

**GTC**

Gibson Traffic Consultants  
2802 Wetmore Avenue  
Suite 220  
Everett, WA 98201  
425.339.8266

# Vinterra Traffic Impact Analysis

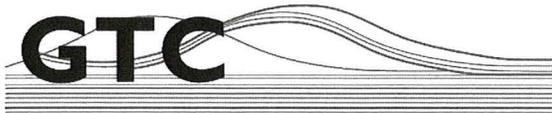
Prepared for: **D.R. Horton**  
Jurisdiction: **City of Woodinville**

**April 2013**

RECEIVED

APR 16 2013

CITY OF WOODINVILLE  
DEVELOPMENT SERVICES

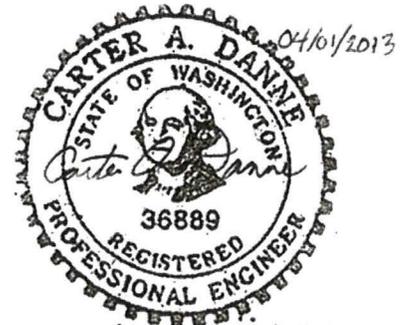


Gibson Traffic Consultants  
2802 Wetmore Avenue  
Suite 220  
Everett, WA 98201  
425.339.8266

# Vinterra Traffic Impact Analysis

Prepared for: D.R. Horton  
Jurisdiction: City of Woodinville

April 2013



**TABLE OF CONTENTS**

1. DEVELOPMENT IDENTIFICATION ..... 3

2. METHODOLOGY ..... 5

3. TRIP GENERATION ..... 6

4. TRIP DISTRIBUTION ..... 7

5. INTERSECTION ANALYSIS ..... 9

5.1 Turning Movements ..... 9

5.2 Level of Service Analysis ..... 13

6. ACCESS ANALYSIS ..... 14

6.1 Signal Warrant Analysis ..... 14

6.2 Channelization Analysis ..... 15

6.3 Sight Distance Analysis ..... 15

6.4 Access Spacing ..... 16

7. TRAFFIC MITIGATION FEES ..... 16

7.1 Traffic Impact Fee Summary ..... 16

8. CONCLUSIONS ..... 17

**LIST OF FIGURES**

Figure 1: Site Vicinity Map ..... 4

Figure 2: Project Trip Distribution and Assignment ..... 8

Figure 3: Existing 2012/2013 Weekday PM Peak Hour Intersection Volumes ..... 10

Figure 4: Future 2018 Weekday Baseline PM Peak Hour Volumes ..... 11

Figure 5: Future 2018 Weekday With Project Intersection Volumes ..... 12

---

**LIST OF TABLES**

**Table 1: Level of Service Criteria for Intersections ..... 6**  
**Table 2: Trip Generation Summary ..... 7**  
**Table 3: Intersection Level of Service Summary ..... 14**  
**Table 4: Traffic Mitigation Fees with Credit for Existing Uses ..... 17**

**ATTACHMENTS**

**Trip Generation Calculations ..... A**  
**Count Data.....B**  
**AM Turning Movement Diagram ..... C**  
**PM Turning Movement Diagrams ..... D**  
**LOS Calculations – 2012/2013 Existing PM Peak Hour Conditions.....E**  
**LOS Calculations – 2018 Baseline PM Peak Hour LOS Conditions .....F**  
**LOS Calculations – 2018 Future with Development PM Peak Hour Conditions ..... G**  
**LOS Calculations – 2018 Future with Development AM Peak Hour Conditions ..... H**  
**Signal Warrant Analysis .....I**

## 1. DEVELOPMENT IDENTIFICATION

Gibson Traffic Consultants (GTC) has been retained to provide a traffic impact analysis for the proposed Vinterra single-family detached housing development to address the City of Woodinville traffic impacts. GTC is a professional traffic engineering consulting firm registered and licensed in the State of Washington.

GTC is located at:

2802 Wetmore Avenue  
Suite 220  
Everett, WA 98201  
Phone: 425-339-8266  
Fax: 425-258-2922  
Email: info@gibsontraffic.com

Carter Danne, responsible for this report and traffic analysis, is a licensed professional engineer (Civil) in the State of Washington, a certified Professional Traffic Operations Engineer (PTOE), and a member of the Washington State section of ITE.

The Vinterra development was studied as consisting of up to 162 single-family detached dwelling units, which is approximately 10 percent more than what the site plan currently shows. This provides a 10-percent sensitivity analysis should minor changes occur in unit yield. Based on final access configuration and layout the final unit number is likely to be less but for this analysis we have used the highest intensity use scenario assuming a single access point. There is a 31.17-acre wholesale nursery on the site that will be removed and on it are buildings totaling 9,119 square feet. GTC has credited the removal of the wholesale nursery in the estimate of the development's traffic mitigation fees; however, no trip generation credit was taken for the impact analysis to be conservatively high on the traffic volume forecasts.

The proposed development site is located on the east side of 124<sup>th</sup> Avenue NE at 15025 124<sup>th</sup> Avenue NE. The development is proposed to create one new access to 124<sup>th</sup> Avenue NE; the internal road layout and connections to other neighboring streets are shown on the site plan.

To improve pedestrian connectivity to the north, a 10-foot wide crosswalk with raised median for refuge will be constructed at the south leg of the 124<sup>th</sup> Avenue NE/NE 154<sup>th</sup> Place intersection. A pedestrian-actuated rapid flashing beacon would be installed at the crosswalk to warn drivers of a pedestrian present at the crosswalk. Post-mounted warning signs would also be installed at the crosswalk location to further alert drivers to the crosswalk. North of the new crosswalk and on the west side of 124<sup>th</sup> Avenue NE, a walkway would be constructed to the north from NE 154<sup>th</sup> Place to the existing pedestrian improvements at the Woodmoor Elementary School driveway accessing 124<sup>th</sup> Avenue NE. Figure 1 illustrates the project location and the site vicinity.



## 2. METHODOLOGY

Trip generation calculations for the Vinterra development has been performed through coordination with city staff. Data contained in the Institute of Transportation Engineers' (ITE) *Trip Generation, 8<sup>th</sup> Edition (2008)* has been used for the proposed and existing uses. The distribution of trips generated by the site is based on distributions for similar developments in the site vicinity, specifically the residential dwellings north of the site that currently access 124<sup>th</sup> Avenue NE via NE 157<sup>th</sup> Street.

GTC also coordinated with city staff to establish the study intersections for analysis. Besides the signalized intersection of 124<sup>th</sup> Avenue NE at NE 160<sup>th</sup> Street and the proposed site access intersection with 124<sup>th</sup> Avenue NE, City staff also identified the signalized intersection of 124<sup>th</sup> Avenue NE at NE 144<sup>th</sup> Street in the City of Kirkland for study.

Congestion at intersections is generally measured in terms of level of service (LOS). In accordance with *Highway Capacity Manual: 2000 Edition (HCM)* by the Transportation Research Board, road facilities and intersections are rated between LOS A and LOS F, with LOS A being free flow and LOS F being forced flow or over-capacity conditions. The level of service at signalized, roundabout and all-way stop-controlled intersections is based on the average delay of all approaches. The level of service for two-way stop-controlled intersections is based on average delays for the critical stopped approach. Geometric characteristics and conflicting traffic movements are taken into consideration when determining level of service values. A summary of the intersection level of service criteria is included in Table 1.

**Table 1: Level of Service Criteria for Intersections**

Level of <sup>1</sup> Service	Expected Delay	Intersection Control Delay (Seconds per Vehicle)	
		Unsignalized Intersections	Signalized Intersections
<b>A</b>	Little/No Delay	≤10	≤10
<b>B</b>	Short Delays	>10 and ≤15	>10 and ≤20
<b>C</b>	Average Delays	>15 and ≤25	>20 and ≤35
<b>D</b>	Long Delays	>25 and ≤35	>35 and ≤55
<b>E</b>	Very Long Delays	>35 and ≤50	>55 and ≤80
<b>F</b>	Extreme Delays <sup>2</sup>	>50	>80

The acceptable level of service for City of Woodinville intersections is LOS E. The City of Kirkland completes a system review and does not have an intersection LOS standard for individual intersections; therefore, the City of Woodinville intersection LOS has been applied for reviewing the study intersection in Kirkland.

Traffic mitigation calculations have been completed per the methodology outlined in City of Woodinville code.

**3. TRIP GENERATION**

The trip generation calculations for the Vinterra development is based on the average trip generation rates for the most appropriate ITE Land Use Code that best describes the proposed and existing uses on the site. As mentioned in the Methodology section, the 8<sup>th</sup> Edition of *Trip Generation* was used.

The development is proposed to construct up to 162 single-family detached homes. The most applicable ITE Land Use Code for the proposed use is 210, Single-Family Detached Housing. The

<sup>1</sup> **Source:** *Highway Capacity Manual 2000*.

- LOS A: Free-flow traffic conditions, with minimal delay to stopped vehicles (no vehicle is delayed longer than one cycle at signalized intersection).
- LOS B: Generally stable traffic flow conditions.
- LOS C: Occasional back-ups may develop, but delay to vehicles is short term and still tolerable.
- LOS D: During short periods of the peak hour, delays to approaching vehicles may be substantial but are tolerable during times of less demand (i.e. vehicles delayed one cycle or less at signal).
- LOS E: Intersections operate at or near capacity, with long queues developing on all approaches and long delays.
- LOS F: Jammed conditions on all approaches with excessively long delays and vehicles unable to move at times.

<sup>2</sup> When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing which may cause severe congestion affecting other traffic movements in the intersection.

site is currently occupied by a 31.17-acre wholesale nursery with 9,119 square feet (SF) of building space (ITE Land Use Code 818, Nursery (Wholesale)).

The 162 single-family homes are anticipated to generate 1,550 average daily trips (ADT) with 122 AM peak-hour trips and 164 PM peak-hour trips, without taking credit for the existing uses. The trip generation is summarized in Table 2. The trip generation results of the existing wholesale nursery versus building square footage and land acreage was averaged because the ITE data was not extensive for this land use.

**Table 2: Trip Generation Summary**

Land Use	Size	Average Daily Trips	AM Peak-Hour Trips			PM Peak-Hour Trips		
			Inbound	Outbound	Total	Inbound	Outbound	Total
Existing Wholesale Nursery (To Be Removed)	-31.17 acres	-608	-3	-5	-8	-7	-7	-14
	-9,119 SF	-356	-9	-13	-22	-24	-23	-47
	Average	-482	-6	-9	-15	-16	-15	-31
New Single-Family Detached Housing	162 units	1,550	31	91	122	103	61	164
<b>NET TOTAL NEW TRIPS</b>		<b>1,068</b>	<b>25</b>	<b>82</b>	<b>107</b>	<b>87</b>	<b>46</b>	<b>133</b>

The trip generation calculations are included in the attachments.

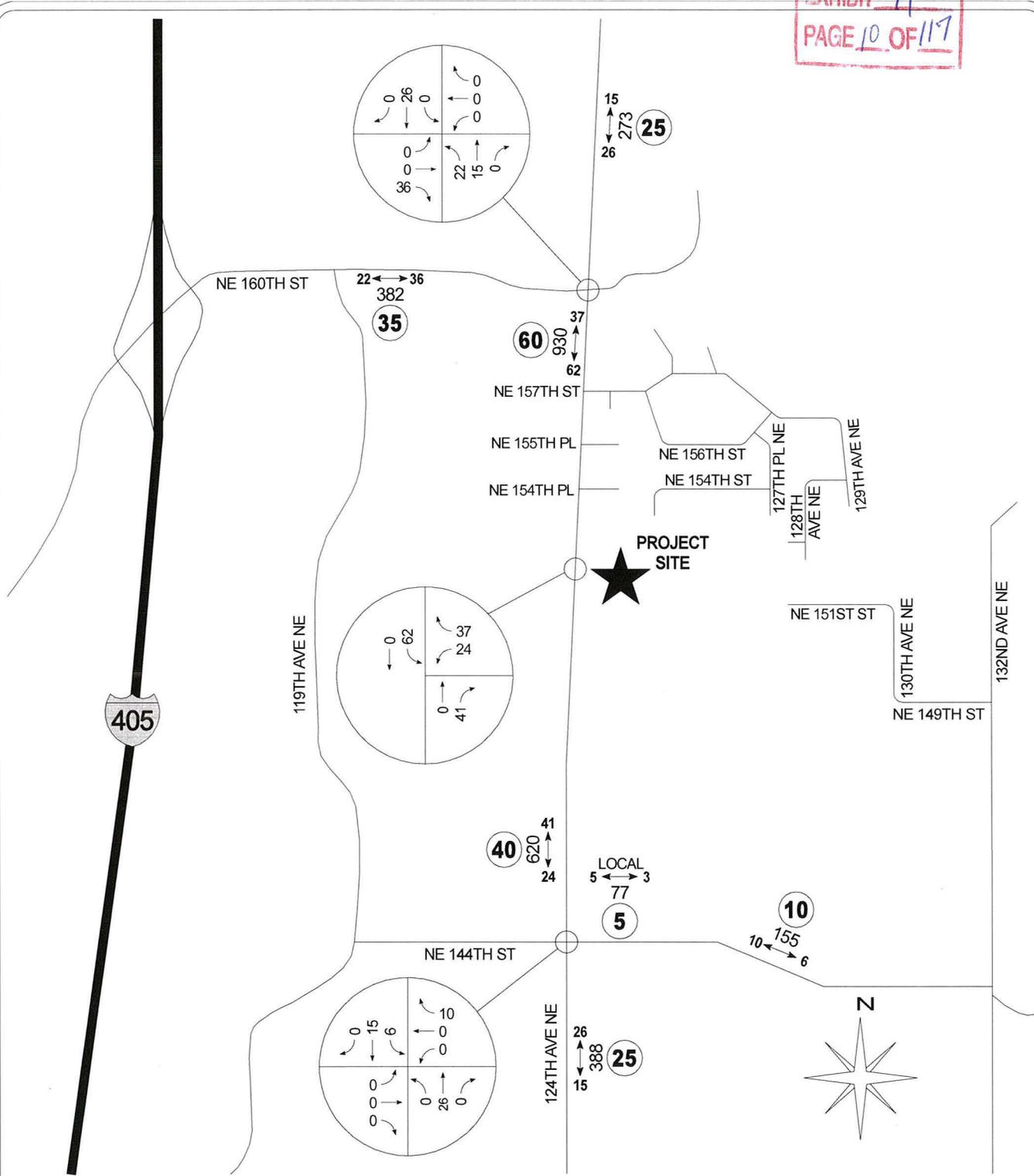
#### 4. TRIP DISTRIBUTION

The distribution of trips generated by the Vinterra development is based on the traffic volumes collected recently in the vicinity at the intersections of 124<sup>th</sup> Avenue NE at NE 160<sup>th</sup> Street, at NE 157<sup>th</sup> Street, and at NE 144<sup>th</sup> Street.

GTC determined from the existing traffic volume patterns that the future site traffic will distribute as follows:

- 60 percent of the project traffic will travel north on 124<sup>th</sup> Avenue NE towards:
  - NE 160<sup>th</sup> Street and the I-405 interchange (35 percent), and
  - Downtown Woodinville (25 percent)
- 40 percent of the project traffic will travel south on 124<sup>th</sup> Avenue NE towards:
  - Totem Lake (25 percent)
  - Local Shopping in Kingsgate (5 percent), and
  - Redmond (10 percent)

Detailed trip distribution and assignments are shown in Figure 2 for the daily and PM peak-hour.



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY  
GTC #12-097

VINTERRA  
162 SFD UNITS

CITY OF WOODINVILLE

**LEGEND**  
AWDT  
PM ← → PEAK  
NEW DAILY TRAFFIC  
NEW PM PEAK HOUR TRIPS  
TRIP DISTRIBUTION %

25

**FIGURE 2**  
**PROJECT TRIP**  
**DISTRIBUTION**  
**AND ASSIGNMENT**

## 5. INTERSECTION ANALYSIS

Based upon GTC's coordination with Tom Hansen, Public Works Director, the following intersections were identified as study intersections:

- 124<sup>th</sup> Avenue NE at NE 160<sup>th</sup> Street
- 124<sup>th</sup> Avenue NE at NE 144<sup>th</sup> Street
- 124<sup>th</sup> Avenue NE at NE 157<sup>th</sup> Street
- 124<sup>th</sup> Avenue NE at the Proposed Site Access

### 5.1 Turning Movements

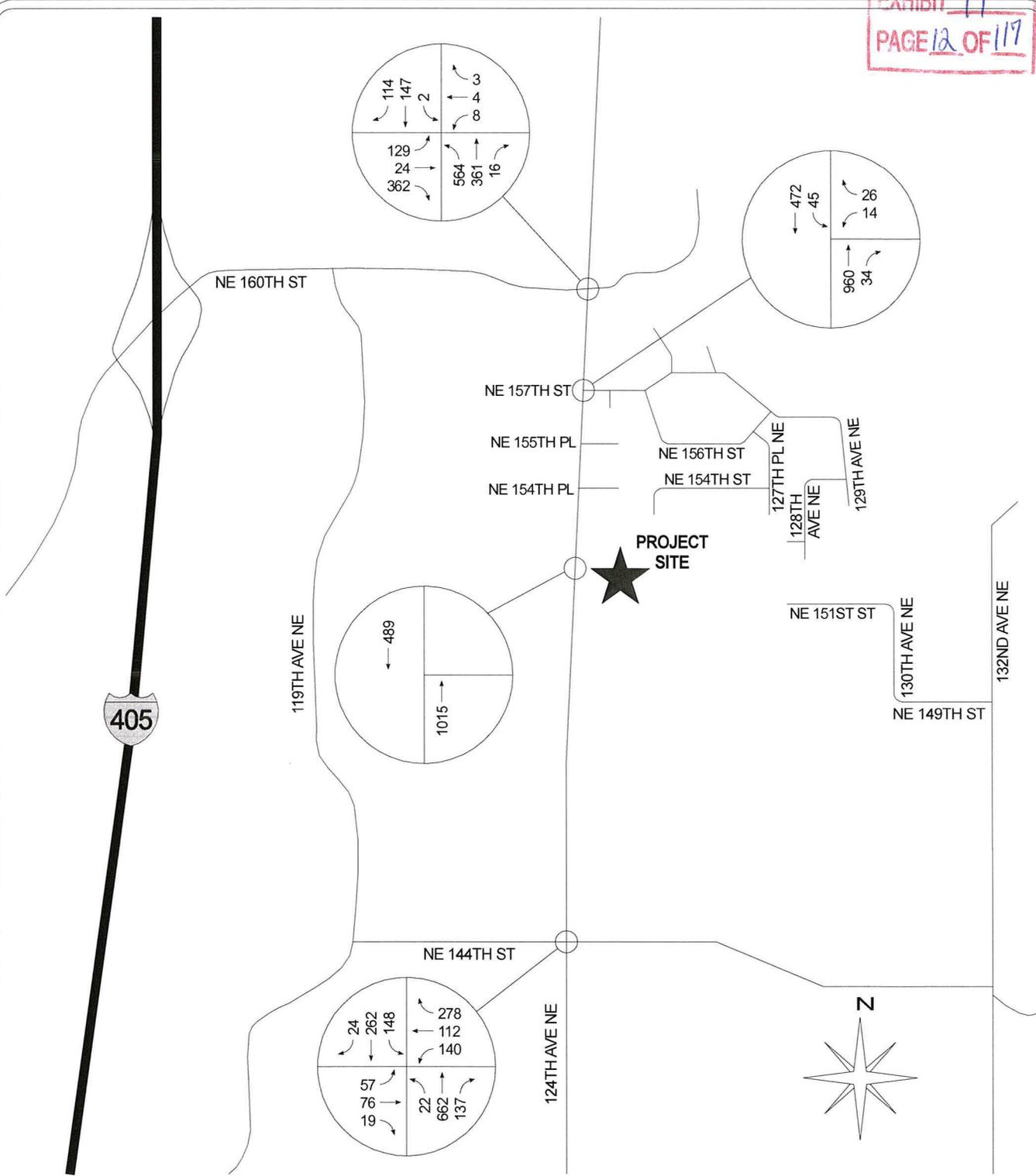
The existing turning movement volumes are based on data obtained from the City of Woodinville and counts performed by the independent count firms of Traffic Data Gathering (TDG) and All Traffic Data (ATD). The TDG counts were completed in September 2012 and the ATD counts were completed in March 2013. The existing conditions turning movements at the study intersections are shown in Figure 3.

Note: The ATD count was completed at the intersection of 124<sup>th</sup> Avenue NE at NE 157<sup>th</sup> Street. ATD captured video of the movements turning from NE 157<sup>th</sup> Street. This allowed GTC to measure the control delay for the NE 157<sup>th</sup> Street approach during the count and provided a basis for validating/calibrating the traffic analysis model.

The 2018 baseline conditions turning movements were calculated by applying a 2 percent annual growth factor to the existing turning movements. The 2018 baseline turning movements at the study intersections are shown in Figure 4 for the PM peak-hour.

The 2018 future conditions with development turning movements were calculated by adding the development's trips to the 2018 baseline turning movements. The development's trips at the study intersections were shown in Figure 2 for the PM peak hour. The 2018 future conditions with development turning movements are shown in Figure 5 for the PM peak hour.

AM peak hour turning movements are shown in the Attachments and AM peak hour analysis was only required at the proposed site access intersection at 124<sup>th</sup> Avenue NE.



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY  
GTC #12-097

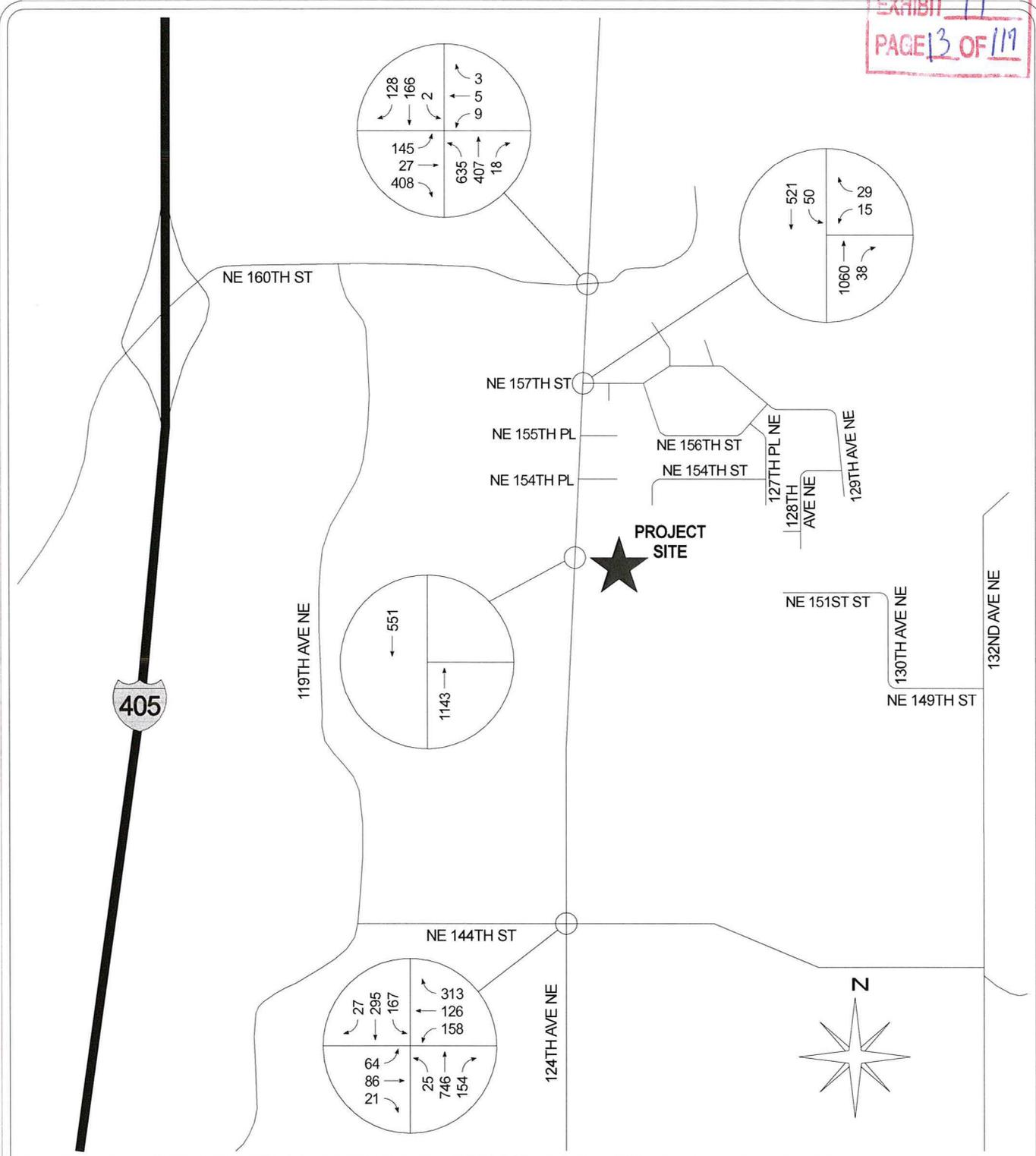
VINTERRA  
162 SFD UNITS

CITY OF WOODINVILLE

**LEGEND**

XXX → PM PEAK HOUR  
TURNING MOVEMENT VOLUMES

**FIGURE 3**  
**EXISTING 2012/2013 WEEKDAY**  
**PM PEAK HOUR**  
**INTERSECTION VOLUMES**



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY  
GTC #12-097

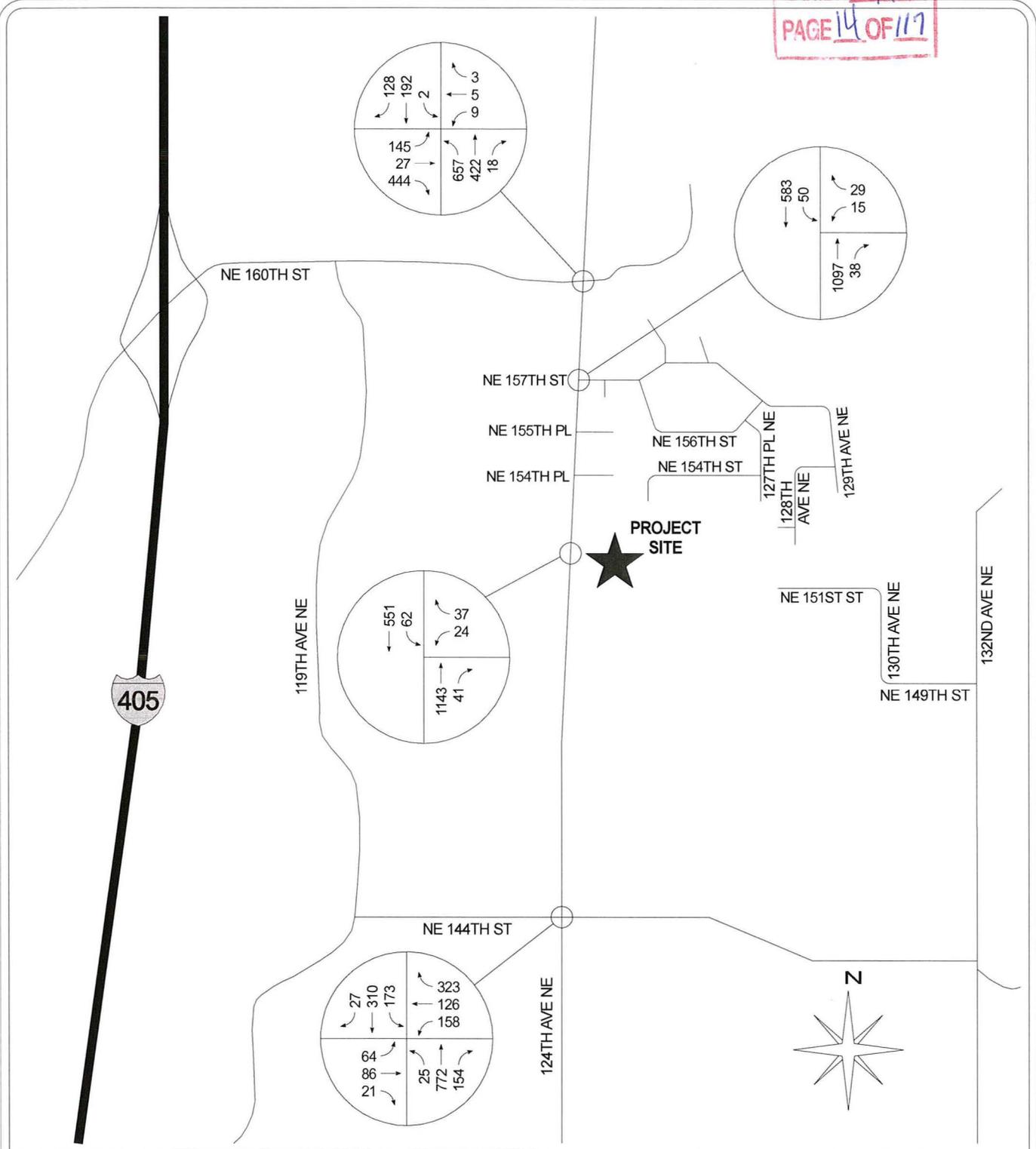
VINTERRA  
162 SFD UNITS

CITY OF WOODINVILLE

**LEGEND**

XXX → TURNING MOVEMENT VOLUMES

**FIGURE 4**  
**FUTURE 2018 WEEKDAY**  
**BASELINE**  
**PM PEAK HOUR VOLUMES**



GIBSON TRAFFIC CONSULTANTS

TRAFFIC IMPACT STUDY  
GTC #12-097

VINTERRA  
162 SFD UNITS

CITY OF WOODINVILLE

**LEGEND**

XXX → PM PEAK HOUR  
TURNING MOVEMENT VOLUMES

**FIGURE 5**  
**FUTURE 2018 WEEKDAY**  
**WITH PROJECT**  
**INTERSECTION VOLUMES**

## 5.2 Level of Service Analysis

The intersection level of service (LOS) analysis has been performed using weekday PM peak hour conditions for the existing conditions, 2018 baseline conditions and 2018 future conditions with development scenarios. Weekday AM peak hour conditions were also studied at the proposed site access onto 124<sup>th</sup> Avenue NE for the 2018 future conditions with development scenario. For the LOS analysis, no credits were taken for the existing uses to provide a “worst case” analysis of traffic operations.

Synchro Version 7 (Build 773, Rev 8) by Trafficware was the software GTC used to study the intersections. To validate that the software used to study the intersections reasonably approximates actual conditions, GTC measured the control delay for the NE 157<sup>th</sup> Street approach to 124<sup>th</sup> Avenue NE using the video collected by ATD at the 124<sup>th</sup> Avenue NE/NE 157<sup>th</sup> Street intersection. GTC’s review of the video resulted in the following observations:

- The PM peak hour average control delay for the NE 157<sup>th</sup> Street westbound approach to 124<sup>th</sup> Avenue NE was 18 seconds per vehicle (see Attachment E for the observations).
- Of the 14 left-turning vehicles during the PM peak hour, only one vehicle made use of the two-way left-turn lane as a refuge area during the peak hour.

Refer to Table 3 below and note how the software produced results for existing conditions of 18.1 seconds per vehicle of delay when applying the center left-turn lane option, which validates that the software is reasonably approximating existing conditions of 18 seconds per vehicle of delay for the NE 157<sup>th</sup> Street approach. Therefore the software would provide a realistic/accurate modeling of the proposed site access to 124<sup>th</sup> as well when utilizing the center lane option even though it has low utilization.

The study intersections operate at LOS C or better under the existing conditions. Under the 2018 baseline conditions the study intersections are anticipated to operate at acceptable LOS C or better. The levels of service of the study intersections are anticipated to remain at acceptable LOS C or better under the 2018 future conditions with development. The study intersection level of service results are summarized in Table 3.

**Table 3: Intersection Level of Service Summary**

Intersection	Peak Hour	Existing Conditions		2018 Baseline Conditions		2018 Future Conditions with Project	
		LOS	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS	Delay (sec/veh)
124 <sup>th</sup> Avenue NE at NE 160 <sup>th</sup> Street	PM	B	19.2	C	20.9	C	22.2
124 <sup>th</sup> Avenue NE at NE 144 <sup>th</sup> Street	PM	C	24.0	C	27.9	C	29.3
124 <sup>th</sup> Avenue NE at NE 157 <sup>th</sup> Street	PM	C	18.1	C	20.4	C	21.3
124 <sup>th</sup> Avenue NE at Proposed Site Access (with center turn lane on 124 <sup>th</sup> Street improvement)	PM	-	-	-	-	D	25.3
	AM	-	-	-	-	B	14.4

The intersection level of service calculations are summarized in the attachments.

## 6. ACCESS ANALYSIS

Vinterra is located on the east side of 124<sup>th</sup> Avenue NE, south of NE 154<sup>th</sup> Place. Along the development's frontage the roadway is a 2-lane roadway with a posted speed limit of 35 mph. There are sections of curb, gutter and sidewalk along the developed portions of 124<sup>th</sup> Avenue NE.

### 6.1 Signal Warrant Analysis

With 162 dwelling units, the question of whether or not a signal would be warranted at the proposed site access per the Manual on Uniform Traffic Control Devices (MUTCD) was examined.

Traffic volume data was collected by Traffic Data Gathering and gathered from the City of Woodinville to assist with the evaluation. Additionally the counts collected pedestrian crossing movements at the nearby intersections to evaluate pedestrian crossing demand. The project trips were distributed on a daily basis consistent with the daily volume profile in the vicinity of the 124<sup>th</sup> Avenue NE at NE 157<sup>th</sup> Street intersection to the north, which has 186 lots accessing that intersection. The following additional assumptions were used to complete the evaluations:

- An 85<sup>th</sup> percentile speed greater than 40 mph was assumed based on speed data collected on 124<sup>th</sup> Avenue NE by the City of Woodinville and Traffic Data Gathering; this assumption makes it easier to warrant a traffic signal because volume thresholds are 70 percent of what they would otherwise be.
- The proposed site access was assumed to have two lanes approaching 124<sup>th</sup> Avenue NE.

The evaluation resulted in the observations summarized below:

- Warrant 1A – 8-Hour Minimum Vehicle Volume: NOT warranted (no hours satisfied)
- Warrant 1B – 8-Hour Interruption of Continuous Traffic: NOT warranted (only 1 hour satisfied)
- Warrant 1C – 8-Hour Combination of Warrants: NOT warranted (no hours satisfied mutually)
- Warrant 2 – 4-Hour Vehicular Volume: NOT warranted (only 1 hour satisfied)
- Warrant 3A – Peak Hour Delay: NOT warranted (less than 0.5 vehicle-hours of delay and 5 vehicle-hours are needed)
- Warrant 3B – Peak Hour Volume Plots: NOT warranted (no hours satisfied)
- Warrant 4 – Pedestrian Volume: NOT warranted

## 6.2 Channelization Analysis

North and south of the project frontage, a center turn lane exists and the striping transitions between left-turn lanes and two-way left-turn lane (TWLTL) channelization depending on location. To attain the LOS conditions shown in the intersection LOS analysis above, at the proposed site access, the following channelization has been assumed:

- Center two-way left-turn lane along the project frontage
- The proposed site access would have a separate left-turn and right-turn lane approaching 124<sup>th</sup> Avenue NE and 50 feet of storage would be more than sufficient to store the 95<sup>th</sup> percentile queues.

Although a northbound right-turn deceleration pocket on 124<sup>th</sup> Avenue NE would be recommended at the proposed site access based on guidelines found in the WSDOT *Design Manual*, that would be inconsistent with the cross-section of 124<sup>th</sup> Avenue NE north and south of the proposed site access. For example, at NE 157<sup>th</sup> Street to the north, a right-turn pocket is not provided, yet there are even more homes located off of NE 157<sup>th</sup> Street (186 homes). Additionally, a right-turn pocket would require the crossing over of a bicycle lane when it is provided along the frontage and adds pavement width, which creates longer pedestrian crossing times. Therefore, a right-turn pocket is not recommended based on the prevailing conditions in the corridor and to minimize impacts to non-motorized traffic.

## 6.3 Sight Distance Analysis

The posted speed limit along 124<sup>th</sup> Avenue NE at the proposed accesses is 35 mph. The required stopping and intersection sight distances are based on guidelines in AASHTO's *A Policy on the Geometric Design of Highways and Streets*. The 85<sup>th</sup> percentile speed on 124<sup>th</sup> Avenue NE was approximately 41 mph southbound and 40 mph northbound based on a speed study in September 2012 by Traffic Data Gathering near the Tolt Pipeline Trail crossing. In April 2011, the City of Woodinville collected speed data at the south city limit that indicated an 85<sup>th</sup> percentile speed of 43.45 mph southbound and 38.34 mph northbound.

For right-turning traffic, a sight triangle using a 40 mph northbound vehicle speed was used, and 305 feet of sight distance is required per AASHTO. For left-turning traffic, a sight triangle using a 44 mph southbound vehicle speed was used, and 349 feet of sight distance is required. The access

will have at least 600 feet of intersection and stopping sight distance in both directions. The access will therefore have adequate intersection and stopping sight distances.

#### **6.4 Access Spacing**

The nearest public street intersection would be over 300 feet away, therefore, per the Woodinville Infrastructure Design Standards and Specifications, the access spacing (and proposed public street intersection spacing) would be acceptable.

### **7. TRAFFIC MITIGATION FEES**

The Washington Growth Management Act and Revised Code of Washington 82.02.050(2) authorize local jurisdictions to establish proportionate share traffic mitigation fees in order to fund capital facilities, such as roads and intersections. City of Woodinville Ordinance No. 527 applies that authority to developments in order to fund road improvements that would accommodate development.

#### **7.1 Traffic Impact Fee Summary**

The Vinterra development will generate new daily trips on the street system and depending on when the building permit is approved, traffic mitigation fees will vary over time as laid out in Ordinance 527. Although the level of service and access signal warrant analysis did not take any credit for the existing uses to ensure a “worst case” analysis, the traffic mitigation fees should take credit for the existing uses to be removed. That credit based on ITE *Trip Generation* report would be for 31.17 acres and 9,119 SF of building space of wholesale nursery. Averaging the trip generation based on acreage and square footages, results in a daily trip credit of 482 trips. Table 4 on the following page summarizes the different impact fees and fee credits.

**Table 4: Traffic Mitigation Fees with Credit for Existing Uses**

Year of Building Permit Approval	Impact Fee Rate (\$/ADT)	Mitigation Fee Credits			Mitigation Fees Due After Credit		
		Existing Uses (ADT)	Fee Credits		Fee Base (Net New ADT)	Mitigation Fee (with credit)	
			Total	Per Unit (162 units)		Total	Per Unit (162 units)
2013	\$290	482	\$139,780	\$862.84	1,068	\$309,720	\$1,911.85
2014	\$320	482	\$154,240	\$952.10	1,068	\$341,760	\$2,109.63
2015	\$355	482	\$171,110	\$1,056.23	1,068	\$379,140	\$2,340.37
2016	\$395	482	\$190,390	\$1,175.25	1,068	\$421,860	\$2,604.07
2017	\$440	482	\$212,080	\$1,309.14	1,068	\$469,920	\$2,900.74

Note: Credit for the existing wholesale nursery accounts for a reduction to the fees of \$139,780.00 to \$212,080.00 depending on when the building permits are issued.

**8. CONCLUSIONS**

The Vinterra development is proposed to consist of up to 162 single-family homes. The development is located along the east side of 124<sup>th</sup> Avenue NE, south of NE 154<sup>th</sup> Place (final unit count likely less than 162). The development is proposed to have one access to 124<sup>th</sup> Avenue NE and additional access either to the north or to the east is possible. The development is anticipated to generate 1,068 total new daily trips with 133 total new PM peak-hour trips with the credit for the existing use on the site. Signalization of the proposed access is not warranted or recommended per standard MUTCD even when using the highest case scenario of 162 units on a single access. The analysis shows that all study intersections will remain at LOS E or better with the development with the calibrated/validated LOS model.

The total traffic mitigation fees for the development will be dependent on the building permit approval and a schedule of said fees was prepared in Table 4.

## Trip Generation Calculations

Vinterra  
GTC #12-097

Trip Generation for: **Weekday**  
(a.k.a.): **Average Weekday Daily Trips (AWDT)**

LAND USE	VARIABLE	ITE LU code	NET EXTERNAL TRIPS BY TYPE																	
			Gross Trips						Internal Crossover		IN BOTH DIRECTIONS				DIRECTIONAL ASSIGNMENTS					
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	TOTAL In+Out (Total)	% of Ext. Trips	In+Out (Total)	DIVERTED LINK % of Ext. Trips	In+Out (Total)	NEW In+Out (Total)	PASS-BY In	Out	DIVERTED LINK In	Out	NEW In	Out
Trip Generation Credit for REMOVING	-31.17 acres	818	19.50	50%	50%	-608	0%	0	-608	0%	0	0%	0	-608	0	0	0	0	-304	-304
Wholesale Nursery	-9.119 1,000 SF	818	39.00	50%	50%	-356	0%	0	-356	0%	0	0%	0	-356	0	0	0	0	-178	-178
	Average Results					-482		0	-482		0		0	-482	0	0	0	0	-241	-241
Single-Family Detached Housing	162 Dwelling Units	210	9.57	50%	50%	1550	0%	0	1550	0%	0	0%	0	1550	0	0	0	0	775	775
<b>TOTAL DEVELOPMENT</b>						1068		0	1068		0		0	1068	0	0	0	0	534	534

EXHIBIT 11  
PAGE 21 OF 119

Vinterra  
GTC #12-097

Trip Generation for: Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 7 and 9 a.m.  
(a.k.a.): Weekday AM Peak Hour

LAND USE	VARIABLE	ITE LU code	NET EXTERNAL TRIPS BY TYPE																		
			Gross Trips						Internal Crossover		IN BOTH DIRECTIONS				DIRECTIONAL ASSIGNMENTS						
			Trip Rate	% IN	% OUT	In+Out (Total)	% of Gross Trips	Trips In+Out (Total)	TOTAL In+Out (Total)	% of Ext. Trips	In+Out (Total)	DIVERTED LINK % of Ext. Trips	IN+Out (Total)	NEW In+Out (Total)	PASS-BY In	OUT	DIVERTED LINK In	OUT	NEW In	OUT	
Trip Generation Credit for REMOVING	-31.17 acres	818	0.26	43%	57%	-8	0%	0	-8	0%	0	0%	0	-8	0	0	0	0	0	-3	-5
Wholesale Nursery	-9.119 1,000 SF	818	2.40	43%	57%	-22	0%	0	-22	0%	0	0%	0	-22	0	0	0	0	-9	-13	
Single-Family Detached Housing	Average Results					-15		0	-15		0		0	-15	0	0	0	0	-6	-9	
TOTAL DEVELOPMENT	162 Dwelling Units	210	0.75	25%	75%	122	0%	0	122	0%	0	0%	0	122	0	0	0	0	31	91	
						107		0	107		0		0	107	0	0	0	0	25	82	

EXHIBIT 11  
PAGE 22 OF 117

Vinterra  
GTC #12-097

Trip Generation for: Weekday, Peak Hour of Adjacent Street Traffic, One Hour between 4 and 6 p.m.  
(a.k.a.): Weekday PM Peak Hour

LAND USE		VARIABLE		ITE LU code		Gross Trips			Internal Crossover		NET EXTERNAL TRIPS BY TYPE											
											IN BOTH DIRECTIONS						DIRECTIONAL ASSIGNMENTS					
											TOTAL	PASS-BY		DIVERTED LINK		NEW	PASS-BY		DIVERTED LINK		NEW	
In+Out (Total)	% of Ext. Trips	In+Out (Total)	% of Ext. Trips	In+Out (Total)	In+Out (Total)	In	Out	In	Out	In	Out	In	Out									
Trip Generation Credit for REMOVING		-31.17 acres	818	0.45	50%	50%	-14	0%	0	-14	0%	0	0%	0	-14	0	0	0	0	-7	-7	
Wholesale Nursery		-9.119 1,000 SF	818	5.17	50%	50%	-47	0%	0	-47	0%	0	0%	0	-47	0	0	0	0	-24	-23	
Average Results							-31		0	-31		0		0	-31	0	0	0	0	-16	-15	
Single-Family Detached Housing		162 Dwelling Units	210	1.01	63%	37%	164	0%	0	164	0%	0	0%	0	164	0	0	0	0	103	61	
<b>TOTAL DEVELOPMENT</b>							133		0	133		0		0	133	0	0	0	0	87	46	

EXHIBIT 11  
PAGE 23 OF 117

**Count Data**

EXHIBIT 11  
PAGE 24 OF 117

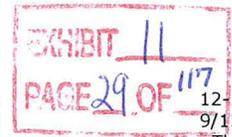








**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**



Location:: 124th Avenue NE n/o Tolt Pipeline Trail  
City, State:: Woodinville, WA  
Counter #:: 0503

Site: 12-138-01  
Date: 9/13/2012  
Thursday

Daily Volume, per Channel  
Channel: NB

Interval Begin			Interval Begin		
12:00 AM	-	-	12:00 PM	99	433
12:15 AM	-	-	12:15 PM	108	
12:30 AM	-	-	12:30 PM	126	
12:45 AM	-	-	12:45 PM	100	
1:00 AM	-	-	1:00 PM	105	388
1:15 AM	-	-	1:15 PM	86	
1:30 AM	-	-	1:30 PM	107	
1:45 AM	-	-	1:45 PM	90	
2:00 AM	-	-	2:00 PM	98	491
2:15 AM	-	-	2:15 PM	101	
2:30 AM	-	-	2:30 PM	127	
2:45 AM	-	-	2:45 PM	165	
3:00 AM	-	-			
3:15 AM	-	-			
3:30 AM	-	-			
3:45 AM	-	-			
4:00 AM	-	-			
4:15 AM	-	-			
4:30 AM	-	-			
4:45 AM	-	-			
5:00 AM	-	-			
5:15 AM	-	-			
5:30 AM	-	-			
5:45 AM	-	-			
6:00 AM	-	-			
6:15 AM	-	-			
6:30 AM	-	-			
6:45 AM	-	-			
7:00 AM	-	-			
7:15 AM	-	-			
7:30 AM	-	-			
7:45 AM	-	-			
8:00 AM	-	-			
8:15 AM	-	-			
8:30 AM	-	-			
8:45 AM	-	-			
9:00 AM	-	-			
9:15 AM	-	-			
9:30 AM	-	-			
9:45 AM	-	-			
10:00 AM	-	-			
10:15 AM	-	-			
10:30 AM	-	-			
10:45 AM	-	-			
11:00 AM	-	115			
11:15 AM	-	-			
11:30 AM	-	-			
11:45 AM	115	-			

**24 Hour Volume**      NB  
1427

**12:00 AM - 12:00 PM**  
NB  
Count 115  
**Peak Hour** -  
Volume -  
Factor -

**12:00 PM - 12:00 AM**  
NB  
1312  
2:00 PM  
491  
0.74

**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

EXHIBIT 11  
PAGE 30 OF 117

124th Avenue NE n/o Tolt Pipeline Trail  
Woodinville, WA  
NT-0122

Site: 12-138-01  
Date: 9/10/2012  
Monday

Daily Volume, per Channel  
Channel: NB

Interval Begin		Interval Begin	
12:00 AM	-	12:00 PM	-
12:15 AM	-	12:15 PM	-
12:30 AM	-	12:30 PM	-
12:45 AM	-	12:45 PM	-
1:00 AM	-	1:00 PM	-
1:15 AM	-	1:15 PM	-
1:30 AM	-	1:30 PM	-
1:45 AM	-	1:45 PM	-
2:00 AM	-	2:00 PM	-
2:15 AM	-	2:15 PM	-
2:30 AM	-	2:30 PM	-
2:45 AM	-	2:45 PM	-
3:00 AM	-	3:00 PM	-
3:15 AM	-	3:15 PM	-
3:30 AM	-	3:30 PM	-
3:45 AM	-	3:45 PM	-
4:00 AM	-	4:00 PM	-
4:15 AM	-	4:15 PM	-
4:30 AM	-	4:30 PM	-
4:45 AM	-	4:45 PM	-
5:00 AM	-	5:00 PM	247
5:15 AM	-	5:15 PM	-
5:30 AM	-	5:30 PM	0
5:45 AM	-	5:45 PM	247
6:00 AM	-	6:00 PM	199
6:15 AM	-	6:15 PM	191
6:30 AM	-	6:30 PM	191
6:45 AM	-	6:45 PM	142
7:00 AM	-	7:00 PM	130
7:15 AM	-	7:15 PM	116
7:30 AM	-	7:30 PM	97
7:45 AM	-	7:45 PM	86
8:00 AM	-	8:00 PM	80
8:15 AM	-	8:15 PM	71
8:30 AM	-	8:30 PM	53
8:45 AM	-	8:45 PM	48
9:00 AM	-	9:00 PM	58
9:15 AM	-	9:15 PM	41
9:30 AM	-	9:30 PM	38
9:45 AM	-	9:45 PM	34
10:00 AM	-	10:00 PM	30
10:15 AM	-	10:15 PM	27
10:30 AM	-	10:30 PM	21
10:45 AM	-	10:45 PM	13
11:00 AM	-	11:00 PM	13
11:15 AM	-	11:15 PM	9
11:30 AM	-	11:30 PM	16
11:45 AM	-	11:45 PM	16

**24 Hour Volume**      NB  
1967

**12:00 AM - 12:00 PM**  
NB  
Count      0  
**Peak Hour**      -  
Volume      -  
Factor      -

**12:00 PM - 12:00 AM**  
NB  
1967  
5:45 PM  
828  
0.84

**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

EXHIBIT 11  
PAGE 31 OF 117

124th Avenue NE n/o Tolt Pipeline Trail  
Woodinville, WA  
NT-0122

Site: 12-138-01  
Date: 9/11/2012  
Tuesday

Daily Volume, per Channel  
Channel: NB

Interval Begin			Interval Begin		
12:00 AM	9	29	12:00 PM	0	0
12:15 AM	5		12:15 PM	0	
12:30 AM	11		12:30 PM	0	
12:45 AM	4		12:45 PM	0	
1:00 AM	4	17	1:00 PM	0	0
1:15 AM	3		1:15 PM	0	
1:30 AM	7		1:30 PM	0	
1:45 AM	3		1:45 PM	0	
2:00 AM	6	17	2:00 PM	18	367
2:15 AM	5		2:15 PM	99	
2:30 AM	5		2:30 PM	118	
2:45 AM	1		2:45 PM	132	
3:00 AM	6	22	3:00 PM	163	680
3:15 AM	1		3:15 PM	152	
3:30 AM	4		3:30 PM	184	
3:45 AM	11		3:45 PM	181	
4:00 AM	8	53	4:00 PM	217	946
4:15 AM	8		4:15 PM	233	
4:30 AM	18		4:30 PM	232	
4:45 AM	19		4:45 PM	264	
5:00 AM	18	136	5:00 PM	235	980
5:15 AM	28		5:15 PM	261	
5:30 AM	49		5:30 PM	255	
5:45 AM	41		5:45 PM	229	
6:00 AM	38	245	6:00 PM	238	850
6:15 AM	64		6:15 PM	219	
6:30 AM	70		6:30 PM	205	
6:45 AM	73		6:45 PM	188	
7:00 AM	74	360	7:00 PM	178	490
7:15 AM	75		7:15 PM	147	
7:30 AM	110		7:30 PM	84	
7:45 AM	101		7:45 PM	81	
8:00 AM	81	360	8:00 PM	91	299
8:15 AM	89		8:15 PM	71	
8:30 AM	94		8:30 PM	73	
8:45 AM	96		8:45 PM	64	
9:00 AM	50	171	9:00 PM	54	170
9:15 AM	33		9:15 PM	49	
9:30 AM	46		9:30 PM	43	
9:45 AM	42		9:45 PM	24	
10:00 AM	35	65	10:00 PM	28	105
10:15 AM	18		10:15 PM	21	
10:30 AM	4		10:30 PM	36	
10:45 AM	8		10:45 PM	20	
11:00 AM	9	9	11:00 PM	15	59
11:15 AM	0		11:15 PM	15	
11:30 AM	0		11:30 PM	18	
11:45 AM	0		11:45 PM	11	

NB  
**24 Hour Volume**      6430

**12:00 AM - 12:00 PM**  
NB  
Count                    1484  
**Peak Hour**            7:30 AM  
Volume                    381  
Factor                    0.87

**12:00 PM - 12:00 AM**  
NB  
Count                    4946  
**Peak Hour**            4:45 PM  
Volume                    1015  
Factor                    0.96

**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

EXHIBIT 11  
PAGE 32 OF 117

124th Avenue NE n/o Tolt Pipeline Trail  
Woodinville, WA  
NT-0122

Site: 12-138-01  
Date: 9/12/2012  
Wednesday

Daily Volume, per Channel  
Channel: NB

Interval Begin		Interval Begin
12:00 AM	11	33
12:15 AM	7	
12:30 AM	11	
12:45 AM	4	
1:00 AM	4	16
1:15 AM	6	
1:30 AM	5	
1:45 AM	1	
2:00 AM	6	26
2:15 AM	5	
2:30 AM	6	
2:45 AM	9	
3:00 AM	4	22
3:15 AM	8	
3:30 AM	1	
3:45 AM	9	
4:00 AM	7	54
4:15 AM	10	
4:30 AM	13	
4:45 AM	24	
5:00 AM	16	136
5:15 AM	31	
5:30 AM	43	
5:45 AM	46	
6:00 AM	48	253
6:15 AM	61	
6:30 AM	73	
6:45 AM	71	
7:00 AM	57	348
7:15 AM	97	
7:30 AM	87	
7:45 AM	107	
8:00 AM	91	364
8:15 AM	88	
8:30 AM	82	
8:45 AM	103	
9:00 AM	87	320
9:15 AM	75	
9:30 AM	73	
9:45 AM	85	
10:00 AM	57	294
10:15 AM	71	
10:30 AM	82	
10:45 AM	84	
11:00 AM	19	19

**24 Hour Volume**      NB  
1885

**12:00 AM - 12:00 PM**  
NB  
Count      1885  
**Peak Hour**      7:15 AM  
Volume      382  
Factor      0.89

**12:00 PM - 12:00 AM**  
NB  
0  
-  
-  
-







**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

EXHIBIT 11  
PAGE 36 OF 117

124th Avenue NE n/o Tolt Pipeline Trail  
Woodinville, WA  
NT-0123

Site: 12-138-01  
Date: 9/10/2012  
Monday

Daily Volume, per Channel  
Channel: SB

Interval Begin			Interval Begin		
12:00 AM	-	-	12:00 PM	-	-
12:15 AM	-	-	12:15 PM	-	-
12:30 AM	-	-	12:30 PM	-	-
12:45 AM	-	-	12:45 PM	-	-
1:00 AM	-	-	1:00 PM	-	-
1:15 AM	-	-	1:15 PM	-	-
1:30 AM	-	-	1:30 PM	-	-
1:45 AM	-	-	1:45 PM	-	-
2:00 AM	-	-	2:00 PM	-	-
2:15 AM	-	-	2:15 PM	-	-
2:30 AM	-	-	2:30 PM	-	-
2:45 AM	-	-	2:45 PM	-	-
3:00 AM	-	-	3:00 PM	-	-
3:15 AM	-	-	3:15 PM	-	-
3:30 AM	-	-	3:30 PM	-	-
3:45 AM	-	-	3:45 PM	-	-
4:00 AM	-	-	4:00 PM	-	-
4:15 AM	-	-	4:15 PM	-	-
4:30 AM	-	-	4:30 PM	-	-
4:45 AM	-	-	4:45 PM	-	-
5:00 AM	-	-	5:00 PM	-	206
5:15 AM	-	-	5:15 PM	-	-
5:30 AM	-	-	5:30 PM	86	-
5:45 AM	-	-	5:45 PM	120	-
6:00 AM	-	-	6:00 PM	90	403
6:15 AM	-	-	6:15 PM	97	-
6:30 AM	-	-	6:30 PM	121	-
6:45 AM	-	-	6:45 PM	95	-
7:00 AM	-	-	7:00 PM	82	325
7:15 AM	-	-	7:15 PM	98	-
7:30 AM	-	-	7:30 PM	62	-
7:45 AM	-	-	7:45 PM	83	-
8:00 AM	-	-	8:00 PM	87	284
8:15 AM	-	-	8:15 PM	76	-
8:30 AM	-	-	8:30 PM	62	-
8:45 AM	-	-	8:45 PM	59	-
9:00 AM	-	-	9:00 PM	56	168
9:15 AM	-	-	9:15 PM	51	-
9:30 AM	-	-	9:30 PM	30	-
9:45 AM	-	-	9:45 PM	31	-
10:00 AM	-	-	10:00 PM	25	103
10:15 AM	-	-	10:15 PM	31	-
10:30 AM	-	-	10:30 PM	23	-
10:45 AM	-	-	10:45 PM	24	-
11:00 AM	-	-	11:00 PM	9	55
11:15 AM	-	-	11:15 PM	19	-
11:30 AM	-	-	11:30 PM	14	-
11:45 AM	-	-	11:45 PM	13	-

**24 Hour Volume**      SB  
1544

**12:00 AM - 12:00 PM**  
SB  
Count      0  
**Peak Hour**      -  
Volume      -  
Factor      -

**12:00 PM - 12:00 AM**  
SB  
1544  
5:45 PM  
428  
0.88

**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

124th Avenue NE n/o Tolt Pipeline Trail  
 Woodinville, WA  
 NT-0123

Site: 12-138-01  
 Date: 9/11/2012  
 Tuesday



Daily Volume, per Channel  
 Channel: SB

Interval Begin			Interval Begin		
12:00 AM	16	40	12:00 PM	82	371
12:15 AM	11		12:15 PM	103	
12:30 AM	9		12:30 PM	91	
12:45 AM	4		12:45 PM	95	
1:00 AM	1	14	1:00 PM	87	400
1:15 AM	6		1:15 PM	101	
1:30 AM	5		1:30 PM	118	
1:45 AM	2		1:45 PM	94	
2:00 AM	5	20	2:00 PM	113	414
2:15 AM	8		2:15 PM	88	
2:30 AM	3		2:30 PM	102	
2:45 AM	4		2:45 PM	111	
3:00 AM	10	23	3:00 PM	89	483
3:15 AM	4		3:15 PM	116	
3:30 AM	4		3:30 PM	112	
3:45 AM	5		3:45 PM	166	
4:00 AM	5	42	4:00 PM	118	500
4:15 AM	7		4:15 PM	141	
4:30 AM	12		4:30 PM	134	
4:45 AM	18		4:45 PM	107	
5:00 AM	15	97	5:00 PM	133	510
5:15 AM	9		5:15 PM	124	
5:30 AM	28		5:30 PM	125	
5:45 AM	45		5:45 PM	128	
6:00 AM	46	312	6:00 PM	123	436
6:15 AM	67		6:15 PM	105	
6:30 AM	70		6:30 PM	93	
6:45 AM	129		6:45 PM	115	
7:00 AM	122	682	7:00 PM	100	333
7:15 AM	147		7:15 PM	88	
7:30 AM	173		7:30 PM	65	
7:45 AM	240		7:45 PM	80	
8:00 AM	196	762	8:00 PM	88	294
8:15 AM	188		8:15 PM	73	
8:30 AM	199		8:30 PM	79	
8:45 AM	179		8:45 PM	54	
9:00 AM	151	548	9:00 PM	59	214
9:15 AM	176		9:15 PM	62	
9:30 AM	117		9:30 PM	54	
9:45 AM	104		9:45 PM	39	
10:00 AM	117	358	10:00 PM	36	119
10:15 AM	67		10:15 PM	31	
10:30 AM	84		10:30 PM	27	
10:45 AM	90		10:45 PM	25	
11:00 AM	71	343	11:00 PM	20	66
11:15 AM	86		11:15 PM	23	
11:30 AM	89		11:30 PM	9	
11:45 AM	97		11:45 PM	14	

**24 Hour Volume**      SB  
 7381

**12:00 AM - 12:00 PM**  
SB  
 Count                    3241  
**Peak Hour**            7:45 AM  
 Volume                    823  
 Factor                    0.86

**12:00 PM - 12:00 AM**  
SB  
                                   4140  
**Peak Hour**            3:45 PM  
                                   559  
                                   0.84

**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

EXHIBIT 11  
PAGE 38 OF 117

124th Avenue NE n/o Tolt Pipeline Trail  
Woodinville, WA  
NT-0123

Site: 12-138-01  
Date: 9/12/2012  
Wednesday

Daily Volume, per Channel  
Channel: SB

Interval Begin		Interval Begin
12:00 AM	17	39
12:15 AM	9	
12:30 AM	9	
12:45 AM	4	
1:00 AM	6	23
1:15 AM	4	
1:30 AM	5	
1:45 AM	8	
2:00 AM	0	3
2:15 AM	0	
2:30 AM	3	
2:45 AM	0	
3:00 AM	2	9
3:15 AM	2	
3:30 AM	2	
3:45 AM	3	
4:00 AM	2	34
4:15 AM	7	
4:30 AM	9	
4:45 AM	16	
5:00 AM	16	97
5:15 AM	10	
5:30 AM	25	
5:45 AM	46	
6:00 AM	37	287
6:15 AM	64	
6:30 AM	72	
6:45 AM	114	
7:00 AM	121	678
7:15 AM	154	
7:30 AM	173	
7:45 AM	230	
8:00 AM	183	742
8:15 AM	192	
8:30 AM	178	
8:45 AM	189	
9:00 AM	197	495
9:15 AM	109	
9:30 AM	109	
9:45 AM	80	
10:00 AM	99	490
10:15 AM	127	
10:30 AM	134	
10:45 AM	130	
11:00 AM	47	47

**24 Hour Volume**      SB  
2944

**12:00 AM - 12:00 PM**  
SB  
Count      2944  
**Peak Hour**      7:45 AM  
Volume      783  
Factor      0.85

**12:00 PM - 12:00 AM**  
SB  
0  
-  
-  
-

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Woodinville  
Street: 124th Ave NE (S of 149th St)**

A study of vehicle traffic was conducted with HI-STAR unit number 6872. The study was done in the North Bound lane at 124th Ave NE (S of 149th St) in Woodinville, WA in King county. The study began on Apr/12/2011 at 12:00:00 AM and concluded on Apr/15/2011 at 12:00:00 AM, lasting a total of 72.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 23132 vehicles passed through the location with a peak volume of 275 on Apr/13/2011 at [17:00-17:15] and a minimum volume of 2 on Apr/12/2011 at [02:15-02:30]. The AADT count for this study was 7,711.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classified vehicles was 33 MPH with 5.02% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.03 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 38.34 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
3	37	93	628	3335	10878	6935	984	138	26	4	3	3	0	0					

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 16281 which represents 71 percent of the total classified vehicles. The number of Vans & Pickups in the study was 5668 which represents 25 percent of the total classified vehicles. The number of Buses & Trucks in the study was 943 which represents 4 percent of the total classified vehicles. The number of Tractor Trailers in the study was 175 which represents 1 percent of the total classified vehicles.

< to 18	19 to 24	25 to 36	37 to 80	81 to >															
16281	5668	943	174	1															

CHART 2

**HEADWAY**

During the peak traffic period, on Apr/13/2011 at [17:00-17:15] the average headway between vehicles was 3.261 seconds. During the slowest traffic period, on Apr/12/2011 at [02:15-02:30] the average headway between vehicles was 300 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 5.00 and 52.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King		Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1		End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711	
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry	

Tue, Apr/12/2011

[00:00-00:15]	14	35 MPH	9 F	---
[00:15-00:30]	8	36 MPH	9 F	---
[00:30-00:45]	3	31 MPH	9 F	---
[00:45-01:00]	8	35 MPH	9 F	---
[01:00-01:15]	6	37 MPH	7 F	---
[01:15-01:30]	4	36 MPH	7 F	---
[01:30-01:45]	5	37 MPH	7 F	---
[01:45-02:00]	5	34 MPH	7 F	---
[02:00-02:15]	7	35 MPH	5 F	---
[02:15-02:30]	2	35 MPH	5 F	---
[02:30-02:45]	5	38 MPH	5 F	---
[02:45-03:00]	2	28 MPH	5 F	---
[03:00-03:15]	2	30 MPH	5 F	---
[03:15-03:30]	4	35 MPH	5 F	---
[03:30-03:45]	5	34 MPH	5 F	---
[03:45-04:00]	3	37 MPH	5 F	---
[04:00-04:15]	5	32 MPH	5 F	---
[04:15-04:30]	5	36 MPH	5 F	---
[04:30-04:45]	18	34 MPH	5 F	---
[04:45-05:00]	18	37 MPH	5 F	---
[05:00-05:15]	18	34 MPH	5 F	---
[05:15-05:30]	22	34 MPH	5 F	---
[05:30-05:45]	31	36 MPH	5 F	---
[05:45-06:00]	36	36 MPH	5 F	---
[06:00-06:15]	36	36 MPH	5 F	---
[06:15-06:30]	52	34 MPH	5 F	---
[06:30-06:45]	47	33 MPH	5 F	---
[06:45-07:00]	54	35 MPH	5 F	---
[07:00-07:15]	51	36 MPH	9 F	---
[07:15-07:30]	64	37 MPH	9 F	---
[07:30-07:45]	97	34 MPH	9 F	---
[07:45-08:00]	78	35 MPH	9 F	---
[08:00-08:15]	84	34 MPH	13 F	---
[08:15-08:30]	89	35 MPH	13 F	---
[08:30-08:45]	81	36 MPH	13 F	---
[08:45-09:00]	79	32 MPH	13 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King		Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1		End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711	
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry	

Tue, Apr/12/2011

[09:00-09:15]	79	35 MPH	17 F	---
[09:15-09:30]	66	34 MPH	17 F	---
[09:30-09:45]	73	34 MPH	17 F	---
[09:45-10:00]	91	35 MPH	17 F	---
[10:00-10:15]	63	34 MPH	31 F	---
[10:15-10:30]	71	34 MPH	31 F	---
[10:30-10:45]	75	35 MPH	31 F	---
[10:45-11:00]	91	34 MPH	31 F	---
[11:00-11:15]	88	35 MPH	39 F	---
[11:15-11:30]	72	35 MPH	39 F	---
[11:30-11:45]	103	34 MPH	39 F	---
[11:45-12:00]	135	33 MPH	39 F	---
[12:00-12:15]	84	34 MPH	44 F	---
[12:15-12:30]	116	34 MPH	44 F	---
[12:30-12:45]	99	34 MPH	44 F	---
[12:45-13:00]	106	33 MPH	44 F	---
[13:00-13:15]	87	34 MPH	50 F	---
[13:15-13:30]	111	35 MPH	50 F	---
[13:30-13:45]	120	34 MPH	50 F	---
[13:45-14:00]	110	34 MPH	50 F	---
[14:00-14:15]	119	33 MPH	52 F	---
[14:15-14:30]	104	34 MPH	52 F	---
[14:30-14:45]	137	33 MPH	52 F	---
[14:45-15:00]	135	34 MPH	52 F	---
[15:00-15:15]	121	32 MPH	46 F	---
[15:15-15:30]	150	33 MPH	46 F	---
[15:30-15:45]	149	32 MPH	46 F	---
[15:45-16:00]	190	32 MPH	46 F	---
[16:00-16:15]	224	32 MPH	41 F	---
[16:15-16:30]	227	33 MPH	41 F	---
[16:30-16:45]	247	33 MPH	41 F	---
[16:45-17:00]	208	33 MPH	41 F	---
[17:00-17:15]	241	33 MPH	37 F	---
[17:15-17:30]	258	31 MPH	37 F	---
[17:30-17:45]	249	33 MPH	37 F	---
[17:45-18:00]	260	32 MPH	37 F	---

**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Tue, Apr/12/2011

[18:00-18:15]	201	33 MPH	37 F	---
[18:15-18:30]	181	33 MPH	31 F	---
[18:30-18:45]	175	34 MPH	31 F	---
[18:45-19:00]	138	33 MPH	31 F	---
[19:00-19:15]	126	34 MPH	27 F	---
[19:15-19:30]	109	34 MPH	27 F	---
[19:30-19:45]	102	33 MPH	27 F	---
[19:45-20:00]	95	34 MPH	27 F	---
[20:00-20:15]	72	34 MPH	23 F	---
[20:15-20:30]	81	34 MPH	23 F	---
[20:30-20:45]	63	34 MPH	23 F	---
[20:45-21:00]	80	34 MPH	23 F	---
[21:00-21:15]	67	32 MPH	21 F	---
[21:15-21:30]	50	33 MPH	21 F	---
[21:30-21:45]	57	34 MPH	21 F	---
[21:45-22:00]	43	33 MPH	21 F	---
[22:00-22:15]	41	34 MPH	21 F	---
[22:15-22:30]	30	35 MPH	21 F	---
[22:30-22:45]	25	34 MPH	21 F	---
[22:45-23:00]	21	34 MPH	21 F	---
[23:00-23:15]	21	36 MPH	19 F	---
[23:15-23:30]	25	33 MPH	19 F	---
[23:30-23:45]	13	36 MPH	19 F	---
[23:45-00:00]	27	34 MPH	19 F	---

Tue, Apr/12/2011

7750      34 MPH      23 F

Wed, Apr/13/2011

[00:00-00:15]	8	38 MPH	19 F	---
[00:15-00:30]	13	32 MPH	19 F	---
[00:30-00:45]	14	33 MPH	19 F	---
[00:45-01:00]	7	37 MPH	19 F	---
[01:00-01:15]	4	37 MPH	17 F	---
[01:15-01:30]	5	38 MPH	17 F	---
[01:30-01:45]	3	34 MPH	17 F	---
[01:45-02:00]	7	35 MPH	17 F	---
[02:00-02:15]	6	33 MPH	15 F	---
[02:15-02:30]	8	36 MPH	15 F	---

**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Wed, Apr/13/2011

[02:30-02:45]	9	36 MPH	15 F	---
[02:45-03:00]	4	34 MPH	15 F	---
[03:00-03:15]	7	37 MPH	13 F	---
[03:15-03:30]	9	35 MPH	13 F	---
[03:30-03:45]	7	36 MPH	13 F	---
[03:45-04:00]	6	36 MPH	13 F	---
[04:00-04:15]	6	33 MPH	13 F	---
[04:15-04:30]	12	35 MPH	13 F	---
[04:30-04:45]	14	34 MPH	13 F	---
[04:45-05:00]	16	34 MPH	13 F	---
[05:00-05:15]	19	34 MPH	13 F	---
[05:15-05:30]	17	34 MPH	13 F	---
[05:30-05:45]	38	35 MPH	13 F	---
[05:45-06:00]	38	35 MPH	13 F	---
[06:00-06:15]	46	36 MPH	13 F	---
[06:15-06:30]	48	34 MPH	13 F	---
[06:30-06:45]	53	34 MPH	13 F	---
[06:45-07:00]	53	35 MPH	13 F	---
[07:00-07:15]	64	35 MPH	15 F	---
[07:15-07:30]	61	35 MPH	15 F	---
[07:30-07:45]	82	35 MPH	15 F	---
[07:45-08:00]	68	35 MPH	15 F	---
[08:00-08:15]	89	34 MPH	17 F	---
[08:15-08:30]	77	34 MPH	17 F	---
[08:30-08:45]	72	34 MPH	17 F	---
[08:45-09:00]	83	31 MPH	17 F	---
[09:00-09:15]	74	33 MPH	17 F	---
[09:15-09:30]	93	32 MPH	17 F	---
[09:30-09:45]	74	36 MPH	17 F	---
[09:45-10:00]	78	34 MPH	17 F	---
[10:00-10:15]	73	34 MPH	21 F	---
[10:15-10:30]	81	34 MPH	21 F	---
[10:30-10:45]	81	34 MPH	21 F	---
[10:45-11:00]	82	34 MPH	21 F	---
[11:00-11:15]	82	35 MPH	17 F	---
[11:15-11:30]	102	34 MPH	17 F	---

**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Wed, Apr/13/2011

[11:30-11:45]	74	34 MPH	17 F	---
[11:45-12:00]	95	34 MPH	17 F	---
[12:00-12:15]	97	34 MPH	21 F	---
[12:15-12:30]	96	34 MPH	21 F	---
[12:30-12:45]	126	34 MPH	21 F	---
[12:45-13:00]	95	33 MPH	21 F	---
[13:00-13:15]	92	34 MPH	27 F	---
[13:15-13:30]	102	34 MPH	27 F	---
[13:30-13:45]	87	34 MPH	27 F	---
[13:45-14:00]	97	33 MPH	27 F	---
[14:00-14:15]	109	32 MPH	23 F	---
[14:15-14:30]	124	34 MPH	23 F	---
[14:30-14:45]	145	33 MPH	23 F	---
[14:45-15:00]	125	34 MPH	23 F	---
[15:00-15:15]	141	33 MPH	23 F	---
[15:15-15:30]	158	32 MPH	21 F	---
[15:30-15:45]	182	32 MPH	21 F	---
[15:45-16:00]	191	32 MPH	21 F	---
[16:00-16:15]	206	32 MPH	23 F	---
[16:15-16:30]	228	32 MPH	23 F	---
[16:30-16:45]	232	31 MPH	23 F	---
[16:45-17:00]	213	32 MPH	23 F	---
[17:00-17:15]	275	33 MPH	23 F	---
[17:15-17:30]	210	34 MPH	23 F	---
[17:30-17:45]	233	32 MPH	23 F	---
[17:45-18:00]	226	33 MPH	23 F	---
[18:00-18:15]	193	33 MPH	19 F	---
[18:15-18:30]	177	34 MPH	19 F	---
[18:30-18:45]	167	34 MPH	19 F	---
[18:45-19:00]	144	34 MPH	19 F	---
[19:00-19:15]	130	34 MPH	15 F	---
[19:15-19:30]	121	34 MPH	15 F	---
[19:30-19:45]	93	34 MPH	15 F	---
[19:45-20:00]	91	34 MPH	15 F	---
[20:00-20:15]	106	34 MPH	11 F	---
[20:15-20:30]	63	34 MPH	11 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Wed, Apr/13/2011

[20:30-20:45]	77	33 MPH	11 F	---
[20:45-21:00]	72	32 MPH	11 F	---
[21:00-21:15]	59	33 MPH	11 F	---
[21:15-21:30]	64	32 MPH	11 F	---
[21:30-21:45]	63	33 MPH	11 F	---
[21:45-22:00]	48	34 MPH	11 F	---
[22:00-22:15]	36	33 MPH	9 F	---
[22:15-22:30]	33	33 MPH	9 F	---
[22:30-22:45]	30	34 MPH	9 F	---
[22:45-23:00]	27	34 MPH	9 F	---
[23:00-23:15]	32	34 MPH	9 F	---
[23:15-23:30]	21	34 MPH	9 F	---
[23:30-23:45]	21	35 MPH	9 F	---
[23:45-00:00]	13	35 MPH	9 F	---

Wed, Apr/13/2011

7733 34 MPH 17 F

Thu, Apr/14/2011

[00:00-00:15]	19	34 MPH	9 F	---
[00:15-00:30]	6	32 MPH	9 F	---
[00:30-00:45]	8	36 MPH	9 F	---
[00:45-01:00]	13	35 MPH	9 F	---
[01:00-01:15]	6	34 MPH	9 F	---
[01:15-01:30]	3	34 MPH	9 F	---
[01:30-01:45]	4	40 MPH	9 F	---
[01:45-02:00]	10	34 MPH	9 F	---
[02:00-02:15]	4	36 MPH	9 F	---
[02:15-02:30]	3	38 MPH	9 F	---
[02:30-02:45]	7	30 MPH	9 F	---
[02:45-03:00]	2	30 MPH	9 F	---
[03:00-03:15]	2	30 MPH	9 F	---
[03:15-03:30]	3	29 MPH	9 F	---
[03:30-03:45]	4	34 MPH	9 F	---
[03:45-04:00]	10	42 MPH	9 F	---
[04:00-04:15]	11	35 MPH	9 F	---
[04:15-04:30]	12	35 MPH	9 F	---
[04:30-04:45]	17	32 MPH	9 F	---
[04:45-05:00]	12	34 MPH	9 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Thu, Apr/14/2011

[05:00-05:15]	21	31 MPH	9 F	---
[05:15-05:30]	22	36 MPH	9 F	---
[05:30-05:45]	30	35 MPH	9 F	---
[05:45-06:00]	34	36 MPH	9 F	---
[06:00-06:15]	41	35 MPH	9 F	---
[06:15-06:30]	42	35 MPH	9 F	---
[06:30-06:45]	57	35 MPH	9 F	---
[06:45-07:00]	61	35 MPH	9 F	---
[07:00-07:15]	58	34 MPH	11 F	---
[07:15-07:30]	77	34 MPH	11 F	---
[07:30-07:45]	77	35 MPH	11 F	---
[07:45-08:00]	82	34 MPH	11 F	---
[08:00-08:15]	75	35 MPH	13 F	---
[08:15-08:30]	79	35 MPH	13 F	---
[08:30-08:45]	64	33 MPH	13 F	---
[08:45-09:00]	80	31 MPH	13 F	---
[09:00-09:15]	80	35 MPH	19 F	---
[09:15-09:30]	69	33 MPH	19 F	---
[09:30-09:45]	61	34 MPH	19 F	---
[09:45-10:00]	75	34 MPH	19 F	---
[10:00-10:15]	72	34 MPH	19 F	---
[10:15-10:30]	69	35 MPH	19 F	---
[10:30-10:45]	94	35 MPH	19 F	---
[10:45-11:00]	81	35 MPH	19 F	---
[11:00-11:15]	101	34 MPH	21 F	---
[11:15-11:30]	71	34 MPH	21 F	---
[11:30-11:45]	85	35 MPH	21 F	---
[11:45-12:00]	108	34 MPH	21 F	---
[12:00-12:15]	97	35 MPH	21 F	---
[12:15-12:30]	100	33 MPH	19 F	---
[12:30-12:45]	95	33 MPH	19 F	---
[12:45-13:00]	98	33 MPH	19 F	---
[13:00-13:15]	105	34 MPH	15 F	---
[13:15-13:30]	96	36 MPH	15 F	---
[13:30-13:45]	105	35 MPH	15 F	---
[13:45-14:00]	104	33 MPH	15 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King		Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1		End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711	
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry	

Thu, Apr/14/2011

[14:00-14:15]	112	32 MPH	15 F	---	
[14:15-14:30]	130	33 MPH	15 F	---	
[14:30-14:45]	133	34 MPH	15 F	---	
[14:45-15:00]	117	34 MPH	15 F	---	
[15:00-15:15]	135	33 MPH	15 F	---	
[15:15-15:30]	142	34 MPH	15 F	---	
[15:30-15:45]	187	33 MPH	15 F	---	
[15:45-16:00]	212	32 MPH	15 F	---	
[16:00-16:15]	205	32 MPH	15 F	---	
[16:15-16:30]	215	33 MPH	15 F	---	
[16:30-16:45]	257	31 MPH	15 F	---	
[16:45-17:00]	224	33 MPH	15 F	---	
[17:00-17:15]	252	33 MPH	15 F	---	
[17:15-17:30]	255	33 MPH	15 F	---	
[17:30-17:45]	252	33 MPH	15 F	---	
[17:45-18:00]	216	34 MPH	15 F	---	
[18:00-18:15]	199	34 MPH	15 F	---	
[18:15-18:30]	188	33 MPH	15 F	---	
[18:30-18:45]	148	33 MPH	15 F	---	
[18:45-19:00]	148	33 MPH	15 F	---	
[19:00-19:15]	124	34 MPH	13 F	---	
[19:15-19:30]	101	34 MPH	13 F	---	
[19:30-19:45]	87	35 MPH	13 F	---	
[19:45-20:00]	71	34 MPH	13 F	---	
[20:00-20:15]	85	34 MPH	11 F	---	
[20:15-20:30]	58	34 MPH	11 F	---	
[20:30-20:45]	82	33 MPH	11 F	---	
[20:45-21:00]	85	33 MPH	11 F	---	
[21:00-21:15]	54	32 MPH	9 F	---	
[21:15-21:30]	43	33 MPH	9 F	---	
[21:30-21:45]	43	34 MPH	9 F	---	
[21:45-22:00]	40	33 MPH	9 F	---	
[22:00-22:15]	39	33 MPH	9 F	---	
[22:15-22:30]	47	33 MPH	9 F	---	
[22:30-22:45]	40	33 MPH	9 F	---	
[22:45-23:00]	25	34 MPH	9 F	---	

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 6872 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King		Begin: Apr/12/2011 12:00:00 AM Lane: North Bound Oper: BGS Posted: 35 AADT Factor: 1		End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 23132 AADT Count: 7,711	
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry	
Thu, Apr/14/2011					
[23:00-23:15]	17	36 MPH	9 F	---	
[23:15-23:30]	27	34 MPH	9 F	---	
[23:30-23:45]	15	32 MPH	9 F	---	
[23:45-00:00]	17	33 MPH	9 F	---	
Thu, Apr/14/2011		7649	34 MPH	13 F	
Apr/12/2011 12:00:00 AM					
Apr/15/2011 12:00:00 AM		23132	34 MPH	18 F	

**Nu-Metrics Traffic Analyzer Study  
Computer Generated Summary Report  
City: Woodinville  
Street: 124th Ave NE (S of 149th St)**

A study of vehicle traffic was conducted with HI-STAR unit number 9110. The study was done in the South Bound lane at 124th Ave NE (S of 149th St) in Woodinville, WA in King county. The study began on Apr/12/2011 at 12:00:00 AM and concluded on Apr/15/2011 at 12:00:00 AM, lasting a total of 72.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 20363 vehicles passed through the location with a peak volume of 219 on Apr/12/2011 at [07:45-08:00] and a minimum volume of 0 on Apr/14/2011 at [03:00-03:15]. The AADT count for this study was 6,788.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 35 - 40 MPH range or lower. The average speed for all classified vehicles was 38 MPH with 32.82% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.18 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 35MPH and the 85th percentile was 43.45 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
21	33	110	308	1000	3686	8448	5227	1148	200	35	18	15	3	0					

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 12839 which represents 63 percent of the total classified vehicles. The number of Vans & Pickups in the study was 5036 which represents 25 percent of the total classified vehicles. The number of Buses & Trucks in the study was 2184 which represents 11 percent of the total classified vehicles. The number of Tractor Trailers in the study was 193 which represents 1 percent of the total classified vehicles.

< to 18	19 to 24	25 to 36	37 to 80	81 to >															
12839	5036	2184	189	4															

CHART 2

**HEADWAY**

During the peak traffic period, on Apr/12/2011 at [07:45-08:00] the average headway between vehicles was 4.091 seconds. During the slowest traffic period, on Apr/14/2011 at [03:00-03:15] the average headway between vehicles was 900 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 5.00 and 54.00 degrees F.

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Tue, Apr/12/2011

[00:00-00:15]	8	42 MPH	9 F	---
[00:15-00:30]	7	43 MPH	9 F	---
[00:30-00:45]	8	36 MPH	9 F	---
[00:45-01:00]	9	40 MPH	9 F	---
[01:00-01:15]	6	37 MPH	7 F	---
[01:15-01:30]	4	45 MPH	7 F	---
[01:30-01:45]	3	36 MPH	7 F	---
[01:45-02:00]	3	41 MPH	7 F	---
[02:00-02:15]	3	43 MPH	7 F	---
[02:15-02:30]	6	39 MPH	7 F	---
[02:30-02:45]	3	34 MPH	7 F	---
[02:45-03:00]	3	37 MPH	7 F	---
[03:00-03:15]	1	48 MPH	5 F	---
[03:15-03:30]	5	38 MPH	5 F	---
[03:30-03:45]	1	48 MPH	5 F	---
[03:45-04:00]	3	43 MPH	5 F	---
[04:00-04:15]	4	38 MPH	5 F	---
[04:15-04:30]	7	38 MPH	5 F	---
[04:30-04:45]	11	37 MPH	5 F	---
[04:45-05:00]	10	41 MPH	5 F	---
[05:00-05:15]	20	35 MPH	5 F	---
[05:15-05:30]	13	36 MPH	5 F	---
[05:30-05:45]	30	39 MPH	5 F	---
[05:45-06:00]	49	40 MPH	5 F	---
[06:00-06:15]	44	39 MPH	5 F	---
[06:15-06:30]	88	38 MPH	7 F	---
[06:30-06:45]	84	40 MPH	7 F	---
[06:45-07:00]	131	41 MPH	7 F	---
[07:00-07:15]	121	38 MPH	9 F	---
[07:15-07:30]	155	38 MPH	9 F	---
[07:30-07:45]	169	38 MPH	9 F	---
[07:45-08:00]	219	37 MPH	9 F	---
[08:00-08:15]	134	38 MPH	9 F	---
[08:15-08:30]	170	36 MPH	13 F	---
[08:30-08:45]	156	38 MPH	13 F	---
[08:45-09:00]	139	35 MPH	13 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Tue, Apr/12/2011

[09:00-09:15]	129	37 MPH	21 F	---
[09:15-09:30]	103	39 MPH	21 F	---
[09:30-09:45]	109	38 MPH	21 F	---
[09:45-10:00]	90	38 MPH	21 F	---
[10:00-10:15]	77	38 MPH	31 F	---
[10:15-10:30]	80	40 MPH	31 F	---
[10:30-10:45]	98	39 MPH	31 F	---
[10:45-11:00]	87	37 MPH	31 F	---
[11:00-11:15]	79	40 MPH	39 F	---
[11:15-11:30]	84	36 MPH	39 F	---
[11:30-11:45]	85	38 MPH	39 F	---
[11:45-12:00]	110	38 MPH	39 F	---
[12:00-12:15]	72	37 MPH	39 F	---
[12:15-12:30]	83	39 MPH	44 F	---
[12:30-12:45]	104	39 MPH	44 F	---
[12:45-13:00]	89	38 MPH	44 F	---
[13:00-13:15]	92	38 MPH	50 F	---
[13:15-13:30]	96	38 MPH	50 F	---
[13:30-13:45]	87	39 MPH	50 F	---
[13:45-14:00]	101	39 MPH	50 F	---
[14:00-14:15]	88	38 MPH	54 F	---
[14:15-14:30]	82	38 MPH	54 F	---
[14:30-14:45]	130	37 MPH	54 F	---
[14:45-15:00]	111	37 MPH	54 F	---
[15:00-15:15]	107	39 MPH	54 F	---
[15:15-15:30]	117	37 MPH	48 F	---
[15:30-15:45]	105	38 MPH	48 F	---
[15:45-16:00]	123	37 MPH	48 F	---
[16:00-16:15]	118	38 MPH	42 F	---
[16:15-16:30]	104	39 MPH	42 F	---
[16:30-16:45]	128	37 MPH	42 F	---
[16:45-17:00]	136	37 MPH	42 F	---
[17:00-17:15]	115	40 MPH	37 F	---
[17:15-17:30]	137	38 MPH	37 F	---
[17:30-17:45]	114	39 MPH	37 F	---
[17:45-18:00]	88	37 MPH	37 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 9110	Begin: Apr/12/2011 12:00:00 AM	End: Apr/15/2011 12:00:00 AM
Street: 124th Ave NE (S of 149th St)	Lane: South Bound	Hours: 72.00
State: WA	Oper: BGS	Period: 15
City: Woodinville	Posted: 35	Raw Count: 20363
County: King	AAADT Factor: 1	AAADT Count: 6,788

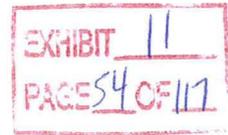
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
Tue, Apr/12/2011				
[18:00-18:15]	97	38 MPH	31 F	---
[18:15-18:30]	108	38 MPH	31 F	---
[18:30-18:45]	103	38 MPH	31 F	---
[18:45-19:00]	103	39 MPH	31 F	---
[19:00-19:15]	94	37 MPH	27 F	---
[19:15-19:30]	87	40 MPH	27 F	---
[19:30-19:45]	71	39 MPH	27 F	---
[19:45-20:00]	76	40 MPH	27 F	---
[20:00-20:15]	75	40 MPH	25 F	---
[20:15-20:30]	77	38 MPH	25 F	---
[20:30-20:45]	66	37 MPH	25 F	---
[20:45-21:00]	59	37 MPH	25 F	---
[21:00-21:15]	62	38 MPH	23 F	---
[21:15-21:30]	60	38 MPH	23 F	---
[21:30-21:45]	67	38 MPH	23 F	---
[21:45-22:00]	36	39 MPH	23 F	---
[22:00-22:15]	42	39 MPH	21 F	---
[22:15-22:30]	37	39 MPH	21 F	---
[22:30-22:45]	29	40 MPH	21 F	---
[22:45-23:00]	26	38 MPH	21 F	---
[23:00-23:15]	20	39 MPH	21 F	---
[23:15-23:30]	17	38 MPH	21 F	---
[23:30-23:45]	12	40 MPH	21 F	---
[23:45-00:00]	9	32 MPH	21 F	---
Tue, Apr/12/2011	6918	38 MPH	24 F	
Wed, Apr/13/2011				
[00:00-00:15]	15	39 MPH	19 F	---
[00:15-00:30]	9	39 MPH	19 F	---
[00:30-00:45]	4	35 MPH	19 F	---
[00:45-01:00]	11	37 MPH	19 F	---
[01:00-01:15]	3	48 MPH	17 F	---
[01:15-01:30]	4	40 MPH	17 F	---
[01:30-01:45]	5	46 MPH	17 F	---
[01:45-02:00]	4	37 MPH	17 F	---
[02:00-02:15]	3	42 MPH	15 F	---
[02:15-02:30]	2	33 MPH	15 F	---

Date/Time/Volume/Average Speed/Temperature Report

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King		Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1		End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788	
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry	

Wed, Apr/13/2011

[02:30-02:45]	4	39 MPH	15 F	---	
[02:45-03:00]	3	37 MPH	15 F	---	
[03:00-03:15]	3	44 MPH	15 F	---	
[03:15-03:30]	5	42 MPH	15 F	---	
[03:30-03:45]	2	40 MPH	15 F	---	
[03:45-04:00]	5	38 MPH	15 F	---	
[04:00-04:15]	4	38 MPH	15 F	---	
[04:15-04:30]	7	36 MPH	15 F	---	
[04:30-04:45]	12	43 MPH	15 F	---	
[04:45-05:00]	12	37 MPH	15 F	---	
[05:00-05:15]	20	36 MPH	13 F	---	
[05:15-05:30]	21	40 MPH	13 F	---	
[05:30-05:45]	24	39 MPH	13 F	---	
[05:45-06:00]	48	38 MPH	13 F	---	
[06:00-06:15]	46	39 MPH	13 F	---	
[06:15-06:30]	69	38 MPH	13 F	---	
[06:30-06:45]	85	39 MPH	13 F	---	
[06:45-07:00]	127	39 MPH	13 F	---	
[07:00-07:15]	98	37 MPH	15 F	---	
[07:15-07:30]	148	38 MPH	15 F	---	
[07:30-07:45]	191	37 MPH	15 F	---	
[07:45-08:00]	208	36 MPH	15 F	---	
[08:00-08:15]	166	37 MPH	17 F	---	
[08:15-08:30]	176	37 MPH	17 F	---	
[08:30-08:45]	174	37 MPH	17 F	---	
[08:45-09:00]	146	34 MPH	17 F	---	
[09:00-09:15]	151	37 MPH	19 F	---	
[09:15-09:30]	118	36 MPH	19 F	---	
[09:30-09:45]	112	38 MPH	19 F	---	
[09:45-10:00]	87	38 MPH	19 F	---	
[10:00-10:15]	78	38 MPH	23 F	---	
[10:15-10:30]	60	39 MPH	23 F	---	
[10:30-10:45]	77	38 MPH	23 F	---	
[10:45-11:00]	74	38 MPH	23 F	---	
[11:00-11:15]	117	38 MPH	23 F	---	
[11:15-11:30]	81	38 MPH	19 F	---	



**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Wed, Apr/13/2011

[11:30-11:45]	74	38 MPH	19 F	---
[11:45-12:00]	71	39 MPH	19 F	---
[12:00-12:15]	98	39 MPH	21 F	---
[12:15-12:30]	83	39 MPH	21 F	---
[12:30-12:45]	91	38 MPH	21 F	---
[12:45-13:00]	80	38 MPH	21 F	---
[13:00-13:15]	78	37 MPH	27 F	---
[13:15-13:30]	86	38 MPH	27 F	---
[13:30-13:45]	92	38 MPH	27 F	---
[13:45-14:00]	104	38 MPH	27 F	---
[14:00-14:15]	86	38 MPH	25 F	---
[14:15-14:30]	83	38 MPH	25 F	---
[14:30-14:45]	119	37 MPH	25 F	---
[14:45-15:00]	110	37 MPH	25 F	---
[15:00-15:15]	93	38 MPH	21 F	---
[15:15-15:30]	117	37 MPH	21 F	---
[15:30-15:45]	119	36 MPH	21 F	---
[15:45-16:00]	134	37 MPH	21 F	---
[16:00-16:15]	104	37 MPH	23 F	---
[16:15-16:30]	109	38 MPH	23 F	---
[16:30-16:45]	126	39 MPH	23 F	---
[16:45-17:00]	147	38 MPH	23 F	---
[17:00-17:15]	97	38 MPH	23 F	---
[17:15-17:30]	101	39 MPH	23 F	---
[17:30-17:45]	97	39 MPH	23 F	---
[17:45-18:00]	112	38 MPH	23 F	---
[18:00-18:15]	119	39 MPH	21 F	---
[18:15-18:30]	94	39 MPH	21 F	---
[18:30-18:45]	104	38 MPH	21 F	---
[18:45-19:00]	89	38 MPH	21 F	---
[19:00-19:15]	92	39 MPH	17 F	---
[19:15-19:30]	91	37 MPH	17 F	---
[19:30-19:45]	74	40 MPH	17 F	---
[19:45-20:00]	104	39 MPH	17 F	---
[20:00-20:15]	71	39 MPH	13 F	---
[20:15-20:30]	81	36 MPH	13 F	---

**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Wed, Apr/13/2011

[20:30-20:45]	68	35 MPH	13 F	---
[20:45-21:00]	52	38 MPH	13 F	---
[21:00-21:15]	49	38 MPH	13 F	---
[21:15-21:30]	44	38 MPH	13 F	---
[21:30-21:45]	35	39 MPH	13 F	---
[21:45-22:00]	34	40 MPH	13 F	---
[22:00-22:15]	43	37 MPH	11 F	---
[22:15-22:30]	31	38 MPH	11 F	---
[22:30-22:45]	27	39 MPH	11 F	---
[22:45-23:00]	19	37 MPH	11 F	---
[23:00-23:15]	23	36 MPH	11 F	---
[23:15-23:30]	16	41 MPH	11 F	---
[23:30-23:45]	20	35 MPH	11 F	---
[23:45-00:00]	11	35 MPH	11 F	---

Wed, Apr/13/2011

6821

38 MPH

18 F

Thu, Apr/14/2011

[00:00-00:15]	4	42 MPH	9 F	---
[00:15-00:30]	5	46 MPH	9 F	---
[00:30-00:45]	8	38 MPH	9 F	---
[00:45-01:00]	8	34 MPH	9 F	---
[01:00-01:15]	6	39 MPH	9 F	---
[01:15-01:30]	4	36 MPH	9 F	---
[01:30-01:45]	3	37 MPH	9 F	---
[01:45-02:00]	4	45 MPH	9 F	---
[02:00-02:15]	5	42 MPH	9 F	---
[02:15-02:30]	3	33 MPH	9 F	---
[02:30-02:45]	4	40 MPH	9 F	---
[02:45-03:00]	1	38 MPH	9 F	---
[03:00-03:15]	0	0 MPH	9 F	---
[03:15-03:30]	2	43 MPH	9 F	---
[03:30-03:45]	5	40 MPH	9 F	---
[03:45-04:00]	3	54 MPH	9 F	---
[04:00-04:15]	3	33 MPH	9 F	---
[04:15-04:30]	5	40 MPH	9 F	---
[04:30-04:45]	11	38 MPH	9 F	---
[04:45-05:00]	13	41 MPH	9 F	---

**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Thu, Apr/14/2011

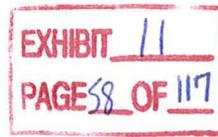
[05:00-05:15]	20	34 MPH	9 F	---
[05:15-05:30]	15	39 MPH	9 F	---
[05:30-05:45]	27	39 MPH	9 F	---
[05:45-06:00]	47	39 MPH	9 F	---
[06:00-06:15]	61	37 MPH	9 F	---
[06:15-06:30]	63	38 MPH	9 F	---
[06:30-06:45]	96	38 MPH	9 F	---
[06:45-07:00]	134	39 MPH	9 F	---
[07:00-07:15]	99	35 MPH	11 F	---
[07:15-07:30]	140	38 MPH	11 F	---
[07:30-07:45]	188	36 MPH	11 F	---
[07:45-08:00]	218	36 MPH	11 F	---
[08:00-08:15]	176	35 MPH	13 F	---
[08:15-08:30]	173	37 MPH	13 F	---
[08:30-08:45]	163	35 MPH	13 F	---
[08:45-09:00]	159	33 MPH	13 F	---
[09:00-09:15]	154	36 MPH	13 F	---
[09:15-09:30]	111	37 MPH	19 F	---
[09:30-09:45]	100	37 MPH	19 F	---
[09:45-10:00]	98	38 MPH	19 F	---
[10:00-10:15]	74	39 MPH	19 F	---
[10:15-10:30]	62	38 MPH	19 F	---
[10:30-10:45]	83	37 MPH	19 F	---
[10:45-11:00]	71	38 MPH	19 F	---
[11:00-11:15]	75	38 MPH	21 F	---
[11:15-11:30]	62	38 MPH	21 F	---
[11:30-11:45]	91	37 MPH	21 F	---
[11:45-12:00]	85	37 MPH	21 F	---
[12:00-12:15]	90	39 MPH	19 F	---
[12:15-12:30]	122	37 MPH	19 F	---
[12:30-12:45]	81	39 MPH	19 F	---
[12:45-13:00]	90	36 MPH	19 F	---
[13:00-13:15]	89	40 MPH	17 F	---
[13:15-13:30]	98	39 MPH	17 F	---
[13:30-13:45]	68	38 MPH	17 F	---
[13:45-14:00]	88	39 MPH	17 F	---

**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788		
Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry

Thu, Apr/14/2011

[14:00-14:15]	82	40 MPH	15 F	---
[14:15-14:30]	84	39 MPH	15 F	---
[14:30-14:45]	124	37 MPH	15 F	---
[14:45-15:00]	94	39 MPH	15 F	---
[15:00-15:15]	117	37 MPH	15 F	---
[15:15-15:30]	101	38 MPH	15 F	---
[15:30-15:45]	97	37 MPH	15 F	---
[15:45-16:00]	119	38 MPH	15 F	---
[16:00-16:15]	113	37 MPH	15 F	---
[16:15-16:30]	106	40 MPH	15 F	---
[16:30-16:45]	113	37 MPH	15 F	---
[16:45-17:00]	103	38 MPH	15 F	---
[17:00-17:15]	109	39 MPH	15 F	---
[17:15-17:30]	112	39 MPH	15 F	---
[17:30-17:45]	125	38 MPH	15 F	---
[17:45-18:00]	116	39 MPH	15 F	---
[18:00-18:15]	93	39 MPH	15 F	---
[18:15-18:30]	98	39 MPH	15 F	---
[18:30-18:45]	87	38 MPH	15 F	---
[18:45-19:00]	88	38 MPH	15 F	---
[19:00-19:15]	82	38 MPH	13 F	---
[19:15-19:30]	71	39 MPH	13 F	---
[19:30-19:45]	54	39 MPH	13 F	---
[19:45-20:00]	64	38 MPH	13 F	---
[20:00-20:15]	78	38 MPH	13 F	---
[20:15-20:30]	70	38 MPH	13 F	---
[20:30-20:45]	55	39 MPH	13 F	---
[20:45-21:00]	62	38 MPH	13 F	---
[21:00-21:15]	47	37 MPH	9 F	---
[21:15-21:30]	46	38 MPH	9 F	---
[21:30-21:45]	47	38 MPH	9 F	---
[21:45-22:00]	38	37 MPH	9 F	---
[22:00-22:15]	35	38 MPH	9 F	---
[22:15-22:30]	33	39 MPH	9 F	---
[22:30-22:45]	22	40 MPH	9 F	---
[22:45-23:00]	23	36 MPH	9 F	---



**Date/Time/Volume/Average Speed/Temperature Report**

HI-Star ID: 9110 Street: 124th Ave NE (S of 149th St) State: WA City: Woodinville County: King	Begin: Apr/12/2011 12:00:00 AM Lane: South Bound Oper: BGS Posted: 35 AADT Factor: 1	End: Apr/15/2011 12:00:00 AM Hours: 72.00 Period: 15 Raw Count: 20363 AADT Count: 6,788
--	--	---

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry
---------------------	---------------	---------------	---------------------	-------------------------

Thu, Apr/14/2011

[23:00-23:15]	15	40 MPH	9 F	---
[23:15-23:30]	14	41 MPH	9 F	---
[23:30-23:45]	11	37 MPH	9 F	---
[23:45-00:00]	8	37 MPH	9 F	---

Thu, Apr/14/2011

6624      38 MPH      13 F

Apr/12/2011 12:00:00 AM	20363	38 MPH	18 F
Apr/15/2011 12:00:00 AM			

**TRAFFIC DATA GATHERING**  
**Lake Stevens, WA**      **Tel: (425) 334-3348**  
**e-mail: CarlaN@TrafficDataGathering.com**

Location:: NE 157th Street e/o 124th Avenue NE  
 City, State:: Woodinville, WA  
 Counter #:: NT-0123

Site: 12-141-01  
 Date: 9/18/2012  
 Tuesday

24 Hour Volume

Begin	WB	EB	Combined	Begin	WB	EB	Combined						
12:00 AM	0	3	2	8	2	11	12:00 PM	7	31	12	39	19	70
12:15 AM	0		4		4		12:15 PM	7		10		17	
12:30 AM	0		0		0		12:30 PM	6		10		16	
12:45 AM	3		2		5		12:45 PM	11		7		18	
1:00 AM	1	2	0	2	1	4	1:00 PM	6	34	7	31	13	65
1:15 AM	0		1		1		1:15 PM	13		7		20	
1:30 AM	1		1		2		1:30 PM	9		7		16	
1:45 AM	0		0		0		1:45 PM	6		10		16	
2:00 AM	1	2	1	1	2	3	2:00 PM	8	54	10	45	18	99
2:15 AM	0		0		0		2:15 PM	14		11		25	
2:30 AM	0		0		0		2:30 PM	21		12		33	
2:45 AM	1		0		1		2:45 PM	11		12		23	
3:00 AM	0	3	0	0	0	3	3:00 PM	7	39	14	74	21	113
3:15 AM	2		0		2		3:15 PM	10		20		30	
3:30 AM	1		0		1		3:30 PM	13		22		35	
3:45 AM	0		0		0		3:45 PM	9		18		27	
4:00 AM	2	11	0	3	2	14	4:00 PM	11	40	18	63	29	103
4:15 AM	1		1		2		4:15 PM	10		15		25	
4:30 AM	6		0		6		4:30 PM	13		15		28	
4:45 AM	2		2		4		4:45 PM	6		15		21	
5:00 AM	6	29	2	6	8	35	5:00 PM	19	56	22	80	41	136
5:15 AM	6		1		7		5:15 PM	9		15		24	
5:30 AM	10		1		11		5:30 PM	12		21		33	
5:45 AM	7		2		9		5:45 PM	16		22		38	
6:00 AM	8	65	0	13	8	78	6:00 PM	13	56	20	67	33	123
6:15 AM	18		6		24		6:15 PM	6		16		22	
6:30 AM	22		1		23		6:30 PM	20		19		39	
6:45 AM	17		6		23		6:45 PM	17		12		29	
7:00 AM	15	90	2	19	17	109	7:00 PM	14	41	25	87	39	128
7:15 AM	19		2		21		7:15 PM	14		26		40	
7:30 AM	24		7		31		7:30 PM	5		16		21	
7:45 AM	32		8		40		7:45 PM	8		20		28	
8:00 AM	22	70	10	27	32	97	8:00 PM	2	20	15	57	17	77
8:15 AM	15		4		19		8:15 PM	7		16		23	
8:30 AM	19		7		26		8:30 PM	4		14		18	
8:45 AM	14		6		20		8:45 PM	7		12		19	
9:00 AM	18	49	11	35	29	84	9:00 PM	4	11	13	34	17	45
9:15 AM	8		9		17		9:15 PM	3		15		18	
9:30 AM	9		7		16		9:30 PM	2		4		6	
9:45 AM	14		8		22		9:45 PM	2		2		4	
10:00 AM	6	33	5	25	11	58	10:00 PM	3	11	3	17	6	28
10:15 AM	10		6		16		10:15 PM	5		3		8	
10:30 AM	11		4		15		10:30 PM	3		8		11	
10:45 AM	6		10		16		10:45 PM	0		3		3	
11:00 AM	6	30	9	31	15	61	11:00 PM	1	3	5	9	6	12
11:15 AM	6		8		14		11:15 PM	1		3		4	
11:30 AM	8		5		13		11:30 PM	1		1		2	
11:45 AM	10		9		19		11:45 PM	0		0		0	

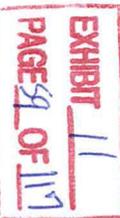
**24 Hour Volume**      WB 783 (50.3%)      EB 773 (49.7%)      Combined 1556

**12:00 AM - 12:00 PM**

Count	<u>WB</u> 387	<u>EB</u> 170	<u>Combined</u> 557
Peak Hour	7:15 AM	9:00 AM	7:15 AM
Volume	97	35	124
Factor	0.76	0.80	0.78

**12:00 PM - 12:00 AM**

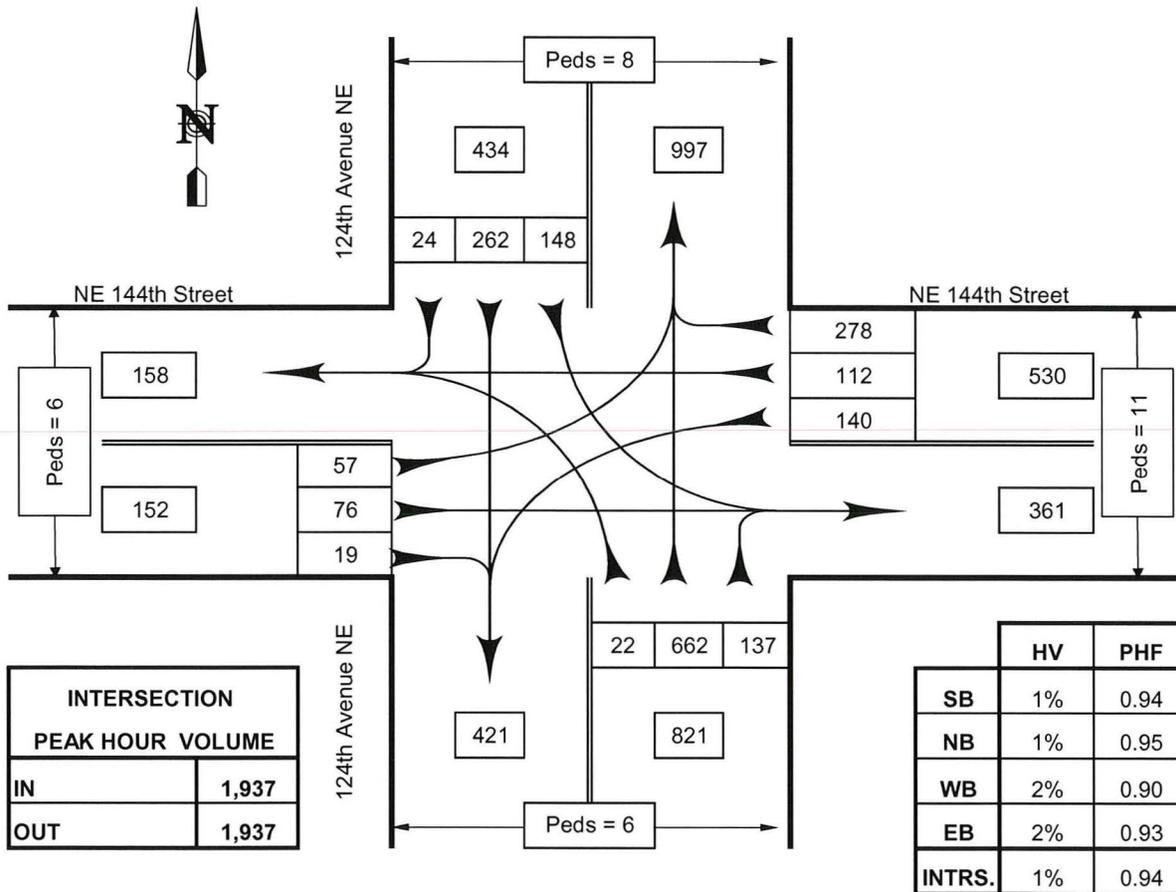
Count	<u>WB</u> 396	<u>EB</u> 603	<u>Combined</u> 999
Peak Hour	6:30 PM	7:00 PM	6:30 PM
Volume	65	87	147
Factor	0.81	0.84	0.92





**TURNING MOVEMENTS DIAGRAM**

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



HV = Heavy Vehicles  
PHF = Peak Hour Factor

**124th Avenue NE @ NE 144th Street**

**Woodinville, WA**

COUNTED BY: JH  
 REDUCED BY: CN  
 DATE: Thu. 9/13/12

DATE OF COUNT: Wed. 9/12/12  
 TIME OF COUNT: 4:00 - 6:00 PM  
 WEATHER: Sunny



**INTERSECTION TURNING MOVEMENTS REDUCTION SHEET**

LOCATION: 124th Avenue NE @ NE 144th Street DATE OF COUNT: Wed. 9/12/12 COUNTED BY: JH  
Woodinville, WA TIME OF COUNT: 4:00 - 6:00 PM WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON 124th Avenue NE					FROM SOUTH ON 124th Avenue NE					FROM EAST ON NE 144th Street					FROM WEST ON NE 144th Street					INTERVAL TOTALS
	Peds	HV	Left	Thru	Right	Peds	HV	Left	Thru	Right	Peds	HV	Left	Thru	Right	Peds	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	3	2	33	78	8	2	2	3	158	39	3	2	32	23	57	0	2	13	14	4	462
04:30 PM	5	1	32	55	9	0	2	8	141	38	0	4	30	14	61	1	1	10	14	0	412
04:45 PM	2	1	32	70	8	1	5	6	147	33	2	3	37	24	67	3	1	17	16	5	462
05:00 PM	2	0	35	74	2	3	1	3	159	36	0	2	35	29	62	2	1	14	18	5	472
05:15 PM	3	1	40	60	4	2	3	4	147	36	2	2	32	24	68	0	0	15	18	5	453
05:30 PM	2	1	29	66	7	2	0	7	170	29	3	5	43	24	62	2	2	15	23	3	478
05:45 PM	0	1	36	69	10	0	1	8	170	38	6	3	29	36	83	1	0	16	21	1	517
06:00 PM	3	1	43	67	3	2	2	3	175	34	0	2	36	28	65	3	1	11	14	10	489
PEAK HOUR TOTALS	8	4	148	262	24	6	6	22	662	137	11	12	140	112	278	6	3	57	76	19	INTERSECTION
ALL MOVEMENTS	434					821					530					152					1937
% HV	1%					1%					2%					2%					1%
PEAK HOUR FACTOR	0.94					0.95					0.90					0.93					0.94

PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM

REDUCED BY: CN

DATE OF REDUCTION: 9/13/2012


**Carter Danne**


---

**From:** Carla Nasr [CarlaN@trafficdatagathering.com]  
**Sent:** Wednesday, September 19, 2012 10:38 PM  
**To:** Carter Danne  
**Cc:** 'Edward Koltonowski'  
**Subject:** RE: 124th Avenue NE & NE 157th Street - Turning Movement Count & 24-Hour Tube Count  
**Attachments:** NE 157 St @ 124 Ave NE PM.pdf; NE 157 St e\_o 124 Ave NE.pdf

Hi Carter,

Attached are the Woodinville counts.

I did not have room on the spread sheet for the NE and SE pedestrian count, please find the results below:

	Pedestrians using the NE corner	Pedestrians using the SE corner
3:45PM	7	0
4:00PM	4	8
4:15PM	2	0
4:30PM	0	1
4:45PM	1	1
5:00PM	0	0
5:15PM	1	0
5:30PM	0	0
5:45PM	0	3
6:00PM	0	0

Thank you for your business. If you have any question or comment please let me know.

Regards,

*Carla Nasr*

Traffic Data Gathering  
 11410 – 13<sup>th</sup> Street SE  
 Lake Stevens, WA 98258  
 (425) 334-3348  
 (425) 345-1148 Cell  
[CarlaN@TrafficDataGathering.com](mailto:CarlaN@TrafficDataGathering.com)

---

**From:** Carter Danne [mailto:carterd@gibsontraffic.com]  
**Sent:** Monday, September 17, 2012 11:54 AM  
**To:** 'Carter Danne'; Carla Nasr  
**Cc:** 'Edward Koltonowski'  
**Subject:** RE: 124th Avenue NE & NE 157th Street - Turning Movement Count & 24-Hour Tube Count

Carla,

One point of clarification: For the pedestrians traveling on the west side 124<sup>th</sup> Avenue NE, we're interested in the ped volume that isn't crossing 124<sup>th</sup> Avenue NE (traveling through). (The peds that cross 124<sup>th</sup> Avenue will be counted as crossing the north or south leg of the intersection and we don't want to double count pedestrians on the west side.)

Thank you,

Carter

---

**From:** Carter Danne [mailto:carterd@gibsontraffic.com]  
**Sent:** Monday, September 17, 2012 11:35 AM  
**To:** 'Carla Nasr '  
**Cc:** 'Edward Koltonowski'

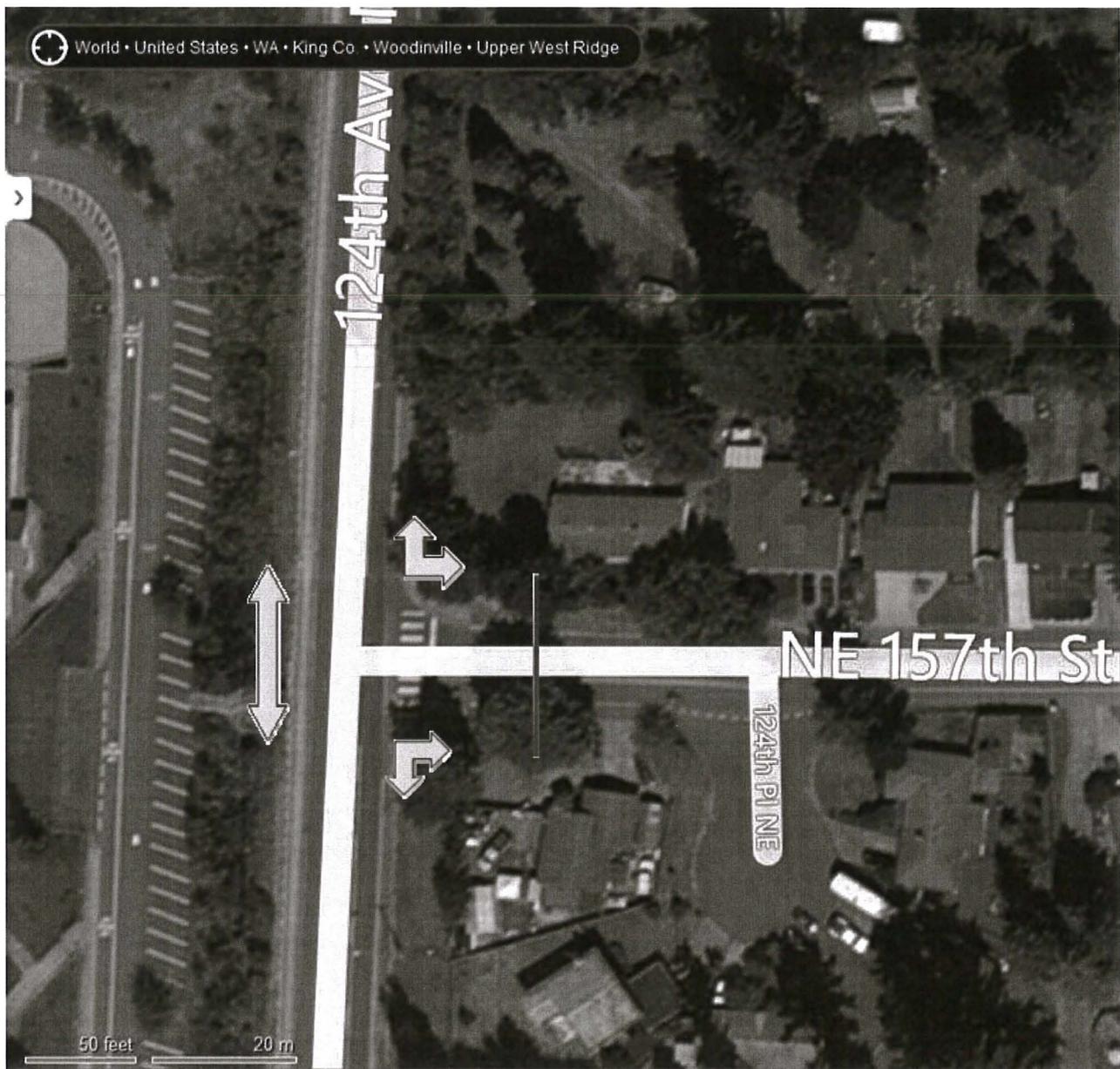
**Subject:** 124th Avenue NE & NE 157th Street - Turning Movement Count & 24-Hour Tube Count

Carla,

Would you please complete the following counts for us tomorrow?

- **24-Hour Tube Count** on NE 157<sup>th</sup> Street, east of 124<sup>th</sup> Avenue NE. The critical direction we are looking for is the westbound direction, however, I assume you'll be providing data for both eastbound and westbound.
- **Turning movement count** from 3:30 PM to 6:00 PM at 124<sup>th</sup> Avenue NE & NE 157<sup>th</sup> Street. Please count the vehicles, bicycles, and pedestrians. *Note: It is very important with this turning movement count to fully count pedestrian movements.* In addition to counting the pedestrians crossing the legs as you normally would, we would like you to collect the following additional information:
  - 1) Please also count the pedestrians traveling north-south on the west-side of 124<sup>th</sup> Avenue (would the same as those crossing the west leg on a 4-legged intersection).
  - 2) Please also count the pedestrians rounding the **northeast** corner of the intersection.
  - 3) Please also count the pedestrians rounding the **southeast** corner of the intersection.

Please get in touch if you have any questions or comments. Thank you!



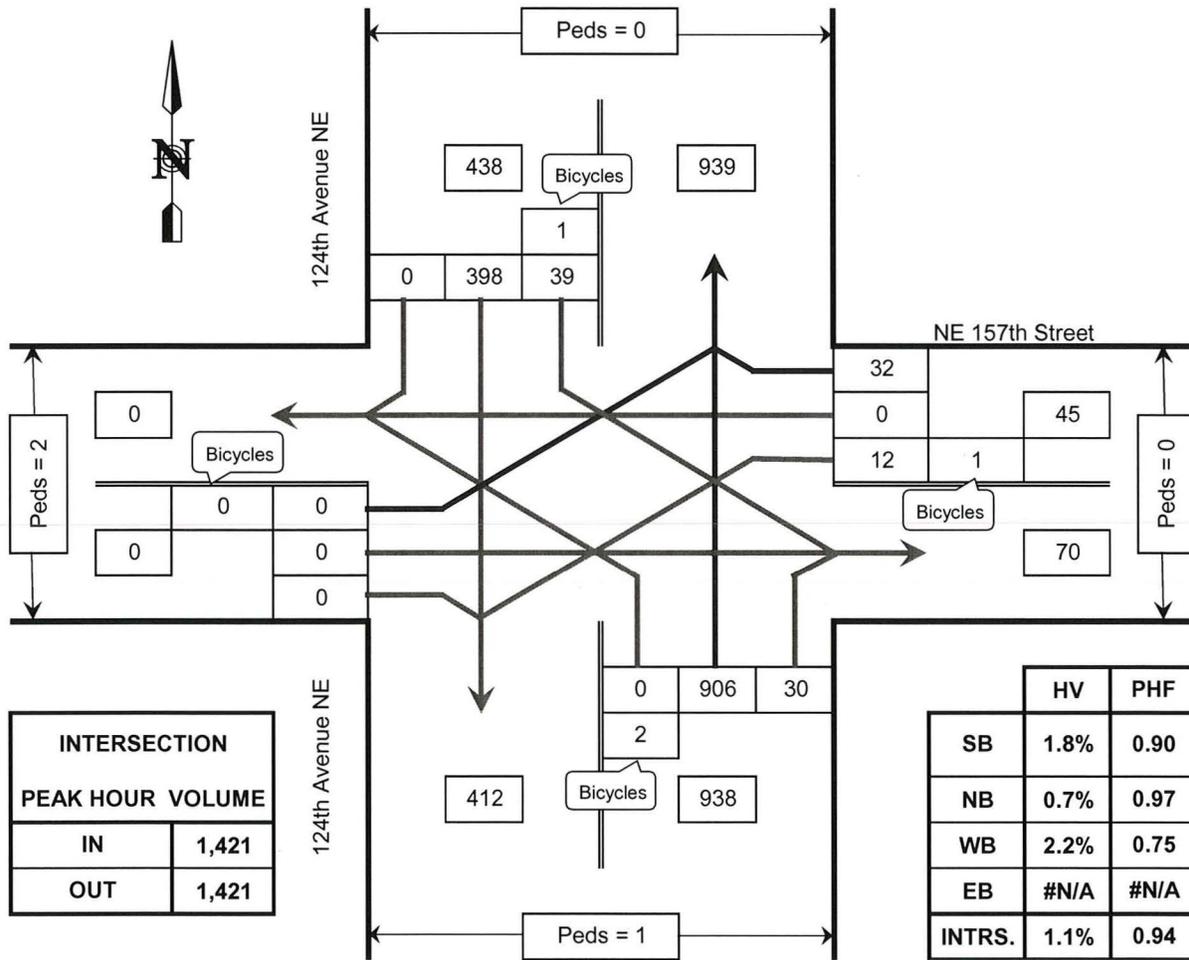
Carter Danne, PE, PTOE  
Gibson Traffic Consultants, Inc.  
2802 Wetmore Avenue, Suite 220, Everett, WA 98201  
Phone: 425.339.8266, Fax: 425.258.2922

EXHIBIT 11  
PAGE 64 OF 117

**DTG TRAFFIC DATA GATHERING**

**TURNING MOVEMENTS DIAGRAM**

3:30 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM



INTERSECTION	
PEAK HOUR VOLUME	
IN	1,421
OUT	1,421

	HV	PHF
SB	1.8%	0.90
NB	0.7%	0.97
WB	2.2%	0.75
EB	#N/A	#N/A
INTRS.	1.1%	0.94

PHF = Peak Hour Factor  
HV = Heavy Vehicles

**NE 157th Street @ 124th Avenue NE**

**Woodinville, WA**

COUNTED BY: CN

DATE OF COUNT: Tue. 9/18/12

REDUCED BY: CN

TIME OF COUNT: 3:30 - 6:00 PM

REDUCTION DATE: Tue. 9/18/12

WEATHER: Sunny

**DTG TRAFFIC DATA GATHERING**  
**INTERSECTION TURNING MOVEMENTS REDUCTION SHEET**

LOCATION: NE 157th Street @ 124th Avenue NE  
Woodinville, WA

DATE OF COUNT: Tue. 9/18/12  
TIME OF COUNT: 3:30 - 6:00 PM

COUNTED BY: CN  
WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON 124th Avenue NE						FROM SOUTH ON 124th Avenue NE						FROM EAST ON NE 157th Street						FROM WEST ON						INTERVAL TOTALS
	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	Peds	HV	Bicycle	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
03:45 PM	0	2	0	24	105	0	0	4	0	0	146	8	0	0	4	0	6	0	0	0	0	0	0	293	
04:00 PM	0	4	1	13	133	0	0	8	0	0	189	8	23	0	3	0	9	4	0	0	0	0	0	355	
04:15 PM	0	2	0	8	115	0	0	5	1	0	187	10	0	2	0	7	0	5	0	0	0	0	0	333	
04:30 PM	0	2	1	8	116	0	0	2	0	0	182	4	0	0	2	0	8	0	0	0	0	0	0	321	
04:45 PM	0	1	0	8	114	0	0	3	0	0	232	10	0	0	2	0	11	1	0	0	0	0	0	377	
05:00 PM	0	3	1	8	97	0	0	1	1	0	211	8	0	0	3	0	5	1	0	0	0	0	0	334	
05:15 PM	0	1	0	13	88	0	0	2	0	0	227	7	0	0	4	0	11	0	0	0	0	0	0	350	
05:30 PM	0	3	0	10	99	0	1	1	1	0	236	5	0	1	1	3	0	5	0	0	0	0	0	360	
05:45 PM	0	1	1	11	86	0	0	3	1	0	219	8	0	0	2	0	8	0	0	0	0	0	0	336	
06:00 PM	0	1	0	16	87	0	0	1	2	0	207	10	3	0	0	3	0	17	1	0	0	0	0	342	
PEAK HOUR TOTALS	0	8	1	39	398	0	1	7	2	0	906	30	0	1	1	12	0	32	2	0	0	0	0	INTERSECTION	
ALL MOVEMENTS	438						938						45						0						1421
% HV	1.8%						0.7%						2.2%						#N/A						1.1%
PEAK HOUR FACTOR	0.90						0.97						0.75						#N/A						0.94

PHF = Peak Hour Factor

3:30 - 6:00 PM PEAK HOUR: 4:30 PM TO 5:30 PM

REDUCED BY: CN

DATE OF REDUCTION: 9/18/2012

Tube Count Data From TDG  
124th Avenue NE near Proposed Site Access

From	To	NB	SB	Total
7:00 AM	7:15 AM	74	122	196
7:15 AM	7:30 AM	75	147	222
7:30 AM	7:45 AM	110	173	283
7:45 AM	8:00 AM	101	240	341
8:00 AM	8:15 AM	81	196	277
8:15 AM	8:30 AM	89	188	277
8:30 AM	8:45 AM	94	199	293
8:45 AM	9:00 AM	96	179	275
7:00 AM	8:00 AM	720	1444	1042
7:15 AM	8:15 AM	367	756	1123
7:30 AM	8:30 AM	381	797	1178
7:45 AM	8:45 AM	365	823	1188 AM Peak Hour
8:00 AM	9:00 AM	360	762	1122

From	To	NB	SB	Total
4:00 PM	4:15 PM	217	118	335
4:15 PM	4:30 PM	233	141	374
4:30 PM	4:45 PM	232	134	366
4:45 PM	5:00 PM	264	107	371
5:00 PM	5:15 PM	235	133	368
5:15 PM	5:30 PM	261	124	385
5:30 PM	5:45 PM	255	125	380
5:45 PM	6:00 PM	229	128	357
4:00 PM	5:00 PM	946	500	1446
4:15 PM	5:15 PM	964	515	1479
4:30 PM	5:30 PM	992	498	1490
4:45 PM	5:45 PM	1015	489	1504 PM Peak Hour
5:00 PM	6:00 PM	980	510	1490

**Trip Distribution North-South from Residential Streets Intersecting 124th Avenue NE**

15-Min. Interval Ending	NE 157th ST East Leg Movements To/From				NE 144th ST West Leg Movements To/From				NE 144th ST East Leg Movements To/From				Total Side Street Movements	
	North		South		North		South		North		South		To/From	
	SBL	WBR	NBR	WBL	SBR	EBL	NBL	EBR	SBL	WBR	NBR	WBL	North	South
3:45 PM	24	6	8	4	0	0	0	0	0	0	0	0	30	12
4:00 PM	13	9	8	3	0	0	0	0	0	0	0	0	22	11
4:15 PM	8	5	10	7	8	13	3	4	33	57	39	32	124	95
4:30 PM	8	8	4	2	9	10	8	0	32	61	38	30	128	82
4:45 PM	8	11	10	2	8	17	6	5	32	67	33	37	143	93
5:00 PM	8	5	8	3	2	14	3	5	35	62	36	35	126	90
5:15 PM	13	11	7	4	4	15	4	5	40	68	36	32	151	88
5:30 PM	10	5	5	3	7	15	7	3	29	62	29	43	128	90
5:45 PM	11	8	8	2	10	16	8	1	36	83	38	29	164	86
6:00 PM	16	17	10	3	3	11	3	10	43	65	34	36	155	96
<b>Total</b>	<b>119</b>	<b>85</b>	<b>78</b>	<b>33</b>	<b>51</b>	<b>111</b>	<b>42</b>	<b>33</b>	<b>280</b>	<b>525</b>	<b>283</b>	<b>274</b>	<b>1171</b>	<b>743</b>
<b>N-S Split</b>	<b>65%</b>		<b>35%</b>		<b>68%</b>		<b>32%</b>		<b>59%</b>		<b>41%</b>		<b>61%</b>	<b>39%</b>
<b>Intersection</b>	<b>4:45-5:45 PM</b>				<b>5:00-6:00 PM</b>								<b>-</b>	<b>-</b>
<b>Peak Hour</b>	<b>39</b>	<b>32</b>	<b>30</b>	<b>12</b>	<b>24</b>	<b>57</b>	<b>22</b>	<b>19</b>	<b>148</b>	<b>278</b>	<b>137</b>	<b>140</b>	<b>578</b>	<b>360</b>
<b>N-S Split</b>	<b>63%</b>		<b>37%</b>		<b>66%</b>		<b>34%</b>		<b>61%</b>		<b>39%</b>		<b>62%</b>	<b>38%</b>
<b>4-6 PM</b>	<b>82</b>	<b>70</b>	<b>62</b>	<b>26</b>	<b>51</b>	<b>111</b>	<b>42</b>	<b>33</b>	<b>280</b>	<b>525</b>	<b>283</b>	<b>274</b>	<b>1119</b>	<b>720</b>
<b>N-S Split</b>	<b>63%</b>		<b>37%</b>		<b>68%</b>		<b>32%</b>		<b>59%</b>		<b>41%</b>		<b>61%</b>	<b>39%</b>

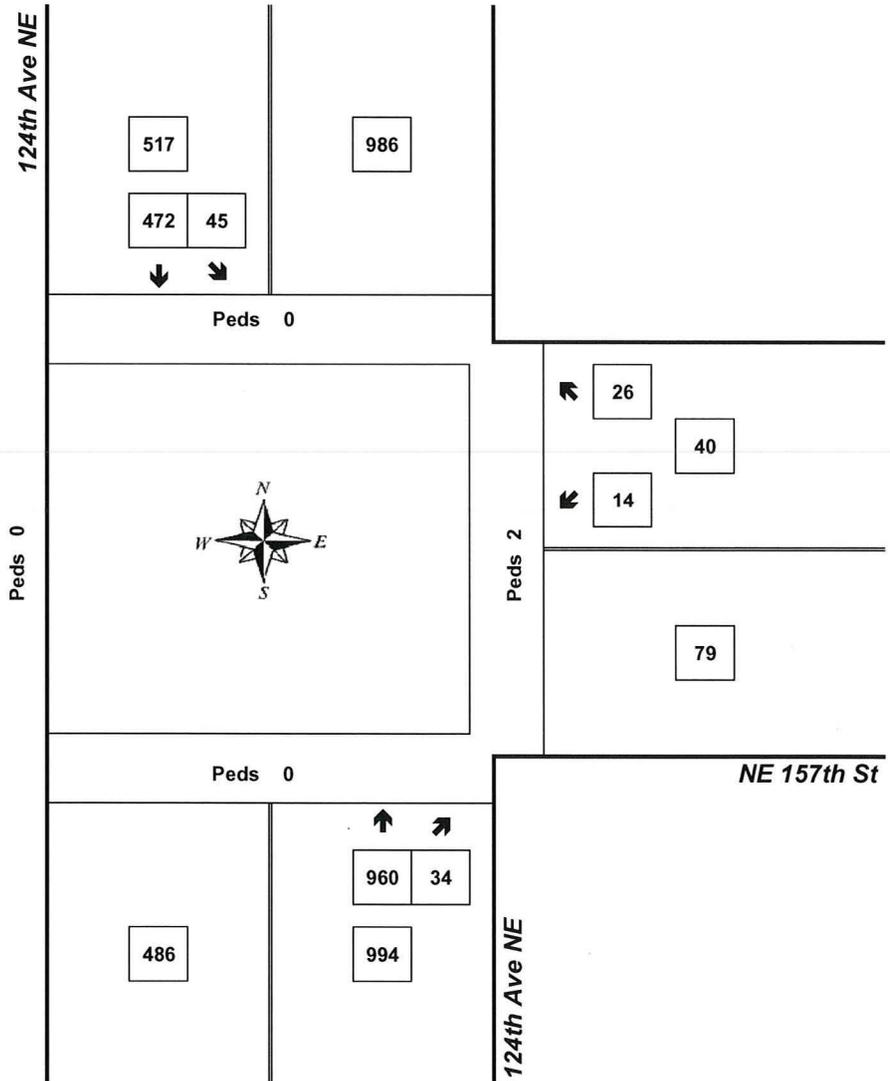
Peak Hour Summary



Mark Skaggs  
(206) 251-0300

124th Ave NE & NE 157th St

4:30 PM to 5:30 PM  
Tuesday, March 12, 2013



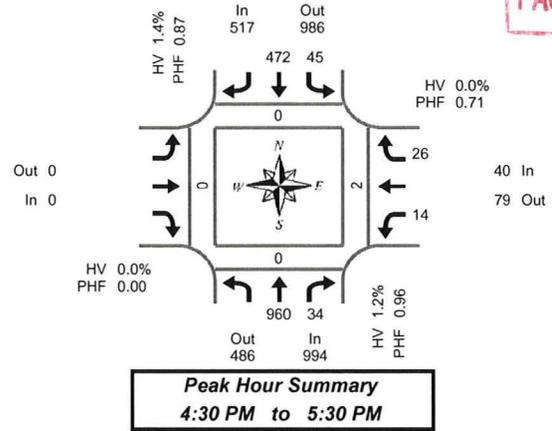
Approach	PHF	HV%	Volume
EB	0.00	0.0%	0
WB	0.71	0.0%	40
NB	0.96	1.2%	994
SB	0.87	1.4%	517
<b>Intersection</b>	<b>0.97</b>	<b>1.2%</b>	<b>1,551</b>

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

**Total Vehicle Summary**



Mark Skaggs  
(206) 251-0300



**124th Ave NE & NE 157th St**

Tuesday, March 12, 2013

4:00 PM to 6:00 PM

**15-Minute Interval Summary**

4:00 PM to 6:00 PM

Interval Start Time	Northbound 124th Ave NE				Southbound 124th Ave NE				Eastbound NE 157th St			Westbound NE 157th St				Interval Total	Pedestrians Crosswalk			
	T	R	HV		L	T	HV					L	R	HV			North	South	East	West
4:00 PM	172	8	3		8	111		2				4	8	0	311	0	0	3	1	
4:15 PM	214	8	3		7	123		1				3	5	0	360	0	0	2	1	
4:30 PM	249	6	4		11	115		3				4	5	0	390	0	0	0	0	
4:45 PM	225	12	4		9	139		2				3	11	0	399	0	0	1	0	
5:00 PM	249	9	3		13	96		1				4	4	0	375	0	0	1	0	
5:15 PM	237	7	1		12	122		1				3	6	0	387	0	0	0	0	
5:30 PM	241	11	2		10	99		0				5	13	0	379	0	0	1	0	
5:45 PM	233	12	2		8	109		1				5	10	0	377	0	0	0	0	
Total Survey	1,820	73	22		78	914		11				31	62	0	2,978	0	0	8	2	

**Peak Hour Summary**

4:30 PM to 5:30 PM

By Approach	Northbound 124th Ave NE				Southbound 124th Ave NE				Eastbound NE 157th St			Westbound NE 157th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total						North	South	East	West
Volume	994	486	1,480	12	517	986	1,503	7	0	0	0	40	79	119	0	1,551	0	0	2	0
%HV	1.2%				1.4%				0.0%			0.0%				1.2%				
PHF	0.96				0.87				0.00			0.71				0.97				

By Movement	Northbound 124th Ave NE			Southbound 124th Ave NE			Eastbound NE 157th St			Westbound NE 157th St			Total
	T	R	Total	L	T	Total			Total	L	R	Total	
Volume	960	34	994	45	472	517			0	14	26	40	1,551
PHF	0.96	0.71	0.96	0.87	0.85	0.87			0.00	0.88	0.59	0.71	0.97

**Rolling Hour Summary**

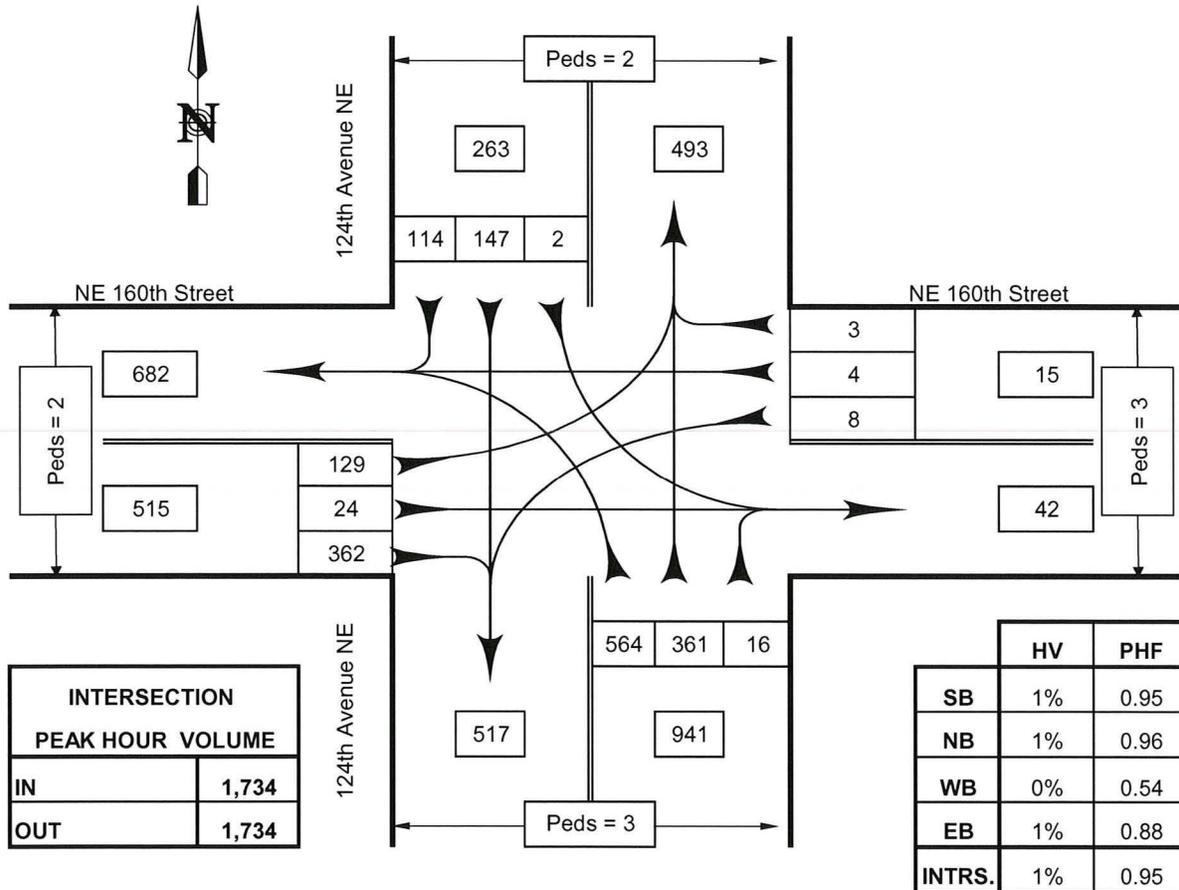
4:00 PM to 6:00 PM

Interval Start Time	Northbound 124th Ave NE				Southbound 124th Ave NE				Eastbound NE 157th St			Westbound NE 157th St				Interval Total	Pedestrians Crosswalk			
	T	R	HV		L	T	HV					L	R	HV			North	South	East	West
4:00 PM	860	34	14		35	488		8				14	29	0	1,460	0	0	6	2	
4:15 PM	937	35	14		40	473		7				14	25	0	1,524	0	0	4	1	
4:30 PM	960	34	12		45	472		7				14	26	0	1,551	0	0	2	0	
4:45 PM	952	39	10		44	456		4				15	34	0	1,540	0	0	3	0	
5:00 PM	960	39	8		43	426		3				17	33	0	1,518	0	0	2	0	



**TURNING MOVEMENTS DIAGRAM**

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM



**124th Avenue NE @ NE 160th Street**

**Woodinville, WA**

COUNTED BY: CN  
 REDUCED BY: CN  
 DATE: Thu. 9/13/12

DATE OF COUNT: Wed. 9/12/12  
 TIME OF COUNT: 4:00 - 6:00 PM  
 WEATHER: Sunny



**INTERSECTION TURNING MOVEMENTS REDUCTION SHEET**

LOCATION: 124th Avenue NE @ NE 160th Street DATE OF COUNT: Wed. 9/12/12 COUNTED BY: CN  
Woodinville, WA TIME OF COUNT: 4:00 - 6:00 PM WEATHER: Sunny

TIME INTERVAL ENDING AT	FROM NORTH ON 124th Avenue NE					FROM SOUTH ON 124th Avenue NE					FROM EAST ON NE 160th Street					FROM WEST ON NE 160th Street					INTERVAL TOTALS
	Peds	HV	Left	Thru	Right	Peds	HV	Left	Thru	Right	Peds	HV	Left	Thru	Right	Peds	HV	Left	Thru	Right	
02:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:15 PM	0	2	0	51	38	0	4	139	73	0	0	0	6	0	0	0	4	28	11	86	432
04:30 PM	0	1	0	30	34	1	5	141	85	3	1	0	1	2	1	0	2	35	7	85	424
04:45 PM	0	0	0	33	25	2	6	153	87	2	0	0	0	1	2	2	1	23	6	95	427
05:00 PM	0	0	2	42	26	0	2	129	90	3	0	0	2	0	0	1	4	29	3	87	413
05:15 PM	0	1	0	39	30	1	3	147	72	5	0	0	2	1	0	2	3	30	5	91	422
05:30 PM	2	1	2	39	27	0	2	133	106	2	2	0	0	1	1	0	3	36	12	98	457
05:45 PM	0	0	0	35	26	2	4	141	86	5	0	0	3	2	2	0	0	22	3	85	410
06:00 PM	0	0	0	34	31	0	2	143	97	4	1	0	3	0	0	0	1	41	4	88	445
PEAK HOUR TOTALS	2	2	2	147	114	3	11	564	361	16	3	0	8	4	3	2	7	129	24	362	INTERSECTION
ALL MOVEMENTS	263					941					15					515					1734
% HV	1%					1%					0%					1%					1%
PEAK HOUR FACTOR	0.95					0.96					0.54					0.88					0.95

PHF = Peak Hour Factor

4:00 - 6:00 PM PEAK HOUR: 5:00 PM TO 6:00 PM

REDUCED BY: CN

DATE OF REDUCTION: 9/13/2012

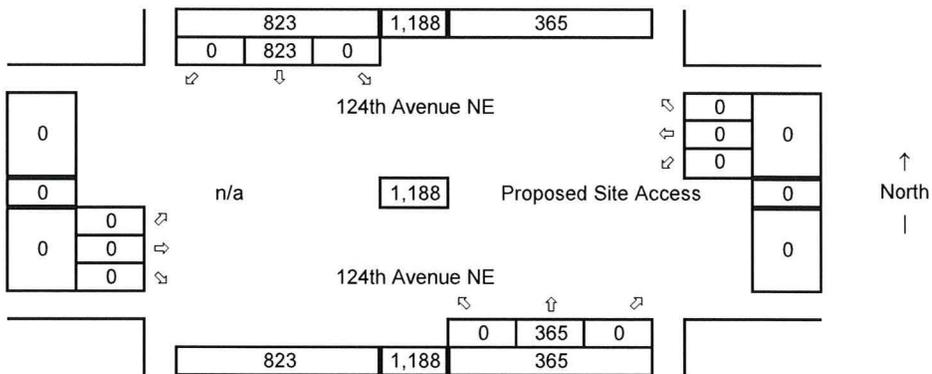
# AM Turning Movement Diagram

Synchro ID: 4

**Existing**  
Average Weekday  
AM Peak Hour

Year: 9/11/12

Data Source: TDG



**Future without Project**

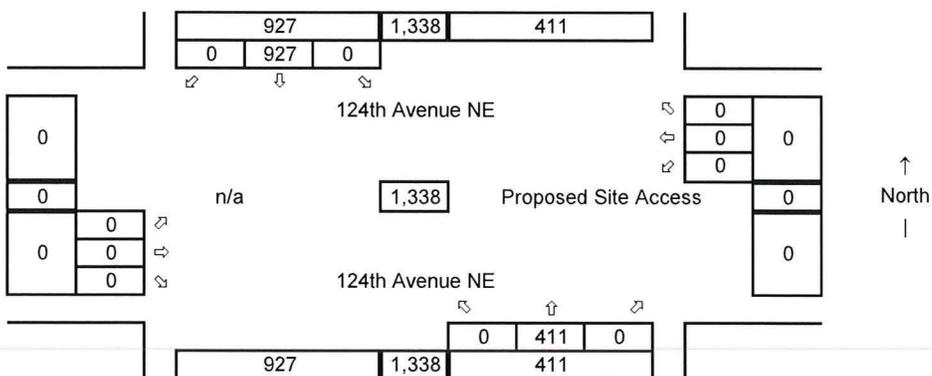
Average Weekday  
AM Peak Hour

Year: 2018

Growth Rate = 2.0%

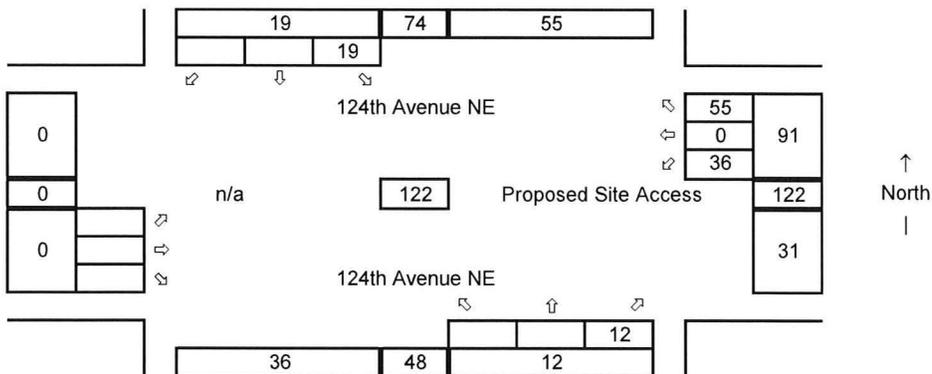
Years of Growth = 6

Total Growth = 1.1262



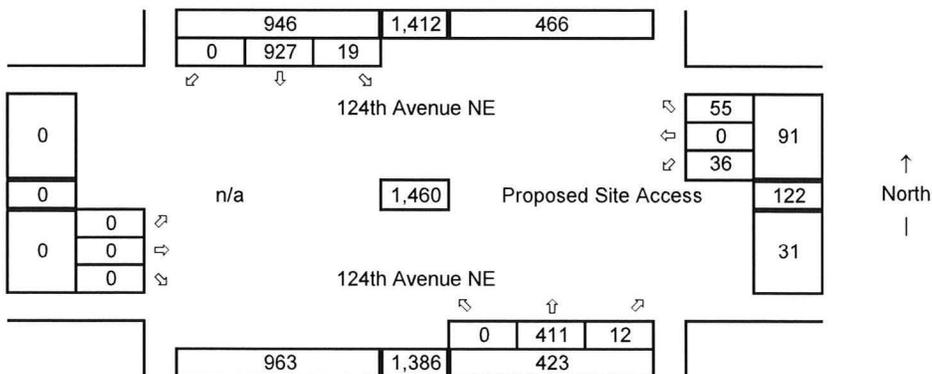
**Total Project Trips**

Average Weekday  
AM Peak Hour



**Future with Project**

Average Weekday  
AM Peak Hour

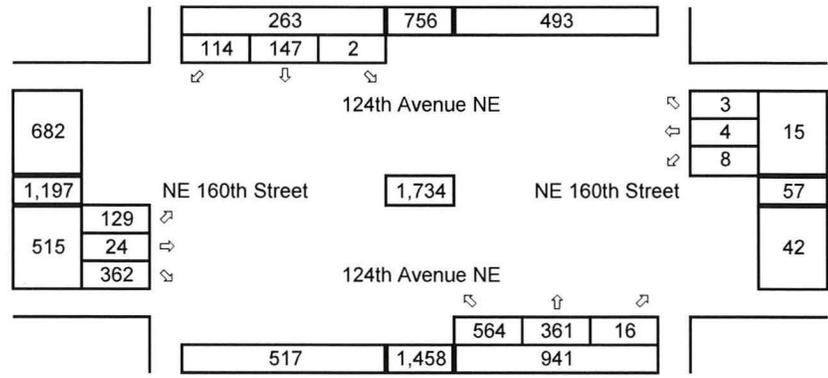


## PM Turning Movement Diagrams

Synchro ID: 1  
**Existing**  
Average Weekday  
PM Peak Hour

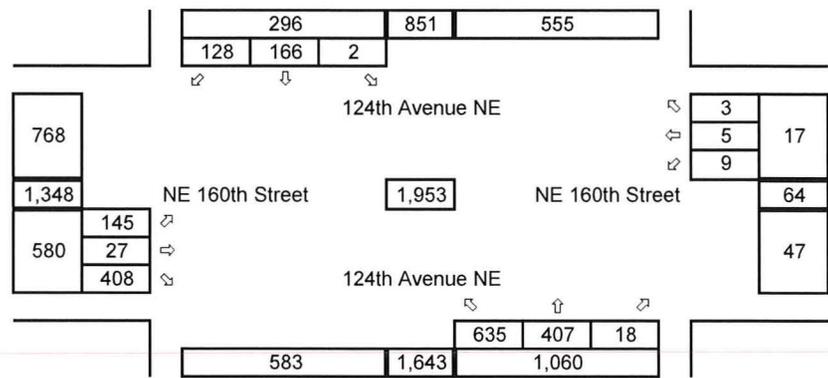
Date: 9/12/12

Data Source: TDG



**Future without Project**  
Average Weekday  
PM Peak Hour

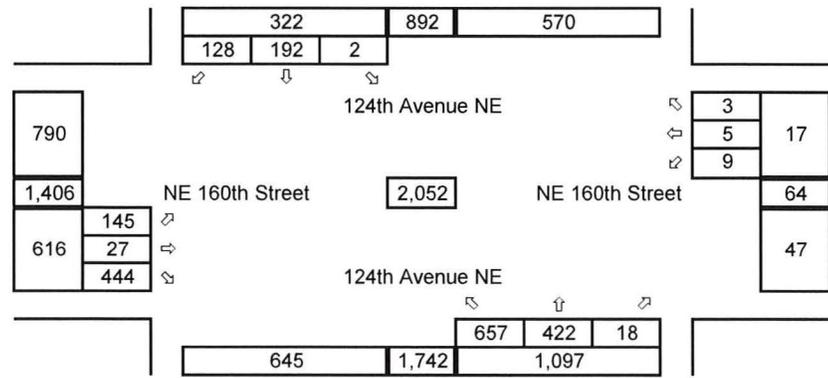
Year: 2018  
Growth Rate = 2.0%  
Years of Growth = 6  
Total Growth = 1.1262



**Net Total Project Trips**  
Average Weekday  
PM Peak Hour



**Future with Project**  
Average Weekday  
PM Peak Hour

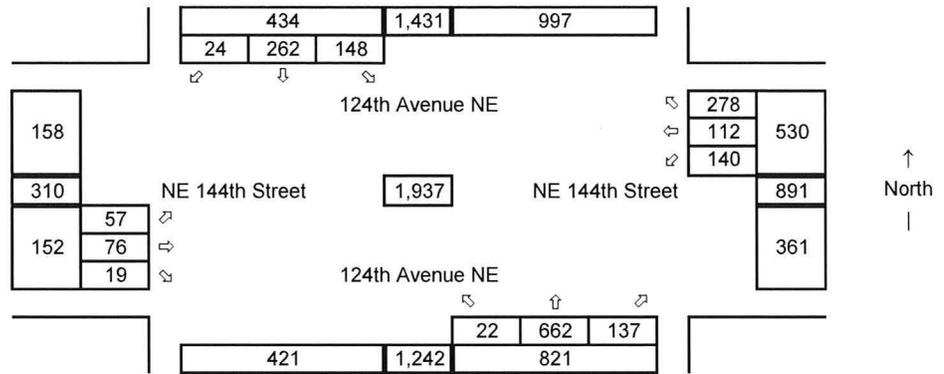


Synchro ID: 2

**Existing**  
Average Weekday  
PM Peak Hour

Date: 9/12/12

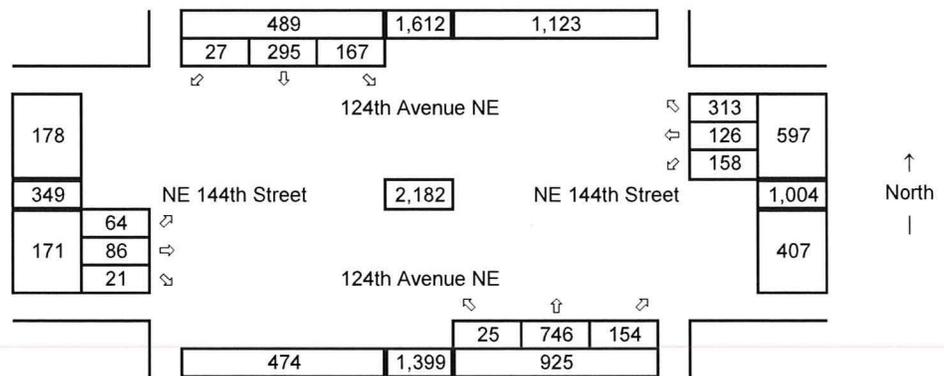
Data Source: TDG



**Future without Project**

Average Weekday  
PM Peak Hour

Year: 2018  
Growth Rate = 2.0%  
Years of Growth = 6  
Total Growth = 1.1262



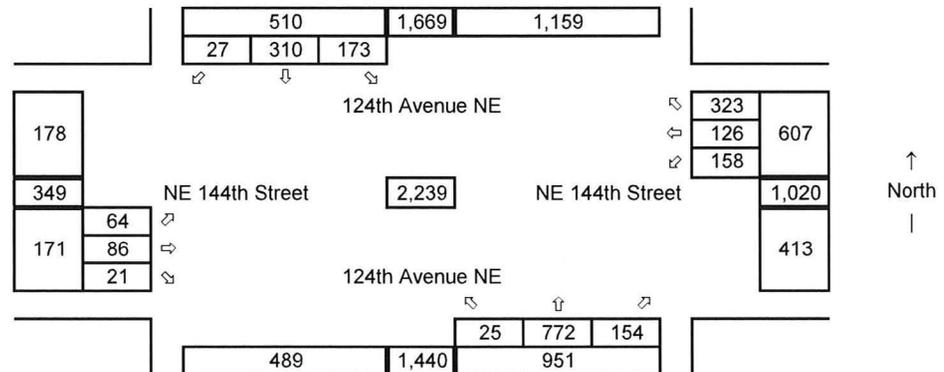
**Total Project Trips**

Average Weekday  
PM Peak Hour



**Future with Project**

Average Weekday  
PM Peak Hour







# LOS Calculations – 2012/2013 Existing PM Peak Hour Conditions

**Observed Seconds of Control Delay: From video of NE 157th Street approaching 124th Avenue NE**

Control Delay = Total Elapsed Time from the Time a Vehicle Stops at the end of the queue to the time the vehicle departs from the stop line.

**Westbound Movements from NE 157th St from 4:30 PM to 5:30 PM on 03/12/2013**

Time Stops at Back of Queue (hh:mm:ss)	Time Departs Stop Line (hh:mm:ss)	Observed Control Delay (hh:mm:ss)	Movement Completed	Used TWLTL for Refuge?	Comments
4:33:26 PM	4:33:27 PM	0:00:01	Right	n/a	
4:34:30 PM	4:34:41 PM	0:00:11	Left	No	
4:36:07 PM	4:37:20 PM	0:01:13	Left	No	Dump truck took a long time to clear on major street left.
4:37:25 PM	4:38:05 PM	0:00:40	Right	n/a	
4:39:49 PM	4:40:05 PM	0:00:16	Left	No	
4:39:51 PM	4:39:59 PM	0:00:08	Right	n/a	
4:40:02 PM	4:40:24 PM	0:00:22	Left	No	
4:40:26 PM	4:41:24 PM	0:00:58	Right	n/a	
4:41:45 PM	4:41:55 PM	0:00:10	Right	n/a	
4:47:56 PM	4:47:57 PM	0:00:01	Right	n/a	
4:48:10 PM	4:48:12 PM	0:00:02	Left	No	Rolling stop, marked when vehicle crossed stop line.
4:49:03 PM	4:49:05 PM	0:00:02	Right	n/a	Rolling stop, marked when vehicle crossed stop line.
4:49:52 PM	4:49:58 PM	0:00:06	Right	n/a	
4:50:13 PM	4:50:23 PM	0:00:10	Right	n/a	
4:50:21 PM	4:50:51 PM	0:00:30	Right	n/a	
4:50:55 PM	4:51:13 PM	0:00:18	Right	n/a	
4:51:08 PM	4:51:17 PM	0:00:09	Right	n/a	
4:53:28 PM	4:53:51 PM	0:00:23	Left	No	
4:54:46 PM	4:54:49 PM	0:00:03	Right	n/a	
4:57:18 PM	4:58:59 PM	0:01:41	Left	No	
4:58:37 PM	4:58:39 PM	0:00:02	Right	n/a	
4:58:49 PM	4:58:59 PM	0:00:10	Right	n/a	
4:59:11 PM	4:59:13 PM	0:00:02	Right	n/a	
5:00:10 PM	5:00:12 PM	0:00:02	Right	n/a	
5:01:42 PM	5:02:03 PM	0:00:21	Left	Yes	
5:07:33 PM	5:07:49 PM	0:00:16	Right	n/a	
5:07:37 PM	5:07:51 PM	0:00:14	Right	n/a	
5:08:58 PM	5:10:01 PM	0:01:03	Left	No	
5:10:39 PM	5:10:43 PM	0:00:04	Left	No	
5:10:53 PM	5:11:20 PM	0:00:27	Right	n/a	
5:12:50 PM	5:13:16 PM	0:00:26	Left	No	
5:20:51 PM	5:20:54 PM	0:00:03	Right	No	
5:23:39 PM	5:23:41 PM	0:00:02	Left	No	
5:23:44 PM	5:24:05 PM	0:00:21	Right	n/a	
5:24:19 PM	5:24:42 PM	0:00:23	Left	No	
5:24:47 PM	5:24:51 PM	0:00:04	Right	n/a	
5:24:57 PM	5:25:15 PM	0:00:18	Left	No	
5:27:22 PM	5:27:29 PM	0:00:07	Right	n/a	
5:27:28 PM	5:27:31 PM	0:00:03	Right	n/a	
5:27:35 PM	5:27:36 PM	0:00:01	Right	n/a	Didn't stop

Average Control Delay (hh:mm:ss)	Vehicle Movement	Vehicle Volume	Level of Service
0:00:18	Approach	40	C
0:00:12	Rights	26	B
0:00:22	Lefts	14	C

**Two-Stage Movements (Detailed Information)**

Time Stops at Back of Queue	Time Departs Stop Line	Observed Control Delay	Stage of Movement
5:01:42 PM	5:01:56 PM	0:00:14	1st Stage
5:01:56 PM	5:02:01 PM	0:00:05	Maneuvering
5:02:01 PM	5:02:03 PM	0:00:02	2nd Stage

Lanes, Volumes, Timings  
1: NE 160th ST & 124th AVE NE

3/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	24	362	8	4	3	564	361	16	2	147	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	15	12	12	11	12	11	11	12
Grade (%)		6%			0%			0%			0%	
Storage Length (ft)	90		105	0		0	120		0	85		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.98		0.99		1.00	1.00		0.99	0.99	
Frt			0.850		0.973			0.994			0.935	
Flt Protected	0.950				0.974		0.950			0.950		
Satd. Flow (prot)	1734	1764	1499	0	1937	0	1759	1805	0	1728	1681	0
Flt Permitted	0.950				0.974		0.496			0.528		
Satd. Flow (perm)	1715	1764	1473	0	1931	0	916	1805	0	954	1681	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			381		3			2			25	
Link Speed (mph)		35			30			40			40	
Link Distance (ft)		826			156			672			548	
Travel Time (s)		16.1			3.5			11.5			9.3	
Confl. Peds. (#/hr)	2		3	3		2	2		3	3		2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	4	0	4	0	0	0	0	4
Adj. Flow (vph)	136	25	381	8	4	3	594	380	17	2	155	120
Shared Lane Traffic (%)												
Lane Group Flow (vph)	136	25	381	0	15	0	594	397	0	2	275	0
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		pm+ov	Split			pm+pt			pm+pt		
Protected Phases	2	2	7	1	1		7	4		3	8	
Permitted Phases			2				4			8		
Detector Phase	2	2	7	1	1		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	8.0	16.0	16.0		8.0	21.0		8.0	27.0	
Total Split (s)	35.0	35.0	56.0	19.0	19.0	0.0	56.0	73.0	0.0	13.0	30.0	0.0
Total Split (%)	25.0%	25.0%	40.0%	13.6%	13.6%	0.0%	40.0%	52.1%	0.0%	9.3%	21.4%	0.0%
Maximum Green (s)	32.0	32.0	53.0	16.0	16.0		53.0	70.0		10.0	27.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	

Lanes, Volumes, Timings  
1: NE 160th ST & 124th AVE NE

3/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
All-Red Time (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	12.0	12.0		6.0	6.0			8.0				10.0
Flash Dont Walk (s)	9.0	9.0		7.0	7.0			10.0				14.0
Pedestrian Calls (#/hr)	3	3		2	2			3				3
Act Effct Green (s)	15.4	15.4	51.3		6.9		113.6	112.0		79.7	74.7	
Actuated g/C Ratio	0.11	0.11	0.37		0.05		0.81	0.80		0.57	0.53	
v/c Ratio	0.71	0.13	0.48		0.15		0.62	0.27		0.00	0.30	
Control Delay	79.7	55.3	3.7		56.4		8.3	6.0		13.5	23.8	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	79.7	55.3	3.7		56.4		8.3	6.0		13.5	23.8	
LOS	E	E	A		E		A	A		B	C	
Approach Delay		25.1			56.4			7.4				23.7
Approach LOS		C			E			A				C
Queue Length 50th (ft)	122	21	0		11		96	54		0	109	
Queue Length 95th (ft)	187	49	45		33		314	221		4	294	
Internal Link Dist (ft)		746			76			592				468
Turn Bay Length (ft)	90		105				120			85		
Base Capacity (vph)	396	403	927		224		1065	1445		632	909	
Starvation Cap Reductn	0	0	0		0		0	0		0	0	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	0.34	0.06	0.41		0.07		0.56	0.27		0.00	0.30	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 100 (71%), Referenced to phase 4:NBTL and 8:SBTL, Start of 1st Green  
 Natural Cycle: 90  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.71  
 Intersection Signal Delay: 15.5  
 Intersection Capacity Utilization 73.7%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service D

Splits and Phases: 1: NE 160th ST & 124th AVE NE

ø1	ø2	ø3	ø4
19 s	35 s	13 s	73 s
		ø7	ø8
		56 s	30 s

HCM Signalized Intersection Capacity Analysis  
1: NE 160th ST & 124th AVE NE

3/28/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	129	24	362	8	4	3	564	361	16	2	147	114
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	15	12	12	11	12	11	11	12
Grade (%)		6%			0%			0%			0%	
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.99		0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		0.97		1.00	0.99		1.00	0.93	
Flt Protected	0.95	1.00	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1734	1764	1491		1937		1756	1804		1722	1680	
Flt Permitted	0.95	1.00	1.00		0.97		0.50	1.00		0.53	1.00	
Satd. Flow (perm)	1734	1764	1491		1937		917	1804		957	1680	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	136	25	381	8	4	3	594	380	17	2	155	120
RTOR Reduction (vph)	0	0	241	0	3	0	0	0	0	0	12	0
Lane Group Flow (vph)	136	25	140	0	12	0	594	397	0	2	263	0
Confl. Peds. (#/hr)	2		3	3		2	2		3	3		2
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	4	0	4	0	0	0	0	4
Turn Type	Split		pm+ov	Split			pm+pt			pm+pt		
Protected Phases	2	2	7	1	1		7	4		3	8	
Permitted Phases			2				4			8		
Actuated Green, G (s)	15.4	15.4	51.3		3.8		111.8	107.8		73.9	72.9	
Effective Green, g (s)	15.4	15.4	51.3		3.8		111.8	107.8		73.9	72.9	
Actuated g/C Ratio	0.11	0.11	0.37		0.03		0.80	0.77		0.53	0.52	
Clearance Time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	191	194	578		53		947	1389		511	875	
v/s Ratio Prot	c0.08	0.01	c0.06		c0.01		c0.16	0.22		0.00	0.16	
v/s Ratio Perm			0.03				c0.34			0.00		
v/c Ratio	0.71	0.13	0.24		0.23		0.63	0.29		0.00	0.30	
Uniform Delay, d1	60.2	56.2	30.8		66.7		5.4	4.7		15.6	19.1	
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.0	0.1	0.1		0.8		0.9	0.5		0.0	0.9	
Delay (s)	70.1	56.4	30.9		67.5		6.4	5.3		15.6	19.9	
Level of Service	E	E	C		E		A	A		B	B	
Approach Delay (s)		41.9			67.5			5.9			19.9	
Approach LOS		D			E			A			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			19.2	HCM Level of Service				B				
HCM Volume to Capacity ratio			0.61									
Actuated Cycle Length (s)			140.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			73.7%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
2: NE 144th ST & 124th AVE NE

3/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	76	19	140	112	278	22	662	137	148	262	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	11	12	12	11	11	11	12	12	12	11	12
Grade (%)		-2%			2%			0%				0%
Storage Length (ft)	80		0	125		135	100		270	185		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.98	0.99		0.99		0.96	0.99		0.96	0.99	1.00	
Frt		0.970				0.850			0.850		0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1847	1753	0	1752	1783	1515	1728	1881	1599	1787	1789	0
Flt Permitted	0.677			0.692			0.950			0.950		
Satd. Flow (perm)	1296	1753	0	1262	1783	1458	1708	1881	1527	1770	1789	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				59			110		5	
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		1443			1141			434			686	
Travel Time (s)		32.8			25.9			7.4			11.7	
Confl. Peds. (#/hr)	8		6	6		8	6		11	11		6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	61	81	20	149	119	296	23	704	146	157	279	26
Shared Lane Traffic (%)												
Lane Group Flow (vph)	61	101	0	149	119	296	23	704	146	157	305	0
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			Perm		pm+ov	Prot		Perm	Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8			2			
Detector Phase	4	4		8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	34.0	34.0		31.0	31.0	10.0	10.0	31.0	31.0	10.0	26.0	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	35.0	25.0	45.0	45.0	35.0	45.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	29.2%	20.8%	37.5%	37.5%	29.2%	37.5%	0.0%
Maximum Green (s)	35.0	35.0		35.0	35.0	30.0	20.0	40.0	40.0	30.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	

Lanes, Volumes, Timings  
2: NE 144th ST & 124th AVE NE

3/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag							Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	7.0
Flash Dont Walk (s)	22.0	22.0		19.0	19.0			19.0	19.0		14.0	14.0
Pedestrian Calls (#/hr)	6	6		8	8			11	11		6	6
Act Effct Green (s)	16.2	16.2		16.2	16.2	29.0	6.8	40.6	40.6	12.9	53.9	53.9
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.34	0.08	0.48	0.48	0.15	0.64	0.64
v/c Ratio	0.25	0.30		0.62	0.35	0.54	0.17	0.78	0.19	0.58	0.27	0.27
Control Delay	31.7	28.6		43.3	32.7	18.0	43.0	28.8	6.4	43.7	10.3	10.3
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	31.7	28.6		43.3	32.7	18.0	43.0	28.8	6.4	43.7	10.3	10.3
LOS	C	C		D	C	B	D	C	A	D	B	B
Approach Delay		29.7			27.8			25.4				21.6
Approach LOS		C			C			C				C
Queue Length 50th (ft)	27	41		72	55	87	11	287	9	77	48	48
Queue Length 95th (ft)	64	89		141	108	148	40	#691	55	158	181	181
Internal Link Dist (ft)		1363			1061			354				606
Turn Bay Length (ft)	80			125		135	100		270	185		
Base Capacity (vph)	542	740		528	746	848	414	900	788	641	1148	1148
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.14		0.28	0.16	0.35	0.06	0.78	0.19	0.24	0.27	0.27

**Intersection Summary**

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 84.8  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.78  
 Intersection Signal Delay: 25.6  
 Intersection LOS: C  
 Intersection Capacity Utilization 71.7%  
 ICU Level of Service C  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NE 144th ST & 124th AVE NE

Ø1	Ø2	Ø4
35 s	45 s	40 s
Ø5	Ø6	Ø8
25 s	45 s	40 s

HCM Signalized Intersection Capacity Analysis  
2: NE 144th ST & 124th AVE NE

3/28/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	57	76	19	140	112	278	22	662	137	148	262	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	11	12	12	11	11	11	12	12	12	11	12
Grade (%)		-2%			2%			0%			0%	
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	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1826	1755		1738	1783	1487	1728	1881	1538	1787	1790	
Flt Permitted	0.68	1.00		0.69	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1301	1755		1265	1783	1487	1728	1881	1538	1787	1790	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	61	81	20	149	119	296	23	704	146	157	279	26
RTOR Reduction (vph)	0	8	0	0	0	39	0	0	55	0	2	0
Lane Group Flow (vph)	61	93	0	149	119	257	23	704	91	157	303	0
Confl. Peds. (#/hr)	8		6	6		8	6		11	11		6
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm		pm+ov	Prot		Perm	Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4					8			2			
Actuated Green, G (s)	16.2	16.2		16.2	16.2	29.1	2.9	43.9	43.9	12.9	53.9	
Effective Green, g (s)	16.2	16.2		16.2	16.2	29.1	2.9	43.9	43.9	12.9	53.9	
Actuated g/C Ratio	0.18	0.18		0.18	0.18	0.33	0.03	0.50	0.50	0.15	0.61	
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)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	240	323		233	328	576	57	938	767	262	1096	
v/s Ratio Prot		0.05			0.07	c0.07	0.01	c0.37		c0.09	0.17	
v/s Ratio Perm	0.05			c0.12		0.11			0.06			
v/c Ratio	0.25	0.29		0.64	0.36	0.45	0.40	0.75	0.12	0.60	0.28	
Uniform Delay, d1	30.7	30.9		33.2	31.4	23.1	41.7	17.7	11.7	35.1	8.0	
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	0.6	0.5		5.7	0.7	0.6	4.6	5.5	0.3	3.7	0.6	
Delay (s)	31.3	31.4		38.9	32.1	23.7	46.3	23.2	12.1	38.8	8.6	
Level of Service	C	C		D	C	C	D	C	B	D	A	
Approach Delay (s)		31.4			29.5			21.9			18.8	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			24.0			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.66									
Actuated Cycle Length (s)			88.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			71.7%			ICU Level of Service			C			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings  
 3: NE 157th St & 124th AVE NE

3/28/2013

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	14	26	960	34	45	472
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1872	0	1787	1881
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1872	0	1787	1881
Link Speed (mph)	30		40			30
Link Distance (ft)	725		1282			672
Travel Time (s)	16.5		21.9			15.3
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Adj. Flow (vph)	14	27	990	35	46	487
Shared Lane Traffic (%)						
Lane Group Flow (vph)	14	27	1025	0	46	487
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	62.6%			ICU Level of Service B		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
3: NE 157th St & 124th AVE NE

3/28/2013

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑		↘	↗
Volume (veh/h)	14	26	960	34	45	472
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	14	27	990	35	46	487
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh	2					
Upstream signal (ft)	672					
pX, platoon unblocked						
vC, conflicting volume	1589	1009			1027	
vC1, stage 1 conf vol	1009					
vC2, stage 2 conf vol	579					
vCu, unblocked vol	1589	1009			1027	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	95	91			93	
cM capacity (veh/h)	304	294			679	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>WB 2</b>	<b>NB 1</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	14	27	1025	46	487	
Volume Left	14	0	0	46	0	
Volume Right	0	27	35	0	0	
cSH	304	294	1700	679	1700	
Volume to Capacity	0.05	0.09	0.60	0.07	0.29	
Queue Length 95th (ft)	4	7	0	5	0	
Control Delay (s)	17.4	18.5	0.0	10.7	0.0	
Lane LOS	C	C		B		
Approach Delay (s)	18.1		0.0	0.9		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay			0.8			
Intersection Capacity Utilization			62.6%	ICU Level of Service	B	
Analysis Period (min)			15			

## **LOS Calculations – 2018 Baseline PM Peak Hour LOS Conditions**

Lanes, Volumes, Timings  
1: NE 160th ST & 124th AVE NE

3/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	27	408	9	5	3	635	407	18	2	166	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	15	12	12	11	12	11	11	12
Grade (%)		6%			0%			0%			0%	
Storage Length (ft)	90		105	0		0	120		0	85		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.98		0.99		1.00	1.00		0.99	0.99	
Frt			0.850		0.976			0.994			0.935	
Flt Protected	0.950				0.974		0.950			0.950		
Satd. Flow (prot)	1734	1764	1499	0	1944	0	1759	1805	0	1728	1681	0
Flt Permitted	0.950				0.974		0.398			0.504		
Satd. Flow (perm)	1715	1764	1473	0	1939	0	735	1805	0	911	1681	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			429		3			2			25	
Link Speed (mph)		35			30			40			40	
Link Distance (ft)		826			156			672			548	
Travel Time (s)		16.1			3.5			11.5			9.3	
Confl. Peds. (#/hr)	2		3	3		2	2		3	3		2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	4	0	4	0	0	0	0	4
Adj. Flow (vph)	153	28	429	9	5	3	668	428	19	2	175	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	28	429	0	17	0	668	447	0	2	310	0
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		pm+ov	Split			pm+pt			pm+pt		
Protected Phases	2	2	7	1	1		7	4		3	8	
Permitted Phases			2				4			8		
Detector Phase	2	2	7	1	1		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	8.0	16.0	16.0		8.0	21.0		8.0	27.0	
Total Split (s)	35.0	35.0	56.0	19.0	19.0	0.0	56.0	73.0	0.0	13.0	30.0	0.0
Total Split (%)	25.0%	25.0%	40.0%	13.6%	13.6%	0.0%	40.0%	52.1%	0.0%	9.3%	21.4%	0.0%
Maximum Green (s)	32.0	32.0	53.0	16.0	16.0		53.0	70.0		10.0	27.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	

Lanes, Volumes, Timings  
1: NE 160th ST & 124th AVE NE

3/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
All-Red Time (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	12.0	12.0		6.0	6.0			8.0			10.0	
Flash Dont Walk (s)	9.0	9.0		7.0	7.0			10.0			14.0	
Pedestrian Calls (#/hr)	3	3		2	2			3			3	
Act Effct Green (s)	16.8	16.8	67.9		6.9		110.5	108.9		61.4	56.4	
Actuated g/C Ratio	0.12	0.12	0.48		0.05		0.79	0.78		0.44	0.40	
v/c Ratio	0.74	0.13	0.45		0.17		0.70	0.32		0.00	0.45	
Control Delay	79.4	54.1	2.5		57.8		11.8	7.2		18.5	35.8	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	79.4	54.1	2.5		57.8		11.8	7.2		18.5	35.8	
LOS	E	D	A		E		B	A		B	D	
Approach Delay		24.2			57.8			9.9			35.7	
Approach LOS		C			E			A			D	
Queue Length 50th (ft)	137	23	0		13		189	103		1	198	
Queue Length 95th (ft)	204	52	37		37		419	266		5	#433	
Internal Link Dist (ft)		746			76			592			468	
Turn Bay Length (ft)	90		105				120			85		
Base Capacity (vph)	396	403	985		225		993	1405		490	692	
Starvation Cap Reductn	0	0	0		0		0	0		0	0	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	0.39	0.07	0.44		0.08		0.67	0.32		0.00	0.45	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 100 (71%), Referenced to phase 4:NBTL and 8:SBTL, Start of 1st Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.74  
 Intersection Signal Delay: 18.5  
 Intersection Capacity Utilization 79.0%  
 Analysis Period (min) 15  
 Intersection LOS: B  
 ICU Level of Service D  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NE 160th ST & 124th AVE NE

ø1	ø2	ø3	ø4
19 s	35 s	13 s	73 s
		ø7	ø8
		56 s	30 s

HCM Signalized Intersection Capacity Analysis  
1: NE 160th ST & 124th AVE NE

3/28/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	27	408	9	5	3	635	407	18	2	166	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	11	11	12	15	12	12	11	12	11	11	12
Grade (%)		6%			0%			0%				0%
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00		0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85		0.98		1.00	0.99		1.00	0.93	
Fit Protected	0.95	1.00	1.00		0.97		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1734	1764	1493		1945		1757	1804		1722	1681	
Fit Permitted	0.95	1.00	1.00		0.97		0.40	1.00		0.50	1.00	
Satd. Flow (perm)	1734	1764	1493		1945		736	1804		914	1681	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	153	28	429	9	5	3	668	428	19	2	175	135
RTOR Reduction (vph)	0	0	221	0	3	0	0	0	0	0	15	0
Lane Group Flow (vph)	153	28	208	0	14	0	668	447	0	2	295	0
Confl. Peds. (#/hr)	2		3	3		2	2		3	3		2
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	4	0	4	0	0	0	0	4
Turn Type	Split		pm+ov	Split			pm+pt			pm+pt		
Protected Phases	2	2	7	1	1		7	4		3	8	
Permitted Phases			2				4			8		
Actuated Green, G (s)	16.8	16.8	68.0		4.9		109.3	105.3		56.1	55.1	
Effective Green, g (s)	16.8	16.8	68.0		4.9		109.3	105.3		56.1	55.1	
Actuated g/C Ratio	0.12	0.12	0.49		0.04		0.78	0.75		0.40	0.39	
Clearance Time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	208	212	757		68		948	1357		372	662	
v/s Ratio Prot	c0.09	0.02	c0.10		c0.01		c0.26	0.25		0.00	0.18	
v/s Ratio Perm			0.04				c0.29			0.00		
v/c Ratio	0.74	0.13	0.28		0.21		0.70	0.33		0.01	0.45	
Uniform Delay, d1	59.5	55.1	21.4		65.7		8.5	5.7		25.2	31.2	
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	11.0	0.1	0.1		0.6		2.0	0.6		0.0	2.2	
Delay (s)	70.5	55.2	21.4		66.2		10.4	6.4		25.2	33.4	
Level of Service	E	E	C		E		B	A		C	C	
Approach Delay (s)		35.3			66.2			8.8			33.3	
Approach LOS		D			E			A			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			20.9	HCM Level of Service				C				
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			140.0	Sum of lost time (s)				6.0				
Intersection Capacity Utilization			79.0%	ICU Level of Service				D				
Analysis Period (min)			15									

c Critical Lane Group

Lanes, Volumes, Timings  
2: NE 144th ST & 124th AVE NE

3/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	86	21	158	126	313	25	746	154	167	295	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	11	12	12	11	11	11	12	12	12	11	12
Grade (%)		-2%			2%			0%				0%
Storage Length (ft)	80		0	125		135	100		270	185		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99		0.96	0.99		0.96	0.99	1.00	
Frt		0.971				0.850			0.850		0.987	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1847	1755	0	1752	1783	1515	1728	1881	1599	1787	1789	0
Flt Permitted	0.637			0.684			0.950			0.950		
Satd. Flow (perm)	1220	1755	0	1248	1783	1458	1709	1881	1527	1772	1789	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				40			110		5	
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		1443			1141			434			686	
Travel Time (s)		32.8			25.9			7.4			11.7	
Confl. Peds. (#/hr)	8		6	6		8	6		11	11		6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	68	91	22	168	134	333	27	794	164	178	314	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	113	0	168	134	333	27	794	164	178	343	0
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			Perm		pm+ov	Prot		Perm	Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8			2			
Detector Phase	4	4		8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	34.0	34.0		31.0	31.0	10.0	10.0	31.0	31.0	10.0	26.0	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	35.0	25.0	45.0	45.0	35.0	45.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	29.2%	20.8%	37.5%	37.5%	29.2%	37.5%	0.0%
Maximum Green (s)	35.0	35.0		35.0	35.0	30.0	20.0	40.0	40.0	30.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	

Lanes, Volumes, Timings  
2: NE 144th ST & 124th AVE NE

3/28/2013

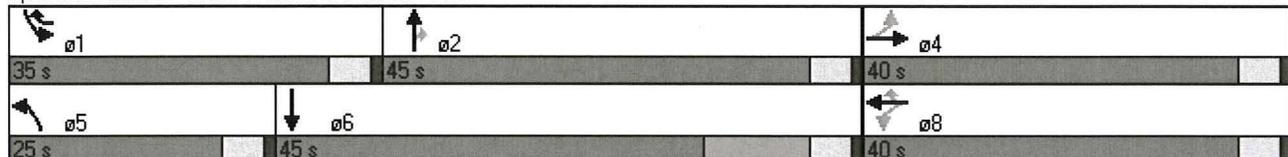


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag							Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0		7.0	
Flash Dont Walk (s)	22.0	22.0		19.0	19.0			19.0	19.0		14.0	
Pedestrian Calls (#/hr)	6	6		8	8			11	11		6	
Act Effct Green (s)	17.6	17.6		17.6	17.6	31.9	7.0	40.6	40.6	14.3	55.2	
Actuated g/C Ratio	0.20	0.20		0.20	0.20	0.36	0.08	0.46	0.46	0.16	0.63	
v/c Ratio	0.28	0.31		0.67	0.37	0.59	0.20	0.91	0.21	0.61	0.30	
Control Delay	33.0	29.6		46.5	33.6	20.3	44.9	41.1	7.9	44.6	11.0	
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Delay	33.0	29.6		46.5	33.6	20.3	44.9	41.1	7.9	44.6	11.0	
LOS	C	C		D	C	C	D	D	A	D	B	
Approach Delay		30.9			30.0			35.7			22.5	
Approach LOS		C			C			D			C	
Queue Length 50th (ft)	32	48		85	63	113	14	382	16	91	61	
Queue Length 95th (ft)	73	102		164	125	180	45	#856	69	176	206	
Internal Link Dist (ft)		1363			1061			354			606	
Turn Bay Length (ft)	80			125		135	100		270	185		
Base Capacity (vph)	494	717		505	722	837	400	870	766	620	1132	
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Storage Cap Reductn	0	0		0	0	0	0	0	0	0	0	
Reduced v/c Ratio	0.14	0.16		0.33	0.19	0.40	0.07	0.91	0.21	0.29	0.30	

**Intersection Summary**

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 87.8  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.91  
 Intersection Signal Delay: 30.8  
 Intersection LOS: C  
 Intersection Capacity Utilization 83.2%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NE 144th ST & 124th AVE NE



HCM Signalized Intersection Capacity Analysis  
2: NE 144th ST & 124th AVE NE

3/28/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	86	21	158	126	313	25	746	154	167	295	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	11	12	12	11	11	11	12	12	12	11	12
Grade (%)		-2%			2%			0%			0%	
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	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1826	1756		1738	1783	1487	1728	1881	1537	1787	1790	
Flt Permitted	0.64	1.00		0.68	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1225	1756		1252	1783	1487	1728	1881	1537	1787	1790	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	68	91	22	168	134	333	27	794	164	178	314	29
RTOR Reduction (vph)	0	8	0	0	0	26	0	0	57	0	2	0
Lane Group Flow (vph)	68	105	0	168	134	307	27	794	107	178	341	0
Confl. Peds. (#/hr)	8		6	6		8	6		11	11		6
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm		pm+ov	Prot		Perm		Prot	
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8			2			
Actuated Green, G (s)	17.6	17.6		17.6	17.6	31.9	3.0	43.9	43.9	14.3	55.2	
Effective Green, g (s)	17.6	17.6		17.6	17.6	31.9	3.0	43.9	43.9	14.3	55.2	
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.35	0.03	0.48	0.48	0.16	0.61	
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)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	237	340		243	346	604	57	909	743	281	1088	
v/s Ratio Prot		0.06			0.08	c0.08	0.02	c0.42		c0.10	0.19	
v/s Ratio Perm	0.06			c0.13		0.13			0.07			
v/c Ratio	0.29	0.31		0.69	0.39	0.51	0.47	0.87	0.14	0.63	0.31	
Uniform Delay, d1	31.2	31.4		34.1	31.9	23.3	43.1	21.0	13.0	35.8	8.6	
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	0.7	0.5		8.2	0.7	0.7	6.1	11.4	0.4	4.6	0.8	
Delay (s)	31.9	31.9		42.3	32.6	23.9	49.2	32.4	13.4	40.4	9.4	
Level of Service	C	C		D	C	C	D	C	B	D	A	
Approach Delay (s)		31.9			30.6			29.7			20.0	
Approach LOS		C			C			C			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			27.9				HCM Level of Service				C	
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			90.8				Sum of lost time (s)			10.0		
Intersection Capacity Utilization			83.2%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings  
3: NE 157th St & 124th AVE NE

3/28/2013



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	15	29	1060	38	50	521
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1872	0	1787	1881
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1872	0	1787	1881
Link Speed (mph)	30		40			30
Link Distance (ft)	725		1282			672
Travel Time (s)	16.5		21.9			15.3
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Adj. Flow (vph)	15	30	1093	39	52	537
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	30	1132	0	52	537
Sign Control	Stop		Free			Free

**Intersection Summary**

Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	68.1%
ICU Level of Service	C
Analysis Period (min)	15

HCM Unsignalized Intersection Capacity Analysis  
3: NE 157th St & 124th AVE NE

3/28/2013

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑		↗	↘
Volume (veh/h)	15	29	1060	38	50	521
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	30	1093	39	52	537
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage (veh)	2					
Upstream signal (ft)	672					
pX, platoon unblocked						
vC, conflicting volume	1755	1114			1134	
vC1, stage 1 conf vol	1114					
vC2, stage 2 conf vol	640					
vCu, unblocked vol	1755	1114			1134	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	88			92	
cM capacity (veh/h)	270	255			619	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>WB 2</b>	<b>NB 1</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	15	30	1132	52	537	
Volume Left	15	0	0	52	0	
Volume Right	0	30	39	0	0	
cSH	270	255	1700	619	1700	
Volume to Capacity	0.06	0.12	0.67	0.08	0.32	
Queue Length 95th (ft)	5	10	0	7	0	
Control Delay (s)	19.2	21.0	0.0	11.3	0.0	
Lane LOS	C	C		B		
Approach Delay (s)	20.4		0.0	1.0		
Approach LOS	C					
<b>Intersection Summary</b>						
Average Delay	0.9					
Intersection Capacity Utilization	68.1%					
ICU Level of Service	C					
Analysis Period (min)	15					

**LOS Calculations –  
2018 Future with Development  
PM Peak Hour Conditions**

Lanes, Volumes, Timings  
1: NE 160th ST & 124th AVE NE

3/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	145	27	444	9	5	3	657	422	18	2	192	128
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	11	11	12	15	12	12	11	12	11	11	12
Grade (%)		6%			0%			0%			0%	
Storage Length (ft)	90		105	0		0	120		0	85		0
Storage Lanes	1		1	0		0	1		0	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99		0.98		0.99		1.00	1.00		0.99	0.99	
Frt			0.850		0.976			0.994			0.940	
Fit Protected	0.950				0.974		0.950			0.950		
Satd. Flow (prot)	1734	1764	1499	0	1944	0	1759	1805	0	1728	1692	0
Fit Permitted	0.950				0.974		0.353			0.497		
Satd. Flow (perm)	1715	1764	1473	0	1939	0	652	1805	0	898	1692	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			467		3			2			21	
Link Speed (mph)		35			30			40			40	
Link Distance (ft)		826			156			672			548	
Travel Time (s)		16.1			3.5			11.5			9.3	
Confl. Peds. (#/hr)	2		3	3		2	2		3	3		2
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%
Bus Blockages (#/hr)	0	0	0	0	4	0	4	0	0	0	0	4
Adj. Flow (vph)	153	28	467	9	5	3	692	444	19	2	202	135
Shared Lane Traffic (%)												
Lane Group Flow (vph)	153	28	467	0	17	0	692	463	0	2	337	0
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		pm+ov	Split			pm+pt			pm+pt		
Protected Phases	2	2	7	1	1		7	4		3	8	
Permitted Phases			2				4			8		
Detector Phase	2	2	7	1	1		7	4		3	8	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0	8.0	16.0	16.0		8.0	21.0		8.0	27.0	
Total Split (s)	35.0	35.0	56.0	19.0	19.0	0.0	56.0	73.0	0.0	13.0	30.0	0.0
Total Split (%)	25.0%	25.0%	40.0%	13.6%	13.6%	0.0%	40.0%	52.1%	0.0%	9.3%	21.4%	0.0%
Maximum Green (s)	32.0	32.0	53.0	16.0	16.0		53.0	70.0		10.0	27.0	
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	

Lanes, Volumes, Timings  
1: NE 160th ST & 124th AVE NE

3/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
All-Red Time (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	4.0	3.0	3.0	4.0	3.0	3.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead		Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Recall Mode	None	None	None	None	None		None	C-Max		None	C-Max	
Walk Time (s)	12.0	12.0		6.0	6.0			8.0				10.0
Flash Dont Walk (s)	9.0	9.0		7.0	7.0			10.0				14.0
Pedestrian Calls (#/hr)	3	3		2	2			3				3
Act Effct Green (s)	16.8	16.8	71.0		6.9		110.5	108.9		58.3	53.3	
Actuated g/C Ratio	0.12	0.12	0.51		0.05		0.79	0.78		0.42	0.38	
v/c Ratio	0.74	0.13	0.47		0.17		0.73	0.33		0.00	0.51	
Control Delay	79.4	54.1	2.5		57.8		14.7	7.3		19.0	39.0	
Queue Delay	0.0	0.0	0.0		0.0		0.0	0.0		0.0	0.0	
Total Delay	79.4	54.1	2.5		57.8		14.7	7.3		19.0	39.0	
LOS	E	D	A		E		B	A		B	D	
Approach Delay		22.9			57.8			11.7			38.9	
Approach LOS		C			E			B			D	
Queue Length 50th (ft)	137	23	0		13		223	109		1	232	
Queue Length 95th (ft)	204	52	37		37		484	278		5	#495	
Internal Link Dist (ft)		746			76			592			468	
Turn Bay Length (ft)	90		105				120			85		
Base Capacity (vph)	396	403	1011		225		968	1405		465	657	
Starvation Cap Reductn	0	0	0		0		0	0		0	0	
Spillback Cap Reductn	0	0	0		0		0	0		0	0	
Storage Cap Reductn	0	0	0		0		0	0		0	0	
Reduced v/c Ratio	0.39	0.07	0.46		0.08		0.71	0.33		0.00	0.51	

Intersection Summary

Area Type: Other  
 Cycle Length: 140  
 Actuated Cycle Length: 140  
 Offset: 100 (71%), Referenced to phase 4:NBTL and 8:SBTL, Start of 1st Green  
 Natural Cycle: 100  
 Control Type: Actuated-Coordinated  
 Maximum v/c Ratio: 0.74  
 Intersection Signal Delay: 19.7  
 Intersection LOS: B  
 Intersection Capacity Utilization 80.3%  
 ICU Level of Service D  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 1: NE 160th ST & 124th AVE NE

ø1 19 s	ø2 35 s	ø3 13 s	ø4 73 s
		ø7 56 s	ø8 30 s

HCM Signalized Intersection Capacity Analysis  
1: NE 160th ST & 124th AVE NE

3/28/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	145	27	444	9	5	3	657	422	18	2	192	128	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Lane Width	12	11	11	12	15	12	12	11	12	11	11	12	
Grade (%)		6%			0%			0%			0%		
Total Lost time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0		
Lane Util. Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00		
Frpb, ped/bikes	1.00	1.00	1.00		0.99		1.00	1.00		1.00	0.99		
Flpb, ped/bikes	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00		
Frt	1.00	1.00	0.85		0.98		1.00	0.99		1.00	0.94		
Flt Protected	0.95	1.00	1.00		0.97		0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1734	1764	1493		1945		1757	1805		1723	1692		
Flt Permitted	0.95	1.00	1.00		0.97		0.35	1.00		0.50	1.00		
Satd. Flow (perm)	1734	1764	1493		1945		653	1805		901	1692		
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	
Adj. Flow (vph)	153	28	467	9	5	3	692	444	19	2	202	135	
RTOR Reduction (vph)	0	0	230	0	3	0	0	0	0	0	13	0	
Lane Group Flow (vph)	153	28	237	0	14	0	692	463	0	2	324	0	
Confl. Peds. (#/hr)	2		3	3		2	2		3	3		2	
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	1%	1%	1%	1%	1%	
Bus Blockages (#/hr)	0	0	0	0	4	0	4	0	0	0	0	4	
Turn Type	Split		pm+ov	Split			pm+pt			pm+pt			
Protected Phases	2	2	7	1	1		7	4		3	8		
Permitted Phases			2				4			8			
Actuated Green, G (s)	16.8	16.8	71.0		4.9		109.3	105.3		53.1	52.1		
Effective Green, g (s)	16.8	16.8	71.0		4.9		109.3	105.3		53.1	52.1		
Actuated g/C Ratio	0.12	0.12	0.51		0.04		0.78	0.75		0.38	0.37		
Clearance Time (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0		
Vehicle Extension (s)	2.0	2.0	2.0		2.0		2.0	2.0		2.0	2.0		
Lane Grp Cap (vph)	208	212	789		68		937	1358		348	630		
v/s Ratio Prot	c0.09	0.02	c0.12		c0.01		c0.29	0.26		0.00	0.19		
v/s Ratio Perm			0.04				c0.29			0.00			
v/c Ratio	0.74	0.13	0.30		0.21		0.74	0.34		0.01	0.51		
Uniform Delay, d1	59.5	55.1	20.1		65.7		11.1	5.8		27.0	34.1		
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00		
Incremental Delay, d2	11.0	0.1	0.1		0.6		2.7	0.7		0.0	3.0		
Delay (s)	70.5	55.2	20.1		66.2		13.7	6.5		27.0	37.1		
Level of Service	E	E	C		E		B	A		C	D		
Approach Delay (s)		33.5			66.2			10.8			37.0		
Approach LOS		C			E			B			D		
<b>Intersection Summary</b>													
HCM Average Control Delay			22.2			HCM Level of Service					C		
HCM Volume to Capacity ratio			0.70										
Actuated Cycle Length (s)			140.0			Sum of lost time (s)					6.0		
Intersection Capacity Utilization			80.3%			ICU Level of Service					D		
Analysis Period (min)			15										

c Critical Lane Group

Lanes, Volumes, Timings  
2: NE 144th ST & 124th AVE NE

3/28/2013

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	86	21	158	126	323	25	772	154	173	310	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width (ft)	13	11	12	12	11	11	11	12	12	12	11	12
Grade (%)		-2%			2%			0%				0%
Storage Length (ft)	80		0	125		135	100		270	185		0
Storage Lanes	1		0	1		1	1		1	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	0.99	0.99		0.99		0.96	0.99		0.96	0.99	1.00	
Fr t		0.971				0.850			0.850		0.988	
Fit Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1847	1755	0	1752	1783	1515	1728	1881	1599	1787	1791	0
Fit Permitted	0.637			0.684			0.950			0.950		
Satd. Flow (perm)	1220	1755	0	1248	1783	1458	1709	1881	1527	1773	1791	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				36			106			5
Link Speed (mph)		30			30			40			40	
Link Distance (ft)		1443			1141			434			686	
Travel Time (s)		32.8			25.9			7.4			11.7	
Confl. Peds. (#/hr)	8		6	6		8	6		11	11		6
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	68	91	22	168	134	344	27	821	164	184	330	29
Shared Lane Traffic (%)												
Lane Group Flow (vph)	68	113	0	168	134	344	27	821	164	184	359	0
Number of Detectors	1	2		1	2	1	1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex								
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			Perm		pm+ov	Prot		Perm	Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8			2			
Detector Phase	4	4		8	8	1	5	2	2	1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	34.0	34.0		31.0	31.0	10.0	10.0	31.0	31.0	10.0	26.0	
Total Split (s)	40.0	40.0	0.0	40.0	40.0	35.0	25.0	45.0	45.0	35.0	45.0	0.0
Total Split (%)	33.3%	33.3%	0.0%	33.3%	33.3%	29.2%	20.8%	37.5%	37.5%	29.2%	37.5%	0.0%
Maximum Green (s)	35.0	35.0		35.0	35.0	30.0	20.0	40.0	40.0	30.0	40.0	
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	

Lanes, Volumes, Timings  
2: NE 144th ST & 124th AVE NE

3/28/2013



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	5.0	5.0	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.0
Lead/Lag							Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?							Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	Max	Max	None	Max	Max
Walk Time (s)	7.0	7.0		7.0	7.0			7.0	7.0			7.0
Flash Dont Walk (s)	22.0	22.0		19.0	19.0			19.0	19.0			14.0
Pedestrian Calls (#/hr)	6	6		8	8			11	11			6
Act Effct Green (s)	17.7	17.7		17.7	17.7	32.3	7.0	40.6	40.6	14.6		55.6
Actuated g/C Ratio	0.20	0.20		0.20	0.20	0.37	0.08	0.46	0.46	0.17		0.63
v/c Ratio	0.28	0.31		0.67	0.37	0.61	0.20	0.95	0.22	0.62		0.32
Control Delay	33.2	29.8		46.7	33.7	21.0	45.1	46.7	8.2	44.8		11.1
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
Total Delay	33.2	29.8		46.7	33.7	21.0	45.1	46.7	8.2	44.8		11.1
LOS	C	C		D	C	C	D	D	A	D		B
Approach Delay		31.1			30.3			40.4				22.5
Approach LOS		C			C			D				C
Queue Length 50th (ft)	32	48		85	64	120	14	410	17	94		65
Queue Length 95th (ft)	74	103		166	125	189	46	#903	71	182		217
Internal Link Dist (ft)		1363			1061			354				606
Turn Bay Length (ft)	80			125		135	100		270	185		
Base Capacity (vph)	492	713		503	718	833	398	867	761	617		1133
Starvation Cap Reductn	0	0		0	0	0	0	0	0	0		0
Spillback Cap Reductn	0	0		0	0	0	0	0	0	0		0
Storage Cap Reductn	0	0		0	0	0	0	0	0	0		0
Reduced v/c Ratio	0.14	0.16		0.33	0.19	0.41	0.07	0.95	0.22	0.30		0.32

Intersection Summary

Area Type: Other  
 Cycle Length: 120  
 Actuated Cycle Length: 88.2  
 Natural Cycle: 90  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.95  
 Intersection Signal Delay: 32.9  
 Intersection LOS: C  
 Intersection Capacity Utilization 84.9%  
 ICU Level of Service E  
 Analysis Period (min) 15  
 # 95th percentile volume exceeds capacity, queue may be longer.  
 Queue shown is maximum after two cycles.

Splits and Phases: 2: NE 144th ST & 124th AVE NE

φ1 35 s	φ2 45 s	φ4 40 s
φ5 25 s	φ6 45 s	φ8 40 s

HCM Signalized Intersection Capacity Analysis  
2: NE 144th ST & 124th AVE NE

3/28/2013

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	86	21	158	126	323	25	772	154	173	310	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	13	11	12	12	11	11	11	12	12	12	11	12
Grade (%)		-2%			2%			0%			0%	
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	
Frbp, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00	0.96	1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Fit Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1826	1755		1738	1783	1487	1728	1881	1537	1787	1792	
Fit Permitted	0.64	1.00		0.68	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1224	1755		1252	1783	1487	1728	1881	1537	1787	1792	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	68	91	22	168	134	344	27	821	164	184	330	29
RTOR Reduction (vph)	0	8	0	0	0	23	0	0	55	0	2	0
Lane Group Flow (vph)	68	105	0	168	134	321	27	821	109	184	357	0
Confl. Peds. (#/hr)	8		6	6		8	6		11	11		6
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	1%	1%	1%	1%	1%	1%
Turn Type	Perm			Perm		pm+ov	Prot		Perm	Prot		
Protected Phases		4			8	1	5	2		1	6	
Permitted Phases	4			8		8		2				
Actuated Green, G (s)	17.7	17.7		17.7	17.7	32.3	3.0	43.9	43.9	14.6	55.5	
Effective Green, g (s)	17.7	17.7		17.7	17.7	32.3	3.0	43.9	43.9	14.6	55.5	
Actuated g/C Ratio	0.19	0.19		0.19	0.19	0.35	0.03	0.48	0.48	0.16	0.61	
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)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	238	341		243	346	608	57	905	740	286	1091	
v/s Ratio Prot		0.06			0.08	c0.08	0.02	c0.44		c0.10	0.20	
v/s Ratio Perm	0.06			c0.13		0.13			0.07			
v/c Ratio	0.29	0.31		0.69	0.39	0.53	0.47	0.91	0.15	0.64	0.33	
Uniform Delay, d1	31.4	31.5		34.2	32.0	23.4	43.3	21.8	13.2	35.9	8.7	
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	0.7	0.5		8.2	0.7	0.8	6.1	14.4	0.4	4.9	0.8	
Delay (s)	32.0	32.0		42.4	32.7	24.2	49.4	36.2	13.6	40.8	9.5	
Level of Service	C	C		D	C	C	D	D	B	D	A	
Approach Delay (s)		32.0			30.7			32.9			20.1	
Approach LOS		C			C			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			29.3			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			91.2			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			84.9%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings  
 3: NE 157th St & 124th AVE NE

3/28/2013

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	15	29	1097	38	50	583
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor						
Frt		0.850	0.996			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1805	1615	1874	0	1787	1881
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1805	1615	1874	0	1787	1881
Link Speed (mph)	30		40			30
Link Distance (ft)	725		1282			672
Travel Time (s)	16.5		21.9			15.3
Confl. Peds. (#/hr)				2	2	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	0%	1%	1%	1%	1%
Adj. Flow (vph)	15	30	1131	39	52	601
Shared Lane Traffic (%)						
Lane Group Flow (vph)	15	30	1170	0	52	601
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	70.0%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
3: NE 157th St & 124th AVE NE

3/28/2013

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑		↗	↘
Volume (veh/h)	15	29	1097	38	50	583
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97
Hourly flow rate (vph)	15	30	1131	39	52	601
Pedestrians	2					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage (veh)	2					
Upstream signal (ft)	672					
pX, platoon unblocked						
vC, conflicting volume	1857		1153		1172	
vC1, stage 1 conf vol	1153					
vC2, stage 2 conf vol	704					
vCu, unblocked vol	1857		1153		1172	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	94	88			91	
cM capacity (veh/h)	254	242			599	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	15	30	1170	52	601	
Volume Left	15	0	0	52	0	
Volume Right	0	30	39	0	0	
cSH	254	242	1700	599	1700	
Volume to Capacity	0.06	0.12	0.69	0.09	0.35	
Queue Length 95th (ft)	5	10	0	7	0	
Control Delay (s)	20.1	21.9	0.0	11.6	0.0	
Lane LOS	C	C		B		
Approach Delay (s)	21.3		0.0	0.9		
Approach LOS	C					
Intersection Summary						
Average Delay			0.8			
Intersection Capacity Utilization			70.0%	ICU Level of Service	C	
Analysis Period (min)	15					

Lanes, Volumes, Timings  
4: Proposed Site Access & 124th AVE NE

3/28/2013

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑		↗	↘
Volume (vph)	24	37	1143	41	62	551
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	11	12	12	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850	0.995			
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1792	0	1770	1801
Flt Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	1792	0	1770	1801
Link Speed (mph)	30		40			30
Link Distance (ft)	672		1835			1282
Travel Time (s)	15.3		31.3			29.1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	26	40	1242	45	67	599
Shared Lane Traffic (%)						
Lane Group Flow (vph)	26	40	1287	0	67	599
Sign Control	Stop		Free			Free
<b>Intersection Summary</b>						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	72.6%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis  
4: Proposed Site Access & 124th AVE NE

3/28/2013

	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑		↗	↘
Volume (veh/h)	24	37	1143	41	62	551
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	40	1242	45	67	599
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1998	1265			1287	
vC1, stage 1 conf vol	1265					
vC2, stage 2 conf vol	734					
vCu, unblocked vol	1998	1265			1287	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	88	81			87	
cM capacity (veh/h)	224	207			539	
Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2	
Volume Total	26	40	1287	67	599	
Volume Left	26	0	0	67	0	
Volume Right	0	40	45	0	0	
cSH	224	207	1700	539	1700	
Volume to Capacity	0.12	0.19	0.76	0.13	0.35	
Queue Length 95th (ft)	10	18	0	11	0	
Control Delay (s)	23.2	26.6	0.0	12.6	0.0	
Lane LOS	C	D			B	
Approach Delay (s)	25.3			1.3		
Approach LOS	D					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization			72.6%	ICU Level of Service	C	
Analysis Period (min)			15			

**LOS Calculations –  
2018 Future with Development  
AM Peak Hour Conditions**

Lanes, Volumes, Timings

4: Proposed Site Access & 124th AVE NE

3/25/2013



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	36	55	411	12	19	927
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width (ft)	12	12	11	12	12	11
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Fr <sub>t</sub>		0.850	0.996			
Fit Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	1793	0	1770	1801
Fit Permitted	0.950				0.950	
Satd. Flow (perm)	1770	1583	1793	0	1770	1801
Link Speed (mph)	30		40		30	
Link Distance (ft)	672		1835		1954	
Travel Time (s)	15.3		31.3		44.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	39	60	447	13	21	1008
Shared Lane Traffic (%)						
Lane Group Flow (vph)	39	60	460	0	21	1008
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12		12	
Link Offset(ft)	0		0		0	
Crosswalk Width(ft)	16		16		16	
Two way Left Turn Lane			Yes			
Headway Factor	1.00	1.00	1.04	1.00	1.00	1.04
Turning Speed (mph)	15	9		9	15	
Sign Control	Stop		Free		Free	

**Intersection Summary**

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 58.8% ICU Level of Service B

Analysis Period (min) 15

HCM Unsignalized Intersection Capacity Analysis  
4: Proposed Site Access & 124th AVE NE

3/25/2013

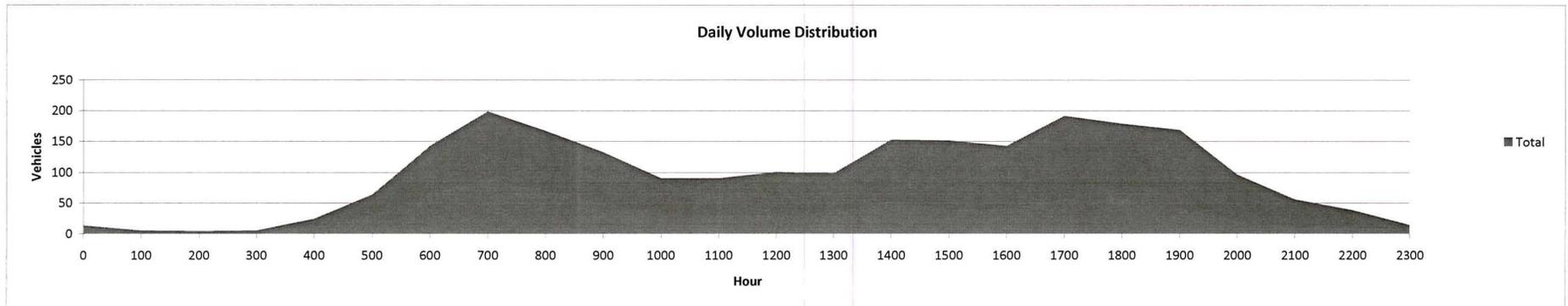
	↙	↖	↑	↗	↘	↓
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↑		↗	↘
Volume (veh/h)	36	55	411	12	19	927
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	60	447	13	21	1008
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			None		
Median storage veh	2					
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1502	453			460	
vC1, stage 1 conf vol	453					
vC2, stage 2 conf vol	1049					
vCu, unblocked vol	1502	453			460	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3			2.2	
p0 queue free %	87	90			98	
cM capacity (veh/h)	304	607			1101	
<b>Direction, Lane #</b>	<b>WB 1</b>	<b>WB 2</b>	<b>NB 1</b>	<b>SB 1</b>	<b>SB 2</b>	
Volume Total	39	60	460	21	1008	
Volume Left	39	0	0	21	0	
Volume Right	0	60	13	0	0	
cSH	304	607	1700	1101	1700	
Volume to Capacity	0.13	0.10	0.27	0.02	0.59	
Queue Length 95th (ft)	11	8	0	1	0	
Control Delay (s)	18.6	11.6	0.0	8.3	0.0	
Lane LOS	C	B			A	
Approach Delay (s)	14.4	0.0		0.2		
Approach LOS	B					
<b>Intersection Summary</b>						
Average Delay			1.0			
Intersection Capacity Utilization			58.8%	ICU Level of Service	B	
Analysis Period (min)			15			

# Signal Warrant Analysis

**NE 157th St - East of 124th Avenue NE**

**Tuesday, September 18, 2012**

Start Time	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Eastbound	8	2	1	0	3	6	13	19	27	35	25	31	39	31	45	74	63	80	67	87	57	34	17	9
Westbound	3	2	2	3	11	29	65	90	70	49	33	30	31	34	54	39	40	56	56	41	20	11	11	3
<b>Total</b>	<b>11</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>14</b>	<b>35</b>	<b>78</b>	<b>109</b>	<b>97</b>	<b>84</b>	<b>58</b>	<b>61</b>	<b>70</b>	<b>65</b>	<b>99</b>	<b>113</b>	<b>103</b>	<b>136</b>	<b>123</b>	<b>128</b>	<b>77</b>	<b>45</b>	<b>28</b>	<b>12</b>
Westbound - %	0.38%	0.26%	0.26%	0.38%	1.40%	3.70%	8.30%	11.49%	8.94%	6.26%	4.21%	3.83%	3.96%	4.34%	6.90%	4.98%	5.11%	7.15%	7.15%	5.24%	2.55%	1.40%	1.40%	0.38%
Rank	20	23	23	20	17	15	3	1	2	7	12	14	13	11	6	10	9	4	4	8	16	17	17	20
Eastbound - %	1.03%	0.26%	0.13%	0.00%	0.39%	0.78%	1.68%	2.46%	3.49%	4.53%	3.23%	4.01%	5.05%	4.01%	5.82%	9.57%	8.15%	10.35%	8.67%	11.25%	7.37%	4.40%	2.20%	1.16%
Rank	19	22	23	24	21	20	17	15	13	9	14	11	8	11	7	3	5	2	4	1	6	10	16	18
Total - %	0.71%	0.26%	0.19%	0.19%	0.90%	2.25%	5.01%	7.01%	6.23%	5.40%	3.73%	3.92%	4.50%	4.18%	6.36%	7.26%	6.62%	8.74%	7.90%	8.23%	4.95%	2.89%	1.80%	0.77%
Rank	21	22	23	23	19	17	10	5	8	9	15	14	12	13	7	4	6	1	3	2	11	16	18	20



**Hourly Project Traffic Assignments based on Daily Volume Distribution Shown Above**

Directional ADT	775																							
Start Time	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
WB Dist. (Exiting)	3	2	2	3	11	29	64	89	69	48	33	30	31	34	53	39	40	55	55	41	20	11	11	3
EB Dist. (Entering)	8	2	1	0	3	6	13	19	27	35	25	31	39	31	45	74	63	80	67	87	57	34	17	9
<b>Total Dist.</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>7</b>	<b>17</b>	<b>39</b>	<b>54</b>	<b>48</b>	<b>42</b>	<b>29</b>	<b>30</b>	<b>35</b>	<b>32</b>	<b>49</b>	<b>56</b>	<b>51</b>	<b>68</b>	<b>61</b>	<b>64</b>	<b>38</b>	<b>22</b>	<b>14</b>	<b>6</b>

EXHIBIT 11  
 PAGE 114 OF 117

**SIGNAL WARRANT ANALYSIS - FUTURE 2018 WITH PROJECT CONDITIONS**  
**124th Avenue NE at Proposed Site Access**

	Start Time	0	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300
Existing 2012 Major Volume NB <sup>1</sup>	29	17	17	22	53	136	245	360	360	304	311	372	433	388	491	680	946	980	850	490	299	170	105	59	
Existing 2012 Major Volume SB <sup>2</sup>	40	14	20	23	42	97	312	682	762	548	358	343	371	400	414	483	500	510	436	333	294	214	119	65	
Existing 2012 Major Volume	69	31	37	45	95	233	557	1042	1122	852	669	715	804	788	905	1163	1446	1490	1286	823	593	384	224	124	
Future 2018 Baseline Major Volume (Includes 2% Annual Growth Compounded)	78	35	42	51	107	262	627	1173	1264	979	768	821	905	887	1019	1310	1628	1678	1448	927	668	432	252	140	
Project-Generated Major Volume <sup>3</sup> (Entering Site Eastbound)	8	2	1	0	3	6	13	19	27	35	25	31	39	31	45	74	63	80	67	87	57	34	17	9	
Major Volume	86	37	43	51	110	268	640	1192	1291	1014	793	852	944	918	1064	1384	1691	1758	1515	1014	725	466	269	149	
Minor Volume (Exiting Site Westbound) <sup>3</sup>	3	2	2	3	11	29	64	89	69	48	33	30	31	34	53	39	40	55	55	41	20	11	11	3	
Int Volume	89	39	45	54	121	297	704	1281	1360	1062	826	882	975	952	1117	1423	1731	1813	1570	1055	745	477	280	152	

<sup>1</sup> From 9/11/2012 TDG Count, however, the northbound tube failed between 9 AM and 3 PM, it was supplemented with City of Woodville April 2011 Counts for 9 AM - 12 PM, and TDG Count from 9/13/2012 for 12 PM - 3 PM.

<sup>2</sup> From 9/11/2012 TDG Count.

<sup>3</sup> From Daily Volume Distribution of Project Traffic based on daily volume distribution on NE 157th Street.

**Warrant 1A Analysis - 8-Hour Minimum Vehicular Volume**

No																									
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hours Satisfied 0  
Warrant 1A Satisfied: **NO**

**Warrant 1B Analysis - 8-Hour Interruption of Continuous Traffic**

No	Yes	No																							
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hours Satisfied 1  
Warrant 1B Satisfied: **NO**

**Warrant 1C Analysis - 8-Hour Combination of Warrants**

Warrant 1A (80%)	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No						
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Warrant 1B (80%)	No	No	No	No	No	No	Yes	Yes	Yes	No															
	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1A Hours Satisfied 0  
1B Hours Satisfied 3  
Warrant 1C Satisfied: **NO**

**Warrant 2 Analysis - 4-Hour Vehicular Volume**

Minimum Required Minor Street Volume	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	No	No	No	No	No	No	Yes	No																	
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Hours Satisfied 1  
Warrant 2 Satisfied: **NO** Minor street volume is not high enough, major street volume not checked because of that.



Vinterra  
GTC #12-097

**Warrant 3A Analysis - Peak Hour Delay**  
Meets volume criteria?

No  
0 0

Peak Hour  
AM PM  
Total Vehicles = 91 61  
Approach Delay (sec/veh) = 14.4 25.3

Stop sign delay (in vehicle-hours) for minor approach (must exceed 5 vehicle-hours): 0.364 0.429

Hours Satisfied 0

**Warrant 3A Satisfied: NO**

**Warrant 3B Analysis - Peak Hour Volume Plots**

Minimum Required Minor Street Volume

100  
No  
0 0

Hours Satisfied 0

**Warrant 3B Satisfied: NO**

EXHIBIT 11  
PAGE 16 OF 17

**MUTCD Warrant 4, Pedestrian Volume Warrant Analysis**

Data Source: Pedestrian and vehicle volumes have been taken from the traffic count data collected by Traffic Data Gathering on 9/18/2012 from 3:30 PM to 6:00 PM at the intersection of 124th Avenue NE at NE 157th Street.

15-Minute Interval Ending At	Peds Crossing Major Street		Pedestrian Activity Peds Not Crossing Major Street (potentially having crossed elsewhere)				Summary of Total Pedestrian Movements	Major Street Approach Vehicle Volumes (south of NE 157th Street)				Total Vehicle Volume (vph)
	North Leg	South Leg	Crossing East Leg NE 157th St	Along West Side Sidewalk	Rounding Northeast Corner	Rounding Southeast Corner		Southbound		Northbound		
								WB Left	Through	Through	Right	
3:45 PM	0	0	0	0	7	0	7	4	105	146	8	263
4:00 PM	0	0	23	4	4	8	39	3	133	189	8	333
4:15 PM	0	0	0	0	2	0	2	7	115	187	10	319
4:30 PM	0	0	0	0	0	1	1	2	116	182	4	304
4:45 PM	0	0	0	1	1	1	3	2	114	232	10	358
5:00 PM	0	0	0	1	0	0	1	3	97	211	8	319
5:15 PM	0	0	0	0	1	0	1	4	88	227	7	326
5:30 PM	0	1	0	0	0	0	1	3	99	236	5	343
5:45 PM	0	0	0	0	0	3	3	2	86	219	8	315
6:00 PM	0	0	3	1	0	0	4	3	87	207	10	307
<b>2.5 Hour Total</b>	<b>0</b>	<b>1</b>	<b>26</b>	<b>7</b>	<b>15</b>	<b>13</b>	<b>62</b>	<b>33</b>	<b>1040</b>	<b>2036</b>	<b>78</b>	<b>3187</b>
<b>Hourly Summaries</b>												
3:30-4:30 PM	0	0	23	4	13	9	49	16	469	704	30	1219
3:45-4:45 PM	0	0	23	5	7	10	45	14	478	790	32	1314
4:00-5:00 PM	0	0	0	2	3	2	7	14	442	812	32	1300
4:15-5:15 PM	0	0	0	2	2	2	6	11	415	852	29	1307
4:30-5:30 PM	0	1	0	2	2	1	6	12	398	906	30	1346
4:45-5:45 PM	0	1	0	1	1	3	6	12	370	893	28	1303
5:00-6:00 PM	0	1	3	1	1	3	9	12	360	889	30	1291
Vehicle Peak Hour 4:30-5:30 PM	0	1	0	2	2	1	6	12	398	906	30	1346
Pedestrian Peak Hour 3:30-4:30 PM	0	0	23	4	13	9	49	16	469	704	30	1219
Future 2018 Baseline Pedestrian Peak Hour Volumes with 2% Annual Growth Compounded							55					1373
Project-Generated Peak Hour Vehicle Volume (no ped increase because peds turn into 157th)												103
Future 2018 with Project Pedestrian Peak Hour Volumes							55					1476
Warrant 4 Peak Hour Volume Requirements												
Condition A (70% Factor), Pedestrian Four-Hour Volume							75		for total vehicle volume = 1,476			
Condition B (70% Factor), Pedestrian Peak Hour							93		for total vehicle volume = 1,476			

<b>Warrant 4 Satisfied?</b>	No. Pedestrian volumes are <b>not</b> high enough either for the Peak Hour or a single hour of the Four-Hour Volume Warrant.
-----------------------------	--

