Woodside Residential

Updated Transportation Impact Study

August 26, 2019

Prepared for:

Polygon WLH, LLC
11624 SE 5th St
Bellevue, WA, 98005

Prepared by:

TENW

Transportation Engineering NorthWest

11400 SE 8th Street, Suite 200
Bellevue, WA 98004
Office: (425) 889-6747
Fax: (425) 889-8369

Table of Contents

Appendices

Figures

Tables

FINDINGS/CONCLUSIONS

This traffic impact analysis has been prepared for the proposed Woodside residential project located on a vacant parcel at 7039 196th Ave NE in Redmond, WA. This is an update to our previous traffic analysis dated February 15, 2019 and addresses City of Redmond PREP 2 comments dated April 30, 2019.

Project Proposal. The proposed Woodside residential project includes the development of up to 170 multifamily housing units including a mix of townhomes and flats. Of the 170 multifamily housing units, 36 units would include two levels and 134 would include three levels. The existing site is currently vacant. Primary vehicle access to the site would be provided by a new NE 70th Street right-of-way that will connect to 188th Avenue NE west of the site. From the south, the project will also extend 191st Avenue NE (becomes 192nd Ave NE) up to the new NE 70th Street right-of-way. A secondary emergency-only access would be provided along the future 192nd Avenue NE project frontage. The new intersection of 192nd Avenue NE/NE 70th Street would be constructed as a mini-roundabout. The project is anticipated to be completed and occupied in 2022.

Trip Generation. The proposed Woodside residential project is estimated to generate 960 new weekday daily trips with 64 new trips occurring during the weekday AM peak hour (16 in, 48 out), and 83 new trips occurring during the weekday PM peak hour (51 in, 32 out).

Transportation Concurrency. A concurrency application has been submitted to the City of Redmond. It is anticipated that transportation concurrency will be satisfied for the proposed project.

Traffic Operations Analysis. An existing and future level of service (LOS) analysis was conducted at four existing off-site study intersections during the weekday PM peak hour. For future with project conditions, six study intersections were analyzed which includes two new intersections that would be created with the proposed development.

Under existing conditions, the signalized study intersections and the controlled approaches at the stop controlled intersections currently operate at LOS D or better during the weekday PM peak hour with exception to the westbound approach at the intersection of 188th Avenue NE/NE 76th Street which currently operates at LOS E.

Under future conditions, the signalized study intersections and controlled approaches at the stop controlled intersections are expected to operate at LOS C or better in the future with or without the project during the weekday PM peak hour with exception to the eastbound and westbound approaches at the intersection of 188th Avenue NE/NE 76th Street. The eastbound approach is expected to operate at LOS E without or with the proposed Woodside residential project, while the westbound approach is expected to operate at LOS E for the without project condition and at LOS F for the future with project condition. It should be noted that the westbound approach is a low-volume private access (10 exiting PM peak hour trips) to the Cadman gravel pit.

188th Avenue NE/NE 76th Street Multi-Way Stop Analysis. An analysis was completed at the intersection of 188th Avenue NE/NE 76th Street to determine if a multi-way stop should be considered. Based on criteria included in the Manual on Uniform Traffic Control Devices (MUTCD), a multi-way stop at the intersection would not be warranted at this time. Our analysis also indicated that a traffic signal is not warranted at this time.

Mitigation

Frontage/Access Improvements

NE 70th Street (future road)

- Dedicate right-of-way along the project frontage and between 188th Ave NE and 192nd Ave NE.
- Construct a new road (NE 70th Street) between 188th Avenue NE and the proposed site access.
- Future roadway would include 20 feet of pavement, curb, gutter, and new street lighting with sidewalks and landscaping on the south side.

192nd Avenue NE (future road)

- Dedicate right-of-way and extend existing roadway from the existing terminus of 191st Avenue NE north to the future NE 70th Street.
- Future roadway would include 20 feet of pavement, curb, gutter, sidewalks, landscaping and street lighting.

- *Intersection of 192nd Avenue NE/NE 70th Street (future intersection):*
  - Construct a new 1-lane mini-roundabout with crosswalks on the south, east, and west legs.

Off-Site Improvements

Based on the results of the analysis shown in this report, no project-specific off-site transportation mitigation is proposed for concurrency or SEPA purposes.

Transportation Impact Fees

Long-term traffic impacts in the City of Redmond are mitigated by the projects included in the City's Transportation Facilities Plan (TFP). The TFP projects are funded through the payment of City of Redmond transportation impact fees. Based on this process, a fee is assessed upon a development to pay for a proportionate share of the cost of public facilities needed to serve new growth and development. As of the date of this study, the adopted impact fee schedule for permits issued in 2019 identifies a fee of $4,922.51 per dwelling unit for Multiple Family units. Based on this rate, a preliminary estimate of impact fees is $836,826.70 (170 units X $4,922.51). The applicant will pay the fees based on the number of units and impact fee rate in effect at the time of building permit issuance.

INTRODUCTION

This traffic impact analysis has been prepared for the proposed Woodside residential project located on a vacant parcel at 7039 196th Ave NE in Redmond, WA (see Figure 1). This is an update to our previous traffic analysis dated February 15, 2019 and addresses City of Redmond PREP 2 comments dated April 30, 2019.

Project Description

The proposed Woodside residential project includes the development of up to 170 multifamily housing units including a mix townhomes and flats. Of the 170 multifamily housing units, 36 units would include two levels and 134 would include three levels. The existing site is currently vacant. Primary vehicle access to the site would be provided by a new NE 70th Street right-of-way that will connect to 188th Avenue NE west of the site. From the south, the project will also extend 191st Avenue NE (becomes 192nd Ave NE) up to the new NE 70th Street right-of-way. A secondary emergency-only access would be provided along the future 192nd Avenue NE project frontage. The new intersection of 192nd Avenue NE/NE 70th Street would be constructed as a mini-roundabout. The project is anticipated to be completed and occupied in 2022. A preliminary site plan is provided in Figure 2.

Project Approach

The specific scope items used in the evaluation of traffic impacts were discussed and confirmed by City staff. To analyze the traffic impacts from the Woodside residential project, the following tasks were undertaken:

- Assessed existing conditions through field reconnaissance and reviewed existing planning documents.
- Described existing roads, non-motorized facilities, and transit facilities in the project vicinity.
- Documented traffic collisions in the project vicinity.
- Documented existing traffic volumes and intersection LOS during the weekday PM peak hour.
- Documented future planned roadway improvements in the project vicinity.
- Developed weekday daily, AM, and PM peak hour trip generation estimates.
- Assigned weekday PM peak hour project-generated trips.
- Analyzed weekday PM peak hour LOS for future conditions at the following study intersections:
    1. 188th Avenue NE / Union Hill Road (signalized intersection)
    2. 185th Avenue NE / NE 76th Street (signalized intersection)
    3. 188th Avenue NE / NE 76th Street (two-way stop controlled intersection)
    4. 188th Avenue NE / SR 202 (signalized intersection)

5. 188th Avenue NE / NE 70th Street (future two-way stop controlled intersection)
6. 192nd Avenue NE / NE 70th Street (future roundabout)

- Assessed the need for a multi-way stop at the intersection of 188th Avenue NE/NE 76th Street.
- Documented proposed traffic mitigation including frontage/access improvements, off-site improvements, and payment of transportation impact fees.

Primary Data and Information Sources

- Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 10th Edition, 2017.
- Institute of Transportation Engineers (ITE), *Trip Generation Handbook*, 3rd Edition, 2017.
- WSDOT collision data, January 1, 2016 to December 31, 2018.
- 2018 and 2019 PM peak hour traffic counts, All Traffic Data.
- City of Redmond 2019-2025 TIP, 2013-2030 TFP, and Transportation Master Plan.
- *Highway Capacity Manual (HCM),* 6th Edition, 2016.
- City of Redmond *Impact Fee Schedule*, effective January 1, 2019.

Figure 1: Project Site Vicinity

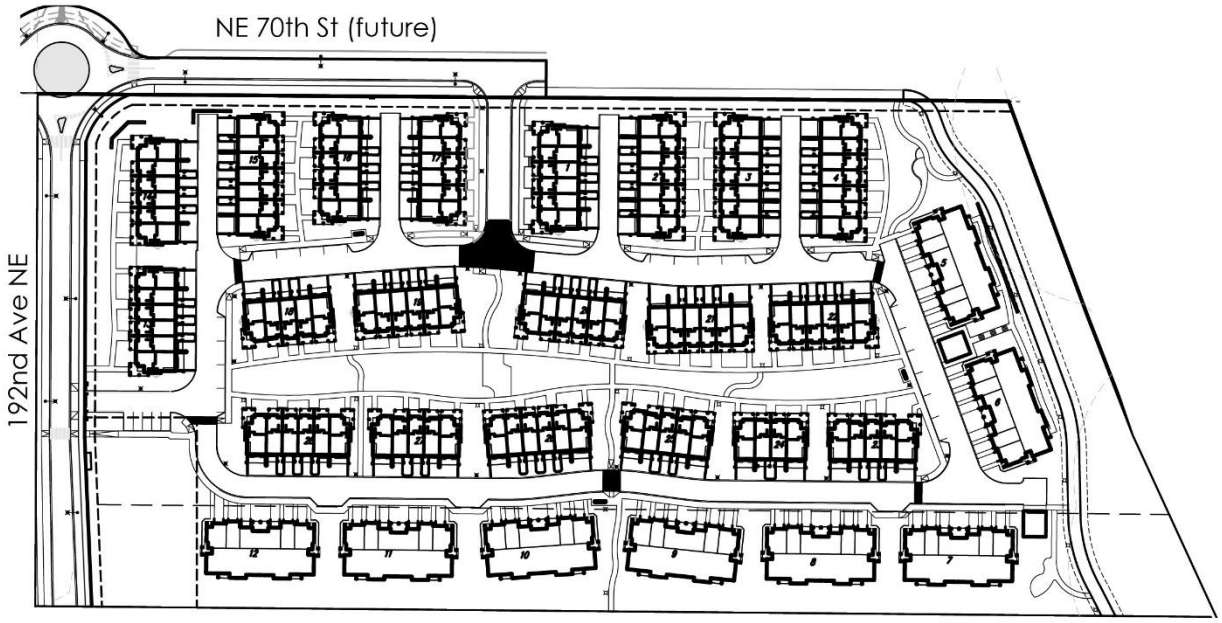


Figure 2: Preliminary Site Plan

N
NOT TO SCALE

EXISTING CONDITIONS

Roadway Network

Table 1 describes the existing characteristics of the streets that would be used as primary routes to and from the site. Roadway characteristics are described in terms of orientation, arterial classification, number of lanes, posted speed limits, parking, pedestrian facilities, and bicycle facilities. The relationship of these roadways to the project site is shown in Figure 1. An aerial view of the transportation network in the site vicinity is shown on the next page.

Table 1
Existing Study Area Roadway Network

Roadway	Orientation	Arterial Classification	# of Travel Lanes	Posted Speed Limit (mph)	Parking	Sidewalks	Bicycle Facilities
188th Ave NE	N/S	Minor Arterial	3	35	No	Yes	Bike Lanes Both Sides
191st Ave NE	N/S	Connector Street	2	25	No	Yes	No
NE 76th Street	E/W	Collector Arterial	3	25	No	Yes	Bike Lanes Both Sides

Nonmotorized Transportation Facilities

Pedestrian facilities in the immediate project vicinity include sidewalks on all streets in the vicinity of the project site. Other pedestrian facilities include curb ramps and crosswalks at signalized intersections as well as a mid-block crosswalk on 188th Avenue NE between NE 68th Street and NE 65th Street.

Bicycle facilities in the project vicinity include bike lanes on both sides of NE 76th Street and 188th Avenue NE.

Transit Service

Transit service to and from the project vicinity is provided by King County Metro Transit. The nearest public transit stops are located on NE 65th Street just west of 188th Avenue NE. The transit stops provide access to Metro Transit routes 216, 268, and 269.

Route 216 offers weekday transit service between Redmond, Sammamish, Issaquah Mercer Island, and Downtown Seattle. The current schedule for Route 216 includes approximately 30-minute headways from 5:30 a.m. to 8:00 a.m. and from 3:00 p.m. to 6:00 p.m. on a typical weekday.

Route 268 offers weekday transit service from Redmond to Downtown Seattle via SR 520. The current schedule for Route 268 includes approximately 30-minute headways from 6:00 a.m. to 8:00 a.m. and from 4:30 p.m. to 6:45 p.m. on a typical weekday.

Route 269 offers weekday and weekend transit service from the Overlake Transit Center to the Issaquah Park and Ride. The current schedule for Route 269 includes approximately 30-minute headways from 6:00 a.m. to 7:30 p.m. on a typical weekday.

Aerial View of Project Vicinity (May 2018 image)

Collision History

Intersection Collisions

Collisions at the study intersections were summarized for the most recent three-year period from January 1, 2016 to December 31, 2018. Collision data was provided by the Washington State Department of Transportation (WSDOT). Summaries of the total, yearly average, and collisions per million entering vehicles (MEV) are provided in Table 2. Summaries of collisions by type are provided in Table 3.

Table 2
Collision Data Summary, January 1, 2016 to December 31, 2018

Intersection	2016	2017	2018	AADT	3-Year Total Collisions	Average Annual Collisions	Collisions per MEV [1]
188th Ave NE / NE Union Hill Rd	3	0	0	26,430	3	1.0	0.10
185th Ave NE / NE 76th St	1	0	4	13,700	5	1.67	0.33
188th Ave NE / NE 76th St	4	1	2	10,580	7	2.33	0.60
188th Ave NE / SR 202	7	2	6	34,420	15	5.0	0.40

Source: WSDOT Collision Records.

[1] MEV = Million Entering Vehicles for intersections.

Table 3
Collision Data Summary by Type, January 1, 2016 to December 31, 2018

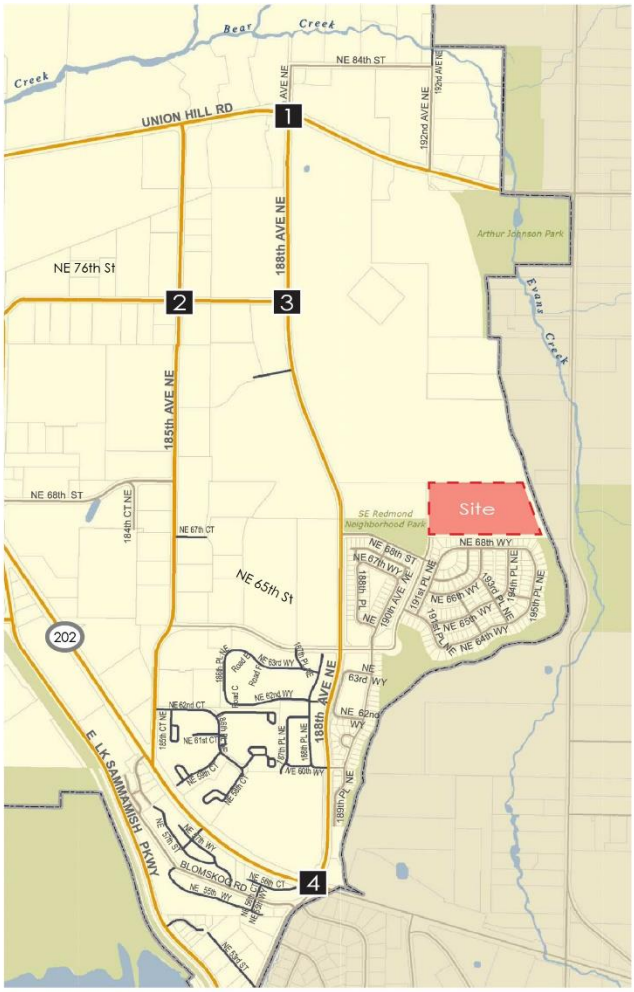
				Collision Type						
Intersection	3-Year Total Collisions	AADT	Average Annual Collision Rate	Right Angle	Rear-end	Sideswipe	Approach Turn	Ped/Cycle	Parked Veh/Fixed	Other
188th Ave NE / NE Union Hill Rd	3	26,430	1.0	0	0	2	0	0	1	0
185th Ave NE / NE 76th St	5	13,700	1.67	2	0	0	3	0	0	0
188th Ave NE / NE 76th St	7	10,580	2.33	3	1	0	3	0	0	0
188th Ave NE / SR 202	15	34,420	5.0	6	7	1	0	0	1	0

Source: WSDOT Collision Records.

Intersection collision rates over 1.0 collision per MEV generally warrant further review to determine if any patterns exist. Based on the collision data, none of the study intersections have a rate that exceeds 1.0 collision per MEV.

Existing Traffic Volumes

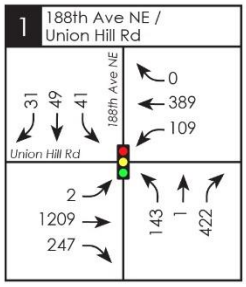
Existing weekday PM peak hour traffic volumes at the four existing study intersections were based on counts conducted in December 2018, January 2019, and May 2019. Figure 3 illustrates the existing 2019 PM peak hour traffic volumes at the study intersections.

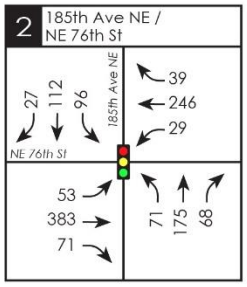


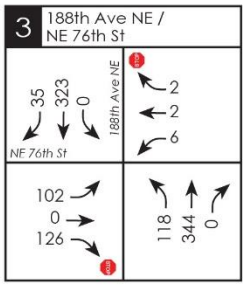
LEGEND

Study Intersection

XX PM Peak Hour Traffic Volume







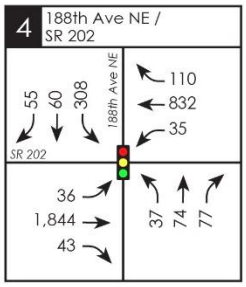


Figure 3: 2019 Existing Weekday PM Peak Hour Traffic Volumes

N
NOT TO SCALE

Existing Level of Service

Based on our scoping discussions and comments received from the City of Redmond, an existing weekday PM peak hour level of service (LOS) analysis was conducted at the following study intersections:

1. 188th Avenue NE / NE Union Hill Road (signalized intersection)
2. 185th Avenue NE / NE 76th St (signalized intersection)
3. 188th Avenue NE / NE 76th Street (two-way stop controlled intersection)
4. 188th Avenue NE / SR 202 (signalized intersection)

Level of service calculations at the signalized and stop controlled study intersections were conducted using *Synchro 10.3*. LOS generally refers to the degree of congestion on a roadway or intersection. It is a measure of vehicle operating speed, travel time, travel delays, and driving comfort. A letter scale from A to F generally describes intersection LOS. At signalized intersections, LOS A represents free-flow conditions (motorists experience little or no delays), and LOS F represents forced-flow conditions where motorists experience an average delay in excess of 80 seconds per vehicle.

The LOS reported for signalized intersections is reported for the overall intersection. The LOS for two-way stop-controlled intersections is reported by controlled approach. The LOS for two-way stop-controlled intersections was based on Highway Capacity Manual (HCM) 6th Edition methodology. Per City of Redmond guidelines, the SIDRA software package was used to analyze the operations for roundabouts.

Existing signal timing used in the analysis was provided by the City of Redmond. The 2019 existing weekday PM peak hour LOS analysis results at the study intersections are summarized in Table 4. The 2019 existing LOS worksheets are included in Appendix A.

Table 4
2019 Existing PM Peak Hour Level of Service Summary

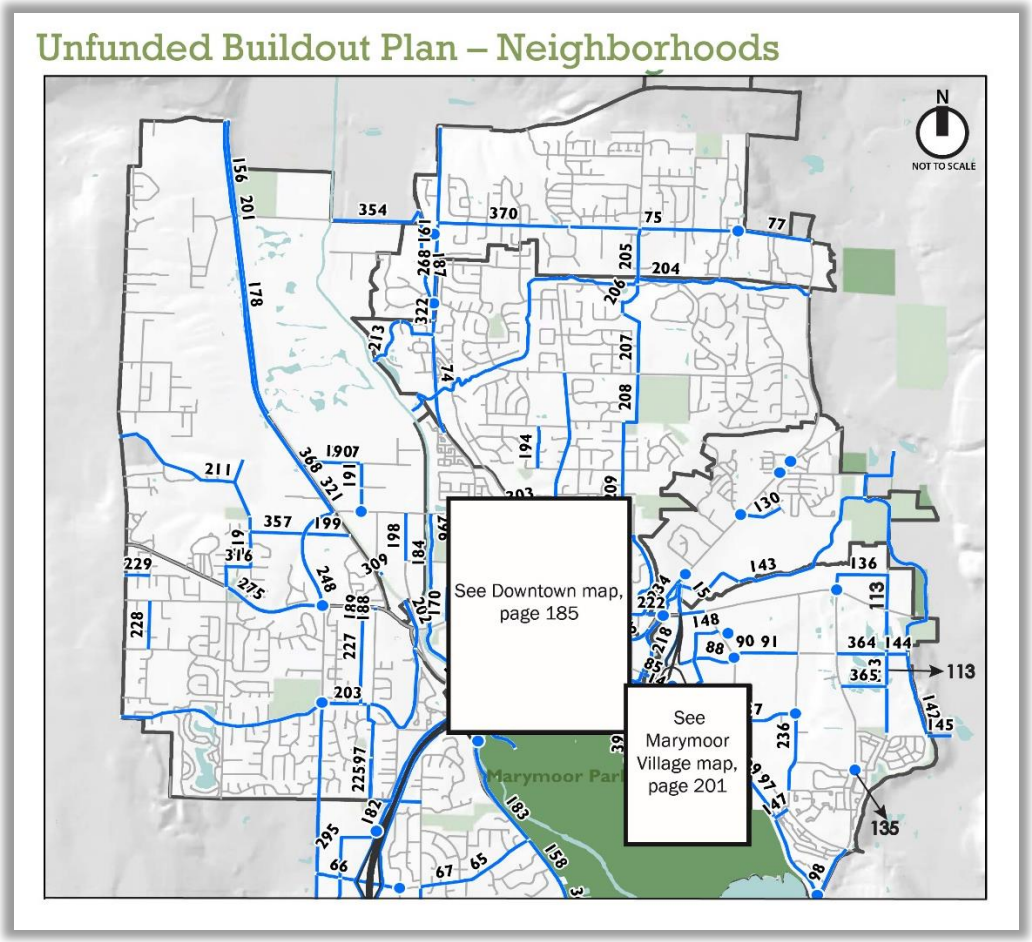
	2019 Existing PM Peak Hour	
Study Intersection	LOS	Delay (sec)
Signalized Intersections		
1. 188th Ave NE / Union Hill Road	C	32.0
2. 185th Ave NE / NE 76th St	A	9.7
4. 188th Ave NE / SR 202	C	31.0
Stop Controlled Intersection		
3. 188th Ave NE / NE 76th Street		
Eastbound Approach	D	30.2
Westbound Approach	E	37.5

As shown in Table 4, the signalized study intersections and the controlled movements at the stop controlled intersection currently operate at LOS D or better during the weekday PM peak hour under 2019 existing conditions with exception to the westbound approach at the intersection of 188th Avenue NE/NE 76th Street which currently operates at LOS E. The westbound approach at this intersection currently serves as a private access to the Cadman gravel pit.

FUTURE CONDITIONS

Planned Transportation Improvements

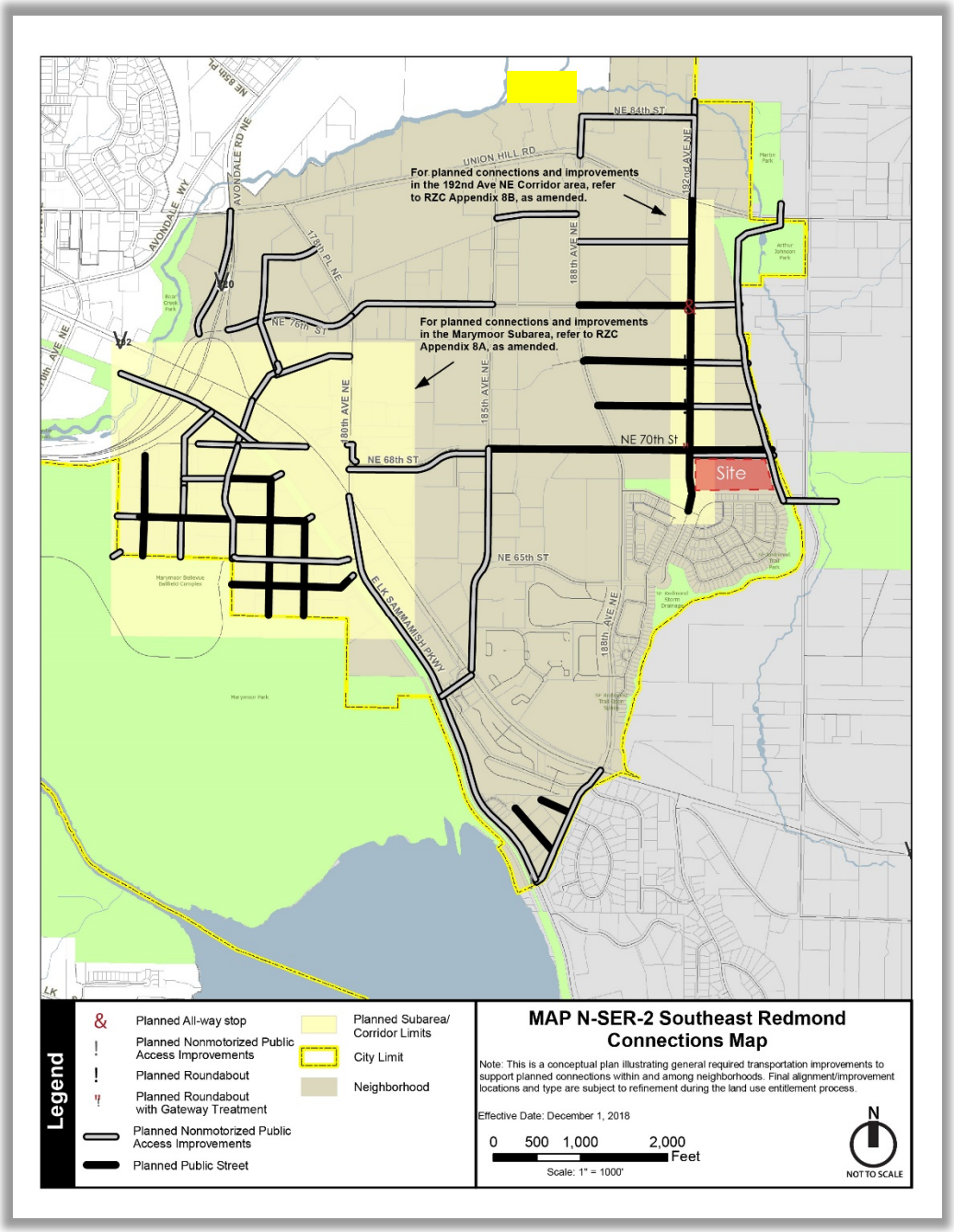
Based on a review of the current City of Redmond Six Year 2019-2024 Transportation Improvement Program (TIP) and the City of Redmond *Transportation Master Plan* (August 2013) including the Transportation Facilities Plan (2013-2030) and Unfunded Buildout Plan the following section describes the transportation improvement projects that are planned in the immediate project vicinity. There are no projects on the City's Six Year TIP in the immediate study area. The project map from the Unfunded Buildout Plan is shown below.



- 192nd Ave NE Extension – NE 68th St to Union Hill Road (Unfunded Buildout Plan Project 113): This project includes the construction of a new 192nd Ave NE from NE 68th St to Union Hill Road. Improvements include 1 through lane in each direction, left turn lanes, bike lanes, sidewalks, street lights, traffic control, storm drainage, right-of-way and easements. Based on Redmond Zoning Code (RZC) Appendix 8B, the extended 192nd Ave roadway section would include a 48-foot wide right-of-way with a 20-foot wide roadway/bike boulevard, 8-foot planters/curb, and 6-foot sidewalk on both sides. The Woodside project is building a portion of this project up to NE 70th Street.

- 188th Ave NE/NE 65th St Intersection Improvements (Unfunded Buildout Plan Project 135): This project would improve intersection operations and safety at the intersection of 188th Avenue NE and NE 65th Street including but not limited to sight distance and pedestrian crossing.
- NE 76th Street Extension - Segment 2 188th Ave NE to 192nd Ave NE (Unfunded Buildout Plan Project 364): This project includes the construction of a new NE 76th St from 188th Ave NE to 192nd Ave NE. Improvements include 1 through lane in each direction, left turn lanes or medians to create a 3 lane section, bike lanes, sidewalks, street lights, traffic control, storm drainage, right-of-way and easements.
- NE 73rd Street Extension - Segment 2 188th Ave NE to 192nd Ave NE (Unfunded Buildout Plan Project 365): This project includes the construction of a new NE 76th St from 188th Ave NE to 192nd Ave NE. Improvements include 1 through lane in each direction, left turn lanes or medians to create a 3 lane section, bike lanes, sidewalks, street lights, traffic control, storm drainage, right-of-way and easements.
- Evans Creek Trail Extension (Project 142): This project extends the Evans Creek Trail south of Union Hill Road east of 188th Ave NE and west of 196th Ave NE.
- Woodbridge Trail Connection (Project 144): This project adds trail connections from the Woodbridge neighborhood to the SE Redmond Trail (at approximately NE 76th Street).
- Woodbridge to Evans Creek Natural Area Trail (Project 145): This project adds a trail from the Woodbridge neighborhood to 196th Ave NE and the Evans Creek Natural Area.

City of Redmond Ordinance 2930 (12/1/18) identifies planned Neighborhood Connections which includes the NE 70th Street roadway between the site and 188th Ave NE. Map N-SER-2 from Ordinance 2930 shown below illustrates the planned connections near the project site. The Woodside project will construct the NE 70th Street connection between the site and 188th Ave NE, the planned roundabout, and a new trail connection.



Project Trip Generation

The trip generation estimates for the proposed use were based on methodology documented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual,* 10th edition for land use code (LUC) 220 (Multifamily Housing – Low-Rise) and LUC 221 (Multifamily Housing – Mid-Rise). Of the 170 multifamily housing units, 36 units would include two levels (Low-Rise) and 134 would include three levels (Mid-Rise). The resulting new weekday Daily, AM, and PM peak hour vehicular trip generation estimates for the Woodside residential project are summarized in **Table 5.** A detailed trip generation estimate is included in **Appendix B**.

Table 5
Woodside Residential Trip Generation Summary

Weekday Time Period	New Trips Generated In	Out	Total
Weekday Daily	480	480	960
Weekday AM Peak Hour	16	48	64
Weekday PM Peak Hour	51	32	83

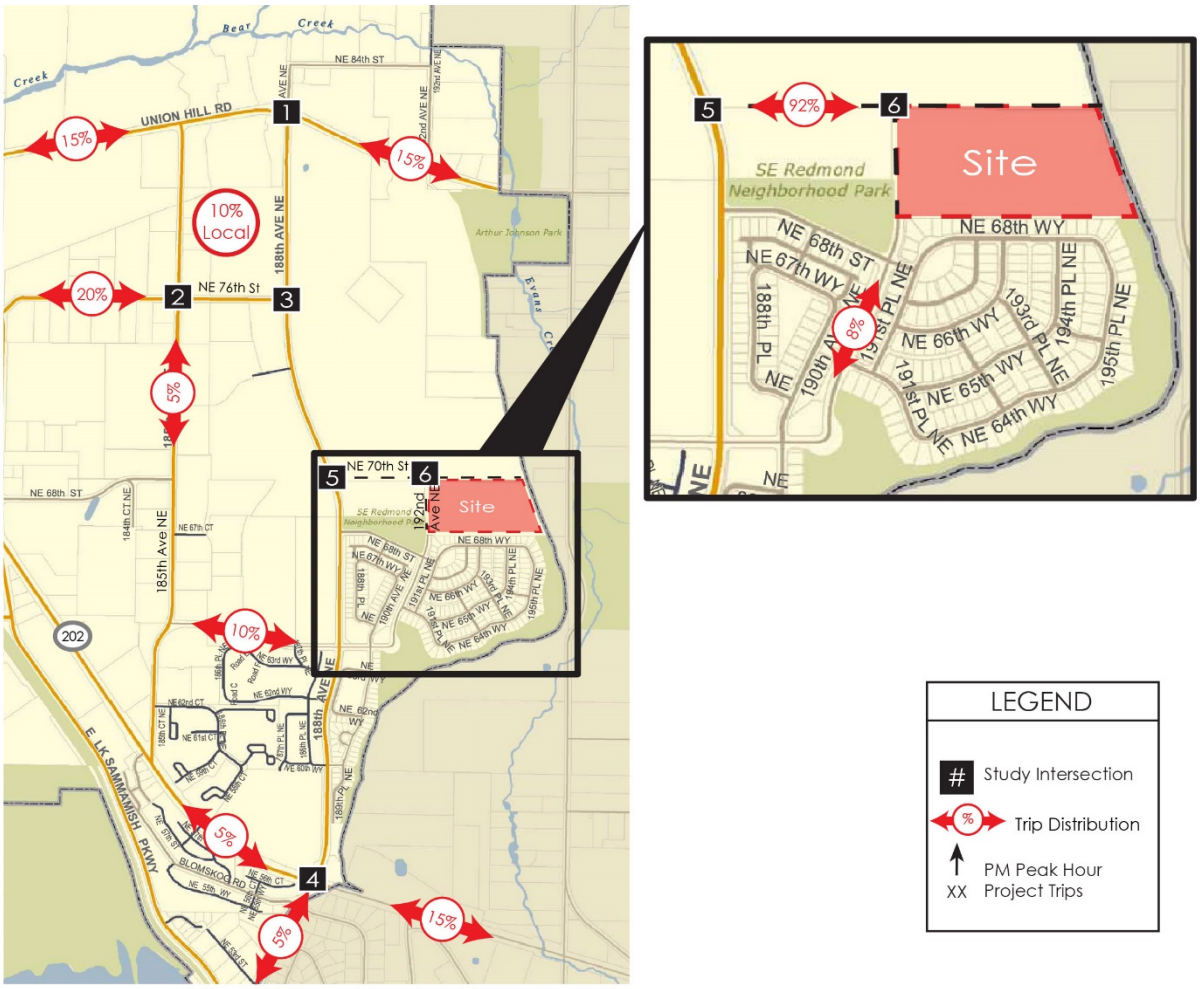
As shown in Table 5, the proposed Woodside residential development is estimated to generate 960 new weekday daily trips with 64 net new trips occurring during the weekday AM peak hour (16 in, 48 out) and 83 net new trips occurring during the weekday PM peak hour (51 in, 32 out).

Project Trip Distribution and Assignment

The distribution of project trips generated by the proposed Woodside residential project was estimated based on existing travel patterns in the study area as shown by recent traffic counts at 188th Ave NE at Redmond Way (SR 202), NE 65th St, NE 68th St, NE 76th St, and NE Union Hill Road. The new PM peak hour project-generated vehicle trips were generally distributed as follows:

- 20 percent to/from the west on NE 76th Street
- 15 percent to/from the west on Union Hill Road
- 15 percent to/from the east on Union Hill Road
- 15 percent to/from the east on Redmond Way (SR 202)
- 10 percent to/from the west on NE 65th Street
- 10 percent local (i.e. Redmond Costco)
- 5 percent to/from the south on 188th Ave NE (south of SR 202)
- 5 percent to/from the west on Redmond Way (SR 202)
- 5 percent to/from the south on 185th Ave NE (south of NE 76th St)

As part of the proposed project, a new road (NE 70th Street) would be constructed between the project site and 188th Avenue NE. In addition, the existing 191st Avenue NE would be extended (becoming 192nd Ave NE) to the future NE 70th Street. The new intersection of 192nd Avenue NE/NE 70th Street would be constructed as a 1-lane mini-roundabout. The resulting trip distribution and assignment of the new PM peak hour trips to/from the project site is illustrated in Figure 4.



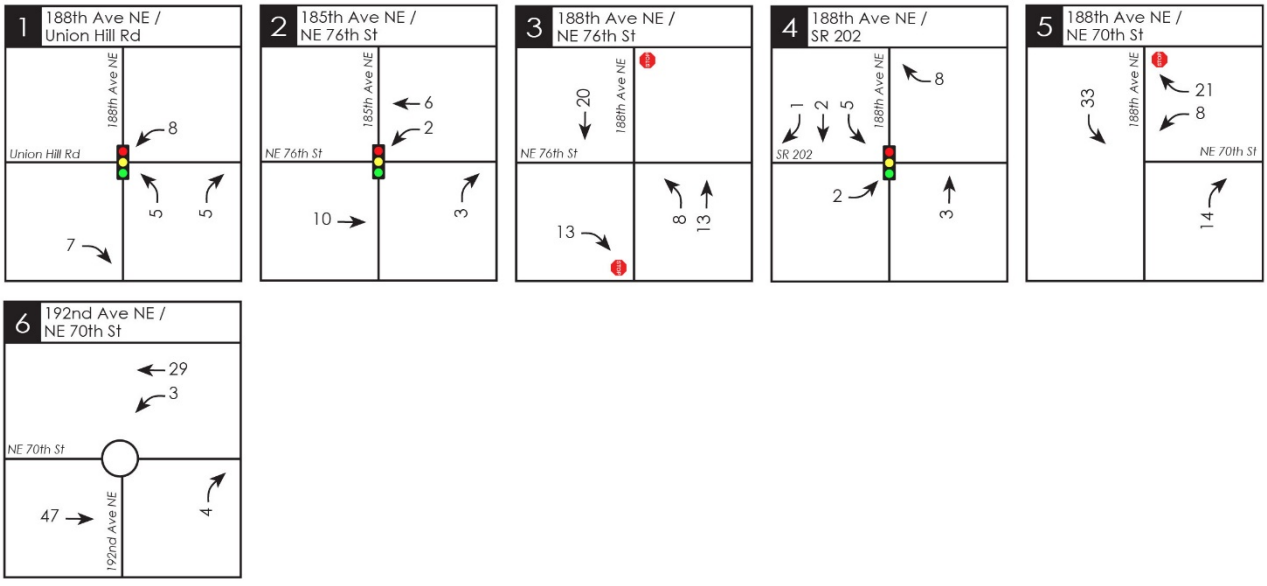


Figure 4: Weekday PM Peak Hour Project Trip Assignment and Distribution

N
NOT TO SCALE

Transportation Concurrency

A concurrency application was submitted separately (a copy has been provided in Appendix C). The concurrency application shows the proposed project would generate a Mobility Unit (MU) demand of 289.0 new MU.

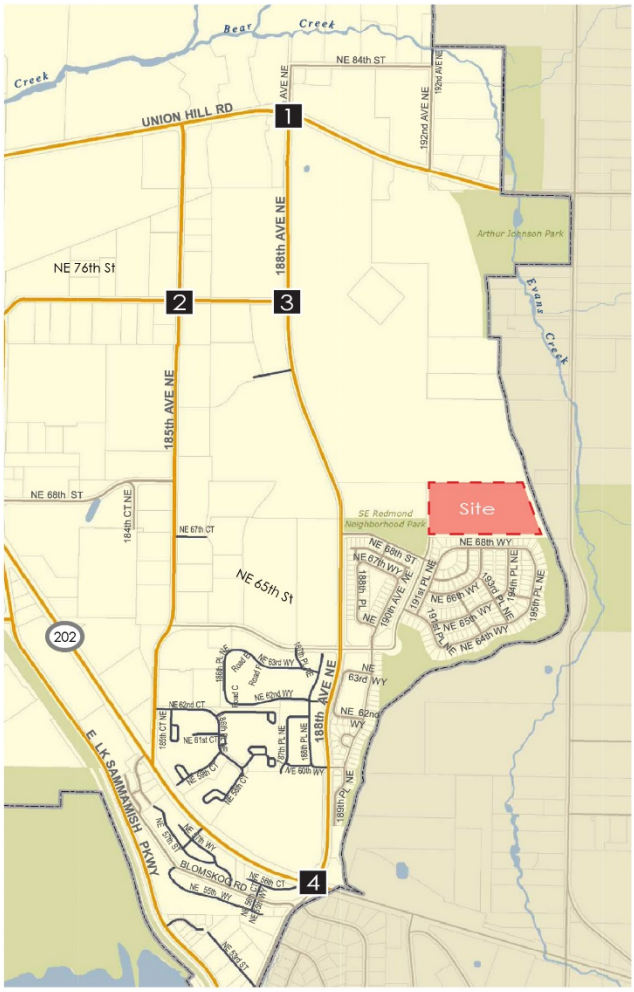
Using this information, the City will determine whether enough MUs from the six-year program and the Transportation Facility Plan (TFP) can be supplied to meet travel demand from the development at the time of opening, or within six years. If the MU supply is available to serve the MU demand from the development, the City will issue a certificate of concurrency. It is expected that the current MU supply will accommodate the additional MU demand created by the proposed Woodside residential project. Therefore, it is anticipated that a certificate of concurrency will be issued for the project.

Future Traffic Operations

Future Traffic Volumes

To estimate the future 2022 Without Project PM peak hour traffic volumes at the study intersections, a 2 percent annual growth rate was applied to the 2019 existing traffic volumes. Through volumes on 188th Avenue NE in the vicinity of the future NE 70th Street were based on a 2018 traffic count at the intersection of 188th Avenue NE/NE 68th Street.

Figure 5 illustrates the future 2022 Without Project PM peak hour traffic volumes without the proposed Woodside project at the study intersections. To determine the future year with-project traffic volumes, the new project-generated trips which are shown in Figure 4 were added to the future baseline volumes to obtain future with-project traffic volumes. The resulting total with-project PM peak hour traffic volumes at the study intersections are shown in Figure 6.



LEGEND

Study Intersection

XX PM Peak Hour Traffic Volume

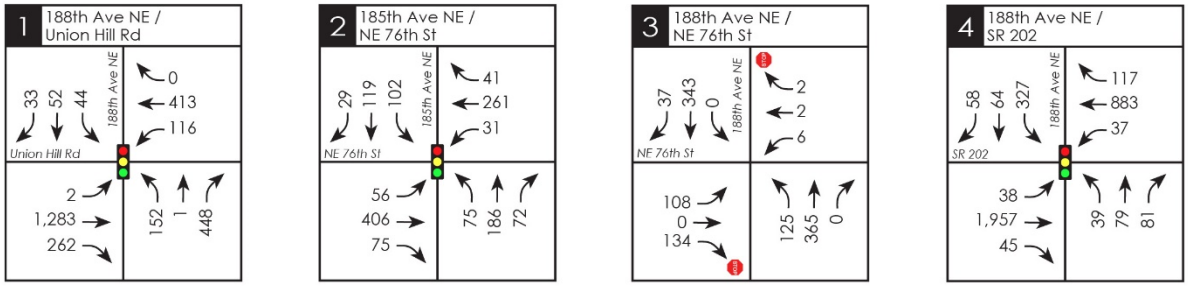
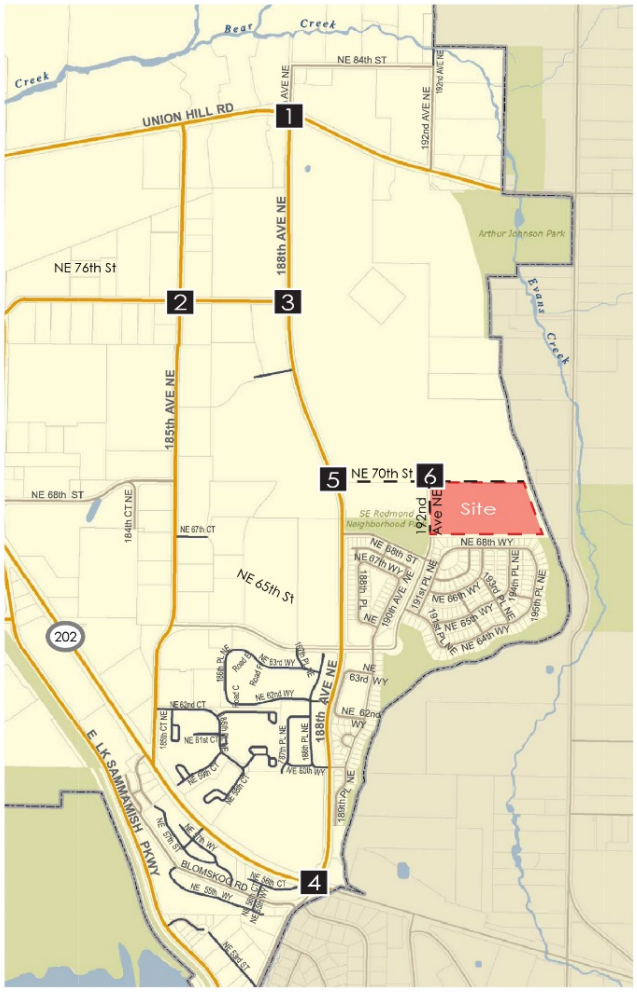
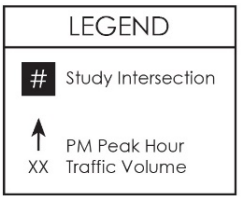


Figure 5: 2022 Without Project Weekday PM Peak Hour Traffic Volumes

N
NOT TO SCALE





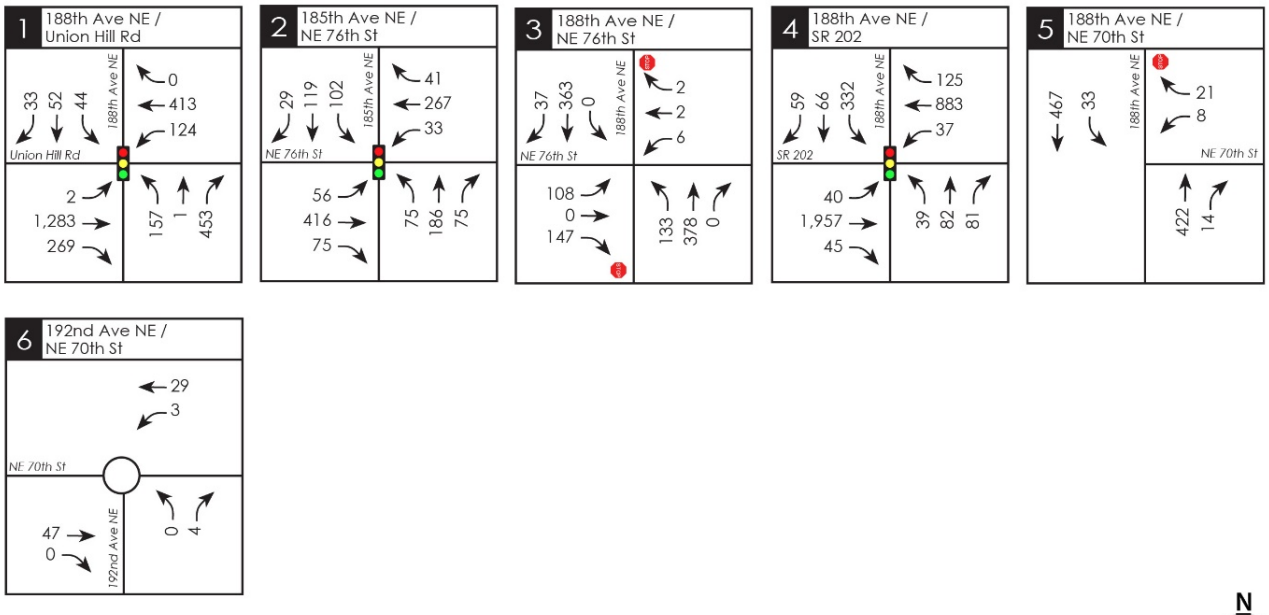


Figure 6: 2022 With Project Weekday PM Peak Hour Traffic Volumes

N
NOT TO SCALE

Future Level of Service

A Level of Service (LOS) analysis was conducted at the four study intersections for weekday PM peak hour 2022 Without Project conditions and for future 2022 With Project conditions. In addition, an LOS analysis was conducted at the two new intersections on the future NE 70th Street for 2022 With Project conditions.

Existing signal timing and channelization at the four existing study intersections were used in the future LOS analysis. The future intersection of 192nd Avenue NE/NE 70th Street assumed the construction of a single lane roundabout. Per City of Redmond guidelines, the SIDRA software package was used to analyze the operations of the proposed roundabout. The future intersection of 188th Avenue NE/NE 70th Street assumed single lane westbound stop controlled operations on 70th Street and a two-way left turn lane on 188th Ave NE.

The future weekday PM peak hour LOS results at the study intersections without and with the proposed Woodside residential project are summarized in Table 6. The LOS worksheets are included in Appendix A.

Table 6
Future 2022 PM Peak Hour Level of Service Summary

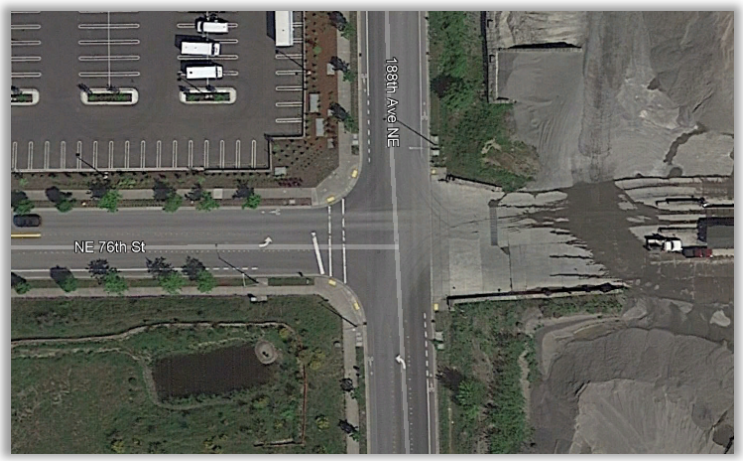
	Future 2022 Without Project		Future 2022 With Project	
Study Intersection	LOS	Delay (sec)	LOS	Delay (sec)
Signalized Intersections				
1. 188th Ave NE / Union Hill Road	C	34.3	C	35.0
2. 185th Ave NE / NE 76th St	B	10.3	B	10.5
4. 188th Ave NE / SR 202	C	33.7	C	34.3
Stop Controlled Intersections				
3. 188th Ave NE / NE 76th Street				
Eastbound Approach	E	37.9	E	44.7
Westbound Approach	E	43.4	F	50.1
5. 188th Ave NE / NE 70th Street				
Westbound Approach	-	-	B	12.5
Roundabout				
6. 192nd Ave NE / NE 70th Street	-	-	A	2.9

As shown in Table 6, the study intersections and controlled movements at the stop controlled intersections are expected to operate at LOS C or better in the future with or without the project during the weekday PM peak hour with exception to the eastbound and westbound approaches at the intersection of 188th Avenue NE/NE 76th Street. The eastbound approach is expected to operate at LOS E without or with the proposed Woodside residential project, while the westbound approach is expected to operate at LOS E without the proposed project and at LOS F for the future with project condition. The Woodside Residential project is estimated to add 54 new PM peak hour trips to the intersection (Woodside Residential project = 4.6 percent of total traffic) with a relatively minor increase in delay of approximately 6.7 seconds with the project. It should be noted that the westbound approach is a low-volume private access (10 exiting PM peak hour trips) to the Cadman

gravel pit. Improvements to consider include an all-way stop or signalization, neither of which is warranted at this time.

188th Avenue NE/NE 76th Street Multi-Way Stop Analysis

The intersection of 188th Avenue NE/NE 76th Street is currently a two-way stop controlled intersection with NE 76th Street as the stop controlled approach. The east leg of the intersection provides an access to the Cadman gravel pit.



The City of Redmond requested an evaluation of the need for a multi-way stop at the intersection based on guidelines included in the *Manual on Uniform Traffic Control Devices* (MUTCD). To conduct this evaluation, two days of existing 24-hour traffic counts were collected on the approaches to the intersection on Tuesday 1/29/19 and Wednesday 1/30/19. In addition, speed data was also collected on 188th Avenue NE just north and just south of NE 76th Street. Using the existing data, TENW forecasted future 2022 with-project volumes on each of the approaches to the intersection. The existing volume and speed data is included and summarized in Appendix D.

The MUTCD multi-way stop guidelines are included below along with TENW responses to each guideline/criteria.

MUTCD Section 2B.07 Multi-Way Stop Applications

Guidance:

The following criteria should be considered in the engineering study for a multi-way stop sign installation:

A. Where traffic control signals are justified, the multi-way stop is an interim measure that can be installed quickly to control traffic while arrangements are being made for the installation of the traffic control signal.

   TENW Response: A traffic signal is currently not warranted at 188th Ave NE/NE 76th Street, therefore this criteria does not apply. Signal warrant worksheets are included in Appendix E.

B. Five or more reported crashes in a 12-month period that are susceptible to correction by a multi-way stop installation. Such crashes include right-turn and left-turn collisions as well as right-angle collisions.

TENW Response: Based on the collision history reviewed for the three-year period from 1/1/15 to 12/31/17, there were less than 5 reported collisions at the intersection in any consecutive 12-month time period.

C. Minimum volumes:

1. The vehicular volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day; *and*
2. The combined vehicular, pedestrian, and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages at least 200 units per hour for the same 8 hours, with an average delay to minor-street vehicular traffic of at least 30 seconds per vehicle during the highest hour; but
3. If the 85th-percentile approach speed of the major-street traffic exceeds 40 mph, the minimum vehicular volume warrants are 70 percent of the values provided in items 1 and 2.

TENW Response: Based on the data collected and summarized in Appendix D, The vehicle volume on the major street does meet the minimum volume criteria in C.1. However, the volumes on NE 76th Street would not meet the minimum volume criteria in C.2, despite the average delay exceeding 30 seconds during the peak hour. In addition, the 85th percentile speed on 188th Avenue NE was observed to be less than 35 mph in both the NB and SB directions, so the 70 percent factor in C.3. does not apply. In summary, the Minimum Volumes criteria would not be met.

D. Where no single criterion is satisfied, but where Criteria B, C.1, and C.2 are satisfied to 80 percent of the minimum values. Criterion C.3 is excluded from this condition.

TENW Response: Although Criteria B and C.1. would be met under the 80 percent condition, Criteria C.2. would not be satisfied to 80 percent of the minimum value for 8 hours a day. Therefore, Criteria D would not be met.

Option:

Other criteria that may be considered in an engineering study include:

A. The need to control left-turn conflicts;

TENW Response: We are unaware of any specific left-turn conflicts that would justify mitigation.

B. The need to control vehicle/pedestrian conflicts near locations that generate high pedestrian volumes;

TENW Response: Based on existing traffic counts, there is currently minimal pedestrian activity at the intersection. Existing PM peak pedestrian counts are shown in Appendix E.

C. Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting cross traffic is also required to stop;

TENW Response: We are not aware of any sight distance deficiencies at this intersection.

D. An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multi-way stop control would improve traffic operational characteristics of the intersection.

TENW Response: Criteria does not apply.

As summary of our multi-way stop evaluation findings is included in Table 7 below.

Table 7
188th Ave NE / NE 76th St Multi-Way Stop Analysis Summary

Criteria		Criteria Met?
Criteria A – Traffic Control Signal Interim Measure		**N/A**
Criteria B – Collisions		**NO**
Criteria C – Minimum Volumes		**NO**
Condition 1 – Major Street Volume	YES	
Condition 2 – Minor Street Volume	NO	
Condition 3 – 70% of Conditions 1 and 2	N/A	
Criteria D – 80% of Criteria B, C.1 and C.2		**NO**
Option: Other Criteria:		
A. Left-Turn Conflicts		**NO**
B. Need to control vehicle/pedestrian conflicts		**NO**
C. Limited sight distance		**NO**
D. Intersection of residential neighborhood streets		**N/A**

As shown in the table above, based on our evaluation, a multi-way stop at the 188th Avenue NE/NE 76th Street intersection would not be warranted at this time.

MITIGATION

Frontage/Access Improvements

NE 70th Street (future road)

- Dedicate right-of-way along the project frontage and between 188th Ave NE and 192nd Ave NE.
- Construct a new road (NE 70th Street) between 188th Avenue NE and the proposed site access.
- Future roadway would include 20 feet of pavement, curb, gutter, and new street lighting with sidewalks and landscaping on the south side.

192nd Avenue NE (future road)

- Dedicate right-of-way and extend existing roadway from the existing terminus of 191st Avenue NE north to the future NE 70th Street.
- Future roadway would include 20 feet of pavement, curb, gutter, sidewalks, landscaping and street lighting.

Intersection of 192nd Avenue NE/NE 70th Street (future intersection):

- Construct a new 1-lane mini-roundabout with crosswalks on the south, east, and west legs.

Off-Site Improvements

Based on the results of the analysis shown in this report, no project-specific off-site transportation mitigation is proposed for concurrency or SEPA purposes.

Transportation Impact Fees

Long-term traffic impacts in the City of Redmond are mitigated by the projects included in the City's Transportation Facilities Plan (TFP). The TFP projects are funded through the payment of City of Redmond transportation impact fees. Based on this process, a fee is assessed upon a development to pay for a proportionate share of the cost of public facilities needed to serve new growth and development. As of the date of this study, the adopted impact fee schedule for permits issued in 2019 identifies a fee of $4,922.51 per dwelling unit for Multiple Family units. Based on this rate, a preliminary estimate of impact fees is $836,826.70 (170 units X $4,922.51). The applicant will pay the fees based on the number of units and impact fee rate in effect at the time of building permit issuance.

Appendix A

Level of Service (LOS) Calculations at Study Intersections

2019 Existing

Lanes, Volumes, Timings
1: 188 Ave NE & Union Hill Rd

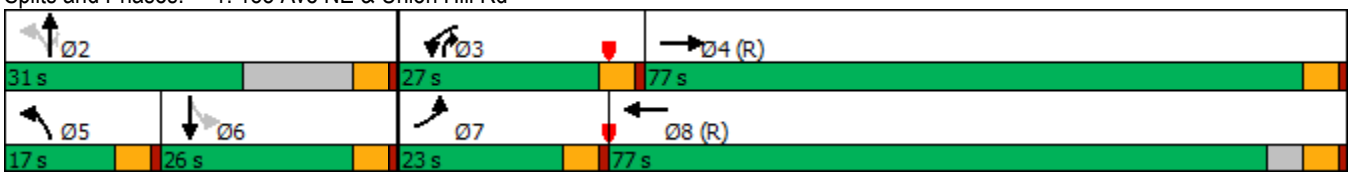
05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1209	247	109	389	0	143	1	422	41	49	31
Future Volume (vph)	2	1209	247	109	389	0	143	1	422	41	49	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	250		0	0		150	150		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	3485	0	1641	3539	0	0	1618	1599	1770	1758	0
Flt Permitted	0.950			0.950				0.651		0.535		
Satd. Flow (perm)	1805	3485	0	1641	3539	0	0	1102	1599	997	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23							35		18	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		987			620			380			367	
Travel Time (s)		19.2			12.1			7.4			7.1	
Confl. Peds. (#/hr)							2					2
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	1%	10%	2%	0%	12%	0%	1%	2%	0%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	1501	0	112	401	0	0	148	435	42	83	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	pm+ov	Perm	NA	
Protected Phases	7	4		3	8		5	2	3		6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	3	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	23.0		10.0	23.0		10.0	26.0	10.0	26.0	26.0	
Total Split (s)	23.0	77.0		27.0	77.0		17.0	31.0	27.0	26.0	26.0	
Total Split (%)	15.6%	52.4%		18.4%	52.4%		11.6%	21.1%	18.4%	17.7%	17.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	5.3	87.2		15.9	105.9			29.0	49.8	29.0	29.0	
Actuated g/C Ratio	0.04	0.59		0.11	0.72			0.20	0.34	0.20	0.20	
v/c Ratio	0.03	0.72		0.63	0.16			0.69	0.77	0.21	0.23	
Control Delay	69.0	25.6		78.3	7.9			69.6	48.3	48.9	37.7	
Queue Delay	0.0	0.2		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	69.0	25.8		78.3	7.9			69.6	48.3	48.9	37.7	
LOS	E	C		E	A			E	D	D	D	
Approach Delay		25.8			23.3			53.7			41.5	
Approach LOS		C			C			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 147	

Actuated Cycle Length: 147	
Offset: 77 (52%), Referenced to phase 4:EBT and 8:WBT, Start of 1st Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.77	
Intersection Signal Delay: 32.0	Intersection LOS: C
Intersection Capacity Utilization 85.3%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: 188 Ave NE & Union Hill Rd



Lanes, Volumes, Timings
2: 185th Ave NE/185 Ave NE & NE76th St/NE 76 St

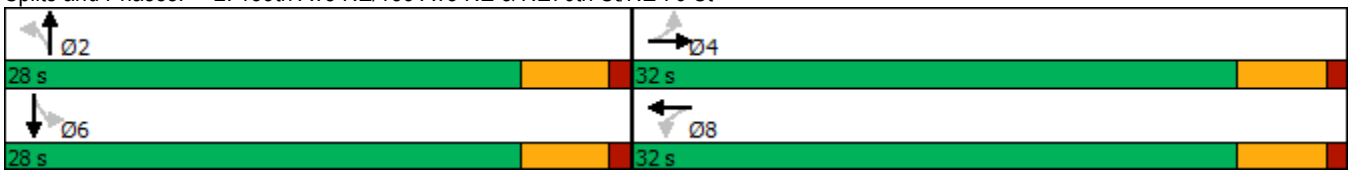
05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	383	71	29	246	39	71	175	68	96	112	27
Future Volume (vph)	53	383	71	29	246	39	71	175	68	96	112	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1330			270			3220			1115	
Travel Time (s)		30.2			6.1			73.2			25.3	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	9%	3%	3%	7%	1%	3%	4%	3%	6%	0%	5%	0%
Mid-Block Traffic (%)		0%			50%			0%			0%	
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		26.0	26.0		26.0	26.0	
Total Split (s)	32.0	32.0		32.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	

Intersection Summary

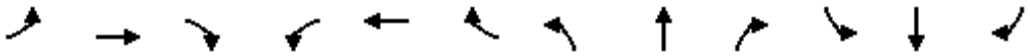
Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 45.7
Natural Cycle: 55
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: 185th Ave NE/185 Ave NE & NE76th St/NE 76 St



HCM 6th Signalized Intersection Summary
2: 185th Ave NE/185 Ave NE & NE76th St/NE 76 St

05/30/2019



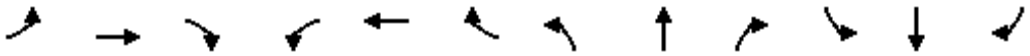
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	53	383	71	29	246	39	71	175	68	96	112	27
Future Volume (veh/h)	53	383	71	29	246	39	71	175	68	96	112	27
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1885	1885	1885	1856	1856	1856	1826	1826	1826
Adj Flow Rate, veh/h	59	426	79	32	273	43	79	194	76	107	124	30
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	1	1	1	3	3	3	5	5	5
Cap, veh/h	157	592	104	144	637	94	203	304	106	291	268	54
Arrive On Green	0.43	0.43	0.43	0.43	0.43	0.43	0.29	0.29	0.29	0.29	0.29	0.29
Sat Flow, veh/h	103	1387	243	75	1491	221	267	1054	368	507	929	187
Grp Volume(v), veh/h	564	0	0	348	0	0	349	0	0	261	0	0
Grp Sat Flow(s),veh/h/ln	1733	0	0	1786	0	0	1689	0	0	1623	0	0
Q Serve(g_s), s	3.3	0.0	0.0	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	9.5	0.0	0.0	4.7	0.0	0.0	6.3	0.0	0.0	4.3	0.0	0.0
Prop In Lane	0.10		0.14	0.09		0.12	0.23		0.22	0.41		0.11
Lane Grp Cap(c), veh/h	853	0	0	875	0	0	613	0	0	613	0	0
V/C Ratio(X)	0.66	0.00	0.00	0.40	0.00	0.00	0.57	0.00	0.00	0.43	0.00	0.00
Avail Cap(c_a), veh/h	1424	0	0	1445	0	0	1198	0	0	1124	0	0
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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.4	0.0	0.0	7.1	0.0	0.0	11.1	0.0	0.0	10.4	0.0	0.0
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.3	0.0	0.0	0.8	0.0	0.0	0.5	0.0	0.0
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 BackOfQ(50%),veh/ln	2.4	0.0	0.0	1.2	0.0	0.0	1.9	0.0	0.0	1.3	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.3	0.0	0.0	7.4	0.0	0.0	11.9	0.0	0.0	10.9	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		564			348			349			261	
Approach Delay, s/veh		9.3			7.4			11.9			10.9	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		15.2		20.0		15.2		20.0				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		23.0		27.0		23.0		27.0				
Max Q Clear Time (g_c+I1), s		8.3		11.5		6.3		6.7				
Green Ext Time (p_c), s		1.9		3.5		1.5		2.2				

Intersection Summary												
HCM 6th Ctrl Delay			9.7									
HCM 6th LOS			A									

Lanes, Volumes, Timings
3: 188 Ave NE & NE 76 St

05/30/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	102	0	126	6	2	2	118	344	0	0	323	35
Future Volume (vph)	102	0	126	6	2	2	118	344	0	0	323	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	120		0	120		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			15			35			35	
Link Distance (ft)		729			160			394			1178	
Travel Time (s)		19.9			7.3			7.7			22.9	
Confl. Peds. (#/hr)	4		4				4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	0%	10%	100%	0%	0%	3%	16%	0%	0%	4%	0%
Mid-Block Traffic (%)		30%			0%			0%			0%	
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	7.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	102	0	126	6	2	2	118	344	0	0	323	35
Future Vol, veh/h	102	0	126	6	2	2	118	344	0	0	323	35
Conflicting Peds, #/hr	4	0	4	0	0	0	4	0	0	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	120	-	-	-	-	-	120	-	-	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	0	10	100	0	0	3	16	0	0	4	0
Mvmt Flow	115	0	142	7	2	2	133	387	0	0	363	39

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1046	1040	391	1111	1059	391	406	0	0	387	0	0
Stage 1	387	387	-	653	653	-	-	-	-	-	-	-
Stage 2	659	653	-	458	406	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.3	8.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.12	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.39	4.4	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	206	232	640	123	226	662	1147	-	-	1183	-	-
Stage 1	637	613	-	328	467	-	-	-	-	-	-	-
Stage 2	453	467	-	433	601	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	184	204	636	87	199	660	1143	-	-	1183	-	-
Mov Cap-2 Maneuver	184	204	-	87	199	-	-	-	-	-	-	-
Stage 1	561	611	-	290	413	-	-	-	-	-	-	-
Stage 2	395	413	-	335	599	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	30.2	37.5	2.2	0
HCM LOS	D	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1143	-	-	184	636	122	1183	-	-
HCM Lane V/C Ratio	0.116	-	-	0.623	0.223	0.092	-	-	-
HCM Control Delay (s)	8.6	-	-	52.3	12.3	37.5	0	-	-
HCM Lane LOS	A	-	-	F	B	E	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	3.5	0.8	0.3	0	-	-

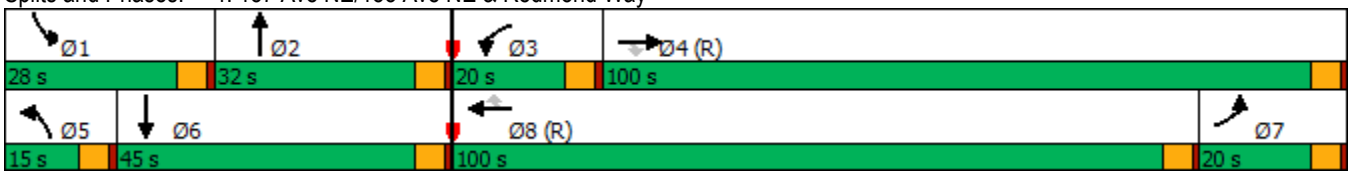
Lanes, Volumes, Timings
4: 187 Ave NE/188 Ave NE & Redmond Way

05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	36	1844	43	35	832	110	37	74	77	308	60	55
Future Volume (vph)	36	1844	43	35	832	110	37	74	77	308	60	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	110		0	110		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		2038			889			536			672	
Travel Time (s)		30.9			13.5			12.2			13.1	
Confl. Peds. (#/hr)						3			1			3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	5%	9%	4%	8%	6%	1%	1%	4%	0%	17%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	40.0	40.0	20.0	40.0	40.0	15.0	32.0		15.0	30.0	
Total Split (s)	20.0	100.0	100.0	20.0	100.0	100.0	15.0	32.0		28.0	45.0	
Total Split (%)	11.1%	55.6%	55.6%	11.1%	55.6%	55.6%	8.3%	17.8%		15.6%	25.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 13 (7%), Referenced to phase 4:EBT and 8:WBT, Start of 1st Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	

Splits and Phases: 4: 187 Ave NE/188 Ave NE & Redmond Way



HCM 6th Signalized Intersection Summary
4: 187 Ave NE/188 Ave NE & Redmond Way

05/30/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	36	1844	43	35	832	110	37	74	77	308	60	55
Future Volume (veh/h)	36	1844	43	35	832	110	37	74	77	308	60	55
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1885	1826	1767	1841	1781	1811	1885	1885	1841	1900	1900
Adj Flow Rate, veh/h	38	1941	4	37	876	0	39	78	81	324	63	58
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	1	5	9	4	8	6	1	1	4	0	0
Cap, veh/h	268	2320	1002	47	1846	797	50	89	92	368	167	154
Arrive On Green	0.20	0.86	0.86	0.03	0.53	0.00	0.03	0.11	0.11	0.11	0.18	0.18
Sat Flow, veh/h	1810	3582	1547	1682	3497	1510	1725	846	878	3401	908	836
Grp Volume(v), veh/h	38	1941	4	37	876	0	39	0	159	324	0	121
Grp Sat Flow(s),veh/h/ln	1810	1791	1547	1682	1749	1510	1725	0	1724	1700	0	1745
Q Serve(g_s), s	3.1	48.4	0.1	3.9	28.4	0.0	4.0	0.0	16.4	16.9	0.0	10.9
Cycle Q Clear(g_c), s	3.1	48.4	0.1	3.9	28.4	0.0	4.0	0.0	16.4	16.9	0.0	10.9
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.51	1.00		0.48
Lane Grp Cap(c), veh/h	268	2320	1002	47	1846	797	50	0	181	368	0	321
V/C Ratio(X)	0.14	0.84	0.00	0.79	0.47	0.00	0.78	0.00	0.88	0.88	0.00	0.38
Avail Cap(c_a), veh/h	268	2320	1002	140	1846	797	96	0	259	435	0	388
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.64	0.64	0.64	0.97	0.97	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	62.8	7.7	4.4	87.0	26.8	0.0	86.8	0.0	79.4	79.1	0.0	64.4
Incr Delay (d2), s/veh	0.2	2.5	0.0	23.7	0.9	0.0	22.8	0.0	20.6	16.7	0.0	0.7
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 BackOfQ(50%),veh/ln	1.4	8.4	0.0	2.0	11.9	0.0	2.1	0.0	8.4	8.3	0.0	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	63.0	10.2	4.4	110.7	27.6	0.0	109.6	0.0	100.0	95.8	0.0	65.1
LnGrp LOS	E	B	A	F	C	A	F	A	F	F	A	E
Approach Vol, veh/h		1983			913			198			445	
Approach Delay, s/veh		11.2			31.0			101.9			87.5	
Approach LOS		B			C			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	24.5	23.9	10.0	121.6	10.2	38.2	31.6	100.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	23.0	27.0	15.0	95.0	10.0	40.0	15.0	95.0
Max Q Clear Time (g_c+I1), s	18.9	18.4	5.9	50.4	6.0	12.9	5.1	30.4
Green Ext Time (p_c), s	0.5	0.3	0.0	15.9	0.0	0.4	0.0	4.5

Intersection Summary	
HCM 6th Ctrl Delay	31.0
HCM 6th LOS	C

Future 2022 Without Project

Lanes, Volumes, Timings
1: 188 Ave NE & Union Hill Rd

05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1283	262	116	413	0	152	1	448	44	52	33
Future Volume (vph)	2	1283	262	116	413	0	152	1	448	44	52	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	250		0	0		150	150		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	3485	0	1641	3539	0	0	1618	1599	1770	1758	0
Flt Permitted	0.950			0.950				0.642		0.525		
Satd. Flow (perm)	1805	3485	0	1641	3539	0	0	1086	1599	978	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		23							28		18	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		987			620			380			367	
Travel Time (s)		19.2			12.1			7.4			7.1	
Confl. Peds. (#/hr)							2					2
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	1%	10%	2%	0%	12%	0%	1%	2%	0%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	1593	0	120	426	0	0	158	462	45	88	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	pm+ov	Perm	NA	
Protected Phases	7	4		3	8		5	2	3		6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	3	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	23.0		10.0	23.0		10.0	26.0	10.0	26.0	26.0	
Total Split (s)	23.0	77.0		27.0	77.0		17.0	31.0	27.0	26.0	26.0	
Total Split (%)	15.6%	52.4%		18.4%	52.4%		11.6%	21.1%	18.4%	17.7%	17.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	5.3	84.6		16.6	104.1			30.8	52.4	30.8	30.8	
Actuated g/C Ratio	0.04	0.58		0.11	0.71			0.21	0.36	0.21	0.21	
v/c Ratio	0.03	0.79		0.65	0.17			0.70	0.79	0.22	0.23	
Control Delay	69.0	29.4		78.3	8.5			69.0	48.7	47.9	37.4	
Queue Delay	0.0	0.3		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	69.0	29.7		78.3	8.5			69.0	48.7	47.9	37.4	
LOS	E	C		E	A			E	D	D	D	
Approach Delay		29.7			23.9			53.9			41.0	
Approach LOS		C			C			D			D	

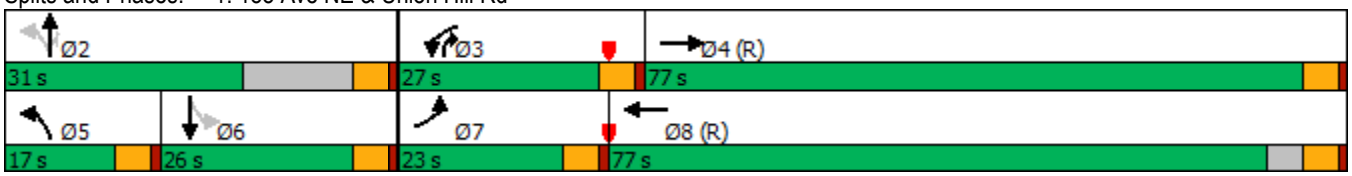
Intersection Summary	
Area Type:	Other
Cycle Length: 147	

Lanes, Volumes, Timings
1: 188 Ave NE & Union Hill Rd

05/30/2019

Actuated Cycle Length: 147	
Offset: 77 (52%), Referenced to phase 4:EBT and 8:WBT, Start of 1st Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.79	
Intersection Signal Delay: 34.3	Intersection LOS: C
Intersection Capacity Utilization 89.7%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: 188 Ave NE & Union Hill Rd



Lanes, Volumes, Timings
2: 185th Ave NE/185 Ave NE & NE 76th St/NE 76 St

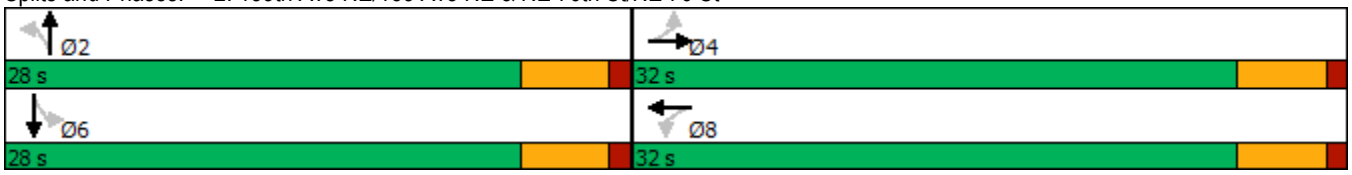
05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	406	75	31	261	41	75	186	72	102	119	29
Future Volume (vph)	56	406	75	31	261	41	75	186	72	102	119	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1330			270			3220			1115	
Travel Time (s)		30.2			6.1			73.2			25.3	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	9%	3%	3%	7%	1%	3%	4%	3%	6%	0%	5%	0%
Mid-Block Traffic (%)		0%			50%			0%			0%	
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		26.0	26.0		26.0	26.0	
Total Split (s)	32.0	32.0		32.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	

Intersection Summary

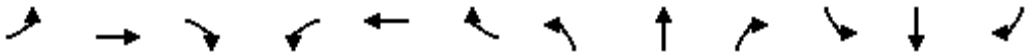
Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 47.9
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: 185th Ave NE/185 Ave NE & NE 76th St/NE 76 St



HCM 6th Signalized Intersection Summary
2: 185th Ave NE/185 Ave NE & NE 76th St/NE 76 St

05/30/2019



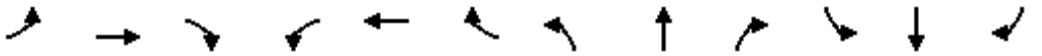
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	406	75	31	261	41	75	186	72	102	119	29
Future Volume (veh/h)	56	406	75	31	261	41	75	186	72	102	119	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1885	1885	1885	1856	1856	1856	1826	1826	1826
Adj Flow Rate, veh/h	62	451	83	34	290	46	83	207	80	113	132	32
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	1	1	1	3	3	3	5	5	5
Cap, veh/h	152	607	106	138	654	98	197	313	108	281	266	54
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	105	1383	241	77	1490	222	270	1060	367	495	902	182
Grp Volume(v), veh/h	596	0	0	370	0	0	370	0	0	277	0	0
Grp Sat Flow(s),veh/h/ln	1729	0	0	1789	0	0	1697	0	0	1579	0	0
Q Serve(g_s), s	4.3	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.8	0.0	0.0	5.3	0.0	0.0	7.1	0.0	0.0	5.1	0.0	0.0
Prop In Lane	0.10		0.14	0.09		0.12	0.22		0.22	0.41		0.12
Lane Grp Cap(c), veh/h	864	0	0	890	0	0	618	0	0	601	0	0
V/C Ratio(X)	0.69	0.00	0.00	0.42	0.00	0.00	0.60	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	1333	0	0	1358	0	0	1126	0	0	1043	0	0
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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	8.9	0.0	0.0	7.4	0.0	0.0	11.8	0.0	0.0	11.1	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.3	0.0	0.0	0.9	0.0	0.0	0.6	0.0	0.0
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 BackOfQ(50%),veh/ln	2.9	0.0	0.0	1.4	0.0	0.0	2.2	0.0	0.0	1.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	9.9	0.0	0.0	7.7	0.0	0.0	12.7	0.0	0.0	11.7	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		596			370			370			277	
Approach Delay, s/veh		9.9			7.7			12.7			11.7	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		16.1		21.5		16.1		21.5				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		23.0		27.0		23.0		27.0				
Max Q Clear Time (g_c+I1), s		9.1		12.8		7.1		7.3				
Green Ext Time (p_c), s		2.0		3.6		1.6		2.3				

Intersection Summary												
HCM 6th Ctrl Delay			10.3									
HCM 6th LOS			B									

Lanes, Volumes, Timings
3: 188 Ave NE & NE 76 St

05/30/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	0	134	6	2	2	125	365	0	0	343	37
Future Volume (vph)	108	0	134	6	2	2	125	365	0	0	343	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	120		0	120		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			15			35			35	
Link Distance (ft)		729			160			394			1178	
Travel Time (s)		19.9			7.3			7.7			22.9	
Confl. Peds. (#/hr)	4		4				4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	0%	10%	100%	0%	0%	3%	16%	0%	0%	4%	0%
Mid-Block Traffic (%)		30%			0%			0%			0%	
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	9.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	108	0	134	6	2	2	125	365	0	0	343	37
Future Vol, veh/h	108	0	134	6	2	2	125	365	0	0	343	37
Conflicting Peds, #/hr	4	0	4	0	0	0	4	0	0	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	120	-	-	-	-	-	120	-	-	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	0	10	100	0	0	3	16	0	0	4	0
Mvmt Flow	121	0	151	7	2	2	140	410	0	0	385	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1106	1100	414	1176	1121	414	431	0	0	410	0	0
Stage 1	410	410	-	690	690	-	-	-	-	-	-	-
Stage 2	696	690	-	486	431	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.3	8.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.12	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.39	4.4	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	188	214	621	109	208	643	1123	-	-	1160	-	-
Stage 1	619	599	-	311	449	-	-	-	-	-	-	-
Stage 2	432	449	-	416	586	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	167	187	617	74	181	641	1119	-	-	1160	-	-
Mov Cap-2 Maneuver	167	187	-	74	181	-	-	-	-	-	-	-
Stage 1	540	597	-	272	393	-	-	-	-	-	-	-
Stage 2	373	393	-	313	584	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	37.9	43.4	2.2	0
HCM LOS	E	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1119	-	-	167	617	105	1160	-	-
HCM Lane V/C Ratio	0.126	-	-	0.727	0.244	0.107	-	-	-
HCM Control Delay (s)	8.7	-	-	69.1	12.7	43.4	0	-	-
HCM Lane LOS	A	-	-	F	B	E	A	-	-
HCM 95th %tile Q(veh)	0.4	-	-	4.5	1	0.3	0	-	-

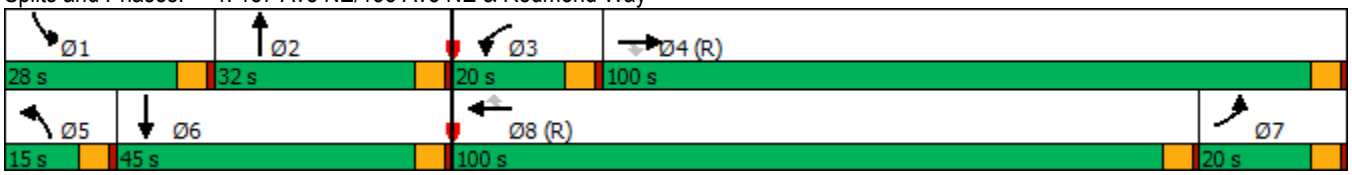
Lanes, Volumes, Timings
4: 187 Ave NE/188 Ave NE & Redmond Way

05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1957	45	37	883	117	39	79	81	327	64	58
Future Volume (vph)	38	1957	45	37	883	117	39	79	81	327	64	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	110		0	110		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		2038			889			536			672	
Travel Time (s)		30.9			13.5			12.2			13.1	
Confl. Peds. (#/hr)						3			1			3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	5%	9%	4%	8%	6%	1%	1%	4%	0%	17%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	40.0	40.0	20.0	40.0	40.0	15.0	32.0		15.0	30.0	
Total Split (s)	20.0	100.0	100.0	20.0	100.0	100.0	15.0	32.0		28.0	45.0	
Total Split (%)	11.1%	55.6%	55.6%	11.1%	55.6%	55.6%	8.3%	17.8%		15.6%	25.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 13 (7%), Referenced to phase 4:EBT and 8:WBT, Start of 1st Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	

Splits and Phases: 4: 187 Ave NE/188 Ave NE & Redmond Way



HCM 6th Signalized Intersection Summary
4: 187 Ave NE/188 Ave NE & Redmond Way

05/30/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	38	1957	45	37	883	117	39	79	81	327	64	58
Future Volume (veh/h)	38	1957	45	37	883	117	39	79	81	327	64	58
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1885	1826	1767	1841	1781	1811	1885	1885	1841	1900	1900
Adj Flow Rate, veh/h	40	2060	4	39	929	0	41	83	85	344	67	61
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	1	5	9	4	8	6	1	1	4	0	0
Cap, veh/h	249	2278	984	50	1846	797	52	94	96	386	176	161
Arrive On Green	0.18	0.85	0.85	0.03	0.53	0.00	0.03	0.11	0.11	0.11	0.19	0.19
Sat Flow, veh/h	1810	3582	1547	1682	3497	1510	1725	852	873	3401	914	832
Grp Volume(v), veh/h	40	2060	4	39	929	0	41	0	168	344	0	128
Grp Sat Flow(s),veh/h/ln	1810	1791	1547	1682	1749	1510	1725	0	1725	1700	0	1746
Q Serve(g_s), s	3.3	67.9	0.1	4.1	30.7	0.0	4.2	0.0	17.3	18.0	0.0	11.5
Cycle Q Clear(g_c), s	3.3	67.9	0.1	4.1	30.7	0.0	4.2	0.0	17.3	18.0	0.0	11.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.51	1.00		0.48
Lane Grp Cap(c), veh/h	249	2278	984	50	1846	797	52	0	190	386	0	337
V/C Ratio(X)	0.16	0.90	0.00	0.79	0.50	0.00	0.78	0.00	0.88	0.89	0.00	0.38
Avail Cap(c_a), veh/h	249	2278	984	140	1846	797	96	0	259	435	0	388
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.64	0.64	0.64	0.97	0.97	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	64.8	10.3	5.1	86.8	27.3	0.0	86.7	0.0	79.0	78.7	0.0	63.2
Incr Delay (d2), s/veh	0.2	4.3	0.0	22.7	1.0	0.0	21.9	0.0	22.8	18.7	0.0	0.7
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 BackOfQ(50%),veh/ln	1.5	14.5	0.0	2.1	12.9	0.0	2.2	0.0	8.9	8.9	0.0	5.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.0	14.6	5.1	109.5	28.3	0.0	108.6	0.0	101.7	97.4	0.0	63.9
LnGrp LOS	E	B	A	F	C	A	F	A	F	F	A	E
Approach Vol, veh/h		2104			968			209			472	
Approach Delay, s/veh		15.6			31.6			103.1			88.3	
Approach LOS		B			C			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.4	24.8	10.3	119.5	10.5	39.8	29.8	100.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	23.0	27.0	15.0	95.0	10.0	40.0	15.0	95.0
Max Q Clear Time (g_c+I1), s	20.0	19.3	6.1	69.9	6.2	13.5	5.3	32.7
Green Ext Time (p_c), s	0.5	0.3	0.0	13.8	0.0	0.4	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	33.7
HCM 6th LOS	C

Future 2022 With Project

Lanes, Volumes, Timings
1: 188 Ave NE & Union Hill Rd

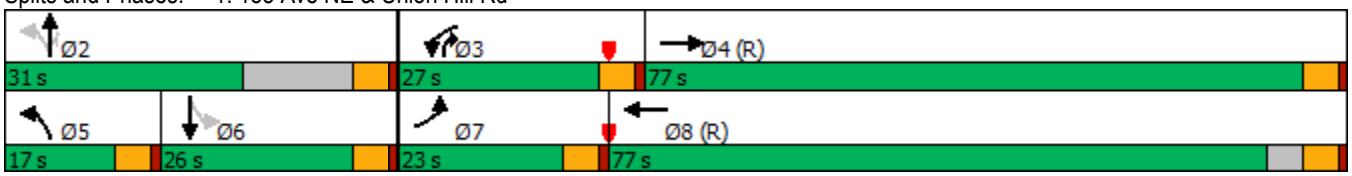
05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	2	1283	269	124	413	0	157	1	453	44	52	33
Future Volume (vph)	2	1283	269	124	413	0	157	1	453	44	52	33
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	250		0	250		0	0		150	150		0
Storage Lanes	1		0	1		0	0		1	1		0
Taper Length (ft)	25			25			25			25		
Satd. Flow (prot)	1805	3481	0	1641	3539	0	0	1618	1599	1770	1758	0
Flt Permitted	0.950			0.950				0.643		0.517		
Satd. Flow (perm)	1805	3481	0	1641	3539	0	0	1088	1599	963	1758	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24							28		18	
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		987			620			380			367	
Travel Time (s)		19.2			12.1			7.4			7.1	
Confl. Peds. (#/hr)							2					2
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	0%	1%	1%	10%	2%	0%	12%	0%	1%	2%	0%	3%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	2	1600	0	128	426	0	0	163	467	45	88	0
Turn Type	Prot	NA		Prot	NA		pm+pt	NA	pm+ov	Perm	NA	
Protected Phases	7	4		3	8		5	2	3		6	
Permitted Phases							2		2	6		
Detector Phase	7	4		3	8		5	2	3	6	6	
Switch Phase												
Minimum Initial (s)	5.0	10.0		5.0	10.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	23.0		10.0	23.0		10.0	26.0	10.0	26.0	26.0	
Total Split (s)	23.0	77.0		27.0	77.0		17.0	31.0	27.0	26.0	26.0	
Total Split (%)	15.6%	52.4%		18.4%	52.4%		11.6%	21.1%	18.4%	17.7%	17.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0	5.0	5.0	
Lead/Lag	Lead	Lag		Lead	Lag		Lead		Lead	Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	5.3	83.8		17.0	103.6			31.2	53.2	31.2	31.2	
Actuated g/C Ratio	0.04	0.57		0.12	0.70			0.21	0.36	0.21	0.21	
v/c Ratio	0.03	0.80		0.68	0.17			0.71	0.78	0.22	0.23	
Control Delay	69.0	30.3		79.9	8.6			69.4	48.0	47.8	37.2	
Queue Delay	0.0	0.3		0.0	0.0			0.0	0.0	0.0	0.0	
Total Delay	69.0	30.6		79.9	8.6			69.4	48.0	47.8	37.2	
LOS	E	C		E	A			E	D	D	D	
Approach Delay		30.6			25.1			53.5			40.8	
Approach LOS		C			C			D			D	

Intersection Summary	
Area Type:	Other
Cycle Length: 147	

Actuated Cycle Length: 147	
Offset: 77 (52%), Referenced to phase 4:EBT and 8:WBT, Start of 1st Green	
Natural Cycle: 90	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.80	
Intersection Signal Delay: 35.0	Intersection LOS: C
Intersection Capacity Utilization 90.2%	ICU Level of Service E
Analysis Period (min) 15	

Splits and Phases: 1: 188 Ave NE & Union Hill Rd



Lanes, Volumes, Timings
2: 185th Ave NE/185 Ave NE & NE 76th St/NE 76 St

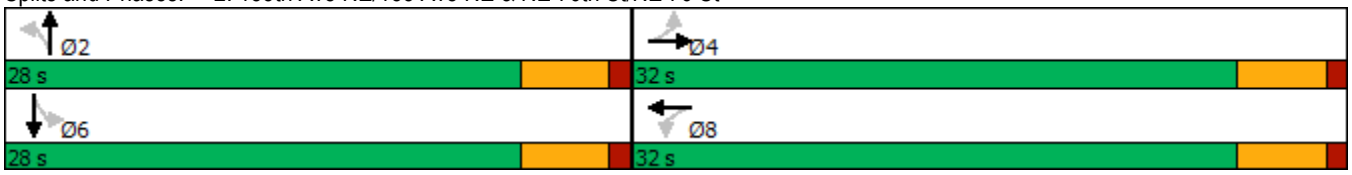
05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	416	75	33	267	41	75	186	75	102	119	29
Future Volume (vph)	56	416	75	33	267	41	75	186	75	102	119	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1330			270			3220			1115	
Travel Time (s)		30.2			6.1			73.2			25.3	
Confl. Peds. (#/hr)	1		1	1		1						
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	9%	3%	3%	7%	1%	3%	4%	3%	6%	0%	5%	0%
Mid-Block Traffic (%)		0%			50%			0%			0%	
Shared Lane Traffic (%)												
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	26.0	26.0		26.0	26.0		26.0	26.0		26.0	26.0	
Total Split (s)	32.0	32.0		32.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	53.3%	53.3%		53.3%	53.3%		46.7%	46.7%		46.7%	46.7%	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0		1.0	1.0	
Lost Time Adjust (s)		0.0			0.0			0.0			0.0	
Total Lost Time (s)		5.0			5.0			5.0			5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		Min	Min		Min	Min	

Intersection Summary

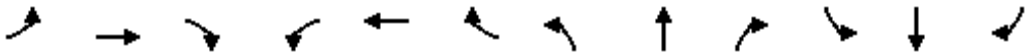
Area Type: Other
Cycle Length: 60
Actuated Cycle Length: 48.3
Natural Cycle: 60
Control Type: Actuated-Uncoordinated

Splits and Phases: 2: 185th Ave NE/185 Ave NE & NE 76th St/NE 76 St



HCM 6th Signalized Intersection Summary
2: 185th Ave NE/185 Ave NE & NE 76th St/NE 76 St

05/30/2019



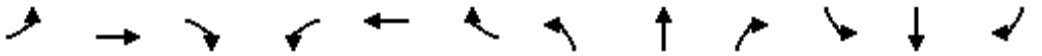
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	56	416	75	33	267	41	75	186	75	102	119	29
Future Volume (veh/h)	56	416	75	33	267	41	75	186	75	102	119	29
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1885	1885	1885	1856	1856	1856	1826	1826	1826
Adj Flow Rate, veh/h	62	462	83	37	297	46	83	207	83	113	132	32
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	3	3	3	1	1	1	3	3	3	5	5	5
Cap, veh/h	149	616	105	141	659	96	195	310	112	278	265	54
Arrive On Green	0.44	0.44	0.44	0.44	0.44	0.44	0.30	0.30	0.30	0.30	0.30	0.30
Sat Flow, veh/h	103	1390	237	84	1487	216	269	1051	378	491	897	181
Grp Volume(v), veh/h	607	0	0	380	0	0	373	0	0	277	0	0
Grp Sat Flow(s),veh/h/ln	1730	0	0	1788	0	0	1697	0	0	1570	0	0
Q Serve(g_s), s	4.5	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	11.2	0.0	0.0	5.5	0.0	0.0	7.3	0.0	0.0	5.3	0.0	0.0
Prop In Lane	0.10		0.14	0.10		0.12	0.22		0.22	0.41		0.12
Lane Grp Cap(c), veh/h	870	0	0	895	0	0	617	0	0	596	0	0
V/C Ratio(X)	0.70	0.00	0.00	0.42	0.00	0.00	0.60	0.00	0.00	0.46	0.00	0.00
Avail Cap(c_a), veh/h	1312	0	0	1333	0	0	1108	0	0	1023	0	0
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	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	9.0	0.0	0.0	7.5	0.0	0.0	12.0	0.0	0.0	11.3	0.0	0.0
Incr Delay (d2), s/veh	1.0	0.0	0.0	0.3	0.0	0.0	1.0	0.0	0.0	0.6	0.0	0.0
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 BackOfQ(50%),veh/ln	3.0	0.0	0.0	1.5	0.0	0.0	2.3	0.0	0.0	1.6	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	10.0	0.0	0.0	7.8	0.0	0.0	13.0	0.0	0.0	11.9	0.0	0.0
LnGrp LOS	A	A	A	A	A	A	B	A	A	B	A	A
Approach Vol, veh/h		607			380			373			277	
Approach Delay, s/veh		10.0			7.8			13.0			11.9	
Approach LOS		A			A			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		16.3		21.9		16.3		21.9				
Change Period (Y+Rc), s		5.0		5.0		5.0		5.0				
Max Green Setting (Gmax), s		23.0		27.0		23.0		27.0				
Max Q Clear Time (g_c+I1), s		9.3		13.2		7.3		7.5				
Green Ext Time (p_c), s		2.0		3.6		1.6		2.4				

Intersection Summary												
HCM 6th Ctrl Delay			10.5									
HCM 6th LOS			B									

Lanes, Volumes, Timings
3: 188 Ave NE & NE 76 St

05/30/2019



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	0	147	6	2	2	133	378	0	0	363	37
Future Volume (vph)	108	0	147	6	2	2	133	378	0	0	363	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	120		0	120		0	120		0	120		0
Storage Lanes	1		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			15			35			35	
Link Distance (ft)		729			160			394			1178	
Travel Time (s)		19.9			7.3			7.7			22.9	
Confl. Peds. (#/hr)	4		4				4					4
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	0%	10%	100%	0%	0%	3%	16%	0%	0%	4%	0%
Mid-Block Traffic (%)		30%			0%			0%			0%	
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	11.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	108	0	147	6	2	2	133	378	0	0	363	37
Future Vol, veh/h	108	0	147	6	2	2	133	378	0	0	363	37
Conflicting Peds, #/hr	4	0	4	0	0	0	4	0	0	0	0	4
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	120	-	-	-	-	-	120	-	-	120	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Vehicles, %	2	0	10	100	0	0	3	16	0	0	4	0
Mvmt Flow	121	0	165	7	2	2	149	425	0	0	408	42

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1162	1156	437	1239	1177	429	454	0	0	425	0	0
Stage 1	433	433	-	723	723	-	-	-	-	-	-	-
Stage 2	729	723	-	516	454	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.5	6.3	8.1	6.5	6.2	4.13	-	-	4.1	-	-
Critical Hdwy Stg 1	6.12	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.5	-	7.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4	3.39	4.4	4	3.3	2.227	-	-	2.2	-	-
Pot Cap-1 Maneuver	172	198	603	98	193	630	1101	-	-	1145	-	-
Stage 1	601	585	-	296	434	-	-	-	-	-	-	-
Stage 2	414	434	-	399	573	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	151	170	599	63	166	628	1097	-	-	1145	-	-
Mov Cap-2 Maneuver	151	170	-	63	166	-	-	-	-	-	-	-
Stage 1	517	583	-	256	375	-	-	-	-	-	-	-
Stage 2	353	375	-	288	571	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	44.7	50.1	2.3	0
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1097	-	-	151	599	91	1145	-	-
HCM Lane V/C Ratio	0.136	-	-	0.804	0.276	0.123	-	-	-
HCM Control Delay (s)	8.8	-	-	87.5	13.3	50.1	0	-	-
HCM Lane LOS	A	-	-	F	B	F	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	5.1	1.1	0.4	0	-	-

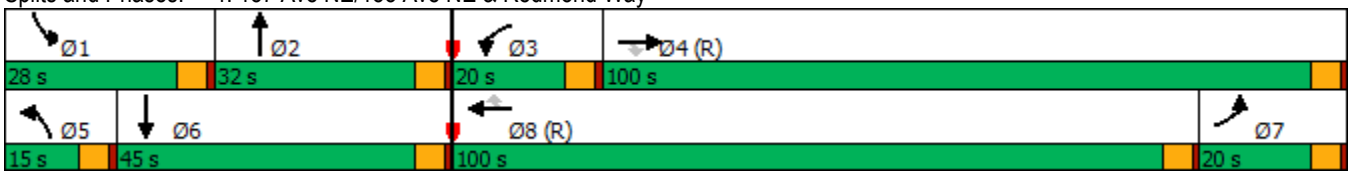
Lanes, Volumes, Timings
4: 187 Ave NE/188 Ave NE & Redmond Way

05/30/2019

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	1957	45	37	883	125	39	82	81	332	66	59
Future Volume (vph)	40	1957	45	37	883	125	39	82	81	332	66	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200		200	110		0	110		0
Storage Lanes	1		1	1		1	1		0	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			35	
Link Distance (ft)		2038			889			536			672	
Travel Time (s)		30.9			13.5			12.2			13.1	
Confl. Peds. (#/hr)						3			1			3
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	0%	1%	5%	9%	4%	8%	6%	1%	1%	4%	0%	17%
Shared Lane Traffic (%)												
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Detector Phase	7	4	4	3	8	8	5	2		1	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Minimum Split (s)	20.0	40.0	40.0	20.0	40.0	40.0	15.0	32.0		15.0	30.0	
Total Split (s)	20.0	100.0	100.0	20.0	100.0	100.0	15.0	32.0		28.0	45.0	
Total Split (%)	11.1%	55.6%	55.6%	11.1%	55.6%	55.6%	8.3%	17.8%		15.6%	25.0%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag		Lead	Lag	
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	C-Max	C-Max	None	C-Max	C-Max	None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 180	
Actuated Cycle Length: 180	
Offset: 13 (7%), Referenced to phase 4:EBT and 8:WBT, Start of 1st Green	
Natural Cycle: 140	
Control Type: Actuated-Coordinated	

Splits and Phases: 4: 187 Ave NE/188 Ave NE & Redmond Way



HCM 6th Signalized Intersection Summary
4: 187 Ave NE/188 Ave NE & Redmond Way

05/30/2019

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	40	1957	45	37	883	125	39	82	81	332	66	59
Future Volume (veh/h)	40	1957	45	37	883	125	39	82	81	332	66	59
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
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1900	1885	1826	1767	1841	1781	1811	1885	1885	1841	1900	1900
Adj Flow Rate, veh/h	42	2060	4	39	929	0	41	86	85	349	69	62
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	1	5	9	4	8	6	1	1	4	0	0
Cap, veh/h	244	2268	980	50	1846	797	52	97	96	390	180	162
Arrive On Green	0.18	0.84	0.84	0.03	0.53	0.00	0.03	0.11	0.11	0.11	0.20	0.20
Sat Flow, veh/h	1810	3582	1547	1682	3497	1510	1725	869	859	3401	920	827
Grp Volume(v), veh/h	42	2060	4	39	929	0	41	0	171	349	0	131
Grp Sat Flow(s),veh/h/ln	1810	1791	1547	1682	1749	1510	1725	0	1728	1700	0	1747
Q Serve(g_s), s	3.5	69.6	0.1	4.1	30.7	0.0	4.2	0.0	17.6	18.2	0.0	11.7
Cycle Q Clear(g_c), s	3.5	69.6	0.1	4.1	30.7	0.0	4.2	0.0	17.6	18.2	0.0	11.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.50	1.00		0.47
Lane Grp Cap(c), veh/h	244	2268	980	50	1846	797	52	0	193	390	0	342
V/C Ratio(X)	0.17	0.91	0.00	0.79	0.50	0.00	0.78	0.00	0.89	0.89	0.00	0.38
Avail Cap(c_a), veh/h	244	2268	980	140	1846	797	96	0	259	435	0	388
HCM Platoon Ratio	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.64	0.64	0.64	0.97	0.97	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	65.4	10.7	5.2	86.8	27.3	0.0	86.7	0.0	78.8	78.6	0.0	62.9
Incr Delay (d2), s/veh	0.2	4.5	0.0	22.7	1.0	0.0	21.9	0.0	23.4	19.2	0.0	0.7
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 BackOfQ(50%),veh/ln	1.6	15.3	0.0	2.1	12.9	0.0	2.2	0.0	9.1	9.0	0.0	5.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.6	15.3	5.2	109.5	28.3	0.0	108.6	0.0	102.2	97.8	0.0	63.6
LnGrp LOS	E	B	A	F	C	A	F	A	F	F	A	E
Approach Vol, veh/h		2106			968			212			480	
Approach Delay, s/veh		16.2			31.6			103.5			88.5	
Approach LOS		B			C			F			F	

Timer - Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	25.7	25.1	10.3	119.0	10.5	40.3	29.3	100.0
Change Period (Y+Rc), s	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Max Green Setting (Gmax), s	23.0	27.0	15.0	95.0	10.0	40.0	15.0	95.0
Max Q Clear Time (g_c+I1), s	20.2	19.6	6.1	71.6	6.2	13.7	5.5	32.7
Green Ext Time (p_c), s	0.4	0.3	0.0	13.3	0.0	0.5	0.0	4.8

Intersection Summary	
HCM 6th Ctrl Delay	34.3
HCM 6th LOS	C

Lanes, Volumes, Timings
5: 188th Ave NE & NE 70th St

05/30/2019

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	8	21	422	14	33	467
Future Volume (vph)	8	21	422	14	33	467
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0		0	25	
Storage Lanes	1	0		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	25		35			35
Link Distance (ft)	878		683			1351
Travel Time (s)	23.9		13.3			26.3
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)					10%	
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	8	21	422	14	33	467
Future Vol, veh/h	8	21	422	14	33	467
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	25	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	3	3	3	3	3
Mvmt Flow	9	23	459	15	36	508

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1047	467	0	0	474	0
Stage 1	467	-	-	-	-	-
Stage 2	580	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.13	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.227	-
Pot Cap-1 Maneuver	252	594	-	-	1083	-
Stage 1	629	-	-	-	-	-
Stage 2	558	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	244	594	-	-	1083	-
Mov Cap-2 Maneuver	375	-	-	-	-	-
Stage 1	629	-	-	-	-	-
Stage 2	540	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.5	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	512	1083	-
HCM Lane V/C Ratio	-	-	0.062	0.033	-
HCM Control Delay (s)	-	-	12.5	8.4	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1	-

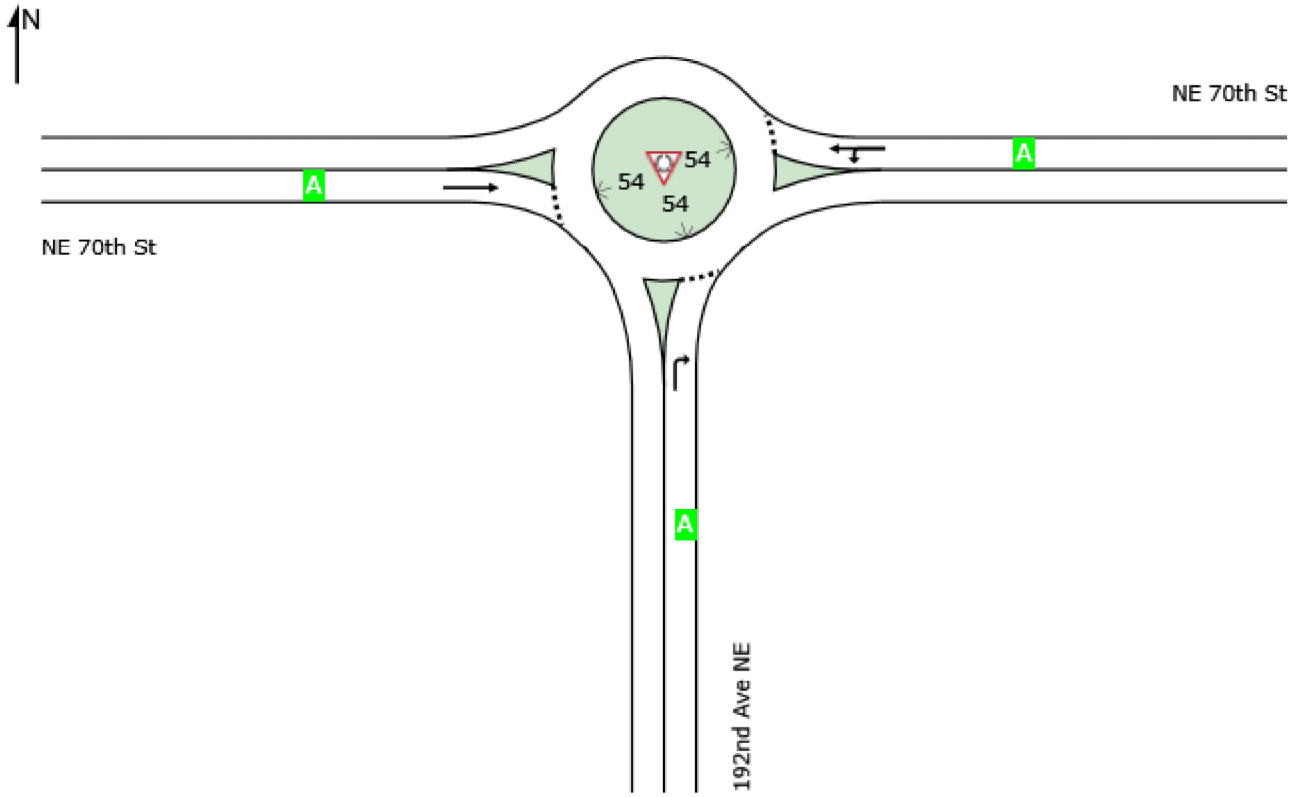
LANE LEVEL OF SERVICE

Lane Level of Service

Site: 6 [2022 With Project PM Peak Hour]

Polygon Woodside
192nd Ave NE / NE 70th St
Site Category: (None)
Roundabout

	Approaches			Intersection
	South	East	West	
LOS	A	A	A	A



Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

LANE SUMMARY

Site: 6 [2022 With Project PM Peak Hour]

Polygon Woodside
192nd Ave NE / NE 70th St
Site Category: (None)
Roundabout

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 192nd Ave NE													
Lane 1[d]	4	3.0	1270	0.003	100	2.9	LOS A	0.0	0.4	Full	1600	0.0	0.0
Approach	4	3.0		0.003		2.9	LOS A	0.0	0.4				
East: NE 70th St													
Lane 1[d]	35	3.0	1340	0.026	100	2.9	LOS A	0.0	0.0	Full	1600	0.0	0.0
Approach	35	3.0		0.026		2.9	LOS A	0.0	0.0				
West: NE 70th St													
Lane 1[d]	51	3.0	1335	0.038	100	3.0	LOS A	0.2	4.1	Full	1600	0.0	0.0
Approach	51	3.0		0.038		3.0	LOS A	0.2	4.1				
Intersection	90	3.0		0.038		2.9	LOS A	0.2	4.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Appendix B

Detailed Trip Generation Calculations

Woodside Residential
Trip Generation Summary

Land Use	Units [1]	ITE LUC [2]	Directional Distribution In	Directional Distribution Out	Trip Rate	Trips Generated In	Trips Generated Out	Trips Generated Total
Daily								
Proposed Use:								
Multifamily Housing (Mid-Rise)	134 DU	221	50%	50%	eqn	364	365	729
Multifamily Housing (Low-Rise)	36 DU	220	50%	50%	eqn	116	115	231
					New Daily Trips =	**480**	**480**	**960**
AM Peak Hour								
Proposed Use:								
Multifamily Housing (Mid-Rise)	134 DU	221	26%	74%	eqn	12	34	46
Multifamily Housing (Low-Rise)	36 DU	220	23%	77%	eqn	4	14	18
					New AM Peak Hour Trips =	**16**	**48**	**64**
PM Peak Hour								
Proposed Use:								
Multifamily Housing (Mid-Rise)	134 DU	221	61%	39%	eqn	36	23	59
Multifamily Housing (Low-Rise)	36 DU	220	63%	37%	eqn	15	9	24
					New PM Peak Hour Trips =	**51**	**32**	**83**

Notes:

[1] DU = Dwelling Units.

[2] Institute of Transportation Engineers, Trip Generation Manual, 10th edition Land Use Code.

Appendix C

Concurrency Application

CITY OF REDMOND TRANSPORTATION CONCURRENCY APPLICATION

This application provides the City of Redmond with the information needed to issue a certificate of concurrency for a development. Please complete the entire form and return it to the Redmond Engineering Services Division. After agreement is reached on the mobility unit demand for a development based on the land use type, size of development and table on the back of this application, the City will, if necessary, determine if enough mobility unit supply is available to issue a certificate of concurrency. If determining the mobility unit demand for a development requires an independent calculation a fee for the review will be required, payable at the City Hall Permit Center.

1. Applicant name and address: Polygon WLH, L.L.C.
   Attn: Nick Abdelnour
   11624 SE 5th Street, Bellevue, WA 98005
2. Property location:
   a. Property address: 7039 196TH AVE NE, Redmond, WA 98053
   b. Development name: Woodside
   c. Assessor's Parcel Number(s): Parcel # 0725069033
3. Type of development permit to be requested: Site Plan Entitlement

	Land Use Type (ITE Land Use Code)	Development Units	Mobility Unit Rate (see table on back)	Mobility Unit Demand	Notes
Proposed	Multiple Family (LUC 221)	170 DU	1.70	289	
			Total Proposed:	289	
Existing					
			Total Existing:		
Net New Mobility Unit Demand (Total Proposed minus Total Existing)				289	

Signature of Applicant:_____ Date:_____

For Official Use Only:

Mobility Unit Demand calculation reviewed: _____ _____
Initials Date

Concurrency certificate required: □ Yes □ No Mobility Units available: □ Yes □ No

Application number:_____

Appendix D

188th Avenue NE/NE 76th Street Volume and Speed Data used for Multi-Way Stop Analysis
(1/29/19 – 1/30/19)

Woodside Residential
24-Hour Volume Summary - 188th Avenue NE / NE 76th Street

Existing Year = 2019 Future Year = 2022 % Growth = 2.0%

	Tuesday 01/29/2019				Wednesday 01/30/2019				2019 Existing - 2 Day Average					2019 Summary	
Time	EB (76th)	WB (76th)	NB (188th)	SB (188th)	EB (76th)	WB (76th)	NB (188th)	SB (188th)	EB (76th)	WB[1] (76th)	NB (188th)	SB (188th)	Total Entering Volume	Total Entering Volume on 188th Ave NE	Total Entering Volume on NE 76th Street
12:00 AM	3	-	2	7	0	-	9	7	2	0	6	7	14	13	2
1:00 AM	1	-	2	2	2	-	3	6	2	0	3	4	8	7	2
2:00 AM	13	-	22	29	16	-	19	24	15	0	21	27	62	47	15
3:00 AM	3	-	16	22	5	-	7	27	4	0	12	25	40	36	4
4:00 AM	23	-	24	113	26	-	19	110	25	0	22	112	158	133	25
5:00 AM	35	-	75	117	32	-	51	109	34	10	63	113	220	176	44
6:00 AM	50	-	127	116	55	-	161	136	53	10	144	126	333	270	63
7:00 AM	76	-	258	248	65	-	298	267	71	10	278	258	616	536	81
8:00 AM	72	-	398	314	71	-	430	295	72	10	414	305	800	719	82
9:00 AM	99	-	396	310	74	-	396	327	87	10	396	319	811	715	97
10:00 AM	74	-	293	164	69	-	258	180	72	10	276	172	529	448	82
11:00 AM	95	-	248	202	101	-	239	194	98	10	244	198	550	442	108
12:00 PM	111	-	229	244	115	-	213	250	113	10	221	247	591	468	123
1:00 PM	96	-	218	230	117	-	195	216	107	10	207	223	546	430	117
2:00 PM	146	-	249	257	158	-	224	285	152	10	237	271	670	508	162
3:00 PM	186	-	397	317	169	-	362	316	178	10	380	317	884	696	188
4:00 PM	204	-	448	356	225	-	453	326	215	10	451	341	1,016	792	225
5:00 PM	280	-	248	380	254	-	253	371	267	1	251	376	894	626	268
6:00 PM	235	-	229	355	211	-	203	355	223	1	216	355	795	571	224
7:00 PM	126	-	155	300	132	-	178	231	129	1	167	266	562	432	130
8:00 PM	92	-	121	159	67	-	86	131	80	0	104	145	328	249	80
9:00 PM	33	-	42	44	30	-	39	51	32	0	41	48	120	88	32
10:00 PM	7	-	21	23	9	-	20	22	8	0	21	23	51	43	8
11:00 PM	4	-	9	12	7	-	3	22	6	0	6	17	29	23	6

1. 24-hour ADT counts not collected on east leg (Cadman Dwy). Volumes at 4 and 5 PM based on turning movement counts conducted 1/10/19. Volumes for rest of the day were estimated. There were no peds crossing E-W in the PM peak hours. Minimal ped volumes are expected

	2022 Without-Project				
Time	EB (76th)	WB (76th)	NB (188th)	SB (188th)	Total Entering Volume
12:00 AM	2	0	6	7	15
1:00 AM	2	0	3	4	9
2:00 AM	15	0	22	28	65
3:00 AM	4	0	12	26	42
4:00 AM	26	0	23	118	167
5:00 AM	36	10	67	120	233
6:00 AM	56	10	153	134	353
7:00 AM	75	10	295	273	653
8:00 AM	76	10	439	323	848
9:00 AM	92	10	420	338	860
10:00 AM	76	10	292	183	561
11:00 AM	104	10	258	210	582
12:00 PM	120	10	235	262	627
1:00 PM	113	10	219	237	579
2:00 PM	161	10	251	288	710
3:00 PM	188	10	403	336	937
4:00 PM	228	10	478	362	1,078
5:00 PM	283	1	266	398	948
6:00 PM	237	1	229	377	844
7:00 PM	137	1	177	282	597
8:00 PM	84	0	110	154	348
9:00 PM	33	0	43	50	126
10:00 PM	8	0	22	24	54
11:00 PM	6	0	6	18	30

	Project Trip Assignment[2]				
Time	EB (76th)	WB (76th)	NB (188th)	SB (188th)	Total Entering Volume
12:00 AM	1	0	2	2	5
1:00 AM	1	0	2	2	5
2:00 AM	1	0	2	2	5
3:00 AM	1	0	2	2	5
4:00 AM	1	0	2	2	5
5:00 AM	1	0	2	2	5
6:00 AM	2	0	17	3	22
7:00 AM	4	0	31	6	41
8:00 AM	4	0	28	7	39
9:00 AM	4	0	20	7	31
10:00 AM	5	0	17	8	30
11:00 AM	5	0	18	8	31
12:00 PM	6	0	17	10	33
1:00 PM	7	0	18	11	36
2:00 PM	8	0	19	13	40
3:00 PM	10	0	20	16	46
4:00 PM	12	0	20	19	51
5:00 PM	13	0	21	20	54
6:00 PM	10	0	16	16	42
7:00 PM	7	0	15	11	33
8:00 PM	6	0	11	10	27
9:00 PM	5	0	7	8	20
10:00 PM	2	0	2	2	6
11:00 PM	2	0	2	2	6

	2022 With-Project					
Time	EB (76th)	WB (76th)	NB (188th)	SB (188th)	Total Entering Volume on 188th Ave NE	Total Entering Volume on NE 76th Street
12:00 AM	3	0	8	9	17	3
1:00 AM	3	0	5	6	11	3
2:00 AM	16	0	24	30	54	16
3:00 AM	5	0	14	28	42	5
4:00 AM	27	0	25	120	145	27
5:00 AM	37	10	69	122	191	37
6:00 AM	58	10	170	137	307	58
7:00 AM	79	10	326	279	605	79
8:00 AM	80	10	467	330	797	80
9:00 AM	96	10	440	345	785	96
10:00 AM	81	10	309	191	500	81
11:00 AM	109	10	276	218	494	109
12:00 PM	126	10	252	272	524	127
1:00 PM	120	10	237	248	485	121
2:00 PM	169	10	270	301	571	170
3:00 PM	198	10	423	352	775	199
4:00 PM	240	10	498	381	879	241
5:00 PM	296	1	287	418	705	297
6:00 PM	247	1	245	393	638	248
7:00 PM	144	1	192	293	485	145
8:00 PM	90	0	121	164	285	91
9:00 PM	38	0	50	58	108	39
10:00 PM	10	0	24	26	50	11
11:00 PM	8	0	8	20	28	9
					Volume >300	Volume >200
					14 hours	3 hours

80% Threshold Check	
Total Entering Volume on 188th Ave NE	Total Entering Volume on NE 76th Street
17	3
11	3
54	16
42	5
145	27
191	37
307	58
605	79
797	80
785	96
500	81
494	109
524	127
485	121
571	170
775	199
879	241
705	297
638	248
485	145
285	91
108	39
50	11
28	9
Volume >240	Volume >160
15 hours	5 hours

2. Project trip assignment based on peak hour trip assignment and the 24-hour variation in traffic documented in the ITE Journal (January 2015).

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 1
Station ID:
188TH AVE NE N/O NE 76TH ST

Start Time	29-Jan-19 Tue	NB	SB							Total
12:00 AM		7	7							14
01:00		2	2							4
02:00		13	29							42
03:00		14	22							36
04:00		12	113							125
05:00		40	117							157
06:00		119	116							235
07:00		205	248							453
08:00		227	**314**							541
09:00		**252**	310							**562**
10:00		197	164							361
11:00		193	202							395
12:00 PM		193	244							437
01:00		186	230							416
02:00		216	257							473
03:00		387	317							704
04:00		**414**	356							**770**
05:00		294	**380**							674
06:00		269	355							624
07:00		158	300							458
08:00		132	159							291
09:00		51	44							95
10:00		23	23							46
11:00		12	12							24
Total		3616	4321							7937
Percent		45.6%	54.4%							
AM Peak	-	09:00	08:00	-	-	-	-	-	-	09:00
Vol.	-	252	314	-	-	-	-	-	-	562
PM Peak	-	16:00	17:00	-	-	-	-	-	-	16:00
Vol.	-	414	380	-	-	-	-	-	-	770

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 1
Station ID:
188TH AVE NE N/O NE 76TH ST

Start Time	30-Jan-19 Wed	NB	SB							Total
12:00 AM		9	7							16
01:00		4	6							10
02:00		12	24							36
03:00		8	27							35
04:00		15	110							125
05:00		34	109							143
06:00		113	136							249
07:00		206	267							473
08:00		227	295							522
09:00		**248**	**327**							**575**
10:00		188	180							368
11:00		204	194							398
12:00 PM		188	250							438
01:00		166	216							382
02:00		240	285							525
03:00		347	316							663
04:00		**458**	326							**784**
05:00		295	**371**							666
06:00		231	355							586
07:00		169	231							400
08:00		89	131							220
09:00		48	51							99
10:00		25	22							47
11:00		5	22							27
Total		3529	4258							7787
Percent		45.3%	54.7%							
AM Peak	-	09:00	09:00	-	-	-	-	-	-	09:00
Vol.	-	248	327	-	-	-	-	-	-	575
PM Peak	-	16:00	17:00	-	-	-	-	-	-	16:00
Vol.	-	458	371	-	-	-	-	-	-	784
Grand Total		7145	8579							15724
Percent		45.4%	54.6%							
ADT		ADT 7,862		AADT 7,862						

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 2B
Station ID:
188TH AVE S/O NE 76TH ST

Start Time	29-Jan-19 Tue	NB	SB							Total
12:00 AM		2	5							7
01:00		2	1							3
02:00		22	12							34
03:00		16	13							29
04:00		24	100							124
05:00		75	64							139
06:00		127	48							175
07:00		258	123							381
08:00		**398**	196							594
09:00		396	**242**							**638**
10:00		293	166							459
11:00		248	207							455
12:00 PM		229	249							478
01:00		218	254							472
02:00		249	277							526
03:00		397	358							755
04:00		**448**	465							**913**
05:00		248	**500**							748
06:00		229	453							682
07:00		155	368							523
08:00		121	196							317
09:00		42	61							103
10:00		21	29							50
11:00		9	16							25
Total		4227	4403							8630
Percent		49.0%	51.0%							
AM Peak	-	08:00	09:00	-	-	-	-	-	-	09:00
Vol.	-	398	242	-	-	-	-	-	-	638
PM Peak	-	16:00	17:00	-	-	-	-	-	-	16:00
Vol.	-	448	500	-	-	-	-	-	-	913

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 2B
Station ID:
188TH AVE S/O NE 76TH ST

Start Time	30-Jan-19 Wed	NB	SB							Total
12:00 AM		9	11							20
01:00		3	7							10
02:00		19	33							52
03:00		7	28							35
04:00		19	129							148
05:00		51	130							181
06:00		161	144							305
07:00		298	193							491
08:00		**430**	179							609
09:00		396	**231**							**627**
10:00		258	154							412
11:00		239	184							423
12:00 PM		213	252							465
01:00		195	249							444
02:00		224	295							519
03:00		362	357							719
04:00		**453**	394							**847**
05:00		253	**482**							735
06:00		203	437							640
07:00		178	290							468
08:00		86	165							251
09:00		39	64							103
10:00		20	26							46
11:00		3	26							29
Total		4119	4460							8579
Percent		48.0%	52.0%							
AM Peak	-	08:00	09:00	-	-	-	-	-	-	09:00
Vol.	-	430	231	-	-	-	-	-	-	627
PM Peak	-	16:00	17:00	-	-	-	-	-	-	16:00
Vol.	-	453	482	-	-	-	-	-	-	847
Grand Total		8346	8863							17209
Percent		48.5%	51.5%							
ADT		ADT 8,604		AADT 8,604						

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 3
Station ID:
NE 76TH ST W/O 188TH AVE NE

Start Time	29-Jan-19 Tue	EB	WB							Total
12:00 AM		3	1							4
01:00		1	1							2
02:00		13	9							22
03:00		3	2							5
04:00		23	4							27
05:00		35	25							60
06:00		50	74							124
07:00		76	252							328
08:00		72	**356**							**428**
09:00		**99**	328							427
10:00		74	161							235
11:00		95	167							262
12:00 PM		111	136							247
01:00		96	138							234
02:00		146	**155**							301
03:00		186	150							336
04:00		204	155							359
05:00		**280**	105							**385**
06:00		235	117							352
07:00		126	101							227
08:00		92	60							152
09:00		33	10							43
10:00		7	6							13
11:00		4	3							7
Total		2064	2516							4580
Percent		45.1%	54.9%							
AM Peak	-	09:00	08:00	-	-	-	-	-	-	08:00
Vol.	-	99	356	-	-	-	-	-	-	428
PM Peak	-	17:00	14:00	-	-	-	-	-	-	17:00
Vol.	-	280	155	-	-	-	-	-	-	385

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 3
Station ID:
NE 76TH ST W/O 188TH AVE NE

Start Time	30-Jan-19 Wed	EB	WB							Total
12:00 AM		0	1							1
01:00		2	1							3
02:00		16	10							26
03:00		5	1							6
04:00		26	10							36
05:00		32	34							66
06:00		55	69							124
07:00		65	234							299
08:00		71	**384**							**455**
09:00		74	283							357
10:00		69	175							244
11:00		**101**	149							250
12:00 PM		115	127							242
01:00		117	129							246
02:00		158	117							275
03:00		169	**161**							330
04:00		225	150							**375**
05:00		**254**	111							365
06:00		211	116							327
07:00		132	85							217
08:00		67	48							115
09:00		30	16							46
10:00		9	3							12
11:00		7	2							9
Total		2010	2416							4426
Percent		45.4%	54.6%							
AM Peak	-	11:00	08:00	-	-	-	-	-	-	08:00
Vol.	-	101	384	-	-	-	-	-	-	455
PM Peak	-	17:00	15:00	-	-	-	-	-	-	16:00
Vol.	-	254	161	-	-	-	-	-	-	375
Grand Total		4074	4932							9006
Percent		45.2%	54.8%							
ADT		ADT 4,503		AADT 4,503						

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 1
Station ID:
188TH AVE NE N/O NE 76TH ST

NB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/29/19	0	0	0	3	2	2	0	0	0	0	0	0	0	0	7	25-34	5
01:00	0	0	0	0	1	0	0	1	0	0	0	0	0	0	2	24-33	1
02:00	0	0	0	4	2	5	1	1	0	0	0	0	0	0	13	31-40	7
03:00	0	1	0	2	6	2	3	0	0	0	0	0	0	0	14	26-35	8
04:00	0	1	1	1	4	3	2	0	0	0	0	0	0	0	12	30-39	7
05:00	5	1	2	12	14	5	1	0	0	0	0	0	0	0	40	26-35	26
06:00	9	2	13	40	38	13	4	0	0	0	0	0	0	0	119	26-35	78
07:00	10	6	25	59	78	20	3	**3**	**1**	0	0	0	0	0	205	26-35	137
08:00	12	3	14	70	87	**37**	2	1	1	0	0	0	0	0	227	26-35	157
09:00	**20**	3	12	**74**	**111**	25	**6**	1	0	0	0	0	0	0	**252**	26-35	185
10:00	2	3	**45**	60	60	23	4	0	0	0	0	0	0	0	197	26-35	120
11:00	17	**8**	30	61	65	9	3	0	0	0	0	0	0	0	193	26-35	126
12 PM	9	4	32	66	63	16	2	**1**	0	0	0	0	0	0	193	26-35	129
13:00	2	8	40	64	48	21	3	0	0	0	0	0	0	0	186	26-35	112
14:00	10	**9**	27	85	64	18	3	0	0	0	0	0	0	0	216	26-35	149
15:00	22	2	44	**129**	129	56	3	1	**1**	0	0	0	0	0	387	26-35	258
16:00	**24**	2	37	111	**156**	**70**	**14**	0	0	0	0	0	0	0	**414**	26-35	267
17:00	15	5	**62**	103	81	26	2	0	0	0	0	0	0	0	294	26-35	184
18:00	18	3	52	119	61	13	3	0	0	0	0	0	0	0	269	26-35	180
19:00	4	2	38	60	40	10	3	1	0	0	0	0	0	0	158	25-34	100
20:00	5	4	30	48	33	11	1	0	0	0	0	0	0	0	132	26-35	81
21:00	0	1	5	18	14	10	2	0	1	0	0	0	0	0	51	26-35	32
22:00	0	0	6	6	4	5	1	1	0	0	0	0	0	0	23	21-30	12
23:00	0	0	2	5	4	1	0	0	0	0	0	0	0	0	12	26-35	9
Total	184	68	517	1200	1165	401	66	11	4	0	0	0	0	0	3616		
Percent	5.1%	1.9%	14.3%	33.2%	32.2%	11.1%	1.8%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	11:00	10:00	09:00	09:00	08:00	09:00	07:00	07:00						09:00		
Vol.	20	8	45	74	111	37	6	3	1						252		
PM Peak	16:00	14:00	17:00	15:00	16:00	16:00	16:00	12:00	15:00						16:00		
Vol.	24	9	62	129	156	70	14	1	1						414		

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 1
Station ID:
188TH AVE NE N/O NE 76TH ST

NB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/30/19	0	0	0	4	2	3	0	0	0	0	0	0	0	0	9	25-34	6
01:00	0	1	1	2	0	0	0	0	0	0	0	0	0	0	4	19-28	3
02:00	0	0	0	3	3	4	2	0	0	0	0	0	0	0	12	31-40	7
03:00	0	0	0	3	1	1	1	1	0	0	0	**1**	0	0	8	26-35	4
04:00	0	0	1	2	7	5	0	0	0	0	0	0	0	0	15	31-40	12
05:00	3	0	3	9	14	4	1	0	0	0	0	0	0	0	34	26-35	23
06:00	4	1	12	37	44	12	3	0	0	0	0	0	0	0	113	26-35	81
07:00	9	7	19	53	84	31	3	0	0	0	0	0	0	0	206	26-35	137
08:00	15	5	19	46	84	**53**	**5**	0	0	0	0	0	0	0	227	31-40	137
09:00	**17**	2	26	57	**89**	52	5	0	0	0	0	0	0	0	**248**	26-35	146
10:00	11	7	43	63	40	19	3	**2**	0	0	0	0	0	0	188	21-30	106
11:00	6	**10**	**64**	**78**	37	8	1	0	0	0	0	0	0	0	204	21-30	142
12 PM	6	8	42	72	48	12	0	0	0	0	0	0	0	0	188	26-35	120
13:00	4	**14**	37	60	40	8	2	1	0	0	0	0	0	0	166	26-35	100
14:00	7	9	49	92	60	22	1	0	0	0	0	0	0	0	240	26-35	152
15:00	14	6	**68**	121	111	23	2	**2**	0	0	0	0	0	0	347	26-35	232
16:00	17	3	64	**155**	**157**	**56**	**5**	1	0	0	0	0	0	0	**458**	26-35	312
17:00	16	6	51	124	69	27	1	1	0	0	0	0	0	0	295	26-35	193
18:00	**21**	4	48	85	60	13	0	0	0	0	0	0	0	0	231	26-35	145
19:00	2	8	39	71	36	11	1	1	0	0	0	0	0	0	169	21-30	110
20:00	0	2	18	40	22	5	0	2	0	0	0	0	0	0	89	26-35	62
21:00	1	1	8	28	8	1	1	0	0	0	0	0	0	0	48	21-30	36
22:00	0	1	2	5	14	1	2	0	0	0	0	0	0	0	25	26-35	19
23:00	0	0	3	2	0	0	0	0	0	0	0	0	0	0	5	20-29	5
Total	153	95	617	1212	1030	371	39	11	0	0	0	1	0	0	3529		
Percent	4.3%	2.7%	17.5%	34.3%	29.2%	10.5%	1.1%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	11:00	11:00	11:00	09:00	08:00	08:00	10:00				03:00			09:00		
Vol.	17	10	64	78	89	53	5	2				1			248		
PM Peak	18:00	13:00	15:00	16:00	16:00	16:00	16:00	15:00							16:00		
Vol.	21	14	68	155	157	56	5	2							458		
Total	337	163	1134	2412	2195	772	105	22	4	0	0	1	0	0	7145		
Percent	4.7%	2.3%	15.9%	33.8%	30.7%	10.8%	1.5%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%			

	15th Percentile :	22 MPH
	50th Percentile :	29 MPH
	85th Percentile :	34 MPH
	95th Percentile :	38 MPH
Stats	10 MPH Pace Speed :	26-35 MPH
	Number in Pace :	4607
	Percent in Pace :	64.5%
	Number of Vehicles > 35 MPH :	904
	Percent of Vehicles > 35 MPH :	12.7%
	Mean Speed(Average) :	29 MPH

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 1
Station ID:
188TH AVE NE N/O NE 76TH ST

SB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/29/19	0	0	0	2	4	1	0	0	0	0	0	0	0	0	7	26-35	6
01:00	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2	25-34	2
02:00	0	0	0	7	14	7	1	0	0	0	0	0	0	0	29	26-35	21
03:00	0	0	2	7	9	2	2	0	0	0	0	0	0	0	22	26-35	16
04:00	0	0	5	20	**64**	**20**	**4**	0	0	0	0	0	0	0	113	26-35	84
05:00	1	0	9	27	62	18	0	0	0	0	0	0	0	0	117	26-35	89
06:00	5	5	13	56	27	6	2	**1**	**1**	0	0	0	0	0	116	26-35	83
07:00	5	**20**	79	94	42	8	0	0	0	0	0	0	0	0	248	21-30	173
08:00	13	12	**120**	132	34	2	1	0	0	0	0	0	0	0	**314**	21-30	252
09:00	**15**	9	80	**158**	41	6	1	0	0	0	0	0	0	0	310	21-30	238
10:00	3	10	49	69	30	3	0	0	0	0	0	0	0	0	164	21-30	118
11:00	12	16	69	76	26	2	1	0	0	0	0	0	0	0	202	21-30	145
12 PM	3	28	91	68	48	5	**1**	0	0	0	0	0	0	0	244	21-30	159
13:00	3	18	79	83	35	12	0	0	0	0	0	0	0	0	230	21-30	162
14:00	10	15	96	84	44	8	0	0	0	0	0	0	0	0	257	21-30	180
15:00	13	22	87	94	87	12	1	0	0	0	0	0	0	**1**	317	21-30	181
16:00	**16**	18	79	121	**98**	**24**	0	0	0	0	0	0	0	0	356	26-35	219
17:00	10	**29**	105	137	92	7	0	0	0	0	0	0	0	0	**380**	21-30	242
18:00	14	17	96	**138**	79	10	1	0	0	0	0	0	0	0	355	21-30	234
19:00	5	12	**113**	122	42	5	1	0	0	0	0	0	0	0	300	21-30	235
20:00	4	9	53	47	42	4	0	0	0	0	0	0	0	0	159	21-30	100
21:00	0	1	8	12	18	4	1	0	0	0	0	0	0	0	44	26-35	30
22:00	0	0	6	4	10	3	0	0	0	0	0	0	0	0	23	26-35	14
23:00	0	1	1	3	7	0	0	0	0	0	0	0	0	0	12	26-35	10
Total	132	242	1240	1561	957	169	17	1	1	0	0	0	0	1	4321		
Percent	3.1%	5.6%	28.7%	36.1%	22.1%	3.9%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	07:00	08:00	09:00	04:00	04:00	04:00	06:00	06:00						08:00		
Vol.	15	20	120	158	64	20	4	1	1						314		
PM Peak	16:00	17:00	19:00	18:00	16:00	16:00	12:00							15:00	17:00		
Vol.	16	29	113	138	98	24	1							1	380		

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 1
Station ID:
188TH AVE NE N/O NE 76TH ST

SB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/30/19	0	0	2	1	1	2	1	0	0	0	0	0	0	0	7	36-45	3
01:00	0	0	0	0	5	1	0	0	0	0	0	0	0	0	6	29-38	6
02:00	0	0	0	12	9	3	0	0	0	0	0	0	0	0	24	26-35	21
03:00	0	2	1	7	11	3	**3**	0	0	0	0	0	0	0	27	26-35	18
04:00	0	1	4	33	**58**	11	3	0	0	0	0	0	0	0	110	26-35	91
05:00	2	0	4	31	47	**20**	3	**1**	**1**	0	0	0	0	0	109	26-35	78
06:00	3	6	21	48	45	11	2	0	0	0	0	0	0	0	136	26-35	93
07:00	8	19	92	106	34	7	1	0	0	0	0	0	0	0	267	21-30	198
08:00	12	**26**	92	130	26	8	1	0	0	0	0	0	0	0	295	21-30	222
09:00	**15**	15	**105**	**146**	42	3	1	0	0	0	0	0	0	0	**327**	21-30	251
10:00	6	10	68	63	27	4	1	1	0	0	0	0	0	0	180	21-30	131
11:00	7	22	76	61	21	7	0	0	0	0	0	0	0	0	194	21-30	137
12 PM	7	**34**	102	69	35	3	0	0	0	0	0	0	0	0	250	21-30	171
13:00	2	23	86	69	32	3	**1**	0	0	0	0	0	0	0	216	21-30	155
14:00	5	18	105	109	39	8	1	0	0	0	0	0	0	0	285	21-30	214
15:00	13	23	**136**	98	39	6	1	0	0	0	0	0	0	0	316	21-30	234
16:00	**17**	23	84	105	79	**18**	0	0	0	0	0	0	0	0	326	21-30	189
17:00	10	16	110	**143**	**83**	9	0	0	0	0	0	0	0	0	**371**	21-30	253
18:00	9	20	123	136	60	7	0	0	0	0	0	0	0	0	355	21-30	259
19:00	6	10	97	84	28	6	0	0	0	0	0	0	0	0	231	21-30	181
20:00	2	6	48	46	24	5	0	0	0	0	0	0	0	0	131	21-30	94
21:00	0	1	12	19	15	4	0	0	0	0	0	0	0	0	51	26-35	34
22:00	0	0	0	6	13	2	1	0	0	0	0	0	0	0	22	26-35	19
23:00	0	1	4	7	7	2	1	0	0	0	0	0	0	0	22	26-35	14
Total	124	276	1372	1529	780	153	21	2	1	0	0	0	0	0	4258		
Percent	2.9%	6.5%	32.2%	35.9%	18.3%	3.6%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	08:00	09:00	09:00	04:00	05:00	03:00	05:00	05:00						09:00		
Vol.	15	26	105	146	58	20	3	1	1						327		
PM Peak	16:00	12:00	15:00	17:00	17:00	16:00	13:00								17:00		
Vol.	17	34	136	143	83	18	1								371		
Total	256	518	2612	3090	1737	322	38	3	2	0	0	0	0	1	8579		
Percent	3.0%	6.0%	30.4%	36.0%	20.2%	3.8%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

	15th Percentile :	20 MPH
	50th Percentile :	26 MPH
	85th Percentile :	32 MPH
	95th Percentile :	34 MPH
Stats	10 MPH Pace Speed :	21-30 MPH
	Number in Pace :	5702
	Percent in Pace :	66.5%
	Number of Vehicles > 35 MPH :	366
	Percent of Vehicles > 35 MPH :	4.3%
	Mean Speed(Average) :	27 MPH

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 2B
Station ID:
188TH AVE S/O NE 76TH ST

NB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/29/19	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2	15-24	2
01:00	0	0	0	1	1	0	0	0	0	0	0	0	0	0	2	24-33	2
02:00	0	2	6	11	2	0	0	0	0	0	0	0	0	**1**	22	21-30	17
03:00	3	0	1	7	4	0	0	**1**	0	0	0	0	0	0	16	26-35	11
04:00	2	4	7	6	4	1	0	0	0	0	0	0	0	0	24	20-29	13
05:00	10	12	19	24	9	1	0	0	0	0	0	0	0	0	75	21-30	43
06:00	1	7	10	88	19	1	1	0	0	0	0	0	0	0	127	26-35	107
07:00	7	7	51	166	25	2	0	0	0	0	0	0	0	0	258	21-30	217
08:00	8	8	**71**	165	**125**	17	**3**	0	**1**	0	0	0	0	0	**398**	26-35	290
09:00	**17**	11	57	**174**	119	17	1	0	0	0	0	0	0	0	396	26-35	293
10:00	8	**13**	46	97	102	**25**	2	0	0	0	0	0	0	0	293	26-35	199
11:00	9	8	30	92	93	16	0	0	0	0	0	0	0	0	248	26-35	185
12 PM	6	3	26	89	88	16	1	0	0	0	0	0	0	0	229	26-35	177
13:00	10	**9**	21	85	84	7	1	1	0	0	0	0	0	0	218	26-35	169
14:00	15	5	22	88	91	24	4	0	0	0	0	0	0	0	249	26-35	179
15:00	**25**	6	36	132	152	40	3	**2**	**1**	0	0	0	0	0	397	26-35	284
16:00	24	4	**44**	**133**	**168**	**67**	**8**	0	0	0	0	0	0	0	**448**	26-35	301
17:00	16	6	19	87	105	13	2	0	0	0	0	0	0	0	248	26-35	192
18:00	24	2	23	98	70	10	2	0	0	0	0	0	0	0	229	26-35	168
19:00	3	1	28	64	48	8	2	1	0	0	0	0	0	0	155	26-35	112
20:00	4	5	27	43	31	9	2	0	0	0	0	0	0	0	121	26-35	74
21:00	0	0	4	9	16	10	2	1	0	0	0	0	0	0	42	29-38	26
22:00	0	2	1	6	5	6	0	1	0	0	0	0	0	0	21	26-35	11
23:00	0	0	1	1	6	0	1	0	0	0	0	0	0	0	9	26-35	7
Total	192	115	552	1666	1367	290	35	7	2	0	0	0	0	1	4227		
Percent	4.5%	2.7%	13.1%	39.4%	32.3%	6.9%	0.8%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	10:00	08:00	09:00	08:00	10:00	08:00	03:00	08:00					02:00	08:00		
Vol.	17	13	71	174	125	25	3	1	1					1	398		
PM Peak	15:00	13:00	16:00	16:00	16:00	16:00	16:00	15:00	15:00						16:00		
Vol.	25	9	44	133	168	67	8	2	1						448		

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 2B
Station ID:
188TH AVE S/O NE 76TH ST

NB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/30/19	0	0	4	1	1	2	1	0	0	0	0	0	0	0	9	19-28	5
01:00	0	0	0	2	1	0	0	0	0	0	0	0	0	0	3	24-33	3
02:00	0	0	2	5	8	4	0	0	0	0	0	0	0	0	19	26-35	13
03:00	0	0	0	2	1	2	1	0	0	0	**1**	0	0	0	7	36-45	3
04:00	2	1	2	1	8	3	2	0	0	0	0	0	0	0	19	31-40	11
05:00	3	1	10	17	15	5	0	0	0	0	0	0	0	0	51	26-35	32
06:00	3	2	23	60	49	21	3	0	0	0	0	0	0	0	161	26-35	109
07:00	11	4	51	105	107	19	1	0	0	0	0	0	0	0	298	26-35	212
08:00	7	**15**	**85**	**161**	**144**	18	0	0	0	0	0	0	0	0	**430**	26-35	305
09:00	**22**	15	47	154	126	**29**	3	0	0	0	0	0	0	0	396	26-35	280
10:00	7	6	56	105	65	15	**4**	0	0	0	0	0	0	0	258	26-35	170
11:00	5	6	53	106	60	8	1	0	0	0	0	0	0	0	239	26-35	166
12 PM	6	3	21	98	69	16	0	0	0	0	0	0	0	0	213	26-35	167
13:00	10	4	17	97	54	10	3	0	0	0	0	0	0	0	195	26-35	151
14:00	5	4	24	87	86	18	0	0	0	0	0	0	0	0	224	26-35	173
15:00	23	3	39	110	150	32	**5**	0	0	0	0	0	0	0	362	26-35	260
16:00	**32**	**6**	**52**	**146**	**169**	**46**	2	0	0	0	0	0	0	0	**453**	26-35	315
17:00	14	0	23	90	106	19	1	0	0	0	0	0	0	0	253	26-35	196
18:00	12	2	19	67	87	15	1	0	0	0	0	0	0	0	203	26-35	154
19:00	6	5	38	70	48	7	3	1	0	0	0	0	0	0	178	26-35	118
20:00	1	2	20	31	25	3	1	**3**	0	0	0	0	0	0	86	26-35	56
21:00	1	0	7	22	5	3	1	0	0	0	0	0	0	0	39	21-30	29
22:00	0	1	4	4	8	1	2	0	0	0	0	0	0	0	20	26-35	12
23:00	0	0	2	1	0	0	0	0	0	0	0	0	0	0	3	19-28	3
Total	170	80	599	1542	1392	296	35	4	0	0	1	0	0	0	4119		
Percent	4.1%	1.9%	14.5%	37.4%	33.8%	7.2%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	08:00	08:00	08:00	08:00	09:00	10:00				03:00				08:00		
Vol.	22	15	85	161	144	29	4				1				430		
PM Peak	16:00	16:00	16:00	16:00	16:00	16:00	15:00	20:00							16:00		
Vol.	32	6	52	146	169	46	5	3							453		
Total	362	195	1151	3208	2759	586	70	11	2	0	1	0	0	1	8346		
Percent	4.3%	2.3%	13.8%	38.4%	33.1%	7.0%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

	15th Percentile :	23 MPH
	50th Percentile :	28 MPH
	85th Percentile :	33 MPH
	95th Percentile :	37 MPH
Stats	10 MPH Pace Speed :	26-35 MPH
	Number in Pace :	5967
	Percent in Pace :	71.5%
	Number of Vehicles > 55 MPH :	2
	Percent of Vehicles > 55 MPH :	0.0%
	Mean Speed(Average) :	29 MPH

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 2B
Station ID:
188TH AVE S/O NE 76TH ST

SB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/29/19	0	1	1	0	2	1	0	0	0	0	0	0	0	0	5	31-40	3
01:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	9-18	1
02:00	2	4	3	1	2	0	0	0	0	0	0	0	0	0	12	15-24	7
03:00	0	0	1	5	6	0	0	0	**1**	0	0	0	0	0	13	26-35	11
04:00	2	1	4	17	56	**17**	3	0	0	0	0	0	0	0	100	31-40	73
05:00	3	0	3	14	24	16	4	0	0	0	0	0	0	0	64	31-40	40
06:00	2	1	3	14	18	9	1	0	0	0	0	0	0	0	48	26-35	32
07:00	6	4	13	44	38	12	**6**	0	0	0	0	0	0	0	123	26-35	82
08:00	6	7	31	81	62	9	0	0	0	0	0	0	0	0	196	26-35	143
09:00	**16**	9	**41**	**86**	**71**	15	4	0	0	0	0	0	0	0	**242**	26-35	157
10:00	6	4	22	60	59	14	1	0	0	0	0	0	0	0	166	26-35	119
11:00	12	**21**	28	69	64	10	3	0	0	0	0	0	0	0	207	26-35	133
12 PM	1	3	24	95	101	22	3	0	0	0	0	0	0	0	249	26-35	196
13:00	8	**9**	31	96	76	28	**6**	0	0	0	0	0	0	0	254	26-35	172
14:00	10	4	31	112	77	38	4	**1**	0	0	0	0	0	0	277	26-35	189
15:00	15	2	38	130	126	44	3	0	0	0	0	0	0	0	358	26-35	256
16:00	**22**	3	37	180	165	**52**	6	0	0	0	0	0	0	0	465	26-35	345
17:00	19	2	41	**186**	**201**	48	2	1	0	0	0	0	0	0	**500**	26-35	387
18:00	13	7	42	173	182	32	4	0	0	0	0	0	0	0	453	26-35	355
19:00	10	9	**64**	147	107	27	4	0	0	0	0	0	0	0	368	26-35	254
20:00	7	9	24	62	66	25	3	0	0	0	0	0	0	0	196	26-35	128
21:00	0	1	6	24	15	12	2	1	0	0	0	0	0	0	61	26-35	39
22:00	0	0	1	9	11	7	1	0	0	0	0	0	0	0	29	26-35	20
23:00	0	0	4	6	4	2	0	0	0	0	0	0	0	0	16	26-35	10
Total	160	102	493	1611	1533	440	60	3	1	0	0	0	0	0	4403		
Percent	3.6%	2.3%	11.2%	36.6%	34.8%	10.0%	1.4%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	11:00	09:00	09:00	09:00	04:00	07:00		03:00						09:00		
Vol.	16	21	41	86	71	17	6		1						242		
PM Peak	16:00	13:00	19:00	17:00	17:00	16:00	13:00	14:00							17:00		
Vol.	22	9	64	186	201	52	6	1							500		

All Traffic Data Sevices
www.alltrafficdata.net

Site Code: 2B
Station ID:
188TH AVE S/O NE 76TH ST

SB

Start Time	1 15	16 20	21 25	26 30	31 35	36 40	41 45	46 50	51 55	56 60	61 65	66 70	71 75	76 999	Total	Pace Speed	Number in Pace
01/30/19	0	2	2	1	2	2	2	0	0	0	0	0	0	0	11	36-45	4
01:00	0	0	1	1	3	2	0	0	0	0	0	0	0	0	7	29-38	5
02:00	0	1	6	12	9	5	0	0	0	0	0	0	0	0	33	26-35	21
03:00	0	0	4	6	12	5	1	0	0	0	0	0	0	0	28	26-35	18
04:00	0	0	14	24	54	**32**	5	0	0	0	0	0	0	0	129	31-40	86
05:00	3	2	11	36	45	22	**9**	**1**	**1**	0	0	0	0	0	130	26-35	81
06:00	3	4	23	45	53	13	2	1	0	0	0	0	0	0	144	26-35	98
07:00	8	7	25	77	62	12	2	0	0	0	0	0	0	0	193	26-35	139
08:00	8	5	18	79	50	16	3	0	0	0	0	0	0	0	179	26-35	129
09:00	**17**	2	**44**	**82**	**67**	14	5	0	0	0	0	0	0	0	**231**	26-35	149
10:00	5	3	20	64	53	6	2	1	0	0	0	0	0	0	154	26-35	117
11:00	4	**16**	17	76	62	7	2	0	0	0	0	0	0	0	184	26-35	138
12 PM	7	**7**	43	114	67	12	2	0	0	0	0	0	0	0	252	26-35	181
13:00	6	4	20	114	89	15	1	0	0	0	0	0	0	0	249	26-35	203
14:00	5	7	28	131	93	29	2	0	0	0	0	0	0	0	295	26-35	224
15:00	20	3	44	139	125	25	1	0	0	0	0	0	0	0	357	26-35	264
16:00	**23**	3	29	134	150	**55**	0	0	0	0	0	0	0	0	394	26-35	284
17:00	13	3	26	**192**	**200**	40	**7**	**1**	0	0	0	0	0	0	**482**	26-35	392
18:00	14	4	**60**	191	138	28	2	0	0	0	0	0	0	0	437	26-35	329
19:00	6	3	60	137	66	17	0	1	0	0	0	0	0	0	290	26-35	203
20:00	1	1	32	66	49	15	1	0	0	0	0	0	0	0	165	26-35	115
21:00	2	0	6	20	30	5	1	0	0	0	0	0	0	0	64	26-35	50
22:00	0	1	3	2	12	7	1	0	0	0	0	0	0	0	26	31-40	19
23:00	0	0	1	8	10	6	1	0	0	0	0	0	0	0	26	26-35	18
Total	145	78	537	1751	1501	390	52	5	1	0	0	0	0	0	4460		
Percent	3.3%	1.7%	12.0%	39.3%	33.7%	8.7%	1.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			
AM Peak	09:00	11:00	09:00	09:00	09:00	04:00	05:00	05:00	05:00						09:00		
Vol.	17	16	44	82	67	32	9	1	1						231		
PM Peak	16:00	12:00	18:00	17:00	17:00	16:00	17:00	17:00							17:00		
Vol.	23	7	60	192	200	55	7	1							482		
Total	305	180	1030	3362	3034	830	112	8	2	0	0	0	0	0	8863		
Percent	3.4%	2.0%	11.6%	37.9%	34.2%	9.4%	1.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%			

	15th Percentile :	24 MPH
	50th Percentile :	29 MPH
	85th Percentile :	34 MPH
	95th Percentile :	38 MPH
Stats	10 MPH Pace Speed :	26-35 MPH
	Number in Pace :	6396
	Percent in Pace :	72.2%
	Number of Vehicles > 55 MPH :	0
	Percent of Vehicles > 55 MPH :	0.0%
	Mean Speed(Average) :	29 MPH

Appendix E

188th Avenue NE/NE 76th Street Signal Warrants and Pedestrian Counts

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 1 - Eight Hour Vehicular Volume
Condition A - Minimum Vehicular Volume

Hour Begins	Minor Approach NE 76th Street Highest EB/WB (2)	Major Approach 188th Avenue NE Total NB & SB (2)	MUTCD (1) Warrant 1A
6:00	58	307	
7:00	79	605	
8:00	80	797	
9:00	96	785	
10:00	81	500	
11:00	109	494	
12:00	126	524	
13:00	120	485	
14:00	169	571	
15:00	198	775	
16:00	240	879	YES
17:00	296	705	YES
18:00	247	638	YES
19:00	144	485	
		WARRANT MET (3) =	**NO**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Two-day average of 24-hour volumes conducted in Jan 2019
(3) Signal warrant satisfied when traffic volumes exist for each of any 8 hours of an average day.

MUTCD Warrant Requirements

Warrant 1, Condition A: Minimum Vehicular Volume

Minimum volume of 500 vehicles per hour on 1-lane major street (both approaches) and 200 vehicles per hour on 2-lane minor street approach.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 1 - Eight Hour Vehicular Volume
Condition B - Interruption of Continuous Traffic

Hour Begins	Minor Approach NE 76th Street Highest EB/WB (2)	Major Approach 188th Avenue NE Total NB & SB (2)	MUTCD (1) Warrant 1B
6:00	58	307	
7:00	79	605	
8:00	80	797	
9:00	96	785	
10:00	81	500	
11:00	109	494	
12:00	126	524	
13:00	120	485	
14:00	169	571	
15:00	198	775	YES
16:00	240	879	YES
17:00	296	705	
18:00	247	638	
19:00	144	485	
		WARRANT MET (3) =	**NO**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Two-day average of 24-hour volumes conducted in Jan 2019
(3) Signal warrant satisfied when traffic volumes exist for each of any 8 hours of an average day.

MUTCD Warrant Requirements

Warrant 1, Condition B: Interruption of Continuous Traffic

Minimum volume of 750 vehicles per hour on 1-lane major street (both approaches) and 100 vehicles per hour on 2-lane minor street approach.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 1 - Eight Hour Vehicular Volume
Combination of Condition A and Condition B

Hour Begins	Minor Approach NE 76th Street Highest EB/WB (2)	Major Approach 188th Avenue NE Total NB & SB (2)	MUTCD (1)		
			Warrant 1 A/B	80% Condition A	80% Condition B
6:00	58	307			
7:00	79	605			
8:00	80	797			YES
9:00	96	785			YES
10:00	81	500			
11:00	109	494			
12:00	126	524			
13:00	120	485			
14:00	169	571		YES	
15:00	198	775	YES	YES	YES
16:00	240	879	YES	YES	YES
17:00	296	705	YES	YES	YES
18:00	247	638	YES	YES	YES
19:00	144	485			
		WARRANT MET (3) =	**NO**		

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Two-day average of 24-hour volumes conducted in Jan 2019
(3) Signal warrant satisfied when traffic volumes exist for each of any 8 hours of an average day.

MUTCD Warrant Requirements

Warrant 1: Combination of A and B

The combination of warrants is satisfied where Condition A and Condition B are satisfied to the extent of 80 percent or more of the stated values.

NOTE:

This combination warrant only applies after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 2 - Four Hour Vehicular Volume

Hour Begins	Minor Approach NE 76th Street Highest EB/WB (2)	Major Approach 188th Avenue NE Total NB & SB (2)	MUTCD (1) Warrant 2
6:00	58	307	
7:00	79	605	
8:00	80	797	
9:00	96	785	
10:00	81	500	
11:00	109	494	
12:00	126	524	
13:00	120	485	
14:00	169	571	
15:00	198	775	NO
16:00	240	879	YES
17:00	296	705	YES
18:00	247	638	NO
17:00	144	485	
		WARRANT MET (3) =	**NO**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Two-day average of 24-hour volumes conducted in Jan 2019
(3) Signal warrant satisfied when traffic volumes exist for each of any 4 hours of an average day.

MUTCD Warrant Requirements

Warrant 2: Four Hour Vehicular Volume

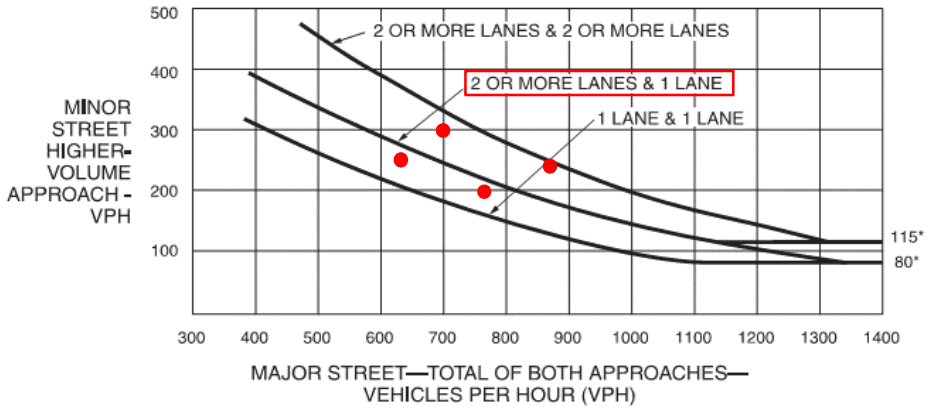
The plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 2 - Four Hour Vehicular Volume

Figure 4C-1. Warrant 2, Four-Hour Vehicular Volume



*Note: 115 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 80 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT MET (2) = YES

Notes:

(1) The four highest hourly minor/major approach volumes as shown in the data for Warrant 1.

(2) The signal warrant is satisfied when the conditions given below exist for each of any 4 hours of an average day.

MUTCD Warrant Requirements

Warrant 2: Four Hour Vehicular Volume

The plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) all fall above the applicable curve in Figure 4C-1 for the existing combination of approach lanes. On the minor street, the higher volume shall not be required to be on the same approach during each of these 4 hours.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 3 - Peak Hour (PM Peak Hour)

Condition A

This warrant is met if all three of the following conditions exist for the same 1 hour (any four consecutive 15-minute periods) of an average day:

1. The total stopped delay experienced by the traffic on one minor-street approach (one direction only) controlled by a STOP sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach

188th Ave NE / NE 76th St,	EB approach (2 lanes)	
Control Delay (sec/veh) =	44.7	sec/veh
Stopped Delay (sec/veh) =	34.4	sec/veh
Total Volume (veh/hr) =	255	veh/hour
Vehicle-Hours =	2.44	veh-hours
CONDITION 1 MET =	**NO**	

2. The volume on the same minor-street approach (one direction only) equals or exceeds 100 vehicles per hour for one moving lane of traffic or 150 vehicles per hour for two moving lanes.

188th Ave NE / NE 76th St, EB approach volume =	
CONDITION 2 MET =	

3. The total entering volume serviced during the hour equals or exceeds 650 vehicle per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

188th Ave NE / NE 76th St, Total approach volume =	
CONDITION 3 MET =	

WARRANT MET =	**NO**

NOTE:
This signal warrant shall only be applied in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 3 - Peak Hour
Condition B

Hour Begins	Minor Approach NE 76th Street Highest EB/WB (2)	Major Approach 188th Avenue NE Total NB & SB (2)	MUTCD (1) Warrant 3
6:00	58	307	
7:00	79	605	
8:00	80	797	
9:00	96	785	
10:00	81	500	
11:00	109	494	
12:00	126	524	
13:00	120	485	
14:00	169	571	
15:00	198	775	NO
16:00	240	879	NO
17:00	296	705	NO
18:00	247	638	
19:00	144	485	
		WARRANT MET (3) =	**NO**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 7/28, 7/29, and 7/30, 2015.
(3) Signal warrant satisfied when traffic volumes exist for one hour of an average day.

MUTCD Warrant Requirements

Warrant 3: Peak Hour - Condition B

The plotted points representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher volume minor street approach (one direction only) for one hour (any four consectutive 15-minute periods) of an average day falls above the curve in Figure 4C-3 for the existing combination of approach lanes.

NOTE:

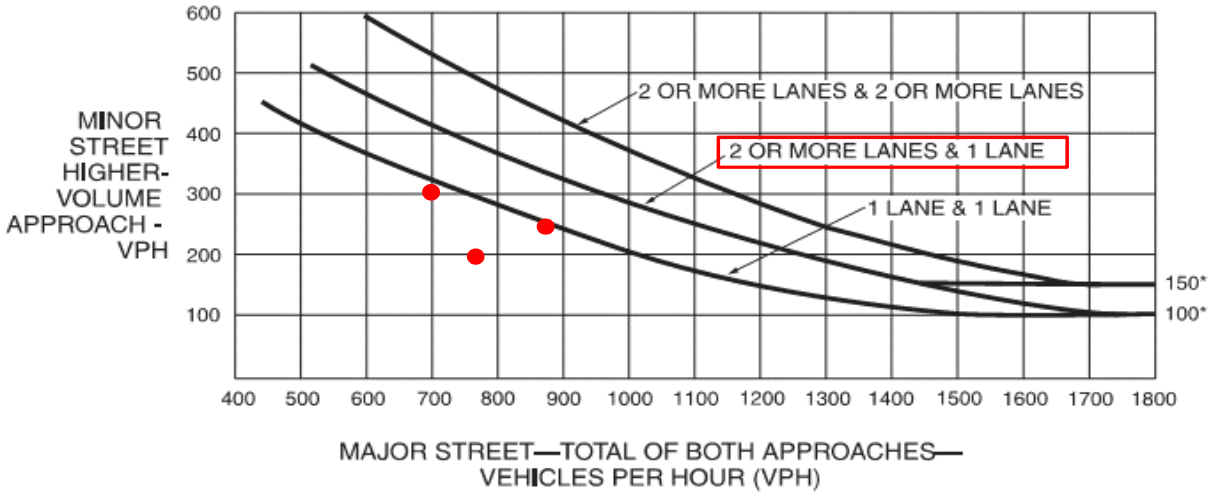
This signal warrant shall only be applied in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

Woodside Residential

Signal Warrant Analysis for 188th Avenue NE / NE 76th Street

Warrant 3 - Peak Hour
Condition B

Figure 4C-3. Warrant 3, Peak Hour



*Note: 150 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 100 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT MET (2) = YES

Notes:

(1) The highest hourly minor/major approach volumes as shown in the data for Warrant 1.

(2) The signal warrant is satisfied when the conditions given below exist for one hour of an average day.

MUTCD Warrant Requirements

Warrant 3: Peak Hour - Condition B

The plotted point representing the vehicles per hour on the major street (total of both approaches) and the corresponding vehicles per hour on the higher-volume minor street approach (one direction only) for 1 hour of an average day falls above the applicable curve in Figure 4C-3 for the existing combination of approach lanes.

NOTE:

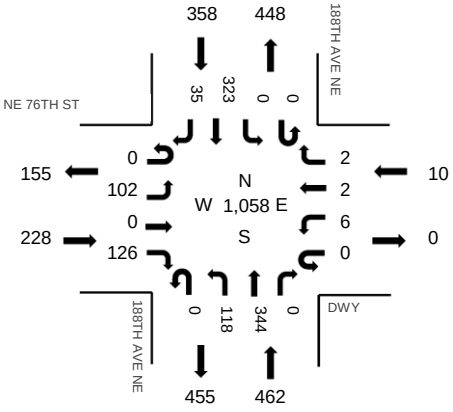
This signal warrant shall only be applied in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

All Traffic Data Services Inc.
(303) 216-2439
www.alltrafficdata.net

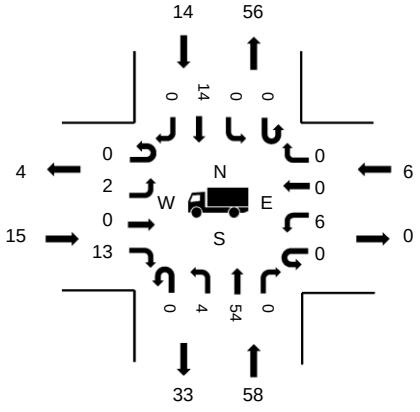
Location: 1 188TH AVE NE & NE 76TH ST PM
Date and Start Time: Thursday, January 10, 2019
Peak Hour: 04:00 PM - 05:00 PM

Peak Hour

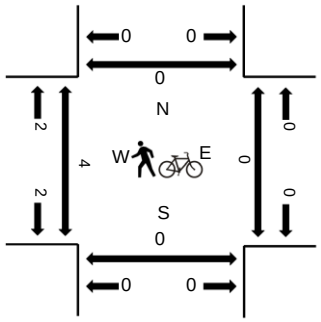
All Vehicles



Heavy Vehicles



Pedestrians/Bicycles in Crosswalk



	HV%	PHF
EB	6.6%	0.86
WB	60.0%	0.50
NB	12.6%	0.80
SB	3.9%	0.90
All	8.8%	0.89

Traffic Counts - All Vehicles

Interval Start Time	NE 76TH ST Eastbound				DWY Westbound				188TH AVE NE Northbound				188TH AVE NE Southbound				Total	Rolling Hour
	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right		
4:00 PM	0	21	0	29	0	1	0	1	0	34	111	0	0	0	86	14	297	1,058
4:15 PM	0	22	0	25	0	2	2	1	0	25	92	0	0	0	79	8	256	1,013
4:30 PM	0	26	0	39	0	2	0	0	0	28	83	0	0	0	83	8	269	995
4:45 PM	0	33	0	33	0	1	0	0	0	31	58	0	0	0	75	5	236	972
5:00 PM	0	30	0	39	0	0	0	0	0	22	62	0	0	0	87	12	252	964
5:15 PM	0	27	0	41	0	0	0	0	0	18	57	0	0	0	88	7	238	
5:30 PM	0	22	1	43	0	0	0	1	0	18	46	0	0	0	106	9	246	
5:45 PM	0	21	0	48	0	0	0	0	0	21	42	0	0	0	88	8	228	
Count Total	0	202	1	297	0	6	2	3	0	197	551	0	0	0	692	71	2,022	
Peak Hour	0	102	0	126	0	6	2	2	0	118	344	0	0	0	323	35	1,058	

Traffic Counts - Heavy Vehicles and Pedestrians/Bicycles in Crosswalk

Interval Start	Heavy Vehicles					Interval Start	Pedestrians/Bicycles on Crosswalk				
	EB	NB	WB	SB	Total		EB	NB	WB	SB	Total
4:00 PM	4	15	1	4	24	4:00 PM	1	0	0	0	1
4:15 PM	6	19	2	2	29	4:15 PM	0	0	0	0	0
4:30 PM	2	17	2	3	24	4:30 PM	2	0	0	0	2
4:45 PM	3	7	1	5	16	4:45 PM	1	0	0	0	1
5:00 PM	4	8	0	4	16	5:00 PM	2	0	0	0	2
5:15 PM	2	0	0	4	6	5:15 PM	4	0	0	0	4
5:30 PM	3	1	0	1	5	5:30 PM	0	0	0	0	0
5:45 PM	3	1	0	3	7	5:45 PM	1	0	0	0	1
Count Tota	27	68	6	26	127	Count Tota	11	0	0	0	11
Peak Hour	15	58	6	14	93	Peak Hour	4	0	0	0	4