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Revised Transportation Impact Analysis

SLOCUM PROPERTY

Prepared for:
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March 2013

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Executive Summary

This section provides an executive summary of the Transportation Impact Analysis prepared for the Slocum Property project through a set of frequently asked questions (FAQs).

Where is the project located and what would be developed?

The proposed Slocum Property development is located at the Southwest quadrant of the intersection of NE 195th Street and 136th Avenue NE and would construct 23 single family dwelling units. Access to the homes would be provided through an on-site roadway connecting to 136th Avenue NE. The project is anticipated to be completed by the end of 2015.

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

All study area intersections currently meet the City's LOS E standard. With the addition of background traffic growth, all study intersections would operate at LOS E or better and continue to meet the City standard. Recent collision records were reviewed within the study area to identify existing traffic safety issues. This review indicated to no specific adverse safety condition exists within the study area, including the four local streets used by vehicles to access the project site.

Would the project have any off-site transportation impacts?

The proposed project is expected project is anticipated to generate 218 trips during a typical weekday. Of these trips, 17 would occur during the AM peak commute period and 23 would occur during the PM peak commute period. With the addition of these trips, all of the study intersections are expected to continue to operate at LOS E or better during the weekday AM and PM peak hours, meeting the City's LOS E standard.

Would the project have any impacts to school walk-route safety?

Pedestrian walkways are provided along NE 195th Street and 136th Avenue NE within the vicinity of the project. The proposed project would construct on-site sidewalks and frontage improvements that would include sidewalks adjacent to the project site. These sidewalk connections would connect to the existing pedestrian facilities and nearby schools and bus stops.

What measures are proposed to reduce or control traffic impacts?

Specific off-site mitigation measures are not recommended, nor required, to reduce/offset potential site-generated traffic impacts.

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Introduction

The purpose of this transportation impact analysis (TIA) is to identify potential traffic-related impacts associated with the proposed Slocum Property residential development. As necessary, mitigation measures are identified that would offset or reduce significant impacts based on applicable City of Woodinville standards.

Project Description

The proposed Slocum Property development is located at the Southwest quadrant of the intersection of NE 195th Street and 136th Avenue NE in the City of Woodinville and is shown in Figure 1. The project will construct 23 single family dwelling units and provide access through an on-site roadway connecting to 136th Avenue NE located 196 feet south of the NE 195th Street / 136th Avenue NE intersection. The project is anticipated to be completed by the end of 2015 and a preliminary site plan is shown in Figure 2.

Study Approach

The overall study approach was coordinated and accepted by City of Woodinville staff. The scope of this analysis follows the City requirements as defined in The Woodinville Infrastructure Design Standards & Specifications (2007, Section 1-2.1). The approach includes:

- A review of the existing roadway network, non-motorized and transit facilities, traffic volumes, school walk routes, and collision data within the study area.
- A review of anticipated future (2015) conditions[1] including any planned improvements and forecast traffic volumes and operations.
- A traffic operations evaluation of study intersections for the weekday AM peak hour and PM peak hour (commuter peak) under existing, future without-project, and future with-project conditions.
- Traffic impacts and mitigation requirements for study intersections are assessed based on level-of-service (LOS).

Study Area

Based upon the estimated trip generation and distribution, and coordination with City of Woodinville staff, four off-site study intersections were identified and included in this analysis. These study intersections are shown in Figure 1 and include:

1. NE 195th Street/136th Avenue NE
2. NE 195th Street/Westbound SR 522 On-ramp
3. NE 195th Street/Eastbound SR 522 Off-ramp
4. NE 195th Street/Woodinville-Snohomish Road

[1] Consistent with the anticipated buildout of the project.

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Project Site Vicinity & Study Intersections

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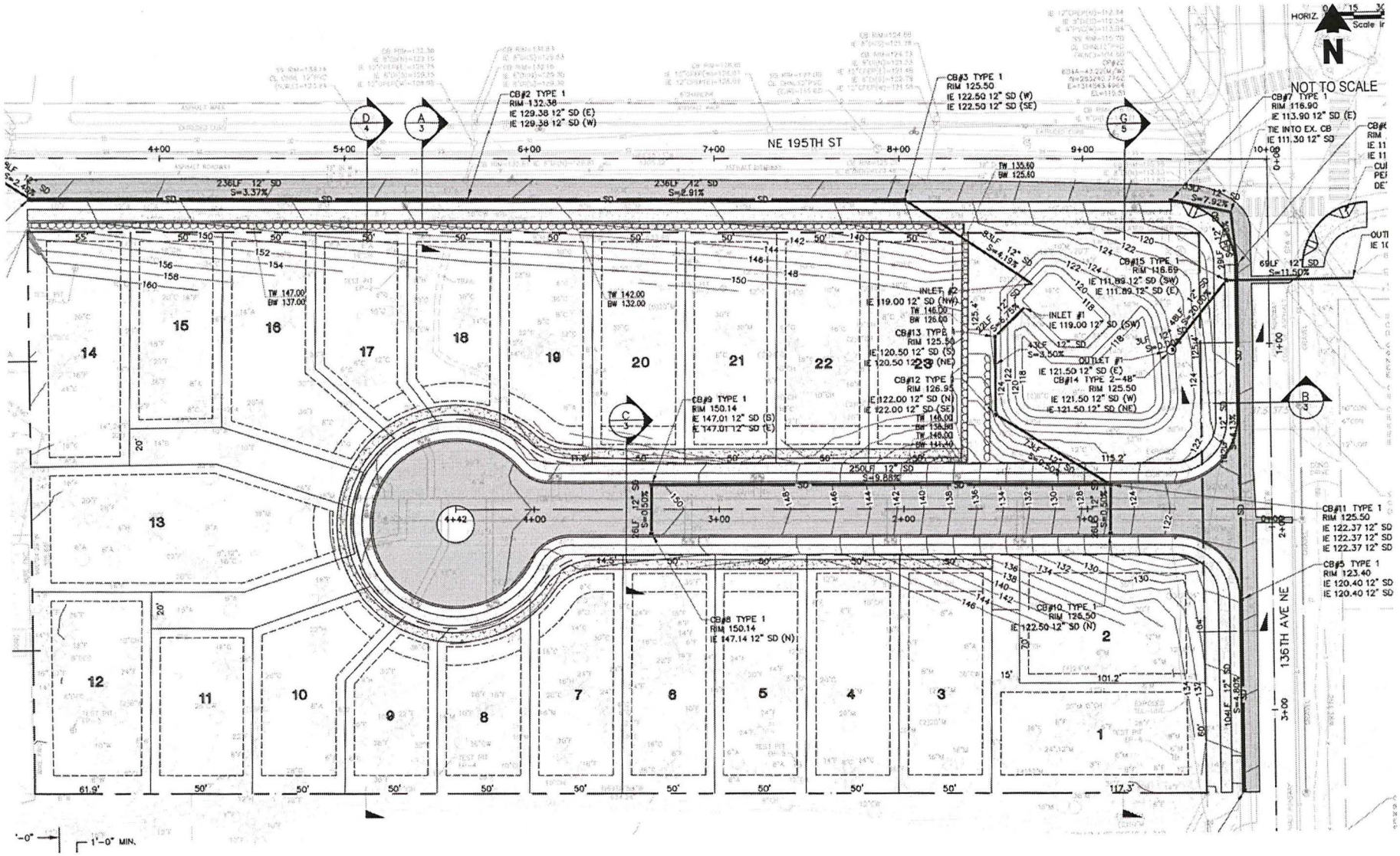

Preliminary Site Plan

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FIGURE 2

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Existing Conditions

This section describes the existing conditions in the vicinity of the proposed project. Key existing characteristics described include:

- Surrounding roadway network
- Non-motorized and Transit Facilities
- Weekday AM and PM peak hour traffic volumes and intersection operations
- Collision history at study intersections and roadways

Roadway Network

The key characteristics of the existing roadway network are summarized in Table 1.

Table 1. Study Area Existing Roadway Network Summary

Roadway	Arterial Classification	Posted Speed Limit	Number of Travel Lanes	Parking?	Sidewalks or Paved Shoulder?	Bicycle Facilities?
SR 522 Ramps	Expressway	60 mph	1 lanes	No	No	No
NE 195th St (East of 136th Ave NE)	Principal Arterial	35 mph	5 lanes	No	Yes	No
Woodinville-Snohomish Rd	Principal Arterial	35 mph	2 lanes	No	Yes	No
NE 195th St (West of 136th Ave NE)	Collector	20/25 mph[1]	2 lanes	No	Yes	Yes
136th Ave NE	Local Street	20/25 mph[1]	2 lanes	No	Yes/No	No

1. 20 mph posted speed limit within the vicinity of Woodinville High School; 25 mph otherwise.

Non-Motorized Facilities

Pedestrian and bicycle facilities in the area of the proposed project are limited. Pedestrian walkways exist on NE 195th Street and 136th Avenue NE within the project vicinity. Bike lanes are provided along NE 195th Street from 136th Avenue NE and extending to the west. In addition a paved mixed-use shoulder separated from vehicular traffic by a raised curb exists along the west side of 136th Avenue NE north of NE 195th Street.

Transit Facilities

One transit route operates within the study area and stops near the NE 195th Street / 136th Avenue NE intersection. King County Metro Route 931 operates between the University of Washington / Cascade Community College Bothell Campus, Woodinville, and Redmond. Route 931 operates on weekdays from the morning commute period and into the evening with 30 minute headways during peak periods and one hour headways during non-peak times. The route also operates on Saturdays with one hour headways.

Traffic Volumes

Consistent with City requirements, this transportation analysis focuses on the weekday AM and PM peak hour periods to assess impacts during the peak morning commute conditions and the peak evening commute. Existing turning movement counts at the study intersections and driveways were counted in May and October 2012. The detailed intersection turning movement traffic volumes are provided in Appendix A. Existing weekday AM and PM peak hour traffic volumes are summarized in Figure 3.

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1 136TH AVE NE NE 195TH ST	2 SR 522 WB ON RAMP NE 195TH ST	3 SR 522 EB OFF RAMP NE 195TH ST	4 WOODINVILLE-SNOHOMISH RD NE 195TH ST
(10) 0			(455) 355
(15) 5 / 105 (190)			(60) 255 / 105 (55)
(5) 10 / 145 (90)			(110) 65 / 140 (45)
(205) 195 / 145 (170)	(360) 325 / 380 (285)	(360) 320 / 1,195 (785)	(580) 615 / 645 (635)
(5) 5 / 25 (20)	(105) 40 / 860 (545)		(215) 185 / 40 (30)
(5) 0 / 25 (65)		(50) 40 / 585 (550)	(90) 245 / 35 (10)
5 (5)			605 (115)

LEGEND

X = PM PEAK HOUR

(X) = AM PEAK HOUR

Existing (2012) Weekday AM & PM Commute Peak Hour Traffic Volumes

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FIGURE 3

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Traffic Operations

The operational characteristics of an intersection are determined by calculating the intersection level of service (LOS). At signalized intersections, LOS is measured in average control delay per vehicle and is typically reported using the intersection delay. At stop-sign-controlled intersections, LOS is measured in delay per vehicle. Traffic operations for an intersection can be described alphabetically with a range of levels of service (LOS A through F), with LOS A indicating free-flowing traffic and LOS F indicating extreme congestion and long vehicle delays. The City of Woodinville has set an intersection LOS standard of E for intersections. [2] Appendix B contains a detailed explanation of LOS criteria and definitions.

Weekday AM and PM peak hour traffic operations were evaluated at the study intersections based on LOS. The LOS analysis method was based on procedures identified in the *Highway Capacity Manual*, and evaluated using Synchro version 8.0.[3] Table 2 (page 6) summarizes the existing weekday AM and PM peak hour LOS at study intersections. The detailed LOS worksheets are included in Appendix C.

Table 2. Existing (2012) Weekday AM & PM Commute Peak Hour Level of Service

	2012 Existing		
Intersections	**LOS[1]**	**Delay[2]**	**Worst Lane Group[3]**
Weekday AM Peak Hour			
1. NE 195th Street/136th Ave NE	B	14	-
2. NE 195th Street/WB SR 522 On-ramp	A	7	-
3. NE 195th Street/EB SR 522 Off-ramp	D	29	NB
4. NE 195th Street/Woodinville-Snohomish Rd[4]	C	27	-
Weekday PM Peak Hour			
1. NE 195th Street/136th Ave NE	B	10	-
2. NE 195th Street/WB SR 522 On-ramp	A	8	-
3. NE 195th Street/EB SR 522 Off-ramp	D	29	NB
4. NE 195th Street/Woodinville-Snohomish Rd[4]	D	35	-

Source: *Highway Capacity Manual* (2010 edition for #1 & #4 and 2010 edition for #2 &3), Transpo Group, 2012
1. Level of service (LOS), based on *Highway Capacity Manual* methodology.
2. Average delay in seconds per vehicle.
3. Worst lane group reported for unsignalized intersections where NB = northbound.
4. Analysis conservatively assumes defacto NB and SB right-turn lanes.

As shown in Table 2, all of the study intersections are currently operating at LOS D or better during the weekday AM and PM commute peak hours and meet the City's LOS E standard.

Traffic Safety

Recent collision records were reviewed within the study area to identify existing traffic safety issues. The Washington State Department of Transportation (WSDOT) maintains a database of all reported collisions throughout the State of Washington and provided collision data for the three-year period between January 1, 2009 and December 31, 2011.

[2] City of Woodinville Municipal Code 21.28.070
[3] The HCM2010 was used to evaluate all study intersections except for #2-NE 195th Street / WB SR 522 On-Ramp and #3-NE 195th Street/EB SR 522 Off-ramp where the intersections cannot be analyzed using the HCM2010 methodologies. Instead, the previous methodology from the *Highway Capacity Manual* (2000 edition) was used to evaluate these intersections.

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In general, a signalized intersection is considered a high-accident location (HAL) if it experiences, on average, 10 or more accidents per year. Similarly, a non-signalized intersection is considered a high-accident location if, on average, five or more accidents are reported on an annual basis. In addition, an intersection is generally considered a high accident location if the accident rate per million entering vehicles (MEV) is greater than 1.0. A summary of the reported collisions at each study intersection and the four site access roadway segments is provided in Table 3.

Table 3. Three-Year Intersection Collision Summary – 2009 to 2011

Location	Number of Collisions			Annual Average	Collisions per MEV[1]
	2009	2010	2011		
1. NE 195th Street/136th Ave NE	0	0	0	0.00	0.00
2. NE 195th Street/WB SR 522 On-ramp	0	0	0	0.00	0.00
3. NE 195th Street/EB SR 522 Off-ramp	0	0	0	0.00	0.00
4. NE 195th Street/EB SR 522 Off-ramp	7	4	2	4.33	0.36

Source: WSDOT and Transpo Group, 2012
1. Million Entering Vehicles for intersections

The highest number of collisions has occurred at the NE 195th Street/Woodinville-Snohomish Road intersections where an annual average of 4.3 collisions were reported within the three years of available data. This intersection also has the highest collision rate of 0.36 collisions per million entering vehicles. These values do not indicate any adverse safety condition at any of the study intersections.

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Future Without-Project Conditions

This section describes the future (2015) traffic conditions during the PM peak hour without the addition of project traffic. The following sections describe the planned transportation improvements, traffic volume forecasts, and traffic operations under future conditions. This scenario provides a baseline against which project impacts can be determined.

Planned Transportation Improvements

The City of Woodinville Six-Year Transportation Improvement Program (TIP, 2011-2016) and 2011-2016 Capital Improvement Plan (CIP) were reviewed to identify any transportation related infrastructure improvements that would be constructed before build-out of the proposed project.

Based on a review of the 6-year TIP and CIP, no roadway or intersection capacity related improvements were identified within the study area. As a result, no changes to the roadway network used for the operations analysis were assumed under future conditions.

Traffic Volume Forecasts

In order to estimate future without-project background traffic volumes at the study area intersections, a 1.5 percent annual growth rate was applied to the existing traffic volumes to account for an increase in general background traffic.
In addition to future background volumes, traffic from other development projects that would contribute traffic to study area intersections (aka – pipeline projects) was added to background traffic volumes. Through coordination with City staff, only the Wood Trails pipeline development project would further impact study area intersections. Pipeline project trips were added to background traffic volumes to estimate future without-project conditions. The resulting future (2015) without-project traffic volumes are shown in Figure 4.

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LEGEND	1 136TH AVE NE NE 195TH ST	2 SR 522 WB ON RAMP NE 195TH ST	3 SR 522 EB OFF RAMP NE 195TH ST	4 WOODINVILLE-SNOHOMISH RD NE 195TH ST
X = PM PEAK HOUR (X) = AM PEAK HOUR	(10) 0 (15) 5 110 (200) (5) 10 150 (95) (215) 205 150 (180) (5) 5 25 (20) (5) 0 25 (70) 5 (5)	(375) 340 395 (300) (110) 40 900 (575)	(375) 335 1,255 (825) (50) 40 615 (575)	(475) 370 (65) 265 110 (60) (115) 70 145 (45) (610) 645 675 (670) (225) 195 40 (30) (95) 255 35 (10) 635 (120)

Future (2015) Without-Project Weekday AM & PM Commute Peak Hour Traffic Volumes

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Future Without-Project Traffic Operations

Intersection LOS was calculated for the future (2015) without-project conditions at the study intersections to establish weekday AM and PM peak hour conditions in 2015 without the proposed project. The 2015 horizon year represents the year of anticipated project completion.

For the future without-project analysis, the signalized study intersections' signal timings were held constant with existing signal timing. This assumption provides a consistent analysis from one scenario to another. The results of the weekday AM and PM peak hour analysis are shown in Table 4. Future baseline levels of service worksheets are included in Appendix D.

Table 4. Existing (2012) & Future (2015) Without-Project Weekday AM & PM Commute Peak Hour LOS Summary

	2011 Existing			2015 Without-Project		
Intersection	**LOS[1]**	**Delay[2]**	**Worst Lane Group[3]**	**LOS**	**Delay**	**Worst Lane Group**
Weekday AM Peak Hour						
1. NE 195th Street/136th Ave NE	B	14	-	C	15	-
2. NE 195th Street/WB SR 522 On-ramp	A	7	-	A	7	-
3. NE 195th Street/EB SR 522 Off-ramp	D	29	NB	E	35	NB
4. NE 195th Street/Woodinville-Snohomish Rd[4]	C	27	-	C	29	-
Weekday PM Peak Hour						
1. NE 195th Street/136th Ave NE	B	10	-	B	10	-
2. NE 195th Street/WB SR 522 On-ramp	A	8	-	A	9	-
3. NE 195th Street/EB SR 522 Off-ramp	D	29	NB	E	36	NB
4. NE 195th Street/Woodinville-Snohomish Rd[4]	D	35	-	D	40	-

Source: *Highway Capacity Manual* (2010 edition for #1-11 and 2010 edition for #12-13), Transpo Group, 2012
1. Level of service (LOS), based on 2010 *Highway Capacity Manual* methodology.
2. Average delay in seconds per vehicle.
3. Worst lane group reported for unsignalized intersections where NB = northbound.
4. Analysis conservatively assumes defacto NB and SB right-turn lanes.

As shown in Table 4, all of the study intersections would operate at LOS E or better with the addition of general traffic growth during the weekday AM and PM peak hours would continue to meet the City's LOS E standard.

At the direction of City staff, operations at the NE 195th Street/136th Avenue NE intersection were also evaluated during the morning school peak which occurs earlier than the typical morning commute peak. This evaluation was based on the forecast traffic volumes identified in the traffic study for the Woodinville High School Modernization project.[4] Buildout 2014 AM school peak volumes from this study were grown at 1.5 percent per year to 2015 conditions and result in overall intersection operations at LOS E with an average of 36 seconds of delay.

[4] Heffron Transportation, Inc. (November 25, 2009)

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Project Impacts

This section of the analysis documents project-generated impacts on the surrounding roadway network and at the study intersections. First, peak hour traffic volumes are estimated, distributed, and assigned to adjacent roadways and intersections within the study area. Next, future (2015) with-project volumes are projected and potential impacts to traffic volumes, traffic operations, and non-motorized facilities are identified.

Trip Generation

Trip generation estimates for the project were derived from *Trip Generation* (9th Edition) published by the Institute of Transportation Engineers (ITE). The project's proposed land use is consistent with ITE's Land Use #210 "Single-Family Detached Housing." Based upon the procedures outlined in *Trip Generation*, the average trip rate was used to estimate the number of project generated trips.

Table 5. Trip Generation

		Project Trips		
23 Single-Family Detached Houses (LU #210)	**Rate[1]**	**In**	**Out**	**Total**
Weekday Daily	9.52	109	109	218
Weekday AM Peak Hour	0.75	4	13	17
Weekday PM Peak Hour	1.00	14	9	23

1. Trips rates from ITE Trip Generation Manual, 9th Edition (2012).

As shown in Table 5, the project is estimated to generate 218 trips during a typical weekday. Of these trips, 17 would occur during the AM school peak and commute period and 23 would occur during the PM peak commute period.

Trip Distribution and Assignment

Trip distribution patterns for the project were based upon the distribution patterns identified in previous analyses[5] and a review of current travel patterns. The distribution of weekday AM and PM peak hour project generated trips is shown Figure 5. The trips generated by the project were then assigned to the roadway network following this distribution and are also shown in Figure 5.

[5] Transportation Impact Analysis – Wood Trails (October 2012).

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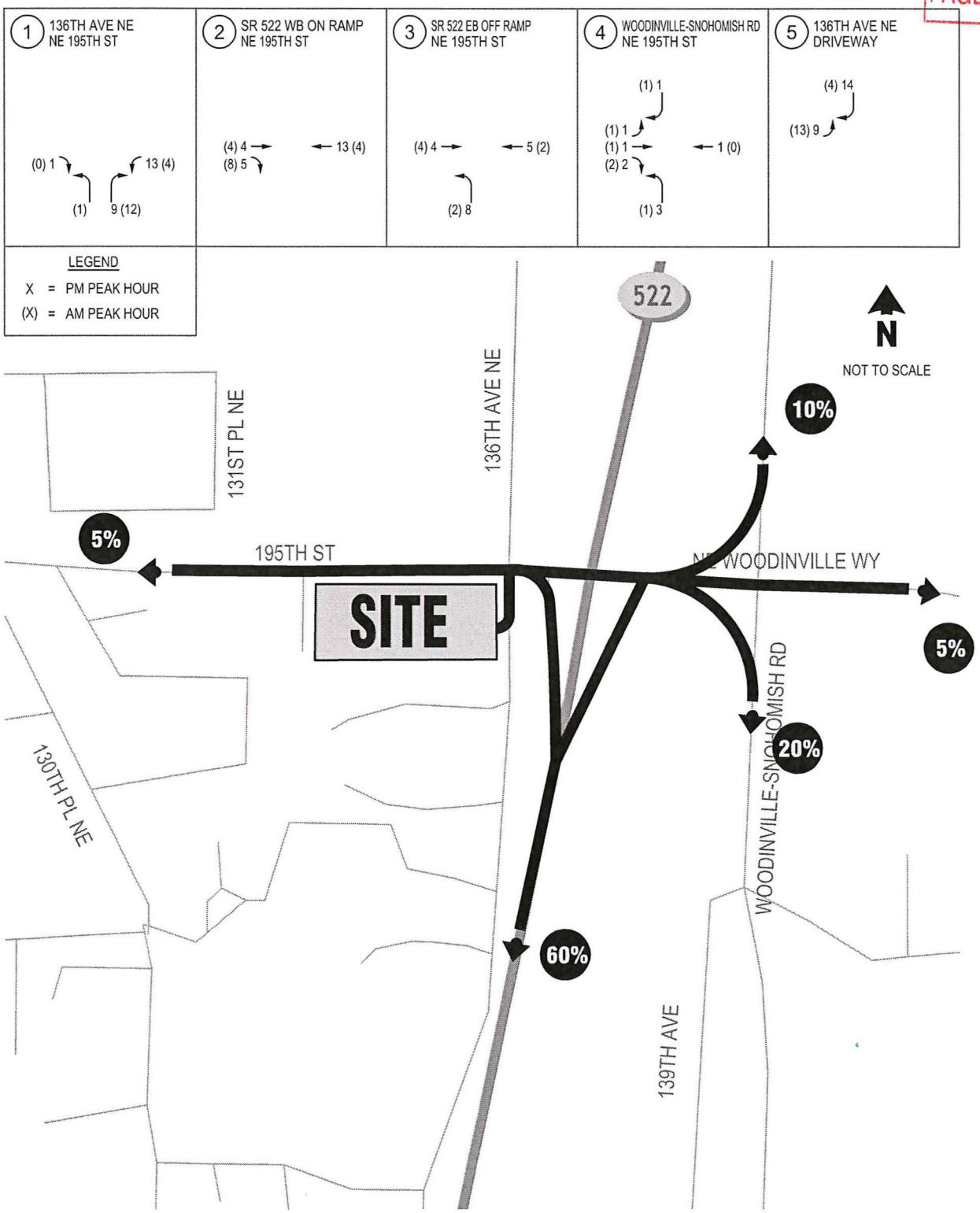

Weekday AM & PM Peak Hour Trip Distribution & Assignment

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Future With-Project Traffic Volumes

Project generated traffic volumes were added to the future (2015) without-project traffic volumes to form the basis of the with-project analysis. Figure 6 shows the estimated future with-project weekday AM and PM peak hour traffic volumes at the study intersections.

Table 6 summarizes the anticipated increase in total traffic entering each study intersection during the weekday AM and PM peak hours as well as the percent of future with-project volume attributable to the proposed project. As shown, project traffic would account for about 3.4 percent or less of the total peak hour traffic volume at the study intersections in 2015.

Table 6. Estimated Weekday AM & PM Commute Peak Hour Traffic Volume Impact at Study Intersections

Study Intersections	Project Traffic (veh)	2015 With-Project (veh)	Project Impact
Weekday AM Peak Hour			
1. NE 195th Street/136th Ave NE	17	842	2.1%
2. NE 195th Street/WB SR 522 On-ramp	16	1,376	1.2%
3. NE 195th Street/EB SR 522 Off-ramp	8	1,833	0.4%
4. NE 195th Street/Woodinville-Snohomish Rd	6	2,526	0.2%
Weekday PM Peak Hour			
1. NE 195th Street/136th Ave NE	23	713	3.3%
2. NE 195th Street/WB SR 522 On-ramp	22	1,697	1.3%
3. NE 195th Street/EB SR 522 Off-ramp	17	2,262	0.8%
4. NE 195th Street/Woodinville-Snohomish Rd	9	3,449	0.3%

Source: Transpo Group.

Future With-Project Traffic Operations

An intersection operations analysis was conducted at the study area intersections for future (2015) conditions with the development of the project. Intersection LOS were calculated at the study intersections using the LOS methodology described previously. Table 7 provides a comparison between the 2015 with and without-project conditions to identify any project generated intersection operation impacts. The detailed LOS worksheets are included in Appendix E.

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1 136TH AVE NE NE 195TH ST	2 SR 522 WB ON RAMP NE 195TH ST	3 SR 522 EB OFF RAMP NE 195TH ST	4 WOODINVILLE-SNOHOMISH RD NE 195TH ST	5 136TH AVE NE DRIVEWAY
(10) 0			(475) 370	(35) 25
(15) 5			(66) 266	(4) 14
110 (200)			110 (60)	
(5) 10			(116) 71	(13) 9
150 (95)			145 (45)	
(215) 205	(379) 344	(379) 339	(611) 646	
150 (180)	408 (304)	1,260 (827)	676 (670)	
(5) 6	(118) 45		(227) 197	
38 (24)	900 (575)		40 (30)	
(6) 0		(52) 48	(96) 258	
34 (82)		615 (575)	35 (10)	
5 (5)			635 (120)	30 (75)

LEGEND
X = PM PEAK HOUR
(X) = AM PEAK HOUR

Future (2015) With-Project Weekday AM & PM Commute Peak Hour Traffic Volumes

FIGURE 6

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Table 7. Future (2015) Without & With-Project Weekday AM & PM Commute Peak Hour LOS Summary

	2015 Without-Project			2015 With-Project		
Intersection	**LOS[1]**	**Delay[2]**	**Worst Lane Group[3]**	**LOS**	**Delay**	**Worst Lane Group**
Weekday AM Peak Hour						
1. NE 195th Street/136th Ave NE	C	15	-	C	16	-
2. NE 195th Street/WB SR 522 On-ramp	A	7	-	A	7	-
3. NE 195th Street/EB SR 522 Off-ramp	E	35	NB	E	36	NB
4. NE 195th Street/Woodinville-Snohomish Rd[4]	C	29	-	C	30	-
Weekday PM Peak Hour						
1. NE 195th Street/136th Ave NE	B	10	-	B	11	-
2. NE 195th Street/WB SR 522 On-ramp	A	9	-	A	9	-
3. NE 195th Street/EB SR 522 Off-ramp	E	36	NB	E	37	NB
4. NE 195th Street/Woodinville-Snohomish Rd[4]	D	40	-	D	40	-

Source: *Highway Capacity Manual*, 2010 and Transpo Group, 2012
Notes: LOS shown in brackets [] indicates intersection operation does not meet City's adopted LOS standards
1. Level of service (LOS), based on 2010 *Highway Capacity Manual* methodology.
2. Average delay in seconds per vehicle.
3. Worst lane group reported for unsignalized intersections where NB = northbound.
4. Analysis conservatively assumes defacto NB and SB right-turn lanes.

As shown in Table 7, all of the study intersections are expected to operate at LOS E or better with the addition of project generated traffic during the weekday AM and PM peak hours would meet the City's LOS E standard.

At the direction of City staff, operations at the NE 195th Street/136th Avenue NE intersection were also evaluated during the morning school peak. To provide a conservative analysis, the AM commute peak project trips were added to 2015 without-project AM school peak volumes. Under future without-project intersection operations the NE 195th Street/136th Avenue NE intersection would operate at LOS E with 36 seconds of delay, and with the conservative addition of AM commute peak trips operations would continue to operate acceptably at LOS E with 37 seconds of delay. Project trips are generally added to non-school movements and as shown, have a small impact on intersection operations.

Site Access Evaluation

Access to the project site is provided by an onsite roadway that would connect to 136th Avenue NE. An operations analysis was conducted under future (2015) conditions with the development of the project. The results show that the site access would operate at LOS A with an average delay of 9 seconds on the eastbound (outbound) approach during weekday AM and PM peak hours.

The onsite roadway would connect to 136th Avenue NE 196 feet south of the NE 195th Street. Section 1-4.2.2-6 of the Woodinville Municipal code requires 125 feet of intersection spacing for local roadways. In addition, 95th percentile queue lengths estimated for the northbound 136th Avenue NE approach to NE 195th Street under 2015 with-project conditions are estimated to be less than two vehicles (see LOS worksheets in Appendix E) and would not extend beyond the proposed access roadway.

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Sight distance at the proposed site access roadway was compared to City of Woodinville sight-distance standards.[6] Figure 7 shows the sight triangles from the approximate access roadway location that should remain free of visual obstructions to conform to City of Woodinville standards.

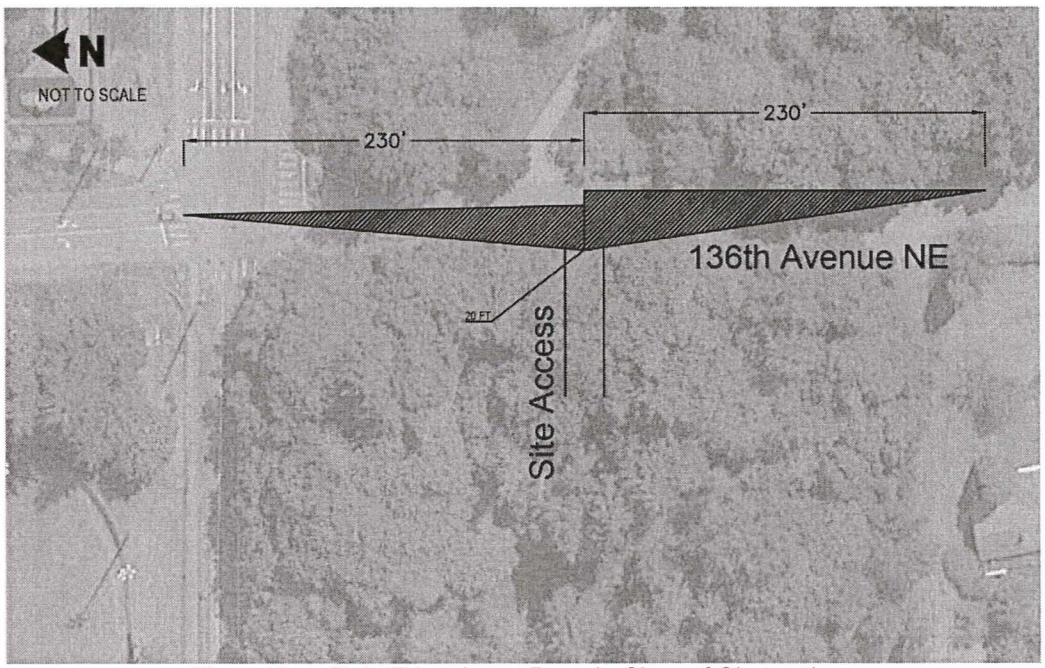

Figure 7. Sight-Triangles to Remain Clear of Obstructions

Traffic Safety

Traffic generated by the proposed project could result in a proportionate increase in the probability of collisions. As previously summarized, historical collision records do not indicate that any adverse safety conditions exist at any of the study intersections. It is not anticipated that the addition of project traffic would create or exacerbate any safety hazard or significantly increase the number of reported collisions.

School Walk-Routes

As previously described, pedestrian walkways exist on NE 195th Street and 136th Avenue NE within the project vicinity. As shown on the preliminary site plan (Figure 2, p 3), the proposed project would construct on-site sidewalks and frontage improvements that would include sidewalks adjacent to the project site. These sidewalk connections would connect to the existing pedestrian facilities serving Woodinville High School and Woodin Elementary School. Based on the location of the local middle school, middle school students would likely be buses.

[6] Using:
- Standard Drawing 325
- Posted speed limit plus 8 miles per hour (136th Avenue NE design speed = 33 mph)
- Distance per AASHTO *Policy on Geometric Design of Highway and Streets* (2011) equation 3-2

EXHIBIT 19
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Findings and Recommendations

This Transportation Impact Analysis summarizes the project traffic impacts of the proposed Slocum Property development. General findings and recommendations include:

- The proposal includes 23 single family homes located at the Southwest quadrant of the intersection of NE 195th Street and 136th Avenue NE in the City of Woodinville.
- Historical collision records do not indicate that any adverse safety conditions exist at any of the study intersections.
- The project is anticipated to generate 218 trips during a typical weekday. Of these trips, 17 would occur during the AM peak commute period and 23 would occur during the PM peak commute period.
- All study intersections are anticipated to meet the City of Woodinville's operational standards with the addition of project generated traffic. The site access driveway would operate at LOS A.
- With the completion of on-site sidewalks and frontage improvements, sidewalks would be provided for all school walk routes from the proposed project to nearby schools and bus stops.

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Appendix A: Traffic Counts

Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

EXHIBIT 19
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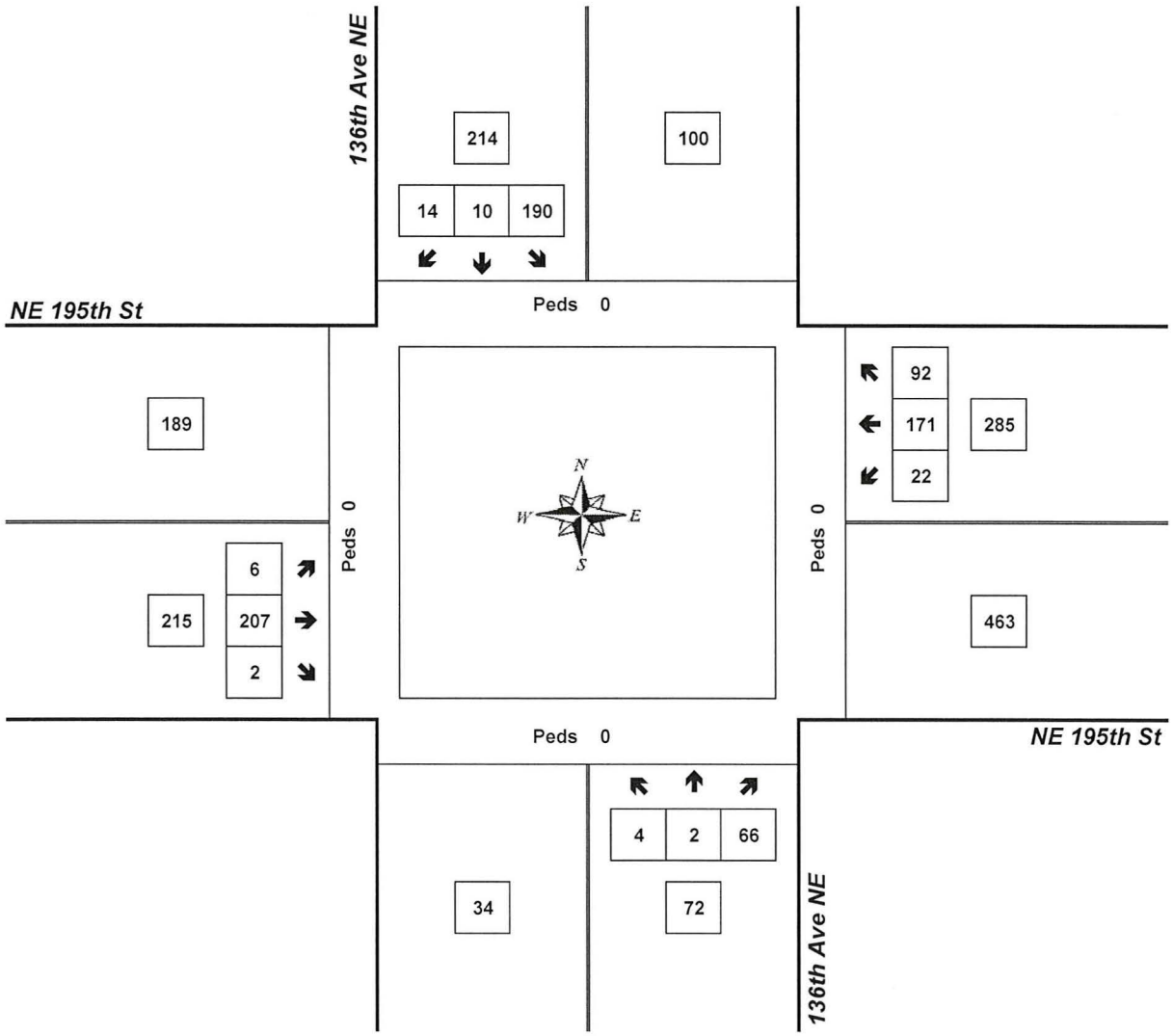
136th Ave NE & NE 195th St

8:00 AM to 9:00 AM
Tuesday, October 30, 2012



Approach	PHF	HV%	Volume
EB	0.72	3.7%	215
WB	0.79	5.6%	285
NB	0.82	0.0%	72
SB	0.86	3.3%	214
Intersection	0.81	3.9%	786

Count Period: 7:00 AM to 9:00 AM

EXHIBIT 19
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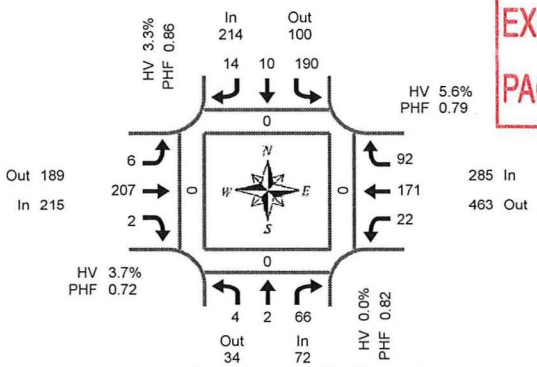
Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



Peak Hour Summary
8:00 AM to 9:00 AM

136th Ave NE & NE 195th St

Tuesday, October 30, 2012
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
7:00 AM	1	24	4	0	87	5	20	0	16	54	2	9	2	34	65	4	314	0	0	0	0
7:15 AM	2	2	2	0	35	0	3	1	2	47	0	5	1	25	16	2	135	0	0	0	0
7:30 AM	0	2	6	1	32	2	2	3	3	64	0	5	4	22	16	0	153	0	0	0	0
7:45 AM	0	3	8	0	37	1	1	0	0	45	1	1	1	49	19	3	165	0	0	0	0
8:00 AM	1	0	8	0	43	3	3	5	1	44	0	2	9	40	19	5	171	0	0	0	0
8:15 AM	1	0	19	0	50	6	6	1	2	45	0	3	5	49	16	4	199	0	0	0	0
8:30 AM	2	2	18	0	42	1	4	0	1	47	0	1	3	40	14	3	174	0	0	0	0
8:45 AM	0	0	21	0	55	0	1	1	2	71	2	2	5	42	43	4	242	0	0	0	0
Total Survey	7	33	86	1	381	18	40	11	27	417	5	28	30	301	208	25	1,553	0	0	0	0

Peak Hour Summary
8:00 AM to 9:00 AM

By Approach	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	72	34	106	0	214	100	314	7	215	189	404	8	285	463	748	16	786	0	0	0	0
%HV	0.0%				3.3%				3.7%				5.6%				3.9%				
PHF	0.82				0.86				0.72				0.79				0.81				

By Movement	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	4	2	66	72	190	10	14	214	6	207	2	215	22	171	92	285	786
PHF	0.50	0.25	0.79	0.82	0.86	0.42	0.58	0.86	0.75	0.73	0.25	0.72	0.61	0.87	0.53	0.79	0.81

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
7:00 AM	3	31	20	1	191	8	26	4	21	210	3	20	8	130	116	9	767	0	0	0	0
7:15 AM	3	7	24	1	147	6	9	9	6	200	1	13	15	136	70	10	624	0	0	0	0
7:30 AM	2	5	41	1	162	12	12	9	6	198	1	11	19	160	70	12	688	0	0	0	0
7:45 AM	4	5	53	0	172	11	14	6	4	181	1	7	18	178	68	15	709	0	0	0	0
8:00 AM	4	2	66	0	190	10	14	7	6	207	2	8	22	171	92	16	786	0	0	0	0

Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

EXHIBIT 19
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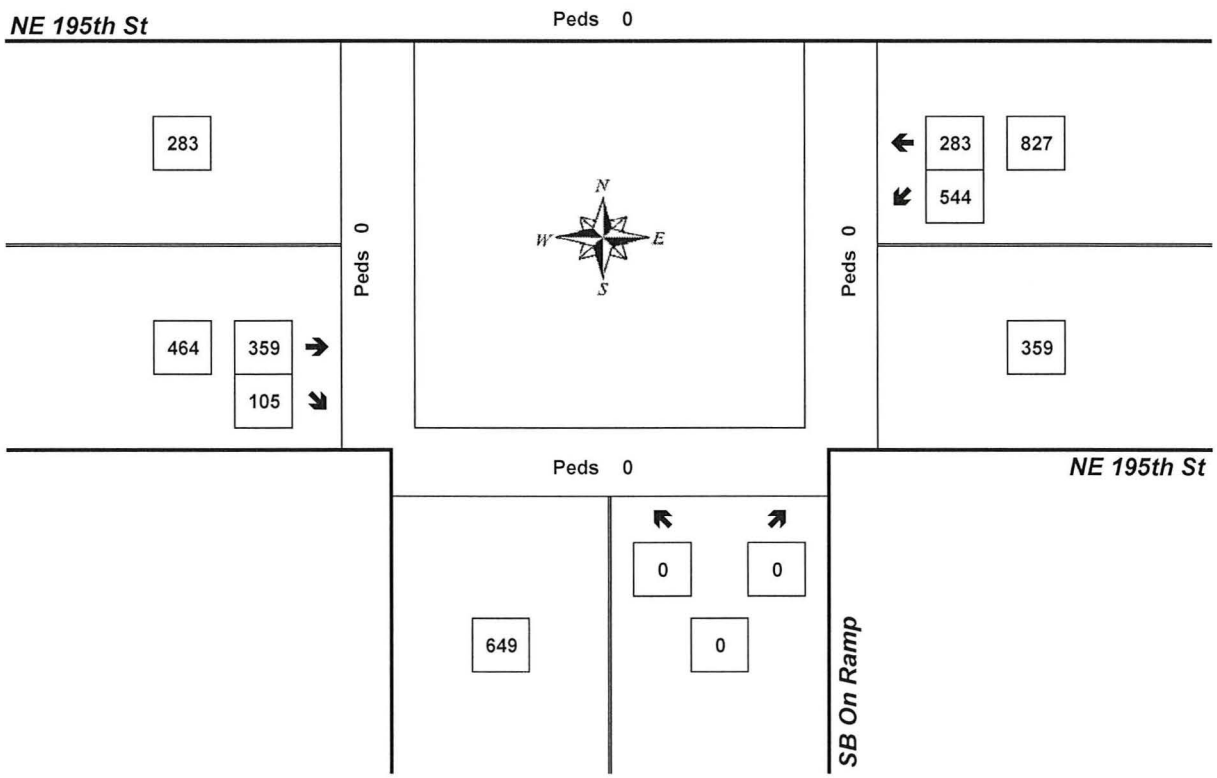
SB On Ramp & NE 195th St

8:00 AM to 9:00 AM
Tuesday, October 30, 2012



Approach	PHF	HV%	Volume
EB	0.79	3.2%	464
WB	0.96	5.3%	827
NB	0.00	0.0%	0
SB	0.00	0.0%	0
Intersection	0.90	4.6%	1,291

Count Period: 7:00 AM to 9:00 AM

Total Vehicle Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300

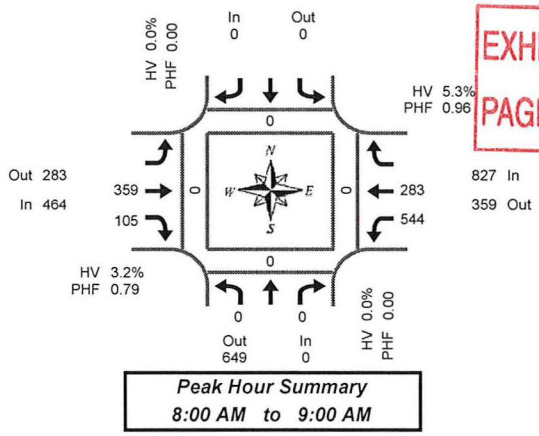


EXHIBIT 19
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SB On Ramp & NE 195th St

Tuesday, October 30, 2012
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound SB On Ramp				Southbound SB On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
7:00 AM	0		0	0					114	36	8		135	99		13	384	0	0	0	0
7:15 AM	0		0	0					66	18	5		155	43		6	282	0	0	0	0
7:30 AM	0		0	0					82	21	7		135	38		7	276	0	0	0	0
7:45 AM	0		0	0					67	21	1		145	73		13	306	0	0	0	0
8:00 AM	0		0	0					80	18	7		153	63		11	314	0	0	0	0
8:15 AM	0		0	0					90	23	3		122	69		12	304	0	0	0	0
8:30 AM	0		0	0					78	29	2		145	61		12	313	0	0	0	0
8:45 AM	0		0	0					111	35	3		124	90		9	360	0	0	0	0
Total Survey	0		0	0					688	201	36		1,114	536		83	2,539	0	0	0	0

Peak Hour Summary
8:00 AM to 9:00 AM

By Approach	Northbound SB On Ramp				Southbound SB On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	0	649	649	0	0	0	0		464	283	747	15	827	359	1,186	44	1,291	0	0	0	0
%HV	0.0%				0.0%				3.2%				5.3%				4.6%				
PHF	0.00				0.00				0.79				0.96				0.90				

By Movement	Northbound SB On Ramp				Southbound SB On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	0		0	0				0		359	105	464	544	283		827	1,291
PHF	0.00		0.00	0.00				0.00		0.81	0.75	0.79	0.89	0.79		0.96	0.90

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound SB On Ramp				Southbound SB On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
7:00 AM	0		0	0					329	96	21		570	253		39	1,248	0	0	0	0
7:15 AM	0		0	0					295	78	20		588	217		37	1,178	0	0	0	0
7:30 AM	0		0	0					319	83	18		555	243		43	1,200	0	0	0	0
7:45 AM	0		0	0					315	91	13		565	266		48	1,237	0	0	0	0
8:00 AM	0		0	0					359	105	15		544	283		44	1,291	0	0	0	0

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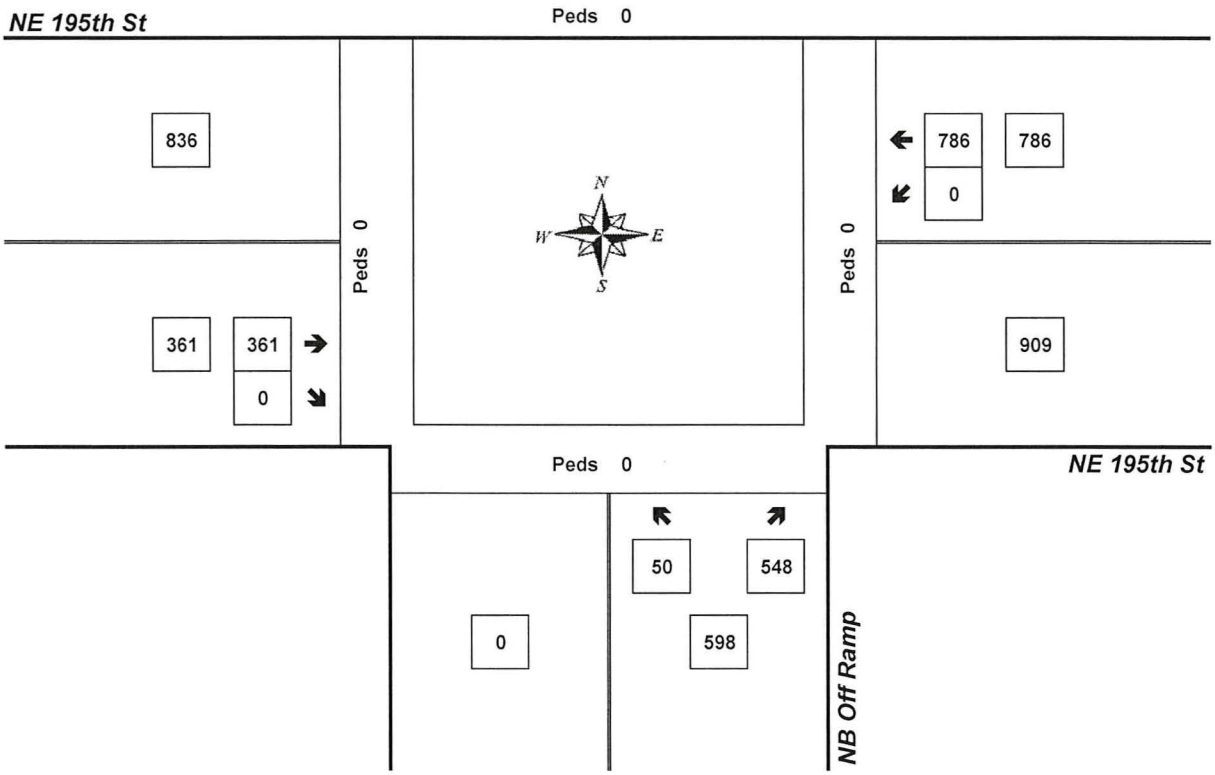
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

NB Off Ramp & NE 195th St

8:00 AM to 9:00 AM
Tuesday, October 30, 2012



Approach	PHF	HV%	Volume
EB	0.84	3.3%	361
WB	0.90	5.7%	786
NB	0.90	5.4%	598
SB	0.00	0.0%	0
Intersection	0.93	5.1%	1,745

Count Period: 7:00 AM to 9:00 AM

EXHIBIT 19
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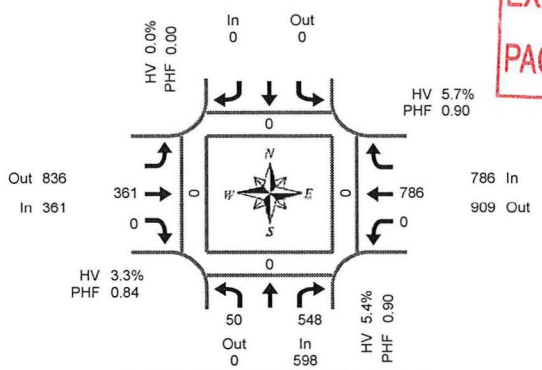
Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



Peak Hour Summary
8:00 AM to 9:00 AM

NB Off Ramp & NE 195th St

Tuesday, October 30, 2012
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound NB Off Ramp				Southbound NB Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
7:00 AM	12		101	4					100	0	6		0	221		15	434	0	0	0	0
7:15 AM	6		107	5					73	0	4		0	184		5	370	0	0	0	0
7:30 AM	5		112	4					82	0	6		0	185		8	384	0	0	0	0
7:45 AM	8		139	10					68	0	1		0	195		10	410	0	0	0	0
8:00 AM	10		157	9					83	0	7		0	219		9	469	0	0	0	0
8:15 AM	8		142	2					88	0	2		0	190		15	428	0	0	0	0
8:30 AM	9		124	9					82	0	1		0	186		11	401	0	0	0	0
8:45 AM	23		125	12					108	0	2		0	191		10	447	0	0	0	0
Total Survey	81		1,007	55					684	0	29		0	1,571		83	3,343	0	0	0	0

Peak Hour Summary
8:00 AM to 9:00 AM

By Approach	Northbound NB Off Ramp				Southbound NB Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	598	0	598	32	0	0	0		361	836	1,197	12	786	909	1,695	45	1,745	0	0	0	0
%HV	5.4%				0.0%				3.3%				5.7%				5.1%				
PHF	0.90				0.00				0.84				0.90				0.93				

By Movement	Northbound NB Off Ramp				Southbound NB Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	50		548	598				0		361	0	361	0	786		786	1,745
PHF	0.54		0.87	0.90				0.00		0.84	0.00	0.84	0.00	0.90		0.90	0.93

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound NB Off Ramp				Southbound NB Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
7:00 AM	31		459	23					323	0	17		0	785		38	1,598	0	0	0	0
7:15 AM	29		515	28					306	0	18		0	783		32	1,633	0	0	0	0
7:30 AM	31		550	25					321	0	16		0	789		42	1,691	0	0	0	0
7:45 AM	35		562	30					321	0	11		0	790		45	1,708	0	0	0	0
8:00 AM	50		548	32					361	0	12		0	786		45	1,745	0	0	0	0

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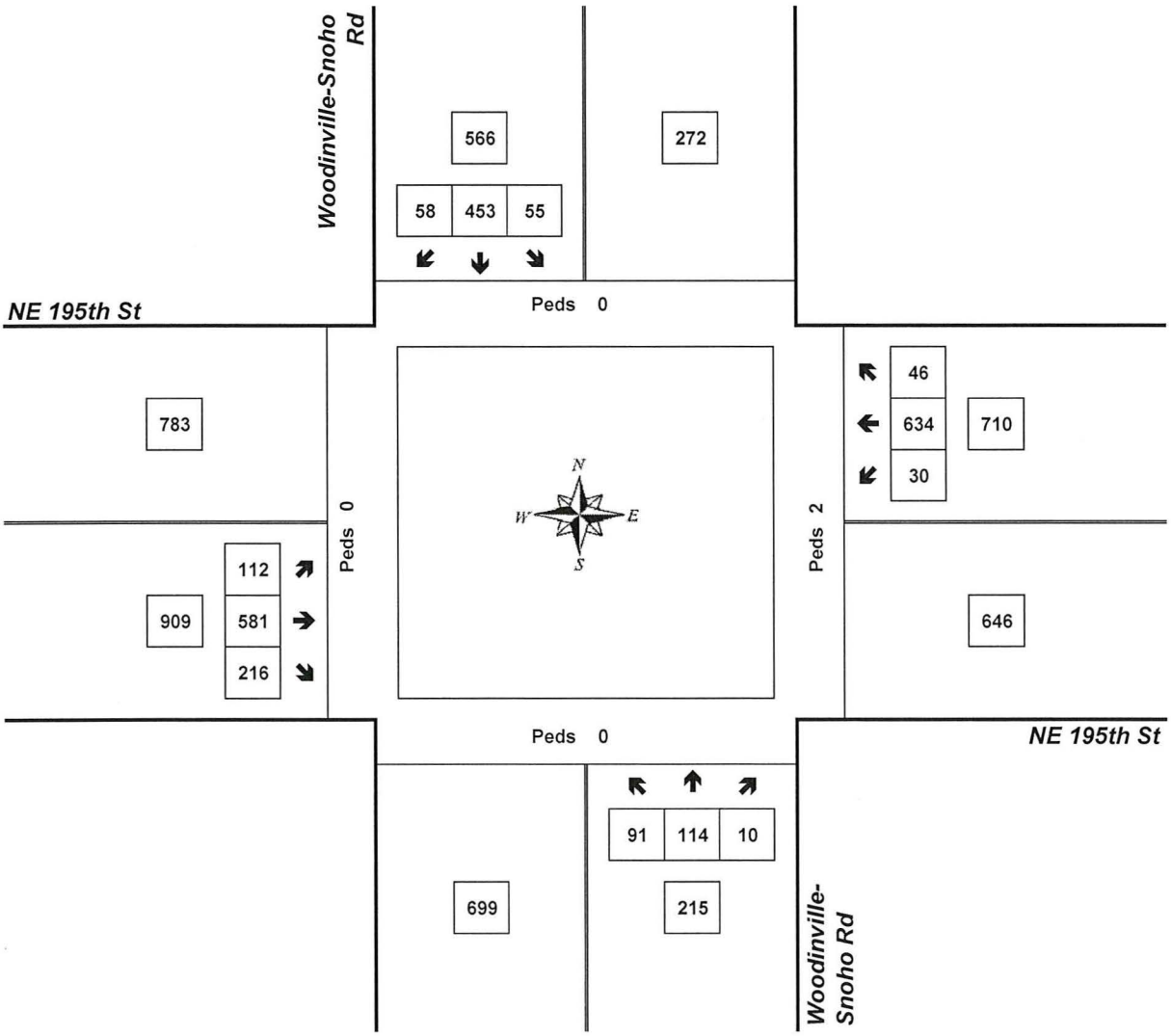
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

Woodinville-Snoho Rd & NE 195th St

8:00 AM to 9:00 AM
Tuesday, October 30, 2012



Approach	PHF	HV%	Volume
EB	0.92	4.8%	909
WB	0.90	4.8%	710
NB	0.79	8.8%	215
SB	0.96	4.1%	566
Intersection	0.96	5.0%	2,400

Count Period: 7:00 AM to 9:00 AM

EXHIBIT 19
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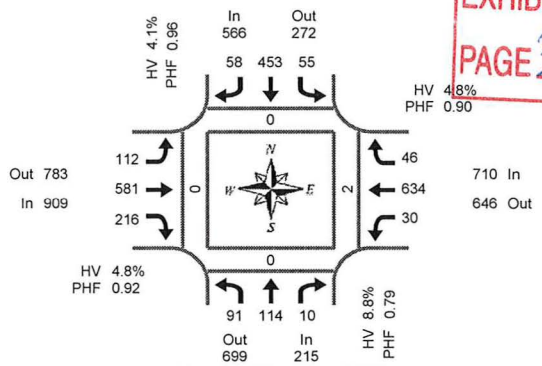
Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



Peak Hour Summary
8:00 AM to 9:00 AM

Woodinville-Snoho Rd & NE 195th St

Tuesday, October 30, 2012
7:00 AM to 9:00 AM

15-Minute Interval Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Woodinville-Snoho Rd				Southbound Woodinville-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
7:00 AM	30	16	5	8	10	104	21	8	35	148	41	12	1	176	5	7	592	0	0	0	0
7:15 AM	11	19	5	6	13	113	14	4	35	117	39	11	8	166	5	5	545	0	0	0	0
7:30 AM	15	27	7	7	17	131	8	9	25	121	38	11	3	145	12	10	549	0	0	1	0
7:45 AM	19	24	0	7	18	114	26	12	29	128	49	12	5	163	14	9	589	0	0	0	1
8:00 AM	15	23	2	5	12	116	17	6	43	149	54	16	9	173	15	11	628	0	0	0	0
8:15 AM	34	29	5	6	12	113	17	7	26	171	30	4	6	135	8	8	586	0	0	0	0
8:30 AM	19	31	2	5	16	116	15	2	17	125	50	10	3	167	9	9	570	0	0	0	0
8:45 AM	23	31	1	3	15	108	9	8	26	136	82	14	12	159	14	6	616	0	0	2	0
Total Survey	166	200	27	47	113	915	127	56	236	1,095	383	90	47	1,284	82	65	4,675	0	0	3	1

Peak Hour Summary
8:00 AM to 9:00 AM

By Approach	Northbound Woodinville-Snoho Rd				Southbound Woodinville-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Total
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	
Volume	215	699	914	19	566	272	838	23	909	783	1,692	44	710	646	1,356	34	2,400
%HV	8.8%				4.1%				4.8%				4.8%				5.0%
PHF	0.79				0.96				0.92				0.90				0.96

Pedestrians Crosswalk			
North	South	East	West
0	0	2	0

By Movement	Northbound Woodinville-Snoho Rd				Southbound Woodinville-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	91	114	10	215	55	453	58	566	112	581	216	909	30	634	46	710	2,400
PHF	0.67	0.92	0.50	0.79	0.86	0.98	0.85	0.96	0.65	0.85	0.66	0.92	0.63	0.92	0.77	0.90	0.96

Rolling Hour Summary
7:00 AM to 9:00 AM

Interval Start Time	Northbound Woodinville-Snoho Rd				Southbound Woodinville-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
7:00 AM	75	86	17	28	58	462	69	33	124	514	167	46	17	650	36	31	2,275	0	0	1	1
7:15 AM	60	93	14	25	60	474	65	31	132	515	180	50	25	647	46	35	2,311	0	0	1	1
7:30 AM	83	103	14	25	59	474	68	34	123	569	171	43	23	616	49	38	2,352	0	0	1	1
7:45 AM	87	107	9	23	58	459	75	27	115	573	183	42	23	638	46	37	2,373	0	0	0	1
8:00 AM	91	114	10	19	55	453	58	23	112	581	216	44	30	634	46	34	2,400	0	0	2	0

EXHIBIT 19
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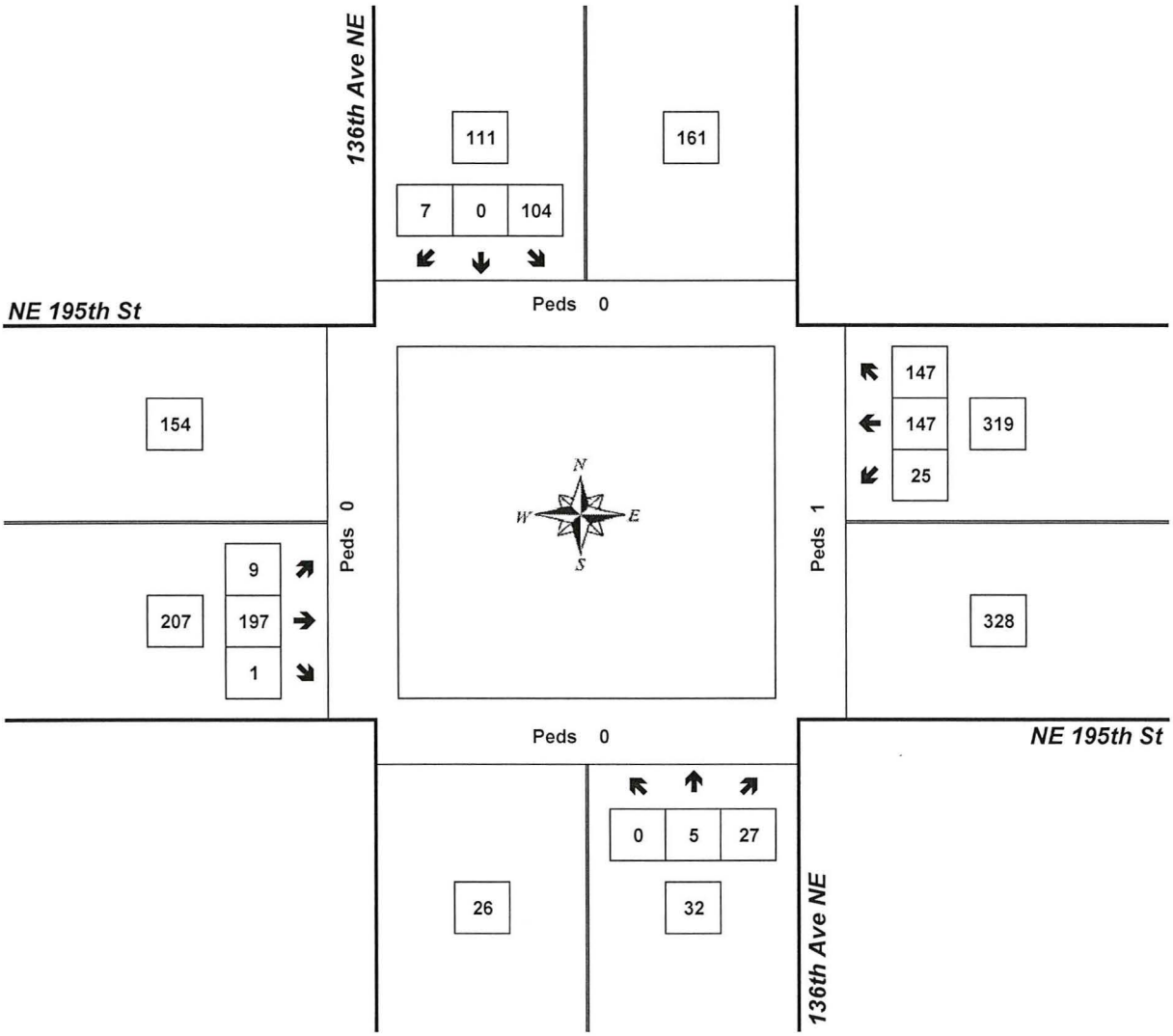
Peak Hour Summary

All Traffic Data Services Inc.
Mark Skaggs
(206) 251-0300

136th Ave NE & NE 195th St

4:45 PM to 5:45 PM
Tuesday, October 30, 2012



Approach	PHF	HV%	Volume
EB	0.88	0.5%	207
WB	0.90	2.5%	319
NB	0.67	0.0%	32
SB	0.73	0.9%	111
Intersection	0.94	1.5%	669

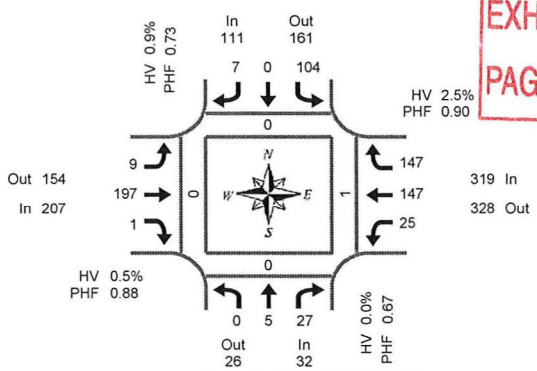
Count Period: 4:00 PM to 6:00 PM

EXHIBIT 19
PAGE 32 OF 58

Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



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

136th Ave NE & NE 195th St

Tuesday, October 30, 2012
4:00 PM to 6:00 PM

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

Interval Start Time	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	2	10	0	30	1	2	0	3	60	1	2	7	41	24	0	181	0	0	0	0
4:15 PM	0	4	5	0	18	0	2	0	1	50	1	1	6	45	35	4	167	0	0	1	0
4:30 PM	0	0	4	0	24	0	1	1	3	37	0	0	4	44	24	0	141	0	0	1	0
4:45 PM	0	2	6	0	23	0	0	0	3	46	0	1	8	25	36	3	149	0	0	1	0
5:00 PM	0	1	5	0	35	0	3	1	1	55	0	0	5	31	41	2	177	0	0	0	0
5:15 PM	0	1	5	0	19	0	3	0	5	53	1	0	6	45	33	3	171	0	0	0	0
5:30 PM	0	1	11	0	27	0	1	0	0	43	0	0	6	46	37	0	172	0	0	0	0
5:45 PM	0	0	4	0	23	2	1	0	1	43	0	0	6	39	22	1	141	0	0	0	1
Total Survey	0	11	50	0	199	3	13	2	17	387	3	4	48	316	252	13	1,299	0	0	3	1

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

By Approach	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Total
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	
Volume	32	26	58	0	111	161	272	1	207	154	361	1	319	328	647	8	669
%HV	0.0%				0.9%				0.5%				2.5%				1.5%
PHF	0.67				0.73				0.88				0.90				0.94

Pedestrians Crosswalk			
North	South	East	West
0	0	1	0

By Movement	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	0	5	27	32	104	0	7	111	9	197	1	207	25	147	147	319	669
PHF	0.00	0.63	0.61	0.67	0.74	0.00	0.58	0.73	0.45	0.90	0.25	0.88	0.78	0.80	0.90	0.90	0.94

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

Interval Start Time	Northbound 136th Ave NE				Southbound 136th Ave NE				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	0	8	25	0	95	1	5	1	10	193	2	4	25	155	119	7	638	0	0	3	0
4:15 PM	0	7	20	0	100	0	6	2	8	188	1	2	23	145	136	9	634	0	0	3	0
4:30 PM	0	4	20	0	101	0	7	2	12	191	1	1	23	145	134	8	638	0	0	2	0
4:45 PM	0	5	27	0	104	0	7	1	9	197	1	1	25	147	147	8	669	0	0	1	0
5:00 PM	0	3	25	0	104	2	8	1	7	194	1	0	23	161	133	6	661	0	0	0	1

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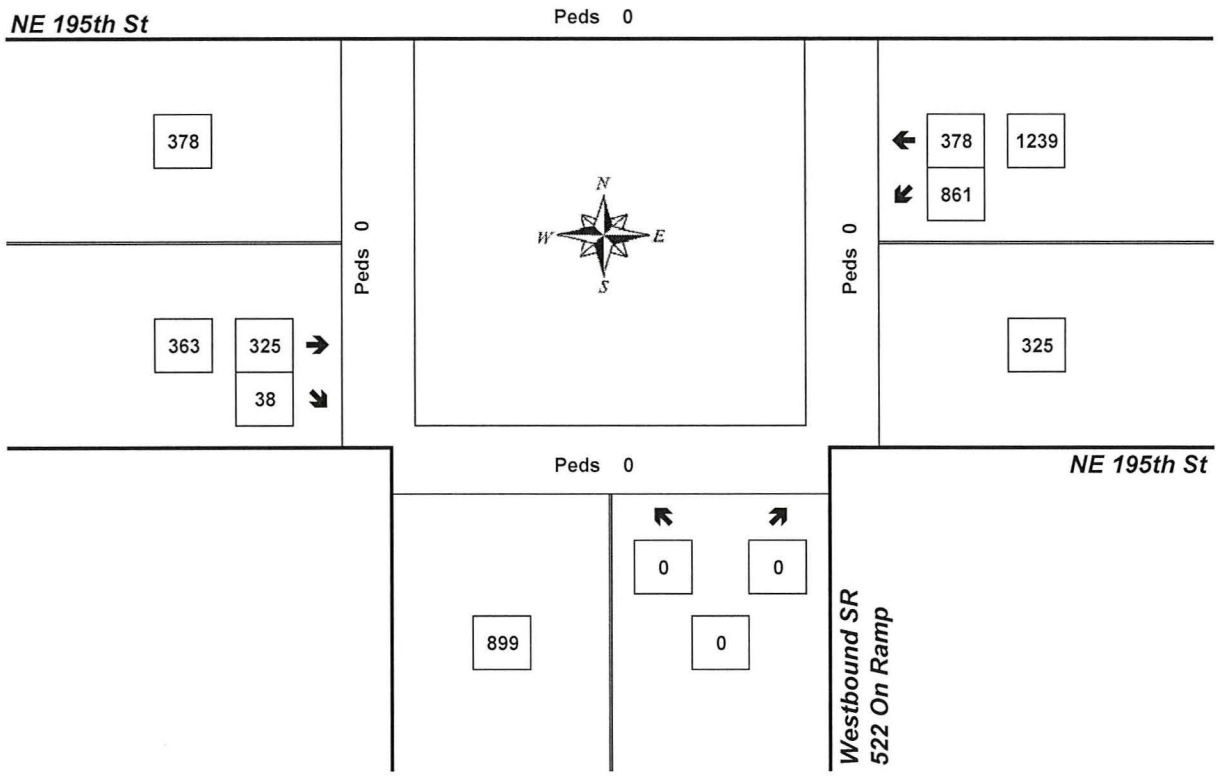
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

Westbound SR 522 On Ramp & NE 195th St

4:30 PM to 5:30 PM
Tuesday, June 05, 2012



Approach	PHF	HV%	Volume
EB	0.93	0.8%	363
WB	0.90	3.2%	1,239
NB	0.00	0.0%	0
SB	0.00	0.0%	0
Intersection	0.90	2.7%	1,602

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

EXHIBIT 19
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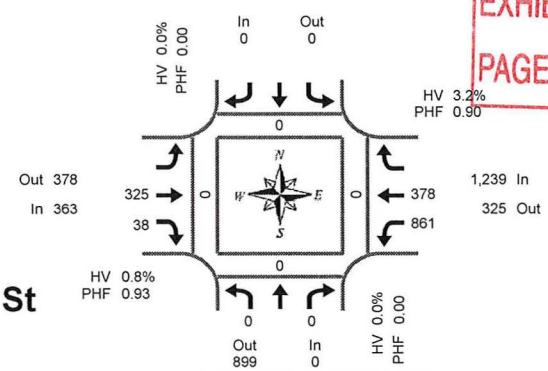
Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



Westbound SR 522 On Ramp & NE 195th St

Tuesday, June 05, 2012
4:00 PM to 6:00 PM

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

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

Interval Start Time	Northbound Westbound SR 522 On Ramp				Southbound Westbound SR 522 On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
4:00 PM	0		0	0					55	15	0		214	66		14	350	0	0	0	0
4:15 PM	0		0	0					71	16	1		184	61		7	332	0	0	0	0
4:30 PM	0		0	0					81	10	0		233	94		10	418	0	0	0	0
4:45 PM	0		0	0					74	8	0		200	77		13	359	0	0	0	0
5:00 PM	0		0	0					86	12	2		240	106		10	444	0	0	0	0
5:15 PM	0		0	0					84	8	1		188	101		7	381	0	0	0	0
5:30 PM	0		0	0					83	7	1		161	85		5	336	0	0	0	0
5:45 PM	0		0	0					79	11	2		129	65		8	284	0	0	0	0
Total Survey	0		0	0					613	87	7		1,549	655		74	2,904	0	0	0	0

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

By Approach	Northbound Westbound SR 522 On Ramp				Southbound Westbound SR 522 On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	0	899	899	0	0	0	0		363	378	741	3	1,239	325	1,564	40	1,602	0	0	0	0
%HV	0.0%				0.0%				0.8%				3.2%				2.7%				
PHF	0.00				0.00				0.93				0.90				0.90				

By Movement	Northbound Westbound SR 522 On Ramp				Southbound Westbound SR 522 On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	0		0	0				0		325	38	363	861	378		1,239	1,602
PHF	0.00		0.00	0.00				0.00		0.94	0.79	0.93	0.90	0.89		0.90	0.90

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

Interval Start Time	Northbound Westbound SR 522 On Ramp				Southbound Westbound SR 522 On Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
4:00 PM	0		0	0					281	49	1		831	298		44	1,459	0	0	0	0
4:15 PM	0		0	0					312	46	3		857	338		40	1,553	0	0	0	0
4:30 PM	0		0	0					325	38	3		861	378		40	1,602	0	0	0	0
4:45 PM	0		0	0					327	35	4		789	369		35	1,520	0	0	0	0
5:00 PM	0		0	0					332	38	6		718	357		30	1,445	0	0	0	0

EXHIBIT 19
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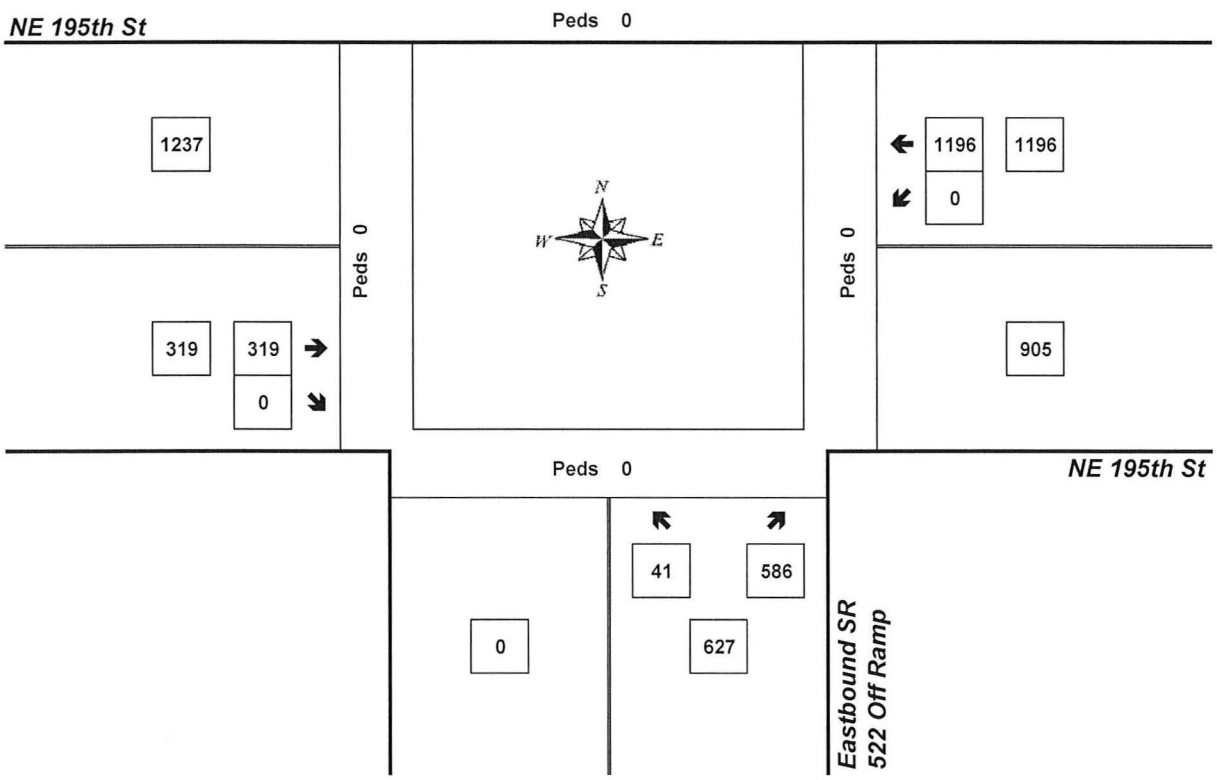
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

Eastbound SR 522 Off Ramp & NE 195th St

4:30 PM to 5:30 PM
Tuesday, June 05, 2012



Approach	PHF	HV%	Volume
EB	0.93	0.9%	319
WB	0.92	3.3%	1,196
NB	0.88	3.2%	627
SB	0.00	0.0%	0
Intersection	0.92	2.9%	2,142

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

EXHIBIT 19
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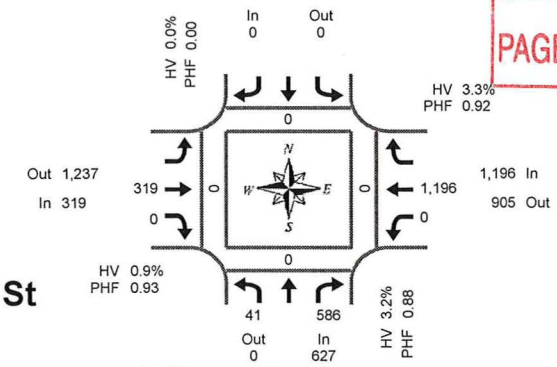
Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



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

Eastbound SR 522 Off Ramp & NE 195th St

Tuesday, June 05, 2012
4:00 PM to 6:00 PM

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

Interval Start Time	Northbound Eastbound SR 522 Off Ramp				Southbound Eastbound SR 522 Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
4:00 PM	7		153	9					47	0	1		0	275		16	482	1	0	0	0
4:15 PM	5		148	5					68	0	1		0	253		11	474	0	0	0	0
4:30 PM	14		141	8					70	0	0		0	311		11	536	0	0	0	0
4:45 PM	9		146	4					86	0	0		0	263		12	504	0	0	0	0
5:00 PM	9		169	3					78	0	2		0	326		10	582	0	0	0	0
5:15 PM	9		130	5					85	0	1		0	296		7	520	0	0	0	0
5:30 PM	9		142	3					85	0	2		0	254		3	490	0	0	0	0
5:45 PM	9		157	2					84	0	3		0	183		7	433	1	0	0	0
Total Survey	71		1,186	39					603	0	10		0	2,161		77	4,021	2	0	0	0

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

By Approach	Northbound Eastbound SR 522 Off Ramp				Southbound Eastbound SR 522 Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total	Pedestrians Crosswalk			
	In	Out	Total	HV	In	Out	Total		In	Out	Total	HV	In	Out	Total	HV		North	South	East	West
Volume	627	0	627	20	0	0	0		319	1,237	1,556	3	1,196	905	2,101	40	2,142	0	0	0	0
%HV	3.2%				0.0%				0.9%				3.3%				2.9%				
PHF	0.88				0.00				0.93				0.92				0.92				

By Movement	Northbound Eastbound SR 522 Off Ramp				Southbound Eastbound SR 522 Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Total
	L		R	Total				Total		T	R	Total	L	T		Total	
Volume	41		586	627				0		319	0	319	0	1,196		1,196	2,142
PHF	0.73		0.87	0.88				0.00		0.93	0.00	0.93	0.00	0.92		0.92	0.92

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

Interval Start Time	Northbound Eastbound SR 522 Off Ramp				Southbound Eastbound SR 522 Off Ramp				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L		R	HV					T	R	HV		L	T		HV		North	South	East	West
4:00 PM	35		588	26					271	0	2		0	1,102		50	1,996	1	0	0	0
4:15 PM	37		604	20					302	0	3		0	1,153		44	2,096	0	0	0	0
4:30 PM	41		586	20					319	0	3		0	1,196		40	2,142	0	0	0	0
4:45 PM	36		587	15					334	0	5		0	1,139		32	2,096	0	0	0	0
5:00 PM	36		598	13					332	0	8		0	1,059		27	2,025	1	0	0	0

EXHIBIT 19
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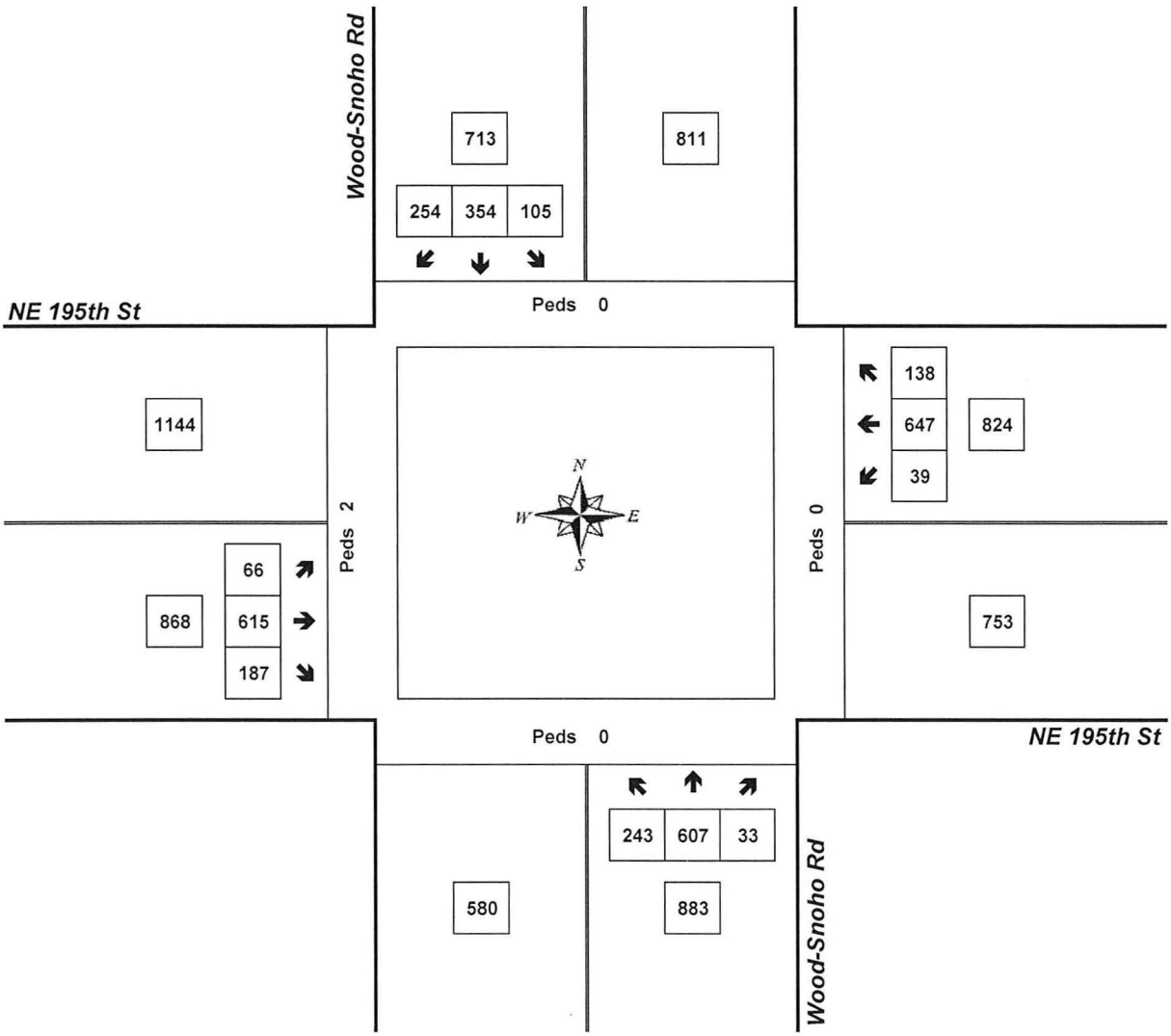
Peak Hour Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300

Wood-Snoho Rd & NE 195th St

4:30 PM to 5:30 PM
Tuesday, May 22, 2012



Approach	PHF	HV%	Volume
EB	0.94	4.1%	868
WB	0.98	2.4%	824
NB	0.92	2.7%	883
SB	0.87	2.1%	713
Intersection	0.95	2.9%	3,288

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

EXHIBIT 19
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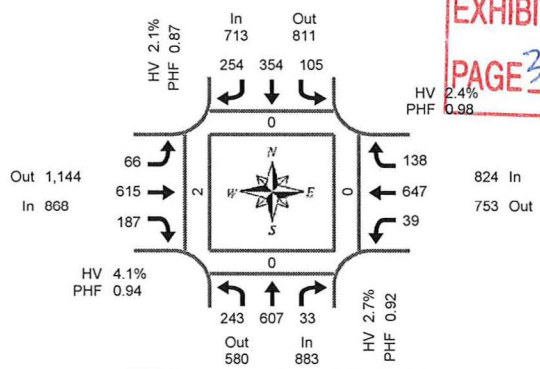
Total Vehicle Summary

All Traffic Data Services Inc.

Mark Skaggs
(206) 251-0300



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

Wood-Snoho Rd & NE 195th St

Tuesday, May 22, 2012
4:00 PM to 6:00 PM

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

Interval Start Time	Northbound Wood-Snoho Rd				Southbound Wood-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	47	134	7	8	30	77	59	5	19	153	32	11	9	156	39	9	762	0	0	1	1
4:15 PM	45	137	3	9	25	78	44	4	22	142	41	10	6	141	32	8	716	0	0	0	0
4:30 PM	54	156	14	7	23	87	96	5	25	153	47	8	7	153	49	4	864	0	0	0	0
4:45 PM	52	146	5	8	33	81	44	2	11	146	56	11	7	174	24	6	779	0	0	0	1
5:00 PM	76	154	9	3	25	94	68	4	16	168	47	4	12	164	34	5	867	0	0	0	1
5:15 PM	61	151	5	6	24	92	46	4	14	148	37	13	13	156	31	5	778	0	0	0	0
5:30 PM	63	143	5	2	32	75	43	4	16	153	47	2	10	147	31	1	765	0	0	0	0
5:45 PM	36	138	7	4	37	70	31	1	15	183	66	2	4	165	36	3	788	0	0	0	0
Total Survey	434	1,159	55	47	229	654	431	29	138	1,246	373	61	68	1,256	276	41	6,319	0	0	1	3

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

By Approach	Northbound Wood-Snoho Rd				Southbound Wood-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Total
	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	In	Out	Total	HV	
Volume	883	580	1,463	24	713	811	1,524	15	868	1,144	2,012	36	824	753	1,577	20	3,288
%HV	2.7%				2.1%				4.1%				2.4%				2.9%
PHF	0.92				0.87				0.94				0.98				0.95

Pedestrians Crosswalk			
North	South	East	West
0	0	0	2

By Movement	Northbound Wood-Snoho Rd				Southbound Wood-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Total
	L	T	R	Total	L	T	R	Total	L	T	R	Total	L	T	R	Total	
Volume	243	607	33	883	105	354	254	713	66	615	187	868	39	647	138	824	3,288
PHF	0.80	0.97	0.59	0.92	0.80	0.94	0.66	0.87	0.66	0.92	0.83	0.94	0.75	0.93	0.70	0.98	0.95

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

Interval Start Time	Northbound Wood-Snoho Rd				Southbound Wood-Snoho Rd				Eastbound NE 195th St				Westbound NE 195th St				Interval Total	Pedestrians Crosswalk			
	L	T	R	HV	L	T	R	HV	L	T	R	HV	L	T	R	HV		North	South	East	West
4:00 PM	198	573	29	32	111	323	243	16	77	594	176	40	29	624	144	27	3,121	0	0	1	2
4:15 PM	227	593	31	27	106	340	252	15	74	609	191	33	32	632	139	23	3,226	0	0	0	2
4:30 PM	243	607	33	24	105	354	254	15	66	615	187	36	39	647	138	20	3,288	0	0	0	2
4:45 PM	252	594	24	19	114	342	201	14	57	615	187	30	42	641	120	17	3,189	0	0	0	2
5:00 PM	236	586	26	15	118	331	188	13	61	652	197	21	39	632	132	14	3,198	0	0	0	1

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Appendix B: LOS Definitions

Highway Capacity Manual 2010

Signalized intersection level of service (LOS) is defined in terms of a weighted average control delay for the entire intersection. Control delay quantifies the increase in travel time that a vehicle experiences due to the traffic signal control as well as provides a surrogate measure for driver discomfort and fuel consumption. Signalized intersection LOS is stated in terms of average control delay per vehicle (in seconds) during a specified time period (e.g., weekday PM peak hour). Control delay is a complex measure based on many variables, including signal phasing and coordination (i.e., progression of movements through the intersection and along the corridor), signal cycle length, and traffic volumes with respect to intersection capacity and resulting queues. Table 1 summarizes the LOS criteria for signalized intersections, as described in the *Highway Capacity Manual 2010* (Transportation Research Board, 2010).

Table 1. Level of Service Criteria for Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	General Description
A	≤10	Free Flow
B	>10 – 20	Stable Flow (slight delays)
C	>20 – 35	Stable flow (acceptable delays)
D	>35 – 55	Approaching unstable flow (tolerable delay, occasionally wait through more than one signal cycle before proceeding)
E	>55 – 80	Unstable flow (intolerable delay)
F[1]	>80	Forced flow (congested and queues fail to clear)

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.
1. If the volume-to-capacity (v/c) ratio for a lane group exceeds 1.0 LOS F is assigned to the individual lane group. LOS for overall approach or intersection is determined solely by the control delay.

Unsignalized intersection LOS criteria can be further reduced into three intersection types: all-way stop, two-way stop, and roundabout control. All-way stop and roundabout control intersection LOS is expressed in terms of the weighted average control delay of the overall intersection or by approach. Two-way stop-controlled intersection LOS is defined in terms of the average control delay for each minor-street movement (or shared movement) as well as major-street left-turns. This approach is because major-street through vehicles are assumed to experience zero delay, a weighted average of all movements results in very low overall average delay, and this calculated low delay could mask deficiencies of minor movements. Table 2 shows LOS criteria for unsignalized intersections.

Table 2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)
A	0 – 10
B	>10 – 15
C	>15 – 25
D	>25 – 35
E	>35 – 50
F[1]	>50

Source: *Highway Capacity Manual 2010*, Transportation Research Board, 2010.
1. If the volume-to-capacity (v/c) ratio exceeds 1.0, LOS F is assigned an individual lane group for all unsignalized intersections, or minor street approach at two-way stop-controlled intersections. Overall intersection LOS is determined solely by control delay.

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Appendix C: Existing (2012) LOS Worksheets

Intersection	
Intersection Delay (sec/veh)	14.2
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	5	205	5	20	170	90	5	5	65	190	10	15
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles(%)	4	4	4	6	6	6	0	0	0	3	3	3
Movement Flow Rate	6	253	6	25	210	111	6	6	80	235	12	19
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	16.4	11.6	11	16.6
HCM LOS	C	B	B	C

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Volume Left (%)	7%	2%	100%	0%	0%	95%	0%
Volume Thru (%)	7%	95%	0%	100%	0%	5%	0%
Volume Right (%)	87%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Volume by Lane	75	215	20	170	90	200	15
Left Turning Volume	5	205	0	170	0	10	0
Through Volume	65	5	0	0	90	0	15
Right Turning Volume	5	5	20	0	0	190	0
Lane Flow Rate	93	265	25	210	111	247	19
Geometry Group	8	8	7	7	7	8	8
Degree of Utilization, X	0.176	0.502	0.047	0.37	0.174	0.5	0.031
Departure Headway, Hd	6.862	6.805	6.859	6.35	5.639	7.288	6.098
Convergence(Y/N)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capacity	526	526	519	562	631	491	582
Service Time	4.562	4.601	4.645	4.136	3.424	5.082	3.89
HCM Lane V/C Ratio	0.177	0.504	0.048	0.374	0.176	0.503	0.033
HCM Control Delay	11	16.4	10	12.9	9.6	17.2	9.1
HCM Lane LOS	B	C	A	B	A	C	A
HCM 95th Percentile Queue	0.6	3	0.1	1.8	0.6	3	0.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	360	105	545	285	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0		
Lane Util. Factor	1.00	1.00	0.97	1.00		
Frt	1.00	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1845	1568	3335	1810		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1845	1568	3335	1810		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	400	117	606	317	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	400	117	606	317	0	0
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%
Turn Type	NA	Free	Prot	NA		
Protected Phases	2		1	6		
Permitted Phases		Free				
Actuated Green, G (s)	13.1	35.6	12.5	35.6		
Effective Green, g (s)	13.1	35.6	12.5	35.6		
Actuated g/C Ratio	0.37	1.00	0.35	1.00		
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	678	1568	1170	1810		
v/s Ratio Prot	c0.22		c0.18	0.18		
v/s Ratio Perm		0.07				
v/c Ratio	0.59	0.07	0.52	0.18		
Uniform Delay, d1	9.1	0.0	9.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.3	0.1	0.4	0.0		
Delay (s)	10.4	0.1	9.5	0.0		
Level of Service	B	A	A	A		
Approach Delay (s)	8.1			6.3	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	6.9	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	35.6	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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HCM Unsignalized Intersection Capacity Analysis
3: SR 522 EB Off-Ramp & NE 195th St

Slocum Property
2012 Existing AM

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	360	0	0	785	50	550
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	387	0	0	844	54	591
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	304			346		
pX, platoon unblocked			0.83		0.91	0.83
vC, conflicting volume			387		809	387
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			159		26	159
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			100		94	16
cM capacity (veh/h)			1153		888	704

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	387	422	422	645
Volume Left	0	0	0	54
Volume Right	0	0	0	591
cSH	1700	1700	1700	769
Volume to Capacity	0.23	0.25	0.25	0.84
Queue Length 95th (ft)	0	0	0	241
Control Delay (s)	0.0	0.0	0.0	29.1
Lane LOS				D
Approach Delay (s)	0.0	0.0		29.1
Approach LOS				D

Intersection Summary			
Average Delay		10.0	
Intersection Capacity Utilization		59.7%	ICU Level of Service B
Analysis Period (min)		15	

HCM 2010 Signalized Intersection Summary
4: Woodinville-Snohomish Road & NE 195th St

Slocum Property
2012 Existing AM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	580	215	30	635	45	90	115	10	55	455	60
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking, Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow Rate	1810	1810	1810	1810	1810	1810	1743	1743	1743	1827	1827	1827
Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Capacity, veh/h	304	929	344	224	1089	77	214	544	463	470	532	451
Arriving On Green	0.06	0.37	0.37	0.02	0.33	0.33	0.06	0.31	0.31	0.04	0.29	0.29
Sat Flow, veh/h	1723.4	2519.1	932.4	1723.4	3340.8	236.5	1660.1	1481.7	1481.7	1739.9	1549.7	1552.9
Grp Volume(v), veh/h	114.6	433.7	394.4	31.3	358.0	350.3	93.8	119.8	10.4	57.3	474.0	62.5
Grp Sat Flow(s),veh/h/ln	1723.4	1809.5	1642.0	1723.4	1809.5	1767.8	1660.1	1743.1	1481.7	1739.9	1826.9	1549.7
Q Serve(g_s), s	3.5	17.1	17.2	1.0	14.3	14.3	3.2	4.4	0.4	2.0	21.3	2.6
Cycle Q Clear(g_c), s	3.5	17.1	17.2	1.0	14.3	14.3	3.2	4.4	0.4	2.0	21.3	2.6
Proportion In Lane	1.000		0.568	1.000		0.134	1.000		1.000	1.000		1.000
Lane Grp Cap(c), veh/h	304.0	667.1	605.3	224.4	589.6	576.0	213.6	544.1	462.5	469.6	532.0	451.2
V/C Ratio(X)	0.377	0.650	0.652	0.139	0.607	0.608	0.439	0.220	0.023	0.122	0.891	0.139
Avail Cap(c_a), veh/h	687.1	934.9	848.3	681.3	934.9	913.3	588.0	693.7	589.6	898.5	727.0	616.7
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Uniform Delay (d), s/veh	17.2	22.5	22.5	19.9	24.3	24.4	21.7	21.8	20.5	20.2	29.2	22.5
Incr Delay (d2), s/veh	0.3	1.5	1.7	0.1	1.4	1.5	0.5	0.1	0.0	0.0	9.6	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Group Delay (d), s/veh	17.4	24.1	24.2	20.0	25.8	25.8	22.2	22.0	20.5	20.3	38.8	22.6
Lane Group LOS	B	C	C	C	C	C	C	C	C	C	D	C
Approach Volume, veh/h		943			740			224			594	
Approach Delay, s/veh		23.3			25.6			22.0			35.3	
Approach LOS		C			C			C			D	

Timer											
Assigned Phase	5	2		1	6		3	8		7	4
Phase Duration (G+Y+Rc), s	10.89	37.28		7.21	33.60		10.62	32.63		8.82	30.82
Change Period (Y+Rc), s	5.60	5.60		5.60	5.60		5.80	5.80		5.80	5.80
Max Green Setting (Gmax), s	24.40	44.40		24.40	44.40		24.20	34.20		24.20	34.20
Max Q Clear Time (g_c+I1), s	5.48	19.15		3.04	16.32		5.25	6.36		3.97	23.34
Green Extension Time (p_c)	0.18	11.15		0.03	11.68		0.15	2.10		0.08	1.68

Intersection Summary	
HCM 2010 Control Delay	26.7
HCM 2010 Level of Service	C

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Intersection	
Intersection Delay (sec/veh)	10.1
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	10	195	5	25	145	145	0	5	25	105	0	5
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(%)	1	1	1	3	3	3	0	0	0	1	1	1
Movement Flow Rate	11	207	5	27	154	154	0	5	27	112	0	5
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	11.5	9	8.8	11
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Volume Left (%)	0%	5%	100%	0%	0%	100%	0%
Volume Thru (%)	17%	93%	0%	100%	0%	0%	0%
Volume Right (%)	83%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Volume by Lane	30	210	25	145	145	105	5
Left Turning Volume	5	195	0	145	0	0	0
Through Volume	25	5	0	0	145	0	5
Right Turning Volume	0	10	25	0	0	105	0
Lane Flow Rate	32	223	27	154	154	112	5
Geometry Group	8	8	7	7	7	8	8
Degree of Utilization, X	0.051	0.351	0.042	0.225	0.194	0.206	0.008
Departure Headway, Hd	5.807	5.654	5.746	5.242	4.538	6.649	5.44
Convergence(Y/N)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capacity	620	630	619	679	784	543	662
Service Time	3.512	3.448	3.52	3.017	2.311	4.351	3.142
HCM Lane V/C Ratio	0.052	0.354	0.044	0.227	0.196	0.206	0.008
HCM Control Delay	8.8	11.5	8.8	9.6	8.4	11.1	8.2
HCM Lane LOS	A	B	A	A	A	B	A
HCM 95th Percentile Queue	0.2	1.6	0.1	0.9	0.7	0.8	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	325	40	860	380	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0		
Lane Util. Factor	1.00	1.00	0.97	1.00		
Frt	1.00	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1881	1599	3400	1845		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1881	1599	3400	1845		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	361	44	956	422	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	361	44	956	422	0	0
Heavy Vehicles (%)	1%	1%	3%	3%	0%	0%
Turn Type	NA	Free	Prot	NA		
Protected Phases	2		1	6		
Permitted Phases		Free				
Actuated Green, G (s)	13.4	42.3	18.9	42.3		
Effective Green, g (s)	13.4	42.3	18.9	42.3		
Actuated g/C Ratio	0.32	1.00	0.45	1.00		
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	595	1599	1519	1845		
v/s Ratio Prot	c0.19		c0.28	0.23		
v/s Ratio Perm		0.03				
v/c Ratio	0.61	0.03	0.63	0.23		
Uniform Delay, d1	12.2	0.0	9.0	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.8	0.0	0.8	0.1		
Delay (s)	14.0	0.0	9.8	0.1		
Level of Service	B	A	A	A		
Approach Delay (s)	12.5			6.8	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	42.3	Sum of lost time (s)	10.0
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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HCM Unsignalized Intersection Capacity Analysis
3: SR 522 WB Off-Ramp & NE 195th St

Slocum Property
2012 Existing PM

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	320	0	0	1195	40	585
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	348	0	0	1299	43	636
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	304			346		
pX, platoon unblocked			0.84		0.88	0.84
vC, conflicting volume			348		997	348
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			129		175	129
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	15
cM capacity (veh/h)			1216		699	751

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	348	649	649	679
Volume Left	0	0	0	43
Volume Right	0	0	0	636
cSH	1700	1700	1700	803
Volume to Capacity	0.20	0.38	0.38	0.85
Queue Length 95th (ft)	0	0	0	250
Control Delay (s)	0.0	0.0	0.0	28.9
Lane LOS				D
Approach Delay (s)	0.0	0.0		28.9
Approach LOS				D

Intersection Summary			
Average Delay		8.4	
Intersection Capacity Utilization		59.7%	ICU Level of Service B
Analysis Period (min)		15	

HCM 2010 Signalized Intersection Summary
4: Woodinville-Snohomish Road & NE 195th St

Slocum Property
2012 Existing PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	615	185	40	645	140	245	605	35	105	355	255
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking, Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow Rate	1827	1827	1827	1863	1863	1863	1845	1845	1845	1863	1863	1863
Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Capacity, veh/h	198	929	279	185	1011	219	392	642	545	199	549	466
Arriving On Green	0.02	0.34	0.34	0.01	0.34	0.34	0.11	0.35	0.35	0.06	0.29	0.29
Sat Flow, veh/h	1739.9	2697.4	810.6	1774.0	2968.2	643.7	1756.8	1568.0	1568.0	1774.0	1580.1	1583.3
Grp Volume(v), veh/h	68.4	438.3	403.9	42.1	425.9	400.5	257.9	636.8	36.8	110.5	373.7	268.4
Grp Sat Flow(s),veh/h/ln	1739.9	1826.9	1681.1	1774.0	1862.7	1749.2	1756.8	1844.7	1568.0	1774.0	1862.7	1580.1
Q Serve(g_s), s	0.0	20.3	20.4	0.0	19.2	19.3	8.8	33.8	1.2	4.2	17.4	11.5
Cycle Q Clear(g_c), s	0.0	20.3	20.4	0.0	19.2	19.3	8.8	33.8	1.2	4.2	17.4	11.5
Proportion In Lane	1.000		0.482	1.000		0.368	1.000		1.000	1.000		1.000
Lane Grp Cap(c), veh/h	198.4	629.2	579.0	185.2	634.5	595.8	392.0	641.5	545.3	198.7	548.9	465.6
V/C Ratio(X)	0.345	0.696	0.698	0.227	0.671	0.672	0.658	0.993	0.068	0.556	0.681	0.577
Avail Cap(c_a), veh/h	598.8	824.9	759.0	600.1	841.0	789.8	622.6	641.5	545.3	525.8	647.8	549.5
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Uniform Delay (d), s/veh	38.5	27.8	27.8	38.2	27.7	27.7	19.7	31.9	13.7	25.8	30.6	19.3
Incr Delay (d2), s/veh	0.4	2.3	2.5	0.2	1.8	1.9	0.7	33.6	0.0	0.9	2.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Group Delay (d), s/veh	38.9	30.1	30.3	38.4	29.5	29.7	20.4	65.5	13.8	26.8	32.6	20.2
Lane Group LOS	D	C	C	D	C	C	C	E	B	C	C	C
Approach Volume, veh/h		911			868			932			753	
Approach Delay, s/veh		30.8			30.0			51.0			27.3	
Approach LOS		C			C			D			C	

Timer												
Assigned Phase	5	2		1	6		3	8		7	4	
Phase Duration (G+Y+Rc), s	7.37	39.47		7.00	39.10		17.09	40.00		11.87	34.78	
Change Period (Y+Rc), s	5.60	5.60		5.60	5.60		5.80	5.80		5.80	5.80	
Max Green Setting (Gmax), s	24.40	44.40		24.40	44.40		24.20	34.20		24.20	34.20	
Max Q Clear Time (g_c+I1), s	2.00	22.38		2.00	21.25		10.85	35.82		6.21	19.41	
Green Extension Time (p_c)	0.10	11.48		0.05	11.80		0.45	0.00		0.17	4.13	

Intersection Summary	
HCM 2010 Control Delay	35.3
HCM 2010 Level of Service	D

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Appendix D: Future (2015) Without-Project LOS Worksheets

EXHIBIT 19
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Intersection	
Intersection Delay, s/veh	15.4
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	215	5	20	180	95	5	5	70	200	10	15
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	4	4	4	6	6	6	0	0	0	3	3	3
Mvmt Flow	6	265	6	25	222	117	6	6	86	247	12	19
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	18	12.3	11.5	18.3
HCM LOS	C	B	B	C

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	6%	2%	100%	0%	0%	95%	0%
Vol Thru, %	6%	96%	0%	100%	0%	5%	0%
Vol Right, %	88%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	80	225	20	180	95	210	15
LT Vol	5	215	0	180	0	10	0
Through Vol	70	5	0	0	95	0	15
RT Vol	5	5	20	0	0	200	0
Lane Flow Rate	99	278	25	222	117	259	19
Geometry Grp	8	8	7	7	7	8	8
Degree of Util (X)	0.194	0.545	0.048	0.4	0.188	0.543	0.033
Departure Headway (Hd)	7.06	7.068	7.126	6.616	5.903	7.546	6.351
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	510	511	506	547	611	480	565
Service Time	4.789	4.792	4.826	4.316	3.603	5.268	4.073
HCM Lane V/C Ratio	0.194	0.544	0.049	0.406	0.191	0.54	0.034
HCM Control Delay	11.5	18	10.2	13.7	10	18.9	9.3
HCM Lane LOS	B	C	B	B	A	C	A
HCM 95th-tile Q	0.7	3.2	0.2	1.9	0.7	3.2	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	375	110	575	300	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0		
Lane Util. Factor	1.00	1.00	0.97	1.00		
Frt	1.00	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1845	1568	3335	1810		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1845	1568	3335	1810		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	417	122	639	333	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	417	122	639	333	0	0
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%
Turn Type	NA	Free	Prot	NA		
Protected Phases	2		1	6		
Permitted Phases		Free				
Actuated Green, G (s)	13.7	37.1	13.4	37.1		
Effective Green, g (s)	13.7	37.1	13.4	37.1		
Actuated g/C Ratio	0.37	1.00	0.36	1.00		
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	681	1568	1204	1810		
v/s Ratio Prot	c0.23		c0.19	0.18		
v/s Ratio Perm		0.08				
v/c Ratio	0.61	0.08	0.53	0.18		
Uniform Delay, d1	9.5	0.0	9.4	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.6	0.1	0.5	0.0		
Delay (s)	11.2	0.1	9.8	0.0		
Level of Service	B	A	A	A		
Approach Delay (s)	8.7			6.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.3	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	37.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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HCM Unsignalized Intersection Capacity Analysis
3: SR 522 EB Off-Ramp & NE 195th St

Slocum Property
2015 Baseline AM Commute Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	375	0	0	825	50	575
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	403	0	0	887	54	618
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	304			346		
pX, platoon unblocked			0.82		0.90	0.82
vC, conflicting volume			403		847	403
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			160		17	160
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			100		94	11
cM capacity (veh/h)			1136		895	694

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	403	444	444	672
Volume Left	0	0	0	54
Volume Right	0	0	0	618
cSH	1700	1700	1700	754
Volume to Capacity	0.24	0.26	0.26	0.89
Queue Length 95th (ft)	0	0	0	289
Control Delay (s)	0.0	0.0	0.0	35.3
Lane LOS				E
Approach Delay (s)	0.0	0.0		35.3
Approach LOS				E

Intersection Summary			
Average Delay		12.1	
Intersection Capacity Utilization		62.0%	ICU Level of Service B
Analysis Period (min)		15	

HCM 2010 Signalized Intersection Summary
4: Woodinville-Snohomish Road & NE 195th St

Slocum Property
2015 Baseline AM Commute Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	115	610	225	30	670	45	95	120	10	60	475	65
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	181.0	181.0	181.0	181.0	181.0	181.0	174.3	174.3	174.3	182.7	182.7	182.7
Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Cap, veh/h	291	915	337	213	1088	73	205	557	472	470	546	464
Arrive On Green	0.06	0.37	0.37	0.02	0.33	0.33	0.06	0.32	0.32	0.04	0.30	0.30
Sat Flow, veh/h	1723	2460	906	1723	3270	220	1660	1743	1479	1740	1827	1550
Grp Volume(v), veh/h	120	444	425	31	367	378	99	125	10	62	495	68
Grp Sat Flow(s),veh/h/ln	1723	1719	1647	1723	1719	1771	1660	1743	1479	1740	1827	1550
Q Serve(g_s), s	3.9	20.1	20.2	1.1	16.7	16.7	3.6	4.8	0.4	2.3	24.0	3.0
Cycle Q Clear(g_c), s	3.9	20.1	20.2	1.1	16.7	16.7	3.6	4.8	0.4	2.3	24.0	3.0
Prop In Lane	1.00		0.55	1.00		0.12	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	291	639	612	213	572	589	205	557	472	470	546	464
V/C Ratio(X)	0.41	0.69	0.69	0.15	0.64	0.64	0.48	0.22	0.02	0.13	0.91	0.15
Avail Cap(c_a), veh/h	639	828	793	629	828	853	544	647	549	862	678	575
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.5	24.5	24.5	21.0	26.1	26.1	23.2	23.0	21.5	21.1	31.1	23.7
Incr Delay (d2), s/veh	0.3	2.2	2.4	0.1	1.7	1.7	0.7	0.1	0.0	0.0	13.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.6	8.5	8.2	0.4	7.1	7.3	1.4	2.0	0.2	0.9	12.5	1.1
Lane Grp Delay (d), s/veh	18.9	26.8	26.9	21.1	27.8	27.8	23.8	23.1	21.5	21.1	44.3	23.8
Lane Grp LOS	B	C	C	C	C	C	C	C	C	C	D	C
Approach Vol, veh/h		989			776			234			625	
Approach Delay, s/veh		25.8			27.5			23.4			39.7	
Approach LOS		C			C			C			D	

Timer												
Assigned Phs	5	2		1	6		3	8		7	4	
Phs Duration (G+Y+Rc), s	11.4	39.9		7.8	36.3		11.1	35.2		9.3	33.4	
Change Period (Y+Rc), s	5.6	5.6		5.6	5.6		5.8	5.8		5.8	5.8	
Max Green Setting (Gmax), s	24.4	44.4		24.4	44.4		24.2	34.2		24.2	34.2	
Max Q Clear Time (g_c+I1), s	5.9	22.2		3.1	18.7		5.6	6.8		4.3	26.0	
Green Ext Time (p_c), s	0.2	11.1		0.0	12.0		0.2	2.2		0.1	1.6	

Intersection Summary		
HCM 2010 Ctrl Delay		29.4
HCM 2010 LOS		C

Notes

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Intersection	
Intersection Delay, s/veh	35.5
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	205	5	10	215	375	0	65	20	255	15	35
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	4	4	4	6	6	6	0	0	0	3	3	3
Mvmt Flow	37	253	6	12	265	463	0	80	25	315	19	43
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	33.6	35.6	16.3	42.1
HCM LOS	D	E	C	E

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	12%	100%	0%	0%	94%	0%
Vol Thru, %	76%	85%	0%	100%	0%	6%	0%
Vol Right, %	24%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	85	240	10	215	375	270	35
LT Vol	65	205	0	215	0	15	0
Through Vol	20	5	0	0	375	0	35
RT Vol	0	30	10	0	0	255	0
Lane Flow Rate	105	296	12	265	463	333	43
Geometry Grp	8	8	7	7	7	8	8
Degree of Util (X)	0.283	0.741	0.028	0.569	0.899	0.848	0.095
Departure Headway (Hd)	9.698	9.007	8.228	7.714	6.993	9.153	7.945
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	369	400	435	467	519	397	451
Service Time	7.474	6.768	5.981	5.466	4.745	6.908	5.699
HCM Lane V/C Ratio	0.285	0.74	0.028	0.567	0.892	0.839	0.095
HCM Control Delay	16.3	33.6	11.2	20.2	45	46.1	11.5
HCM Lane LOS	C	D	B	C	E	E	B
HCM 95th-tile Q	1.1	5.9	0.1	3.5	10.3	8	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

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Intersection	
Intersection Delay (sec/veh)	10.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Volume (vph)	10	205	5	25	150	150	0	5	25	110	0	5
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(%)	1	1	1	3	3	3	0	0	0	1	1	1
Movement Flow Rate	11	218	5	27	160	160	0	5	27	117	0	5
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	11.9	9.1	8.9	11.2
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Volume Left (%)	0%	5%	100%	0%	0%	100%	0%
Volume Thru (%)	17%	93%	0%	100%	0%	0%	0%
Volume Right (%)	83%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Volume by Lane	30	220	25	150	150	110	5
Left Turning Volume	5	205	0	150	0	0	0
Through Volume	25	5	0	0	150	0	5
Right Turning Volume	0	10	25	0	0	110	0
Lane Flow Rate	32	234	27	160	160	117	5
Geometry Group	8	8	7	7	7	8	8
Degree of Utilization, X	0.052	0.37	0.043	0.234	0.203	0.218	0.008
Departure Headway, Hd	5.895	5.802	5.78	5.276	4.571	6.718	5.509
Convergence(Y/N)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Capacity	611	625	614	673	776	537	653
Service Time	3.6	3.502	3.563	3.059	2.354	4.42	3.21
HCM Lane V/C Ratio	0.052	0.374	0.044	0.238	0.206	0.218	0.008
HCM Control Delay	8.9	11.9	8.8	9.7	8.5	11.3	8.3
HCM Lane LOS	A	B	A	A	A	B	A
HCM 95th Percentile Queue	0.2	1.8	0.1	0.9	0.8	0.8	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	340	40	900	395	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0		
Lane Util. Factor	1.00	1.00	0.97	1.00		
Frt	1.00	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1881	1599	3400	1845		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1881	1599	3400	1845		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	378	44	1000	439	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	378	44	1000	439	0	0
Heavy Vehicles (%)	1%	1%	3%	3%	0%	0%
Turn Type	NA	Free	Prot	NA		
Protected Phases	2		1	6		
Permitted Phases		Free				
Actuated Green, G (s)	13.9	43.8	19.9	43.8		
Effective Green, g (s)	13.9	43.8	19.9	43.8		
Actuated g/C Ratio	0.32	1.00	0.45	1.00		
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	596	1599	1544	1845		
v/s Ratio Prot	c0.20		c0.29	0.24		
v/s Ratio Perm		0.03				
v/c Ratio	0.63	0.03	0.65	0.24		
Uniform Delay, d1	12.8	0.0	9.2	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	2.2	0.0	0.9	0.1		
Delay (s)	15.0	0.0	10.2	0.1		
Level of Service	B	A	B	A		
Approach Delay (s)	13.4			7.1	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	43.8	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.4%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	335	0	0	1255	40	615
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	364	0	0	1364	43	668
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	304			346		
pX, platoon unblocked			0.83		0.87	0.83
vC, conflicting volume			364		1046	364
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			131		177	131
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		94	10
cM capacity (veh/h)			1199		692	740

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	364	682	682	712
Volume Left	0	0	0	43
Volume Right	0	0	0	668
cSH	1700	1700	1700	788
Volume to Capacity	0.21	0.40	0.40	0.90
Queue Length 95th (ft)	0	0	0	307
Control Delay (s)	0.0	0.0	0.0	36.1
Lane LOS				E
Approach Delay (s)	0.0	0.0		36.1
Approach LOS				E

Intersection Summary			
Average Delay		10.5	
Intersection Capacity Utilization		62.4%	ICU Level of Service B
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	645	195	40	675	145	255	635	35	110	370	265
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Queue, veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking, Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow Rate	1827	1827	1827	1863	1863	1863	1845	1845	1845	1863	1863	1863
Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Capacity, veh/h	194	952	288	179	1039	223	376	629	534	201	533	452
Arriving On Green	0.02	0.35	0.35	0.01	0.35	0.35	0.12	0.34	0.34	0.06	0.29	0.29
Sat Flow, veh/h	1739.9	2693.5	814.0	1774.0	2974.2	638.6	1756.8	1568.0	1568.0	1774.0	1580.0	1583.3
Grp Volume(v), veh/h	73.7	460.4	423.8	42.1	444.9	418.3	268.4	668.4	36.8	115.8	389.5	278.9
Grp Sat Flow(s),veh/h/ln	1739.9	1826.9	1680.6	1774.0	1862.7	1750.1	1756.8	1844.7	1568.0	1774.0	1862.7	1580.0
Q Serve(g_s), s	0.0	21.9	21.9	0.0	20.5	20.5	9.5	34.2	1.3	4.6	18.9	12.5
Cycle Q Clear(g_c), s	0.0	21.9	21.9	0.0	20.5	20.5	9.5	34.2	1.3	4.6	18.9	12.5
Proportion In Lane	1.000		0.484	1.000		0.365	1.000		1.000	1.000		1.000
Lane Grp Cap(c), veh/h	194.3	646.0	594.2	178.9	650.8	611.4	376.3	628.5	534.3	201.3	533.1	452.2
V/C Ratio(X)	0.379	0.713	0.713	0.235	0.684	0.684	0.713	1.063	0.069	0.575	0.731	0.617
Avail Cap(c_a), veh/h	585.5	808.1	743.4	585.2	824.0	774.1	590.9	628.5	534.3	514.7	634.7	538.4
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Uniform Delay (d), s/veh	39.8	28.0	28.0	39.3	27.9	27.9	20.9	33.1	14.5	26.6	32.3	20.6
Incr Delay (d2), s/veh	0.5	2.7	3.0	0.2	2.1	2.3	0.9	54.0	0.0	1.0	3.1	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lane Group Delay (d), s/veh	40.3	30.8	31.0	39.5	30.0	30.2	21.9	87.0	14.6	27.6	35.5	21.9
Lane Group LOS	D	C	C	D	C	C	C	F	B	C	D	C
Approach Volume, veh/h		958			905			974			784	
Approach Delay, s/veh		31.6			30.6			66.3			29.5	
Approach LOS		C			C			E			C	

Timer												
Assigned Phase	5	2		1	6		3	8		7	4	
Phase Duration (G+Y+Rc), s	7.44	41.09		7.02	40.67		17.74	40.00		12.27	34.53	
Change Period (Y+Rc), s	5.60	5.60		5.60	5.60		5.80	5.80		5.80	5.80	
Max Green Setting (Gmax), s	24.40	44.40		24.40	44.40		24.20	34.20		24.20	34.20	
Max Q Clear Time (g_c+I1), s	2.00	23.88		2.00	22.51		11.48	36.20		6.55	20.94	
Green Extension Time (p_c)	0.11	11.61		0.05	12.06		0.47	0.00		0.18	4.18	

Intersection Summary	
HCM 2010 Control Delay	40.2
HCM 2010 Level of Service	D

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Appendix E: Future (2015) With-Project LOS Worksheets

Intersection	
Intersection Delay, s/veh	15.7
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	5	215	5	24	180	95	6	5	82	200	10	15
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	4	4	4	6	6	6	0	0	0	3	3	3
Mvmt Flow	6	265	6	30	222	117	7	6	101	247	12	19
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	18.5	12.5	11.9	18.7
HCM LOS	C	B	B	C

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	6%	2%	100%	0%	0%	95%	0%
Vol Thru, %	5%	96%	0%	100%	0%	5%	0%
Vol Right, %	88%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	93	225	24	180	95	210	15
LT Vol	5	215	0	180	0	10	0
Through Vol	82	5	0	0	95	0	15
RT Vol	6	5	24	0	0	200	0
Lane Flow Rate	115	278	30	222	117	259	19
Geometry Grp	8	8	7	7	7	8	8
Degree of Util (X)	0.227	0.553	0.059	0.412	0.194	0.55	0.033
Departure Headway (Hd)	7.108	7.17	7.18	6.67	5.956	7.641	6.445
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	505	503	499	540	603	472	555
Service Time	4.857	4.912	4.918	4.408	3.694	5.384	4.188
HCM Lane V/C Ratio	0.228	0.553	0.06	0.411	0.194	0.549	0.034
HCM Control Delay	11.9	18.5	10.4	14	10.1	19.4	9.4
HCM Lane LOS	B	C	B	B	B	C	A
HCM 95th-tile Q	0.9	3.3	0.2	2	0.7	3.3	0.1

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	379	118	575	304	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0		
Lane Util. Factor	1.00	1.00	0.97	1.00		
Frt	1.00	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1845	1568	3335	1810		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1845	1568	3335	1810		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	421	131	639	338	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	421	131	639	338	0	0
Heavy Vehicles (%)	3%	3%	5%	5%	0%	0%
Turn Type	NA	Free	Prot	NA		
Protected Phases	2		1	6		
Permitted Phases		Free				
Actuated Green, G (s)	13.8	37.2	13.4	37.2		
Effective Green, g (s)	13.8	37.2	13.4	37.2		
Actuated g/C Ratio	0.37	1.00	0.36	1.00		
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	684	1568	1201	1810		
v/s Ratio Prot	c0.23		c0.19	0.19		
v/s Ratio Perm		0.08				
v/c Ratio	0.62	0.08	0.53	0.19		
Uniform Delay, d1	9.5	0.0	9.4	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	1.7	0.1	0.5	0.1		
Delay (s)	11.2	0.1	9.9	0.1		
Level of Service	B	A	A	A		
Approach Delay (s)	8.6			6.5	0.0	
Approach LOS	A			A	A	

Intersection Summary			
HCM 2000 Control Delay	7.2	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	37.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

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HCM Unsignalized Intersection Capacity Analysis
3: SR 522 EB Off-Ramp & NE 195th St

Slocum Property
2015 With-Project AM Commute Peak

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	379	0	0	827	52	575
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	408	0	0	889	56	618
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	304			346		
pX, platoon unblocked			0.82		0.91	0.82
vC, conflicting volume			408		852	408
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			161		19	161
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.3
p0 queue free %			100		94	10
cM capacity (veh/h)			1131		894	690

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	408	445	445	674
Volume Left	0	0	0	56
Volume Right	0	0	0	618
cSH	1700	1700	1700	753
Volume to Capacity	0.24	0.26	0.26	0.90
Queue Length 95th (ft)	0	0	0	293
Control Delay (s)	0.0	0.0	0.0	35.8
Lane LOS				E
Approach Delay (s)	0.0	0.0		35.8
Approach LOS				E

Intersection Summary			
Average Delay	12.3		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

HCM 2010 Signalized Intersection Summary
4: Woodinville-Snohomish Road & NE 195th St

Slocum Property
2015 With-Project AM Commute Peak

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	116	611	227	30	670	45	96	120	10	60	475	66
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	181.0	181.0	181.0	181.0	181.0	181.0	174.3	174.3	174.3	182.7	182.7	182.7
Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Cap, veh/h	292	913	339	212	1087	73	205	558	473	470	546	463
Arrive On Green	0.06	0.37	0.37	0.02	0.33	0.33	0.06	0.32	0.32	0.04	0.30	0.30
Sat Flow, veh/h	1723	2455	910	1723	3270	220	1660	1743	1479	1740	1827	1550
Grp Volume(v), veh/h	121	445	427	31	367	378	100	125	10	62	495	69
Grp Sat Flow(s),veh/h/ln	1723	1719	1646	1723	1719	1771	1660	1743	1479	1740	1827	1550
Q Serve(g_s), s	3.9	20.3	20.3	1.1	16.7	16.8	3.7	4.9	0.4	2.3	24.1	3.0
Cycle Q Clear(g_c), s	3.9	20.3	20.3	1.1	16.7	16.8	3.7	4.9	0.4	2.3	24.1	3.0
Prop In Lane	1.00		0.55	1.00		0.12	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	292	640	612	212	572	589	205	558	473	470	546	463
V/C Ratio(X)	0.41	0.70	0.70	0.15	0.64	0.64	0.49	0.22	0.02	0.13	0.91	0.15
Avail Cap(c_a), veh/h	638	826	791	627	826	851	543	645	547	861	676	574
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	18.5	24.6	24.6	21.1	26.2	26.2	23.2	23.0	21.5	21.1	31.1	23.8
Incr Delay (d2), s/veh	0.4	2.3	2.4	0.1	1.7	1.7	0.7	0.1	0.0	0.0	13.3	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.6	8.7	8.4	0.4	7.1	7.3	1.5	2.0	0.2	0.9	12.5	1.1
Lane Grp Delay (d), s/veh	18.9	26.9	27.0	21.2	27.9	27.8	23.9	23.2	21.5	21.2	44.4	23.9
Lane Grp LOS	B	C	C	C	C	C	C	C	C	C	D	C
Approach Vol, veh/h		993			776			235			626	
Approach Delay, s/veh		26.0			27.6			23.4			39.9	
Approach LOS		C			C			C			D	

Timer												
Assigned Phs	5	2		1	6		3	8		7	4	
Phs Duration (G+Y+Rc), s	11.5	40.0		7.8	36.3		11.2	35.4		9.3	33.4	
Change Period (Y+Rc), s	5.6	5.6		5.6	5.6		5.8	5.8		5.8	5.8	
Max Green Setting (Gmax), s	24.4	44.4		24.4	44.4		24.2	34.2		24.2	34.2	
Max Q Clear Time (g_c+I1), s	5.9	22.3		3.1	18.8		5.7	6.9		4.3	26.1	
Green Ext Time (p_c), s	0.2	11.1		0.0	12.0		0.2	2.2		0.1	1.6	

Intersection Summary	
HCM 2010 Ctrl Delay	29.5
HCM 2010 LOS	C

Notes

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Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	13	0	0	75	35	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0	0			0
Median Width	12			0	0	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	16	0	0	93	43	5
Number of Lanes	1	0	0	1	1	0

Major/Minor			Major 1		Major 2	
Conflicting Flow All	139	46	48	0	-	0
Stage 1	46	-	-	-	-	-
Stage 2	93	-	-	-	-	-
Follow-up Headway	3.5	3.3	2.2	-	-	-
Pot Capacity-1 Maneuver	859	1029	1572	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	936	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	-	-	-
Mov Capacity-1 Maneuver	859	1029	1572	-	-	-
Mov Capacity-2 Maneuver	859	-	-	-	-	-
Stage 1	982	-	-	-	-	-
Stage 2	936	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.3	0	0
HCM LOS	A	-	-

Minor Lane / Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Cap, veh/h	1572	-	859	-	-
HCM Control Delay, s	0	-	9.3	-	-
HCM Lane V/C Ratio	-	-	0.02	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th-tile Q, veh	0.0	-	0.1	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Intersection	
Intersection Delay, s/veh	37.4
Intersection LOS	E

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	205	5	14	215	375	1	65	32	255	15	35
Peak Hour Factor	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Heavy Vehicles, %	4	4	4	6	6	6	0	0	0	3	3	3
Mvmt Flow	37	253	6	17	265	463	1	80	40	315	19	43
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	35.4	37.9	17.2	44.5
HCM LOS	E	E	C	E

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	1%	12%	100%	0%	0%	94%	0%
Vol Thru, %	66%	85%	0%	100%	0%	6%	0%
Vol Right, %	33%	2%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	98	240	14	215	375	270	35
LT Vol	65	205	0	215	0	15	0
Through Vol	32	5	0	0	375	0	35
RT Vol	1	30	14	0	0	255	0
Lane Flow Rate	121	296	17	265	463	333	43
Geometry Grp	8	8	7	7	7	8	8
Degree of Util (X)	0.327	0.755	0.04	0.578	0.916	0.861	0.097
Departure Headway (Hd)	9.728	9.169	8.361	7.846	7.124	9.3	8.09
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	369	394	428	459	509	390	442
Service Time	7.513	6.936	6.119	5.603	4.882	7.064	5.853
HCM Lane V/C Ratio	0.328	0.751	0.04	0.577	0.91	0.854	0.097
HCM Control Delay	17.2	35.4	11.5	20.9	48.6	48.7	11.7
HCM Lane LOS	C	E	B	C	E	E	B
HCM 95th-tile Q	1.4	6.1	0.1	3.6	10.8	8.3	0.3

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

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Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	10	205	6	38	150	150	0	5	34	110	0	5
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, %	1	1	1	3	3	3	0	0	0	1	1	1
Mvmt Flow	11	218	6	40	160	160	0	5	36	117	0	5
Number of Lanes	0	1	0	1	1	1	0	1	0	0	1	1

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	1	2	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	1	1	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	2	3	1
HCM Control Delay	12.2	9.2	9.1	11.3
HCM LOS	B	A	A	B

Lane	NBLn1	EBLn1	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	0%	5%	100%	0%	0%	100%	0%
Vol Thru, %	13%	93%	0%	100%	0%	0%	0%
Vol Right, %	87%	3%	0%	0%	100%	0%	100%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	39	221	38	150	150	110	5
LT Vol	5	205	0	150	0	0	0
Through Vol	34	6	0	0	150	0	5
RT Vol	0	10	38	0	0	110	0
Lane Flow Rate	41	235	40	160	160	117	5
Geometry Grp	8	8	7	7	7	8	8
Degree of Util (X)	0.068	0.383	0.065	0.236	0.204	0.221	0.008
Departure Headway (Hd)	5.92	5.859	5.816	5.313	4.607	6.794	5.583
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	607	616	610	669	768	530	643
Service Time	3.64	3.57	3.613	3.109	2.403	4.509	3.298
HCM Lane V/C Ratio	0.068	0.381	0.066	0.239	0.208	0.221	0.008
HCM Control Delay	9.1	12.2	9	9.8	8.6	11.4	8.3
HCM Lane LOS	A	B	A	A	A	B	A
HCM 95th-tile Q	0.2	1.8	0.2	0.9	0.8	0.8	0

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	344	45	900	408	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	4.0	5.0	5.0		
Lane Util. Factor	1.00	1.00	0.97	1.00		
Frt	1.00	0.85	1.00	1.00		
Flt Protected	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	1881	1599	3400	1845		
Flt Permitted	1.00	1.00	0.95	1.00		
Satd. Flow (perm)	1881	1599	3400	1845		
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	382	50	1000	453	0	0
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	382	50	1000	453	0	0
Heavy Vehicles (%)	1%	1%	3%	3%	0%	0%
Turn Type	NA	Free	Prot	NA		
Protected Phases	2		1	6		
Permitted Phases		Free				
Actuated Green, G (s)	14.0	43.9	19.9	43.9		
Effective Green, g (s)	14.0	43.9	19.9	43.9		
Actuated g/C Ratio	0.32	1.00	0.45	1.00		
Clearance Time (s)	5.0		5.0	5.0		
Vehicle Extension (s)	3.0		3.0	3.0		
Lane Grp Cap (vph)	599	1599	1541	1845		
v/s Ratio Prot	c0.20		c0.29	0.25		
v/s Ratio Perm		0.03				
v/c Ratio	0.64	0.03	0.65	0.25		
Uniform Delay, d1	12.8	0.0	9.3	0.0		
Progression Factor	1.00	1.00	1.00	1.00		
Incremental Delay, d2	2.2	0.0	1.0	0.1		
Delay (s)	15.0	0.0	10.2	0.1		
Level of Service	B	A	B	A		
Approach Delay (s)	13.3			7.1	0.0	
Approach LOS	B			A	A	

Intersection Summary			
HCM 2000 Control Delay	8.5	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	43.9	Sum of lost time (s)	10.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

EXHIBIT 19
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HCM Unsignalized Intersection Capacity Analysis
3: SR 522 Off-Ramp & NE 195th St

Slocum Property
Future (2015) With Project PM

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	339	0	0	1260	48	615
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	368	0	0	1370	52	668
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						6
Median type	None			None		
Median storage veh)						
Upstream signal (ft)	304			346		
pX, platoon unblocked			0.83		0.87	0.83
vC, conflicting volume			368		1053	368
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			132		179	132
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		92	9
cM capacity (veh/h)			1194		691	736

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	368	685	685	721
Volume Left	0	0	0	52
Volume Right	0	0	0	668
cSH	1700	1700	1700	793
Volume to Capacity	0.22	0.40	0.40	0.91
Queue Length 95th (ft)	0	0	0	313
Control Delay (s)	0.0	0.0	0.0	36.5
Lane LOS				E
Approach Delay (s)	0.0	0.0		36.5
Approach LOS				E

Intersection Summary			
Average Delay		10.7	
Intersection Capacity Utilization		62.6%	ICU Level of Service B
Analysis Period (min)		15	

HCM 2010 Signalized Intersection Summary
4: Woodinville-Snohomish Road & NE 195th St

Slocum Property
Future (2015) With Project PM

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	71	646	197	40	676	145	258	635	35	110	370	266
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow veh/h/ln	182.7	182.7	182.7	186.3	186.3	186.3	184.5	184.5	184.5	186.3	186.3	186.3
Lanes	1	2	0	1	2	0	1	1	1	1	1	1
Cap, veh/h	195	834	254	165	883	190	370	653	554	204	557	472
Arrive On Green	0.04	0.32	0.32	0.03	0.30	0.30	0.12	0.35	0.35	0.06	0.30	0.30
Sat Flow, veh/h	1740	2621	798	1774	2900	623	1757	1845	1565	1774	1863	1580
Grp Volume(v), veh/h	75	450	437	42	434	431	272	668	37	116	389	280
Grp Sat Flow(s),veh/h/ln	1740	1736	1683	1774	1770	1753	1757	1845	1565	1774	1863	1580
Q Serve(g_s), s	0.0	23.1	23.1	0.0	21.9	21.9	9.0	34.2	1.2	4.3	17.9	11.3
Cycle Q Clear(g_c), s	0.0	23.1	23.1	0.0	21.9	21.9	9.0	34.2	1.2	4.3	17.9	11.3
Prop In Lane	1.00		0.47	1.00		0.36	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	195	552	535	165	539	534	370	653	554	204	557	472
V/C Ratio(X)	0.38	0.82	0.82	0.25	0.81	0.81	0.73	1.02	0.07	0.57	0.70	0.59
Avail Cap(c_a), veh/h	562	797	773	563	813	805	601	653	554	534	659	559
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	41.9	30.3	30.4	42.6	31.0	31.0	19.8	31.2	12.4	25.2	30.0	17.2
Incr Delay (d2), s/veh	0.5	5.4	5.6	0.3	4.7	4.8	1.1	41.2	0.0	0.9	2.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile Back of Q (50%), veh/ln	1.8	10.3	10.0	1.0	10.1	10.0	4.2	22.5	0.6	2.8	8.4	4.2
Lane Grp Delay (d), s/veh	42.4	35.7	35.9	42.9	35.7	35.7	20.9	72.5	12.4	26.1	32.3	18.1
Lane Grp LOS	D	D	D	D	D	D	C	F	B	C	C	B
Approach Vol, veh/h		962			907			977			785	
Approach Delay, s/veh		36.3			36.0			55.8			26.3	
Approach LOS		D			D			E			C	

Timer												
Assigned Phs	5	2		1	6		3	8		7	4	
Phs Duration (G+Y+Rc), s	9.6	36.3		8.3	35.0		17.3	40.0		12.0	34.7	
Change Period (Y+Rc), s	5.6	5.6		5.6	5.6		5.8	5.8		5.8	5.8	
Max Green Setting (Gmax), s	24.4	44.4		24.4	44.4		24.2	34.2		24.2	34.2	
Max Q Clear Time (g_c+I1), s	2.0	25.1		2.0	23.9		11.0	36.2		6.3	19.9	
Green Ext Time (p_c), s	0.2	5.6		0.2	5.5		0.5	0.0		0.2	4.3	

Intersection Summary		
HCM 2010 Ctrl Delay		39.3
HCM 2010 LOS		D

Notes

EXHIBIT 19
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Intersection	
Intersection Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	9	0	0	30	25	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	None	None	None	None	None	None
Storage Length	0	0	0			0
Median Width	12			0	0	
Grade, %	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	10	0	0	32	27	15
Number of Lanes	1	0	0	1	1	0

Major/Minor				Major 1	Major 2	
Conflicting Flow All	66	34	41	0	-	0
Stage 1	34	-	-	-	-	-
Stage 2	32	-	-	-	-	-
Follow-up Headway	3.5	3.3	2.2	-	-	-
Pot Capacity-1 Maneuver	944	1045	1581	-	-	-
Stage 1	994	-	-	-	-	-
Stage 2	996	-	-	-	-	-
Time blocked-Platoon, %	0	0	0	-	-	-
Mov Capacity-1 Maneuver	944	1045	1581	-	-	-
Mov Capacity-2 Maneuver	944	-	-	-	-	-
Stage 1	994	-	-	-	-	-
Stage 2	996	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	8.9	0	0
HCM LOS	A	-	-

Minor Lane / Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Cap, veh/h	1581	-	944	-	-
HCM Control Delay, s	0	-	8.9	-	-
HCM Lane V/C Ratio	-	-	0.01	-	-
HCM Lane LOS	A	-	A	-	-
HCM 95th-tile Q, veh	0.0	-	0.0	-	-

Notes

~ : Volume Exceeds Capacity; $: Delay Exceeds 300 Seconds; Error : Computation Not Defined

EXHIBIT 19
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