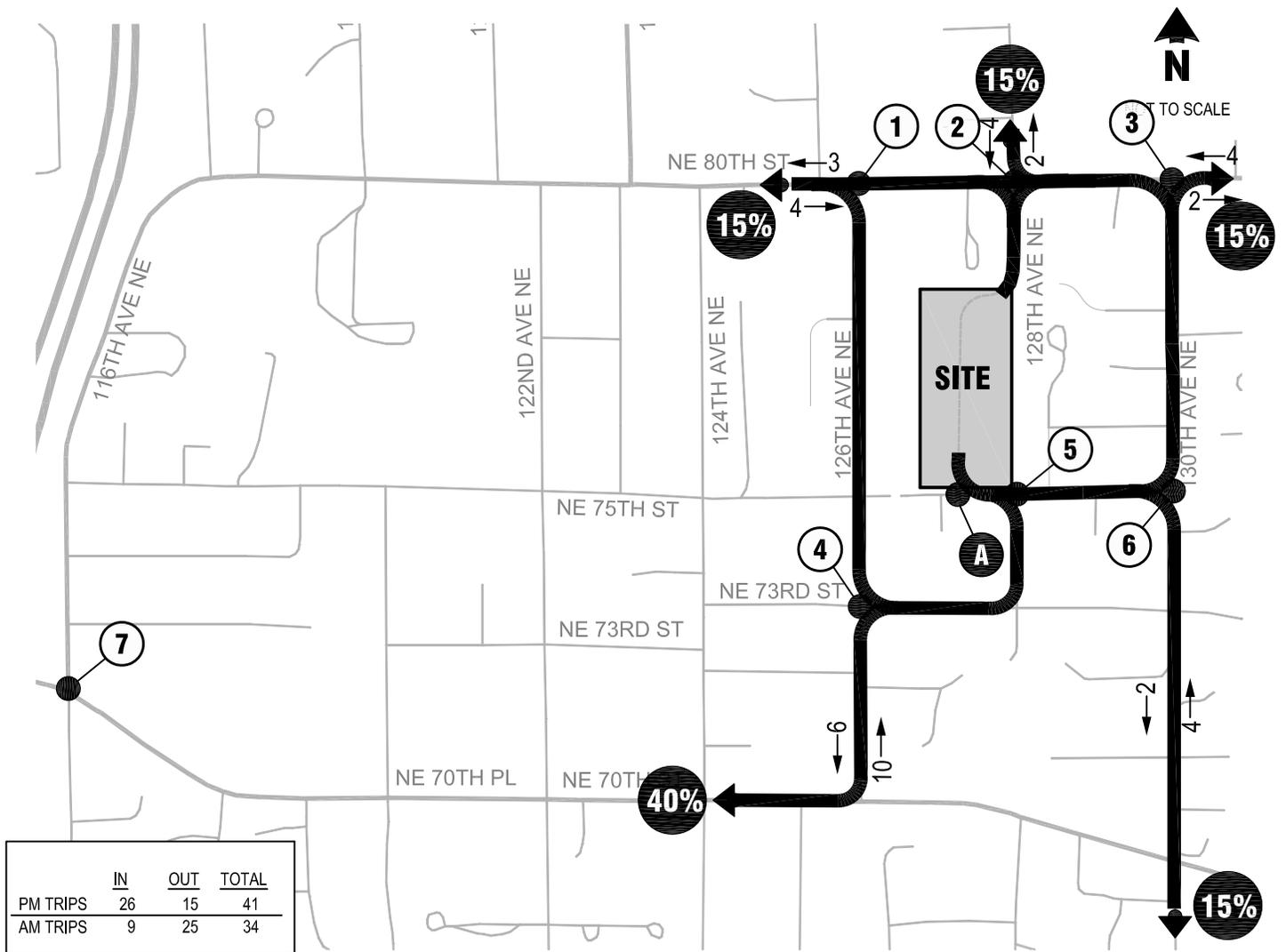
Project traffic generated by the proposed project was assigned to the surrounding roadway network based on the distribution provided by the City of Kirkland Concurrency Model as well as comments from neighborhood residents regarding travel patterns near the site. The resulting distribution is illustrated in [Figure 5](#). Project trips were then assigned to the roadway network based on the distribution, and are also shown in [Figure 5](#).

With-Project Traffic Volumes

Background traffic volumes were shifted assuming the 128th Avenue NE connection through the site, connecting with NE 80th Street. Based on a review of the roadway network and number of residences near the 128th Avenue connection an estimate of background trips utilizing the new 128th Avenue NE connection was made for the weekday PM peak hour period. The potential users of this new connection include the residences located on NE 75th Street between 128th Avenue NE and the roadway closure west of 127th Avenue NE, residences on 127th Avenue NE, and potentially a couple of residences on 128th Avenue NE

between NE 75th Street and NE 73rd Street. This results in approximately 9 - 12 residences totaling approximately 16 trips during the weekday PM peak hour (based on recent turning movement counts). The resulting traffic volume assignment and with-project volumes during the weekday AM, afternoon school peak, and PM peak hour with the 128th Avenue NE connection were adjusted to account for shifts in traffic. No reductions to existing traffic patterns from the residences were taken, resulting in a conservative analysis.

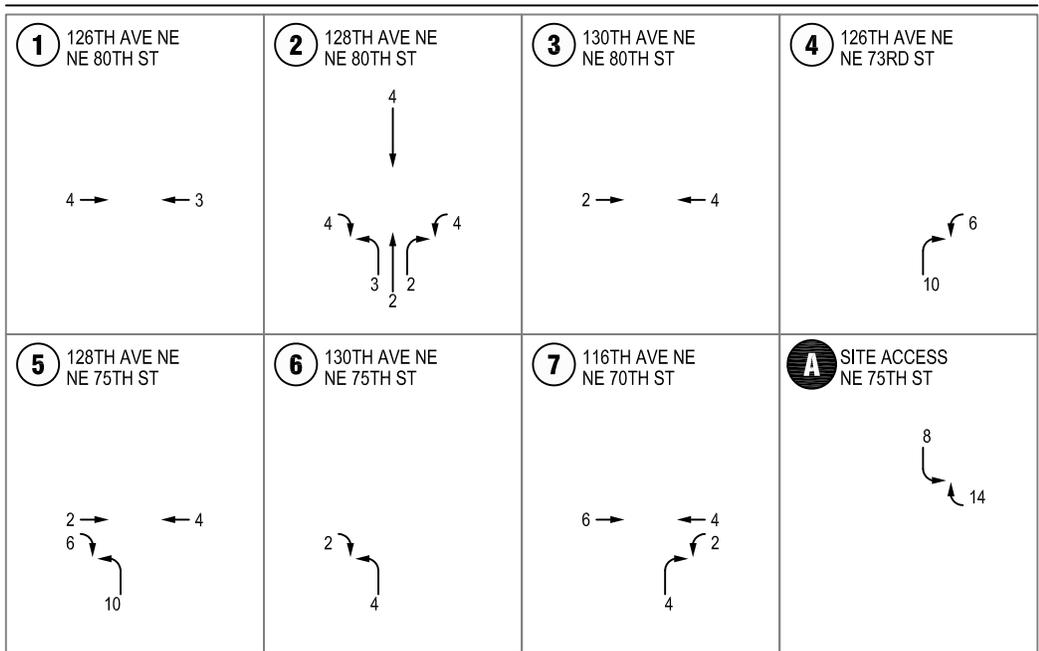
The net new project-generated traffic was added to without project traffic volumes to obtain 2015 with-project weekday peak hour traffic volumes for the study intersections and is illustrated in [Figure 6](#).



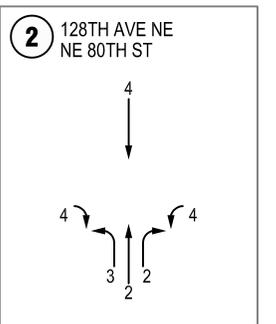
	IN	OUT	TOTAL
PM TRIPS	26	15	41
AM TRIPS	9	25	34

PM PEAK

AM PEAK



AFTERNOON PEAK



Trip Distribution and Assignment

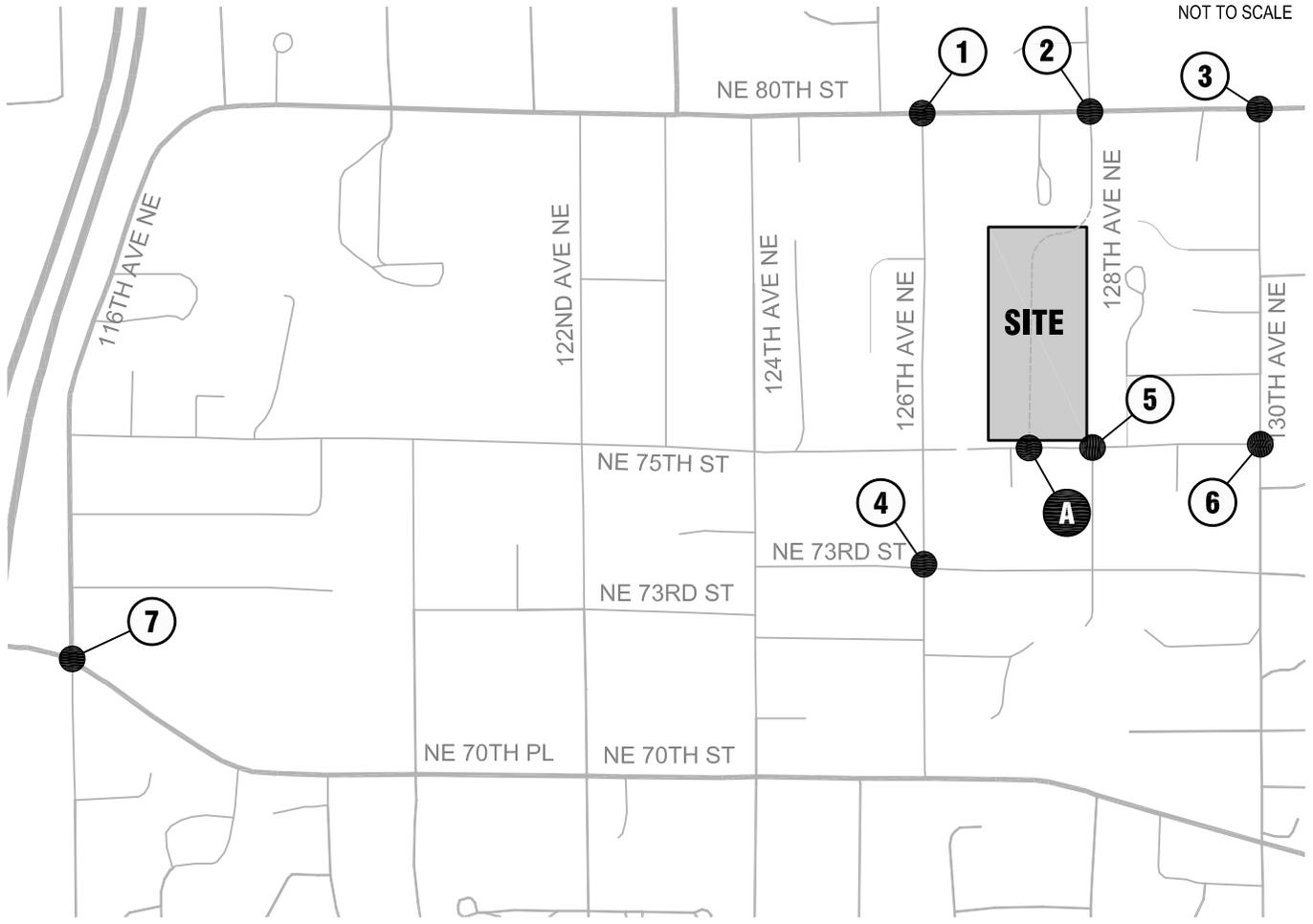
FIGURE

C and G Property



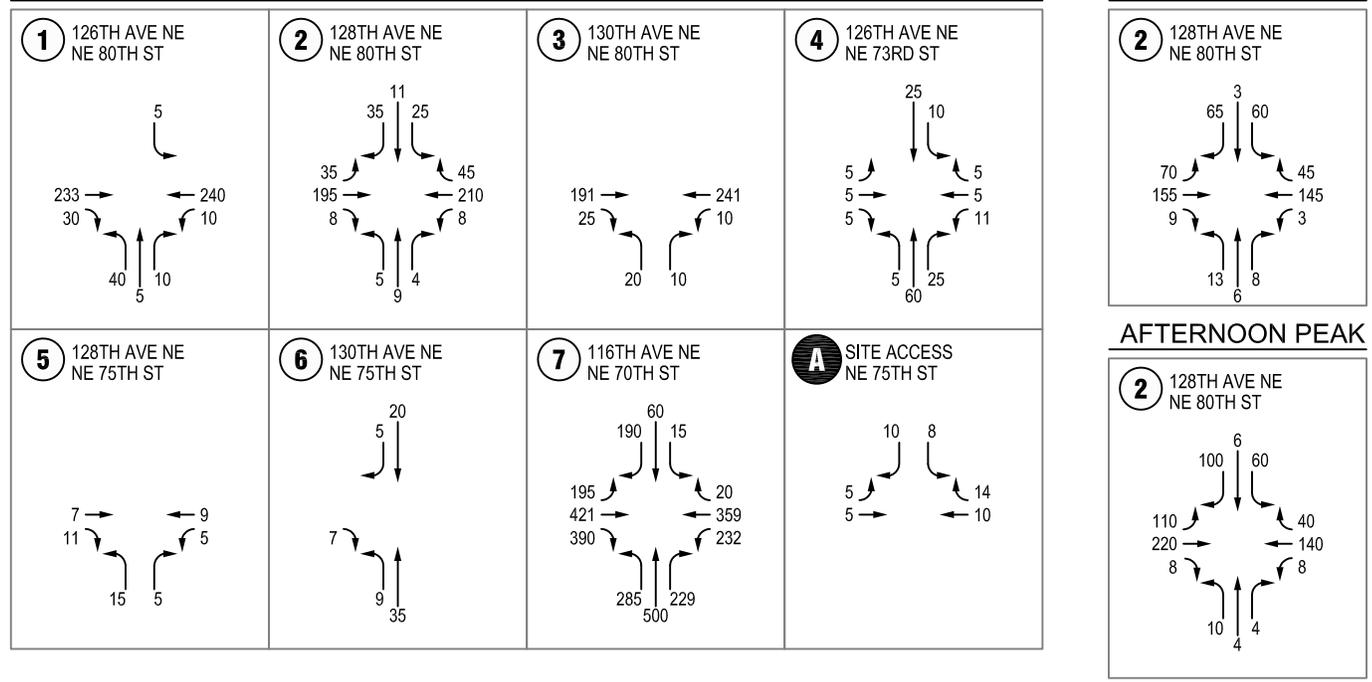


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PM PEAK

AM PEAK



Future With-Project Weekday Peak Hour Traffic Volumes

FIGURE

C and G Property



Traffic Operations Impact

Future with-project level of service analysis was conducted for the weekday AM, afternoon school peak, and PM peak hour to analyze traffic impacts of the proposed project. The same methodologies were applied and all intersection parameters such as channelization and intersection control were held consistent with those used in the evaluation of existing and without project conditions. Signal timing at the intersection of 116th Avenue NE / NE 70th Street were not optimized between without and with-project conditions. [Table 5](#) compares the 2015 without- and with-project traffic operations during the weekday AM, afternoon school peak, and PM peak hour. The detailed LOS worksheets are included in [Appendix D](#).

Table 5. Future Without- and With-Project LOS Summary

Intersection	2015 Without-Project			2015 With-Project		
	LOS ¹	Delay ²	WM ³	LOS	Delay	WM
Weekday AM Peak Hour						
128th Avenue NE / NE 80th Street	C	16.9	NB	C	16.5	SB
Weekday Afternoon Peak Hour						
128th Avenue NE / NE 80th Street	C	22.9	NB	C	20.7	NB
Weekday PM Peak Hour						
128th Avenue NE / NE 75th Street	A	8.9	EB	A	9.0	EB
126th Avenue NE / NE 73rd Street	A	9.4	WB	A	9.5	WB
126th Avenue NE / NE 80th Street	B	14.0	SB	B	14.2	SB
128th Avenue NE / NE 80th Street (Site Access)	B	13.7	NB	B	13.5	NB
130th Avenue NE / NE 80th Street	B	11.7	NB	B	11.8	NB
130th Avenue NE / NE 75th Street	A	8.5	EB	A	8.5	EB
116th Avenue NE / NE 70th Street	C	31.0	0.88	C	33.0	0.88
Site Access / NE 75th Street	-	-	-	A	8.6	SB

1. Level of Service as defined by the *Highway Capacity Manual* (TRB, 2010)
2. Average delay per vehicle in seconds.
3. Worst Movement reported for unsignalized intersections.

As shown in [Table 5](#) all study intersections are anticipated to continue operating at the same LOS as without project conditions. The delay at the study intersections is expected to increase by less than two seconds from without to with-project conditions.

Site Access

Access to the site is provided via a full access driveway on NE 75th Street and NE 80th Street. As shown in [Table 5](#) driveway operations at NE 75th Street are anticipated to operate at LOS B or better during the weekday PM peak hour. Intersection operations at NE 80th Street / 128th Avenue NE are anticipated to operate at LOS C or better during the weekday AM, afternoon school peak, and PM peak hour.

Sight Distance

A sight distance analysis was conducted at the site access points using the City of Kirkland *Sight Distance Guidelines*. Based on the side-street stop-controlled approach and the 25 mph speed limit on NE 80th Street and NE 75th Street, the required sight distance for a driver 14 feet back of the edge of traveled way is 280 feet east and west of the site access.

The edge of traveled way on NE 80th Street was assumed to be the bike lane, which is conservative as motorists often consider the edge of traveled way to be located at the edge of the vehicle travel lane. Results of the sight distance analysis are shown in **Table 6**. The sight distance triangles are shown in **Figure 7**.

Table 6. Driveway Sight Distance Analysis

Direction	Minimum (Required) ¹	Recommended (Desirable) ¹	Measured Distance	Met?
NE 80th Street / 128th Avenue NE				
East	150 feet	280 feet	270 feet	Yes
West	150 feet	280 feet	>300 feet	Yes
NE 75th Street / Site Access				
East	150 feet	280 feet	>280 feet	Yes
West	150 feet	280 feet	280 feet	Yes

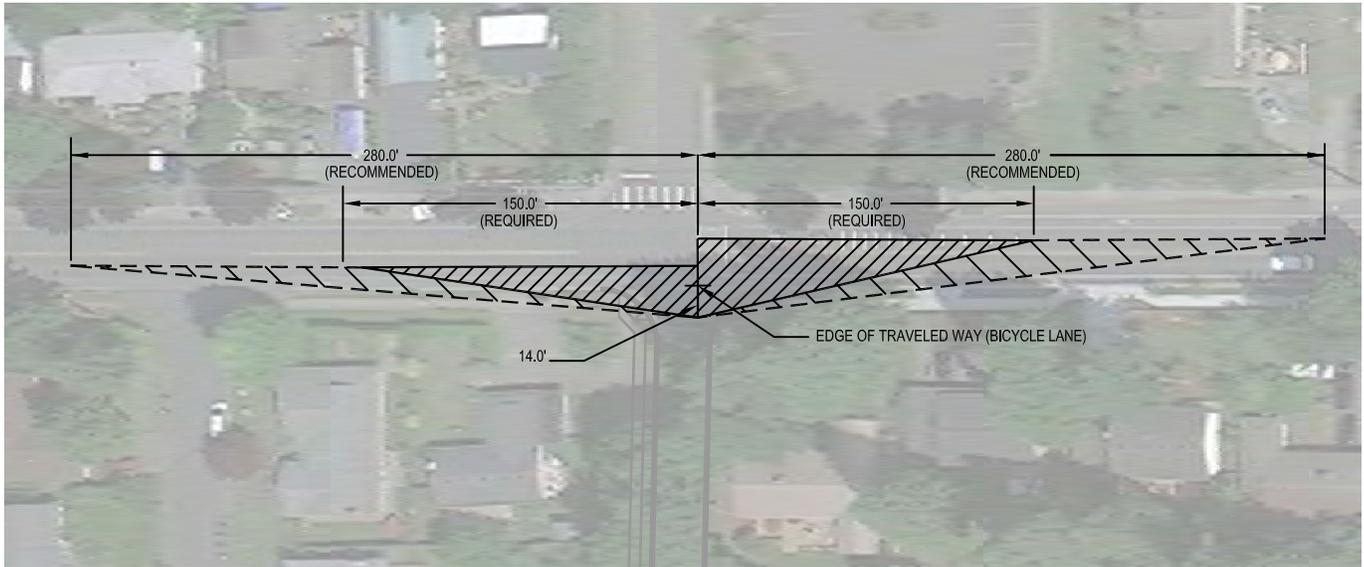
1. From City of Kirkland's *Sight Distance Guidelines* for intersection Type B (stop-controlled) with a roadway speed of 25 mph.

No vertical or horizontal obstructions from the roadway alignment within the defined sight triangle are present at the proposed site access locations. A tree east of the NE 80th Street access inhibits the view of drivers looking east when assuming the 14 foot setback from the edge of bike lane. With this obstruction, sight distance is reduced to 270 feet. Assuming the edge of traveled way is the vehicle travel lane increases sight distance to over 280 feet. With the development of the roadway frontage on NE 75th Street, landscaping and vegetation will need to be maintained to prevent any sight obstructions between 3 feet and 8 feet, per the City of Kirkland *Sight Distance Guidelines*.



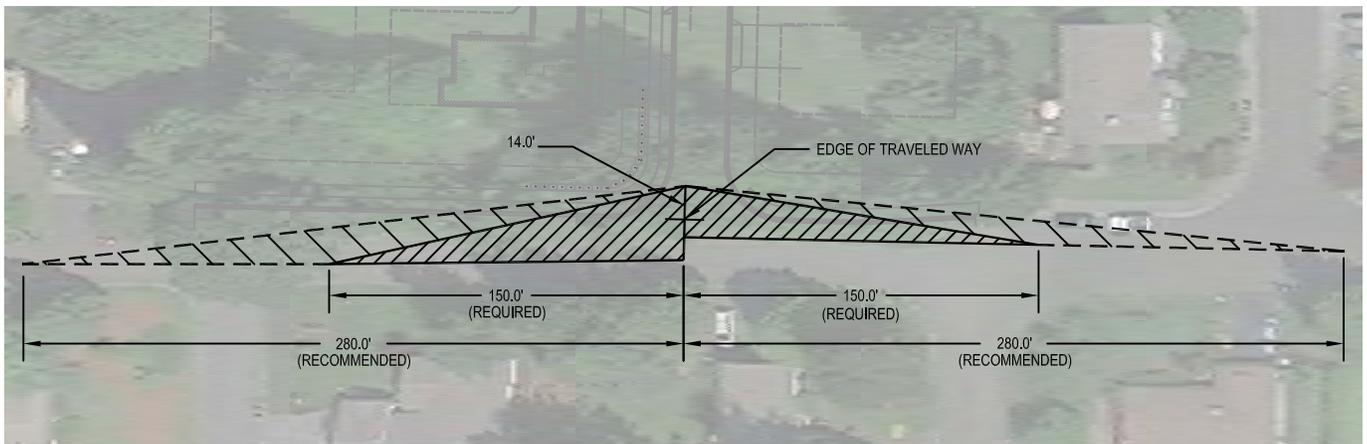
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NE 80th Street



- RECOMMENDED VERTICAL SIGHT DISTANCE CURRENTLY MET IN BOTH DIRECTIONS.
- RECOMMENDED HORIZONTAL SIGHT DISTANCE CURRENTLY MET TOWARDS THE WEST.
- REQUIRED HORIZONTAL SIGHT DISTANCE CURRENTLY MET TOWARDS THE EAST. RECOMMENDED SIGHT DISTANCE IS BLOCKED AT APPROXIMATELY 270 FEET BY TREE.

NE 75th Street



- RECOMMENDED HORIZONTAL AND VERTICAL SIGHT DISTANCE CURRENTLY MET IN BOTH DIRECTIONS.
- VEGETATION ALONG ROADWAY MUST BE MAINTAINED WITHIN SIGHT TRIANGLES BETWEEN 3 FEET AND 8 FEET.

Sight Distance

C and G Property

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Findings and Recommendations

This transportation impact analysis summarizes the potential project traffic related impacts of the proposed residential development in Kirkland, WA. The following outlines the general findings of the study.

- The proposed development is located north of NE 75th Street and east of 126th Avenue NE in the South Rose Hill Neighborhood and would include the construction of up to 35 single family homes. Access to the development is provided via NE 75th Street and NE 80th Street.
- The development is anticipated generate 400 daily trips with 34 weekday AM peak hour trips and 41 weekday PM peak hour trips.
- All study intersections would continue to operate at LOS C or better during with or without-project conditions.
- No off-site mitigation measures are required based on the analysis.
- Sight distance is met at both access driveways.

Appendix A: City of Kirkland Concurrency Results

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	85th St	# of Lanes* = 2	
Minor Street¹	128th Ave	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	15	24	6
Minor Street Volume $V_2 =$	15	30	0

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	1	1	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.15%
$P_2 = V_2 / (5,000 \times f_2) =$	0.30%
$P_3 = V_1 / (15,000 \times f_3) =$	0.10%
$P_4 = V_2 / (2,500 \times f_4) =$	0.60%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.23%
$S_2 = (P_3 + P_4) / 2 =$	0.35%

Intersection Proportional Share = Maximum of S1 and S2 = 0.35%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	116th Street	# of Lanes* = 1	
Minor Street¹	I-405 NB	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	15	30	0
Minor Street Volume $V_2 =$	15	30	0

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.18%
$P_2 = V_2 / (5,000 \times f_2) =$	0.30%
$P_3 = V_1 / (15,000 \times f_3) =$	0.12%
$P_4 = V_2 / (2,500 \times f_4) =$	0.60%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.24%
$S_2 = (P_3 + P_4) / 2 =$	0.36%

Intersection Proportional Share = Maximum of S1 and S2 = 0.36%
Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	70th Street	# of Lanes* = 1	
Minor Street¹	I-405 SB	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	30	50	10
Minor Street Volume $V_2 =$	25	50	0

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.36%
$P_2 = V_2 / (5,000 \times f_2) =$	0.50%
$P_3 = V_1 / (15,000 \times f_3) =$	0.24%
$P_4 = V_2 / (2,500 \times f_4) =$	1.00%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.43%
$S_2 = (P_3 + P_4) / 2 =$	0.62%

Intersection Proportional Share = Maximum of S1 and S2 = 0.62%
Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	NE 70th St	# of Lanes* = 1	
Minor Street¹	126th Ave	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	40	80	0
Minor Street Volume $V_2 =$	40	80	0

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.48%
$P_2 = V_2 / (5,000 \times f_2) =$	0.80%
$P_3 = V_1 / (15,000 \times f_3) =$	0.32%
$P_4 = V_2 / (2,500 \times f_4) =$	1.60%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.64%
$S_2 = (P_3 + P_4) / 2 =$	0.96%

Intersection Proportional Share = Maximum of S1 and S2 = 0.96%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	116th Avenue NE	# of Lanes* =	1
Minor Street¹	70th St	# of Lanes* =	1

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

3/20/1900

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	25	50	0
Minor Street Volume $V_2 =$	65	50	80

Major

Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$ 0.30%

$P_2 = V_2 / (5,000 \times f_2) =$ 1.30%

$P_3 = V_1 / (15,000 \times f_3) =$ 0.20%

$P_4 = V_2 / (2,500 \times f_4) =$ 2.60%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$ 0.80%

$S_2 = (P_3 + P_4) / 2 =$ 1.40%

Intersection Proportional Share = Maximum of S1 and S2 = 1.40%
Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee

Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	NE 70th Street	# of Lanes* = 1	
Minor Street¹	132nd Avenue NE	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	15	30	0
Minor Street Volume $V_2 =$	15	30	0

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.18%
$P_2 = V_2 / (5,000 \times f_2) =$	0.30%
$P_3 = V_1 / (15,000 \times f_3) =$	0.12%
$P_4 = V_2 / (2,500 \times f_4) =$	0.60%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.24%
$S_2 = (P_3 + P_4) / 2 =$	0.36%

Intersection Proportional Share = Maximum of S1 and S2 = 0.36%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	126th Ave Ne	# of Lanes* =	1
Minor Street¹	NE 75th St	# of Lanes* =	1

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	0	0	0
Minor Street Volume $V_2 =$	0	0	0

Major

Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$ 0.00%

$P_2 = V_2 / (5,000 \times f_2) =$ 0.00%

$P_3 = V_1 / (15,000 \times f_3) =$ 0.00%

$P_4 = V_2 / (2,500 \times f_4) =$ 0.00%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$ 0.00%

$S_2 = (P_3 + P_4) / 2 =$ 0.00%

Intersection Proportional Share = Maximum of S1 and S2 = 0.00%
Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee

Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	NE 80th St	# of Lanes* = 1	
Minor Street¹	128th Ave	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	30	30	30
Minor Street Volume $V_2 =$	60	90	30

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.36%
$P_2 = V_2 / (5,000 \times f_2) =$	1.20%
$P_3 = V_1 / (15,000 \times f_3) =$	0.24%
$P_4 = V_2 / (2,500 \times f_4) =$	2.40%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.78%
$S_2 = (P_3 + P_4) / 2 =$	1.32%

Intersection Proportional Share = Maximum of S1 and S2 = 1.32%
Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	NE 85th Street	# of Lanes* = 2	
Minor Street¹	120th Avenue NE	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	42.5	54	31
Minor Street Volume $V_2 =$	7.5	15	0

Major

Minor

***Do not leave cell empty for zero volume**

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	1	1	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.43%
$P_2 = V_2 / (5,000 \times f_2) =$	0.15%
$P_3 = V_1 / (15,000 \times f_3) =$	0.28%
$P_4 = V_2 / (2,500 \times f_4) =$	0.30%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.29%
$S_2 = (P_3 + P_4) / 2 =$	0.29%

Intersection Proportional Share = Maximum of S1 and S2 = 0.29%
Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	NE 85th Street	# of Lanes* =	2
Minor Street¹	124th Avenue NE	# of Lanes* =	1

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	31.5	39	24
Minor Street Volume $V_2 =$	11.5	8	15

Major

Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f ₁	f ₂	f ₃	f ₄
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f ₁	f ₂	f ₃	f ₄
1	1	1	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$ 0.32%

$P_2 = V_2 / (5,000 \times f_2) =$ 0.23%

$P_3 = V_1 / (15,000 \times f_3) =$ 0.21%

$P_4 = V_2 / (2,500 \times f_4) =$ 0.46%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$ 0.27%

$S_2 = (P_3 + P_4) / 2 =$ 0.34%

Intersection Proportional Share = Maximum of S1 and S2 = 0.34%
Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Proportional Share Impact Worksheet

Input appropriate information in green cells

¹ See "Intersection Description" worksheet for descriptions

Project Name:	C and G Property		Through Lanes¹
Major Street¹	NE 90th Street	# of Lanes* = 1	
Minor Street¹	124th Avenue NE	# of Lanes* = 1	

¹ May Change without notice, call Thang Nguyen 425-587-3869 with questions

DATE:

2/11/2013

Daily Project Traffic Entering the Intersection

(Total of both approaches divided by two)

(Total of both approaches divided by two)

	Daily Volumes	Entering Leg Volumes *	
Major Street Volume $V_1 =$	0	0	0
Minor Street Volume $V_2 =$	8	8	8

Major

Minor

*Do not leave cell empty for zero volume

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	1	0.833	1

Calculate Base Percentages

$P_1 = V_1 / (10,000 \times f_1) =$	0.00%
$P_2 = V_2 / (5,000 \times f_2) =$	0.16%
$P_3 = V_1 / (15,000 \times f_3) =$	0.00%
$P_4 = V_2 / (2,500 \times f_4) =$	0.32%

Calculate Proportional Share

$S_1 = (P_1 + P_2) / 2 =$	0.08%
$S_2 = (P_3 + P_4) / 2 =$	0.16%

Intersection Proportional Share = Maximum of S1 and S2 = 0.16%
Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Scott Lee
Company: Transpo Group

Appendix B: Traffic Volumes

Peak Hour Summary

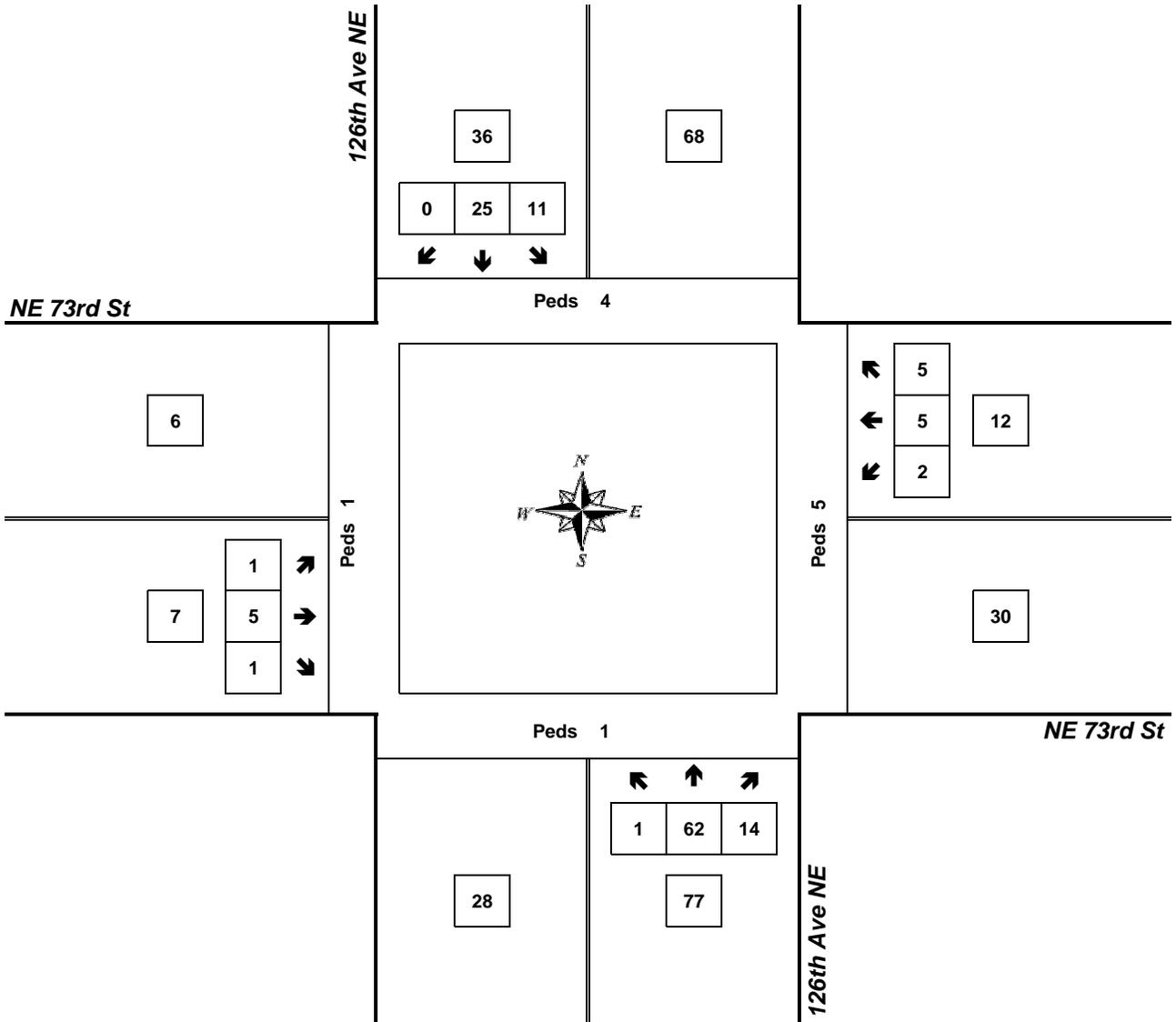


Mark Skaggs
(206) 251-0300

126th Ave NE & NE 73rd St

5:00 PM to 6:00 PM

Wednesday, February 22, 2012



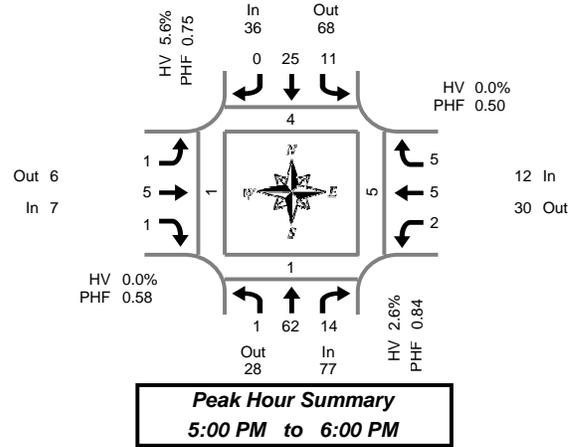
Approach	PHF	HV%	Volume
EB	0.58	0.0%	7
WB	0.50	0.0%	12
NB	0.84	2.6%	77
SB	0.75	5.6%	36
Intersection	0.92	3.0%	132

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



126th Ave NE & NE 73rd St

Wednesday, February 22, 2012
4:00 PM to 6:00 PM

15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	11	3	0	2	3	0	0	0	0	0	0	1	0	0	0	20	0	0	0	0
4:15 PM	0	4	2	0	0	4	0	0	0	0	0	0	0	1	2	0	13	0	1	1	0
4:30 PM	0	5	3	1	0	5	0	0	0	0	1	0	2	0	1	0	17	0	0	0	0
4:45 PM	0	13	3	0	2	4	1	0	0	1	0	0	0	4	0	0	28	0	0	0	0
5:00 PM	0	16	3	0	7	5	0	1	0	1	1	0	1	2	0	0	36	2	0	0	0
5:15 PM	1	14	3	0	1	8	0	0	0	3	0	0	1	1	4	0	36	1	0	4	0
5:30 PM	0	13	4	1	3	6	0	1	1	1	0	0	0	2	1	0	31	0	1	1	1
5:45 PM	0	19	4	1	0	6	0	0	0	0	0	0	0	0	0	0	29	1	0	0	0
Total Survey	1	95	25	3	15	41	1	2	1	6	2	0	5	10	8	0	210	4	2	6	1

Peak Hour Summary

5:00 PM to 6:00 PM

By Approach	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	77	28	105	2	36	68	104	2	7	6	13	0	12	30	42	0	132	4	1	5	1
%HV	2.6%				5.6%				0.0%				0.0%				3.0%				
PHF	0.84				0.75				0.58				0.50				0.92				

By Movement	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	1	62	14	77	11	25	0	36	1	5	1	7	2	5	5	12	132
PHF	0.25	0.82	0.88	0.84	0.39	0.78	0.00	0.75	0.25	0.42	0.25	0.58	0.50	0.63	0.31	0.50	0.92

Rolling Hour Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	33	11	1	4	16	1	0	0	1	1	0	3	5	3	0	78	0	1	1	0
4:15 PM	0	38	11	1	9	18	1	1	0	2	2	0	3	7	3	0	94	2	1	1	0
4:30 PM	1	48	12	1	10	22	1	1	0	5	2	0	4	7	5	0	117	3	0	4	0
4:45 PM	1	56	13	1	13	23	1	2	1	6	1	0	2	9	5	0	131	3	1	5	1
5:00 PM	1	62	14	2	11	25	0	2	1	5	1	0	2	5	5	0	132	4	1	5	1

Peak Hour Summary

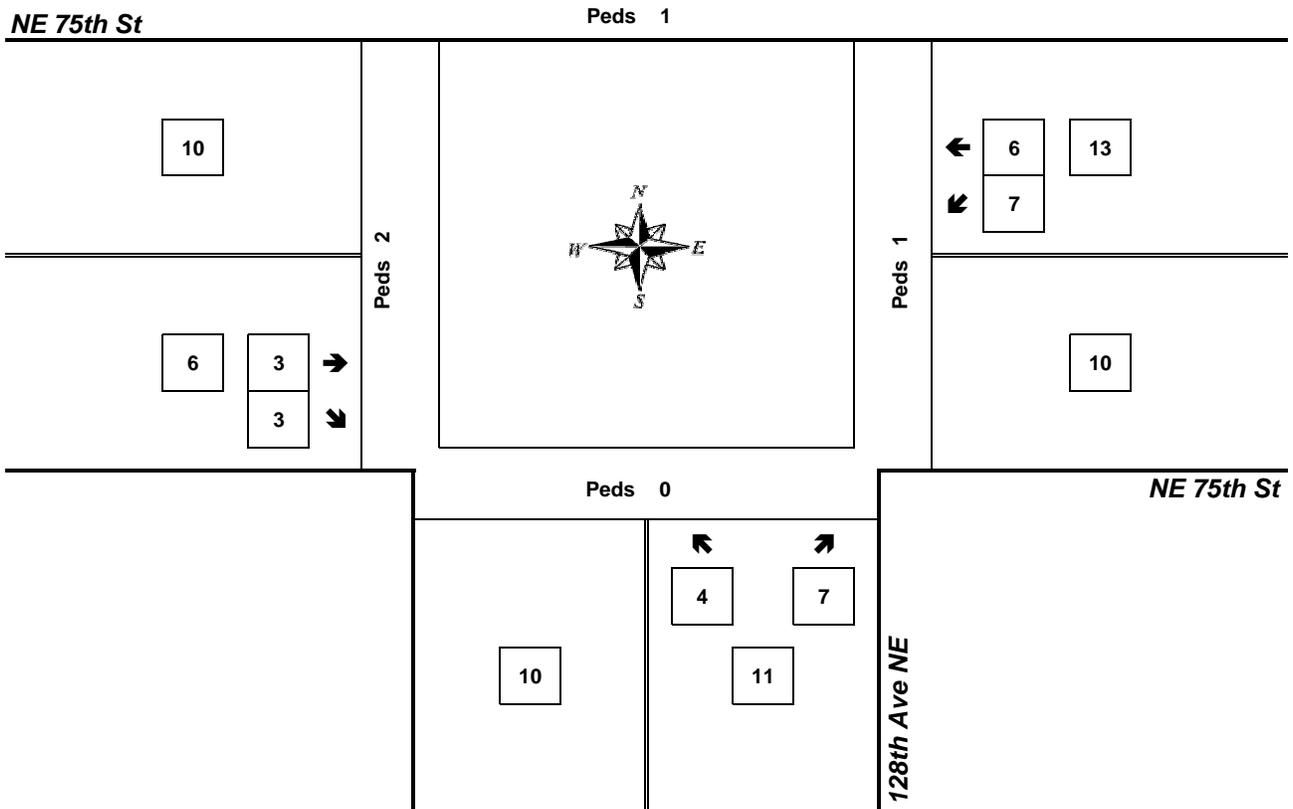


Mark Skaggs
(206) 251-0300

128th Ave NE & NE 75th St

4:30 PM to 5:30 PM

Wednesday, February 22, 2012



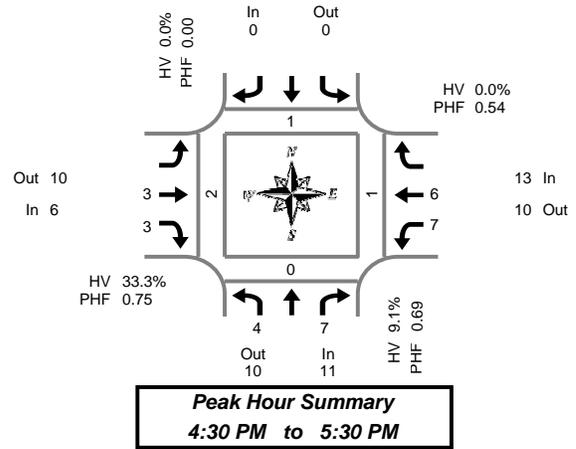
Approach	PHF	HV%	Volume
EB	0.75	33.3%	6
WB	0.54	0.0%	13
NB	0.69	9.1%	11
SB	0.00	0.0%	0
Intersection	0.75	10.0%	30

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



128th Ave NE & NE 75th St

Wednesday, February 22, 2012

4:00 PM to 6:00 PM

Peak Hour Summary
4:30 PM to 5:30 PM

15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 128th Ave NE			Southbound 128th Ave NE			Eastbound NE 75th St			Westbound NE 75th St			Interval Total	Pedestrians Crosswalk			
	L	R	HV				T	R	HV	L	T	HV		North	South	East	West
4:00 PM	2	1	0				2	0	0	0	0	0	5	0	0	0	0
4:15 PM	0	0	0				0	0	0	0	1	0	1	0	0	0	0
4:30 PM	2	1	1				0	2	2	1	1	0	7	0	0	0	0
4:45 PM	1	3	0				2	0	0	2	0	0	8	0	0	0	0
5:00 PM	0	2	0				0	0	0	3	0	0	5	1	0	1	2
5:15 PM	1	1	0				1	1	0	1	5	0	10	0	0	0	0
5:30 PM	1	2	0				0	0	0	0	0	0	3	0	0	0	0
5:45 PM	1	2	1				0	0	0	0	0	0	3	0	0	0	0
Total Survey	8	12	2				5	3	2	7	7	0	42	1	0	1	2

Peak Hour Summary

4:30 PM to 5:30 PM

By Approach	Northbound 128th Ave NE				Southbound 128th Ave NE			Eastbound NE 75th St				Westbound NE 75th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	11	10	21	1	0	0	0	6	10	16	2	13	10	23	0	30	1	0	1	2
%HV	9.1%				0.0%			33.3%				0.0%				10.0%				
PHF	0.69				0.00			0.75				0.54				0.75				

By Movement	Northbound 128th Ave NE			Southbound 128th Ave NE			Eastbound NE 75th St			Westbound NE 75th St			Total
	L	R	Total			Total	T	R	Total	L	T	Total	
Volume	4	7	11			0	3	3	6	7	6	13	30
PHF	0.50	0.58	0.69			0.00	0.38	0.38	0.75	0.58	0.30	0.54	0.75

Rolling Hour Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 128th Ave NE			Southbound 128th Ave NE			Eastbound NE 75th St			Westbound NE 75th St			Interval Total	Pedestrians Crosswalk			
	L	R	HV				T	R	HV	L	T	HV		North	South	East	West
4:00 PM	5	5	1				4	2	2	3	2	0	21	0	0	0	0
4:15 PM	3	6	1				2	2	2	6	2	0	21	1	0	1	2
4:30 PM	4	7	1				3	3	2	7	6	0	30	1	0	1	2
4:45 PM	3	8	0				3	1	0	6	5	0	26	1	0	1	2
5:00 PM	3	7	1				1	1	0	4	5	0	21	1	0	1	2

Peak Hour Summary

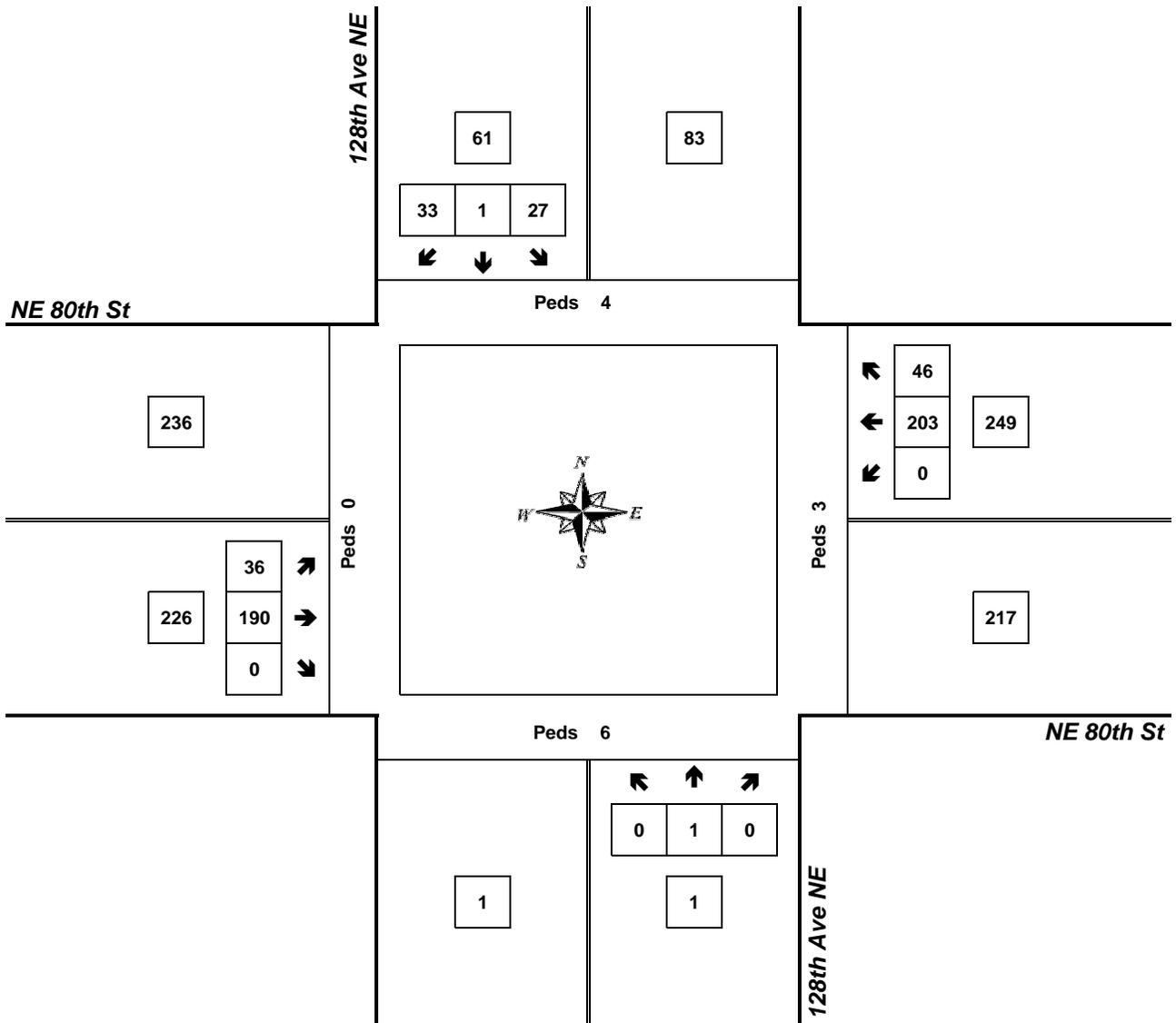


Mark Skaggs
(206) 251-0300

128th Ave NE & NE 80th St

5:00 PM to 6:00 PM

Wednesday, February 22, 2012



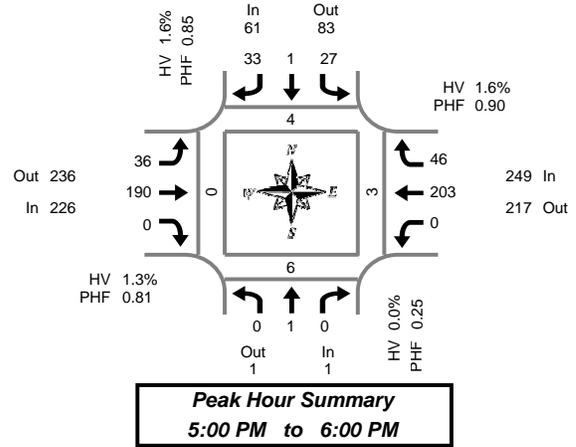
Approach	PHF	HV%	Volume
EB	0.81	1.3%	226
WB	0.90	1.6%	249
NB	0.25	0.0%	1
SB	0.85	1.6%	61
Intersection	0.93	1.5%	537

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



128th Ave NE & NE 80th St

Wednesday, February 22, 2012

4:00 PM to 6:00 PM

15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	0	0	0	4	0	6	0	4	19	0	1	0	27	9	0	69	3	4	4	0
4:15 PM	0	0	0	0	2	0	9	1	8	30	0	1	0	35	5	1	89	1	0	0	0
4:30 PM	0	0	0	0	3	0	3	0	5	28	0	1	0	30	2	0	71	4	5	0	0
4:45 PM	0	0	0	0	7	1	6	0	10	34	1	0	0	40	6	1	105	0	5	0	0
5:00 PM	0	0	0	0	3	1	8	0	5	47	0	1	0	54	10	0	128	0	1	2	0
5:15 PM	0	1	0	0	6	0	8	0	15	55	0	0	0	51	8	1	144	1	3	1	0
5:30 PM	0	0	0	0	9	0	9	1	7	49	0	1	0	55	14	1	143	2	2	0	0
5:45 PM	0	0	0	0	9	0	8	0	9	39	0	1	0	43	14	2	122	1	0	0	0
Total Survey	0	1	0	0	43	2	57	2	63	301	1	6	0	335	68	6	871	12	20	7	0

Peak Hour Summary

5:00 PM to 6:00 PM

By Approach	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	1	1	2	0	61	83	144	1	226	236	462	3	249	217	466	4	537	4	6	3	0
%HV	0.0%				1.6%				1.3%				1.6%				1.5%				
PHF	0.25				0.85				0.81				0.90				0.93				

By Movement	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	1	0	1	27	1	33	61	36	190	0	226	0	203	46	249	537
PHF	0.00	0.25	0.00	0.25	0.75	0.25	0.92	0.85	0.60	0.86	0.00	0.81	0.00	0.92	0.82	0.90	0.93

Rolling Hour Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	0	0	0	16	1	24	1	27	111	1	3	0	132	22	2	334	8	14	4	0
4:15 PM	0	0	0	0	15	2	26	1	28	139	1	3	0	159	23	2	393	5	11	2	0
4:30 PM	0	1	0	0	19	2	25	0	35	164	1	2	0	175	26	2	448	5	14	3	0
4:45 PM	0	1	0	0	25	2	31	1	37	185	1	2	0	200	38	3	520	3	11	3	0
5:00 PM	0	1	0	0	27	1	33	1	36	190	0	3	0	203	46	4	537	4	6	3	0

Peak Hour Summary

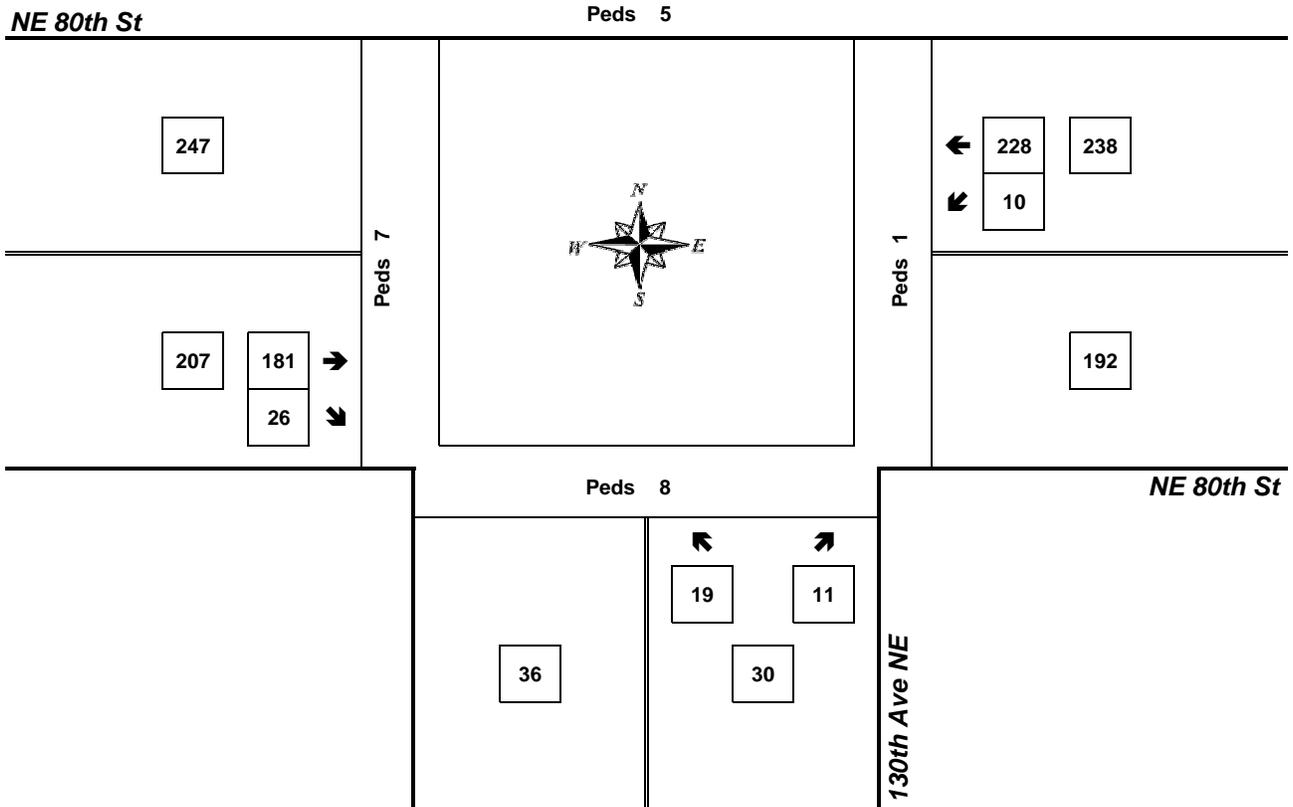


Mark Skaggs
(206) 251-0300

130th Ave NE & NE 80th St

5:00 PM to 6:00 PM

Wednesday, February 22, 2012



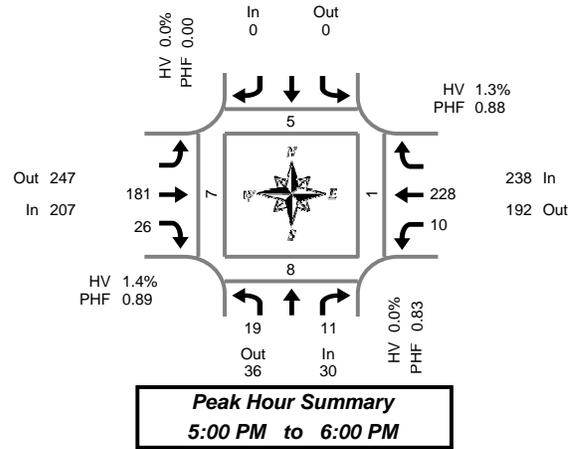
Approach	PHF	HV%	Volume
EB	0.89	1.4%	207
WB	0.88	1.3%	238
NB	0.83	0.0%	30
SB	0.00	0.0%	0
Intersection	0.88	1.3%	475

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



130th Ave NE & NE 80th St

Wednesday, February 22, 2012

4:00 PM to 6:00 PM

15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 130th Ave NE			Southbound 130th Ave NE			Eastbound NE 80th St			Westbound NE 80th St			Interval Total	Pedestrians Crosswalk			
	L	R	HV				T	R	HV	L	T	HV		North	South	East	West
4:00 PM	2	4	1				18	1	1	0	32	0	57	0	1	0	2
4:15 PM	3	4	0				31	2	0	4	33	0	77	4	0	0	1
4:30 PM	3	3	0				28	1	2	0	30	2	65	7	1	0	0
4:45 PM	5	4	1				39	4	0	2	45	0	99	0	2	0	0
5:00 PM	5	2	0				42	5	1	0	53	1	107	2	3	0	0
5:15 PM	4	2	0				48	9	0	4	53	1	120	0	1	0	2
5:30 PM	4	5	0				53	5	1	3	65	1	135	2	4	1	5
5:45 PM	6	2	0				38	7	1	3	57	0	113	1	0	0	0
Total Survey	32		26	2			297	34	6	16	368	5	773	16	12	1	10

Peak Hour Summary

5:00 PM to 6:00 PM

By Approach	Northbound 130th Ave NE				Southbound 130th Ave NE			Eastbound NE 80th St				Westbound NE 80th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	30	36	66	0	0	0	0	207	247	454	3	238	192	430	3	475	5	8	1	7
%HV	0.0%				0.0%			1.4%				1.3%				1.3%				
PHF	0.83				0.00			0.89				0.88				0.88				

By Movement	Northbound 130th Ave NE			Southbound 130th Ave NE			Eastbound NE 80th St			Westbound NE 80th St			Total
	L	R	Total			Total	T	R	Total	L	T	Total	
Volume	19	11	30			0	181	26	207	10	228	238	475
PHF	0.79	0.55	0.83			0.00	0.85	0.72	0.89	0.63	0.88	0.88	0.88

Rolling Hour Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 130th Ave NE			Southbound 130th Ave NE			Eastbound NE 80th St			Westbound NE 80th St			Interval Total	Pedestrians Crosswalk			
	L	R	HV				T	R	HV	L	T	HV		North	South	East	West
4:00 PM	13	15	2				116	8	3	6	140	2	298	11	4	0	3
4:15 PM	16	13	1				140	12	3	6	161	3	348	13	6	0	1
4:30 PM	17	11	1				157	19	3	6	181	4	391	9	7	0	2
4:45 PM	18	13	1				182	23	2	9	216	3	461	4	10	1	7
5:00 PM	19	11	0				181	26	3	10	228	3	475	5	8	1	7

Peak Hour Summary

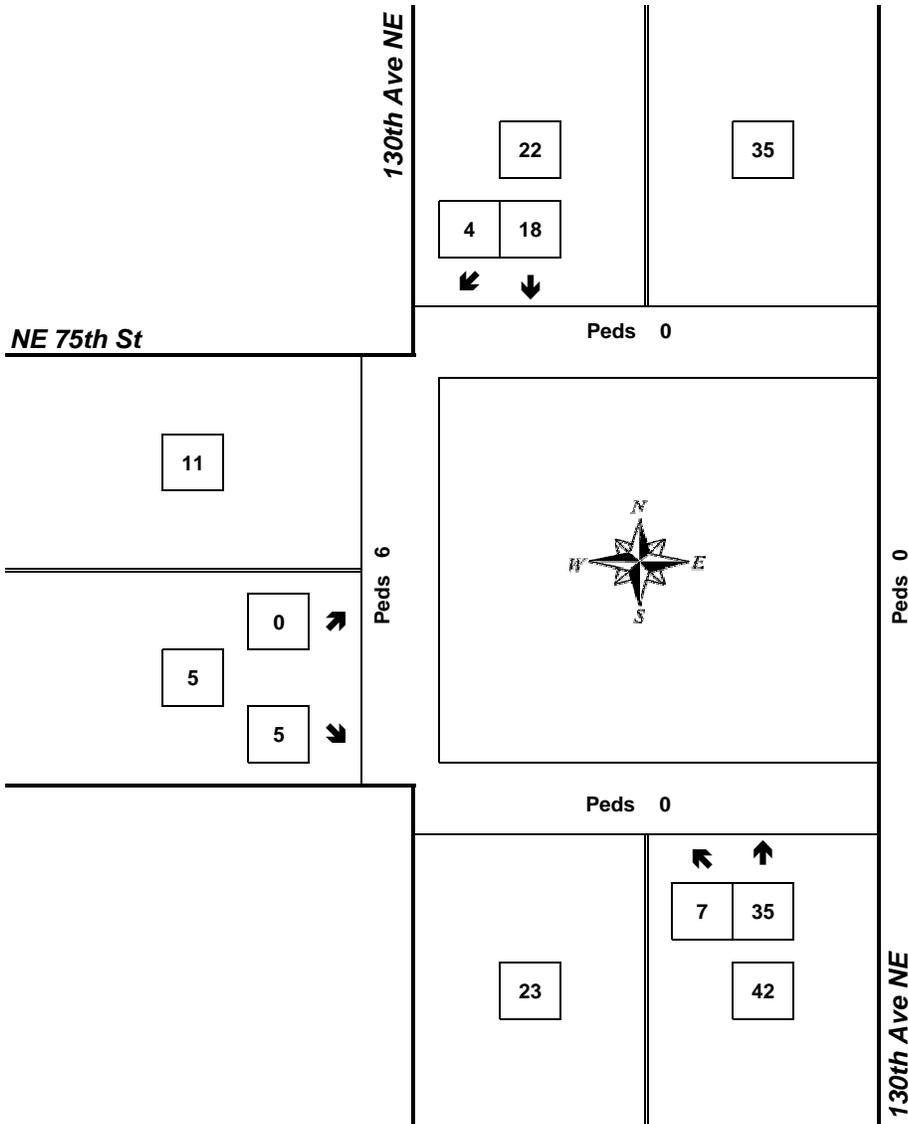


Mark Skaggs
(206) 251-0300

130th Ave NE & NE 75th St

4:45 PM to 5:45 PM

Wednesday, February 22, 2012



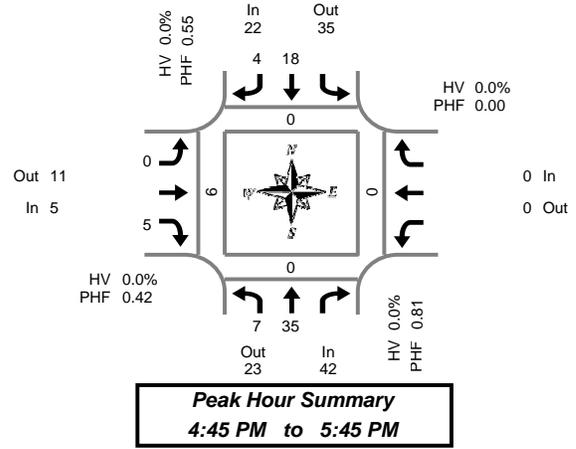
Approach	PHF	HV%	Volume
EB	0.42	0.0%	5
WB	0.00	0.0%	0
NB	0.81	0.0%	42
SB	0.55	0.0%	22
Intersection	0.75	0.0%	69

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



130th Ave NE & NE 75th St

Wednesday, February 22, 2012
4:00 PM to 6:00 PM

15-Minute Interval Summary 4:00 PM to 6:00 PM

Interval Start Time	Northbound 130th Ave NE			Southbound 130th Ave NE			Eastbound NE 75th St			Westbound NE 75th St			Interval Total	Pedestrians Crosswalk			
	L	T	HV	T	R	HV	L	R	HV	In	Out	Total		North	South	East	West
4:00 PM	2	6	0	3	0	0	1	1	0	0	0	0	13	0	0	0	2
4:15 PM	1	7	0	5	1	0	1	1	0	0	0	0	16	0	0	0	0
4:30 PM	1	2	0	0	0	0	0	1	1	0	0	0	4	0	0	0	1
4:45 PM	1	8	0	4	1	0	0	2	0	0	0	0	16	0	0	0	1
5:00 PM	0	8	0	1	1	0	0	3	0	0	0	0	13	0	0	0	3
5:15 PM	3	10	0	8	2	0	0	0	0	0	0	0	23	0	0	0	0
5:30 PM	3	9	0	5	0	0	0	0	0	0	0	0	17	0	0	0	2
5:45 PM	2	4	0	5	1	0	1	0	0	0	0	0	13	0	0	0	0
Total Survey	13	54	0	31	6	0	3	8	1	0	0	0	115	0	0	0	9

Peak Hour Summary 4:45 PM to 5:45 PM

By Approach	Northbound 130th Ave NE				Southbound 130th Ave NE				Eastbound NE 75th St				Westbound NE 75th St			Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total		North	South	East	West
Volume	42	23	65	0	22	35	57	0	5	11	16	0	0	0	0	69	0	0	0	6
%HV	0.0%				0.0%				0.0%				0.0%			0.0%				
PHF	0.81				0.55				0.42				0.00			0.75				

By Movement	Northbound 130th Ave NE			Southbound 130th Ave NE			Eastbound NE 75th St			Westbound NE 75th St			Total
	L	T	Total	T	R	Total	L	R	Total	In	Out	Total	
Volume	7	35	42	18	4	22	0	5	5	0	0	0	69
PHF	0.58	0.88	0.81	0.56	0.50	0.55	0.00	0.42	0.42	0.00	0.00	0.00	0.75

Rolling Hour Summary 4:00 PM to 6:00 PM

Interval Start Time	Northbound 130th Ave NE			Southbound 130th Ave NE			Eastbound NE 75th St			Westbound NE 75th St			Interval Total	Pedestrians Crosswalk			
	L	T	HV	T	R	HV	L	R	HV	In	Out	Total		North	South	East	West
4:00 PM	5	23	0	12	2	0	2	5	1	0	0	0	49	0	0	0	4
4:15 PM	3	25	0	10	3	0	1	7	1	0	0	0	49	0	0	0	5
4:30 PM	5	28	0	13	4	0	0	6	1	0	0	0	56	0	0	0	5
4:45 PM	7	35	0	18	4	0	0	5	0	0	0	0	69	0	0	0	6
5:00 PM	8	31	0	19	4	0	1	3	0	0	0	0	66	0	0	0	5

Peak Hour Summary

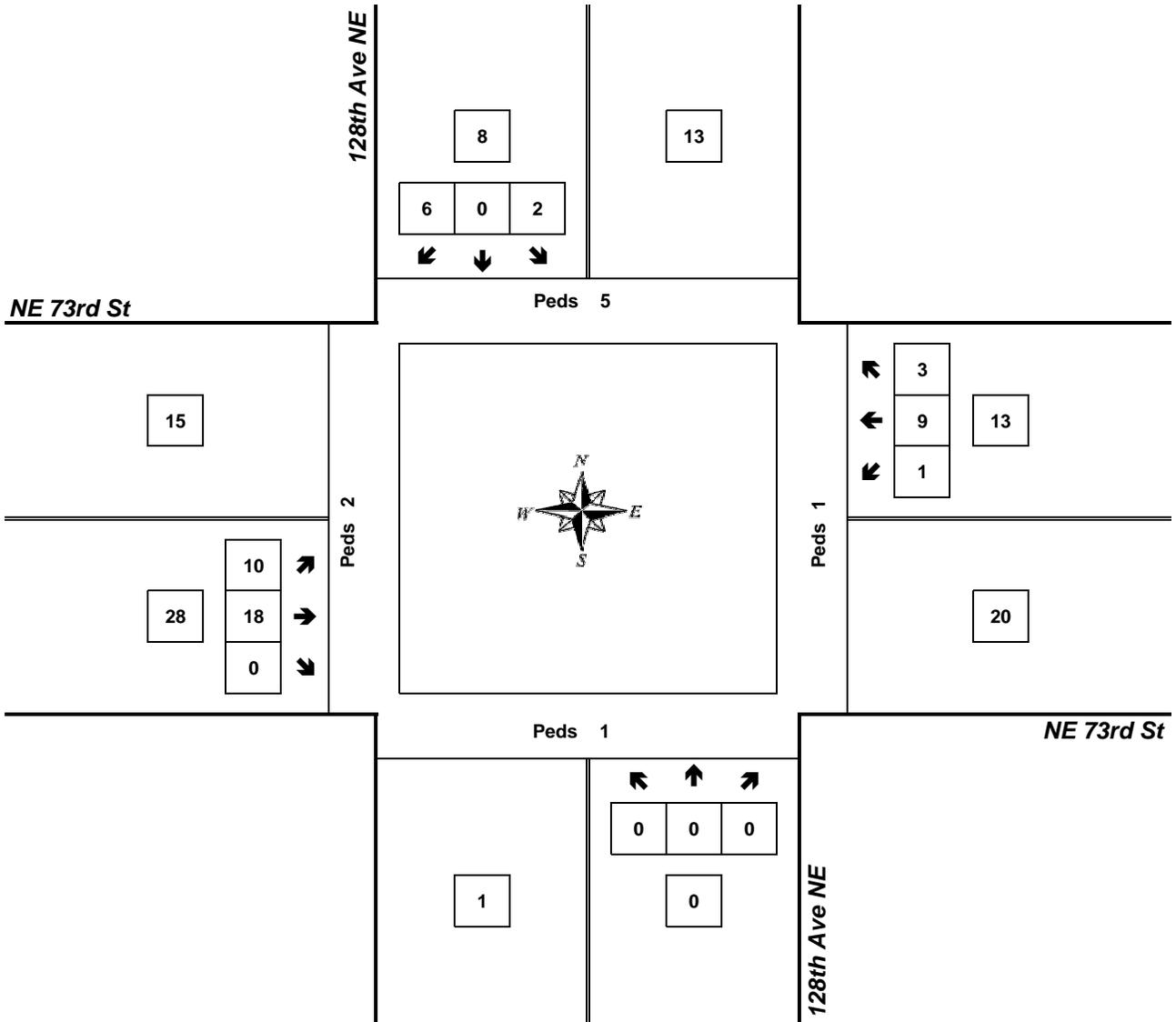


Mark Skaggs
(206) 251-0300

128th Ave NE & NE 73rd St

4:45 PM to 5:45 PM

Wednesday, February 22, 2012



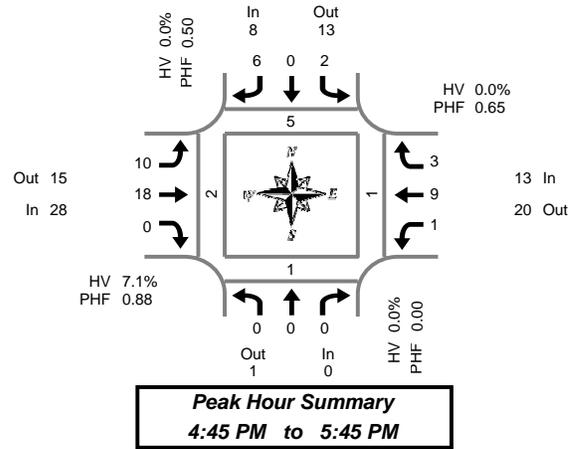
Approach	PHF	HV%	Volume
EB	0.88	7.1%	28
WB	0.65	0.0%	13
NB	0.00	0.0%	0
SB	0.50	0.0%	8
Intersection	0.94	4.1%	49

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



128th Ave NE & NE 73rd St

Wednesday, February 22, 2012
4:00 PM to 6:00 PM

15-Minute Interval Summary 4:00 PM to 6:00 PM

Interval Start Time	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	0	0	0	1	0	1	0	4	2	0	1	0	1	1	1	10	4	0	0	0
4:15 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	3	0	0	0	0
4:30 PM	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	4	1	0	1	1
4:45 PM	0	0	0	0	0	0	1	0	3	3	0	0	0	4	1	0	12	1	0	1	1
5:00 PM	0	0	0	0	2	0	2	0	3	5	0	1	0	1	0	0	13	2	0	0	1
5:15 PM	0	0	0	0	0	0	3	0	2	4	0	0	1	1	1	0	12	1	1	0	0
5:30 PM	0	0	0	0	0	0	0	0	2	6	0	1	0	3	1	0	12	1	0	0	0
5:45 PM	0	0	0	0	0	0	0	0	3	2	0	1	0	1	1	0	7	3	4	0	0
Total Survey	0	0	0	0	3	0	8	0	18	23	1	4	1	14	5	1	73	13	5	2	3

Peak Hour Summary 4:45 PM to 5:45 PM

By Approach	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	0	1	1	0	8	13	21	0	28	15	43	2	13	20	33	0	49	5	1	1	2
%HV	0.0%				0.0%				7.1%				0.0%				4.1%				
PHF	0.00				0.50				0.88				0.65				0.94				

By Movement	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	0	0	0	2	0	6	8	10	18	0	28	1	9	3	13	49
PHF	0.00	0.00	0.00	0.00	0.25	0.00	0.50	0.50	0.83	0.75	0.00	0.88	0.25	0.56	0.75	0.65	0.94

Rolling Hour Summary 4:00 PM to 6:00 PM

Interval Start Time	Northbound 128th Ave NE				Southbound 128th Ave NE				Eastbound NE 73rd St				Westbound NE 73rd St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	0	0	0	1	0	3	0	8	6	1	1	0	8	2	1	29	6	0	2	2
4:15 PM	0	0	0	0	2	0	4	0	7	9	1	1	0	8	1	0	32	4	0	2	3
4:30 PM	0	0	0	0	2	0	7	0	9	12	1	1	1	7	2	0	41	5	1	2	3
4:45 PM	0	0	0	0	2	0	6	0	10	18	0	2	1	9	3	0	49	5	1	1	2
5:00 PM	0	0	0	0	2	0	5	0	10	17	0	3	1	6	3	0	44	7	5	0	1

Peak Hour Summary

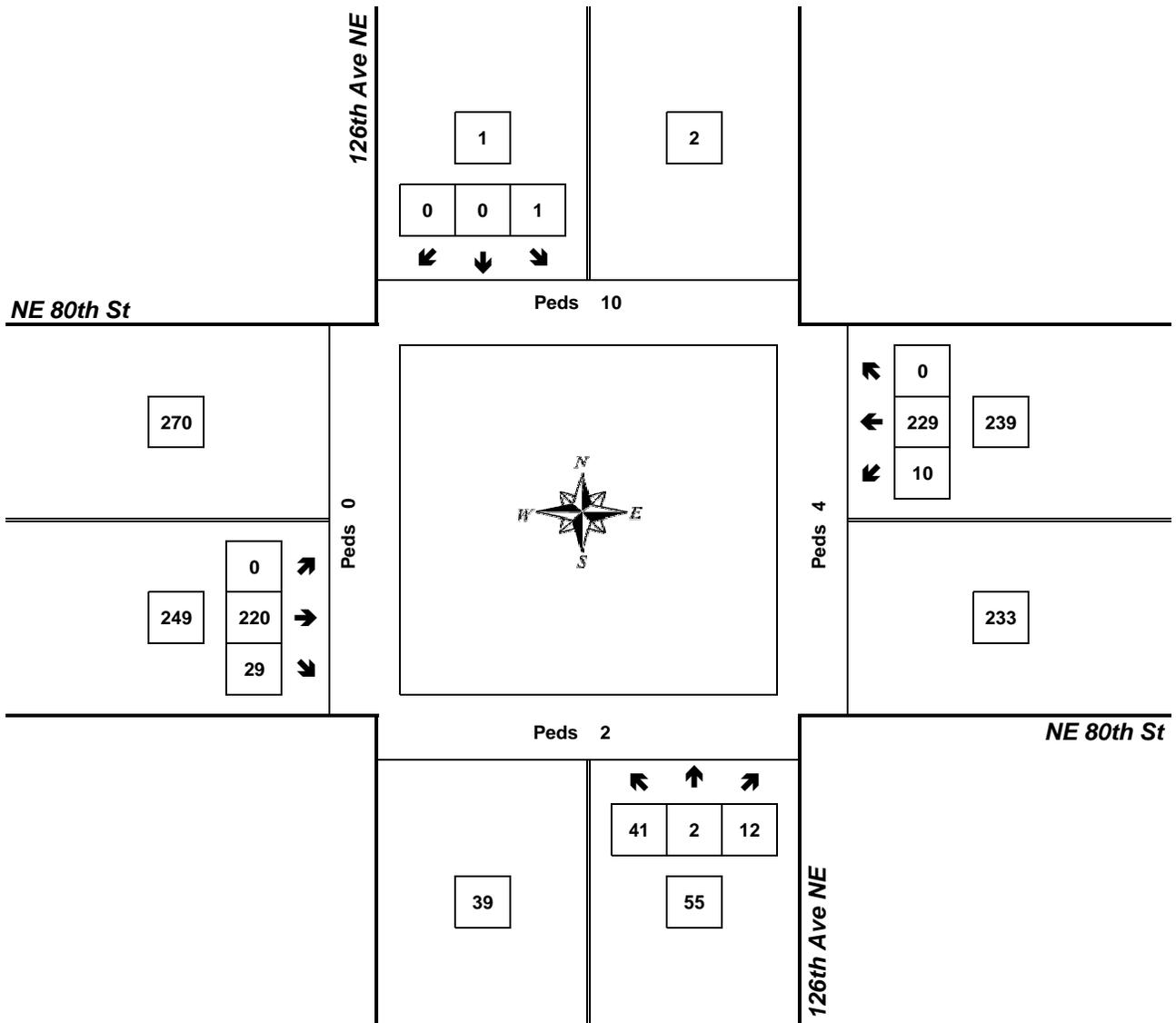


Mark Skaggs
(206) 251-0300

126th Ave NE & NE 80th St

5:00 PM to 6:00 PM

Wednesday, February 22, 2012



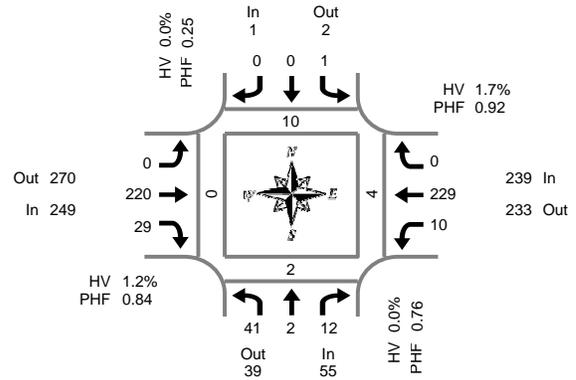
Approach	PHF	HV%	Volume
EB	0.84	1.2%	249
WB	0.92	1.7%	239
NB	0.76	0.0%	55
SB	0.25	0.0%	1
Intersection	0.89	1.3%	544

Count Period: 4:00 PM to 6:00 PM

Total Vehicle Summary



Mark Skaggs
(206) 251-0300



Peak Hour Summary
5:00 PM to 6:00 PM

126th Ave NE & NE 80th St

Wednesday, February 22, 2012

4:00 PM to 6:00 PM

15-Minute Interval Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	8	0	1	0	0	0	0	0	0	19	6	2	1	31	0	0	66	0	2	0	0
4:15 PM	3	0	3	0	0	0	0	0	0	37	4	1	1	42	0	1	90	2	0	1	1
4:30 PM	7	0	2	1	0	0	0	0	0	30	5	1	4	30	0	0	78	4	0	0	0
4:45 PM	10	0	2	0	0	0	0	0	0	44	5	0	1	43	0	1	105	2	0	2	0
5:00 PM	10	2	3	0	1	0	0	0	0	53	9	0	3	61	0	0	142	0	0	0	0
5:15 PM	14	0	4	0	0	0	0	0	0	67	7	1	5	55	0	1	152	4	1	0	0
5:30 PM	8	0	1	0	0	0	0	0	0	61	6	1	1	64	0	2	141	2	1	2	0
5:45 PM	9	0	4	0	0	0	0	0	0	39	7	1	1	49	0	1	109	4	0	2	0
Total Survey	69	2	20	1	1	0	0	0	0	350	49	7	17	375	0	6	883	18	4	7	1

Peak Hour Summary

5:00 PM to 6:00 PM

By Approach	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	55	39	94	0	1	2	3	0	249	270	519	3	239	233	472	4	544	10	2	4	0
%HV	0.0%				0.0%				1.2%				1.7%				1.3%				
PHF	0.76				0.25				0.84				0.92				0.89				

By Movement	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Total				
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total					
Volume	41	2	12	55	1	0	0	1	0	220	29	249	10	229	0	239	544				
PHF	0.73	0.25	0.75	0.76	0.25	0.00	0.00	0.25	0.00	0.82	0.81	0.84	0.50	0.89	0.00	0.92	0.89				

Rolling Hour Summary

4:00 PM to 6:00 PM

Interval Start Time	Northbound 126th Ave NE				Southbound 126th Ave NE				Eastbound NE 80th St				Westbound NE 80th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	28	0	8	1	0	0	0	0	0	130	20	4	7	146	0	2	339	8	2	3	1
4:15 PM	30	2	10	1	1	0	0	0	0	164	23	2	9	176	0	2	415	8	0	3	1
4:30 PM	41	2	11	1	1	0	0	0	0	194	26	2	13	189	0	2	477	10	1	2	0
4:45 PM	42	2	10	0	1	0	0	0	0	225	27	2	10	223	0	4	540	8	2	4	0
5:00 PM	41	2	12	0	1	0	0	0	0	220	29	3	10	229	0	4	544	10	2	4	0



Prepared for: **Transpo Group**
Traffic Count Consultants, Inc.

Phone: (253) 926-6009 FAX: (253) 922-7211 E-Mail: Team@TC2inc.com

WBE/DBE

Intersection: 116th Ave NE & NE 70th PI
 Location: Kirkland, Washington

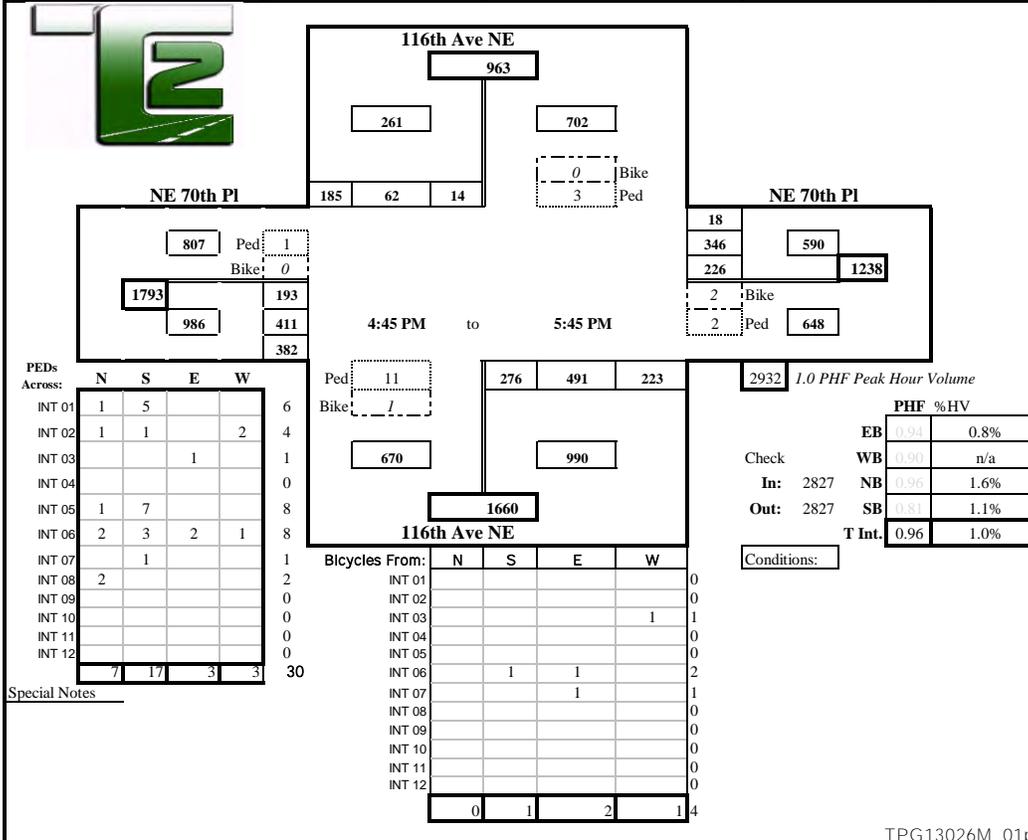
Date of Count: Wed 02/13/2013
 Checked By: Jess

Time Interval Ending at	From North on (SB) 116th Ave NE				From South on (NB) 116th Ave NE				From East on (WB) NE 70th PI				From West on (EB) NE 70th PI				Interval Total
	T	L	S	R	T	L	S	R	T	L	S	R	T	L	S	R	
4:15 P	1	4	28	20	6	81	100	44	3	42	81	4	3	29	95	104	632
4:30 P	0	5	15	20	5	93	117	46	0	46	77	11	2	36	111	90	667
4:45 P	2	5	16	42	5	66	95	60	1	56	83	5	2	35	93	87	643
5:00 P	0	1	18	62	2	68	123	56	0	52	75	3	3	47	85	98	688
5:15 P	1	5	10	42	7	67	111	62	0	65	75	3	2	56	105	84	685
5:30 P	1	3	15	45	2	66	125	55	0	60	96	7	1	43	115	103	733
5:45 P	1	5	19	36	5	75	132	50	0	49	100	5	2	47	106	97	721
6:00 P	1	3	23	42	4	50	91	78	0	61	113	2	1	31	102	85	681
6:15 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:30 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:45 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00 P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Total Survey	7	31	144	309	36	566	894	451	4	431	700	40	16	324	812	748	5450
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Peak Hour: 4:45 PM to 5:45 PM

Total	3	14	62	185	16	276	491	223	0	226	346	18	8	193	411	382	2827
Approach	261				990				590				986				2827
%HV	1.1%				1.6%				n/a				0.8%				1.0%
PHF	0.81				0.96				0.90				0.94				0.96



Appendix C: LOS Definitions

Highway Capacity Manual, 2000

Signalized intersection level of service (LOS) is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. Specifically, LOS criteria are stated in terms of average delay per vehicle during a specified time period (for example, the PM peak hour). Vehicle delay is a complex measure based on many variables, including signal phasing (i.e., progression of movements through the intersection), signal cycle length, and traffic volumes with respect to intersection capacity. Table 1 shows LOS criteria for signalized intersections, as described in the *Highway Capacity Manual* (Transportation Research Board, Special Report 209, 2000).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (sec/veh)	General Description (Signalized Intersections)
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	>80	Forced flow (jammed)

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

Unsignalized intersection LOS criteria can be further reduced into two intersection types: all-way stop-controlled and two-way stop-controlled. All-way, stop-controlled intersection LOS is expressed in terms of the average vehicle delay of all of the movements, much like that of a signalized intersection. Two-way, stop-controlled intersection LOS is defined in terms of the average vehicle delay of an individual movement(s). This is because the performance of a two-way, stop-controlled intersection is more closely reflected in terms of its individual movements, rather than its performance overall. For this reason, LOS for a two-way, stop-controlled intersection is defined in terms of its individual movements. With this in mind, total average vehicle delay (i.e., average delay of all movements) for a two-way, stop-controlled intersection should be viewed with discretion. Table 2 shows LOS criteria for unsignalized intersections (both all-way and two-way, stop-controlled).

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (sec/veh)
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50

Source: *Highway Capacity Manual*, Transportation Research Board, Special Report 209, 2000.

Appendix D: LOS Worksheets

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	70	150	5	0	140	45	5	0	0	60	0	60
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	86	185	6	0	173	56	6	0	0	74	0	74
Pedestrians					12			11			30	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			1			2	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	258			202			647	631	211	604	606	231
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	258			202			647	631	211	604	606	231
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			98	100	100	80	100	91
cM capacity (veh/h)	1262			1328			321	361	818	363	368	784

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	278	228	6	148
Volume Left	86	0	6	74
Volume Right	6	56	0	74
cSH	1262	1328	321	496
Volume to Capacity	0.07	0.00	0.02	0.30
Queue Length 95th (ft)	6	0	1	31
Control Delay (s)	2.9	0.0	16.5	15.3
Lane LOS	A		C	C
Approach Delay (s)	2.9	0.0	16.5	15.3
Approach LOS			C	C

Intersection Summary

Average Delay	4.8
Intersection Capacity Utilization	41.5%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	100	215	0	0	135	40	5	0	0	60	0	85
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	118	253	0	0	159	47	6	0	0	71	0	100
Pedestrians					15			32			25	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			3			2	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	231			285			803	751	300	711	728	207
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	231			285			803	751	300	711	728	207
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	91			100			97	100	100	76	100	88
cM capacity (veh/h)	1303			1238			233	296	715	299	301	808

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	371	206	6	171
Volume Left	118	0	6	71
Volume Right	0	47	0	100
cSH	1303	1238	233	474
Volume to Capacity	0.09	0.00	0.03	0.36
Queue Length 95th (ft)	7	0	2	40
Control Delay (s)	3.1	0.0	20.8	16.8
Lane LOS	A		C	C
Approach Delay (s)	3.1	0.0	20.8	16.8
Approach LOS			C	C

Intersection Summary

Average Delay		5.5	
Intersection Capacity Utilization	46.4%		ICU Level of Service
Analysis Period (min)		15	
			A

HCM Unsignalized Intersection Capacity Analysis

1: 128th Ave NE & NE 75th St

4/20/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	5	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	7	7	7	7	7
Pedestrians	2				1	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	33	12	15			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	33	12	15			
tC, single (s)	6.7	6.5	4.2			
tC, 2 stage (s)						
tF (s)	3.8	3.6	2.3			
p0 queue free %	99	99	100			
cM capacity (veh/h)	901	984	1555			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	13	13	13
Volume Left	7	7	0
Volume Right	7	0	7
cSH	940	1555	1700
Volume to Capacity	0.01	0.00	0.01
Queue Length 95th (ft)	1	0	0
Control Delay (s)	8.9	3.7	0.0
Lane LOS	A	A	
Approach Delay (s)	8.9	3.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay		4.2	
Intersection Capacity Utilization	14.7%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

3: 126th Ave NE & NE 73rd St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	5	5	5	5	5	5	5	60	15	10	25	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	5	5	5	5	5	65	16	11	27	0
Pedestrians		1			5			1			4	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	146	147	29	147	139	82	28			87		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146	147	29	147	139	82	28			87		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	99	99	99	99	99	99	100			99		
cM capacity (veh/h)	805	736	1050	803	744	975	1577			1479		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	16	87	38
Volume Left	5	5	5	11
Volume Right	5	5	16	0
cSH	844	830	1577	1479
Volume to Capacity	0.02	0.02	0.00	0.01
Queue Length 95th (ft)	1	2	0	1
Control Delay (s)	9.3	9.4	0.5	2.2
Lane LOS	A	A	A	A
Approach Delay (s)	9.3	9.4	0.5	2.2
Approach LOS	A	A		

Intersection Summary

Average Delay	2.7
Intersection Capacity Utilization	17.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	35	190	0	0	205	45	0	5	0	25	5	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	38	204	0	0	220	48	0	5	0	27	5	38
Pedestrians					3			6			4	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	273			210			571	558	213	534	534	249
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	273			210			571	558	213	534	534	249
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	99	100	94	99	95
cM capacity (veh/h)	1292			1354			397	424	826	437	435	787

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	242	269	5	70
Volume Left	38	0	0	27
Volume Right	0	48	0	38
cSH	1292	1354	424	575
Volume to Capacity	0.03	0.00	0.01	0.12
Queue Length 95th (ft)	2	0	1	10
Control Delay (s)	1.4	0.0	13.6	12.1
Lane LOS	A		B	B
Approach Delay (s)	1.4	0.0	13.6	12.1
Approach LOS			B	B

Intersection Summary

Average Delay	2.2
Intersection Capacity Utilization	46.3%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

6: 130th Ave NE & NE 80th St

4/20/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↔	↔
Volume (veh/h)	180	25	10	230	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	205	28	11	261	23	11
Pedestrians	7			1	8	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			0	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			241		518	228
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			241		518	228
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		96	99
cM capacity (veh/h)			1323		510	810

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	233	273	34
Volume Left	0	11	23
Volume Right	28	0	11
cSH	1700	1323	582
Volume to Capacity	0.14	0.01	0.06
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.4	11.6
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	11.6
Approach LOS			B

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		30.6%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

7: 130th Ave NE & NE 75th St

4/20/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	5	35	20	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	7	47	27	7
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	96	36	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	96	36	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	900	1037	1576			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	53	33			
Volume Left	0	7	0			
Volume Right	7	0	7			
cSH	1037	1576	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	8.5	0.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.5	0.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization		16.1%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

10: 116th Ave & 70th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	190	405	380	225	345	20	275	485	220	15	60	185
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1900	1615	1787	1866		1787	1881	1599	1770	1651	
Flt Permitted	0.29	1.00	1.00	0.23	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	556	1900	1615	425	1866		1787	1881	1599	1770	1651	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	198	422	396	234	359	21	286	505	229	16	62	193
RTOR Reduction (vph)	0	0	229	0	3	0	0	0	146	0	145	0
Lane Group Flow (vph)	198	422	167	234	377	0	286	505	83	16	110	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8					2			
Actuated Green, G (s)	21.8	16.7	28.9	23.8	17.7		12.2	24.9	24.9	0.8	13.5	
Effective Green, g (s)	21.8	16.7	28.9	23.8	17.7		12.2	24.9	24.9	0.8	13.5	
Actuated g/C Ratio	0.32	0.24	0.42	0.35	0.26		0.18	0.36	0.36	0.01	0.20	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	0.2	0.2	0.2	0.2	0.2		0.2	2.0	2.0	0.2	0.2	
Lane Grp Cap (vph)	269	463	799	268	482		318	683	581	20	325	
v/s Ratio Prot	0.05	0.22	0.04	c0.08	0.20		c0.16	c0.27		0.01	c0.07	
v/s Ratio Perm	0.18		0.07	c0.22					0.05			
v/c Ratio	0.74	0.91	0.21	0.87	0.78		0.90	0.74	0.14	0.80	0.34	
Uniform Delay, d1	19.2	25.2	12.6	18.9	23.6		27.5	19.0	14.6	33.8	23.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	8.7	21.7	0.0	24.7	7.5		25.8	3.6	0.0	105.9	0.2	
Delay (s)	27.9	46.9	12.6	43.6	31.1		53.4	22.6	14.7	139.6	23.9	
Level of Service	C	D	B	D	C		D	C	B	F	C	
Approach Delay (s)		29.8			35.9			29.5			30.7	
Approach LOS		C			D			C			C	

Intersection Summary

HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	68.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

20: 126th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	220	30	10	230	0	40	5	10	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	247	34	11	258	0	45	6	11	6	0	0
Pedestrians					4			2			10	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	268			283			547	557	270	573	574	268
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	268			283			547	557	270	573	574	268
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			90	99	99	99	100	100
cM capacity (veh/h)	1290			1277			444	433	770	412	424	769

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	281	270	62	6
Volume Left	0	11	45	6
Volume Right	34	0	11	0
cSH	1290	1277	480	412
Volume to Capacity	0.00	0.01	0.13	0.01
Queue Length 95th (ft)	0	1	11	1
Control Delay (s)	0.0	0.4	13.6	13.9
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.4	13.6	13.9
Approach LOS			B	B

Intersection Summary

Average Delay		1.7		
Intersection Capacity Utilization		31.5%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	70	155	5	0	145	45	5	0	0	60	0	65
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	86	191	6	0	179	56	6	0	0	74	0	80
Pedestrians					12			11			30	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			1			3	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	265			209			665	643	217	616	618	237
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	265			209			665	643	217	616	618	237
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			98	100	100	79	100	90
cM capacity (veh/h)	1256			1321			308	355	812	356	362	777
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	284	235	6	154								
Volume Left	86	0	6	74								
Volume Right	6	56	0	80								
cSH	1256	1321	308	496								
Volume to Capacity	0.07	0.00	0.02	0.31								
Queue Length 95th (ft)	6	0	2	33								
Control Delay (s)	2.9	0.0	16.9	15.5								
Lane LOS	A		C	C								
Approach Delay (s)	2.9	0.0	16.9	15.5								
Approach LOS			C	C								
Intersection Summary												
Average Delay			4.9									
Intersection Capacity Utilization			41.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Volume (veh/h)	110	220	0	0	140	40	5	0	0	60	0	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	129	259	0	0	165	47	6	0	0	71	0	118
Pedestrians					15			32			25	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			3			2	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	237			291			856	786	306	746	763	213
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	237			291			856	786	306	746	763	213
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			100			97	100	100	75	100	85
cM capacity (veh/h)	1297			1231			207	280	710	281	284	802

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	388	212	6	188
Volume Left	129	0	6	71
Volume Right	0	47	0	118
cSH	1297	1231	207	473
Volume to Capacity	0.10	0.00	0.03	0.40
Queue Length 95th (ft)	8	0	2	47
Control Delay (s)	3.3	0.0	22.9	17.6
Lane LOS	A		C	C
Approach Delay (s)	3.3	0.0	22.9	17.6
Approach LOS			C	C

Intersection Summary			
Average Delay		6.0	
Intersection Capacity Utilization	48.2%		ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis

1: 128th Ave NE & NE 75th St

4/20/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	5	5	5	5	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	7	7	7	7	7
Pedestrians	2				1	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	33	12	15			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	33	12	15			
tC, single (s)	6.7	6.5	4.2			
tC, 2 stage (s)						
tF (s)	3.8	3.6	2.3			
p0 queue free %	99	99	100			
cM capacity (veh/h)	901	984	1555			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	13	13	13			
Volume Left	7	7	0			
Volume Right	7	0	7			
cSH	940	1555	1700			
Volume to Capacity	0.01	0.00	0.01			
Queue Length 95th (ft)	1	0	0			
Control Delay (s)	8.9	3.7	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.9	3.7	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			4.2			
Intersection Capacity Utilization		14.7%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: 126th Ave NE & NE 73rd St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	5	5	5	5	5	5	5	60	15	10	25	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	5	5	5	5	5	65	16	11	27	0
Pedestrians		1			5			1			4	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	146	147	29	147	139	82	28			87		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	146	147	29	147	139	82	28			87		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	99	99	99	99	99	99	100			99		
cM capacity (veh/h)	805	736	1050	803	744	975	1577			1479		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	16	87	38
Volume Left	5	5	5	11
Volume Right	5	5	16	0
cSH	844	830	1577	1479
Volume to Capacity	0.02	0.02	0.00	0.01
Queue Length 95th (ft)	1	2	0	1
Control Delay (s)	9.3	9.4	0.5	2.2
Lane LOS	A	A	A	A
Approach Delay (s)	9.3	9.4	0.5	2.2
Approach LOS	A	A		

Intersection Summary

Average Delay	2.7
Intersection Capacity Utilization	17.2%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	35	195	0	0	210	45	0	5	0	25	5	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	38	210	0	0	226	48	0	5	0	27	5	38
Pedestrians					3			6			4	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			1			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	278			216			581	569	219	545	545	254
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278			216			581	569	219	545	545	254
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	99	100	94	99	95
cM capacity (veh/h)	1286			1347			390	418	820	430	429	782

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	247	274	5	70
Volume Left	38	0	0	27
Volume Right	0	48	0	38
cSH	1286	1347	418	567
Volume to Capacity	0.03	0.00	0.01	0.12
Queue Length 95th (ft)	2	0	1	10
Control Delay (s)	1.4	0.0	13.7	12.2
Lane LOS	A		B	B
Approach Delay (s)	1.4	0.0	13.7	12.2
Approach LOS			B	B

Intersection Summary

Average Delay		2.1		
Intersection Capacity Utilization		46.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis

6: 130th Ave NE & NE 80th St

4/20/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	←	↘
Volume (veh/h)	185	25	10	235	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	210	28	11	267	23	11
Pedestrians	7			1	8	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			0	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			247		529	233
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			247		529	233
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	99
cM capacity (veh/h)			1316		503	805

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	239	278	34
Volume Left	0	11	23
Volume Right	28	0	11
cSH	1700	1316	575
Volume to Capacity	0.14	0.01	0.06
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.4	11.7
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	11.7
Approach LOS			B

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		30.8%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

7: 130th Ave NE & NE 75th St

4/20/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	5	5	35	20	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	7	7	47	27	7
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	1					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	96	36	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	96	36	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	100			
cM capacity (veh/h)	900	1037	1576			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	7	53	33			
Volume Left	0	7	0			
Volume Right	7	0	7			
cSH	1037	1576	1700			
Volume to Capacity	0.01	0.00	0.02			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	8.5	0.9	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.5	0.9	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization		16.1%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

20: 126th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	225	30	10	235	0	40	5	10	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	253	34	11	264	0	45	6	11	6	0	0
Pedestrians					4			2			10	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	274			289			558	568	276	584	585	274
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	274			289			558	568	276	584	585	274
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			90	99	99	99	100	100
cM capacity (veh/h)	1284			1271			436	427	764	405	418	763

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	287	275	62	6
Volume Left	0	11	45	6
Volume Right	34	0	11	0
cSH	1284	1271	472	405
Volume to Capacity	0.00	0.01	0.13	0.01
Queue Length 95th (ft)	0	1	11	1
Control Delay (s)	0.0	0.4	13.8	14.0
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.4	13.8	14.0
Approach LOS			B	B

Intersection Summary

Average Delay		1.7		
Intersection Capacity Utilization		31.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis

25: 116th Ave & 70th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	195	415	390	230	355	20	285	500	225	15	60	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1900	1615	1787	1866		1787	1881	1599	1770	1650	
Flt Permitted	0.33	1.00	1.00	0.21	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	621	1900	1615	388	1866		1787	1881	1599	1770	1650	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	203	432	406	240	370	21	297	521	234	16	62	198
RTOR Reduction (vph)	0	0	225	0	3	0	0	0	150	0	153	0
Lane Group Flow (vph)	203	432	181	240	388	0	297	521	84	16	107	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8					2			
Actuated Green, G (s)	21.5	17.4	30.7	25.5	19.4		13.3	24.6	24.6	0.6	11.9	
Effective Green, g (s)	21.5	17.4	30.7	25.5	19.4		13.3	24.6	24.6	0.6	11.9	
Actuated g/C Ratio	0.31	0.25	0.45	0.37	0.28		0.19	0.36	0.36	0.01	0.17	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	0.2	0.2	0.2	0.2	0.2		0.2	2.0	2.0	0.2	0.2	
Lane Grp Cap (vph)	265	481	839	268	526		345	673	572	15	285	
v/s Ratio Prot	0.05	0.23	0.04	c0.08	0.21		0.17	c0.28		0.01	c0.06	
v/s Ratio Perm	0.19		0.07	c0.25					0.05			
v/c Ratio	0.77	0.90	0.22	0.90	0.74		0.86	0.77	0.15	1.07	0.38	
Uniform Delay, d1	20.7	24.8	11.6	18.2	22.3		26.8	19.6	14.9	34.1	25.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	11.3	18.8	0.0	28.7	4.6		18.6	5.1	0.0	255.5	0.3	
Delay (s)	31.9	43.6	11.7	46.9	27.0		45.4	24.6	15.0	289.5	25.4	
Level of Service	C	D	B	D	C		D	C	B	F	C	
Approach Delay (s)		28.9			34.6			28.4			40.7	
Approach LOS		C			C			C			D	

Intersection Summary

HCM 2000 Control Delay	31.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	68.7	Sum of lost time (s)	20.0
Intersection Capacity Utilization	81.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	70	155	9	3	145	45	13	6	8	60	3	65
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Hourly flow rate (vph)	86	191	11	4	179	56	16	7	10	74	4	80
Pedestrians					12			11			30	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			1			2	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	265			213			677	653	220	640	631	237
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	265			213			677	653	220	640	631	237
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	93			100			95	98	99	78	99	90
cM capacity (veh/h)	1256			1315			300	349	809	333	355	777

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	289	238	33	158
Volume Left	86	4	16	74
Volume Right	11	56	10	80
cSH	1256	1315	384	470
Volume to Capacity	0.07	0.00	0.09	0.34
Queue Length 95th (ft)	6	0	7	37
Control Delay (s)	2.9	0.1	15.3	16.5
Lane LOS	A	A	C	C
Approach Delay (s)	2.9	0.1	15.3	16.5
Approach LOS			C	C

Intersection Summary

Average Delay		5.5		
Intersection Capacity Utilization		44.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	110	220	8	8	140	40	10	4	4	60	6	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	129	259	9	9	165	47	12	5	5	71	7	118
Pedestrians					15			32			25	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					1			3			2	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	237			300			883	810	311	776	791	213
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	237			300			883	810	311	776	791	213
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.2	6.6	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	90			99			94	98	99	73	97	85
cM capacity (veh/h)	1297			1222			194	269	706	261	271	802

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	398	221	21	195
Volume Left	129	9	12	71
Volume Right	9	47	5	118
cSH	1297	1222	250	441
Volume to Capacity	0.10	0.01	0.08	0.44
Queue Length 95th (ft)	8	1	7	56
Control Delay (s)	3.3	0.4	20.7	19.5
Lane LOS	A	A	C	C
Approach Delay (s)	3.3	0.4	20.7	19.5
Approach LOS			C	C

Intersection Summary			
Average Delay		6.8	
Intersection Capacity Utilization	51.1%		ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

1: 128th Ave NE & NE 75th St

4/20/2013



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	11	15	5	5	9
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	9	15	20	7	7	12
Pedestrians	2				1	
Lane Width (ft)	12.0				12.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	62	15	21			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	62	15	21			
tC, single (s)	6.7	6.5	4.2			
tC, 2 stage (s)						
tF (s)	3.8	3.6	2.3			
p0 queue free %	99	99	99			
cM capacity (veh/h)	858	980	1548			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	24	27	19			
Volume Left	9	20	0			
Volume Right	15	0	12			
cSH	929	1548	1700			
Volume to Capacity	0.03	0.01	0.01			
Queue Length 95th (ft)	2	1	0			
Control Delay (s)	9.0	5.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	9.0	5.5	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			5.2			
Intersection Capacity Utilization		17.8%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

3: 126th Ave NE & NE 73rd St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	5	5	5	11	5	5	5	60	25	10	25	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	5	5	12	5	5	5	65	27	11	27	0
Pedestrians		1			5			1			4	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	152	158	29	153	145	88	28			97		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	152	158	29	153	145	88	28			97		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	99	99	99	98	99	99	100			99		
cM capacity (veh/h)	798	726	1050	796	739	969	1577			1465		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	16	23	98	38
Volume Left	5	12	5	11
Volume Right	5	5	27	0
cSH	837	816	1577	1465
Volume to Capacity	0.02	0.03	0.00	0.01
Queue Length 95th (ft)	1	2	0	1
Control Delay (s)	9.4	9.5	0.4	2.2
Lane LOS	A	A	A	A
Approach Delay (s)	9.4	9.5	0.4	2.2
Approach LOS	A	A		

Intersection Summary

Average Delay	2.8
Intersection Capacity Utilization	17.8%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

5: 128th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	35	195	8	8	210	45	5	9	4	25	11	35
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	38	210	9	9	226	48	5	10	4	27	12	38
Pedestrians					3			6			4	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			0			0	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	278			224			606	591	223	573	571	254
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	278			224			606	591	223	573	571	254
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			99			99	98	99	93	97	95
cM capacity (veh/h)	1286			1338			369	404	815	404	412	782

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	256	283	19	76
Volume Left	38	9	5	27
Volume Right	9	48	4	38
cSH	1286	1338	442	533
Volume to Capacity	0.03	0.01	0.04	0.14
Queue Length 95th (ft)	2	0	3	12
Control Delay (s)	1.4	0.3	13.5	12.9
Lane LOS	A	A	B	B
Approach Delay (s)	1.4	0.3	13.5	12.9
Approach LOS			B	B

Intersection Summary

Average Delay	2.7
Intersection Capacity Utilization	40.1%
ICU Level of Service	A
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis

6: 130th Ave NE & NE 80th St

4/20/2013



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	→			←	↘	↙
Volume (veh/h)	191	25	10	241	20	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	217	28	11	274	23	11
Pedestrians	7			1	8	
Lane Width (ft)	12.0			12.0	12.0	
Walking Speed (ft/s)	4.0			4.0	4.0	
Percent Blockage	1			0	1	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			253		543	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			253		543	240
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		95	99
cM capacity (veh/h)			1309		494	798

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	245	285	34
Volume Left	0	11	23
Volume Right	28	0	11
cSH	1700	1309	566
Volume to Capacity	0.14	0.01	0.06
Queue Length 95th (ft)	0	1	5
Control Delay (s)	0.0	0.4	11.8
Lane LOS		A	B
Approach Delay (s)	0.0	0.4	11.8
Approach LOS			B

Intersection Summary			
Average Delay		0.9	
Intersection Capacity Utilization		31.1%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

7: 130th Ave NE & NE 75th St

4/20/2013

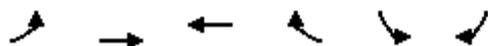


Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	0	7	9	35	20	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	0	9	12	47	27	7
Pedestrians	6					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	107	36	39			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	107	36	39			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	99			
cM capacity (veh/h)	885	1037	1576			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	9	59	33			
Volume Left	0	12	0			
Volume Right	9	0	7			
cSH	1037	1576	1700			
Volume to Capacity	0.01	0.01	0.02			
Queue Length 95th (ft)	1	1	0			
Control Delay (s)	8.5	1.5	0.0			
Lane LOS	A	A				
Approach Delay (s)	8.5	1.5	0.0			
Approach LOS	A					
Intersection Summary						
Average Delay			1.7			
Intersection Capacity Utilization		19.0%		ICU Level of Service		A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis

8: NE 75th St & Site Access

4/20/2013



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	5	10	14	8	10
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.75	0.75	0.75	0.75	0.75	0.75
Hourly flow rate (vph)	7	7	13	19	11	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	32				43	23
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	32				43	23
tC, single (s)	4.4				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.5				3.5	3.3
p0 queue free %	100				99	99
cM capacity (veh/h)	1402				964	1054

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	13	32	24
Volume Left	7	0	11
Volume Right	0	19	13
cSH	1402	1700	1012
Volume to Capacity	0.00	0.02	0.02
Queue Length 95th (ft)	0	0	2
Control Delay (s)	3.8	0.0	8.6
Lane LOS	A		A
Approach Delay (s)	3.8	0.0	8.6
Approach LOS			A

Intersection Summary			
Average Delay		3.7	
Intersection Capacity Utilization		14.7%	ICU Level of Service
Analysis Period (min)		15	A

HCM Unsignalized Intersection Capacity Analysis

20: 126th Ave NE & NE 80th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (veh/h)	0	233	30	10	240	0	40	5	10	5	0	0
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	0	262	34	11	270	0	45	6	11	6	0	0
Pedestrians					4			2			10	
Lane Width (ft)					12.0			12.0			12.0	
Walking Speed (ft/s)					4.0			4.0			4.0	
Percent Blockage					0			0			1	
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	280			298			573	583	285	599	600	280
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	280			298			573	583	285	599	600	280
tC, single (s)	4.1			4.1			7.1	6.5	6.2	7.1	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			99			89	99	99	99	100	100
cM capacity (veh/h)	1278			1262			427	419	755	396	410	758

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	296	281	62	6
Volume Left	0	11	45	6
Volume Right	34	0	11	0
cSH	1278	1262	462	396
Volume to Capacity	0.00	0.01	0.13	0.01
Queue Length 95th (ft)	0	1	11	1
Control Delay (s)	0.0	0.4	14.0	14.2
Lane LOS		A	B	B
Approach Delay (s)	0.0	0.4	14.0	14.2
Approach LOS			B	B

Intersection Summary			
Average Delay		1.6	
Intersection Capacity Utilization		32.0%	ICU Level of Service A
Analysis Period (min)		15	

HCM Signalized Intersection Capacity Analysis

25: 116th Ave & 70th St

4/20/2013



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	195	421	390	232	359	20	285	500	229	15	60	190
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	1900	1615	1787	1866		1787	1881	1599	1770	1650	
Flt Permitted	0.31	1.00	1.00	0.20	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	595	1900	1615	378	1866		1787	1881	1599	1770	1650	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	203	439	406	242	374	21	297	521	239	16	62	198
RTOR Reduction (vph)	0	0	228	0	3	0	0	0	151	0	149	0
Lane Group Flow (vph)	203	439	178	242	392	0	297	521	88	16	111	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	7	4	5	3	8		5	2		1	6	
Permitted Phases	4		4	8					2			
Actuated Green, G (s)	22.0	17.9	31.1	26.0	19.9		13.2	26.1	26.1	0.7	13.6	
Effective Green, g (s)	22.0	17.9	31.1	26.0	19.9		13.2	26.1	26.1	0.7	13.6	
Actuated g/C Ratio	0.31	0.25	0.44	0.37	0.28		0.19	0.37	0.37	0.01	0.19	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	0.2	0.2	0.2	0.2	0.2		0.2	2.0	2.0	0.2	0.2	
Lane Grp Cap (vph)	254	480	823	260	524		333	693	589	17	316	
v/s Ratio Prot	0.05	0.23	0.04	c0.08	0.21		0.17	c0.28		0.01	c0.07	
v/s Ratio Perm	0.20		0.07	c0.26					0.06			
v/c Ratio	0.80	0.91	0.22	0.93	0.75		0.89	0.75	0.15	0.94	0.35	
Uniform Delay, d1	21.8	25.7	12.3	19.6	23.2		28.1	19.5	14.9	35.0	24.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	15.0	21.6	0.0	37.1	5.1		24.0	4.1	0.0	187.2	0.2	
Delay (s)	36.8	47.3	12.3	56.7	28.3		52.1	23.6	15.0	222.2	25.0	
Level of Service	D	D	B	E	C		D	C	B	F	C	
Approach Delay (s)		31.7			39.1			29.7			36.4	
Approach LOS		C			D			C			D	

Intersection Summary

HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	70.8	Sum of lost time (s)	20.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group