Attachment 11

New Elementary School in North Redmond

Updated Transportation Impact Study

October 28, 2016

Prepared for:

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FINDINGS/CONCLUSIONS

This updated transportation impact study has been prepared for the proposed New Elementary School in North Redmond. This is an update to the previous report dated October 20, 2016 and provides revised analysis to address comments received from the City of Redmond on October 27, 2016.

Project Proposal. The proposed New Elementary School in North Redmond is located on a vacant site on the southwest corner of the intersection of 172nd Ave NE/NE 122nd Street. The planned capacity for the school is up to 550 students and 40 teachers/staff according to the Lake Washington School District (LWSD). The project would also include permitting for the future addition of up to 5 portables to the site. Each portable would have a capacity of 23 students and 1 teacher, bringing the total planned capacity of the New Elementary School in North Redmond to 665 students and 45 staff. A total of 80 parking stalls is shown on the current site plan for visitors and staff. The project is planned to be completed prior to the start of the school in Fall 2018.

Vehicular access to the site would be provided by three proposed driveways on NE 122nd Street and two driveways on 172nd Ave NE. The driveways on NE 122nd Street include a bus/staff driveway, a one-way entrance to the north drop-off/pick-up lane, and a one-way exit from the north drop-off/pick-up lane. The driveways on 172nd Ave NE include a one-way entrance to a staff/visitor parking lot and east drop-off/pick-up lane, and a one-way exit from the staff/visitor parking lot and east drop-off/pick-up lane.

Trip Generation. The trip generation and traffic analysis for the proposed New Elementary School in North Redmond was conducted based on two potential boundary scenarios as described below:

- **Scenario 1** represents the best available estimate of the enrollment boundary at the time of this study, including student population walking, being driven, or being bussed to school and with the best estimate of geographical boundaries. The trip generation analyzed for Scenario 1 included 552 trips during the weekday AM peak hour (293 entering, 259 exiting), 346 trips during the weekday afternoon peak hour (163 entering, 183 exiting), and 126 trips during the weekday PM peak hour (52 entering, 74 exiting).
- **Scenario 2** represents a worst case scenario from a traffic perspective where minimal bus service is provided, the boundaries extend to a point where bus service would be triggered, and the majority of students would likely be driven to school. The trip generation analyzed for Scenario 2 included 652 trips during the weekday AM peak hour (339 entering, 313 exiting), and 406 trips during the weekday afternoon peak hour (199 entering, 207 exiting).

Concurrency. A transportation concurrency application was submitted to the City of Redmond and it is expected that the current Mobility Unit (MU) supply will accommodate the additional MU demand created by the proposed New Elementary School in North Redmond. Therefore, it is anticipated that a certificate of concurrency will be issued for the project.

Off-Site Intersection Operations. Based on an analysis of 7 off-site study intersections, the minor street approaches at the intersection of 162nd Place NE/NE 124th Street operate at LOS E/F under future conditions with or without the project. A new signal at 162nd Place NE/NE 124th Street is an impact-fee funded project on the City's TIP and TFP (TIP S40, TFP 111). As such, LWSD's required payment of transportation impact fees at building permit issuance will fully mitigate the school's transportation impacts and satisfy the school's fair share contribution to a future signal at this location. This future signal is expected to improve the stop-controlled LOS E/F movements at this intersection.

Site Access Operations. The controlled movements at the proposed site access driveways are expected to operate at acceptable levels (LOS C or better) during the weekday AM, afternoon, and PM peak hours.

Student Drop-Off/Pick-Up Queuing. Based on a comparison to other local schools, the proposed New Elementary School in North Redmond will provide more entrance queue, pick-up/drop-off zone, and exit queue storage than any other local elementary school. Specifically, the New Elementary School in North Redmond will provide approximately 1,600 lineal feet of combined entrance queue and pick-up/drop-off zone storage which is 3 to 6 times that of the other local schools. Approximately 1,600 lineal feet of combined entrance queue and pick-up/drop-off storage space for parents exceeds preliminary storage recommendations even for the "worst case" conditions with 5 portables fully occupied and for either boundary Scenario 1 or Scenario 2 based on a review of national guidelines.

Signal Warrant Analysis at 162nd Pl NE/NE 124th Street. A signal warrant analysis was documented at the intersection of 162nd Pl NE/NE 124th Street for future year conditions consistent with the signal warrant analysis provided to the City on 8/20/14 as part of the proposed Edgewood West (Mansoori) development. All three of the signal warrants evaluated (Warrant 1 – Eight-Hour, Warrant 2 – Four-Hour, and Warrant 3 – Peak Hour) would be met in 2018 without or with the proposed New Elementary School in North Redmond for Scenarios 1 and 2.

Analysis with 172nd Ave NE Extension. Based on an operational analysis of year 2022 conditions with the New Elementary School in North Redmond at 5 intersections, mitigation may be required at 172nd Ave NE/NE 120th Way NE with the 172nd Ave NE extension. The City and LWSD will discuss a condition that requires monitoring delays at this intersection for the first 2 years after occupancy to determine if mitigation is needed in cooperation with the neighborhood.

Parking Supply/Demand. The estimated weekday peak parking demand for the New Elementary School in North Redmond is 73 vehicles based on the results of local studies conducted at 5 other elementary schools. Therefore, the proposed supply of 80 stalls would more than accommodate the typical weekday peak demand at the school. A minimum of 45 of these stalls will be allocated to staff parking.

Based on our recent event parking study at Ben Rush Elementary, the proposed on-site parking supply for events (177 spaces) is expected to accommodate the event parking demand at year of opening (550 students). For future "worst case" conditions with 5 portables fully occupied (665 students), both on-site and on-street parking is anticipated to be utilized for events. The amount of on-street parking to be used by the school for an event is expected to be accommodated by the adjacent on-street parking along 172nd and 122nd (up to 71 on-street spaces will exist along the frontage and across the street if needed) and should have little to no impact on the neighborhood.

Mitigation

Frontage Improvements

The project will construct frontage improvements on NE 122nd Street and 172nd Ave NE including curb and gutter, pedestrian facilities, landscaping, street lighting, and parking based on the sections outlined in the 2006 *172nd Avenue NE Corridor Plan*.

Off-Site Mitigation

Based on the results of the analysis shown in this report, impacts at 3 intersections will be addressed as follows:

162nd Place NE/NE 124th Street

The intersection of 162nd Place NE/NE 124th Street will meet signal warrants in 2018 without or with the proposed New Elementary School in North Redmond. The signal at 162nd Place NE/NE 124th Street is an impact-fee funded project on the City's TIP and TFP (TIP S40, TFP 111). As such, LWSD's required payment of transportation impact fees at building permit issuance will fully mitigate the school's transportation impacts and satisfy the school's fair share contribution to a future signal at this location.

172nd Ave NE/NE 120th Way NE

The westbound approach is estimated to operate at LOS E in the AM peak hour with the 172nd Extension, with no bussing assumed, and with a school enrollment of at least 580 students. The City and LWSD will discuss a condition that requires monitoring delays at this intersection for the first 2 years after occupancy to determine if mitigation is needed in cooperation with the neighborhood.

172nd Ave NE/NE 122nd Street

LWSD will coordinate with the City of Redmond to determine the appropriate intersection control (potential all-way stop control, two-way stop, or traffic circle/yield control) at the intersection of 172nd Ave NE/NE 122nd Street, as well as confirm the appropriate location(s) of marked pedestrian crossings on 172nd Ave NE and NE 122nd Street. In addition, widening of the intersection on the northwest and southwest corners to better accommodate bus turning movements are proposed.

Transportation Management Program (TMP)

To reduce traffic congestion, Lake Washington School District will work with the City of Redmond to develop measures to encourage both students and staff to use alternate modes of transportation (i.e. carpool/bus/walk/bike) and to manage on-site traffic operations. The TMP measures will be finalized with the City prior to occupancy of the proposed school.

Impact Fees

LWSD will be required to pay transportation impact fees to the City of Redmond to help fund planned transportation improvements throughout the City. Based on the City's current impact fee schedule (2016), the adopted transportation impact fee rate for Elementary Schools is $470.61 per student. This results in a preliminary impact fee estimate of $258,836 based on a school with 550 students, and $54,120 based on 5 portable classrooms with a total of 115 students. This estimate is preliminary, and the actual impact fee amount will be determined at building permit issuance based on the impact fee rate in effect at that time.

INTRODUCTION

This updated transportation impact study has been prepared for the proposed New Elementary School in North Redmond. This is an update to the previous report dated October 20, 2016 and provides revised analysis to address comments received from the City of Redmond on October 27, 2016.

The New Elementary School in North Redmond is located on the currently vacant Parcels 2526059072 and 2526059045 on the southwest corner of the intersection of 172nd Ave NE/NE 122nd Street. A vicinity map showing the location of the site and the surrounding area is included in Figure 1. The planned capacity for the school is up to 550 students and 40 teachers/staff according to the Lake Washington School District (LWSD). The project would also include permitting for the future addition of up to 5 portables to the site. Each portable would have a capacity of 23 students and 1 teacher, bringing the total planned capacity of the New Elementary School in North Redmond to 665 students and 45 staff. A total of 80 parking stalls is shown on the current site plan for visitors and staff.

Vehicular access to the site would be provided by three proposed driveways on NE 122nd Street and two driveways on 172nd Ave NE. The driveways on NE 122nd Street include a bus/staff driveway, a one-way entrance to the north drop-off/pick-up lane, and a one-way exit from the north drop-off/pick-up lane. The driveways on 172nd Ave NE include a one-way entrance to a staff/visitor parking lot and east drop-off/pick-up lane, and a one-way exit from the staff/visitor parking lot and east drop-off/pick-up lane.

The project is planned to be completed prior to the start of the school in Fall 2018. A preliminary site plan is shown in Figure 2.

Analysis Approach

To analyze potential traffic impacts from the New Elementary School in North Redmond, the following tasks were completed:

- Assessment of existing conditions through field reconnaissance and review of existing planning documents.
- Documented existing roadway conditions in the project vicinity.
- Documented existing public transit services in the project vicinity.
- Analyzed existing AM, afternoon, and PM peak hour Levels of Service (LOS) at the following seven off-site study intersections:
    1. 172nd Ave NE / NE 122nd St
    2. 172nd Ave NE / NE 120th St
    3. Red-Wood Rd (SR 202) / NE 116th St
    4. 162nd Ave NE / NE 116th St
    5. 172nd Ave NE / NE 116th St
    6. Avondale Rd NE / NE 116th St
    7. 162nd Pl NE / NE 124th Street

- Documented planned transportation improvements in the study area.
- Estimated the weekday AM, afternoon, and PM peak hour trips generated by the New Elementary School in North Redmond for 2 school boundary assumptions (Scenario 1 and Scenario 2).
- Assigned weekday project-generated AM, afternoon, and PM peak hour trips to the existing street network for Scenarios 1 and 2.
- Analyzed year 2018 AM, afternoon, and PM peak hour LOS at the seven off-site study intersections for Scenarios 1 and 2.
- Analyzed year 2018 operations at the proposed site driveways for Scenarios 1 and 2.
- Evaluated on-site circulation including drop-off/pick-up queuing, and recommendations for queue storage for Scenarios 1 and 2.
- Evaluated signal warrants at 162nd Pl NE/ NE 124th Street.
- Analyzed year 2022 operations with the 172nd Ave NE Extension at five off-site study intersections for Scenarios 1 and 2.
- Analyzed intersection control and all-way stop control guidelines at 172nd Ave NE/NE 122nd Street.
- Assessed parking supply and demand.
- Identified mitigation to the City of Redmond.

Primary Data and Information Sources

- *Highway Capacity Manual (HCM),* 2010.
- All Traffic Data, Year 2016 traffic counts.
- *2006 172nd Avenue NE Corridor Plan,* David Evans & Associates.
- *2007 172nd Avenue NE Corridor Study Design Report,* David Evans & Associates.
- *City of Redmond 2016-2021 TIP*
- *City of Redmond Transportation Master Plan*
- *City of Redmond Transportation Facilities Plan*

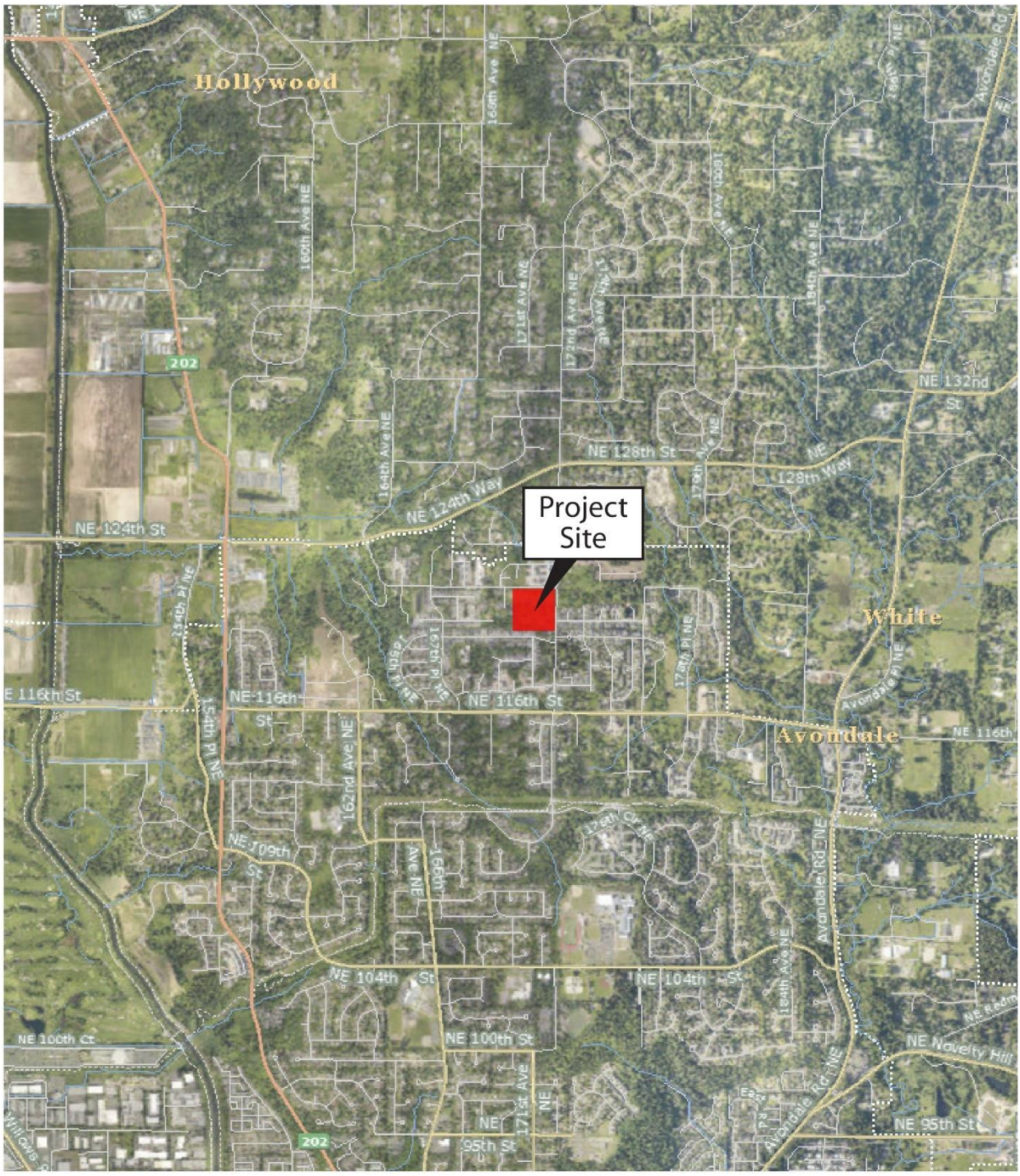


Figure 1: Site Vicinity

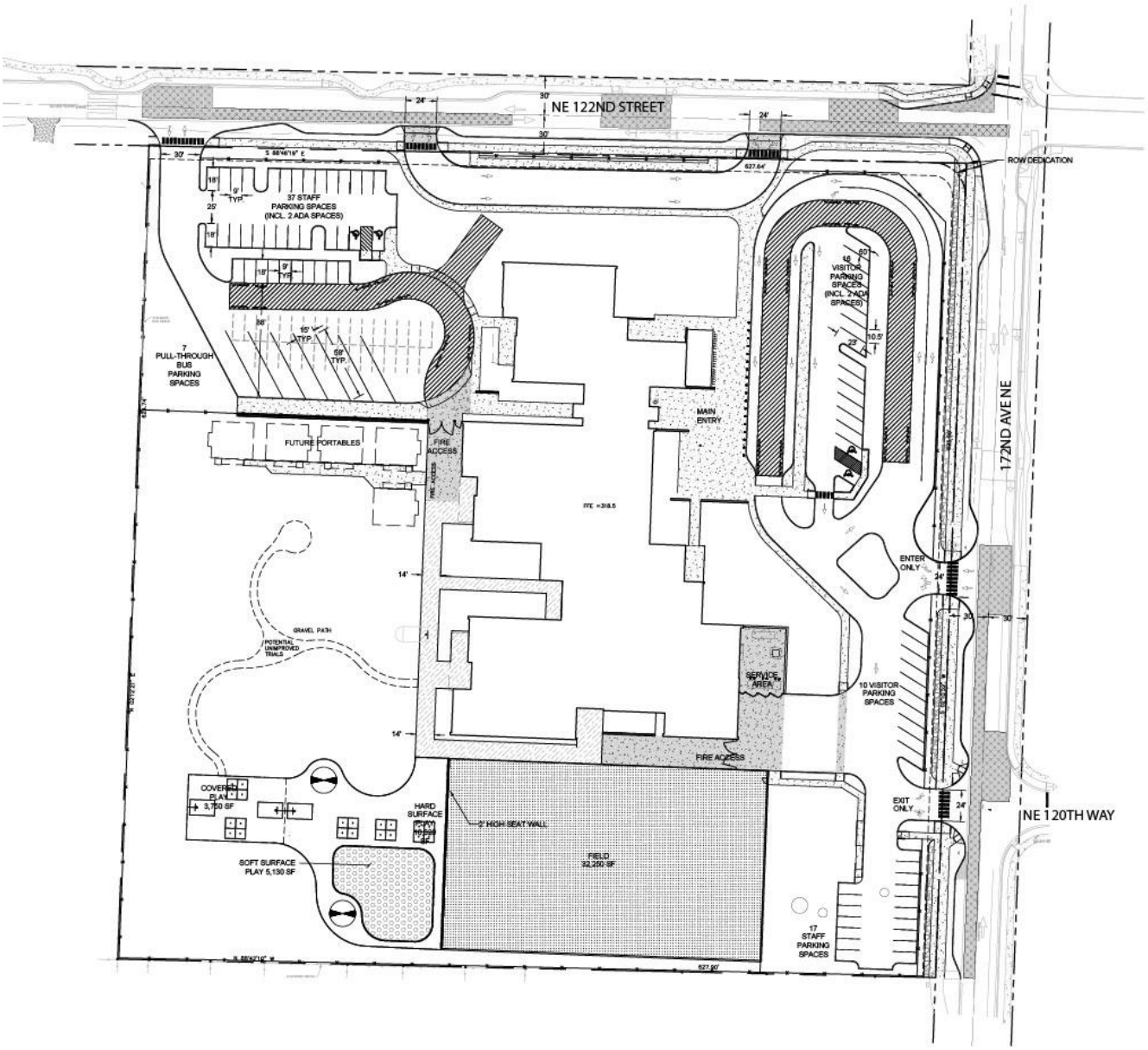


Figure 2: Preliminary Site Plan

EXISTING CONDITIONS

This section describes existing transportation system conditions in the study area. Existing conditions described include an inventory of existing roadways, public transportation services, non-motorized transportation facilities, existing traffic volumes, and intersection levels of service (LOS).

Roadway Network

The following paragraphs describe existing roadways that would be used as primary routes for site access.

NE 122nd Street is a two-lane, east-west local access street with a post speed limit of 25 mph. In the project vicinity there is curb, gutter, and sidewalks on the north side.

172nd Ave NE is a two-lane, north-south connector street with a posted speed limit of 25 mph. In the project vicinity there is curb, gutter, and sidewalks on the east side.

NE 116th Street is a three-lane, east-west collector arterial including a center two-way left-turn lane with a posted speed limit of 35 mph. There is curb, gutter, sidewalk on both sides of the street.

Public Transportation Services

The site is currently served by King County Metro Transit Routes 221 and 931. The nearest transit stops are located on 172nd Ave NE south of NE 116th Street and on NE 128th Street at 172nd Ave NE. Route 221 provides transit service between the Education Hill, Overlake, and Lake Hills neighborhoods. Route 931 provides transit service between Bothell, Woodinville, and Redmond.

Pedestrian/Bicycle Facilities

Pedestrian facilities in the study area include intermittent sidewalks and paved shoulders. In the project vicinity, there are sidewalks located on the north side of NE 122nd St and the east side of 172nd Ave NE. The nearest marked crosswalks are located at the 172nd Ave NE / NE 120th Street intersection, located approximately 215 feet south of the site. Marked crosswalks and curb ramps are located at the signalized intersections and roundabouts on NE 116th Street. There are bike lanes on both sides of NE 116th Street.

Peak-Hour Traffic Volumes

Weekday AM, afternoon, and PM peak hour turning movement volume data was collected in May 2016 at seven off-site study intersections. Study intersections were determined based on coordination with City of Redmond staff and include the following:

1. 172nd Ave NE / NE 122nd St
2. 172nd Ave NE / NE 120th Way
3. Red-Wood Rd (SR 202) / NE 116th St
4. 162nd Ave NE / NE 116th St
5. 172nd Ave NE / NE 116th St
6. Avondale Rd NE / NE 116th St
7. 162nd Pl NE / NE 124th Street

The weekday AM peak hour was determined based on traffic counts conducted between 7:00 and 9:30 AM. The weekday afternoon peak hour is the peak hour associated with student departures, which typically occurs between 3:00 and 4:00 PM. The weekday PM peak hour is assumed to be the peak hour of adjacent street traffic as defined by the Institute of Transportation Engineers (highest hour between 4:00 and 6:00 p.m.).

Figures 3-5 show the existing 2016 weekday AM, afternoon, and PM peak hour traffic volumes at the study intersections.



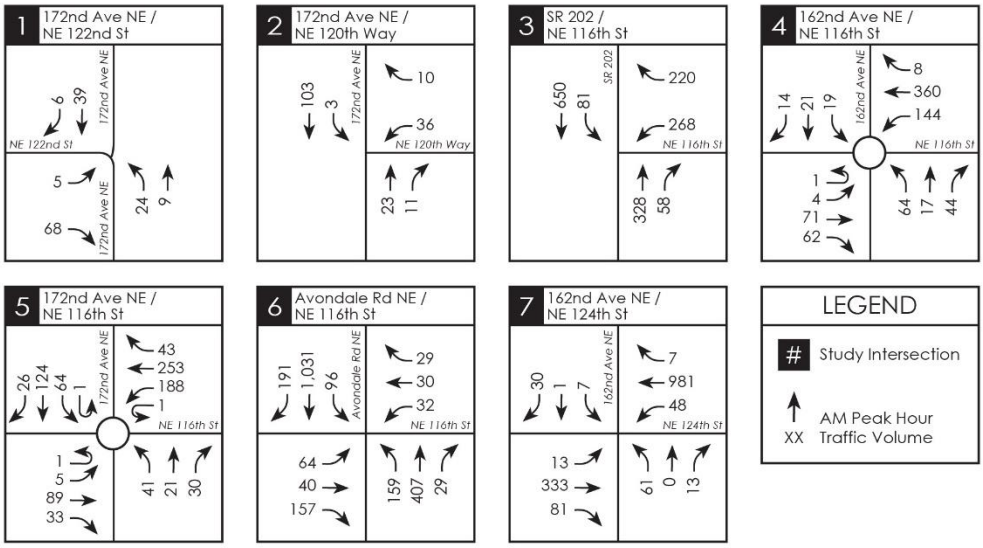
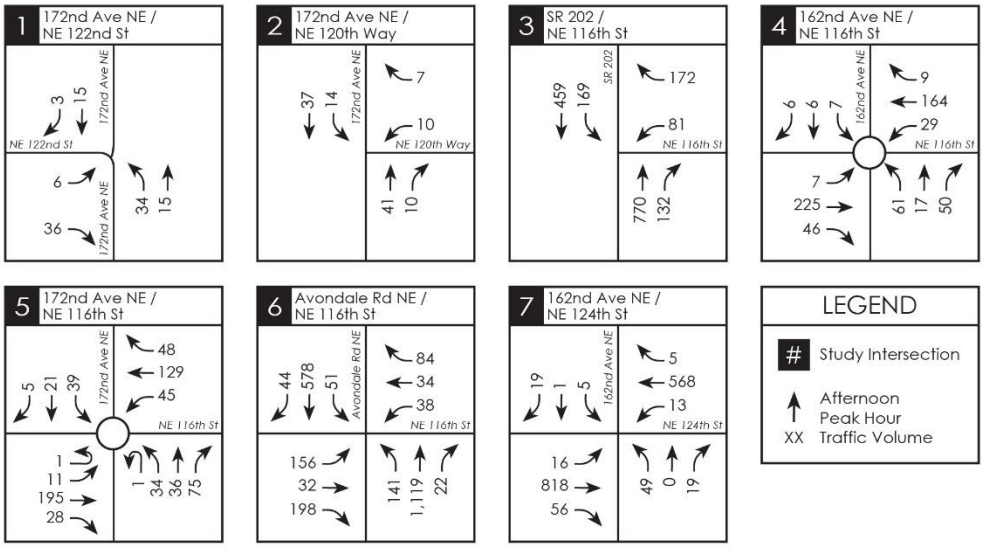


Figure 3: 2016 Existing AM Peak Hour Traffic Volumes

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NOT TO SCALE





N
NOT TO SCALE

Figure 4: 2016 Existing Afternoon Peak Hour Traffic Volumes



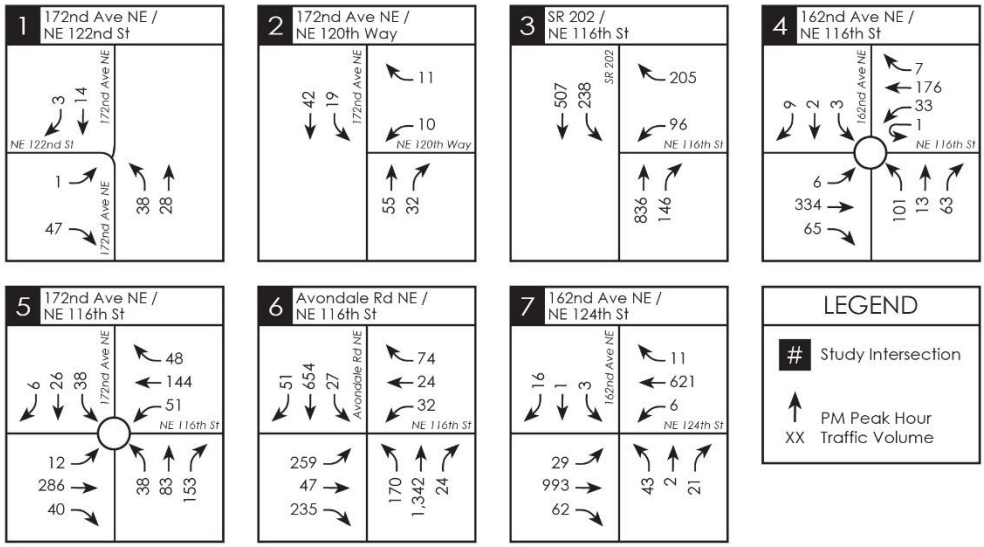


Figure 5: 2016 Existing PM Peak Hour Traffic Volumes

N
NOT TO SCALE

Intersection Levels of Service

Level of service calculations for intersections were based on methodology and procedures outlined in the 2010 update of the *Highway Capacity Manual*, Transportation Research Board (HCM 2010) using *Synchro 8.0* traffic analysis software.

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, roundabouts, and all-way stop controlled intersections represents the average control delay (sec/veh) and can be reported for the overall intersection, for each approach, and for each lane group or movement (additional v/c ratio criteria apply to lane group or movement LOS only).

The LOS reported at two-way stop-controlled intersections is based on the average control delay and can be reported for each controlled minor approach, controlled minor lane group, and controlled major-street movement (additional v/c ratio criteria apply to lane group or movement LOS only).

Table 1 outlines the current HCM 2010 LOS criteria for signalized and unsignalized intersections based on these methodologies.

Table 1
LOS Criteria for Signalized and Unsignalized Intersections[1]

SIGNALIZED INTERSECTIONS			UNSIGNALIZED INTERSECTIONS		
	LOS by Volume-to Capacity (V/C) Ratio[2]			LOS by Volume-to Capacity (V/C) Ratio[3]	
Control Delay (sec/veh)	≤ 1.0	> 1.0	Control Delay (sec/veh)	≤ 1.0	> 1.0
≤ 10	A	F	≤ 10	A	F
> 10 to ≤ 20	B	F	> 10 to ≤ 15	B	F
> 20 to ≤ 35	C	F	> 15 to ≤ 25	C	F
> 35 to ≤ 55	D	F	> 25 to ≤ 35	D	F
> 55 to ≤ 80	E	F	> 35 to ≤ 50	E	F
> 80	F	F	> 50	F	F

[1] Source: HCM2010 Highway Capacity Manual, Transportation Research Board, 2010.

[2] For approach-based and intersection-wide assessments at signals, LOS is defined solely by control delay.

[3] For two-way stop controlled intersections, the LOS criteria apply to each lane on a given approach and to each approach on the minor street. LOS is not calculated for major-street approaches or for the intersection as a whole at two-way stop controlled intersections. For approach-based and intersection-wide assessments at all-way stop controlled intersections and roundabouts, LOS is solely defined by control delay.

An existing weekday AM, afternoon and PM peak hour level of service analysis was conducted at the study intersections. Existing signal timing used in the analysis was provided by the City of Redmond. The LOS results are summarized in Table 2. Detailed LOS summary worksheets are provided in Appendix A.

As shown in Table 2, the signalized and roundabout study intersections and controlled movements at the two-way stop controlled intersections are estimated to operate at LOS D or better at all study intersections except for the northbound shared left-thru-right movement at the intersection of 162nd Pl

NE/NE 124th Street which currently operates at LOS F under existing conditions during the weekday AM, afternoon, and PM peak hours.

Table 2
2016 Existing Peak Hour Level of Service Summary

	2016 Existing Conditions	
Study Intersection	LOS	Delay (sec)
AM Peak Hour		
Signalized Intersections		
3. SR 202 / NE 116th St	B	10.2
6. Avondale Rd NE / NE 116th St	B	13.6
Unsignalized Intersections		
1. 172nd Ave NE / NE 122nd St		
Eastbound shared Lt-Thru	A	7.3
Southbound shared Thru-Rt	A	8.7
2. 172nd Ave NE / NE 120th Way		
Westbound Shared Lt-Rt	A	9.6
Southbound Shared Lt-Thru	A	7.4
7. 162nd Pl NE / NE 124th Street		
Eastbound shared Lt-Thru-Rt	B	10.9
Westbound shared Lt-Thru-Rt	A	8.4
Northbound shared Lt-Thru	F	267
Northbound Rt	B	10.8
Southbound shared Lt-Thru-Rt	D	33.8
Roundabout Intersections		
4. 162nd Ave NE / NE 116th St	B	12.4
5. 172nd Ave NE / NE 116th St	B	10.6
Afternoon Peak Hour		
Signalized Intersections		
3. SR 202 / NE 116th St	B	11.5
6. Avondale Rd NE / NE 116th St	B	16.4
Unsignalized Intersections		
1. 172nd Ave NE / NE 122nd St		
Eastbound shared Lt-Thru	A	7.3
Southbound shared Thru-Rt	A	8.7
2. 172nd Ave NE / NE 120th Way		
Westbound Shared Lt-Rt	A	9.0
Southbound Shared Lt-Thru	A	7.4
7. 162nd Pl NE / NE 124th Street		
Eastbound shared Lt-Thru-Rt	A	8.8
Westbound shared Lt-Thru-Rt	B	10.1
Northbound shared Lt-Thru	F	123.1
Northbound Rt	C	16.6
Southbound shared Lt-Thru-Rt	C	24.2
Roundabout Intersections		
4. 162nd Ave NE / NE 116th St	A	6.1
5. 172nd Ave NE / NE 116th St	A	6.5

Table 2 (continued)
2016 Existing Peak Hour Level of Service Summary

Study Intersection	2016 Existing Conditions LOS	Delay (sec)
PM Peak Hour		
Signalized Intersections		
3. SR 202 / NE 116th St	B	14.3
6. Avondale Rd NE / NE 116th St	B	17.8
Unsignalized Intersections		
1. 172nd Ave NE / NE 122nd St		
Eastbound shared Lt-Thru	A	7.3
Southbound shared Thru-Rt	A	8.7
2. 172nd Ave NE / NE 120th Way		
Westbound Shared Lt-Rt	A	9.4
Southbound Shared Lt-Thru	A	7.5
7. 162nd Pl NE / NE 124th Street		
Eastbound shared Lt-Thru-Rt	A	9.0
Westbound shared Lt-Thru-Rt	B	10.7
Northbound shared Lt-Thru	F	184.0
Northbound Rt	C	19.3
Southbound shared Lt-Thru-Rt	D	25.9
Roundabout Intersections		
4. 162nd Ave NE / NE 116th St	A	7.0
5. 172nd Ave NE / NE 116th St	A	7.5

FUTURE CONDITIONS

Planned Transportation Improvements

This section documents the known planned transportation improvements in the study area. There is one planned transportation improvement project identified in the City of Redmond's six-year *2016-2021 Transportation Improvement Program (TIP)* (and also the City's *Transportation Facilities Program TFP)* in the study area:

- *TIP S40 (TFP 111): NE 124th Street and 162nd Place NE Signal*

  Description:
  The project includes construction of a new traffic signal at 124th Ave NE and NE 162nd Place NE. The project includes the addition of turn lanes on NE 124th Street and modifications on 162nd Place for sight distance. The estimated cost of the project in the TIP/TFP is $896,000 of which $275,000 is funded. This improvement is partially funded by transportation impact fees.

172nd Ave NE Extension

Another related project in the immediate site vicinity includes the future opening of 172nd Avenue NE between NE 122nd Street and NE 124th Street to through traffic. Currently a barricade is located on 172nd Avenue NE at NE 124th Street that prohibits through traffic. The date of the removal of the barricade is undetermined and is dependent on the following criteria being met:

- The intersection of 162nd Place NE and NE 124th Street must meet warrants for a traffic signal, which will happen when there are enough residential units built and occupied in North Redmond to generate sufficient traffic volumes (see separate section in this report for signal warrant analysis conducted for this intersection, as well as a traffic operations analysis with the 172nd Ave NE Extension).
- A traffic signal and left turn lanes at 162nd Place NE and NE 124th Street will be constructed. (Note: This project is listed as Project S40 (TFP 111) on the City's *6-Year Transportation Improvement Program*, but currently there is no dedicated funding for the project. In addition to the intersection of 162nd Place NE and NE 124th Street meeting the necessary warrants for a traffic signal, funding must be secured before the project moves forward with construction.)
- Traffic calming will be completed along the corridor between NE 111th St and NE 128th Street, including a roundabout at NE 116th Street and 172nd Avenue NE. Proposed traffic calming treatments will be coordinated with area residents and King County. (Note: the roundabout at NE 116th St/172nd Ave NE has already been constructed).

Project Trip Generation

Per the City's request, trip generation and traffic operations analysis for the proposed New Elementary School in North Redmond was estimated based on two potential boundary scenarios as described below:

- **Scenario 1** represents the best available estimate of the enrollment boundary at the time of this study, including student population walking, being driven, or being bussed to school and with the best estimate of geographical boundaries.

- **Scenario 2** represents a worst case scenario from a traffic perspective where minimal bus service is provided, the boundaries extend to a point where bus service would be triggered, and the majority of students would likely be driven to school. Minimal bus service means that the only busses provided would be for special conditions such as grandfathering or to serve areas that are within the walk boundary but have safe walk route restrictions.

Trip Generation for Scenario 1

The trip generation estimates for the proposed New Elementary School in North Redmond were based on a review of existing trip generation rates derived at local LWSD elementary schools located in the City of Redmond and vicinity. The data included for Scenario 1 was based on four studies that had typical bus service provided (4-5 busses with approximately 220-280 bus riders) and 2 studies that had minimal bus service (1-2 busses for special conditions with only 25-30 bus riders). "Minimal" bus service is defined as a school that is a designated walking school but was serviced by up to 2 busses due to safe walk route restrictions and areas that were provided grandfathered bus service after temporary boundary changes. The trip rate summary in Appendix B provides a summary of the data used including bussing statistics at each school at the time of the studies.

Trip generation studies (traffic counts) were conducted at Rosa Parks Elementary (October 2013), Einstein Elementary (October 2013), Redmond Elementary (April and December 2014), Horace Mann Elementary (October 2014), and Audubon Elementary (June 2015) over a two-day study period (Tuesday and Thursday) during the AM peak hour, afternoon (school) peak hour, and the PM peak hour. The AM peak hour was the highest hour surrounding the school arrival time and generally coincides with the peak hour of AM commute traffic (the peak hour ranged between 7:45 and 9:15 AM). The afternoon peak hour was the highest hour surrounding the school dismissal time (the peak hour ranged between 2:30 and 4:00 PM). The PM peak hour was the highest hour between 4:00 PM and 6:00 PM (which is the traditional peak hour of adjacent street traffic as defined by ITE). The traffic counts captured all vehicles entering and exiting the school sites as well as vehicles dropping off and picking up students on the adjacent streets.

Trip Generation Rates at Existing Schools for Scenario 1

Based on the student enrollment at each school during the time of the traffic counts described above (as provided by LWSD), a trip rate per student was derived. The following Table 3 summarizes the derived trip generation rates (per student) for each time period at each study site for Scenario 1. The trip rate calculations and vehicular count summaries for the existing elementary schools are included in Appendix B.

Table 3
Existing Elementary Schools Trip Rate Summary for Scenario 1

School	Date Studied	Student Enrollment	Trip Rate (per student) AM Peak Hour	Afternoon Peak Hour	PM Peak Hour
Rosa Parks Elementary	Oct 2013	650	0.95	0.52	0.25
Einstein Elementary	Oct 2013	488	0.58	0.34	0.18
Redmond Elementary	April 2014	435	0.82	0.55	0.21
Redmond Elementary	Dec 2014	473	0.87	0.56	0.18
Horace Mann Elementary	Oct 2014	471	0.93	0.68	--
Audubon Elementary	June 2015	565	0.80	0.48	0.11
Weighted Average Trip Rate (per student)			**0.83**	**0.52**	**0.19**

As shown in Table 3, a weighted average trip generation rate (per student) was calculated for each time period (AM, Afternoon, and PM) based on the trip generation rates and student enrollments at the 5 elementary schools. The weighted average trip rate is 0.83 trips per student during the AM peak hour, 0.52 trips per student during the Afternoon peak hour, and 0.19 trips per student during the PM peak hour.

Trip Generation Estimate for New Elementary Scenario 1

Per LWSD, the future planned capacity of the proposed New Elementary School in North Redmond is 665 students (including permitting for 5 portables). To estimate the AM, Afternoon, and PM peak hour trips generated by the school with Scenario 1, the weighted average trip rates derived from the 5 other local LWSD elementary schools (see Table 3 above) were used. The resulting estimated trips generated by the proposed school with Scenario 1 during the weekday AM peak hour, Afternoon peak hour, and PM peak hour are summarized in Table 4. The detailed trip generation estimate is included in Appendix C.

Table 4
North Redmond Trip Generation Summary for Scenario 1

Weekday Time Period	Scenario 1 Trips Generated In	Out	Total
AM Peak Hour	293	259	552
Afternoon Peak Hour	163	183	346
PM Peak Hour	52	74	126

As shown in Table 4, under Scenario 1, the proposed New Elementary School in North Redmond Elementary is estimated to generate 552 trips during the weekday AM peak hour (293 entering, 259 exiting), 346 trips during the weekday afternoon peak hour (163 entering, 183 exiting), and 126 trips during the weekday PM peak hour (52 entering, 74 exiting).

Trip Generation for Scenario 2

The trip generation estimates for the proposed New Elementary School in North Redmond with Scenario 2 (minimal bus service) were based on the existing trip generation rates derived at local (City of Redmond and vicinity) LWSD elementary schools. For Scenario 2, in addition to the 2 studies with minimal bus service utilized in Scenario 1 (1-2 busses with only 25-30 riders), a third study was added (Horace Mann from April 2014) which had no bussing at that time (0 busses and 0 riders). "Minimal" bus service is defined as a school that is a designated walking school but was serviced by up to 2 busses due to safe walk route restrictions and areas that were provided grandfathered bus service after temporary boundary changes. The trip rate summary in Appendix B provides a summary of the data used including bussing statistics at each school at the time of the studies.

Trip Generation Rates at Existing Schools for Scenario 2

Based on the student enrollment at each school during the time of the traffic counts described above (as provided by LWSD), a trip rate per student was derived. The following Table 5 summarizes the derived trip generation rates (per student) for each time period at each study site for Scenario 2. The trip rate calculations and vehicular count summaries for the existing elementary schools are included in Appendix B.

Table 5
Existing Elementary Schools Trip Rate Summary for Scenario 2

School	Date Studied	Student Enrollment	Trip Rate (per student) AM Peak Hour	Trip Rate (per student) Afternoon Peak Hour
Rosa Parks Elementary	Oct 2013	650	0.95	0.52
Horace Mann Elementary	Apr 2014	437	1.08	0.67
Horace Mann Elementary	Oct 2014	471	0.93	0.68
Weighted Average Trip Rate (per student)			**0.98**	**0.61**

As shown in Table 5, the weighted average trip rate for schools with "Minimal" bus service was 0.98 trips per student during the AM peak hour, and 0.61 trips per student during the Afternoon peak hour (the PM peak hour trip rates for Scenario 1 were used for both scenarios since bus service does not have a direct impact on the PM peak hour). These trip generation rates represent a 17 to 18 percent increase over the estimated trip generation rates used for Scenario 1.

Also shown in Appendix B is a summary of a hypothetical "Scenario 1A", which would represent a scenario for schools that all had "typical" bus service (excluding the 2 "minimal" bus service studies). For this hypothetical scenario, the weighted average trip rate was 0.77 trips per student during the AM peak hour, and 0.48 trips per student during the Afternoon peak hour. If we compare the trip rates for Scenario 2 to this scenario, the Scenario 2 trip rates represent a 27 percent increase over Scenario 1A. In other words, local schools with little to no bus service had trip generation that was nearly 30 percent higher than schools with "typical" bus service.

Trip Generation Estimate for New Elementary Scenario 2

Based on the rates in Table 5, the resulting estimated trips generated by the proposed school with Scenario 2 during the weekday AM, Afternoon, and PM peak hours are summarized in Table 6. The detailed trip generation estimate is included in Appendix C.

Table 6
North Redmond Trip Generation Summary for Scenario 2

	Scenario 2 Trips Generated		
Weekday Time Period	In	Out	Total
AM Peak Hour	339	313	652
Afternoon Peak Hour	199	207	406
PM Peak Hour[1]	52	74	126

1. PM peak hour trip generation was assumed to be consistent with Scenario 1 since bus service does not have a direct impact on the PM peak hour.

As shown in Table 6, under Scenario 2, the proposed New Elementary School in North Redmond is estimated to generate 652 trips during the weekday AM peak hour (339 entering, 313 exiting), 406 trips during the weekday afternoon peak hour (199 entering, 207 exiting), and 126 trips during the weekday PM peak hour (52 entering, 74 exiting).

Existing Elementary Schools Historical Trip Generation Comparison

The City of Redmond requested a comparison of existing elementary schools' forecasted vehicular trip generation at the time of opening to the current vehicular trip generation based on our recent counts (specifically for Horace Mann Elementary, Redmond Elementary, and Audubon Elementary). TENW was able to locate the prior traffic studies for Horace Mann and Redmond Elementary, but despite an internal search by LWSD and a Public Records Request to the City of Redmond, the traffic study for Audubon Elementary was not able to be located. Table 7 summarizes the historical trip generation forecasts compared to our recent counts at Horace Mann Elementary and Redmond Elementary.

Table 7
Existing Elementary Schools
Historical Trip Generation vs. Recent Counts

		AM Peak Hour		Afternoon Peak Hour		PM Peak Hour	
School	Student Enrollment	Total Trips	Trip Rate per Student	Total Trips	Trip Rate per Student	Total Trips	Trip Rate per Student
Horace Mann Elementary							
2001 Traffic Study	450	316	0.70	141	0.31	10	0.02
April 2014 Counts	437	471	1.08	292	0.67	89	0.20
October 2014 Counts	471	438	0.93	321	0.68	--	--
Redmond Elementary							
1996 Traffic Study	550	165	0.30	138	0.25	55	0.10
April 2014 Counts	435	357	0.82	240	0.55	93	0.21
December 2014 Counts	473	413	0.87	263	0.56	84	0.18

The information provided in Table 7 shows that traffic studies conducted for these elementary schools in 1996 and 2001 estimated relatively low trip generation relative to current traffic counts, and likely did not account for local conditions where a majority of parents drive their children to school rather

than using bus service. It is not clear whether this phenomenon has evolved into the current situation over the last 15-20 years, or if the traffic studies simply underestimated trip generation from the start. We have concluded that the use of nationally published studies from ITE that formed the basis of some of these original traffic studies does not appear to adequately account for the current local conditions. As opposed to previously used methods, we have chosen to use data from an extensive set of local studies at schools in and near Redmond to evaluate the impacts of this project for varying levels of bus service. Therefore, we believe that our methodology provides a realistic evaluation of the low and high ends of the anticipated impacts from this school.

Concurrency

Based on enrollment capacity information provided by the applicant, 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.

A concurrency application was submitted to the City and it is expected that the current MU supply will accommodate the additional MU demand created by the proposed New Elementary School in North Redmond. Therefore, it is anticipated that a certificate of concurrency will be issued for the project.

Project Trip Distribution and Assignment

School attendance boundaries are generally used as a guide to estimate the distribution of trips for school projects. However, final school boundaries for the proposed New Elementary School in North Redmond have not yet been established by LWSD. As described in a separate letter from LWSD to the City of Redmond, the actual enrollment boundary will not be determined until much later in the development process. To capture the potential range in trip generation and distribution from this school, boundary assumptions for Scenario 1 and Scenario 2 were developed to "bookend" the range of potential traffic impacts (see Trip Generation section for descriptions of Scenarios 1 and 2). Preliminary boundary assumptions for traffic analysis purposes were provided by LWSD to assist with the traffic study. The preliminary boundary assumptions for Scenario 1 and Scenario 2 are included in Appendix D. The limits are very preliminary and are subject to change, but the assumptions for Scenario 1 and Scenario 2 likely cover the range of potential traffic impacts from this project.

To estimate the trip distribution and trip assignment in the study area, the location of existing and future residential developments within the preliminary boundary area were taken into consideration. School traffic traditionally has a slightly different distribution for inbound versus outbound trips. This is intuitive since inbound trips mainly originate at home, while outbound trips are likely more varied with regard to destination. For example, in the AM peak hour, some parents might leave home to drop off their students at school and then exit the site and go to work instead of returning home. Based on our experience, the inbound and outbound patterns are generally more balanced in the afternoon and PM peak hours.

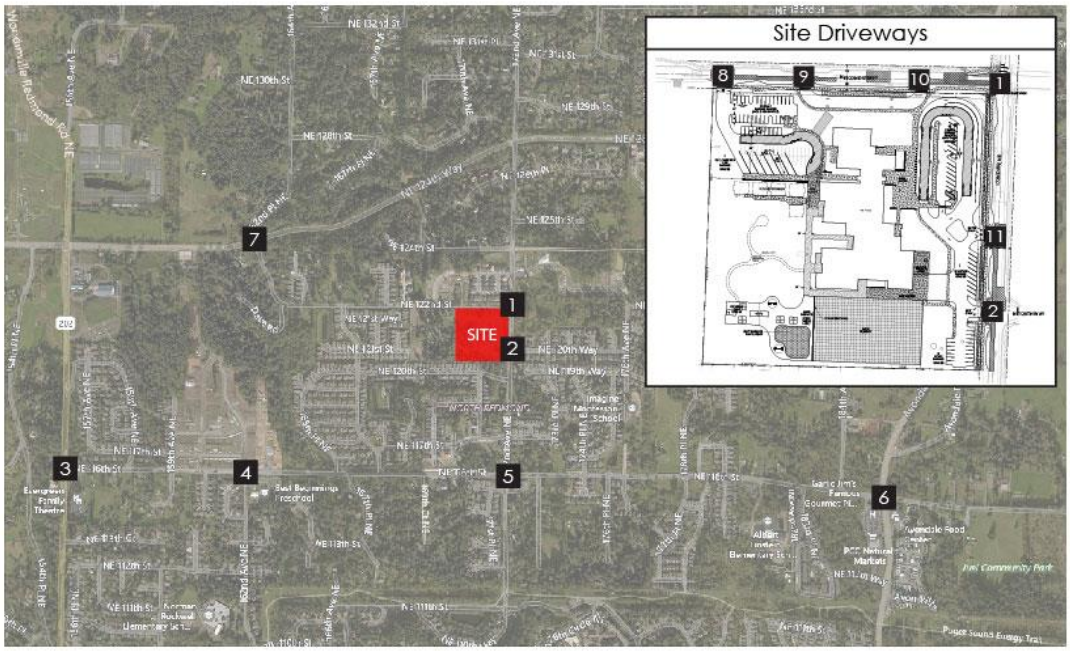
The estimated distribution of inbound and outbound trips to/from the proposed school during the AM, afternoon, and PM peak hours for Scenario 1 is illustrated in Appendix E. Also included in in Appendix E are figures showing the assignment of trips to individual streets in the study area.

Figures 6 to 8 illustrate the assignment of the Scenario 1 project-generated traffic through the proposed site access driveways and at the seven off-site study area intersections during the AM, afternoon, and PM peak hours.

The estimated distribution of inbound and outbound trips to/from the proposed school during the AM, afternoon, and PM peak hours for Scenario 2 is illustrated in Appendix F. Also included in in Appendix F are figures showing the assignment of trips to individual streets in the study area.

Figures 9 to 11 illustrate the assignment of the Scenario 2 project-generated traffic through the proposed site access driveways and at the seven off-site study area intersections during the AM, afternoon, and PM peak hours.

As shown in the figures, Scenario 2 generally has a larger number of trips to/from the south when compared to Scenario 1 due to the enrollment boundary assumptions for Scenario 2, which would potentially capture neighborhoods south of NE 116th Street.



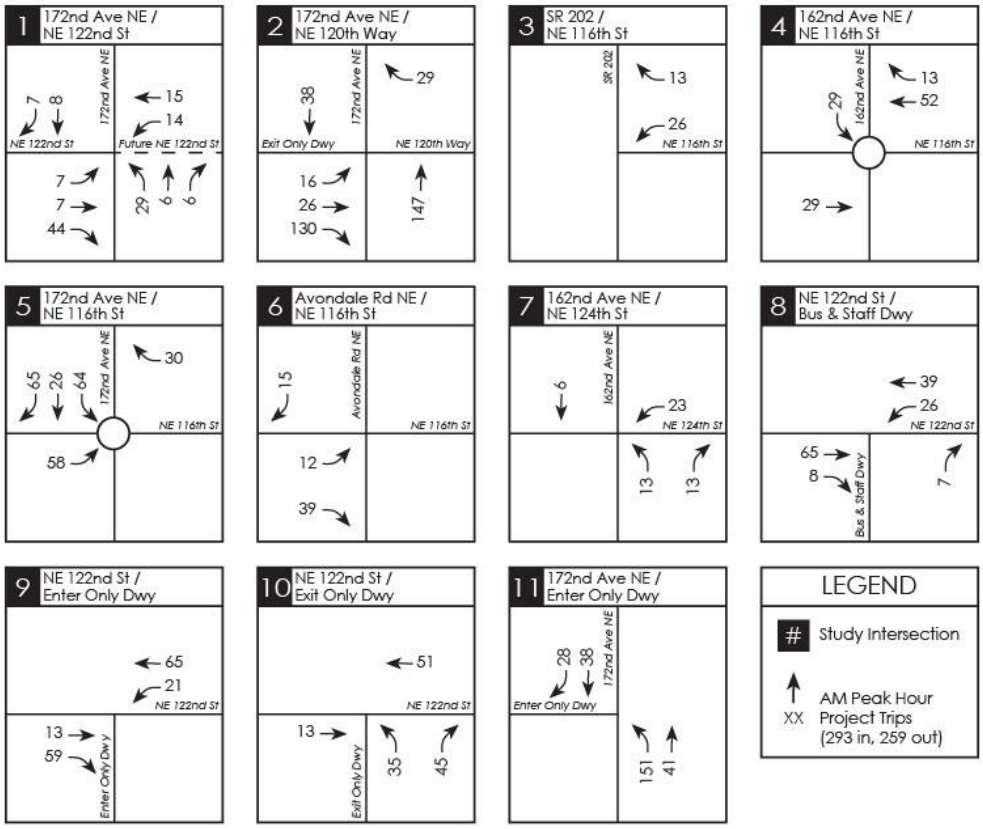
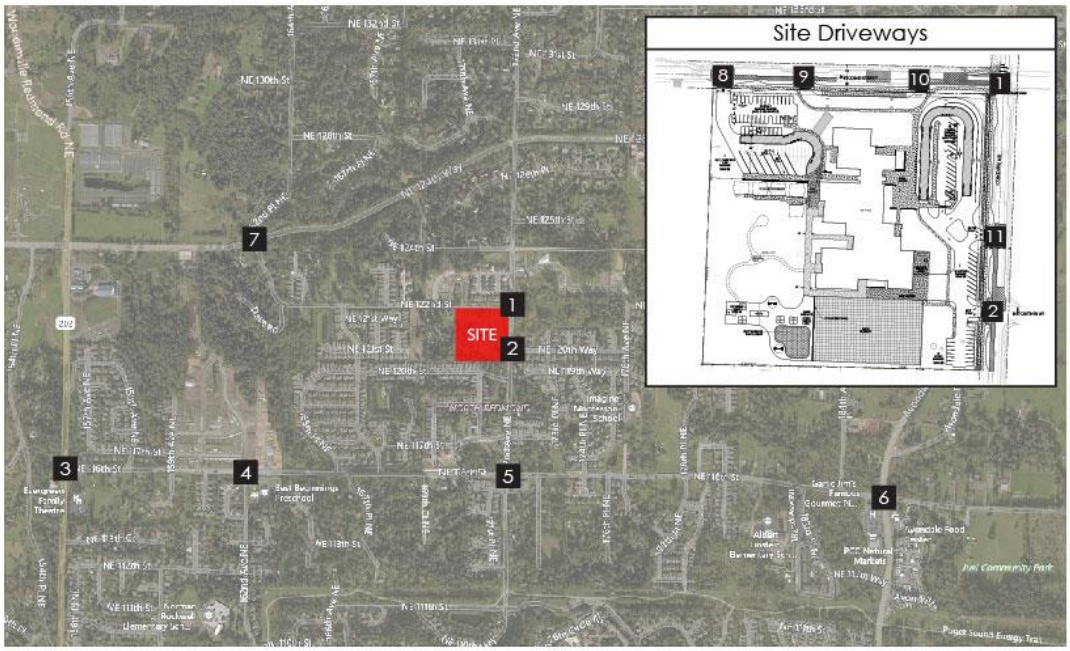


Figure 6: AM Peak Hour Project Trip Assignment for Scenario 1



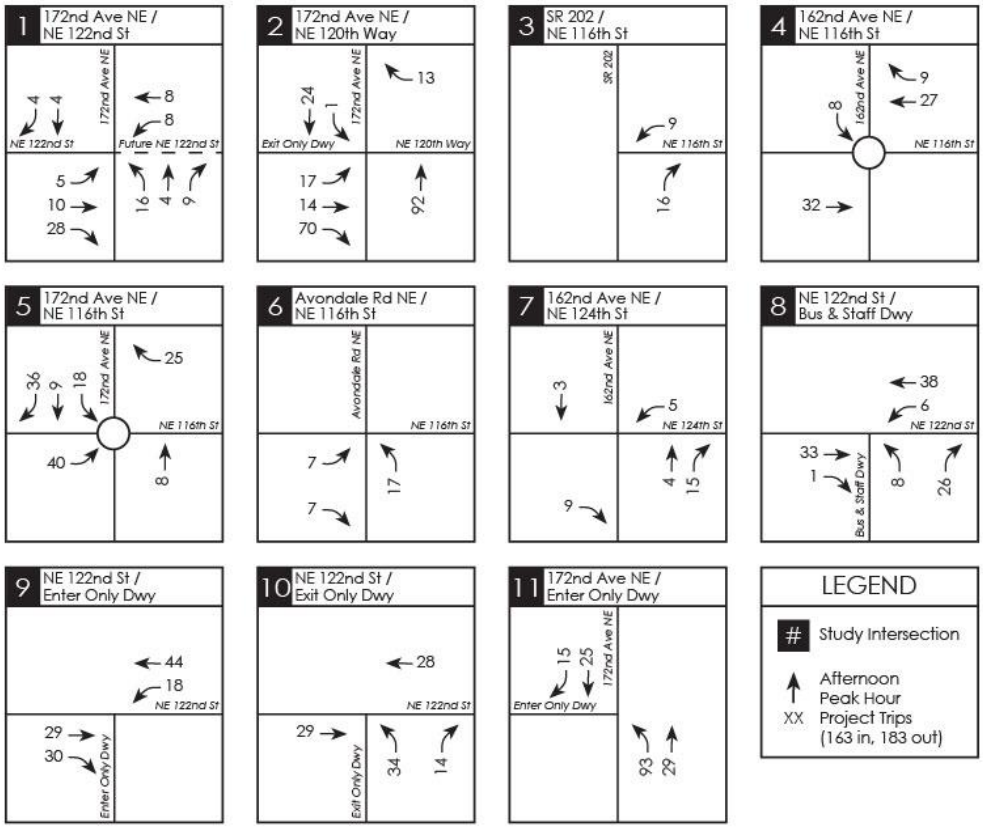
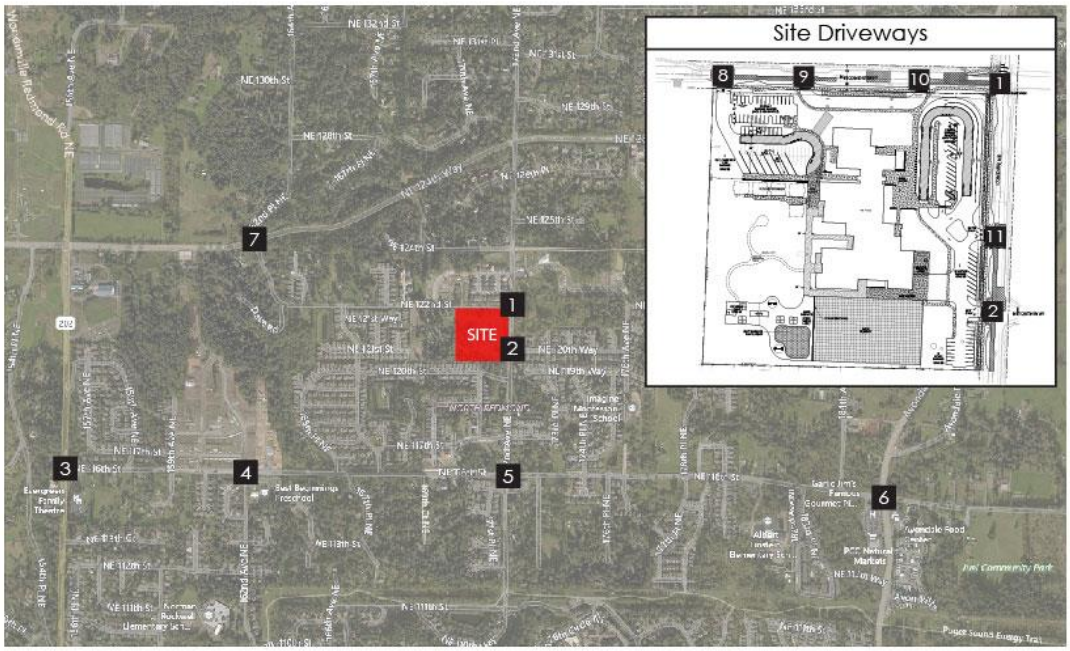


Figure 7: Afternoon Peak Hour Project Trip Assignment for Scenario 1



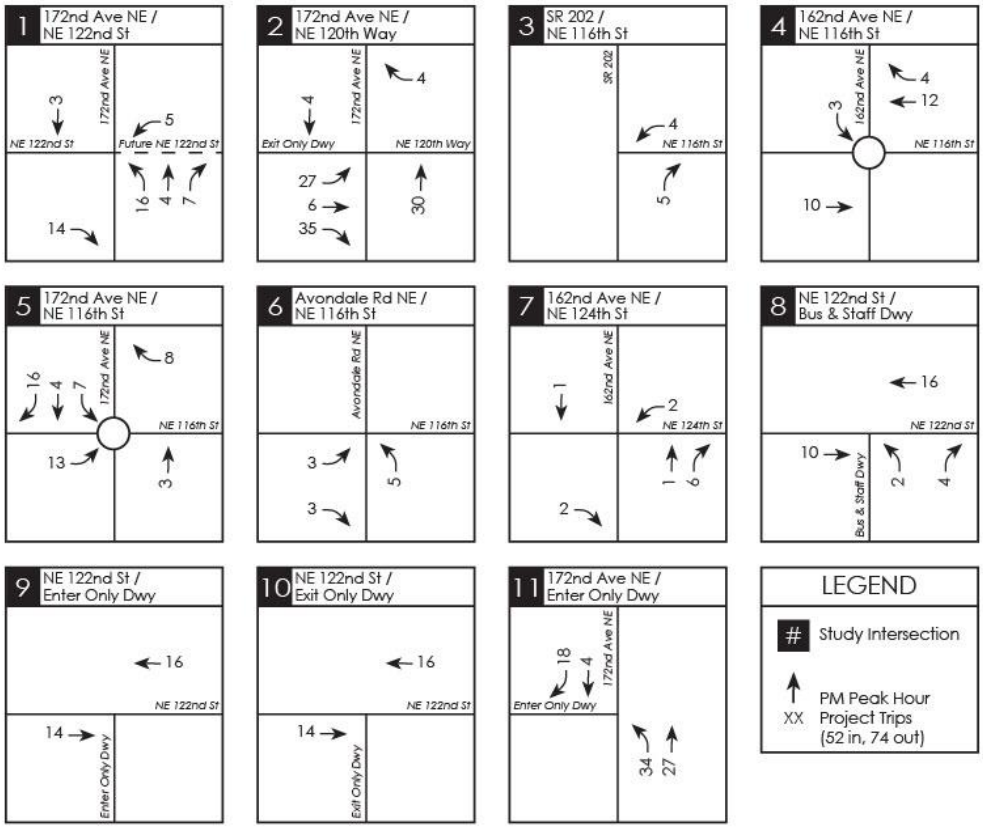
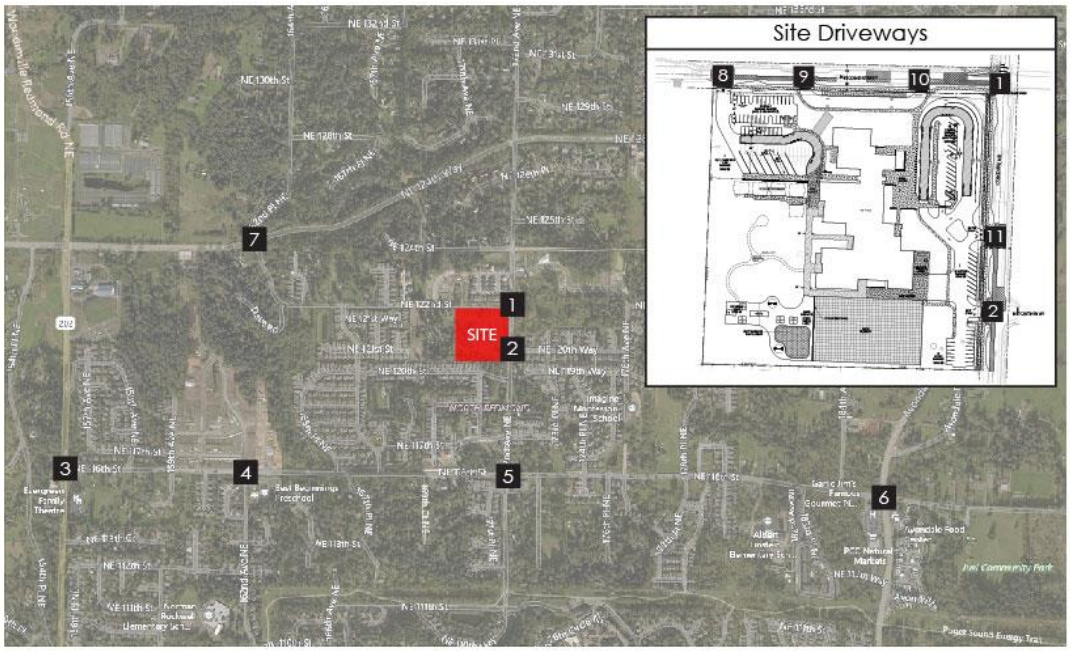


Figure 8: PM Peak Hour Project Trip Assignment for Scenario 1



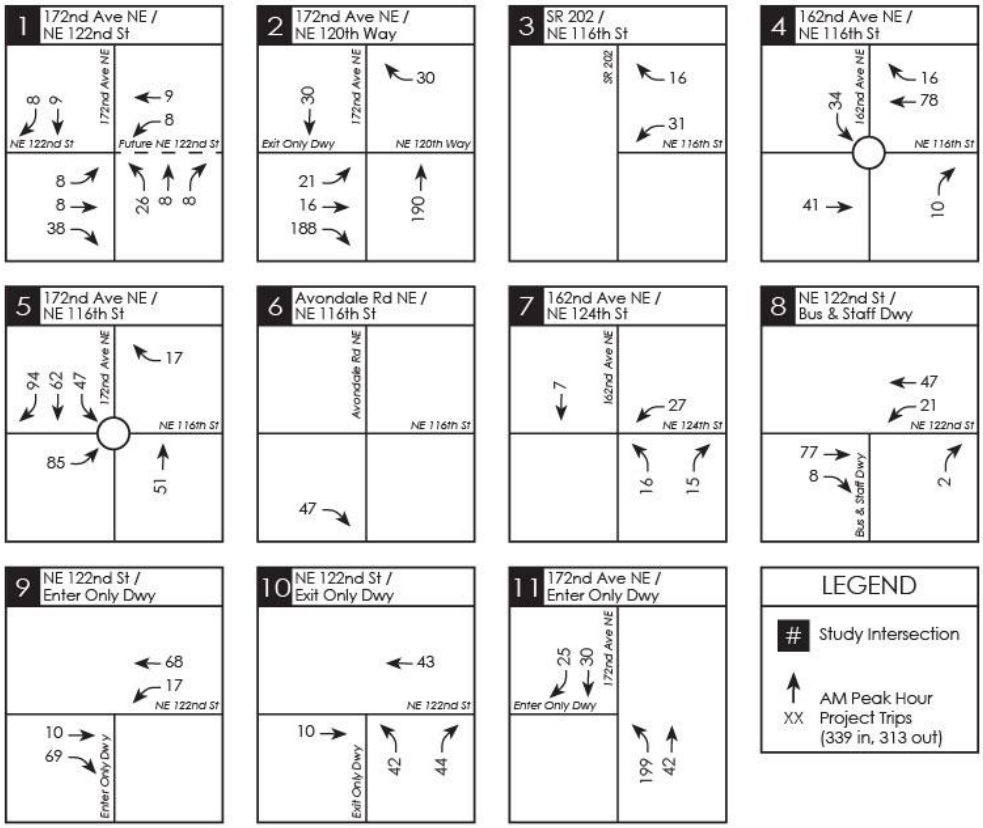
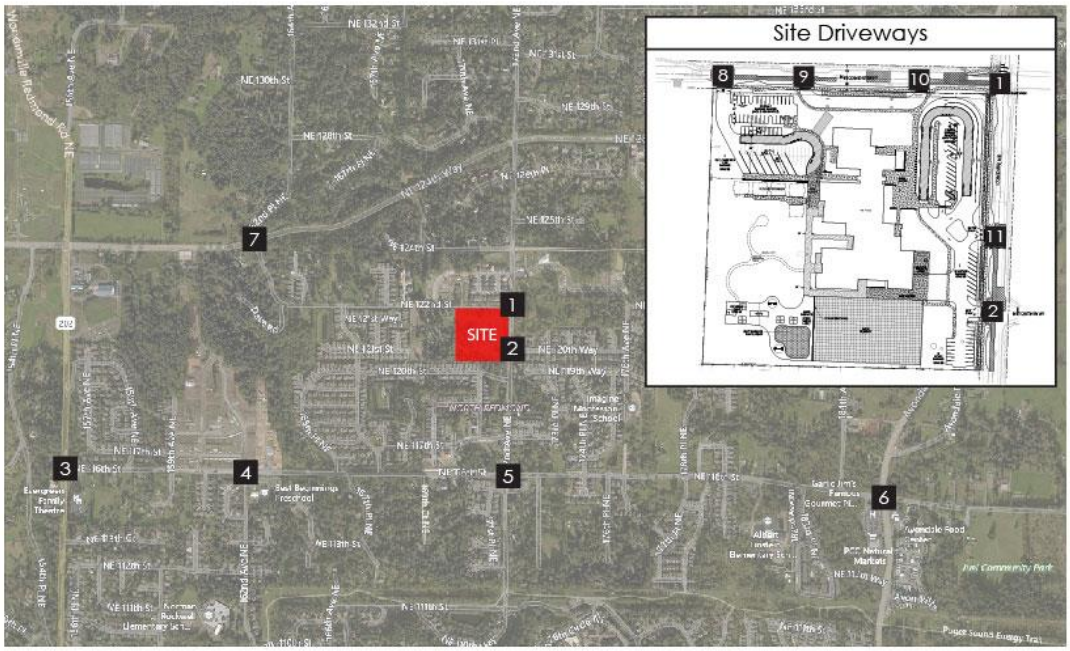


Figure 9: AM Peak Hour Project Trip Assignment for Scenario 2



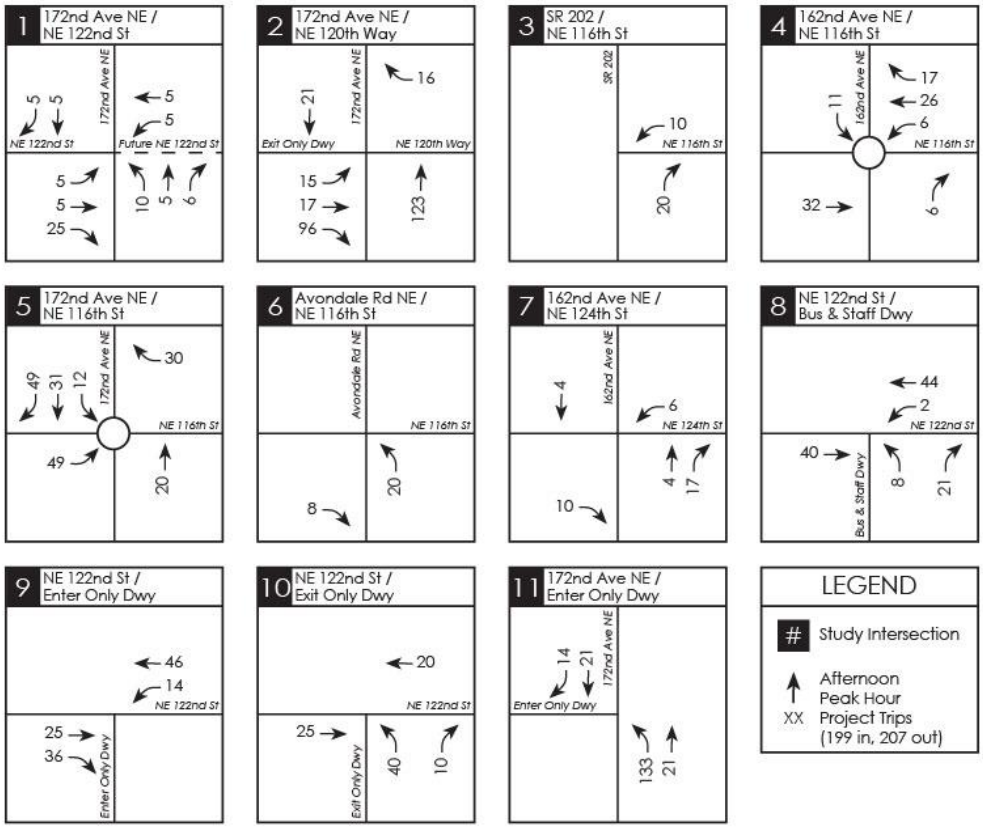
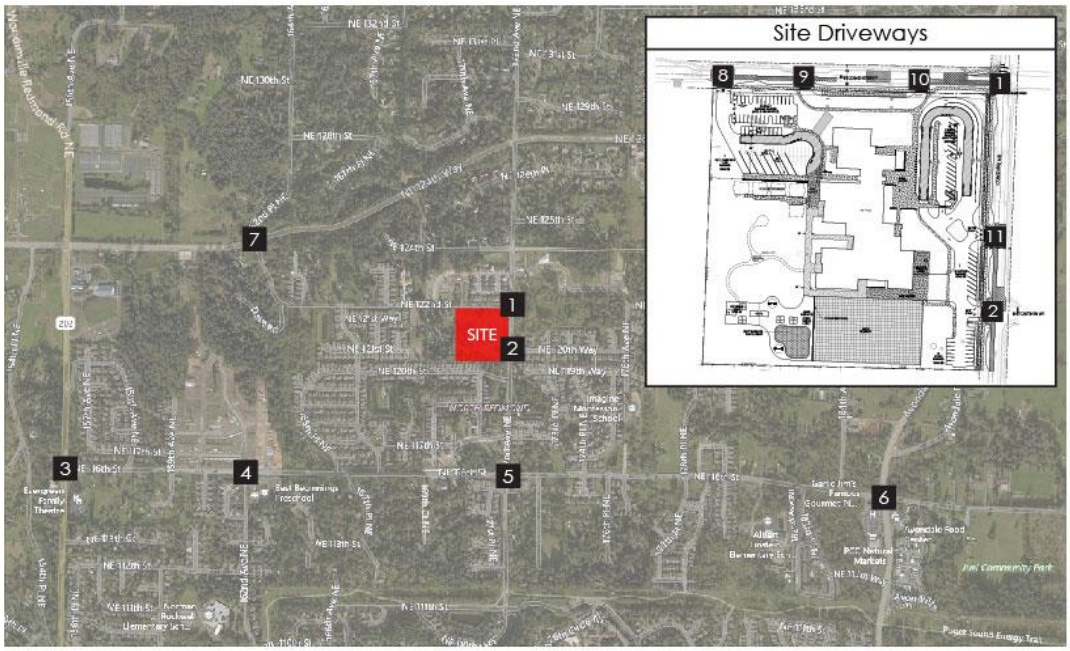


Figure 10: Afternoon Peak Hour Project Trip Assignment for Scenario 2



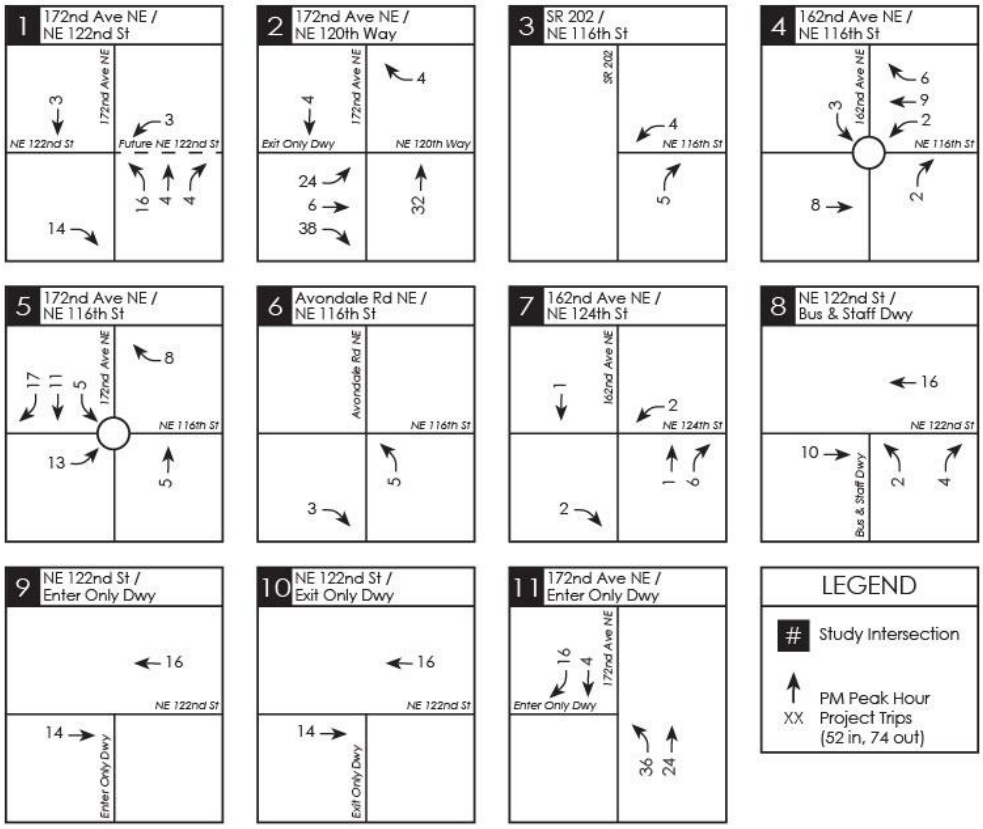


Figure 11: PM Peak Hour Project Trip Assignment for Scenario 2

Future Traffic Volumes

Future year 2018 baseline traffic volumes used in the analysis were estimated based on existing traffic volumes with a 2 percent annual growth rate applied. The annual growth rate of 2 percent used to estimate growth in background traffic was provided by the City of Redmond. In addition to the background growth rate, trips from the future *Hawks Glen* and *Edgewood West* residential developments were included in the future year traffic volumes. The future 2018 No Action AM, afternoon, and PM peak hour traffic volumes at the study intersections are shown in Figures 12 to 14.

The project trips associated with the New Elementary School in North Redmond for Scenario 1 (Figures 6 to 8) were added to the No Action traffic volumes (Figures 12 to 14) to estimate the future year 2018 With Scenario 1 peak hour traffic volumes. The resulting future year 2018 With Scenario 1 peak hour traffic volumes at the study intersections and site access locations are shown in Figures 15 to 17.

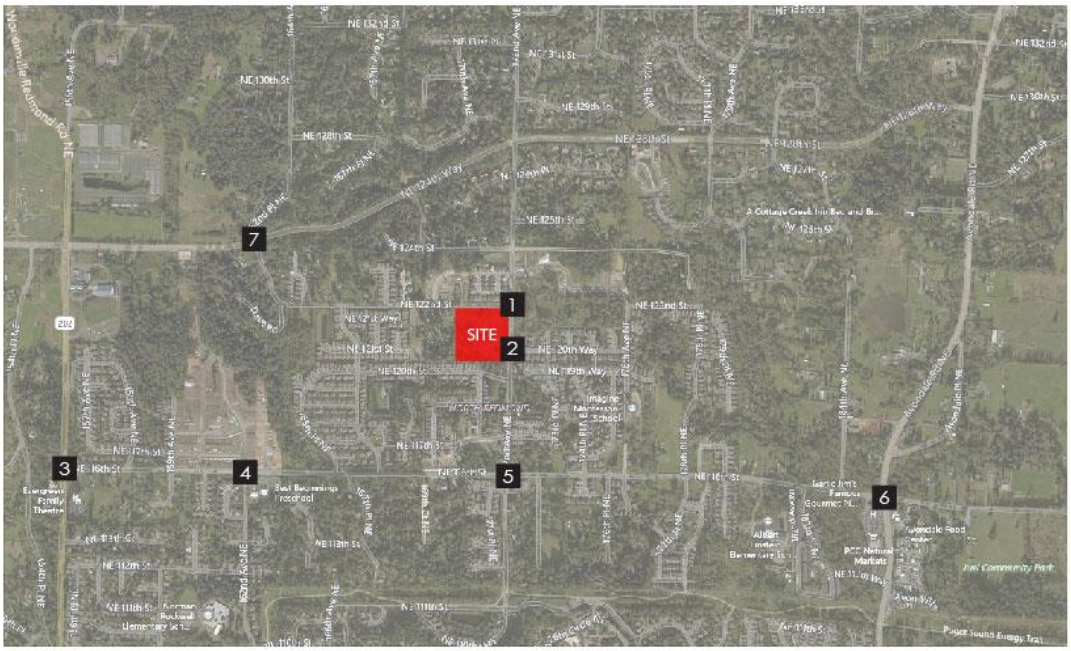
The project trips associated with the New Elementary School in North Redmond for Scenario 2 (Figures 9 to 11) were added to the No Action traffic volumes (Figures 12 to 14) to estimate the future year 2018 With Scenario 2 peak hour traffic volumes. The resulting future year 2018 With Scenario 2 peak hour traffic volumes at the study intersections and site access locations are shown in Figures 18 to 20.

Assigning all of the gross trips to/from the school to the road network is a simplification that results in conservative volumes, which may result in double-counting residential/school trips in the study area. Trips that may be double-counted include:

a. Trips that are generated by existing homes in the area that are already traveling to/from other existing elementary schools during these same time periods.

b. Trips that will be generated by future homes in the "pipeline", whose trips have already been accounted for or will be accounted for in traffic studies for past and future residential plat projects.

Closer to the site and at the site driveways, the trips will mostly be new trips to the streets adjacent to the school. Some of these trips might be considered "pass-by" and others "diverted". At the enrollment boundaries, nearly all of the trips will not be new trips to the system because they are either already using these same intersections today, or are from future pipeline developments that will be using these same intersections. Based on these assumptions, the forecasted volumes used in the analysis are likely conservative.



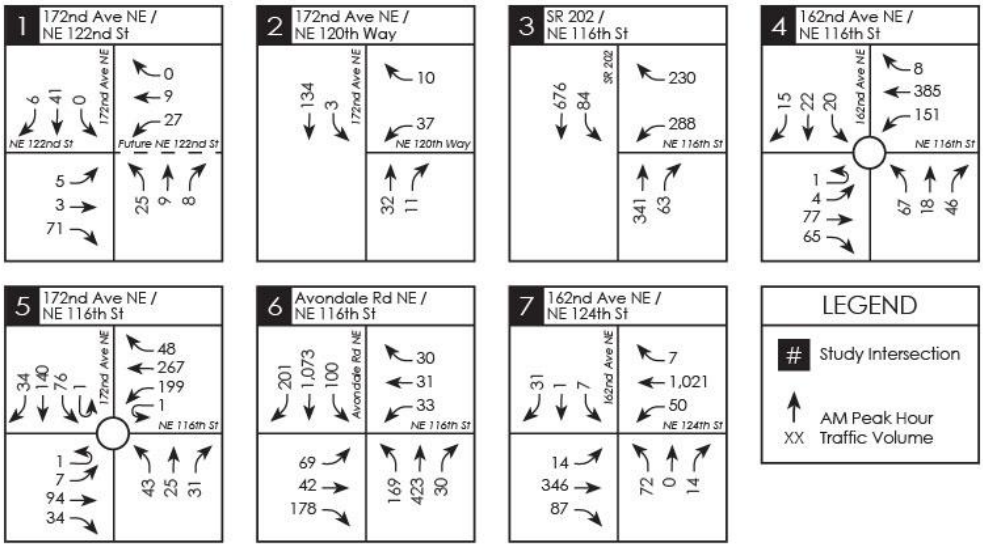
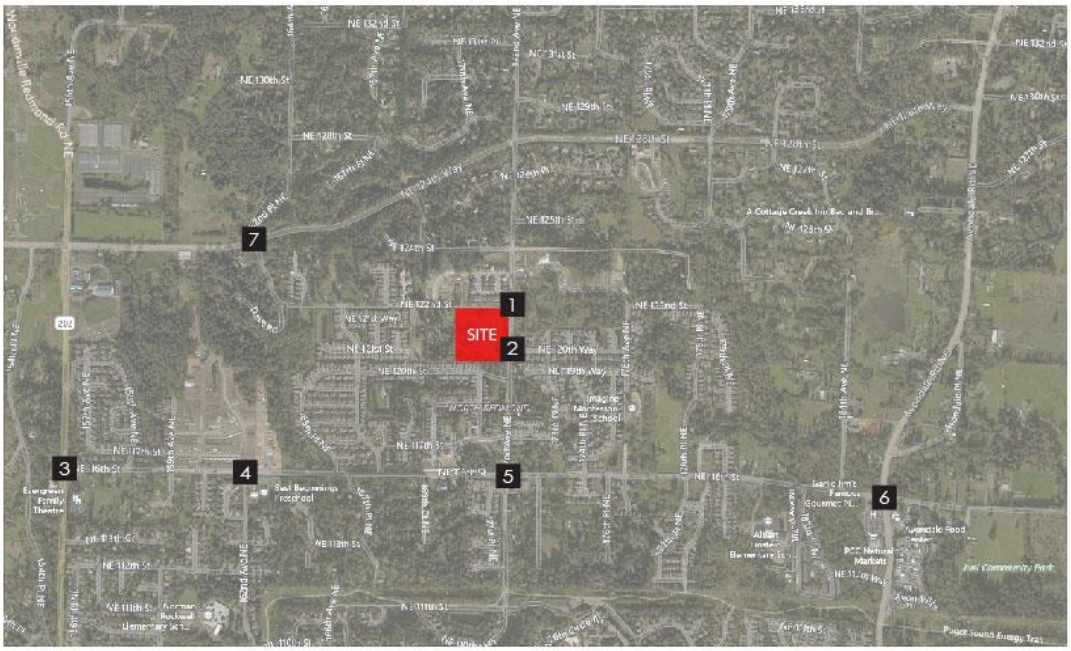


Figure 12: 2018 No Action AM Peak Hour Traffic Volumes

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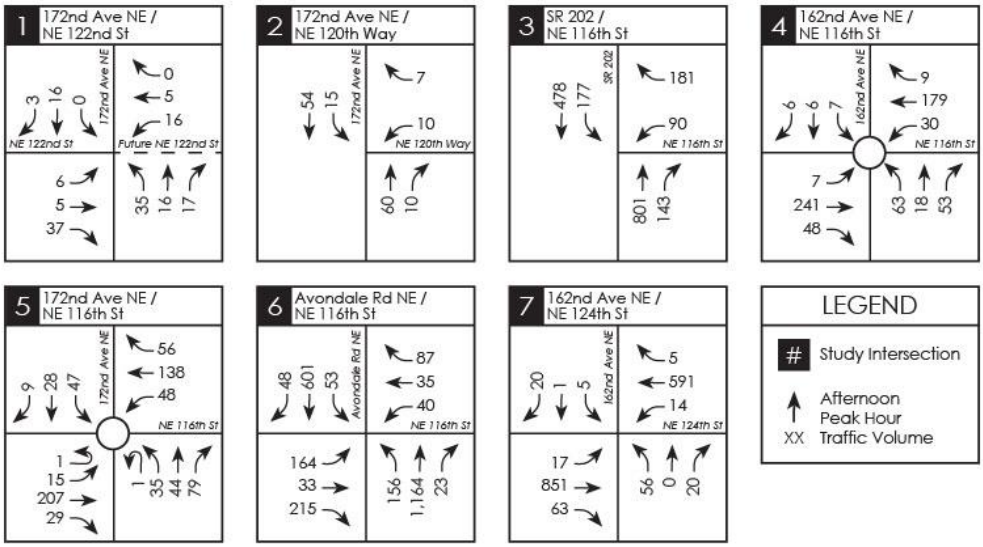
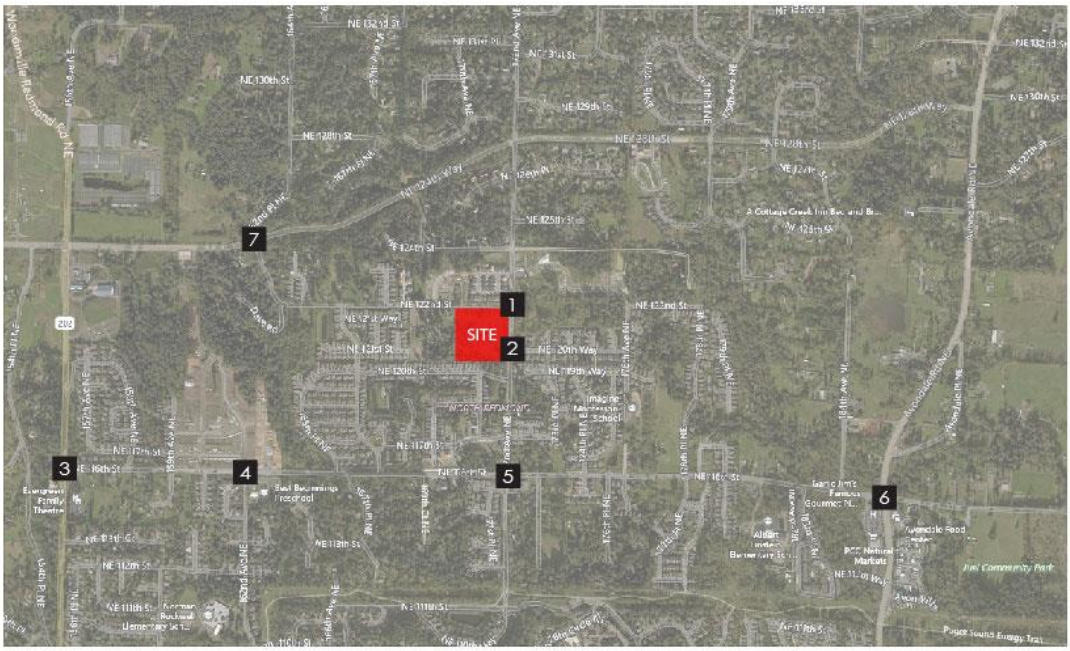


Figure 13: 2018 No Action Afternoon Peak Hour Traffic Volumes

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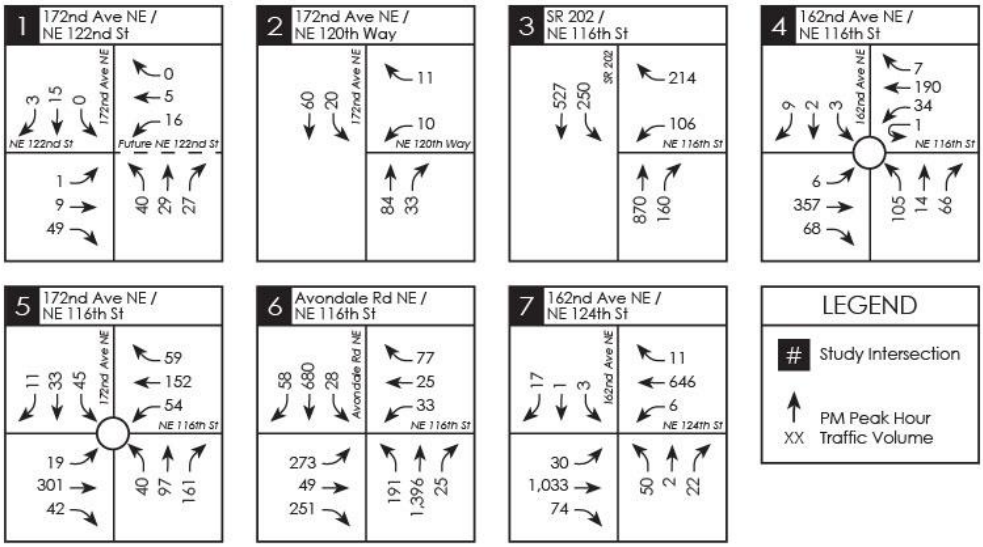
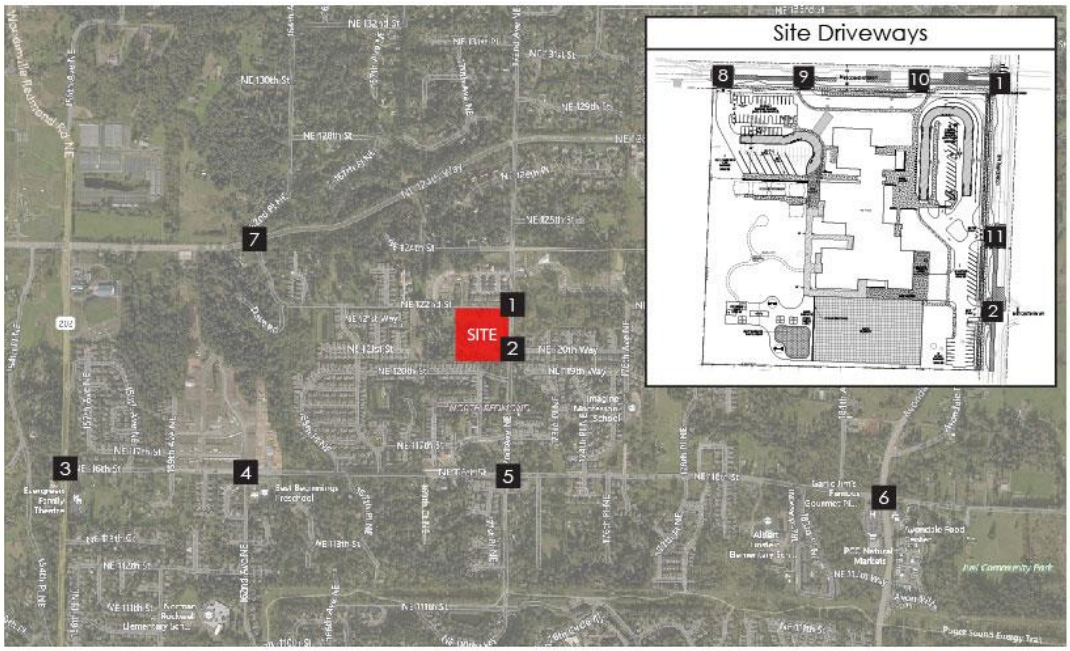


Figure 14: 2018 No Action PM Peak Hour Traffic Volumes

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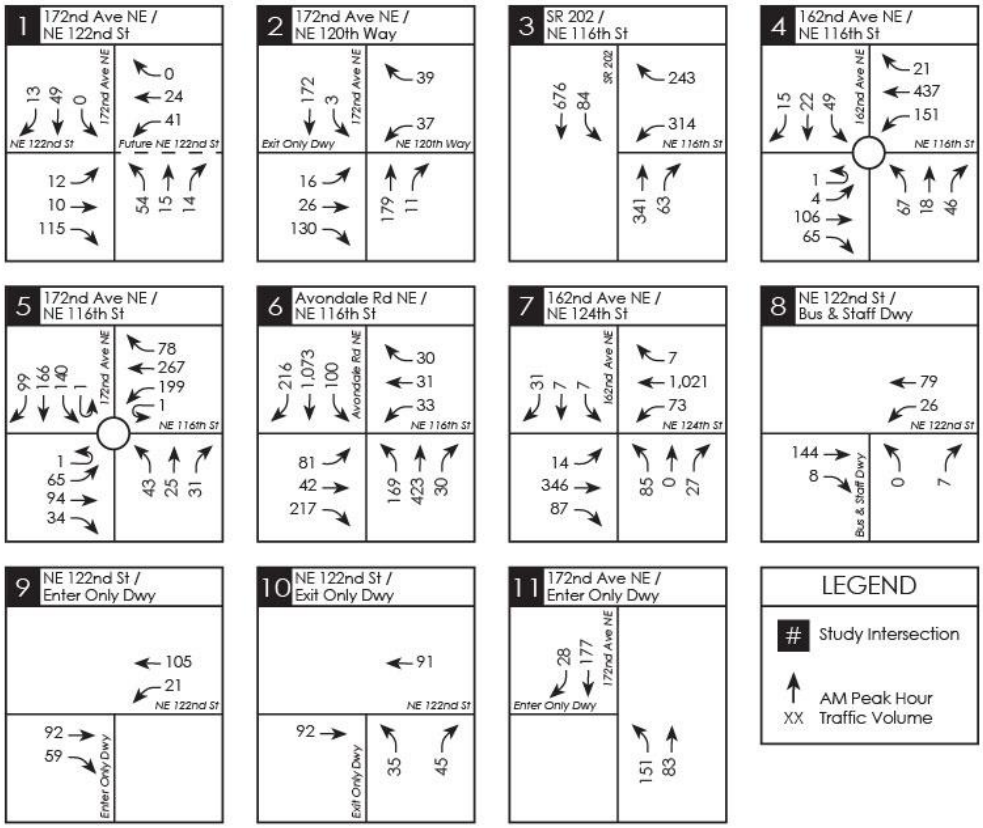
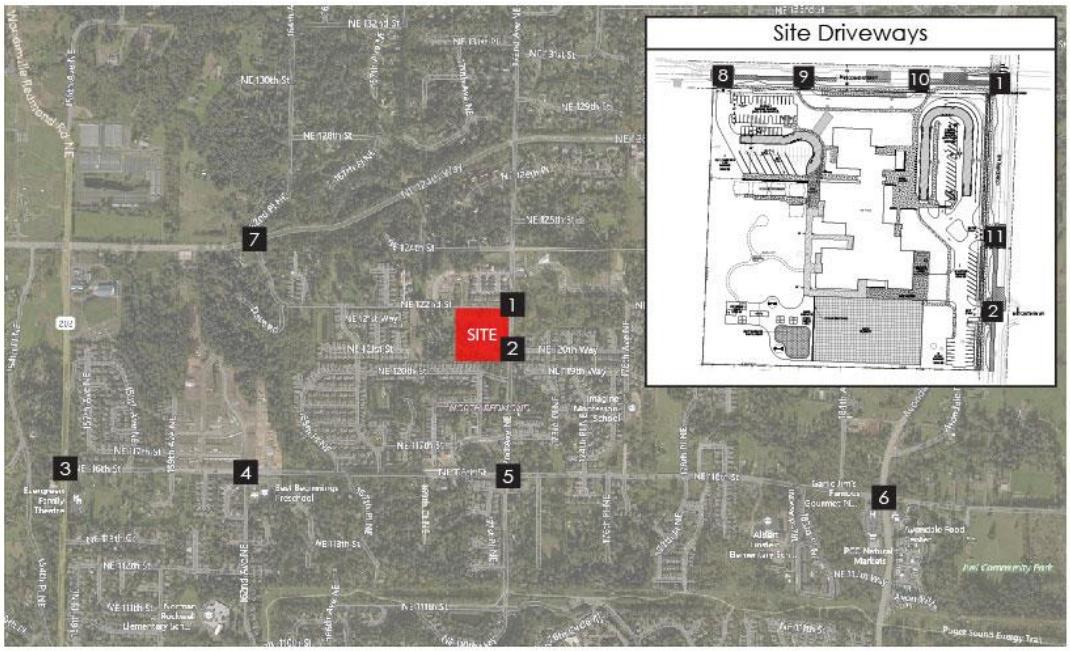


Figure 15: 2018 With Scenario 1 AM Peak Hour Traffic Volumes



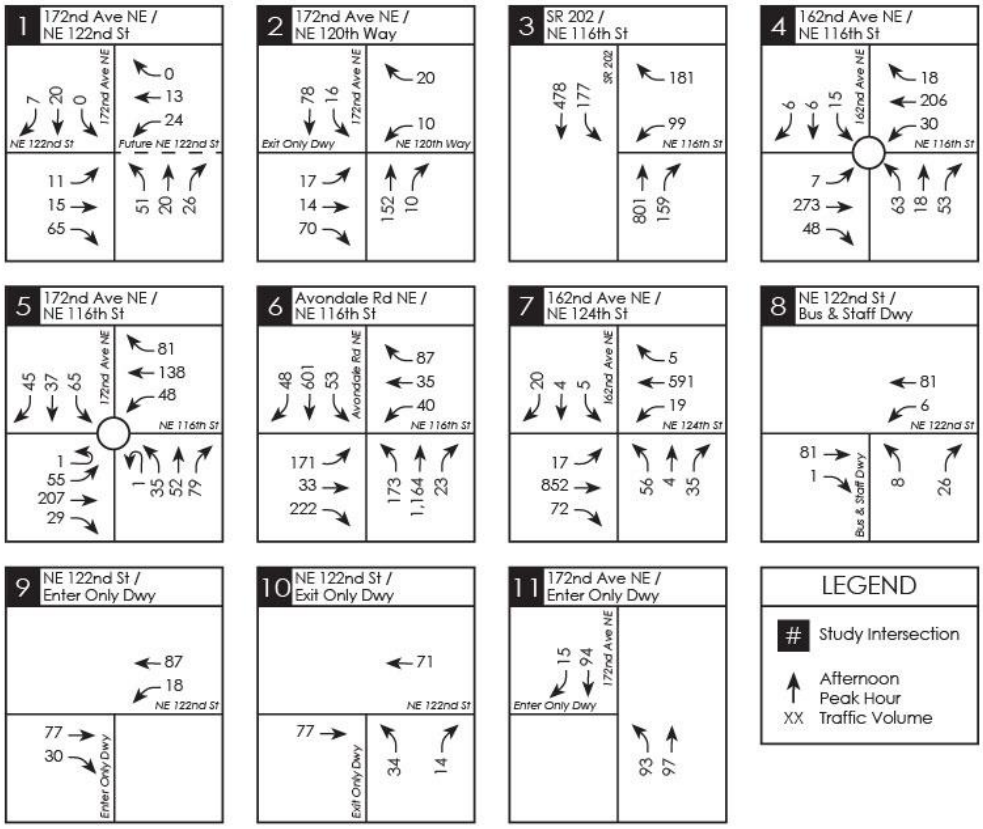
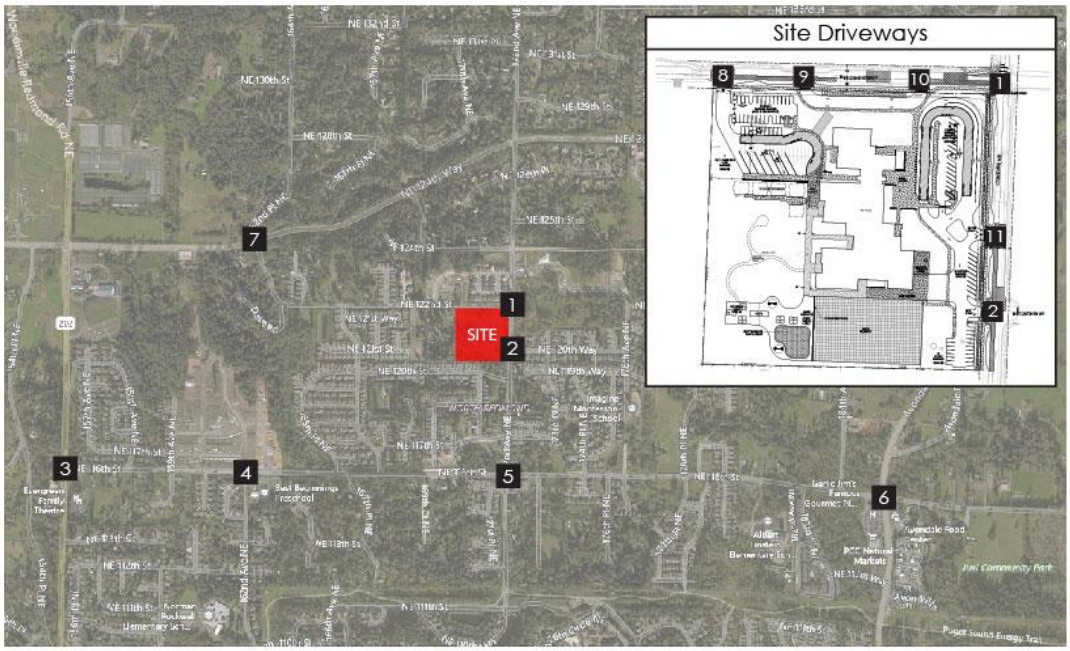


Figure 16: 2018 With Scenario 1 Afternoon Peak Hour Traffic Volumes



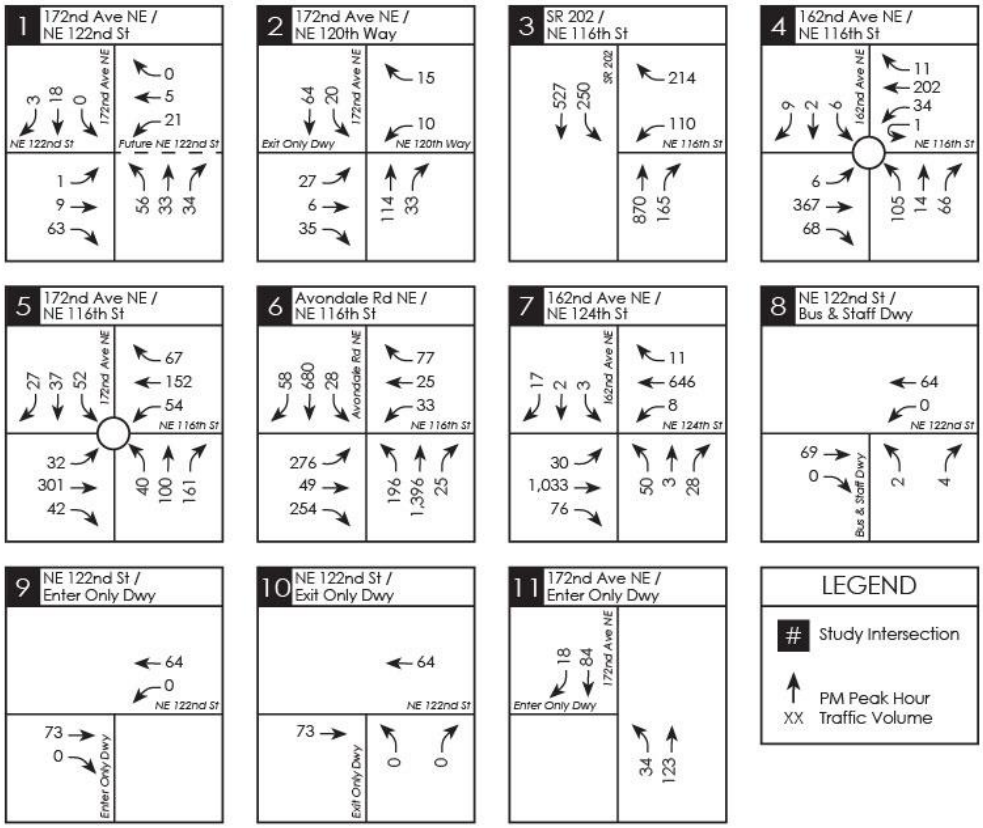


Figure 17: 2018 With Scenario 1 PM Peak Hour Traffic Volumes

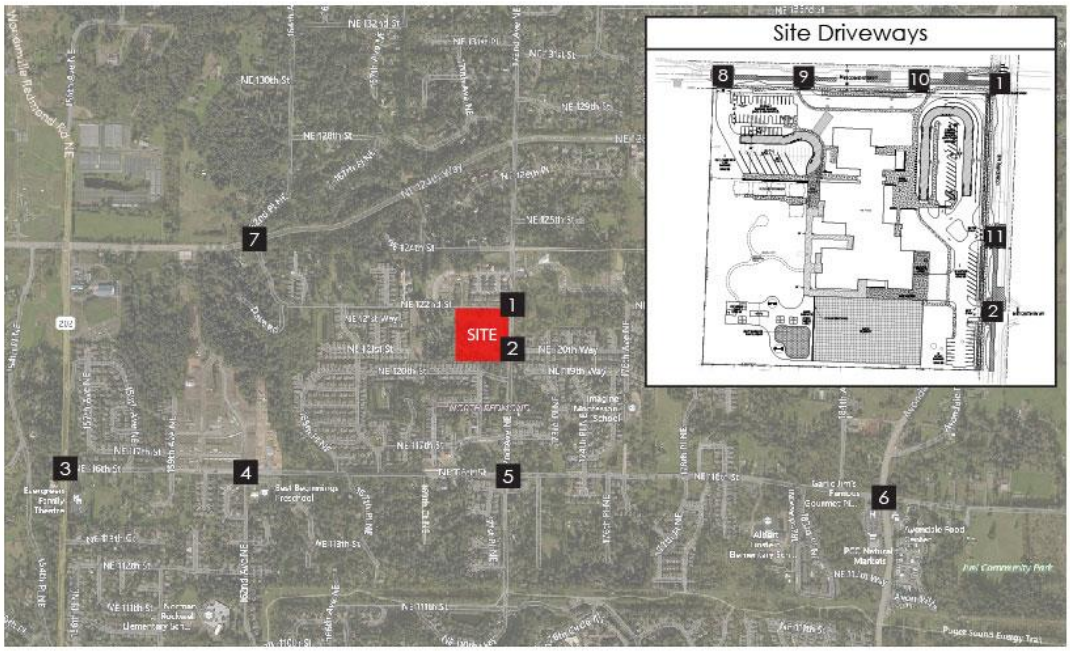
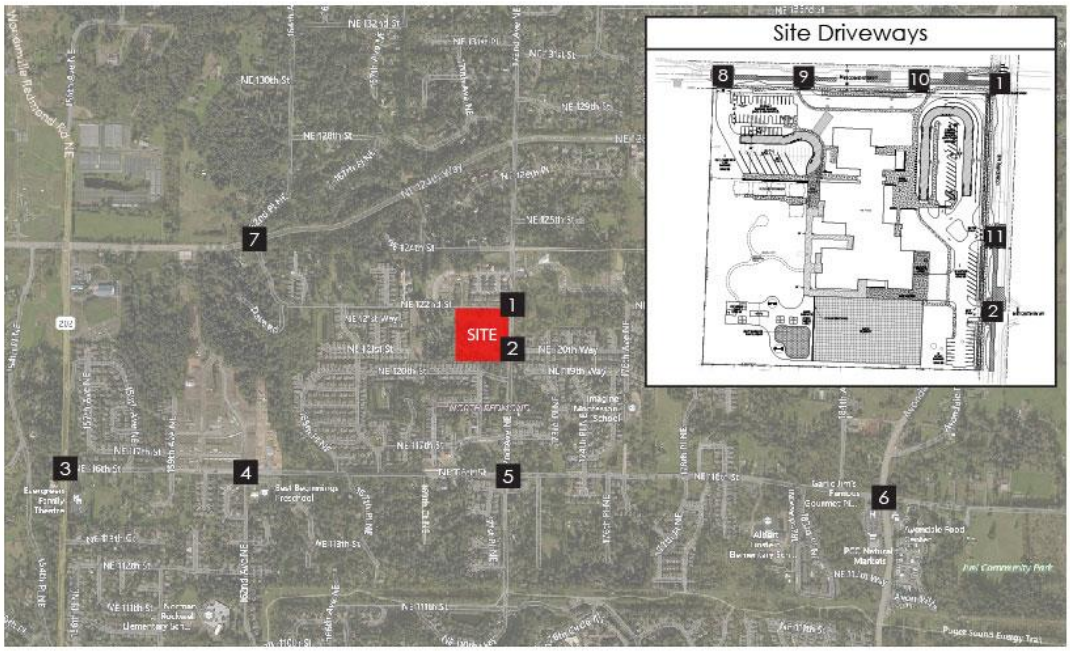


Figure 18: 2018 With Scenario 2 AM Peak Hour Traffic Volumes



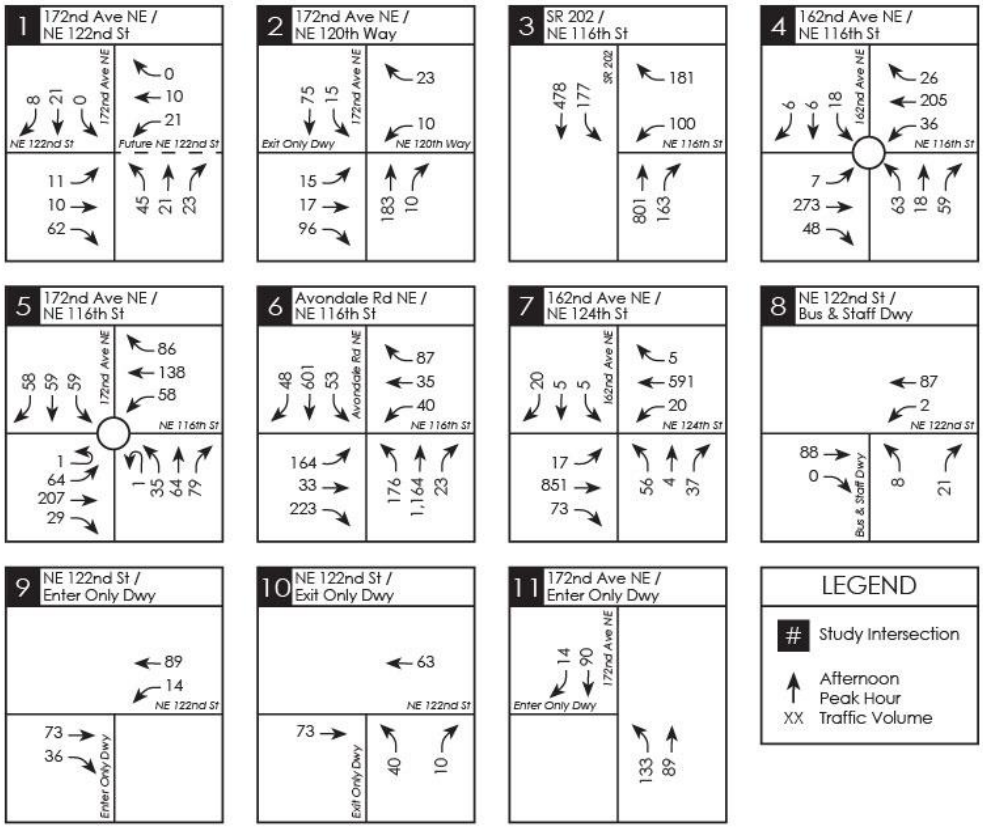
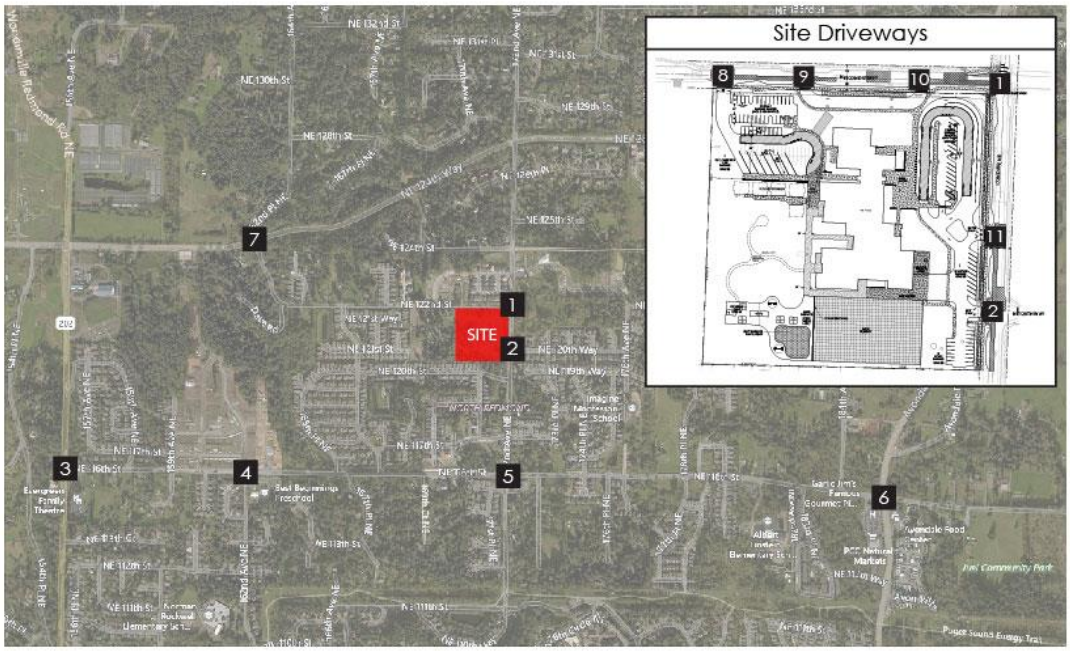


Figure 19: 2018 With Scenario 2 Afternoon Peak Hour Traffic Volumes



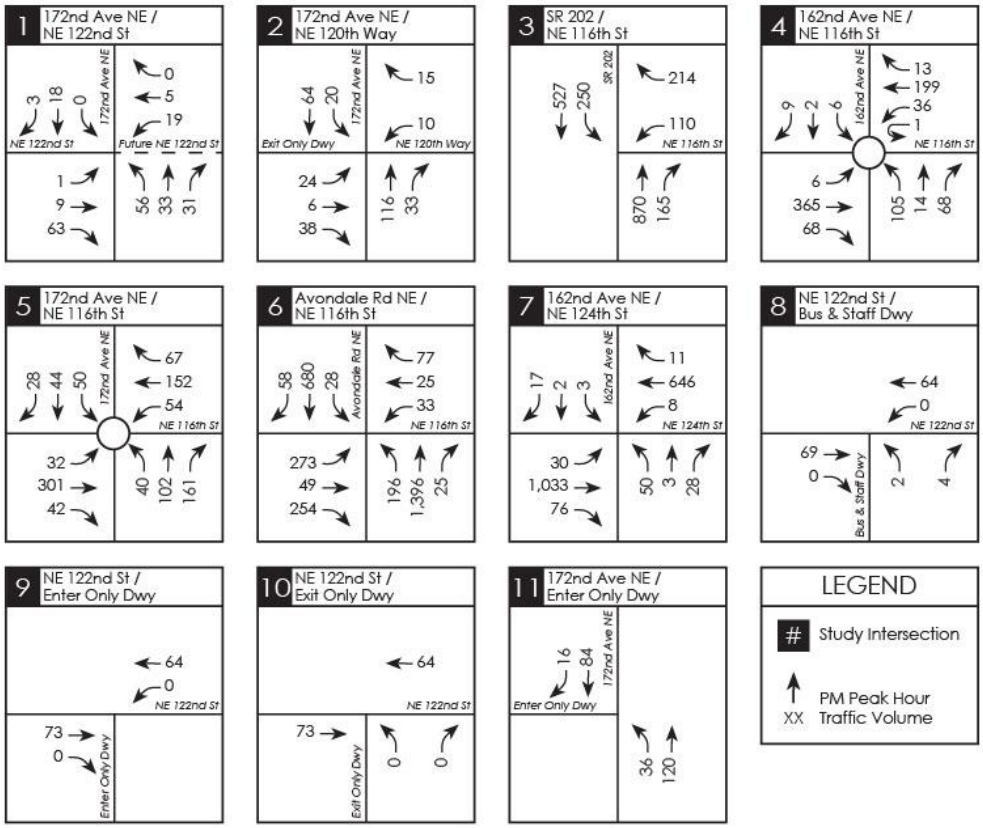


Figure 20: 2018 With Scenario 2 PM Peak Hour Traffic Volumes

Intersection Operations

A future year weekday peak hour Level of Service (LOS) analysis was conducted at the study intersections for future year 2018 No Action (without project) conditions and future year 2018 conditions with the New Elementary - Scenario 1 and with the New Elementary - Scenario 2.

The roadway network assumed in the future year LOS analysis was generally based on existing intersection geometry as there are currently no funded transportation improvements identified in the study area. The only future roadway geometry assumption that was modified for the year 2018 analysis was at the intersection of 172nd Ave NE/NE 122nd Street. In the future with the Edgewood West plat, this intersection would include a new east leg and was planned to include a new all-way yield-controlled traffic circle (consistent with recommendations from the 2006 *172nd Avenue NE Corridor Plan*). However, the traffic circle has been eliminated from the plans based on recent discussions with the City in October 2016. As we understand, the improvements associated with the Edgewood West plat are likely to be constructed prior to the opening of the new school. However, for our year 2018 analysis, we made a conservative assumption for future intersection control at this location and assumed all-way stop control (see review of all-way stop control guidelines later in this report). The intersection control at this location is discussed later in this report.

Existing signal timing and splits at the 2 signalized study intersections were provided by City staff and were used in the future year LOS analysis.

The weekday AM peak hour, afternoon peak hour, and PM peak hour LOS results at the study intersections for 2018 No Action, 2018 With Scenario 1, and 2018 with Scenario 2 conditions are summarized in Table 8. The LOS worksheets are included in Appendix A.

Table 8
2018 Peak Hour Level of Service Summary

Study Intersection	2018 No Action LOS	2018 No Action Delay (sec)	2018 With Scenario 1 LOS	2018 With Scenario 1 Delay (sec)	2018 With Scenario 2 LOS	2018 With Scenario 2 Delay (sec)
AM Peak Hour						
Signalized Intersections						
3. SR 202 / NE 116th St	B	10.9	B	11.4	B	11.5
6. Avondale Rd NE / NE 116th St	B	14.0	B	14.8	B	14.7
Unsignalized Intersections						
1. 172nd Ave NE / NE 122nd St (All-Way Stop)	A	7.5	A	8.6	A	8.4
2. 172nd Ave NE / NE 120th Way						
Eastbound Shared Thru-Lt	-	-	C	18.6	C	21.9
Eastbound Right	-	-	B	12.6	B	14.9
Westbound Shared Lt-Rt	A	9.8	C	24.6	*E*[1]	*44.0*
Southbound Shared Lt-Thru	A	7.4	A	8.1	A	8.4
7. 162nd Pl NE / NE 124th Street						
Eastbound shared Lt-Thru-Rt	B	11.1	B	11.1	B	11.1
Westbound shared Lt-Thru-Rt	A	8.5	A	8.6	A	8.6
Northbound shared Lt-Thru	F	424.5	F	796.0	F	892.6
Northbound Rt	B	11.0	B	11.1	B	11.1
Southbound shared Lt-Thru-Rt	E	37.4	F	54.6	F	59.6
Roundabout Intersections						
4. 162nd Ave NE / NE 116th St	B	14.1	C	18.7	C	21.6
5. 172nd Ave NE / NE 116th St	B	12.2	C	21.5	D	28.7
Afternoon Peak Hour						
Signalized Intersections						
3. SR 202 / NE 116th St	B	12.9	B	13.1	B	13.1
6. Avondale Rd NE / NE 116th St	B	17.1	B	17.3	B	17.1
Unsignalized Intersections						
1. 172nd Ave NE / NE 122nd St (All-Way Stop)	A	7.4	A	7.8	A	7.7
2. 172nd Ave NE / NE 120th Way						
Eastbound Shared Thru-Lt	-	-	B	12.6	B	13.3
Eastbound Right	-	-	A	9.3	A	9.6
Westbound Shared Lt-Rt	A	9.3	B	11.0	B	11.6
Southbound Shared Lt-Thru	A	7.5	A	7.9	A	8.0
7. 162nd Pl NE / NE 124th Street						
Eastbound shared Lt-Thru-Rt	A	8.9	A	8.9	A	8.9
Westbound shared Lt-Thru-Rt	B	10.3	B	10.4	B	10.4
Northbound shared Lt-Thru	F	179.7	F	222.8	F	229.9
Northbound Rt	C	17.3	C	18.1	C	18.2
Southbound shared Lt-Thru-Rt	D	26.0	D	32.4	D	34.2
Roundabout Intersections						
4. 162nd Ave NE / NE 116th St	A	6.3	A	6.8	A	6.9
5. 172nd Ave NE / NE 116th St	A	7.0	A	7.9	A	8.3

Table 8 (continued)
2018 Peak Hour Level of Service Summary

Study Intersection	2018 No Action LOS	2018 No Action Delay (sec)	2018 With Scenario 1 LOS	2018 With Scenario 1 Delay (sec)	2018 With Scenario 2 LOS	2018 With Scenario 2 Delay (sec)
PM Peak Hour						
Signalized Intersections						
3. SR 202 / NE 116th St	B	16.4	B	16.4	B	16.4
6. Avondale Rd NE / NE 116th St	B	18.8	B	18.9	B	18.8
Unsignalized Intersections						
1. 172nd Ave NE / NE 122nd St (All-Way Stop)	A	7.5	A	7.7	A	7.6
2. 172nd Ave NE / NE 120th Way						
Eastbound Shared Thru-Lt	-	-	B	10.8	B	10.9
Eastbound Right	-	-	A	8.8	A	8.8
Westbound Shared Lt-Rt	A	9.7	B	10.0	B	10.0
Southbound Shared Lt-Thru	A	7.6	A	7.7	A	7.7
7. 162nd Pl NE / NE 124th Street						
Eastbound shared Lt-Thru-Rt	A	9.1	A	9.1	A	9.1
Westbound shared Lt-Thru-Rt	B	10.9	B	11.0	B	11.0
Northbound shared Lt-Thru-Rt	F	291.0	F	298.1	F	298.1
Northbound Rt	C	20.4	D	31.2	D	31.2
Southbound shared Lt-Thru-Rt	D	28.2				
Roundabout Intersections			A	7.5	A	7.5
4. 162nd Ave NE / NE 116th St	A	7.4	A	8.4	A	8.4
5. 172nd Ave NE / NE 116th St	A	8.1	B	16.4	B	16.4

[1] Result based on the conservative assumption without accounting for school trips that are double-counted. Revised LOS to adjust for double-counting results in LOS D operations. See discussion below.

As shown in Table 8, the signalized, all-way stop, and roundabout study intersections are estimated to operate at LOS D or better under future conditions with the proposed New Elementary School in North Redmond during the weekday AM, afternoon, and PM peak hours under both Scenarios 1 and 2. Additionally, all controlled movements at the two-way stop controlled intersections are estimated to operate at LOS D or better under future conditions with the proposed New Elementary School in North Redmond during the weekday AM, afternoon, and PM peak hours, with the exception of the minor street approaches at the intersection of 162nd Place NE/NE 124th Street and the westbound approach at the intersection of 172nd Ave NE/NE 120th Way. The northbound left-through lane at 162nd Pl NE/NE 124th Street is anticipated to operate at LOS F in the future without or with the project (Scenarios 1 and 2) during the AM, afternoon, and PM peak hours and the southbound approach is anticipated to operate at LOS E/F without or with the project (Scenarios 1 and 2) during the AM peak hour. The westbound approach at 172nd Ave NE/NE 120th Way is anticipated to operate at LOS E in the future with Scenario 2 during the AM peak hour. In general, the delays at intersections are slightly higher in Scenario 2 but are not significantly different.

Impacts at 172nd Ave NE/NE 120th Way NE

There are 37 westbound left turns in the AM peak hour at this intersection under baseline (without project) conditions. It can be assumed that some of these vehicles are already taking a westbound left turn and taking their kids to existing schools (Einstein and others). These kids will likely be going

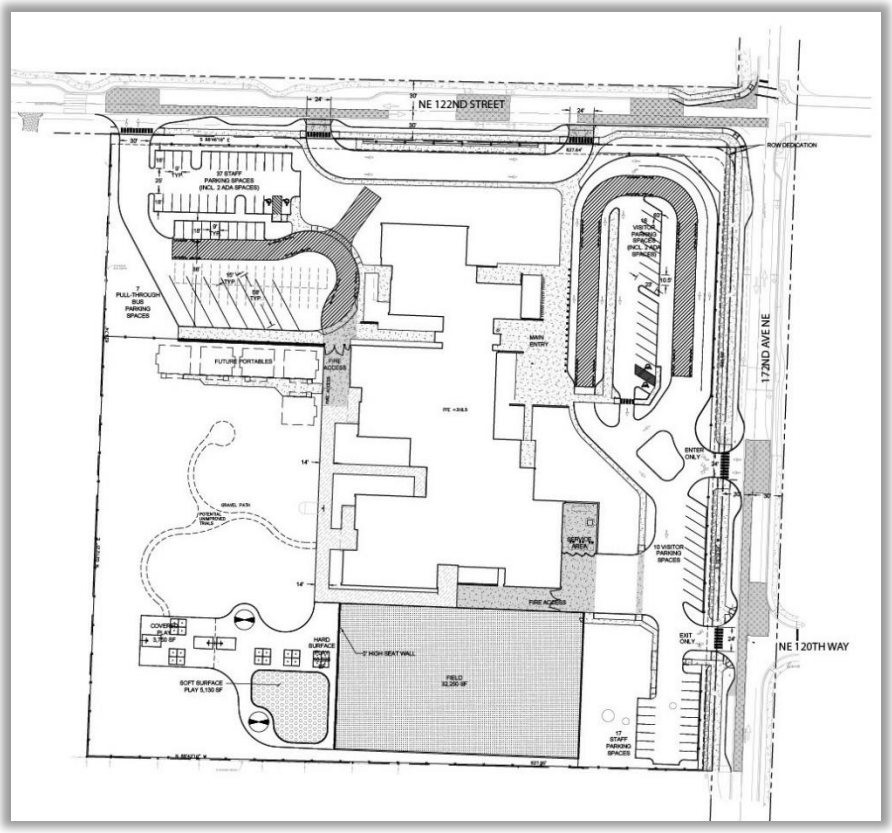
to the new school when it opens, thus becoming westbound right-turns instead of left turns. As discussed earlier, our analysis takes a very conservative approach and is double counting trips by taking a simpler approach and not reducing trips on certain movements due to the complexities of traffic redistribution. However, given the implications of potential mitigation, this level of conservatism needs to be re-evaluated, at least at this specific location. Therefore, TENW conducted another LOS analysis and found that if just 10 trips from the WB left turn movement are removed due to double-counting, the LOS on the westbound approach improves from LOS E to LOS D (without 172nd for Scenario 2). Based on our judgement, the removal of 10 westbound left turns due to double counting at this location is justified and we believe it provides a more accurate LOS result. The City and LWSD will discuss a condition that requires monitoring delays at this intersection for the first 2 years after occupancy to determine if mitigation is needed in cooperation with the neighborhood.

Impacts at 162nd Pl NE/NE 124th St

A new signal at 162nd Place NE/NE 124th Street is an impact-fee funded project on the City's TIP and TFP (TIP S40, TFP 111). As such, LWSD's required payment of transportation impact fees at building permit issuance will fully mitigate the school's transportation impacts and satisfy the school's fair share contribution to a future signal at this location. This future signal is expected to improve the stop-controlled LOS E/F movements at this intersection.

Site Access & Circulation Analysis

As shown below, vehicular access to the site would be provided by three proposed driveways on NE 122nd Street and two driveways on 172nd Ave NE. The driveways on NE 122nd Street include a bus/staff driveway, a one-way entrance to the north drop-off/pick-up lane, and a one-way exit from the north drop-off/pick-up lane. The driveways on 172nd Ave NE include a one-way entrance to a staff/visitor parking lot and east drop-off/pick-up lane, and a one-way exit from the staff/visitor parking lot and east drop-off/pick-up lane. The one-way exit on 172nd is proposed to be aligned with an existing public street, NE 120th Way.



All driveways are proposed to provide full access with no restricted turning movements (other than the one-way restrictions). To evaluate the operations of the site access, a level of service (LOS) and queuing analysis was conducted, and an evaluation of on-site student drop-off/pick-up queuing was also conducted.

Site Access LOS and Queuing

The weekday peak hour LOS and queue analyses at the site access driveways were based on the methodology outlined in the 2010 *Highway Capacity Manual*. The estimated future weekday peak hour traffic volumes at the proposed site access driveways used in the analysis are shown in Figures 15-17 for 2018 with Scenario 1 and Figures 18-20 for 2018 with Scenario 2. Table 9 summarizes the calculated LOS and the 95th percentile queues at the site access driveways during the weekday peak hours for Scenarios 1 and 2. The reported 95th percentile queues represent a condition that is exceeded only 5 percent of the time. Detailed LOS and queue calculation worksheets are included in Appendix A.

Table 9
2018 Peak Hour Site Access LOS and Queuing

Site Access and Movement	2018 With Scenario 1 LOS	Delay (sec/veh)	95th % Queue (ft) [1]	2018 With Scenario 2 LOS	Delay (sec/veh)	95th % Queue (ft) [1]
AM Peak Hour						
Bus & Staff Driveway / NE 122nd St						
Northbound (exiting)	B	11.2	<25'	B	11.4	0'
Westbound Left (entering)	A	7.9	<25'	A	7.9	<25'
Enter Only Driveway / NE 122nd St						
Westbound Left (entering)	A	7.9	<25'	A	7.9	<25'
Exit Only Driveway / NE 122nd St						
Northbound (exiting)	B	10.6	25'	B	10.6	25'
Enter Only Driveway / 172nd Ave NE						
Northbound Left (entering)	A	8.9	25'	A	9.3	25'
Exit Only (NE 120th Way) / 172nd Ave NE						
Eastbound Shared Lt-Thru (exiting)	C	18.6	25'	C	21.9	25'
Eastbound Right (exiting)	B	12.6	50'	B	14.9	75'
Afternoon Peak Hour						
Bus & Staff Driveway / NE 122nd St						
Northbound (exiting)	A	9.6	<25'	A	9.7	<25'
Westbound Left (entering)	A	7.5	0'	A	7.5	0'
Enter Only Driveway / NE 122nd St						
Westbound Left (entering)	A	7.6	<25'	A	7.6	0'
Exit Only Driveway / NE 122nd St						
Northbound (exiting)	A	9.8	<25'	A	9.7	<25'
Enter Only Driveway / 172nd Ave NE						
Northbound Left (entering)	A	7.8	<25'	A	7.9	25'
Exit Only (NE 120th Way) / 172nd Ave NE						
Eastbound Shared Lt-Thru (exiting)	B	12.6	<25'	B	13.3	<25'
Eastbound Right (exiting)	A	9.3	<25'	A	9.6	25'
PM Peak Hour						
Bus & Staff Driveway / NE 122nd St						
Northbound (exiting)	A	8.9	0'	A	8.9	0'
Westbound Left (entering)	A	0.0	0'	A	0.0	0'
Enter Only Driveway / NE 122nd St						
Westbound Left (entering)	A	0.0	0'	A	0.0	0'
Exit Only Driveway / NE 122nd St						
Northbound (exiting)	A	0.0	0'	A	0.0	0'
Enter Only Driveway / 172nd Ave NE						
Northbound Left (entering)	A	7.5	<25'	A	7.5	<25'
Exit Only (NE 120th Way) / 172nd Ave NE						
Eastbound Shared Lt-Thru (exiting)	B	10.8	<25'	B	10.9	<25'
Eastbound Right (exiting)	A	8.8	<25'	A	8.8	<25'

1. Queues are 95th Percentile queues. <25' indicates 95th Percentile queue statistically less than 1 vehicle.

As shown in Table 9, based on our analysis, the controlled movements at the proposed site access driveways are expected to operate at acceptable levels (LOS C or better) with vehicle queues of 50 feet or less for Scenario 1, and vehicle queues of 75 feet or less for Scenario 2 during the weekday AM, afternoon, and PM peak hours.

Student Drop-Off/Pick-Up Queuing

One of the primary site circulation elements to consider for an elementary school site is the capacity of the parent drop-off/pick-up lane and vehicle queuing during peak drop-off and pick-up periods.

We reviewed recommendations from studies conducted nationally and metrics used in other jurisdictions. We also compared the proposed capacity provided at the New Elementary School in North Redmond to other local elementary schools.

The Institute of Transportation Engineers' (ITE) *Safe Routes to School Briefing Sheets*, available on the ITE website, reference several studies/guidelines with recommendations for drop-off/pick-up lane queue storage. Table 10 provides a summary of the recommendations from these references as applied to the enrollment at the New Elementary School in North Redmond for two conditions: (a) Year of Opening (enrollment of 550 total students, assuming the main school building is at capacity), and (b) the potential "worst case" future condition (if 5 portables were fully occupied with a total enrollment of 665 total students). For each enrollment scenario, we also considered the two potential boundary scenarios, Scenario 1 and Scenario 2.

Table 10
Queue Storage Recommendations from Other Jurisdictional Guidelines/Studies[1]

Study	Enrollment Metric	Queue Storage Recommendation	NORTH REDMOND ASSUMPTIONS – **YEAR OF OPENING (550 STUDENTS)**	NORTH REDMOND ASSUMPTIONS – **POTENTIAL FUTURE WITH 5 PORTABLES (665 STUDENTS)**
TTI[2]	500 or more students	750-1,500 ft (assumed average)	1,125 ft	1,125 ft
Qualls[3]	Q(veh) = 0.05 (enrollment) + 19	47 veh (550 students) 52 veh (665 students)	1,175 ft	1,300 ft
North Carolina DOT[4]	Excel Calculator Tool	Used average of "average day" & "high demand day"	1,045 ft	1,266 ft
		Average of 3 National Studies =	**1,115 ft**	**1,230 ft**
		North Redmond Storage Recommendation for Scenario 1 =	**1,115 ft**	**1,230 ft**
		North Redmond Storage Recommendation for Scenario 2 =	**1,320-1,420 ft**	**1,450-1,560 ft**

1. ITE's *Safe Routes to School Briefing Sheets – School On-Site Design* (available on ITE website) references the 3 studies included in this table.
2. *Traffic Operations and Safety at Schools: Recommended Guidelines,* Texas Transportation Institute (TTI), October 2013.
3. *Strategies for the Greening of Student Pick-Ups at School Dismissal,* Dustin Qualls, PE, PTOE, November 2010.
4. *The MSTA School Traffic Calculator,* Microsoft Excel tool, North Carolina DOT, source: NCDOT website, accessed May 2016.

As shown in Table 10, the studies referenced by ITE recommend on-site queue storage for drop-off/pick-up for a school of this size of approximately 1,115 feet for enrollment of 550 students and 1,230 feet for an enrollment of 665 students. No specific bus service information was provided for the studies that were used to develop the guidelines above. Therefore, how the 1,115 feet or 1,230 feet relates to the New Elementary School in North Redmond and the two scenarios analyzed in this report is not certain. However, it is likely that the results shown above are based on a wide range of school sites, some having extensive bus service, and some having minimal bus service. Therefore, it would be reasonable to assume that our Scenario 1 would equate to a recommended storage of 1,115 feet (at 550 students) or 1,230 feet (at 665 students). The amount of storage required for Scenario 2 could then be estimated by factoring the storage by the increase in trip generation rates from Scenario 1 to 2 (+18%). This would result in a recommended storage for Scenario 2 of approximately 1,320 feet (550 students) and 1,450 feet (665 students). If Scenario 1A is used as the baseline scenario (based on studies with typical bus service, see Appendix B), it would result in an even more conservative assumption and the recommended storage for Scenario 2 would be approximately 1,420 feet (550 students) and 1,560 feet (665 students).

Table 11 provides a comparison of on-site drop-off/pick-up storage for the New Elementary School in North Redmond to other local schools. Per City comments, the queue storage measurements include entering queue storage, drop-off/pick-up zone storage, and exiting queue storage. Also as directed by the City, the storage does not include any areas within 20 feet of a crosswalk, sidewalk, or pathway, and does not include any storage within City right-of-way. Additionally, the drop-off/pick-up zone storage shown in Table 11 does not include any areas beyond the school's main entrance. Queue storage diagrams at each local school are included in Appendix G. A queue storage diagram for the New Elementary School in North Redmond is included in Figure 21.

Table 11
Pick-Up/Drop-Off Queue Storage Comparison

School	Parking Supply	Entrance Queue (ft)	Pick-Up/ Drop-Off Zone (ft)	**Entrance Queue + Pick-Up/ Drop-Off Zone (ft)**	Exit Queue (ft)	Cumulative Total All Areas (ft)
Einstein Elementary	82	230	245	475	165	640
Rosa Parks Elementary	69	305	230	535	135	670
Horace Mann Elementary	63	80	325	405	320	725
Audubon Elementary	64	180	80	260	215	475
Redmond Elementary	106	50	230	280	225	505
North Redmond - East Loop		**640**	**520**	**1,160**	**280**	**1,440**
North Redmond - North Loop		**0**	**440**	**440**	**20**	**460**
North Redmond Total	80	**640**	**960**	**1,600**	**300**	**1,900**

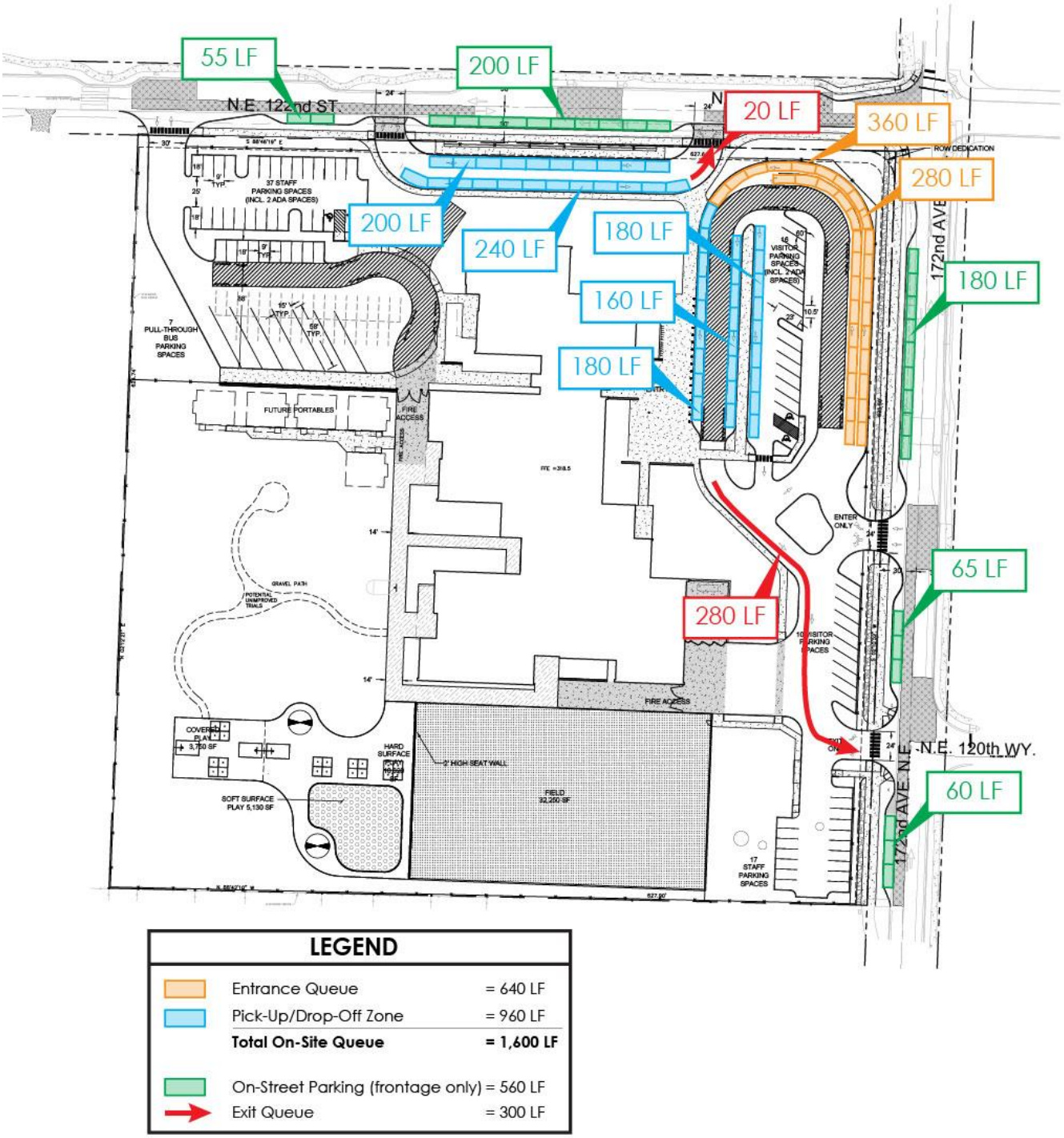


Figure 21: Proposed Queue Storage

As shown in Table 11, the proposed New Elementary School in North Redmond will provide more entrance queue, pick-up/drop-off zone, and exit queue storage than any other local elementary school (total of both east and north drop-off loops). Specifically, the New Elementary School in North Redmond will provide:

- 640 feet of entrance queue storage (2.1 to 12.8 times that of the other local schools)
- 960 feet of drop-off/pick-up zone (3.0 to 12.0 times that of the other local schools)
- 1,600 feet combined entrance queue and pick-up/drop-off zone (3.0 to 6.2 times that of the other local schools)
- 300 feet of exit queue storage (0.9 to 2.2 times that of the other local schools)
- 1,900 feet of cumulative entrance, pick-up/drop-off, and exit queue storage (2.6 to 4.0 times that of the other local schools)

Approximately 1,600 lineal feet of combined entrance queue and pick-up/drop-off storage space for parents exceeds both of the storage recommendations in Table 10 for school boundary Scenario 1 and Scenario 2, even for the "worst case" conditions with 5 portables fully occupied. Therefore, the amount of queue storage provided exceeds the national guidelines, and vastly exceeds the amount of storage for pick-up/drop-off activity at any other local elementary school in the area.

LWSD will also construct frontage improvements that will include approximately 255 lineal feet of on-street parking on NE 122nd Street, and 305 lineal feet on 172nd Ave NE for a total of 560 feet. It is expected that this parking will be utilized by some parents for drop-off and pick-up activity. This only includes the parking that is immediately adjacent to the school property (additional on-street parking is already available on the north side of NE 122nd St, and will be available on the east side of 172nd Ave NE when the Edgewood West development is completed).

When compared to traffic congestion issues that have been observed at Horace Mann and Audubon Elementary Schools, the proposed drop-off/pick-up circulation at the New Elementary School in North Redmond will be much improved. Specifically:

1. The primary issues at Horace Mann and Audubon are related to the amount of queue storage available. The amount of on-site entrance queue and pick-up/drop-off storage at the New Elementary School in North Redmond will be much greater and is unprecedented in Redmond (approximately 4 times the amount provided at Horace Mann, and 6 times the amount provided at Audubon).
2. Both Horace Mann and Audubon have only 1 pick-up/drop-off loop. The New Elementary School in North Redmond will have 2 loops: the north loop on NE 122nd Street and the east loop on 172nd Ave NE. This gives parents a choice and allows for natural "self-balancing" of pick-up/drop-off demands.
3. Audubon Elementary has a single shared entry/exit onto 180th Ave NE for drop-off/pick-up activity. Shared entry/exits at schools are generally not desirable and create congestion due to conflicts between entering and exiting traffic. The New Elementary School in North Redmond will not only have 2 drop-off loops, but each one will have its own separate entry and exit point (4 total curb cuts will serve parents compared with only 1 at Audubon).
4. All busses and staff must enter/exit Horace Mann Elementary at the same entrance/exit as parents/visitors. This occasionally creates conflicts and congestion. The New Elementary

School in North Redmond will have a separate bus loop and staff parking area for entry/exit to minimize conflicts.

5. Limited on-street parking is available along the frontage of Horace Mann and no parking is available along the frontage of Audubon. The New Elementary School in North Redmond will have approximately 560 lineal feet of on-street parking along its frontages on NE 122nd St and 172nd Ave NE. As witnessed at other schools, regardless of how much on-site storage is provided, many parents will choose to use on-street parking for drop-off/pick-up rather than use the drop-off loop. The availability of a significant amount of on-street parking provides yet another option for parents at the New Elementary School in North Redmond that is not available at the other schools.

Signal Warrant Analysis at 162nd Pl NE/NE 124th Street

A traffic signal warrant analysis was conducted at the intersection of 162nd Pl NE/NE 124th Street based on traffic signal warrants as outlined in the US Department of Transportation/Federal Highway Administration, *Manual on Uniform Traffic Control Devices* (MUTCD), 2009 Edition. Of the eight signal warrants outlined in the MUTCD, Warrant 1 (Eight-Hour Vehicular Volume), Warrant 2 (Four-Hour Vehicular Volume), and Warrant 3 (Peak Hour) were analyzed.

The volume criteria used in the signal warrant analysis was based on the assumption of 1-lane approaches on the minor street (162nd Pl NE), and 1-lane approaches on the major street (NE 124th Street). Also, since the major street (NE 124th Street) has a posted speed limit of 45 mph, the 70% factor was applied to all of the signal warrants analyzed.

The volumes and methodology used in the signal warrant analysis are consistent with the signal warrant analysis provided to the City on 8/20/14 as part of the proposed Edgewood West (Mansoori) development, which showed that the intersection met the signal warrants evaluated (1B, 2, and 4A)

Future year No Action (without-project) traffic volumes at 162nd Pl NE/NE 124th Street were estimated based on 72-hour traffic counts conducted on August 5-7, 2014 with added pipeline growth associated with 205 approved single-family lots in the vicinity that would be expected to add traffic to the intersection. Future year 2018 With-Project traffic volumes with the project were estimated by distributing the hourly traffic associated with the proposed school through the intersection and adding it to the 2018 No Action traffic volumes. The volumes used are based on Scenario 1. The traffic volumes used in the signal warrant analysis are included in Appendix H.

The results of the signal warrant analysis are summarized in Table 12. Detailed signal warrant analysis worksheets are included in Appendix H.

Table 12
Signal Warrant Analysis Results for 162nd/124th

Warrant	2018 Without Project	2018 With Project
Warrant 1 – Eight-Hour Vehicular Volume		
Condition A (Minimum Vehicular Volume)	NO	NO
Condition B (Interruption of Continuous Traffic)	YES	YES
80% Combination of A & B	NO	NO
Warrant 1 Met?	**YES**	**YES**
Warrant 2 – Four-Hour Vehicular Volume		
Warrant 2 Met?	**YES**	**YES**
Warrant 3 – Peak Hour		
Condition A (Delay Calculations)	NO	YES
Condition B (graph)	YES	YES
Warrant 3 Met?	**YES**	**YES**

As shown in Table 12, all three of the signal warrants evaluated (Warrant 1 – Eight-Hour, Warrant 2 – Four-Hour, and Warrant 3 – Peak Hour) would be met in 2018 without or with the proposed New Elementary School in North Redmond. The conclusions of this analysis would not change with Scenario 2.

The signal at 162nd Place NE/NE 124th Street is an impact-fee funded project on the City's TIP and TFP (TIP S40, TFP 111). As such, the school district's required payment of transportation impact fees at building permit issuance will satisfy the school's fair share contribution to a future signal at this location.

Analysis with 172nd Ave NE Extension

Although signal warrants at 162nd Pl NE/NE 124th Street were shown to be met for future year 2018 conditions, it is unclear when funding will be identified for the construction of the traffic signal and turn lanes. The project must also be coordinated with King County, where a majority of the intersection lies. Based on initial discussions with the City, the project is unlikely to be constructed within the next 5-6 years. Because the opening of 172nd Ave NE north of NE 124th Street is contingent on the signal being constructed, the opening of 172nd Ave NE is likely to occur later than the opening of the proposed New Elementary School in North Redmond in 2018.

Despite the opening of 172nd Ave NE being later than the opening of the proposed school, the City has requested an analysis of conditions with the school with 172nd Ave NE open. The analysis was conducted at the following study intersections for future year 2022 conditions with the 172nd Ave NE Extension and with the proposed New Elementary School in North Redmond project for both Scenarios 1 and 2:

- 172nd Ave NE / NE 122nd St (study intersection #1)
- 172nd Ave NE / NE 120th Way (study intersection #2)
- 172nd Ave NE / NE 116th St (study intersection #5)
- 162nd Pl NE / NE 124th Street (study intersection #7)
- 172nd Ave NE / NE 128th Street (study intersection #12)

The future year 2022 analysis with the 172nd Ave NE extension assumes that the intersection of 162nd Pl NE/NE 124th Street is signalized with the addition of eastbound and westbound left-turn lanes and a northbound right-turn lane.

The PM peak hour traffic volumes for the year 2022 analysis with the 172nd Ave NE extension were based on the year 2022 PM Peak Hour Volumes with Extension and Traffic Calming (Figure 6 from the City's *172nd Ave NE Corridor Study*). The AM and Afternoon peak hour traffic volumes for the year 2022 analysis with the 172nd Ave NE extension were estimated based on existing (2016) traffic volumes with a 2 percent annual growth rate applied and pipeline trips from the future *Hawks Glen* and *Edgewood West* residential developments included. Adjustments to the AM and afternoon volumes were based on preliminary estimates of trips that would potentially be re-routed with the opening of 172nd Ave NE.

The project trips associated with the New Elementary School in North Redmond project for Scenarios 1 and 2 with the 172nd Ave NE extension (see Appendix I) were added to the 2022 With Extension traffic volumes to estimate the future year 2022 With 172nd Extension and With-Project peak hour traffic volumes. The resulting future year 2022 With 172nd Extension and With-Project peak hour traffic volumes for Scenarios 1 and 2 at the study intersections are shown in Appendix I.

The weekday AM peak hour, afternoon peak hour, and PM peak hour LOS results at the study intersections for 2022 conditions With Scenario 1 and With Scenario 2 and With the 172nd Extension are summarized in Table 13. The LOS worksheets are included in Appendix J.

Table 13
2022 With 172nd Extension Peak Hour LOS Summary

Study Intersection	2022 With Scenario 1 and 172nd Ave Extension LOS[1]	Delay (sec)	2022 With Scenario 2 and 172nd Ave Extension LOS[1]	Delay (sec)
AM Peak Hour				
Signalized Intersections				
7. 162nd Pl NE / NE 124th Street	B	12.9	B	13.1
12. 172nd Ave NE / NE 128th Street	B	19.0	B	19.0
Unsignalized Intersections				
1. 172nd Ave NE / NE 122nd St (All-Way Stop)	A	9.9	A	9.6
2. 172nd Ave NE / NE 120th Way				
Eastbound Shared Lt-Thru	C	22.8	C	25.5
Eastbound Right	B	13.1	C	16.5
Westbound Shared Lt-Rt	D	28.8	*F*[1]	*71.9*
Southbound Shared Lt-Thru	A	8.2	A	8.5
Roundabout Intersections				
5. 172nd Ave NE / NE 116th St	E	37.6	F	57.3
Afternoon Peak Hour				
Signalized Intersections				
7. 162nd Pl NE / NE 124th Street	B	10.2	B	10.3
12. 172nd Ave NE / NE 128th Street	B	17.2	B	17.2
Unsignalized Intersections				
1. 172nd Ave NE / NE 122nd St (All-Way Stop)	A	9.2	A	9.0
2. 172nd Ave NE / NE 120th Way				
Eastbound Shared Lt-Thru	C	15.2	C	16.0
Eastbound Right	A	9.5	A	9.7
Westbound Shared Lt-Rt	B	12.7	B	13.6
Southbound Shared Lt-Thru	A	8.3	A	8.4
Roundabout Intersections				
5. 172nd Ave NE / NE 116th St	B	10.5	B	11.1
PM Peak Hour				
Signalized Intersections				
7. 162nd Pl NE / NE 124th Street	C	34.1	C	34.1
12. 172nd Ave NE / NE 128th Street	D	46.5	D	46.0
Unsignalized Intersections				
1. 172nd Ave NE / NE 122nd St (All-Way Stop)	B	13.1	B	13.1
2. 172nd Ave NE / NE 120th Way				
Eastbound Shared Lt-Thru	C	15.9	C	15.7
Eastbound Right	A	9.3	A	9.4
Westbound Shared Lt-Rt	B	11.6	B	11.6
Southbound Shared Lt-Thru	A	0.0	A	0.0
Roundabout Intersections				
5. 172nd Ave NE / NE 116th St	C	16.1	C	16.2

[1] Result based on the conservative assumption without accounting for school trips that are double-counted. Revised LOS to adjust for double-counting results in LOS E operations. See discussion below.

As shown in Table 13, during the AM peak hour in 2022 with the 172nd Ave NE extension and the New Elementary School in North Redmond, the intersection of 172nd Ave NE/NE 116th Street (roundabout) is anticipated to operate at LOS E for Scenario 1 and LOS F for Scenario 2. The stop-controlled westbound approach at the intersection of 172nd Ave NE/NE 120th Way is anticipated to operate at LOS F in the AM peak hour for Scenario 2. All other intersections and movements are anticipated to operate at LOS D or better during the weekday AM peak hour, afternoon peak hour, and PM peak hour in 2022 with the project and the extension for Scenarios 1 and 2.

Impacts at 172nd Ave NE/NE 120th Way NE

There are 41 westbound left turns in the AM peak hour at this intersection under baseline (without project) conditions. It can be assumed that some of these vehicles are already taking a westbound left turn and taking their kids to existing schools (Einstein and others). These kids will likely be going to the new school when it opens, thus becoming westbound right-turns instead of left turns. As discussed earlier, our analysis takes a very conservative approach and is double counting trips by taking a simpler approach and not reducing trips on certain movements due to the complexities of traffic redistribution. However, given the implications of potential mitigation, this level of conservatism needs to be re-evaluated, at least at this specific location. Therefore, TENW conducted another LOS analysis and found that if just 10 trips from the WB left turn movement are removed due to double-counting, the LOS on the westbound approach improves from LOS F to LOS E (with 172nd for Scenario 2). Based on our judgement, the removal of 10 westbound left turns due to double counting at this location is justified and we believe it provides a more accurate LOS result. TENW also determined that the LOS E condition would only occur when the enrollment reached at least 580 students. The City and LWSD will discuss a condition that requires monitoring delays at this intersection for the first 2 years after occupancy to determine if mitigation is needed in cooperation with the neighborhood.

Impacts at 172nd Ave NE/NE 116th St

The LOS results in the AM peak hour (LOS E/F) at this roundabout intersection are based on forecasted volumes with the 172nd extension which are conservative and include trips that are double counted. Based on discussions with the City, physical improvements to the roundabout are not desirable and due to the conservative nature of this analysis are not warranted with this project. If/when the 172nd Ave NE is open to through traffic up to NE 128th Street, the City should monitor conditions to determine what, if any, improvements are required at that time.

Intersection Control at 172nd Ave NE/NE 122nd Street

In the future with the Edgewood West plat, the intersection of 172nd Ave NE/NE 122nd Street would include a new east leg and was planned to include a new all-way yield-controlled traffic circle (consistent with recommendations from the 2006 *172nd Avenue NE Corridor Plan*). However, the traffic circle has been eliminated from the plans based on recent discussions with the City in October 2016. For our traffic operations analysis, we made a conservative assumption for future intersection control at this location and assumed all-way stop control.

Based on our review of MUTCD All-Way Stop Control guidelines, it is unlikely that the traffic volumes in 2018 or in 2022 with the school at 172nd/122nd would meet the minimum criteria for the installation of all-way stop control, with or without the 172nd extension for either Scenario 1 or 2 (see Appendix K for a review of all-way stop criteria). However, the MUTCD includes other non-volume criteria, including the "need to control vehicle/pedestrian conflicts near locations that generate high

pedestrian volumes". Based on this, an all-way stop could be considered given the proximity to the school and increased pedestrian activity. Additional considerations at this intersection include the proposed accommodations for school bus turning movements, with curb revisions being proposed by LWSD on the northwest and southwest corners. The future intersection control at 172nd/122nd should be discussed further and confirmed with the City of Redmond.

Parking

Weekday Parking

The future weekday peak parking demand estimates for the proposed New Elementary School in North Redmond were evaluated based on an assessment of parking demand characteristics at five local elementary schools within the Lake Washington School District where parking counts were collected.

Parking studies were completed at Rosa Parks and Einstein Elementary schools in October 2013, at Redmond Elementary in December 2014, at Audubon Elementary in June 2015, and at Mead Elementary in May 2016. The parking studies determined the weekday peak parking demand and derived peak parking demand rates per student. Table 14 summarizes the peak parking demand rates, and the resulting parking supply vs. demand for the New Elementary School in North Redmond. Appendix L includes the weekday parking demand study data.

Table 14
Weekday Peak Parking Demand Summary

School	Student Enrollment	Total On-Site Parking Supply (stalls)	Peak Parking Demand (veh)	Peak Parking Demand Rate[1] (veh/student)
Rosa Parks Elementary	650	69	60	0.09
Audubon Elementary	565	64	57	0.10
Mead Elementary	600	78	59	0.10
Einstein Elementary	488	82	59	0.12
Redmond Elementary	473	106	70	0.15
			Average Peak Parking Demand Rate =	0.11
			Peak Parking Demand Estimate for New Elementary (665 students) =	73 vehicles
			Proposed On-Site Parking Supply for New Elementary =	80 stalls

As shown in Table 14, the estimated weekday peak parking demand for the New Elementary School in North Redmond is 73 vehicles based on the results of the local studies. Therefore, the proposed supply of 80 stalls would more than accommodate the typical weekday peak demand at the school. A minimum of 45 of these stalls will be allocated to staff parking.

Event Parking

With regard to events, elementary school sites are not typically sized to accommodate all event-related parking on-site. Events such as open houses, curriculum nights, athletic events, etc. are typically expected to exceed the on-site parking supply, but usually only occur a few times per year. At the New Elementary School in North Redmond, this overflow parking would be accommodated

through the use of on-site drop-off/pick-up lanes for parking, use of the bus/staff loop for parking, and the use of legal on-street parking spaces along 172nd Avenue NE and NE 122nd Street.

Parking demand during an event at the New Elementary School in North Redmond was estimated based on parking demand data collected during a fall Curriculum Night event at Benjamin Rush Elementary School in September 2016. Per LWSD staff, the fall Curriculum Night at Ben Rush was characterized as a "large event" at the school and was representative of near "worst-case" parking conditions. The observed peak parking demand rate as counted by TENW during the event was 0.30 vehicles per student (177 vehicles / 585 students), which included full use of on-site parking facilities as well as use of nearby public on-street parking. The parking demand data is included in Appendix M.

Event parking forecasts at the New Elementary School in North Redmond were calculated for 2 conditions: (a) Year of Opening (enrollment of 550 total students, assuming the main school building is at capacity), and (b) the potential "worst case" future condition (if 5 portables were fully occupied with a total enrollment of 665 total students). As shown in Table 15, applying the event parking demand rate of 0.30 vehicles per student to the future enrollment of the New Elementary School in North Redmond results in an estimated event parking demand of 165 vehicles for the "year of opening" condition with 550 students, and 200 vehicles for the "worst case" condition with 5 portables and 665 students.

Table 15
Event Parking Demand Forecast for North Redmond

Future Condition	Event Parking Demand Rate (veh/student)	Peak Event Parking Demand Forecast (veh)
Year of Opening (550 students)	0.30	**165**
Future "Worst Case" (with 5 portables, 665 students)	0.30	**200**

To accommodate event parking for the New Elementary School in North Redmond, in addition to the 80 striped parking stalls on-site, the east drop-off/pick-up loop off of 172nd Ave NE, the north drop-off/pick-up loop off of NE 122nd Street, and the bus/staff loop off of NE 122nd Street will all be made available for event parking. A total of approximately 97 vehicles are expected to be accommodated in the bus/staff loop and drop-off/pick-up lanes during an event. Therefore, a total of approximately 177 vehicles (80 parking stalls + 97) are expected to be accommodated on-site during an event. This would be expected to accommodate all vehicles on-site for an event at "year of opening" with 550 students. For future "worst case" conditions, this would leave an excess of 23 vehicles parking off-site during an event. These 23 vehicles could easily be accommodated in the on-street parking on the frontage of the site (27 spaces along the frontage, plus 44 spaces across the street). The event parking supply on-site and on the adjacent street frontages is summarized in Table 16 and on Figure 22.

Table 16
Event Parking Supply Summary

	# of Vehicles
On-Site Parking Supply	
Striped Parking Stalls	80
Use of drop-off/pick-up Lanes and Bus Loop	
East Loop segment 1 (main)	27
East Loop segment 2 (west side of island)	8
East Loop segment 3 (east side of island)	9
North Loop segment 1 (main)	12
North Loop segment 2 (south side of island)	10
Bus/Staff Loop (temporary stall striping)	31
Drop-Off/Pick-Up Lanes and Bus Loop Subtotal	97
Total On-Site Parking Supply for Events	177
Adjacent On-Street Parking Supply	
Frontage Only (172nd and 122nd)	27
Across Street from School (172nd and 122nd)	44
Total Adjacent On-Street Parking Supply	71
Total Parking Supply (On-Site + Adjacent Street)	**248**
Year of Opening Event Parking Demand (550 students)	***165***
"Worst Case" Event Parking Demand (5 portables, 665 students)	***200***

Conclusions on Event Parking

- Based on our recent event parking study at Ben Rush Elementary, the proposed on-site parking supply for events is expected to accommodate the event parking demand at year of opening (550 students).
- For future "worst case" conditions with 5 portables fully occupied (665 students), the amount of on-street parking to be used by the school for an event is expected to be accommodated by the adjacent on-street parking along 172nd and 122nd (along the frontage and across the street if needed) and should have little to no impact on the neighborhood.

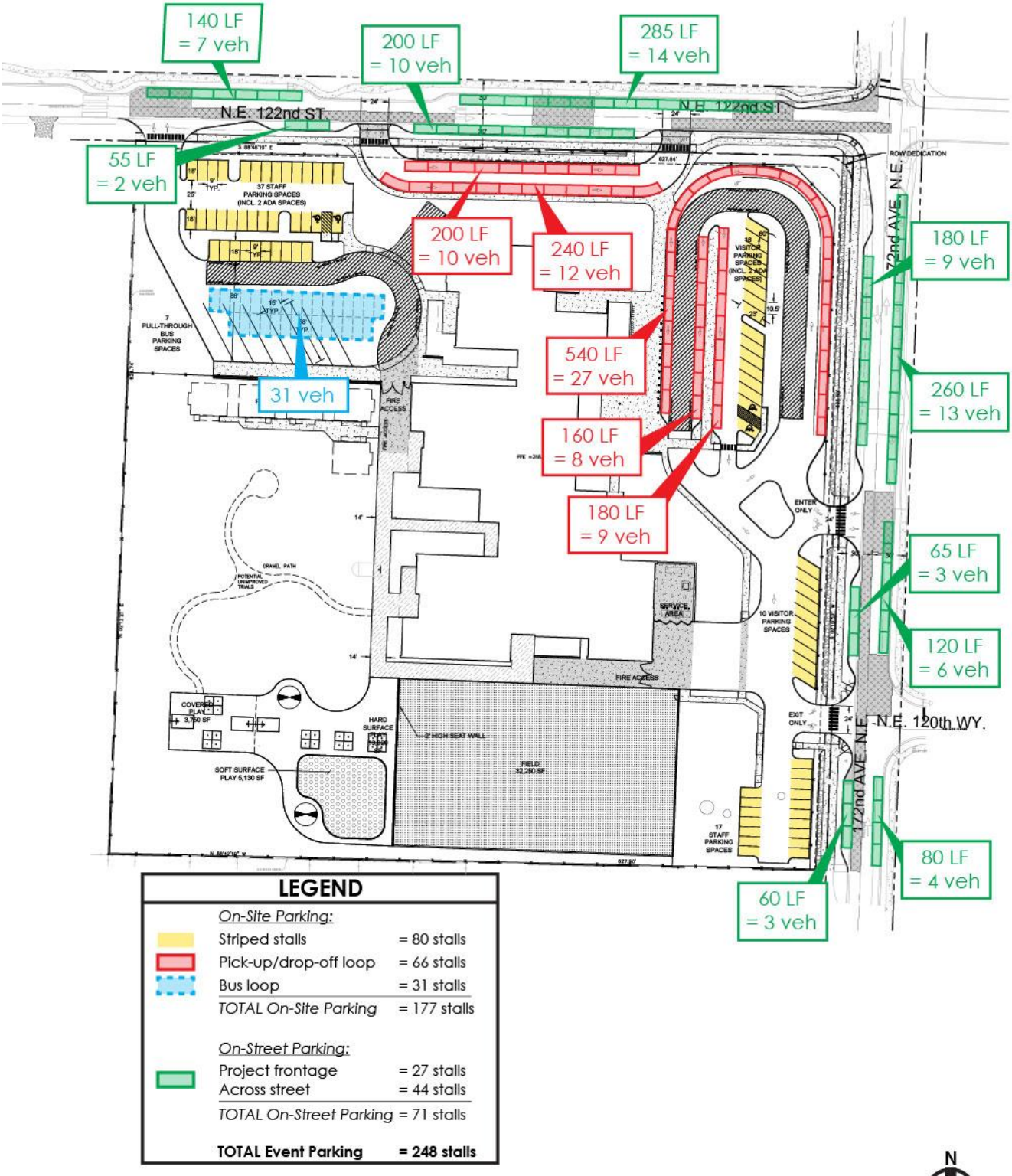


Figure 22: Event Parking Supply (On-Site + On-Street)

MITIGATION

Frontage Improvements

The project will construct frontage improvements on NE 122nd Street and 172nd Ave NE including curb and gutter, pedestrian facilities, landscaping, street lighting, and parking based on the sections outlined in the 2006 *172nd Avenue NE Corridor Plan*.

Off-Site Mitigation

Based on the results of the analysis shown in this report, impacts at 3 intersections will be addressed as follows:

162nd Place NE/NE 124th Street

The intersection of 162nd Place NE/NE 124th Street will meet signal warrants in 2018 without or with the proposed New Elementary School in North Redmond. The signal at 162nd Place NE/NE 124th Street is an impact-fee funded project on the City's TIP and TFP (TIP S40, TFP 111). As such, LWSD's required payment of transportation impact fees at building permit issuance will fully mitigate the school's transportation impacts and satisfy the school's fair share contribution to a future signal at this location.

172nd Ave NE/NE 120th Way NE

The westbound approach is estimated to operate at LOS E in the AM peak hour with the 172nd Extension, with no bussing assumed, and with a school enrollment of at least 580 students. The City and LWSD will discuss a condition that requires monitoring delays at this intersection for the first 2 years after occupancy to determine if mitigation is needed in cooperation with the neighborhood.

172nd Ave NE/NE 122nd Street

LWSD will coordinate with the City of Redmond to determine the appropriate intersection control (potential all-way stop control, two-way stop, or traffic circle/yield control) at the intersection of 172nd Ave NE/NE 122nd Street, as well as confirm the appropriate location(s) of marked pedestrian crossings on 172nd Ave NE and NE 122nd Street. In addition, widening of the intersection on the northwest and southwest corners to better accommodate bus turning movements are proposed.

Transportation Management Program (TMP)

To reduce traffic congestion, Lake Washington School District will work with the City of Redmond to develop measures to encourage both students and staff to use alternate modes of transportation (i.e. carpool/bus/walk/bike) and to manage on-site traffic operations. The TMP measures will be finalized with the City prior to occupancy of the proposed school.

Impact Fees

LWSD will be required to pay transportation impact fees to the City of Redmond to help fund planned transportation improvements throughout the City. Based on the City's current impact fee schedule (2016), the adopted transportation impact fee rate for Elementary Schools is $470.61 per student. This results in a preliminary impact fee estimate of $258,836 based on a school with 550 students, and $54,120 based on 5 portable classrooms with a total of 115 students. This estimate is preliminary, and the actual impact fee amount will be determined at building permit issuance based on the impact fee rate in effect at that time.

Appendix A

Level of Service Worksheets

2016 Existing

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

8/3/2016

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	5	68	24	9	39	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	998			532	785	
Travel Time (s)	27.2			14.5	21.4	
Confl. Peds. (#/hr)	7					7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	8%	8%	6%	6%	4%	4%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	2.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	5	68	24	9	39	6
Conflicting Peds, #/hr	7	0	0	0	0	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	80	80	80	80	80	80
Heavy Vehicles, %	8	8	6	6	4	4
Mvmt Flow	6	85	30	11	49	8

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	18	0	85	0	176	25
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	98	-
Critical Hdwy	4.18	-	-	-	6.54	6.24
Critical Hdwy Stg 1	-	-	-	-	5.54	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.272	-	-	-	4.036	3.336
Pot Cap-1 Maneuver	1561	-	-	-	714	1045
Stage 1	-	-	-	-	826	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-		-		
Mov Cap-1 Maneuver	1552	-	-	-	0	1033
Mov Cap-2 Maneuver	-	-	-	-	0	-
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-

Approach	EB	NB	SB
HCM Control Delay, s	0.5		8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBL	NBT	EBL	EBR	SBLn1
Capacity (veh/h)	-	-	1552	-	1033
HCM Lane V/C Ratio	-	-	0.004	-	0.054
HCM Control Delay (s)	-	-	7.3	-	8.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.2

Lanes, Volumes, Timings
2: 172nd Ave NE & NE 120th Way

8/3/2016



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	36	10	23	11	3	103
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25		25			25
Link Distance (ft)	453		1446			532
Travel Time (s)	12.4		39.4			14.5
Confl. Peds. (#/hr)	7	7		7	7	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	6%	6%	6%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	2.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	36	10	23	11	3	103
Conflicting Peds, #/hr	7	7	0	7	7	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	6	6	6	6
Mvmt Flow	42	12	27	13	4	121

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	169	48	0	0	47	0
Stage 1	41	-	-	-	-	-
Stage 2	128	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.16	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.254	-
Pot Cap-1 Maneuver	821	1021	-	-	1535	-
Stage 1	981	-	-	-	-	-
Stage 2	898	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	809	1009	-	-	1526	-
Mov Cap-2 Maneuver	809	-	-	-	-	-
Stage 1	975	-	-	-	-	-
Stage 2	890	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.6	0	0.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	845	1526	-
HCM Lane V/C Ratio	-	-	0.064	0.002	-
HCM Control Delay (s)	-	-	9.6	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

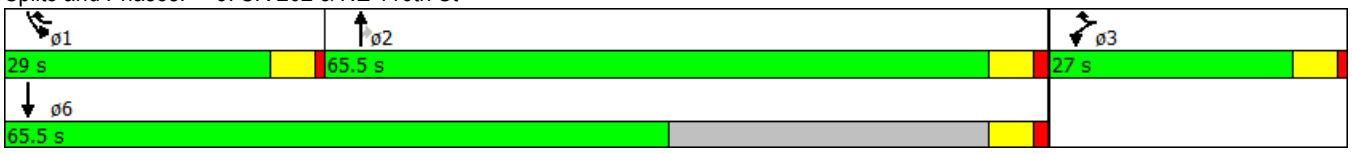
Lanes, Volumes, Timings
3: SR 202 & NE 116th St

8/3/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	268	220	328	58	81	650
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		2193			372
Travel Time (s)	41.7		37.4			6.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	4%	5%	5%	5%	5%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	10.0		25.5	25.5	10.0	25.5
Total Split (s)	27.0		65.5	65.5	29.0	65.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	53.9%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 61.6	
Natural Cycle: 50	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116th St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116th St

8/3/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	268	220	328	58	81	650
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1828	1828	1800	1800
Adj Flow Rate, veh/h	298	117	364	0	90	722
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	5	5
Cap, veh/h	483	626	687	584	213	1029
Arrive On Green	0.27	0.27	0.38	0.00	0.12	0.57
Sat Flow, veh/h	1757	1568	1828	1553	1715	1800
Grp Volume(v), veh/h	298	117	364	0	90	722
Grp Sat Flow(s),veh/h/ln	1757	1568	1828	1553	1715	1800
Q Serve(g_s), s	6.3	2.0	6.6	0.0	2.1	12.1
Cycle Q Clear(g_c), s	6.3	2.0	6.6	0.0	2.1	12.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	483	626	687	584	213	1029
V/C Ratio(X)	0.62	0.19	0.53	0.00	0.42	0.70
Avail Cap(c_a), veh/h	997	1085	2680	2278	1054	2640
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	13.4	8.2	10.3	0.0	17.1	6.5
Incr Delay (d2), s/veh	1.3	0.1	0.6	0.0	1.3	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.9	3.4	0.0	1.1	6.1
LnGrp Delay(d),s/veh	14.7	8.4	10.9	0.0	18.4	7.4
LnGrp LOS	B	A	B		B	A
Approach Vol, veh/h	415		364			812
Approach Delay, s/veh	12.9		10.9			8.6
Approach LOS	B		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	8.3	19.4				27.7		14.6
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				60.0		22.0
Max Q Clear Time (g_c+I1), s	4.1	8.6				14.1		8.3
Green Ext Time (p_c), s	0.2	5.3				5.3		1.4

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1	4	71	62	144	360	8	64	17	44	19	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			0%			-2%			0%			0%
Link Speed (mph)			35			35			25			25
Link Distance (ft)			2140			3057			693			353
Travel Time (s)			41.7			59.6			18.9			9.6
Confl. Peds. (#/hr)	34	39		50	18		7	50		18	7	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	7%	7%	7%	7%	2%	2%	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	14
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	39
Peak Hour Factor	0.73
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	188	701	171	74
Demand Flow Rate, veh/h	201	715	174	74
Vehicles Circulating, veh/h	256	119	136	795
Vehicles Exiting, veh/h	613	191	321	39
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	50	18	50	39
Ped Cap Adj	0.993	0.998	0.993	0.995
Approach Delay, s/veh	6.9	15.8	5.4	9.0
Approach LOS	A	C	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	201	715	174	74
Cap Entry Lane, veh/h	875	1003	986	510
Entry HV Adj Factor	0.936	0.981	0.980	1.000
Flow Entry, veh/h	188	701	171	74
Cap Entry, veh/h	813	981	960	508
V/C Ratio	0.231	0.715	0.178	0.146
Control Delay, s/veh	6.9	15.8	5.4	9.0
LOS	A	C	A	A
95th %tile Queue, veh	1	6	1	1

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (vph)	1	5	89	33	1	188	253	43	41	21	30	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35				35			25		
Link Distance (ft)			3057				696			543		
Travel Time (s)			59.6				13.6			14.8		
Confl. Peds. (#/hr)		1		2		2		1	2		2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	4%	4%	4%	4%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Sign Control			Yield				Yield			Yield		

Intersection Summary

Area Type: Other
Control Type: Roundabout

Lane Group	SBL	SBT	SBR
Lane Configurations			
Volume (vph)	64	124	26
Ideal Flow (vphpl)	1900	1900	1900
Link Speed (mph)		25	
Link Distance (ft)		1446	
Travel Time (s)		39.4	
Confl. Peds. (#/hr)	1		1
Peak Hour Factor	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%
Shared Lane Traffic (%)			
Sign Control		Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	10.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	154	585	110	258
Demand Flow Rate, veh/h	166	608	110	265
Vehicles Circulating, veh/h	470	82	204	604
Vehicles Exiting, veh/h	399	232	432	86
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	2	2	1
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.3	11.4	5.0	12.6
Approach LOS	A	B	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	166	608	110	265
Cap Entry Lane, veh/h	706	1041	921	618
Entry HV Adj Factor	0.930	0.962	0.998	0.972
Flow Entry, veh/h	154	585	110	258
Cap Entry, veh/h	656	1001	919	600
V/C Ratio	0.235	0.584	0.119	0.429
Control Delay, s/veh	8.3	11.4	5.0	12.6
LOS	A	B	A	B
95th %tile Queue, veh	1	4	0	2

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

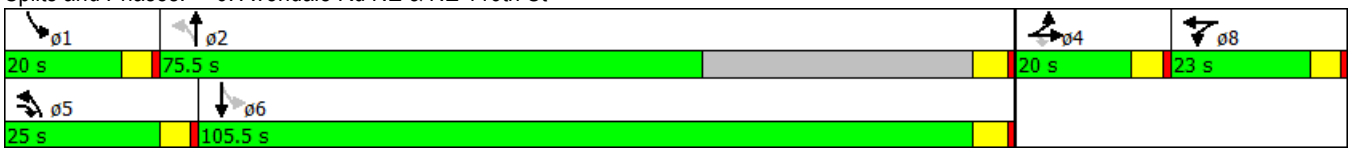
8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	64	40	157	32	30	29	159	407	29	96	1031	191
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		816			799			1116			800	
Travel Time (s)		15.9			15.6			19.0			13.6	
Confl. Peds. (#/hr)			2				4					4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	15%	15%	15%	4%	4%	4%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	10.0	25.0	25.0		10.0	26.5		10.0	26.5	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 91.4
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

8/3/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	64	40	157	32	30	29	159	407	29	96	1031	191
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1835	1835	1872	1652	1652	1900	1827	1827	1900
Adj Flow Rate, veh/h	53	58	43	33	31	30	162	415	30	98	1052	195
Adj No. of Lanes	1	1	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	5	5	5	2	2	2	15	15	15	4	4	4
Cap, veh/h	173	182	313	156	77	74	368	1599	115	688	1535	284
Arrive On Green	0.10	0.10	0.10	0.09	0.09	0.07	0.10	0.54	0.52	0.09	0.53	0.51
Sat Flow, veh/h	1723	1810	1529	1747	858	830	1573	2969	214	1740	2924	541
Grp Volume(v), veh/h	53	58	43	33	0	61	162	219	226	98	623	624
Grp Sat Flow(s),veh/h/ln	1723	1810	1529	1747	0	1688	1573	1570	1613	1740	1736	1729
Q Serve(g_s), s	2.0	2.1	1.6	1.2	0.0	2.4	2.9	5.2	5.2	1.6	18.4	18.6
Cycle Q Clear(g_c), s	2.0	2.1	1.6	1.2	0.0	2.4	2.9	5.2	5.2	1.6	18.4	18.6
Prop In Lane	1.00		1.00	1.00		0.49	1.00		0.13	1.00		0.31
Lane Grp Cap(c), veh/h	173	182	313	156	0	151	368	845	869	688	911	908
V/C Ratio(X)	0.31	0.32	0.14	0.21	0.00	0.40	0.44	0.26	0.26	0.14	0.68	0.69
Avail Cap(c_a), veh/h	425	446	536	506	0	489	707	1638	1683	959	2565	2556
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.8	28.8	22.5	29.2	0.0	29.9	9.5	8.5	8.6	5.6	12.1	12.3
Incr Delay (d2), s/veh	1.0	1.0	0.2	0.7	0.0	1.7	0.8	0.2	0.2	0.1	1.1	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.0	1.1	0.7	0.6	0.0	1.2	1.4	2.2	2.3	0.8	8.9	9.0
LnGrp Delay(d),s/veh	29.8	29.8	22.7	29.8	0.0	31.6	10.4	8.7	8.8	5.6	13.2	13.4
LnGrp LOS	C	C	C	C		C	B	A	A	A	B	B
Approach Vol, veh/h		154			94			607			1345	
Approach Delay, s/veh		27.8			31.0			9.2			12.8	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.2	40.7		9.9	10.2	39.7		9.2
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.6	7.2		4.1	4.9	20.6		4.4
Green Ext Time (p_c), s	0.2	13.5		0.4	0.5	13.7		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	13.6
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	333	81	48	981	7	61	0	13	7	1	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	4%	4%	4%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	11.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	13	333	81	48	981	7	61	0	13	7	1	30
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	6	6	6	3	3	3	4	4	4	5	5	5
Mvmt Flow	14	366	89	53	1078	8	67	0	14	8	1	33

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1088	0	0	457	0	0	1647	1634	412	1630	1675	1084
Stage 1	-	-	-	-	-	-	441	441	-	1189	1189	-
Stage 2	-	-	-	-	-	-	1206	1193	-	441	486	-
Critical Hdwy	4.16	-	-	4.13	-	-	7.14	6.54	6.24	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Follow-up Hdwy	2.254	-	-	2.227	-	-	3.536	4.036	3.336	3.545	4.045	3.345
Pot Cap-1 Maneuver	626	-	-	1099	-	-	78	100	636	80	94	260
Stage 1	-	-	-	-	-	-	591	574	-	226	258	-
Stage 2	-	-	-	-	-	-	222	258	-	589	546	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	626	-	-	1099	-	-	~ 60	85	635	69	80	260
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 60	85	-	69	80	-
Stage 1	-	-	-	-	-	-	572	556	-	219	226	-
Stage 2	-	-	-	-	-	-	169	226	-	558	529	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.4	222	33.8
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	60	635	626	-	-	1099	-	-	166
HCM Lane V/C Ratio	1.117	0.022	0.023	-	-	0.048	-	-	0.252
HCM Control Delay (s)	267	10.8	10.9	0	-	8.4	0	-	33.8
HCM Lane LOS	F	B	B	A	-	A	A	-	D
HCM 95th %tile Q(veh)	5.5	0.1	0.1	-	-	0.2	-	-	1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

8/3/2016

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	6	36	34	15	15	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	270			290	785	
Travel Time (s)	7.4			7.9	21.4	
Confl. Peds. (#/hr)	7					7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	5%	5%	8%	8%	17%	17%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	6	36	34	15	15	3
Conflicting Peds, #/hr	7	0	0	0	0	7
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	5	5	8	8	17	17
Mvmt Flow	7	42	40	18	18	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	25	0	42	0	161	32
Stage 1	-	-	-	-	105	-
Stage 2	-	-	-	-	56	-
Critical Hdwy	4.15	-	-	-	6.67	6.37
Critical Hdwy Stg 1	-	-	-	-	5.67	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.245	-	-	-	4.153	3.453
Pot Cap-1 Maneuver	1570	-	-	-	705	1000
Stage 1	-	-	-	-	780	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-		-		
Mov Cap-1 Maneuver	1561	-	-	-	0	988
Mov Cap-2 Maneuver	-	-	-	-	0	-
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-

Approach	EB	NB	SB
HCM Control Delay, s	1		8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBL	NBT	EBL	EBR	SBLn1
Capacity (veh/h)	-	-	1561	-	988
HCM Lane V/C Ratio	-	-	0.005	-	0.021
HCM Control Delay (s)	-	-	7.3	-	8.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Lanes, Volumes, Timings
2: 172nd Ave NE & NE 120th Way

8/3/2016



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	7	41	10	14	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25		25			25
Link Distance (ft)	453		1446			242
Travel Time (s)	12.4		39.4			6.6
Confl. Peds. (#/hr)	3	3		3	3	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	0%	0%	10%	10%	8%	8%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	7	41	10	14	37
Conflicting Peds, #/hr	3	3	0	3	3	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	10	10	8	8
Mvmt Flow	12	8	48	12	16	44

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	133	60	0	0	63	0
Stage 1	57	-	-	-	-	-
Stage 2	76	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.18	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.272	-
Pot Cap-1 Maneuver	866	1011	-	-	1502	-
Stage 1	971	-	-	-	-	-
Stage 2	952	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	852	1006	-	-	1498	-
Mov Cap-2 Maneuver	852	-	-	-	-	-
Stage 1	969	-	-	-	-	-
Stage 2	939	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9	0	2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	909	1498	-
HCM Lane V/C Ratio	-	-	0.022	0.011	-
HCM Control Delay (s)	-	-	9	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

8/3/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	81	172	770	132	169	459
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
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 (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 88.3	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

8/3/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	81	172	770	132	169	459
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1835	1835
Adj Flow Rate, veh/h	88	92	837	53	184	499
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	210	452	1035	880	293	1419
Arrive On Green	0.12	0.12	0.56	0.56	0.17	0.77
Sat Flow, veh/h	1774	1584	1863	1584	1748	1835
Grp Volume(v), veh/h	88	92	837	53	184	499
Grp Sat Flow(s),veh/h/ln	1774	1584	1863	1584	1748	1835
Q Serve(g_s), s	2.7	2.6	21.7	0.9	5.9	5.1
Cycle Q Clear(g_c), s	2.7	2.6	21.7	0.9	5.9	5.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	210	452	1035	880	293	1419
V/C Ratio(X)	0.42	0.20	0.81	0.06	0.63	0.35
Avail Cap(c_a), veh/h	713	901	1933	1643	760	2518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	16.2	10.7	6.1	23.2	2.1
Incr Delay (d2), s/veh	1.3	0.2	1.6	0.0	2.2	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.4	1.2	11.4	0.4	3.0	2.6
LnGrp Delay(d),s/veh	25.8	16.4	12.3	6.1	25.4	2.3
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	180		890			683
Approach Delay, s/veh	21.0		11.9			8.5
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	13.0	36.7				49.7		10.1
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	7.9	23.7				7.1		4.7
Green Ext Time (p_c), s	0.5	7.5				7.8		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	7	225	46	29	164	9	61	17	50	7	6	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			-2%			0%			0%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		2140			3057			693			326	
Travel Time (s)		41.7			59.6			18.9			8.9	
Confl. Peds. (#/hr)	33		52	52		33	52		52	33		33
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	0%	0%	0%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other

Control Type: Roundabout

Intersection	
Intersection Delay, s/veh	6.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	306	222	141	22
Demand Flow Rate, veh/h	318	230	141	22
Vehicles Circulating, veh/h	48	94	273	287
Vehicles Exiting, veh/h	261	320	93	37
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	52	52	52	33
Ped Cap Adj	0.993	0.993	0.993	0.995
Approach Delay, s/veh	6.5	5.8	5.9	4.6
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	318	230	141	22
Cap Entry Lane, veh/h	1077	1029	860	848
Entry HV Adj Factor	0.963	0.964	1.000	0.985
Flow Entry, veh/h	306	222	141	22
Cap Entry, veh/h	1029	985	854	831
V/C Ratio	0.297	0.225	0.165	0.026
Control Delay, s/veh	6.5	5.8	5.9	4.6
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	1	11	195	28	45	129	48	1	34	36	75	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35			35				25		
Link Distance (ft)			3057			696				543		
Travel Time (s)			59.6			13.6				14.8		
Confl. Peds. (#/hr)	6	11		10	4		5	4	10		4	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%	4%	2%	2%	2%	2%	5%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield				Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBT	SBR
Lane Configurations		
Volume (vph)	21	5
Ideal Flow (vphpl)	1900	1900
Link Speed (mph)	25	
Link Distance (ft)	1446	
Travel Time (s)	39.4	
Confl. Peds. (#/hr)		11
Peak Hour Factor	0.84	0.84
Heavy Vehicles (%)	5%	5%
Shared Lane Traffic (%)		
Sign Control	Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	6.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	279	265	173	77
Demand Flow Rate, veh/h	294	275	177	80
Vehicles Circulating, veh/h	131	101	307	259
Vehicles Exiting, veh/h	208	383	118	117
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	5	10	11
Ped Cap Adj	0.998	0.999	0.999	0.998
Approach Delay, s/veh	6.9	6.4	6.7	5.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	294	275	177	80
Cap Entry Lane, veh/h	991	1021	831	872
Entry HV Adj Factor	0.950	0.963	0.978	0.960
Flow Entry, veh/h	279	265	173	77
Cap Entry, veh/h	940	983	812	836
V/C Ratio	0.297	0.269	0.213	0.092
Control Delay, s/veh	6.9	6.4	6.7	5.2
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	0

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	156	32	198	38	34	84	141	1119	22	51	578	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 173.5	
Actuated Cycle Length: 92.6	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

8/3/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	156	32	198	38	34	84	141	1119	22	51	578	44
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1835	1835	1872	1810	1810	1900	1845	1845	1900
Adj Flow Rate, veh/h	196	0	51	42	37	92	155	1230	24	56	635	48
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	2	2	2	5	5	5	3	3	3
Cap, veh/h	397	0	326	227	61	151	535	1799	35	332	1647	124
Arrive On Green	0.11	0.00	0.11	0.13	0.13	0.12	0.09	0.52	0.51	0.07	0.50	0.49
Sat Flow, veh/h	3514	0	1568	1747	467	1162	1723	3449	67	1757	3304	249
Grp Volume(v), veh/h	196	0	51	42	0	129	155	613	641	56	337	346
Grp Sat Flow(s),veh/h/ln	1757	0	1568	1747	0	1630	1723	1719	1798	1757	1752	1801
Q Serve(g_s), s	4.0	0.0	2.0	1.6	0.0	5.7	3.0	20.2	20.3	1.1	9.1	9.1
Cycle Q Clear(g_c), s	4.0	0.0	2.0	1.6	0.0	5.7	3.0	20.2	20.3	1.1	9.1	9.1
Prop In Lane	1.00		1.00	1.00		0.71	1.00		0.04	1.00		0.14
Lane Grp Cap(c), veh/h	397	0	326	227	0	212	535	896	937	332	874	898
V/C Ratio(X)	0.49	0.00	0.16	0.18	0.00	0.61	0.29	0.68	0.68	0.17	0.39	0.39
Avail Cap(c_a), veh/h	782	0	497	458	0	427	868	1620	1695	597	2340	2405
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.8	0.0	24.8	29.6	0.0	31.7	7.4	13.6	13.6	9.9	11.9	11.9
Incr Delay (d2), s/veh	0.9	0.0	0.2	0.4	0.0	2.8	0.3	1.1	1.1	0.2	0.3	0.3
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	2.0	0.0	0.9	0.8	0.0	2.8	1.5	9.8	10.3	0.5	4.5	4.6
LnGrp Delay(d),s/veh	32.8	0.0	25.0	30.0	0.0	34.5	7.7	14.7	14.7	10.1	12.2	12.3
LnGrp LOS	C		C	C		C	A	B	B	B	B	B
Approach Vol, veh/h		247			171			1409			739	
Approach Delay, s/veh		31.2			33.4			13.9			12.1	
Approach LOS		C			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.5	43.3		11.6	10.2	41.6		12.9
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.1	22.3		6.0	5.0	11.1		7.7
Green Ext Time (p_c), s	0.1	15.6		0.7	0.4	16.9		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	818	56	13	568	5	49	0	19	5	1	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	818	56	13	568	5	49	0	19	5	1	19
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	8	8	8
Mvmt Flow	17	880	60	14	611	5	53	0	20	5	1	20

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	618	0	0	942	0	0	1600	1592	912	1589	1619	615
Stage 1	-	-	-	-	-	-	946	946	-	643	643	-
Stage 2	-	-	-	-	-	-	654	646	-	946	976	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.12	6.52	6.22	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.518	4.018	3.318	3.572	4.072	3.372
Pot Cap-1 Maneuver	957	-	-	724	-	-	85	107	332	84	100	480
Stage 1	-	-	-	-	-	-	314	340	-	452	459	-
Stage 2	-	-	-	-	-	-	456	467	-	306	322	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	957	-	-	724	-	-	76	100	331	75	93	479
Mov Cap-2 Maneuver	-	-	-	-	-	-	76	100	-	75	93	-
Stage 1	-	-	-	-	-	-	302	327	-	434	445	-
Stage 2	-	-	-	-	-	-	423	453	-	276	309	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	93.3	24.2
HCM LOS			F	C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	76	331	957	-	-	724	-	-	214
HCM Lane V/C Ratio	0.693	0.062	0.018	-	-	0.019	-	-	0.126
HCM Control Delay (s)	123.1	16.6	8.8	0	-	10.1	0	-	24.2
HCM Lane LOS	F	C	A	A	-	B	A	-	C
HCM 95th %tile Q(veh)	3.2	0.2	0.1	-	-	0.1	-	-	0.4

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

8/3/2016

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	1	47	38	28	14	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	270			290	785	
Travel Time (s)	7.4			7.9	21.4	
Confl. Peds. (#/hr)	3	2	2			3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	3%	3%	12%	12%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	1	47	38	28	14	3
Conflicting Peds, #/hr	3	2	2	0	0	3
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	84	84	84	84	84	84
Heavy Vehicles, %	2	2	3	3	12	12
Mvmt Flow	1	56	45	33	17	4

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	36	0	56	0	185	39
Stage 1	-	-	-	-	127	-
Stage 2	-	-	-	-	58	-
Critical Hdwy	4.12	-	-	-	6.62	6.32
Critical Hdwy Stg 1	-	-	-	-	5.62	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	2.218	-	-	-	4.108	3.408
Pot Cap-1 Maneuver	1575	-	-	-	692	1005
Stage 1	-	-	-	-	772	-
Stage 2	-	-	-	-	-	-
Platoon blocked, %		-		-		
Mov Cap-1 Maneuver	1571	-	-	-	0	1000
Mov Cap-2 Maneuver	-	-	-	-	0	-
Stage 1	-	-	-	-	0	-
Stage 2	-	-	-	-	0	-

Approach	EB	NB	SB
HCM Control Delay, s	0.2		8.7
HCM LOS			A

Minor Lane/Major Mvmt	NBL	NBT	EBL	EBR	SBLn1
Capacity (veh/h)	-	-	1571	-	1000
HCM Lane V/C Ratio	-	-	0.001	-	0.02
HCM Control Delay (s)	-	-	7.3	-	8.7
HCM Lane LOS	-	-	A	-	A
HCM 95th %tile Q(veh)	-	-	0	-	0.1

Lanes, Volumes, Timings
2: 172nd Ave NE & NE 120th Way

8/3/2016



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	11	55	32	19	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25		25			25
Link Distance (ft)	453		1446			242
Travel Time (s)	12.4		39.4			6.6
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	5%	5%	2%	2%	7%	7%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	2

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	11	55	32	19	42
Conflicting Peds, #/hr	10	10	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	5	5	2	2	7	7
Mvmt Flow	12	13	64	37	22	49

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	186	103	0	0	111	0
Stage 1	93	-	-	-	-	-
Stage 2	93	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.263	-
Pot Cap-1 Maneuver	796	944	-	-	1448	-
Stage 1	923	-	-	-	-	-
Stage 2	923	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	770	928	-	-	1436	-
Mov Cap-2 Maneuver	770	-	-	-	-	-
Stage 1	915	-	-	-	-	-
Stage 2	901	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.4	0	2.4
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	845	1436	-
HCM Lane V/C Ratio	-	-	0.029	0.015	-
HCM Control Delay (s)	-	-	9.4	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

8/3/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	96	205	836	146	238	507
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	3%	3%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 93.8	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

8/3/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	96	205	836	146	238	507
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1835	1835
Adj Flow Rate, veh/h	98	135	853	49	243	517
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	3	3
Cap, veh/h	233	524	1026	872	342	1429
Arrive On Green	0.13	0.13	0.54	0.54	0.20	0.78
Sat Flow, veh/h	1810	1615	1900	1615	1748	1835
Grp Volume(v), veh/h	98	135	853	49	243	517
Grp Sat Flow(s),veh/h/ln	1810	1615	1900	1615	1748	1835
Q Serve(g_s), s	3.5	4.3	26.3	1.0	9.1	6.1
Cycle Q Clear(g_c), s	3.5	4.3	26.3	1.0	9.1	6.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	233	524	1026	872	342	1429
V/C Ratio(X)	0.42	0.26	0.83	0.06	0.71	0.36
Avail Cap(c_a), veh/h	620	869	1681	1429	648	2147
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.1	17.5	13.4	7.6	26.3	2.4
Incr Delay (d2), s/veh	1.2	0.3	1.9	0.0	2.7	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.8	2.0	14.1	0.4	4.6	3.1
LnGrp Delay(d),s/veh	29.3	17.7	15.4	7.7	29.1	2.5
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	233		902			760
Approach Delay, s/veh	22.6		14.9			11.0
Approach LOS	C		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	16.7	41.4				58.1		12.0
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	11.1	28.3				8.1		6.3
Green Ext Time (p_c), s	0.7	7.6				8.1		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	14.3
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	6	334	65	1	33	176	7	101	13	63	3	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%				-2%			0%			0%
Link Speed (mph)		35				35			25			25
Link Distance (ft)		2140				3057			693			326
Travel Time (s)		41.7				59.6			18.9			8.9
Confl. Peds. (#/hr)	15		12				3	12			3	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Yield				Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	9
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	15
Peak Hour Factor	0.96
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	422	225	185	14
Demand Flow Rate, veh/h	434	225	185	14
Vehicles Circulating, veh/h	40	125	368	323
Vehicles Exiting, veh/h	297	428	106	27
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	34	3	12	15
Ped Cap Adj	0.995	1.000	0.998	0.998
Approach Delay, s/veh	7.7	5.8	7.2	4.6
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	434	225	185	14
Cap Entry Lane, veh/h	1086	997	782	818
Entry HV Adj Factor	0.971	1.000	1.000	1.000
Flow Entry, veh/h	422	225	185	14
Cap Entry, veh/h	1050	997	781	816
V/C Ratio	0.402	0.226	0.237	0.017
Control Delay, s/veh	7.7	5.8	7.2	4.6
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (vph)	12	286	40	51	144	48	38	83	153	38	26	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		3057			696			543			1446	
Travel Time (s)		59.6			13.6			14.8			39.4	
Confl. Peds. (#/hr)	11		2			9	2			9		11
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 (%)	4%	4%	4%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	348	250	283	72
Demand Flow Rate, veh/h	362	252	286	74
Vehicles Circulating, veh/h	122	138	359	242
Vehicles Exiting, veh/h	194	507	125	148
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	9	2	11
Ped Cap Adj	0.998	0.999	1.000	0.998
Approach Delay, s/veh	7.7	6.2	9.0	5.0
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	362	252	286	74
Cap Entry Lane, veh/h	1000	984	789	887
Entry HV Adj Factor	0.962	0.990	0.990	0.975
Flow Entry, veh/h	348	250	283	72
Cap Entry, veh/h	961	973	781	864
V/C Ratio	0.362	0.256	0.363	0.084
Control Delay, s/veh	7.7	6.2	9.0	5.0
LOS	A	A	A	A
95th %tile Queue, veh	2	1	2	0

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

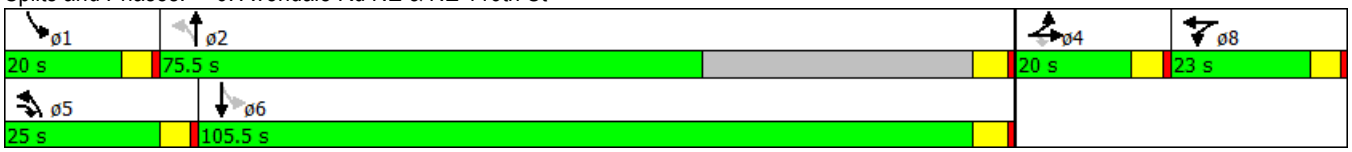
8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	259	47	235	32	24	74	170	1342	24	27	654	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Confl. Peds. (#/hr)			17				4					4
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 (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)	41%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 92.3
Natural Cycle: 110
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

8/3/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	259	47	235	32	24	74	170	1342	24	27	654	51
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1853	1853	1872	1881	1881	1900	1845	1845	1900
Adj Flow Rate, veh/h	301	0	79	33	25	76	175	1384	25	28	674	53
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
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
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	3	3	3
Cap, veh/h	524	0	371	187	43	131	527	1959	35	274	1662	131
Arrive On Green	0.15	0.00	0.15	0.11	0.11	0.09	0.09	0.55	0.53	0.05	0.50	0.49
Sat Flow, veh/h	3514	0	1514	1765	405	1231	1792	3592	65	1757	3292	259
Grp Volume(v), veh/h	301	0	79	33	0	101	175	688	721	28	359	368
Grp Sat Flow(s),veh/h/ln	1757	0	1514	1765	0	1636	1792	1787	1869	1757	1752	1798
Q Serve(g_s), s	6.8	0.0	3.5	1.4	0.0	5.0	3.5	24.2	24.2	0.6	10.8	10.9
Cycle Q Clear(g_c), s	6.8	0.0	3.5	1.4	0.0	5.0	3.5	24.2	24.2	0.6	10.8	10.9
Prop In Lane	1.00		1.00	1.00		0.75	1.00		0.03	1.00		0.14
Lane Grp Cap(c), veh/h	524	0	371	187	0	174	527	975	1020	274	885	907
V/C Ratio(X)	0.57	0.00	0.21	0.18	0.00	0.58	0.33	0.71	0.71	0.10	0.41	0.41
Avail Cap(c_a), veh/h	703	0	449	416	0	385	825	1515	1585	534	2105	2159
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.6	0.0	25.7	34.6	0.0	36.5	8.0	14.3	14.3	11.2	13.1	13.1
Incr Delay (d2), s/veh	1.0	0.0	0.3	0.4	0.0	3.1	0.4	1.1	1.1	0.2	0.4	0.4
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	3.3	0.0	1.5	0.7	0.0	2.4	1.8	12.2	12.7	0.3	5.3	5.4
LnGrp Delay(d),s/veh	34.6	0.0	26.0	35.0	0.0	39.6	8.4	15.4	15.4	11.4	13.5	13.5
LnGrp LOS	C		C	D		D	A	B	B	B	B	B
Approach Vol, veh/h		380			134			1584			755	
Approach Delay, s/veh		32.8			38.5			14.6			13.4	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.4	49.8		15.7	10.9	46.4		12.0
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	2.6	26.2		8.8	5.5	12.9		7.0
Green Ext Time (p_c), s	0.0	18.1		0.9	0.5	21.0		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	17.8
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	993	62	6	621	11	43	2	21	3	1	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)			3	3					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 (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	29	993	62	6	621	11	43	2	21	3	1	16
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	30	1024	64	6	640	11	44	2	22	3	1	16

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	654	0	0	1090	0	0	1786	1783	1061	1778	1809	651
Stage 1	-	-	-	-	-	-	1117	1117	-	660	660	-
Stage 2	-	-	-	-	-	-	669	666	-	1118	1149	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	938	-	-	644	-	-	64	83	274	65	80	472
Stage 1	-	-	-	-	-	-	254	285	-	455	463	-
Stage 2	-	-	-	-	-	-	450	460	-	254	275	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	936	-	-	642	-	-	56	75	273	54	72	470
Mov Cap-2 Maneuver	-	-	-	-	-	-	56	75	-	54	72	-
Stage 1	-	-	-	-	-	-	233	261	-	417	455	-
Stage 2	-	-	-	-	-	-	426	452	-	212	252	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	131.6	25.9
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	57	273	936	-	-	642	-	-	193
HCM Lane V/C Ratio	0.814	0.079	0.032	-	-	0.01	-	-	0.107
HCM Control Delay (s)	184	19.3	9	0	-	10.7	0	-	25.9
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	3.6	0.3	0.1	-	-	0	-	-	0.4

2018 No Action

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	5	3	71	27	9	0	25	9	8	0	41	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		998			299			532			785	
Travel Time (s)		27.2			8.2			14.5			21.4	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	5	3	71	0	27	9	0	0	25	9	8
Peak Hour Factor	0.92	0.80	0.80	0.80	0.92	0.80	0.80	0.80	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	8	8	8	2	2	2	2	2	6	6	6
Mvmt Flow	0	6	4	89	0	34	11	0	0	31	11	10
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.2	7.7	7.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	60%	6%	75%	0%
Vol Thru, %	21%	4%	25%	87%
Vol Right, %	19%	90%	0%	13%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	42	79	36	47
LT Vol	25	5	27	0
Through Vol	9	3	9	41
RT Vol	8	71	0	6
Lane Flow Rate	52	99	45	59
Geometry Grp	1	1	1	1
Degree of Util (X)	0.063	0.102	0.054	0.068
Departure Headway (Hd)	4.302	3.736	4.354	4.182
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	824	946	813	848
Service Time	2.371	1.81	2.43	2.25
HCM Lane V/C Ratio	0.063	0.105	0.055	0.07
HCM Control Delay	7.7	7.2	7.7	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.2	0.3	0.2	0.2

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	41	6
Peak Hour Factor	0.92	0.80	0.80	0.80
Heavy Vehicles, %	2	4	4	4
Mvmt Flow	0	0	51	7
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.6
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & NE 120th Way

8/3/2016



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	37	10	32	11	3	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25		25			25
Link Distance (ft)	453		1446			532
Travel Time (s)	12.4		39.4			14.5
Confl. Peds. (#/hr)	7	7		7	7	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	6%	6%	6%	6%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	2.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	37	10	32	11	3	134
Conflicting Peds, #/hr	7	7	0	7	7	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	2	2	6	6	6	6
Mvmt Flow	44	12	38	13	4	158

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	216	58	0	0	58	0
Stage 1	51	-	-	-	-	-
Stage 2	165	-	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.16	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.254	-
Pot Cap-1 Maneuver	772	1008	-	-	1521	-
Stage 1	971	-	-	-	-	-
Stage 2	864	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	761	996	-	-	1512	-
Mov Cap-2 Maneuver	761	-	-	-	-	-
Stage 1	965	-	-	-	-	-
Stage 2	856	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.8	0	0.2
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	801	1512	-
HCM Lane V/C Ratio	-	-	0.069	0.002	-
HCM Control Delay (s)	-	-	9.8	7.4	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.2	0	-

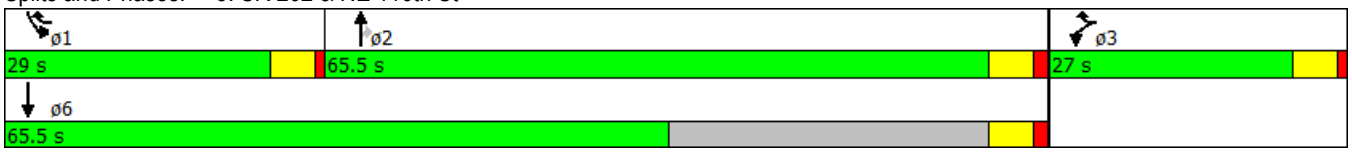
Lanes, Volumes, Timings
3: SR 202 & NE 116th St

8/3/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	288	230	341	63	84	676
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		2193			372
Travel Time (s)	41.7		37.4			6.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	4%	5%	5%	5%	5%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	10.0		25.5	25.5	10.0	25.5
Total Split (s)	27.0		65.5	65.5	29.0	65.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	53.9%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 64.7	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116th St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116th St

8/3/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	288	230	341	63	84	676
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1828	1828	1800	1800
Adj Flow Rate, veh/h	320	125	379	0	93	751
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	5	5
Cap, veh/h	498	636	695	591	209	1027
Arrive On Green	0.28	0.28	0.38	0.00	0.12	0.57
Sat Flow, veh/h	1757	1568	1828	1553	1715	1800
Grp Volume(v), veh/h	320	125	379	0	93	751
Grp Sat Flow(s),veh/h/ln	1757	1568	1828	1553	1715	1800
Q Serve(g_s), s	7.1	2.3	7.2	0.0	2.2	13.6
Cycle Q Clear(g_c), s	7.1	2.3	7.2	0.0	2.2	13.6
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	498	636	695	591	209	1027
V/C Ratio(X)	0.64	0.20	0.55	0.00	0.44	0.73
Avail Cap(c_a), veh/h	951	1040	2556	2173	1006	2518
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	13.9	8.5	10.7	0.0	18.1	7.0
Incr Delay (d2), s/veh	1.4	0.1	0.7	0.0	1.5	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	1.0	3.7	0.0	1.1	7.0
LnGrp Delay(d),s/veh	15.3	8.7	11.4	0.0	19.5	8.1
LnGrp LOS	B	A	B		B	A
Approach Vol, veh/h	445		379			844
Approach Delay, s/veh	13.4		11.4			9.3
Approach LOS	B		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	8.4	20.4				28.8		15.6
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				60.0		22.0
Max Q Clear Time (g_c+I1), s	4.2	9.2				15.6		9.1
Green Ext Time (p_c), s	0.2	5.7				5.7		1.5

Intersection Summary	
HCM 2010 Ctrl Delay	10.9
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1	4	77	65	151	385	8	67	18	46	20	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			0%			-2%			0%			0%
Link Speed (mph)			35			35			25			25
Link Distance (ft)			2140			3057			693			353
Travel Time (s)			41.7			59.6			18.9			9.6
Confl. Peds. (#/hr)	34	39		50	18		7	50		18	7	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	7%	7%	7%	7%	2%	2%	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)	10%											
Sign Control			Yield			Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	15
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	39
Peak Hour Factor	0.73
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	14.1
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	200	745	180	78
Demand Flow Rate, veh/h	213	760	184	78
Vehicles Circulating, veh/h	268	125	145	844
Vehicles Exiting, veh/h	654	203	336	41
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	50	18	50	39
Ped Cap Adj	0.955	0.998	0.993	0.995
Approach Delay, s/veh	7.6	18.4	5.6	9.7
Approach LOS	A	C	A	A

Lane	Right	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	213	760	184	78
Cap Entry Lane, veh/h	864	997	977	486
Entry HV Adj Factor	0.937	0.981	0.981	1.000
Flow Entry, veh/h	200	745	180	78
Cap Entry, veh/h	774	976	952	483
V/C Ratio	0.258	0.764	0.190	0.161
Control Delay, s/veh	7.6	18.4	5.6	9.7
LOS	A	C	A	A
95th %tile Queue, veh	1	8	1	1

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (vph)	1	7	94	34	1	199	267	48	43	25	31	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35				35			25		
Link Distance (ft)			3057				696			543		
Travel Time (s)			59.6				13.6			14.8		
Confl. Peds. (#/hr)		1		2		2		1	2		2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	4%	4%	4%	4%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Sign Control			Yield				Yield			Yield		

Intersection Summary

Area Type: Other
Control Type: Roundabout

Lane Group	SBL	SBT	SBR
Lane Configurations			
Volume (vph)	76	140	34
Ideal Flow (vphpl)	1900	1900	1900
Link Speed (mph)		25	
Link Distance (ft)		1446	
Travel Time (s)		39.4	
Confl. Peds. (#/hr)	1		1
Peak Hour Factor	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%
Shared Lane Traffic (%)			
Sign Control		Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	12.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	163	621	119	303
Demand Flow Rate, veh/h	176	646	120	312
Vehicles Circulating, veh/h	521	94	229	640
Vehicles Exiting, veh/h	431	255	468	100
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	2	2	1
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.2	12.7	5.3	15.5
Approach LOS	A	B	A	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	176	646	120	312
Cap Entry Lane, veh/h	671	1029	899	596
Entry HV Adj Factor	0.926	0.961	0.989	0.971
Flow Entry, veh/h	163	621	119	303
Cap Entry, veh/h	621	989	889	578
V/C Ratio	0.262	0.628	0.134	0.524
Control Delay, s/veh	9.2	12.7	5.3	15.5
LOS	A	B	A	C
95th %tile Queue, veh	1	5	0	3

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

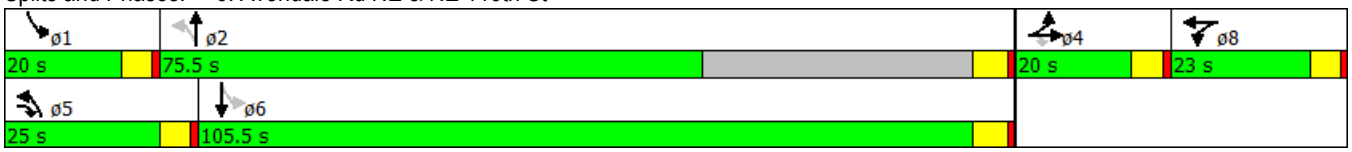
8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	42	178	33	31	30	169	423	30	100	1073	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		816			799			1116			800	
Travel Time (s)		15.9			15.6			19.0			13.6	
Confl. Peds. (#/hr)			2				4					4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	15%	15%	15%	4%	4%	4%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	10.0	25.0	25.0		10.0	26.5		10.0	26.5	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 97.5
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

8/3/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	42	178	33	31	30	169	423	30	100	1073	201
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1835	1835	1872	1652	1652	1900	1827	1827	1900
Adj Flow Rate, veh/h	56	62	48	34	32	31	172	432	31	102	1095	205
Adj No. of Lanes	1	1	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	5	5	5	2	2	2	15	15	15	4	4	4
Cap, veh/h	168	176	307	152	75	72	360	1649	118	686	1575	294
Arrive On Green	0.10	0.10	0.10	0.09	0.09	0.07	0.10	0.56	0.54	0.09	0.54	0.53
Sat Flow, veh/h	1723	1810	1529	1747	858	831	1573	2971	212	1740	2919	545
Grp Volume(v), veh/h	56	62	48	34	0	63	172	228	235	102	649	651
Grp Sat Flow(s),veh/h/ln	1723	1810	1529	1747	0	1688	1573	1570	1614	1740	1736	1728
Q Serve(g_s), s	2.2	2.3	1.9	1.3	0.0	2.6	3.2	5.5	5.5	1.7	19.9	20.2
Cycle Q Clear(g_c), s	2.2	2.3	1.9	1.3	0.0	2.6	3.2	5.5	5.5	1.7	19.9	20.2
Prop In Lane	1.00		1.00	1.00		0.49	1.00		0.13	1.00		0.32
Lane Grp Cap(c), veh/h	168	176	307	152	0	147	360	871	896	686	937	933
V/C Ratio(X)	0.33	0.35	0.16	0.22	0.00	0.43	0.48	0.26	0.26	0.15	0.69	0.70
Avail Cap(c_a), veh/h	405	425	518	483	0	467	676	1563	1607	943	2448	2438
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.5	30.5	23.9	30.7	0.0	31.5	10.4	8.4	8.4	5.5	12.2	12.4
Incr Delay (d2), s/veh	1.2	1.2	0.2	0.7	0.0	2.0	1.0	0.2	0.2	0.1	1.1	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.2	0.8	0.7	0.0	1.3	1.8	2.4	2.5	0.8	9.7	9.7
LnGrp Delay(d),s/veh	31.6	31.7	24.1	31.5	0.0	33.5	11.4	8.6	8.6	5.6	13.4	13.6
LnGrp LOS	C	C	C	C		C	B	A	A	A	B	B
Approach Vol, veh/h		166			97			635			1402	
Approach Delay, s/veh		29.5			32.8			9.3			12.9	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	43.6		10.0	10.5	42.5		9.3
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.7	7.5		4.3	5.2	22.2		4.6
Green Ext Time (p_c), s	0.2	14.6		0.4	0.5	14.8		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	14.0
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	346	87	50	1021	7	72	0	14	7	1	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		100	0		100	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	4%	4%	4%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	19.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	346	87	50	1021	7	72	0	14	7	1	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	100	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	6	6	6	3	3	3	4	4	4	5	5	5
Mvmt Flow	15	380	96	55	1122	8	79	0	15	8	1	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1124	0	0	478	0	0	1712	1695	430	1695	1743	1124
Stage 1	-	-	-	-	-	-	461	461	-	1234	1234	-
Stage 2	-	-	-	-	-	-	1251	1234	-	461	509	-
Critical Hdwy	4.16	-	-	4.13	-	-	7.14	6.54	6.24	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Follow-up Hdwy	2.254	-	-	2.227	-	-	3.536	4.036	3.336	3.545	4.045	3.345
Pot Cap-1 Maneuver	607	-	-	1079	-	-	~ 71	92	621	72	85	246
Stage 1	-	-	-	-	-	-	577	562	-	213	245	-
Stage 2	-	-	-	-	-	-	209	247	-	575	533	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	607	-	-	1079	-	-	~ 53	76	620	61	71	246
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 53	76	-	61	71	-
Stage 1	-	-	-	-	-	-	556	542	-	205	211	-
Stage 2	-	-	-	-	-	-	155	213	-	542	514	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.4	$ 357.2	37.4
HCM LOS			F	E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	53	620	607	-	-	1079	-	-	153
HCM Lane V/C Ratio	1.493	0.025	0.025	-	-	0.051	-	-	0.28
HCM Control Delay (s)	$ 424.5	11	11.1	0	-	8.5	0	-	37.4
HCM Lane LOS	F	B	B	A	-	A	A	-	E
HCM 95th %tile Q(veh)	7.3	0.1	0.1	-	-	0.2	-	-	1.1

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	5	37	16	5	0	35	16	17	0	16	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			428			290			785	
Travel Time (s)		7.4			11.7			7.9			21.4	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.82	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	6	5	37	0	16	5	0	0	35	16	17
Peak Hour Factor	0.92	0.85	0.85	0.85	0.92	0.85	0.85	0.82	0.92	0.85	0.85	0.85
Heavy Vehicles, %	2	5	5	5	2	2	2	2	2	8	8	8
Mvmt Flow	0	7	6	44	0	19	6	0	0	41	19	20
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7	7.5	7.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	51%	12%	76%	0%
Vol Thru, %	24%	10%	24%	84%
Vol Right, %	25%	77%	0%	16%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	68	48	21	19
LT Vol	35	6	16	0
Through Vol	16	5	5	16
RT Vol	17	37	0	3
Lane Flow Rate	80	56	25	22
Geometry Grp	1	1	1	1
Degree of Util (X)	0.092	0.059	0.03	0.027
Departure Headway (Hd)	4.147	3.743	4.308	4.296
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	862	947	824	828
Service Time	2.186	1.805	2.371	2.348
HCM Lane V/C Ratio	0.093	0.059	0.03	0.027
HCM Control Delay	7.6	7	7.5	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.3	0.2	0.1	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	16	3
Peak Hour Factor	0.92	0.85	0.85	0.85
Heavy Vehicles, %	2	17	17	17
Mvmt Flow	0	0	19	4
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.5
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & NE 120th Way

8/3/2016



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	7	60	10	15	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25		25			25
Link Distance (ft)	453		1446			242
Travel Time (s)	12.4		39.4			6.6
Confl. Peds. (#/hr)	3	3		3	3	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	0%	0%	10%	10%	8%	8%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	7	60	10	15	54
Conflicting Peds, #/hr	3	3	0	3	3	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	85	85	85	85	85	85
Heavy Vehicles, %	0	0	10	10	8	8
Mvmt Flow	12	8	71	12	18	64

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	178	82	0	0	85	0
Stage 1	79	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.4	6.2	-	-	4.18	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	-	-	2.272	-
Pot Cap-1 Maneuver	816	983	-	-	1474	-
Stage 1	949	-	-	-	-	-
Stage 2	930	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	801	978	-	-	1470	-
Mov Cap-2 Maneuver	801	-	-	-	-	-
Stage 1	947	-	-	-	-	-
Stage 2	916	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.3	0	1.6
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	865	1470	-
HCM Lane V/C Ratio	-	-	0.023	0.012	-
HCM Control Delay (s)	-	-	9.3	7.5	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

8/3/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	90	181	801	143	177	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
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 (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 93.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

8/3/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	90	181	801	143	177	478
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1835	1835
Adj Flow Rate, veh/h	98	119	871	48	192	520
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	225	466	1048	891	293	1423
Arrive On Green	0.13	0.13	0.56	0.56	0.17	0.78
Sat Flow, veh/h	1774	1584	1863	1584	1748	1835
Grp Volume(v), veh/h	98	119	871	48	192	520
Grp Sat Flow(s),veh/h/ln	1774	1584	1863	1584	1748	1835
Q Serve(g_s), s	3.4	3.8	25.5	0.9	6.8	5.9
Cycle Q Clear(g_c), s	3.4	3.8	25.5	0.9	6.8	5.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	225	466	1048	891	293	1423
V/C Ratio(X)	0.44	0.26	0.83	0.05	0.66	0.37
Avail Cap(c_a), veh/h	642	838	1741	1480	685	2268
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.8	17.9	11.9	6.5	25.8	2.3
Incr Delay (d2), s/veh	1.3	0.3	1.8	0.0	2.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.7	1.7	13.3	0.4	3.5	3.0
LnGrp Delay(d),s/veh	28.1	18.2	13.7	6.6	28.3	2.5
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	217		919			712
Approach Delay, s/veh	22.7		13.3			9.5
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	14.1	40.8				55.0		11.4
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	8.8	27.5				7.9		5.8
Green Ext Time (p_c), s	0.6	7.9				8.4		0.7

Intersection Summary	
HCM 2010 Ctrl Delay	12.9
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	7	241	48	30	179	9	63	18	53	7	6	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			-2%			0%			0%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		2140			3057			693			326	
Travel Time (s)		41.7			59.6			18.9			8.9	
Confl. Peds. (#/hr)	33		52	52		33	52		52	33		33
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	0%	0%	0%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other

Control Type: Roundabout

Intersection	
Intersection Delay, s/veh	6.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	326	240	147	22
Demand Flow Rate, veh/h	339	249	147	22
Vehicles Circulating, veh/h	49	97	292	308
Vehicles Exiting, veh/h	281	342	96	38
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	52	52	52	33
Ped Cap Adj	0.993	0.993	0.993	0.995
Approach Delay, s/veh	6.7	6.1	6.1	4.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	339	249	147	22
Cap Entry Lane, veh/h	1076	1025	844	830
Entry HV Adj Factor	0.963	0.964	1.000	0.985
Flow Entry, veh/h	326	240	147	22
Cap Entry, veh/h	1028	982	838	814
V/C Ratio	0.317	0.245	0.175	0.027
Control Delay, s/veh	6.7	6.1	6.1	4.7
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	1	15	207	29	48	138	56	1	35	44	79	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35			35				25		
Link Distance (ft)			3057			696				543		
Travel Time (s)			59.6			13.6				14.8		
Confl. Peds. (#/hr)	6	11		10	4		5	4	10		4	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%	4%	2%	2%	2%	2%	5%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield				Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBT	SBR
Lane Configurations		
Volume (vph)	28	9
Ideal Flow (vphpl)	1900	1900
Link Speed (mph)	25	
Link Distance (ft)	1446	
Travel Time (s)	39.4	
Confl. Peds. (#/hr)		11
Peak Hour Factor	0.84	0.84
Heavy Vehicles (%)	5%	5%
Shared Lane Traffic (%)		
Sign Control	Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.0
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	300	288	189	100
Demand Flow Rate, veh/h	315	300	193	106
Vehicles Circulating, veh/h	154	117	337	275
Vehicles Exiting, veh/h	227	413	132	142
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	5	10	11
Ped Cap Adj	0.998	0.999	0.999	0.998
Approach Delay, s/veh	7.4	6.8	7.2	5.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	315	300	193	106
Cap Entry Lane, veh/h	969	1005	807	858
Entry HV Adj Factor	0.951	0.961	0.979	0.947
Flow Entry, veh/h	300	288	189	100
Cap Entry, veh/h	920	966	789	811
V/C Ratio	0.326	0.299	0.240	0.124
Control Delay, s/veh	7.4	6.8	7.2	5.7
LOS	A	A	A	A
95th %tile Queue, veh	1	1	1	0

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	164	33	215	40	35	87	156	1164	23	53	601	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 173.5	
Actuated Cycle Length: 95.8	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

8/3/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	164	33	215	40	35	87	156	1164	23	53	601	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1835	1835	1872	1810	1810	1900	1845	1845	1900
Adj Flow Rate, veh/h	206	0	56	44	38	96	171	1279	25	58	660	53
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	2	2	2	5	5	5	3	3	3
Cap, veh/h	398	0	328	229	61	153	526	1832	36	318	1659	133
Arrive On Green	0.11	0.00	0.11	0.13	0.13	0.12	0.10	0.53	0.52	0.07	0.50	0.49
Sat Flow, veh/h	3514	0	1568	1747	462	1167	1723	3449	67	1757	3287	264
Grp Volume(v), veh/h	206	0	56	44	0	134	171	637	667	58	352	361
Grp Sat Flow(s),veh/h/ln	1757	0	1568	1747	0	1629	1723	1719	1798	1757	1752	1798
Q Serve(g_s), s	4.5	0.0	2.4	1.8	0.0	6.3	3.4	22.3	22.3	1.2	10.0	10.1
Cycle Q Clear(g_c), s	4.5	0.0	2.4	1.8	0.0	6.3	3.4	22.3	22.3	1.2	10.0	10.1
Prop In Lane	1.00		1.00	1.00		0.72	1.00		0.04	1.00		0.15
Lane Grp Cap(c), veh/h	398	0	328	229	0	213	526	913	955	318	884	907
V/C Ratio(X)	0.52	0.00	0.17	0.19	0.00	0.63	0.33	0.70	0.70	0.18	0.40	0.40
Avail Cap(c_a), veh/h	740	0	481	433	0	404	830	1533	1603	565	2214	2272
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.7	0.0	26.2	31.3	0.0	33.6	7.7	14.1	14.1	10.5	12.4	12.4
Incr Delay (d2), s/veh	1.0	0.0	0.2	0.4	0.0	3.0	0.4	1.2	1.1	0.3	0.3	0.3
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	2.2	0.0	1.0	0.9	0.0	3.0	1.7	10.7	11.2	0.6	4.9	5.0
LnGrp Delay(d),s/veh	34.8	0.0	26.4	31.7	0.0	36.6	8.0	15.3	15.3	10.8	12.7	12.8
LnGrp LOS	C		C	C		D	A	B	B	B	B	B
Approach Vol, veh/h		262			178			1475			771	
Approach Delay, s/veh		33.0			35.4			14.4			12.6	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.6	46.4		12.1	10.8	44.2		13.6
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.2	24.3		6.5	5.4	12.1		8.3
Green Ext Time (p_c), s	0.1	16.5		0.7	0.5	18.4		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	17.1
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	851	63	14	591	5	56	0	20	5	1	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	851	63	14	591	5	56	0	20	5	1	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	8	8	8
Mvmt Flow	18	915	68	15	635	5	60	0	22	5	1	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	643	0	0	985	0	0	1669	1660	951	1657	1691	640
Stage 1	-	-	-	-	-	-	987	987	-	670	670	-
Stage 2	-	-	-	-	-	-	682	673	-	987	1021	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.12	6.52	6.22	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.518	4.018	3.318	3.572	4.072	3.372
Pot Cap-1 Maneuver	937	-	-	697	-	-	76	97	315	75	90	465
Stage 1	-	-	-	-	-	-	298	325	-	437	446	-
Stage 2	-	-	-	-	-	-	440	454	-	290	306	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	937	-	-	697	-	-	68	89	314	66	83	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	68	89	-	66	83	-
Stage 1	-	-	-	-	-	-	285	311	-	418	431	-
Stage 2	-	-	-	-	-	-	405	438	-	259	292	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	137	26
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	68	314	937	-	-	697	-	-	199
HCM Lane V/C Ratio	0.886	0.068	0.02	-	-	0.022	-	-	0.14
HCM Control Delay (s)	179.7	17.3	8.9	0	-	10.3	0	-	26
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	4.3	0.2	0.1	-	-	0.1	-	-	0.5

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	1	9	49	16	5	0	40	29	27	0	15	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			440			290			785	
Travel Time (s)		7.4			12.0			7.9			21.4	
Confl. Peds. (#/hr)	3		2				2					3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	12%	12%	12%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	1	9	49	0	16	5	0	0	40	29	27
Peak Hour Factor	0.92	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.92	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	0	1	11	58	0	19	6	0	0	48	35	32
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.1	7.6	7.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	42%	2%	76%	0%
Vol Thru, %	30%	15%	24%	83%
Vol Right, %	28%	83%	0%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	96	59	21	18
LT Vol	40	1	16	0
Through Vol	29	9	5	15
RT Vol	27	49	0	3
Lane Flow Rate	114	70	25	21
Geometry Grp	1	1	1	1
Degree of Util (X)	0.128	0.072	0.03	0.025
Departure Headway (Hd)	4.046	3.693	4.378	4.257
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	882	958	809	835
Service Time	2.086	1.762	2.45	2.315
HCM Lane V/C Ratio	0.129	0.073	0.031	0.025
HCM Control Delay	7.7	7.1	7.6	7.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.2	0.1	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	15	3
Peak Hour Factor	0.92	0.84	0.84	0.84
Heavy Vehicles, %	2	12	12	12
Mvmt Flow	0	0	18	4
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.4
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & NE 120th Way

8/3/2016



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	10	11	84	33	20	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25		25			25
Link Distance (ft)	453		1446			242
Travel Time (s)	12.4		39.4			6.6
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	5%	5%	2%	2%	7%	7%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	1.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	10	11	84	33	20	60
Conflicting Peds, #/hr	10	10	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	86	86	86	86	86	86
Heavy Vehicles, %	5	5	2	2	7	7
Mvmt Flow	12	13	98	38	23	70

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	243	137	0	0	146	0
Stage 1	127	-	-	-	-	-
Stage 2	116	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.17	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.263	-
Pot Cap-1 Maneuver	739	904	-	-	1406	-
Stage 1	891	-	-	-	-	-
Stage 2	902	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	714	889	-	-	1394	-
Mov Cap-2 Maneuver	714	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	879	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	9.7	0	1.9
HCM LOS	A		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	796	1394	-
HCM Lane V/C Ratio	-	-	0.031	0.017	-
HCM Control Delay (s)	-	-	9.7	7.6	0
HCM Lane LOS	-	-	A	A	A
HCM 95th %tile Q(veh)	-	-	0.1	0.1	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

8/3/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	106	214	870	160	250	527
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	3%	3%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 98.7	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

8/3/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	106	214	870	160	250	527
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1835	1835
Adj Flow Rate, veh/h	108	150	888	53	255	538
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	3	3
Cap, veh/h	237	530	1043	887	345	1441
Arrive On Green	0.13	0.13	0.55	0.55	0.20	0.79
Sat Flow, veh/h	1810	1615	1900	1615	1748	1835
Grp Volume(v), veh/h	108	150	888	53	255	538
Grp Sat Flow(s),veh/h/ln	1810	1615	1900	1615	1748	1835
Q Serve(g_s), s	4.3	5.3	30.6	1.2	10.6	6.9
Cycle Q Clear(g_c), s	4.3	5.3	30.6	1.2	10.6	6.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	237	530	1043	887	345	1441
V/C Ratio(X)	0.46	0.28	0.85	0.06	0.74	0.37
Avail Cap(c_a), veh/h	561	819	1521	1293	587	1943
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.1	19.3	14.8	8.1	29.2	2.5
Incr Delay (d2), s/veh	1.4	0.3	3.3	0.0	3.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.2	2.4	16.7	0.5	5.4	3.5
LnGrp Delay(d),s/veh	32.5	19.6	18.0	8.2	32.4	2.7
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	258		941			793
Approach Delay, s/veh	25.0		17.5			12.2
Approach LOS	C		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	18.3	46.0				64.3		13.2
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	12.6	32.6				8.9		7.3
Green Ext Time (p_c), s	0.7	7.9				8.8		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	6	357	68	1	34	190	7	105	14	66	3	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%				-2%			0%			0%
Link Speed (mph)		35				35			25			25
Link Distance (ft)		2140				3057			693			326
Travel Time (s)		41.7				59.6			18.9			8.9
Confl. Peds. (#/hr)	15		12				3	12			3	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Yield				Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	9
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	15
Peak Hour Factor	0.96
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	449	241	193	14
Demand Flow Rate, veh/h	462	241	193	14
Vehicles Circulating, veh/h	41	130	393	343
Vehicles Exiting, veh/h	316	456	110	28
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	34	3	12	15
Ped Cap Adj	0.995	1.000	0.998	0.998
Approach Delay, s/veh	8.1	6.0	7.6	4.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	462	241	193	14
Cap Entry Lane, veh/h	1085	992	763	802
Entry HV Adj Factor	0.972	1.000	1.000	1.000
Flow Entry, veh/h	449	241	193	14
Cap Entry, veh/h	1049	992	761	800
V/C Ratio	0.428	0.243	0.253	0.017
Control Delay, s/veh	8.1	6.0	7.6	4.7
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	19	301	42	54	152	59	40	97	161	45	33	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		3057			696			543			1446	
Travel Time (s)		59.6			13.6			14.8			39.4	
Confl. Peds. (#/hr)	11		2			9	2			9		11
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 (%)	4%	4%	4%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	373	274	307	91
Demand Flow Rate, veh/h	388	278	310	93
Vehicles Circulating, veh/h	139	163	390	257
Vehicles Exiting, veh/h	211	537	137	184
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	9	2	11
Ped Cap Adj	0.998	0.999	1.000	0.998
Approach Delay, s/veh	8.3	6.8	10.0	5.3
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	388	278	310	93
Cap Entry Lane, veh/h	983	960	765	874
Entry HV Adj Factor	0.960	0.987	0.990	0.978
Flow Entry, veh/h	373	274	307	91
Cap Entry, veh/h	943	946	757	854
V/C Ratio	0.395	0.290	0.405	0.107
Control Delay, s/veh	8.3	6.8	10.0	5.3
LOS	A	A	A	A
95th %tile Queue, veh	2	1	2	0

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

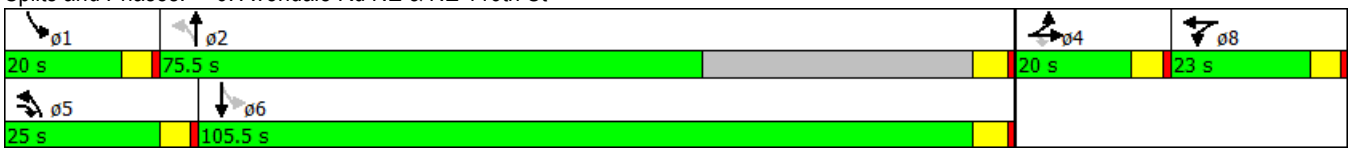
8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	273	49	251	33	25	77	191	1396	25	28	680	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Confl. Peds. (#/hr)			17				4					4
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 (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)	41%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 96.9
Natural Cycle: 110
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

8/3/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	273	49	251	33	25	77	191	1396	25	28	680	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1853	1853	1872	1881	1881	1900	1845	1845	1900
Adj Flow Rate, veh/h	317	0	92	34	26	79	197	1439	26	29	701	60
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
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
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	3	3	3
Cap, veh/h	523	0	376	189	43	132	518	1991	36	261	1663	142
Arrive On Green	0.15	0.00	0.15	0.11	0.11	0.10	0.10	0.55	0.54	0.05	0.51	0.50
Sat Flow, veh/h	3514	0	1514	1765	405	1231	1792	3592	65	1757	3267	279
Grp Volume(v), veh/h	317	0	92	34	0	105	197	715	750	29	376	385
Grp Sat Flow(s),veh/h/ln	1757	0	1514	1765	0	1636	1792	1787	1869	1757	1752	1794
Q Serve(g_s), s	7.6	0.0	4.4	1.6	0.0	5.5	4.1	26.7	26.8	0.7	12.0	12.1
Cycle Q Clear(g_c), s	7.6	0.0	4.4	1.6	0.0	5.5	4.1	26.7	26.8	0.7	12.0	12.1
Prop In Lane	1.00		1.00	1.00		0.75	1.00		0.03	1.00		0.16
Lane Grp Cap(c), veh/h	523	0	376	189	0	175	518	991	1036	261	892	913
V/C Ratio(X)	0.61	0.00	0.24	0.18	0.00	0.60	0.38	0.72	0.72	0.11	0.42	0.42
Avail Cap(c_a), veh/h	665	0	437	393	0	364	784	1432	1498	504	1990	2037
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	27.3	36.5	0.0	38.7	8.5	14.9	14.9	12.0	13.8	13.8
Incr Delay (d2), s/veh	1.1	0.0	0.3	0.5	0.0	3.3	0.5	1.2	1.2	0.2	0.4	0.4
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	3.7	0.0	1.9	0.8	0.0	2.6	2.1	13.5	14.1	0.3	5.8	6.0
LnGrp Delay(d),s/veh	36.9	0.0	27.6	37.0	0.0	41.9	9.0	16.1	16.1	12.2	14.2	14.2
LnGrp LOS	D		C	D		D	A	B	B	B	B	B
Approach Vol, veh/h		409			139			1662			790	
Approach Delay, s/veh		34.8			40.7			15.2			14.1	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	53.3		16.4	11.6	49.2		12.6
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	2.7	28.8		9.6	6.1	14.1		7.5
Green Ext Time (p_c), s	0.0	19.0		0.9	0.6	23.1		0.3

Intersection Summary	
HCM 2010 Ctrl Delay	18.8
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

8/3/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1033	74	6	646	11	50	2	22	3	1	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)			3	3					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 (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	8.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	1033	74	6	646	11	50	2	22	3	1	17
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	31	1065	76	6	666	11	52	2	23	3	1	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	679	0	0	1143	0	0	1862	1859	1108	1854	1891	677
Stage 1	-	-	-	-	-	-	1167	1167	-	686	686	-
Stage 2	-	-	-	-	-	-	695	692	-	1168	1205	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	918	-	-	615	-	-	57	74	258	57	71	456
Stage 1	-	-	-	-	-	-	238	270	-	441	451	-
Stage 2	-	-	-	-	-	-	436	448	-	238	259	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	916	-	-	613	-	-	~ 49	66	257	46	63	454
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 49	66	-	46	63	-
Stage 1	-	-	-	-	-	-	215	244	-	398	443	-
Stage 2	-	-	-	-	-	-	410	440	-	194	234	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	210.6	28.2
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	49	257	916	-	-	613	-	-	177
HCM Lane V/C Ratio	1.094	0.088	0.034	-	-	0.01	-	-	0.122
HCM Control Delay (s)	291	20.4	9.1	0	-	10.9	0	-	28.2
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	4.8	0.3	0.1	-	-	0	-	-	0.4

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

2018 With Scenario 1

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	12	10	115	41	24	0	54	15	14	0	49	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			260			290			785	
Travel Time (s)		7.4			7.1			7.9			21.4	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	8.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	12	10	115	0	41	24	0	0	54	15	14
Peak Hour Factor	0.92	0.67	0.67	0.67	0.92	0.67	0.67	0.67	0.92	0.67	0.67	0.67
Heavy Vehicles, %	2	8	8	8	2	2	2	2	2	6	6	6
Mvmt Flow	0	18	15	172	0	61	36	0	0	81	22	21
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.5	8.6	8.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	65%	9%	63%	0%
Vol Thru, %	18%	7%	37%	79%
Vol Right, %	17%	84%	0%	21%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	83	137	65	62
LT Vol	54	12	41	0
Through Vol	15	10	24	49
RT Vol	14	115	0	13
Lane Flow Rate	124	204	97	93
Geometry Grp	1	1	1	1
Degree of Util (X)	0.166	0.238	0.13	0.12
Departure Headway (Hd)	4.817	4.192	4.806	4.671
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	743	857	745	765
Service Time	2.855	2.221	2.841	2.711
HCM Lane V/C Ratio	0.167	0.238	0.13	0.122
HCM Control Delay	8.8	8.5	8.6	8.4
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.9	0.4	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	49	13
Peak Hour Factor	0.92	0.67	0.67	0.67
Heavy Vehicles, %	2	4	4	4
Mvmt Flow	0	0	73	19
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.4
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	16	26	130	37	0	39	0	179	11	3	172	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				7		7			7	7		
Peak Hour Factor	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	16	26	130	37	0	39	0	179	11	3	172	0
Conflicting Peds, #/hr	0	0	0	7	0	7	0	0	7	7	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	54	54	54	54	54	54	54	54	54	54	54	54
Heavy Vehicles, %	0	0	0	2	2	2	6	6	6	6	6	6
Mvmt Flow	30	48	241	69	0	72	0	331	20	6	319	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	715	689	326	703	679	356	319	0	0	359	0	0
Stage 1	330	330	-	349	349	-	-	-	-	-	-	-
Stage 2	385	359	-	354	330	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	348	371	720	352	374	688	1219	-	-	1178	-	-
Stage 1	687	649	-	667	633	-	-	-	-	-	-	-
Stage 2	642	631	-	663	646	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	308	367	716	207	370	680	1212	-	-	1171	-	-
Mov Cap-2 Maneuver	308	367	-	207	370	-	-	-	-	-	-	-
Stage 1	687	645	-	663	629	-	-	-	-	-	-	-
Stage 2	570	627	-	402	642	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.1	24.6	0	0.1
HCM LOS	B	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1212	-	-	342	716	322	1171	-	-
HCM Lane V/C Ratio	-	-	-	0.227	0.336	0.437	0.005	-	-
HCM Control Delay (s)	0	-	-	18.6	12.6	24.6	8.1	0	-
HCM Lane LOS	A	-	-	C	B	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.9	1.5	2.1	0	-	-

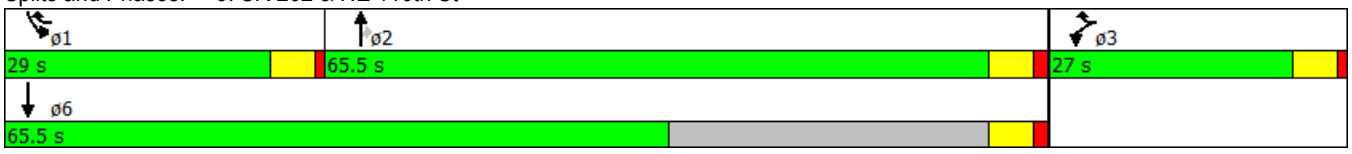
Lanes, Volumes, Timings
3: SR 202 & NE 116th St

9/15/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	314	243	341	63	84	676
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		2193			372
Travel Time (s)	41.7		37.4			6.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	4%	5%	5%	5%	5%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	10.0		25.5	25.5	10.0	25.5
Total Split (s)	27.0		65.5	65.5	29.0	65.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	53.9%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 66.5	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116th St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116th St

9/15/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	314	243	341	63	84	676
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1828	1828	1800	1800
Adj Flow Rate, veh/h	349	137	379	0	93	751
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	5	5
Cap, veh/h	522	654	686	583	205	1009
Arrive On Green	0.30	0.30	0.38	0.00	0.12	0.56
Sat Flow, veh/h	1757	1568	1828	1553	1715	1800
Grp Volume(v), veh/h	349	137	379	0	93	751
Grp Sat Flow(s),veh/h/ln	1757	1568	1828	1553	1715	1800
Q Serve(g_s), s	8.0	2.6	7.5	0.0	2.3	14.4
Cycle Q Clear(g_c), s	8.0	2.6	7.5	0.0	2.3	14.4
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	522	654	686	583	205	1009
V/C Ratio(X)	0.67	0.21	0.55	0.00	0.45	0.74
Avail Cap(c_a), veh/h	923	1011	2480	2108	976	2443
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	8.5	11.2	0.0	18.7	7.6
Incr Delay (d2), s/veh	1.5	0.2	0.7	0.0	1.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.0	1.1	3.8	0.0	1.2	7.2
LnGrp Delay(d),s/veh	15.6	8.7	11.9	0.0	20.3	8.7
LnGrp LOS	B	A	B		C	A
Approach Vol, veh/h	486		379			844
Approach Delay, s/veh	13.6		11.9			10.0
Approach LOS	B		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	8.5	20.6				29.1		16.6
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				60.0		22.0
Max Q Clear Time (g_c+I1), s	4.3	9.5				16.4		10.0
Green Ext Time (p_c), s	0.2	5.7				5.6		1.6

Intersection Summary	
HCM 2010 Ctrl Delay	11.4
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1	4	106	65	151	437	21	67	18	46	49	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			0%			-2%			0%			0%
Link Speed (mph)			35			35			25			25
Link Distance (ft)			2140			3057			693			353
Travel Time (s)			41.7			59.6			18.9			9.6
Confl. Peds. (#/hr)	34	39		50	18		7	50		18	7	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	7%	7%	7%	7%	2%	2%	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	15
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	39
Peak Hour Factor	0.73
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	18.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	240	835	180	118
Demand Flow Rate, veh/h	256	852	184	118
Vehicles Circulating, veh/h	308	125	228	917
Vehicles Exiting, veh/h	727	286	336	60
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	50	18	50	39
Ped Cap Adj	0.993	0.998	0.993	1.000
Approach Delay, s/veh	8.3	25.3	6.2	12.1
Approach LOS	A	D	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	256	852	184	118
Cap Entry Lane, veh/h	830	997	900	452
Entry HV Adj Factor	0.937	0.980	0.981	1.000
Flow Entry, veh/h	240	835	180	118
Cap Entry, veh/h	773	975	876	452
V/C Ratio	0.310	0.857	0.206	0.261
Control Delay, s/veh	8.3	25.3	6.2	12.1
LOS	A	D	A	B
95th %tile Queue, veh	1	11	1	1

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (vph)	1	65	94	34	1	199	267	78	43	25	31	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35				35			25		
Link Distance (ft)			3057				696			543		
Travel Time (s)			59.6				13.6			14.8		
Confl. Peds. (#/hr)	1	1		2		2		1	2		2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	4%	4%	4%	4%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Sign Control			Yield				Yield			Yield		

Intersection Summary

Area Type: Other
Control Type: Roundabout

Lane Group	SBL	SBT	SBR
Lane Configurations			
Volume (vph)	140	166	99
Ideal Flow (vphpl)	1900	1900	1900
Link Speed (mph)		25	
Link Distance (ft)		1446	
Travel Time (s)		39.4	
Confl. Peds. (#/hr)	1		1
Peak Hour Factor	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%
Shared Lane Traffic (%)			
Sign Control		Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	21.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	233	657	119	489
Demand Flow Rate, veh/h	251	684	120	504
Vehicles Circulating, veh/h	632	169	383	640
Vehicles Exiting, veh/h	512	334	500	213
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	2	2	1
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	13.1	16.8	6.4	35.6
Approach LOS	B	C	A	E

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	251	684	120	504
Cap Entry Lane, veh/h	601	954	770	596
Entry HV Adj Factor	0.928	0.961	0.989	0.970
Flow Entry, veh/h	233	657	119	489
Cap Entry, veh/h	557	916	762	578
V/C Ratio	0.418	0.717	0.156	0.846
Control Delay, s/veh	13.1	16.8	6.4	35.6
LOS	B	C	A	E
95th %tile Queue, veh	2	6	1	9

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

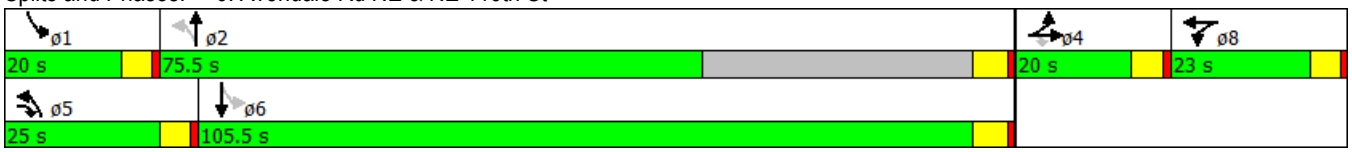
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	42	217	33	31	30	169	423	30	100	1073	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		816			799			1116			800	
Travel Time (s)		15.9			15.6			19.0			13.6	
Confl. Peds. (#/hr)			2				4					4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	15%	15%	15%	4%	4%	4%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	10.0	25.0	25.0		10.0	26.5		10.0	26.5	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 102.1
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	81	42	217	33	31	30	169	423	30	100	1073	216
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1835	1835	1872	1652	1652	1900	1827	1827	1900
Adj Flow Rate, veh/h	63	71	83	34	32	31	172	432	31	102	1095	220
Adj No. of Lanes	1	1	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	5	5	5	2	2	2	15	15	15	4	4	4
Cap, veh/h	185	194	320	148	72	70	350	1652	118	679	1556	311
Arrive On Green	0.11	0.11	0.11	0.08	0.08	0.07	0.10	0.56	0.54	0.09	0.54	0.53
Sat Flow, veh/h	1723	1810	1530	1747	858	831	1573	2971	212	1740	2882	577
Grp Volume(v), veh/h	63	71	83	34	0	63	172	228	235	102	658	657
Grp Sat Flow(s),veh/h/ln	1723	1810	1530	1747	0	1688	1573	1570	1614	1740	1736	1723
Q Serve(g_s), s	2.5	2.7	3.4	1.4	0.0	2.7	3.3	5.6	5.7	1.8	21.1	21.4
Cycle Q Clear(g_c), s	2.5	2.7	3.4	1.4	0.0	2.7	3.3	5.6	5.7	1.8	21.1	21.4
Prop In Lane	1.00		1.00	1.00		0.49	1.00		0.13	1.00		0.33
Lane Grp Cap(c), veh/h	185	194	320	148	0	143	350	873	897	679	937	930
V/C Ratio(X)	0.34	0.37	0.26	0.23	0.00	0.44	0.49	0.26	0.26	0.15	0.70	0.71
Avail Cap(c_a), veh/h	390	410	503	466	0	450	651	1506	1549	925	2360	2342
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.0	31.1	24.8	32.1	0.0	32.9	11.2	8.6	8.7	5.7	12.8	13.0
Incr Delay (d2), s/veh	1.1	1.1	0.4	0.8	0.0	2.1	1.1	0.2	0.2	0.1	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	1.4	1.5	0.7	0.0	1.3	2.0	2.4	2.5	0.8	10.4	10.4
LnGrp Delay(d),s/veh	32.1	32.2	25.2	32.9	0.0	35.0	12.2	8.8	8.9	5.8	13.9	14.2
LnGrp LOS	C	C	C	C		D	B	A	A	A	B	B
Approach Vol, veh/h		217			97			635			1417	
Approach Delay, s/veh		29.5			34.3			9.8			13.5	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	45.2		11.1	10.6	44.0		9.3
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.8	7.7		5.4	5.3	23.4		4.7
Green Ext Time (p_c), s	0.2	14.9		0.5	0.5	15.1		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	14.8
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	346	87	73	1021	7	85	0	27	7	7	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	4%	4%	4%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	41.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	346	87	73	1021	7	85	0	27	7	7	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	6	6	6	3	3	3	4	4	4	5	5	5
Mvmt Flow	15	380	96	80	1122	8	93	0	30	8	8	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1132	0	0	478	0	0	1770	1753	430	1749	1797	1128
Stage 1	-	-	-	-	-	-	461	461	-	1288	1288	-
Stage 2	-	-	-	-	-	-	1309	1292	-	461	509	-
Critical Hdwy	4.16	-	-	4.13	-	-	7.14	6.54	6.24	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Follow-up Hdwy	2.254	-	-	2.227	-	-	3.536	4.036	3.336	3.545	4.045	3.345
Pot Cap-1 Maneuver	603	-	-	1079	-	-	~ 64	84	621	66	79	245
Stage 1	-	-	-	-	-	-	577	562	-	199	231	-
Stage 2	-	-	-	-	-	-	194	231	-	575	533	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	603	-	-	1079	-	-	~ 41	65	620	52	61	245
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 41	65	-	52	61	-
Stage 1	-	-	-	-	-	-	556	542	-	192	184	-
Stage 2	-	-	-	-	-	-	128	184	-	529	514	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.6	$ 606.8	54.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	41	620	603	-	-	1079	-	-	120
HCM Lane V/C Ratio	2.278	0.048	0.026	-	-	0.074	-	-	0.412
HCM Control Delay (s)	$ 796	11.1	11.1	0	-	8.6	0	-	54.6
HCM Lane LOS	F	B	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	10	0.1	0.1	-	-	0.2	-	-	1.8

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
8: Bus & Staff Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	144	8	26	79	0	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	777			151	210	
Travel Time (s)	21.2			4.1	5.7	
Peak Hour Factor	0.57	0.57	0.57	0.57	0.57	0.57
Heavy Vehicles (%)	2%	2%	2%	2%	100%	100%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	144	8	26	79	0	7
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	100	100
Mvmt Flow	253	14	46	139	0	12

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	267	0	490	260
Stage 1	-	-	-	-	260	-
Stage 2	-	-	-	-	230	-
Critical Hdwy	-	-	4.12	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	-	-	2.218	-	4.4	4.2
Pot Cap-1 Maneuver	-	-	1297	-	397	591
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1297	-	382	591
Mov Cap-2 Maneuver	-	-	-	-	382	-
Stage 1	-	-	-	-	602	-
Stage 2	-	-	-	-	600	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	591	-	-	1297	-
HCM Lane V/C Ratio	0.021	-	-	0.035	-
HCM Control Delay (s)	11.2	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.1	-	-	0.1	-

Lanes, Volumes, Timings
9: Enter Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	92	59	21	105	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	151			199	211	
Travel Time (s)	4.1			5.4	5.8	
Peak Hour Factor	0.56	0.56	0.56	0.56	0.56	0.56
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	92	59	21	105	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	56	56	56	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	164	105	38	188	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	270	0	480	217
Stage 1	-	-	-	-	217	-
Stage 2	-	-	-	-	263	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1293	-	545	823
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	781	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1293	-	527	823
Mov Cap-2 Maneuver	-	-	-	-	527	-
Stage 1	-	-	-	-	819	-
Stage 2	-	-	-	-	755	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1293	-
HCM Lane V/C Ratio	-	-	-	0.029	-
HCM Control Delay (s)	0	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Lanes, Volumes, Timings
10: Exit Only Dwy & NE 122nd St

9/15/2016



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	92	0	0	91	35	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	199			270	210	
Travel Time (s)	5.4			7.4	5.7	
Peak Hour Factor	0.57	0.57	0.57	0.57	0.57	0.57
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	3.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	92	0	0	91	35	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	57	57	57	57	57	57
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	161	0	0	160	61	79

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	161	0	321	161
Stage 1	-	-	-	-	161	-
Stage 2	-	-	-	-	160	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1418	-	677	889
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	874	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1418	-	677	889
Mov Cap-2 Maneuver	-	-	-	-	677	-
Stage 1	-	-	-	-	873	-
Stage 2	-	-	-	-	874	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	782	-	-	1418	-
HCM Lane V/C Ratio	0.179	-	-	-	-
HCM Control Delay (s)	10.6	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Lanes, Volumes, Timings
11: 172nd Ave NE & Enter Only

9/15/2016

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	0	151	83	177	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	217			242	290	
Travel Time (s)	5.9			6.6	7.9	
Peak Hour Factor	0.56	0.56	0.56	0.56	0.56	0.56
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	151	83	177	28
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	56	56	56	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	270	148	316	50

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1029	341	366	0	-	0
Stage 1	341	-	-	-	-	-
Stage 2	688	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	259	701	1193	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	499	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	195	701	1193	-	-	-
Mov Cap-2 Maneuver	195	-	-	-	-	-
Stage 1	720	-	-	-	-	-
Stage 2	376	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	5.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1193	-	-	-	-
HCM Lane V/C Ratio	0.226	-	-	-	-
HCM Control Delay (s)	8.9	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.9	-	-	-	-

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	11	15	65	24	13	0	51	20	26	0	20	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			276			290			785	
Travel Time (s)		7.4			7.5			7.9			21.4	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.8
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	11	15	65	0	24	13	0	0	51	20	26
Peak Hour Factor	0.92	0.79	0.79	0.79	0.92	0.79	0.79	0.79	0.92	0.79	0.79	0.79
Heavy Vehicles, %	2	5	5	5	2	2	2	2	2	8	8	8
Mvmt Flow	0	14	19	82	0	30	16	0	0	65	25	33
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.6	7.8	8.1
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	53%	12%	65%	0%
Vol Thru, %	21%	16%	35%	74%
Vol Right, %	27%	71%	0%	26%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	97	91	37	27
LT Vol	51	11	24	0
Through Vol	20	15	13	20
RT Vol	26	65	0	7
Lane Flow Rate	123	115	47	34
Geometry Grp	1	1	1	1
Degree of Util (X)	0.146	0.128	0.059	0.043
Departure Headway (Hd)	4.287	3.997	4.543	4.52
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	824	902	792	795
Service Time	2.382	2	2.548	2.53
HCM Lane V/C Ratio	0.149	0.127	0.059	0.043
HCM Control Delay	8.1	7.6	7.8	7.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.5	0.4	0.2	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	20	7
Peak Hour Factor	0.92	0.79	0.79	0.79
Heavy Vehicles, %	2	17	17	17
Mvmt Flow	0	0	25	9
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.7
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	14	70	10	0	20	0	152	10	16	78	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				3		3			3	3		
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	10%	10%	10%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	14	70	10	0	20	0	152	10	16	78	0
Conflicting Peds, #/hr	0	0	0	3	0	3	0	0	3	3	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	67	67	67	67	67	67	67	67	67	67	67	67
Heavy Vehicles, %	0	0	0	0	0	0	10	10	10	8	8	8
Mvmt Flow	25	21	104	15	0	30	0	227	15	24	116	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	416	409	119	412	401	240	116	0	0	245	0	0
Stage 1	164	164	-	237	237	-	-	-	-	-	-	-
Stage 2	252	245	-	175	164	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.2	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.29	-	-	2.272	-	-
Pot Cap-1 Maneuver	551	535	938	554	541	804	1424	-	-	1287	-	-
Stage 1	843	766	-	771	713	-	-	-	-	-	-	-
Stage 2	757	707	-	832	766	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	521	523	936	468	529	800	1420	-	-	1284	-	-
Mov Cap-2 Maneuver	521	523	-	468	529	-	-	-	-	-	-	-
Stage 1	843	751	-	769	711	-	-	-	-	-	-	-
Stage 2	727	705	-	702	751	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.3	11	0	1.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1420	-	-	522	936	647	1284	-	-
HCM Lane V/C Ratio	-	-	-	0.089	0.112	0.069	0.019	-	-
HCM Control Delay (s)	0	-	-	12.6	9.3	11	7.9	0	-
HCM Lane LOS	A	-	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.4	0.2	0.1	-	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

9/15/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	99	181	801	159	177	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
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 (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 94.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

9/15/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	99	181	801	159	177	478
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1835	1835
Adj Flow Rate, veh/h	108	120	871	56	192	520
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	227	467	1048	891	292	1422
Arrive On Green	0.13	0.13	0.56	0.56	0.17	0.77
Sat Flow, veh/h	1774	1584	1863	1584	1748	1835
Grp Volume(v), veh/h	108	120	871	56	192	520
Grp Sat Flow(s),veh/h/ln	1774	1584	1863	1584	1748	1835
Q Serve(g_s), s	3.8	3.9	25.6	1.1	6.9	5.9
Cycle Q Clear(g_c), s	3.8	3.9	25.6	1.1	6.9	5.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	227	467	1048	891	292	1422
V/C Ratio(X)	0.48	0.26	0.83	0.06	0.66	0.37
Avail Cap(c_a), veh/h	638	835	1732	1472	681	2257
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	17.9	12.0	6.6	26.0	2.4
Incr Delay (d2), s/veh	1.6	0.3	1.8	0.0	2.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	1.7	13.4	0.5	3.5	3.0
LnGrp Delay(d),s/veh	28.6	18.2	13.8	6.6	28.5	2.5
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	228		927			712
Approach Delay, s/veh	23.1		13.4			9.5
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	14.1	41.0				55.2		11.5
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	8.9	27.6				7.9		5.9
Green Ext Time (p_c), s	0.6	7.9				8.4		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	273	48	30	206	18	63	18	53	15	6	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			-2%			0%			0%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		2140			3057			693			326	
Travel Time (s)		41.7			59.6			18.9			8.9	
Confl. Peds. (#/hr)	33		52	52		33	52		52	33		33
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	0%	0%	0%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other

Control Type: Roundabout

Intersection	
Intersection Delay, s/veh	6.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	361	279	147	30
Demand Flow Rate, veh/h	375	290	147	31
Vehicles Circulating, veh/h	58	97	337	338
Vehicles Exiting, veh/h	311	387	96	49
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	52	52	52	33
Ped Cap Adj	0.993	0.993	0.993	0.995
Approach Delay, s/veh	7.2	6.6	6.4	5.1
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	375	290	147	31
Cap Entry Lane, veh/h	1066	1025	807	806
Entry HV Adj Factor	0.963	0.962	1.000	0.957
Flow Entry, veh/h	361	279	147	30
Cap Entry, veh/h	1019	979	801	768
V/C Ratio	0.354	0.285	0.184	0.039
Control Delay, s/veh	7.2	6.6	6.4	5.1
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	1	55	207	29	48	138	81	1	35	52	79	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35			35				25		
Link Distance (ft)			3057			696				543		
Travel Time (s)			59.6			13.6				14.8		
Confl. Peds. (#/hr)	6	11		10	4		5	4	10		4	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%	4%	2%	2%	2%	2%	5%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield				Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBT	SBR
Lane Configurations		
Volume (vph)	37	45
Ideal Flow (vphpl)	1900	1900
Link Speed (mph)	25	
Link Distance (ft)	1446	
Travel Time (s)	39.4	
Confl. Peds. (#/hr)		11
Peak Hour Factor	0.84	0.84
Heavy Vehicles (%)	5%	5%
Shared Lane Traffic (%)		
Sign Control	Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	347	317	199	175
Demand Flow Rate, veh/h	364	330	203	184
Vehicles Circulating, veh/h	187	176	408	275
Vehicles Exiting, veh/h	272	435	143	231
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	5	10	11
Ped Cap Adj	0.998	0.999	0.999	0.998
Approach Delay, s/veh	8.5	7.8	8.1	6.7
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	364	330	203	184
Cap Entry Lane, veh/h	937	948	751	858
Entry HV Adj Factor	0.952	0.962	0.979	0.950
Flow Entry, veh/h	347	317	199	175
Cap Entry, veh/h	891	911	735	814
V/C Ratio	0.389	0.348	0.271	0.215
Control Delay, s/veh	8.5	7.8	8.1	6.7
LOS	A	A	A	A
95th %tile Queue, veh	2	2	1	1

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	171	33	222	40	35	87	173	1164	23	53	601	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Shared Lane Traffic (%)	41%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 173.5	
Actuated Cycle Length: 96.2	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	171	33	222	40	35	87	173	1164	23	53	601	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1835	1835	1872	1810	1810	1900	1845	1845	1900
Adj Flow Rate, veh/h	214	0	59	44	38	96	190	1279	25	58	660	53
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	2	2	2	5	5	5	3	3	3
Cap, veh/h	406	0	341	229	60	153	529	1829	36	316	1636	131
Arrive On Green	0.12	0.00	0.12	0.13	0.13	0.12	0.10	0.53	0.52	0.07	0.50	0.49
Sat Flow, veh/h	3514	0	1568	1747	462	1167	1723	3449	67	1757	3287	264
Grp Volume(v), veh/h	214	0	59	44	0	134	190	637	667	58	352	361
Grp Sat Flow(s),veh/h/ln	1757	0	1568	1747	0	1629	1723	1719	1798	1757	1752	1798
Q Serve(g_s), s	4.7	0.0	2.5	1.8	0.0	6.3	3.8	22.5	22.5	1.2	10.2	10.3
Cycle Q Clear(g_c), s	4.7	0.0	2.5	1.8	0.0	6.3	3.8	22.5	22.5	1.2	10.2	10.3
Prop In Lane	1.00		1.00	1.00		0.72	1.00		0.04	1.00		0.15
Lane Grp Cap(c), veh/h	406	0	341	229	0	213	529	911	953	316	872	895
V/C Ratio(X)	0.53	0.00	0.17	0.19	0.00	0.63	0.36	0.70	0.70	0.18	0.40	0.40
Avail Cap(c_a), veh/h	736	0	488	431	0	401	821	1525	1595	562	2203	2260
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.8	0.0	25.8	31.4	0.0	33.8	7.8	14.2	14.3	10.7	12.8	12.9
Incr Delay (d2), s/veh	1.1	0.0	0.2	0.4	0.0	3.0	0.4	1.2	1.1	0.3	0.4	0.4
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	2.3	0.0	1.1	0.9	0.0	3.0	1.8	10.9	11.4	0.6	5.0	5.1
LnGrp Delay(d),s/veh	34.9	0.0	26.1	31.9	0.0	36.8	8.2	15.4	15.4	11.0	13.2	13.2
LnGrp LOS	C		C	C		D	A	B	B	B	B	B
Approach Vol, veh/h		273			178			1494			771	
Approach Delay, s/veh		33.0			35.6			14.5			13.0	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.6	46.5		12.4	11.3	43.9		13.6
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.2	24.5		6.7	5.8	12.3		8.3
Green Ext Time (p_c), s	0.1	16.5		0.7	0.5	18.4		0.4

Intersection Summary	
HCM 2010 Ctrl Delay	17.3
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.
User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	851	72	19	591	5	56	4	35	5	4	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	851	72	19	591	5	56	4	35	5	4	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	8	8	8
Mvmt Flow	18	915	77	20	635	5	60	4	38	5	4	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	643	0	0	994	0	0	1686	1676	956	1675	1712	640
Stage 1	-	-	-	-	-	-	992	992	-	681	681	-
Stage 2	-	-	-	-	-	-	694	684	-	994	1031	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.12	6.52	6.22	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.518	4.018	3.318	3.572	4.072	3.372
Pot Cap-1 Maneuver	937	-	-	692	-	-	74	95	313	73	88	465
Stage 1	-	-	-	-	-	-	296	324	-	431	441	-
Stage 2	-	-	-	-	-	-	433	449	-	288	303	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	937	-	-	692	-	-	63	86	312	58	80	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	63	86	-	58	80	-
Stage 1	-	-	-	-	-	-	283	309	-	411	420	-
Stage 2	-	-	-	-	-	-	390	428	-	239	289	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	147.4	32.4
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	64	312	937	-	-	692	-	-	162
HCM Lane V/C Ratio	1.008	0.121	0.02	-	-	0.03	-	-	0.192
HCM Control Delay (s)	222.8	18.1	8.9	0	-	10.4	0	-	32.4
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	5	0.4	0.1	-	-	0.1	-	-	0.7

Lanes, Volumes, Timings
8: Bus & Staff Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	81	1	6	81	8	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	777			151	210	
Travel Time (s)	21.2			4.1	5.7	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	2%	21%	21%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	81	1	6	81	8	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	2	2	2	21	21
Mvmt Flow	116	1	9	116	11	37

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	117	0	249	116
Stage 1	-	-	-	-	116	-
Stage 2	-	-	-	-	133	-
Critical Hdwy	-	-	4.12	-	6.61	6.41
Critical Hdwy Stg 1	-	-	-	-	5.61	-
Critical Hdwy Stg 2	-	-	-	-	5.61	-
Follow-up Hdwy	-	-	2.218	-	3.689	3.489
Pot Cap-1 Maneuver	-	-	1471	-	700	887
Stage 1	-	-	-	-	864	-
Stage 2	-	-	-	-	848	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1471	-	695	887
Mov Cap-2 Maneuver	-	-	-	-	695	-
Stage 1	-	-	-	-	864	-
Stage 2	-	-	-	-	842	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.5	9.6
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	833	-	-	1471	-
HCM Lane V/C Ratio	0.058	-	-	0.006	-
HCM Control Delay (s)	9.6	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lanes, Volumes, Timings
9: Enter Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	77	30	18	87	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	151			199	211	
Travel Time (s)	4.1			5.4	5.8	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	77	30	18	87	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	112	43	26	126	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	155	0	311	133
Stage 1	-	-	-	-	133	-
Stage 2	-	-	-	-	178	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1425	-	681	916
Stage 1	-	-	-	-	893	-
Stage 2	-	-	-	-	853	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1425	-	667	916
Mov Cap-2 Maneuver	-	-	-	-	667	-
Stage 1	-	-	-	-	893	-
Stage 2	-	-	-	-	836	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.3	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1425	-
HCM Lane V/C Ratio	-	-	-	0.018	-
HCM Control Delay (s)	0	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Lanes, Volumes, Timings
10: Exit Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	77	0	0	71	34	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	199			270	210	
Travel Time (s)	5.4			7.4	5.7	
Peak Hour Factor	0.70	0.70	0.70	0.70	0.70	0.70
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	77	0	0	71	34	14
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	70	70	70	70	70	70
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	110	0	0	101	49	20

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	110	0	211	110
Stage 1	-	-	-	-	110	-
Stage 2	-	-	-	-	101	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1480	-	782	949
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	928	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1480	-	782	949
Mov Cap-2 Maneuver	-	-	-	-	782	-
Stage 1	-	-	-	-	920	-
Stage 2	-	-	-	-	928	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	824	-	-	1480	-
HCM Lane V/C Ratio	0.083	-	-	-	-
HCM Control Delay (s)	9.8	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings
11: 172nd Ave NE & Enter Only Dwy

9/15/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	0	93	97	94	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	217			242	290	
Travel Time (s)	5.9			6.6	7.9	
Peak Hour Factor	0.68	0.68	0.68	0.68	0.68	0.68
Heavy Vehicles (%)	0%	0%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	93	97	94	15
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	68	68	68	68	68	68
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	0	0	137	143	138	22

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	565	149	160	0	-	0
Stage 1	149	-	-	-	-	-
Stage 2	416	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	490	903	1419	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	670	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	439	903	1419	-	-	-
Mov Cap-2 Maneuver	439	-	-	-	-	-
Stage 1	884	-	-	-	-	-
Stage 2	600	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	3.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1419	-	-	-	-
HCM Lane V/C Ratio	0.096	-	-	-	-
HCM Control Delay (s)	7.8	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.3	-	-	-	-

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	1	9	63	21	5	0	56	33	34	0	18	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			302			290			785	
Travel Time (s)		7.4			8.2			7.9			21.4	
Confl. Peds. (#/hr)	3		2				2					3
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	12%	12%	12%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	1	9	63	0	21	5	0	0	56	33	34
Peak Hour Factor	0.92	0.86	0.86	0.86	0.92	0.86	0.86	0.86	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	0	1	10	73	0	24	6	0	0	65	38	40
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.2	7.7	8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	46%	1%	81%	0%
Vol Thru, %	27%	12%	19%	86%
Vol Right, %	28%	86%	0%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	123	73	26	21
LT Vol	56	1	21	0
Through Vol	33	9	5	18
RT Vol	34	63	0	3
Lane Flow Rate	143	85	30	24
Geometry Grp	1	1	1	1
Degree of Util (X)	0.163	0.088	0.037	0.029
Departure Headway (Hd)	4.094	3.732	4.454	4.329
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	871	943	792	817
Service Time	2.145	1.824	2.55	2.407
HCM Lane V/C Ratio	0.164	0.09	0.038	0.029
HCM Control Delay	8	7.2	7.7	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.3	0.1	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	18	3
Peak Hour Factor	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	12	12	12
Mvmt Flow	0	0	21	3
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.5
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	27	6	35	10	0	15	0	114	33	20	64	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				10		10			10	10		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	7%	7%	7%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	27	6	35	10	0	15	0	114	33	20	64	0
Conflicting Peds, #/hr	0	0	0	10	0	10	0	0	10	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	0	0	0	5	5	5	2	2	2	7	7	7
Mvmt Flow	29	6	38	11	0	16	0	123	35	22	69	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	270	280	79	265	262	160	69	0	0	168	0	0
Stage 1	112	112	-	150	150	-	-	-	-	-	-	-
Stage 2	158	168	-	115	112	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.55	6.25	4.12	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4.045	3.345	2.218	-	-	2.263	-	-
Pot Cap-1 Maneuver	687	632	987	682	638	877	1532	-	-	1380	-	-
Stage 1	898	807	-	845	767	-	-	-	-	-	-	-
Stage 2	849	763	-	883	797	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	660	616	979	631	622	862	1519	-	-	1369	-	-
Mov Cap-2 Maneuver	660	616	-	631	622	-	-	-	-	-	-	-
Stage 1	898	793	-	838	761	-	-	-	-	-	-	-
Stage 2	826	757	-	821	783	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.8	10	0	1.8
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1519	-	-	652	979	752	1369	-	-
HCM Lane V/C Ratio	-	-	-	0.054	0.038	0.036	0.016	-	-
HCM Control Delay (s)	0	-	-	10.8	8.8	10	7.7	0	-
HCM Lane LOS	A	-	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.1	0	-	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

9/15/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	110	214	870	165	250	527
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	3%	3%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 99.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

9/15/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	110	214	870	165	250	527
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1835	1835
Adj Flow Rate, veh/h	112	150	888	54	255	538
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	3	3
Cap, veh/h	237	530	1043	887	345	1441
Arrive On Green	0.13	0.13	0.55	0.55	0.20	0.78
Sat Flow, veh/h	1810	1615	1900	1615	1748	1835
Grp Volume(v), veh/h	112	150	888	54	255	538
Grp Sat Flow(s),veh/h/ln	1810	1615	1900	1615	1748	1835
Q Serve(g_s), s	4.4	5.3	30.7	1.2	10.6	6.9
Cycle Q Clear(g_c), s	4.4	5.3	30.7	1.2	10.6	6.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	237	530	1043	887	345	1441
V/C Ratio(X)	0.47	0.28	0.85	0.06	0.74	0.37
Avail Cap(c_a), veh/h	560	818	1520	1292	586	1942
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	19.3	14.8	8.2	29.3	2.5
Incr Delay (d2), s/veh	1.5	0.3	3.3	0.0	3.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	2.4	16.7	0.5	5.4	3.5
LnGrp Delay(d),s/veh	32.6	19.6	18.1	8.2	32.4	2.7
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	262		942			793
Approach Delay, s/veh	25.2		17.5			12.2
Approach LOS	C		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	18.3	46.1				64.3		13.2
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	12.6	32.7				8.9		7.3
Green Ext Time (p_c), s	0.7	7.9				8.8		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	6	367	68	1	34	202	11	105	14	66	6	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%				-2%			0%			0%
Link Speed (mph)		35				35			25			25
Link Distance (ft)		2140				3057			693			326
Travel Time (s)		41.7				59.6			18.9			8.9
Confl. Peds. (#/hr)	15		12				3	12			3	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Yield				Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	9
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	15
Peak Hour Factor	0.96
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	459	257	193	17
Demand Flow Rate, veh/h	472	257	193	17
Vehicles Circulating, veh/h	44	130	406	355
Vehicles Exiting, veh/h	328	469	110	32
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	34	3	12	15
Ped Cap Adj	0.995	1.000	0.998	0.998
Approach Delay, s/veh	8.3	6.2	7.7	4.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	472	257	193	17
Cap Entry Lane, veh/h	1081	992	753	792
Entry HV Adj Factor	0.972	1.000	1.000	1.000
Flow Entry, veh/h	459	257	193	17
Cap Entry, veh/h	1046	992	752	791
V/C Ratio	0.439	0.259	0.257	0.022
Control Delay, s/veh	8.3	6.2	7.7	4.8
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (vph)	32	301	42	54	152	67	40	100	161	52	37	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		3057			696			543			1446	
Travel Time (s)		59.6			13.6			14.8			39.4	
Confl. Peds. (#/hr)	11		2			9	2			9		11
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 (%)	4%	4%	4%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	386	282	310	120
Demand Flow Rate, veh/h	401	286	313	124
Vehicles Circulating, veh/h	152	179	412	257
Vehicles Exiting, veh/h	229	546	141	208
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	9	2	11
Ped Cap Adj	0.998	0.999	1.000	0.998
Approach Delay, s/veh	8.6	7.1	10.4	5.7
Approach LOS	A	A	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	401	286	313	124
Cap Entry Lane, veh/h	971	945	748	874
Entry HV Adj Factor	0.962	0.988	0.990	0.967
Flow Entry, veh/h	386	282	310	120
Cap Entry, veh/h	932	932	741	843
V/C Ratio	0.414	0.303	0.418	0.142
Control Delay, s/veh	8.6	7.1	10.4	5.7
LOS	A	A	B	A
95th %tile Queue, veh	2	1	2	0

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

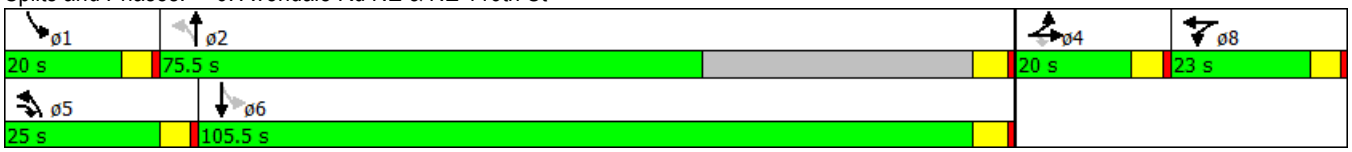
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	276	49	254	33	25	77	196	1396	25	28	680	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Confl. Peds. (#/hr)			17				4					4
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 (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)	41%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 96.9
Natural Cycle: 110
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	276	49	254	33	25	77	196	1396	25	28	680	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1853	1853	1872	1881	1881	1900	1845	1845	1900
Adj Flow Rate, veh/h	321	0	95	34	26	79	202	1439	26	29	701	60
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
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
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	3	3	3
Cap, veh/h	525	0	380	188	43	131	519	1990	36	260	1657	142
Arrive On Green	0.15	0.00	0.15	0.11	0.11	0.10	0.10	0.55	0.54	0.05	0.51	0.50
Sat Flow, veh/h	3514	0	1514	1765	405	1231	1792	3592	65	1757	3267	279
Grp Volume(v), veh/h	321	0	95	34	0	105	202	715	750	29	376	385
Grp Sat Flow(s),veh/h/ln	1757	0	1514	1765	0	1636	1792	1787	1869	1757	1752	1794
Q Serve(g_s), s	7.7	0.0	4.5	1.6	0.0	5.5	4.3	26.8	26.9	0.7	12.1	12.2
Cycle Q Clear(g_c), s	7.7	0.0	4.5	1.6	0.0	5.5	4.3	26.8	26.9	0.7	12.1	12.2
Prop In Lane	1.00		1.00	1.00		0.75	1.00		0.03	1.00		0.16
Lane Grp Cap(c), veh/h	525	0	380	188	0	175	519	990	1036	260	889	910
V/C Ratio(X)	0.61	0.00	0.25	0.18	0.00	0.60	0.39	0.72	0.72	0.11	0.42	0.42
Avail Cap(c_a), veh/h	664	0	439	392	0	363	782	1430	1496	503	1986	2033
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	27.2	36.6	0.0	38.7	8.6	14.9	15.0	12.0	13.9	14.0
Incr Delay (d2), s/veh	1.2	0.0	0.3	0.5	0.0	3.3	0.5	1.2	1.2	0.2	0.4	0.4
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	3.8	0.0	1.9	0.8	0.0	2.7	2.1	13.5	14.1	0.3	5.9	6.1
LnGrp Delay(d),s/veh	37.0	0.0	27.6	37.1	0.0	42.0	9.1	16.2	16.1	12.2	14.3	14.4
LnGrp LOS	D		C	D		D	A	B	B	B	B	B
Approach Vol, veh/h		416			139			1667			790	
Approach Delay, s/veh		34.8			40.8			15.3			14.3	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	53.4		16.5	11.8	49.1		12.6
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	2.7	28.9		9.7	6.3	14.2		7.5
Green Ext Time (p_c), s	0.0	19.0		0.9	0.6	23.1		0.3

Intersection Summary		
HCM 2010 Ctrl Delay	18.9	
HCM 2010 LOS	B	

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1033	76	8	646	11	50	3	28	3	2	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)			3	3					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 (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	1033	76	8	646	11	50	3	28	3	2	17
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	31	1065	78	8	666	11	52	3	29	3	2	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	679	0	0	1145	0	0	1868	1864	1109	1860	1897	677
Stage 1	-	-	-	-	-	-	1168	1168	-	690	690	-
Stage 2	-	-	-	-	-	-	700	696	-	1170	1207	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	918	-	-	614	-	-	56	74	257	57	70	456
Stage 1	-	-	-	-	-	-	238	270	-	439	449	-
Stage 2	-	-	-	-	-	-	433	446	-	237	259	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	916	-	-	612	-	-	~ 48	65	256	44	62	454
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 48	65	-	44	62	-
Stage 1	-	-	-	-	-	-	215	244	-	397	439	-
Stage 2	-	-	-	-	-	-	405	436	-	187	234	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	202.2	31.2
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	49	256	916	-	-	612	-	-	160
HCM Lane V/C Ratio	1.115	0.113	0.034	-	-	0.013	-	-	0.142
HCM Control Delay (s)	298.1	20.8	9.1	0	-	11	0	-	31.2
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	4.9	0.4	0.1	-	-	0	-	-	0.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
8: Bus & Staff Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	69	0	0	64	2	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	777			151	210	
Travel Time (s)	21.2			4.1	5.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	69	0	0	64	2	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	78	0	0	72	2	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	150	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1520	-	847	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	847	988
Mov Cap-2 Maneuver	-	-	-	-	847	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	956	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	936	-	-	1520	-
HCM Lane V/C Ratio	0.007	-	-	-	-
HCM Control Delay (s)	8.9	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings
9: Enter Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	73	0	0	64	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	151			199	211	
Travel Time (s)	4.1			5.4	5.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	73	0	0	64	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	78	0	0	69	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	147	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	69	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1520	-	850	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	850	988
Mov Cap-2 Maneuver	-	-	-	-	850	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1520	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Lanes, Volumes, Timings
10: Exit Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	73	0	0	64	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	199			270	210	
Travel Time (s)	5.4			7.4	5.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	73	0	0	64	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	78	0	0	69	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	147	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	69	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1520	-	850	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	850	988
Mov Cap-2 Maneuver	-	-	-	-	850	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1520	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Lanes, Volumes, Timings
11: 172nd Ave NE & Enter Only Dwy

9/15/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	0	34	123	84	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	217			242	290	
Travel Time (s)	5.9			6.6	7.9	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	0%	0%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	34	123	84	18
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	0	0	37	132	90	19

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	305	100	110	0	-	0
Stage 1	100	-	-	-	-	-
Stage 2	205	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	691	961	1480	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	834	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	672	961	1480	-	-	-
Mov Cap-2 Maneuver	672	-	-	-	-	-
Stage 1	929	-	-	-	-	-
Stage 2	811	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	1.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	-	-	-
HCM Lane V/C Ratio	0.025	-	-	-	-
HCM Control Delay (s)	7.5	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-

2018 With Scenario 2

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	13	11	109	35	18	0	51	17	16	0	50	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			260			290			785	
Travel Time (s)		7.4			7.1			7.9			21.4	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	13	11	109	0	35	18	0	0	51	17	16
Peak Hour Factor	0.92	0.69	0.69	0.69	0.92	0.69	0.69	0.69	0.92	0.69	0.69	0.69
Heavy Vehicles, %	2	8	8	8	2	2	2	2	2	6	6	6
Mvmt Flow	0	19	16	158	0	51	26	0	0	74	25	23
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.4	8.4	8.7
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	61%	10%	66%	0%
Vol Thru, %	20%	8%	34%	78%
Vol Right, %	19%	82%	0%	22%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	84	133	53	64
LT Vol	51	13	35	0
Through Vol	17	11	18	50
RT Vol	16	109	0	14
Lane Flow Rate	122	193	77	93
Geometry Grp	1	1	1	1
Degree of Util (X)	0.16	0.223	0.102	0.118
Departure Headway (Hd)	4.719	4.168	4.785	4.586
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	760	862	749	781
Service Time	2.749	2.193	2.816	2.617
HCM Lane V/C Ratio	0.161	0.224	0.103	0.119
HCM Control Delay	8.7	8.4	8.4	8.2
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.9	0.3	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	50	14
Peak Hour Factor	0.92	0.69	0.69	0.69
Heavy Vehicles, %	2	4	4	4
Mvmt Flow	0	0	72	20
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.2
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	16	188	37	0	40	0	222	11	3	164	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				7		7			7	7		
Peak Hour Factor	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	21	16	188	37	0	40	0	222	11	3	164	0
Conflicting Peds, #/hr	0	0	0	7	0	7	0	0	7	7	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	52	52	52	52	52	52	52	52	52	52	52	52
Heavy Vehicles, %	0	0	0	2	2	2	6	6	6	6	6	6
Mvmt Flow	40	31	362	71	0	77	0	427	21	6	315	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	810	782	322	787	772	452	315	0	0	455	0	0
Stage 1	327	327	-	445	445	-	-	-	-	-	-	-
Stage 2	483	455	-	342	327	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	301	328	724	309	330	608	1223	-	-	1085	-	-
Stage 1	690	651	-	592	575	-	-	-	-	-	-	-
Stage 2	569	572	-	673	648	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	260	324	720	140	326	601	1216	-	-	1079	-	-
Mov Cap-2 Maneuver	260	324	-	140	326	-	-	-	-	-	-	-
Stage 1	690	646	-	589	572	-	-	-	-	-	-	-
Stage 2	493	569	-	315	643	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.1	44	0	0.2
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1216	-	-	284	720	233	1079	-	-
HCM Lane V/C Ratio	-	-	-	0.251	0.502	0.636	0.005	-	-
HCM Control Delay (s)	0	-	-	21.9	14.9	44	8.4	0	-
HCM Lane LOS	A	-	-	C	B	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	2.8	3.8	0	-	-

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

10/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	16	188	27	0	40	0	222	11	3	164	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				7		7			7	7		
Peak Hour Factor	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

10/28/2016

Intersection	
Int Delay, s/veh	8.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	21	16	188	27	0	40	0	222	11	3	164	0
Conflicting Peds, #/hr	0	0	0	7	0	7	0	0	7	7	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	52	52	52	52	52	52	52	52	52	52	52	52
Heavy Vehicles, %	0	0	0	2	2	2	6	6	6	6	6	6
Mvmt Flow	40	31	362	52	0	77	0	427	21	6	315	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	810	782	322	787	772	452	315	0	0	455	0	0
Stage 1	327	327	-	445	445	-	-	-	-	-	-	-
Stage 2	483	455	-	342	327	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	301	328	724	309	330	608	1223	-	-	1085	-	-
Stage 1	690	651	-	592	575	-	-	-	-	-	-	-
Stage 2	569	572	-	673	648	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	260	324	720	140	326	601	1216	-	-	1079	-	-
Mov Cap-2 Maneuver	260	324	-	140	326	-	-	-	-	-	-	-
Stage 1	690	646	-	589	572	-	-	-	-	-	-	-
Stage 2	493	569	-	315	643	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.1	32.1	0	0.2
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1216	-	-	284	720	258	1079	-	-
HCM Lane V/C Ratio	-	-	-	0.251	0.502	0.499	0.005	-	-
HCM Control Delay (s)	0	-	-	21.9	14.9	32.1	8.4	0	-
HCM Lane LOS	A	-	-	C	B	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	2.8	2.6	0	-	-

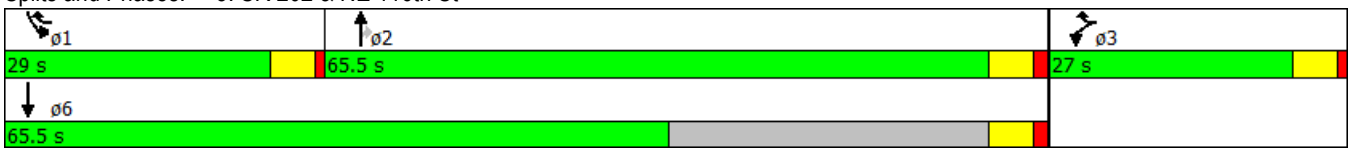
Lanes, Volumes, Timings
3: SR 202 & NE 116th St

9/15/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	319	246	341	63	84	676
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		2193			372
Travel Time (s)	41.7		37.4			6.3
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	4%	5%	5%	5%	5%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	10.0		25.5	25.5	10.0	25.5
Total Split (s)	27.0		65.5	65.5	29.0	65.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	53.9%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 66.5	
Natural Cycle: 55	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116th St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116th St

9/15/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	319	246	341	63	84	676
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1828	1828	1800	1800
Adj Flow Rate, veh/h	354	139	379	0	93	751
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	4	4	5	5	5	5
Cap, veh/h	526	657	684	582	204	1006
Arrive On Green	0.30	0.30	0.37	0.00	0.12	0.56
Sat Flow, veh/h	1757	1568	1828	1553	1715	1800
Grp Volume(v), veh/h	354	139	379	0	93	751
Grp Sat Flow(s),veh/h/ln	1757	1568	1828	1553	1715	1800
Q Serve(g_s), s	8.1	2.6	7.5	0.0	2.3	14.5
Cycle Q Clear(g_c), s	8.1	2.6	7.5	0.0	2.3	14.5
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	526	657	684	582	204	1006
V/C Ratio(X)	0.67	0.21	0.55	0.00	0.46	0.75
Avail Cap(c_a), veh/h	918	1007	2467	2097	971	2431
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	14.1	8.5	11.3	0.0	18.8	7.7
Incr Delay (d2), s/veh	1.5	0.2	0.7	0.0	1.6	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.2	1.1	3.9	0.0	1.2	7.4
LnGrp Delay(d),s/veh	15.6	8.7	12.0	0.0	20.4	8.8
LnGrp LOS	B	A	B		C	A
Approach Vol, veh/h	493		379			844
Approach Delay, s/veh	13.7		12.0			10.1
Approach LOS	B		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	8.5	20.7				29.2		16.8
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				60.0		22.0
Max Q Clear Time (g_c+I1), s	4.3	9.5				16.5		10.1
Green Ext Time (p_c), s	0.2	5.7				5.6		1.7

Intersection Summary	
HCM 2010 Ctrl Delay	11.5
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	1	4	118	65	151	463	24	67	18	56	54	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)			0%			-2%			0%			0%
Link Speed (mph)			35			35			25			25
Link Distance (ft)			2140			3057			693			353
Travel Time (s)			41.7			59.6			18.9			9.6
Confl. Peds. (#/hr)	34	39		50	18		7	50		18	7	
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	7%	7%	7%	7%	2%	2%	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	15
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	39
Peak Hour Factor	0.73
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	21.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	257	874	194	125
Demand Flow Rate, veh/h	274	892	199	125
Vehicles Circulating, veh/h	315	125	253	953
Vehicles Exiting, veh/h	763	326	336	64
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	50	18	50	39
Ped Cap Adj	0.993	0.998	0.993	1.000
Approach Delay, s/veh	8.7	30.0	6.6	13.0
Approach LOS	A	D	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	274	892	199	125
Cap Entry Lane, veh/h	825	997	877	436
Entry HV Adj Factor	0.937	0.980	0.977	1.000
Flow Entry, veh/h	257	874	194	125
Cap Entry, veh/h	767	975	852	436
V/C Ratio	0.335	0.897	0.228	0.287
Control Delay, s/veh	8.7	30.0	6.6	13.0
LOS	A	D	A	B
95th %tile Queue, veh	1	13	1	1

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (vph)	1	92	94	34	1	199	267	65	43	76	31	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35				35			25		
Link Distance (ft)			3057				696			543		
Travel Time (s)			59.6				13.6			14.8		
Confl. Peds. (#/hr)	1	1		2		2		1	2		2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	4%	4%	4%	4%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Sign Control			Yield				Yield			Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBL	SBT	SBR
Lane Configurations			
Volume (vph)	123	202	128
Ideal Flow (vphpl)	1900	1900	1900
Link Speed (mph)		25	
Link Distance (ft)		1446	
Travel Time (s)		39.4	
Confl. Peds. (#/hr)	1		1
Peak Hour Factor	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%
Shared Lane Traffic (%)			
Sign Control		Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	28.7
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	266	641	181	546
Demand Flow Rate, veh/h	287	667	183	562
Vehicles Circulating, veh/h	654	268	397	640
Vehicles Exiting, veh/h	548	312	544	295
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	2	2	1
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	15.2	21.2	7.5	51.2
Approach LOS	C	C	A	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	287	667	183	562
Cap Entry Lane, veh/h	588	864	760	596
Entry HV Adj Factor	0.926	0.961	0.990	0.971
Flow Entry, veh/h	266	641	181	546
Cap Entry, veh/h	544	830	752	578
V/C Ratio	0.489	0.772	0.241	0.943
Control Delay, s/veh	15.2	21.2	7.5	51.2
LOS	C	C	A	F
95th %tile Queue, veh	3	8	1	12

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

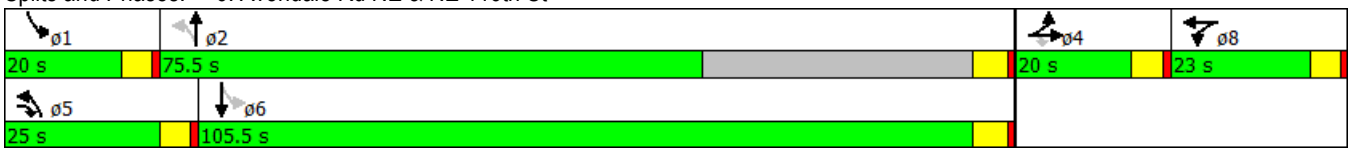
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	69	42	225	33	31	30	169	423	30	100	1073	201
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		816			799			1116			800	
Travel Time (s)		15.9			15.6			19.0			13.6	
Confl. Peds. (#/hr)			2				4					4
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	15%	15%	15%	4%	4%	4%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	10.0	25.0	25.0		10.0	26.5		10.0	26.5	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 97.5
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	69	42	225	33	31	30	169	423	30	100	1073	201
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1810	1810	1810	1835	1835	1872	1652	1652	1900	1827	1827	1900
Adj Flow Rate, veh/h	56	62	89	34	32	31	172	432	31	102	1095	205
Adj No. of Lanes	1	1	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	5	5	5	2	2	2	15	15	15	4	4	4
Cap, veh/h	190	200	326	148	73	71	352	1637	117	676	1561	291
Arrive On Green	0.11	0.11	0.11	0.08	0.08	0.07	0.10	0.55	0.54	0.09	0.53	0.52
Sat Flow, veh/h	1723	1810	1530	1747	858	831	1573	2971	212	1740	2919	545
Grp Volume(v), veh/h	56	62	89	34	0	63	172	228	235	102	649	651
Grp Sat Flow(s),veh/h/ln	1723	1810	1530	1747	0	1688	1573	1570	1614	1740	1736	1728
Q Serve(g_s), s	2.2	2.4	3.6	1.4	0.0	2.7	3.3	5.7	5.7	1.8	20.7	21.0
Cycle Q Clear(g_c), s	2.2	2.4	3.6	1.4	0.0	2.7	3.3	5.7	5.7	1.8	20.7	21.0
Prop In Lane	1.00		1.00	1.00		0.49	1.00		0.13	1.00		0.32
Lane Grp Cap(c), veh/h	190	200	326	148	0	143	352	865	889	676	928	924
V/C Ratio(X)	0.29	0.31	0.27	0.23	0.00	0.44	0.49	0.26	0.26	0.15	0.70	0.70
Avail Cap(c_a), veh/h	393	413	506	469	0	453	656	1517	1559	923	2376	2366
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.5	30.5	24.5	31.8	0.0	32.6	11.0	8.8	8.8	5.9	12.9	13.1
Incr Delay (d2), s/veh	0.9	0.9	0.4	0.8	0.0	2.1	1.1	0.2	0.2	0.1	1.2	1.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	1.2	1.6	0.7	0.0	1.3	1.9	2.5	2.6	0.8	10.0	10.3
LnGrp Delay(d),s/veh	31.3	31.4	25.0	32.6	0.0	34.8	12.1	9.0	9.0	6.0	14.1	14.3
LnGrp LOS	C	C	C	C		C	B	A	A	A	B	B
Approach Vol, veh/h		207			97			635			1402	
Approach Delay, s/veh		28.6			34.0			9.8			13.6	
Approach LOS		C			C			A			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.4	44.6		11.2	10.6	43.3		9.3
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.8	7.7		5.6	5.3	23.0		4.7
Green Ext Time (p_c), s	0.2	14.6		0.5	0.5	14.8		0.2

Intersection Summary	
HCM 2010 Ctrl Delay	14.7
HCM 2010 LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	14	346	87	77	1021	7	88	0	29	7	8	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	4%	4%	4%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	48.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	14	346	87	77	1021	7	88	0	29	7	8	31
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	6	6	6	3	3	3	4	4	4	5	5	5
Mvmt Flow	15	380	96	85	1122	8	97	0	32	8	9	34

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1132	0	0	478	0	0	1779	1762	430	1758	1806	1128
Stage 1	-	-	-	-	-	-	461	461	-	1297	1297	-
Stage 2	-	-	-	-	-	-	1318	1301	-	461	509	-
Critical Hdwy	4.16	-	-	4.13	-	-	7.14	6.54	6.24	7.15	6.55	6.25
Critical Hdwy Stg 1	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.14	5.54	-	6.15	5.55	-
Follow-up Hdwy	2.254	-	-	2.227	-	-	3.536	4.036	3.336	3.545	4.045	3.345
Pot Cap-1 Maneuver	603	-	-	1079	-	-	~ 63	83	621	65	78	245
Stage 1	-	-	-	-	-	-	577	562	-	196	229	-
Stage 2	-	-	-	-	-	-	192	229	-	575	533	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	603	-	-	1079	-	-	~ 39	63	620	50	59	245
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 39	63	-	50	59	-
Stage 1	-	-	-	-	-	-	556	542	-	189	180	-
Stage 2	-	-	-	-	-	-	124	180	-	527	514	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.6	$ 674.1	59.6
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	620	603	-	-	1079	-	-	114
HCM Lane V/C Ratio	2.48	0.051	0.026	-	-	0.078	-	-	0.443
HCM Control Delay (s)	$ 892.6	11.1	11.1	0	-	8.6	0	-	59.6
HCM Lane LOS	F	B	B	A	-	A	A	-	F
HCM 95th %tile Q(veh)	10.6	0.2	0.1	-	-	0.3	-	-	1.9

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
8: Bus & Staff Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	156	8	21	87	0	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	777			151	210	
Travel Time (s)	21.2			4.1	5.7	
Peak Hour Factor	0.56	0.56	0.56	0.56	0.56	0.56
Heavy Vehicles (%)	2%	2%	2%	2%	100%	100%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	156	8	21	87	0	2
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	56	56	56	56	56	56
Heavy Vehicles, %	2	2	2	2	100	100
Mvmt Flow	279	14	38	155	0	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	293	0	516	286
Stage 1	-	-	-	-	286	-
Stage 2	-	-	-	-	230	-
Critical Hdwy	-	-	4.12	-	7.4	7.2
Critical Hdwy Stg 1	-	-	-	-	6.4	-
Critical Hdwy Stg 2	-	-	-	-	6.4	-
Follow-up Hdwy	-	-	2.218	-	4.4	4.2
Pot Cap-1 Maneuver	-	-	1269	-	382	569
Stage 1	-	-	-	-	583	-
Stage 2	-	-	-	-	624	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1269	-	369	569
Mov Cap-2 Maneuver	-	-	-	-	369	-
Stage 1	-	-	-	-	583	-
Stage 2	-	-	-	-	603	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.5	11.4
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	569	-	-	1269	-
HCM Lane V/C Ratio	0.006	-	-	0.03	-
HCM Control Delay (s)	11.4	-	-	7.9	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0	-	-	0.1	-

Lanes, Volumes, Timings
9: Enter Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	69	17	108	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	151			199	211	
Travel Time (s)	4.1			5.4	5.8	
Peak Hour Factor	0.56	0.56	0.56	0.56	0.56	0.56
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	89	69	17	108	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	56	56	56	56	56	56
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	159	123	30	193	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	282	0	475	221
Stage 1	-	-	-	-	221	-
Stage 2	-	-	-	-	254	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1280	-	548	819
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	788	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1280	-	534	819
Mov Cap-2 Maneuver	-	-	-	-	534	-
Stage 1	-	-	-	-	816	-
Stage 2	-	-	-	-	768	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1280	-
HCM Lane V/C Ratio	-	-	-	0.024	-
HCM Control Delay (s)	0	-	-	7.9	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0.1	-

Lanes, Volumes, Timings
10: Exit Only Dwy & NE 122nd St

9/15/2016



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	89	0	0	83	42	44
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	199			270	210	
Travel Time (s)	5.4			7.4	5.7	
Peak Hour Factor	0.58	0.58	0.58	0.58	0.58	0.58
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	3.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	89	0	0	83	42	44
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	58	58	58	58	58	58
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	153	0	0	143	72	76

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	153	0	296	153
Stage 1	-	-	-	-	153	-
Stage 2	-	-	-	-	143	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1428	-	699	898
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	889	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1428	-	699	898
Mov Cap-2 Maneuver	-	-	-	-	699	-
Stage 1	-	-	-	-	880	-
Stage 2	-	-	-	-	889	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	10.6
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	788	-	-	1428	-
HCM Lane V/C Ratio	0.188	-	-	-	-
HCM Control Delay (s)	10.6	-	-	0	-
HCM Lane LOS	B	-	-	A	-
HCM 95th %tile Q(veh)	0.7	-	-	0	-

Lanes, Volumes, Timings
11: 172nd Ave NE & Enter Only

9/15/2016

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	0	199	84	169	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	217			242	290	
Travel Time (s)	5.9			6.6	7.9	
Peak Hour Factor	0.54	0.54	0.54	0.54	0.54	0.54
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	199	84	169	25
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	54	54	54	54	54	54
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	0	369	156	313	46

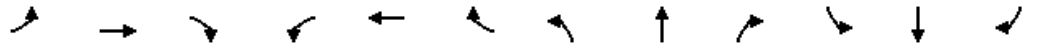
Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1229	336	359	0	-	0
Stage 1	336	-	-	-	-	-
Stage 2	893	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	196	706	1200	-	-	-
Stage 1	724	-	-	-	-	-
Stage 2	400	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	130	706	1200	-	-	-
Mov Cap-2 Maneuver	130	-	-	-	-	-
Stage 1	724	-	-	-	-	-
Stage 2	265	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	6.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1200	-	-	-	-
HCM Lane V/C Ratio	0.307	-	-	-	-
HCM Control Delay (s)	9.3	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	1.3	-	-	-	-

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	10	62	21	10	0	45	21	23	0	21	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			276			290			785	
Travel Time (s)		7.4			7.5			7.9			21.4	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.7
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	11	10	62	0	21	10	0	0	45	21	23
Peak Hour Factor	0.92	0.83	0.83	0.83	0.92	0.83	0.83	0.83	0.92	0.83	0.83	0.83
Heavy Vehicles, %	2	5	5	5	2	2	2	2	2	8	8	8
Mvmt Flow	0	13	12	75	0	25	12	0	0	54	25	28
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.4	7.7	7.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	51%	13%	68%	0%
Vol Thru, %	24%	12%	32%	72%
Vol Right, %	26%	75%	0%	28%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	89	83	31	29
LT Vol	45	11	21	0
Through Vol	21	10	10	21
RT Vol	23	62	0	8
Lane Flow Rate	107	100	37	35
Geometry Grp	1	1	1	1
Degree of Util (X)	0.127	0.107	0.047	0.042
Departure Headway (Hd)	4.247	3.837	4.495	4.345
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	835	917	802	812
Service Time	2.319	1.933	2.495	2.437
HCM Lane V/C Ratio	0.128	0.109	0.046	0.043
HCM Control Delay	7.9	7.4	7.7	7.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.4	0.4	0.1	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	21	8
Peak Hour Factor	0.92	0.83	0.83	0.83
Heavy Vehicles, %	2	17	17	17
Mvmt Flow	0	0	25	10
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.6
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	17	96	10	0	23	0	183	10	15	75	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				3		3			3	3		
Peak Hour Factor	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	10%	10%	10%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	4.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	17	96	10	0	23	0	183	10	15	75	0
Conflicting Peds, #/hr	0	0	0	3	0	3	0	0	3	3	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	65	65	65	65	65	65	65	65	65	65	65	65
Heavy Vehicles, %	0	0	0	0	0	0	10	10	10	8	8	8
Mvmt Flow	23	26	148	15	0	35	0	282	15	23	115	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	472	462	118	467	454	295	115	0	0	300	0	0
Stage 1	162	162	-	292	292	-	-	-	-	-	-	-
Stage 2	310	300	-	175	162	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.2	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.29	-	-	2.272	-	-
Pot Cap-1 Maneuver	506	500	939	509	505	749	1426	-	-	1228	-	-
Stage 1	845	768	-	720	675	-	-	-	-	-	-	-
Stage 2	705	669	-	832	768	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	473	489	937	403	494	745	1422	-	-	1225	-	-
Mov Cap-2 Maneuver	473	489	-	403	494	-	-	-	-	-	-	-
Stage 1	845	753	-	718	673	-	-	-	-	-	-	-
Stage 2	670	667	-	661	753	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	10.5	11.6	0	1.3
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1422	-	-	481	937	593	1225	-	-
HCM Lane V/C Ratio	-	-	-	0.102	0.158	0.086	0.019	-	-
HCM Control Delay (s)	0	-	-	13.3	9.6	11.6	8	0	-
HCM Lane LOS	A	-	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.6	0.3	0.1	-	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

9/15/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	100	181	801	163	177	478
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
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 (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 94.2	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

9/15/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	100	181	801	163	177	478
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1835	1835
Adj Flow Rate, veh/h	109	120	871	59	192	520
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3
Cap, veh/h	227	467	1048	891	292	1422
Arrive On Green	0.13	0.13	0.56	0.56	0.17	0.77
Sat Flow, veh/h	1774	1584	1863	1584	1748	1835
Grp Volume(v), veh/h	109	120	871	59	192	520
Grp Sat Flow(s),veh/h/ln	1774	1584	1863	1584	1748	1835
Q Serve(g_s), s	3.8	3.9	25.6	1.1	6.9	5.9
Cycle Q Clear(g_c), s	3.8	3.9	25.6	1.1	6.9	5.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	227	467	1048	891	292	1422
V/C Ratio(X)	0.48	0.26	0.83	0.07	0.66	0.37
Avail Cap(c_a), veh/h	638	834	1731	1471	681	2255
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.0	18.0	12.0	6.6	26.0	2.4
Incr Delay (d2), s/veh	1.6	0.3	1.8	0.0	2.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	1.7	13.4	0.5	3.5	3.0
LnGrp Delay(d),s/veh	28.6	18.2	13.8	6.7	28.5	2.5
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	229		930			712
Approach Delay, s/veh	23.2		13.3			9.5
Approach LOS	C		B			A

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	14.2	41.1				55.2		11.5
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	8.9	27.6				7.9		5.9
Green Ext Time (p_c), s	0.6	7.9				8.4		0.8

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	273	48	36	205	26	63	18	59	18	6	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			-2%			0%			0%	
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		2140			3057			693			326	
Travel Time (s)		41.7			59.6			18.9			8.9	
Confl. Peds. (#/hr)	33		52	52		33	52		52	33		33
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	0%	0%	0%	5%	5%	5%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other

Control Type: Roundabout

Intersection	
Intersection Delay, s/veh	6.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	361	294	154	34
Demand Flow Rate, veh/h	375	306	154	35
Vehicles Circulating, veh/h	70	97	341	345
Vehicles Exiting, veh/h	310	398	104	58
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	52	52	52	33
Ped Cap Adj	0.993	0.993	0.993	0.995
Approach Delay, s/veh	7.4	6.8	6.6	5.1
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	375	306	154	35
Cap Entry Lane, veh/h	1054	1025	803	800
Entry HV Adj Factor	0.963	0.961	1.000	0.962
Flow Entry, veh/h	361	294	154	34
Cap Entry, veh/h	1007	978	798	766
V/C Ratio	0.358	0.301	0.193	0.044
Control Delay, s/veh	7.4	6.8	6.6	5.1
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	1	64	207	29	48	138	86	1	35	64	79	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35			35				25		
Link Distance (ft)			3057			696				543		
Travel Time (s)			59.6			13.6				14.8		
Confl. Peds. (#/hr)	6	11		10	4		5	4	10		4	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%	4%	2%	2%	2%	2%	5%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield				Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBT	SBR
Lane Configurations		
Volume (vph)	59	58
Ideal Flow (vphpl)	1900	1900
Link Speed (mph)	25	
Link Distance (ft)	1446	
Travel Time (s)	39.4	
Confl. Peds. (#/hr)		11
Peak Hour Factor	0.84	0.84
Heavy Vehicles (%)	5%	5%
Shared Lane Traffic (%)		
Sign Control	Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	8.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	358	323	213	209
Demand Flow Rate, veh/h	376	336	218	220
Vehicles Circulating, veh/h	206	203	412	275
Vehicles Exiting, veh/h	287	427	170	264
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	5	10	11
Ped Cap Adj	0.998	0.999	0.999	0.998
Approach Delay, s/veh	9.0	8.2	8.4	7.2
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	376	336	218	220
Cap Entry Lane, veh/h	920	922	748	858
Entry HV Adj Factor	0.951	0.963	0.979	0.952
Flow Entry, veh/h	358	323	213	209
Cap Entry, veh/h	873	887	732	816
V/C Ratio	0.409	0.365	0.292	0.257
Control Delay, s/veh	9.0	8.2	8.4	7.2
LOS	A	A	A	A
95th %tile Queue, veh	2	2	1	1

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	164	33	223	40	35	87	176	1164	23	53	601	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	5%	5%	5%	3%	3%	3%
Shared Lane Traffic (%)	40%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary	
Area Type:	Other
Cycle Length: 173.5	
Actuated Cycle Length: 96	
Natural Cycle: 110	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	164	33	223	40	35	87	176	1164	23	53	601	48
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1835	1835	1872	1810	1810	1900	1845	1845	1900
Adj Flow Rate, veh/h	206	0	59	44	38	96	193	1279	25	58	660	53
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	3	3	3	2	2	2	5	5	5	3	3	3
Cap, veh/h	398	0	339	229	61	153	531	1832	36	318	1637	131
Arrive On Green	0.11	0.00	0.11	0.13	0.13	0.12	0.10	0.53	0.52	0.07	0.50	0.49
Sat Flow, veh/h	3514	0	1568	1747	462	1167	1723	3449	67	1757	3287	264
Grp Volume(v), veh/h	206	0	59	44	0	134	193	637	667	58	352	361
Grp Sat Flow(s),veh/h/ln	1757	0	1568	1747	0	1629	1723	1719	1798	1757	1752	1798
Q Serve(g_s), s	4.5	0.0	2.5	1.8	0.0	6.3	3.9	22.3	22.3	1.2	10.2	10.2
Cycle Q Clear(g_c), s	4.5	0.0	2.5	1.8	0.0	6.3	3.9	22.3	22.3	1.2	10.2	10.2
Prop In Lane	1.00		1.00	1.00		0.72	1.00		0.04	1.00		0.15
Lane Grp Cap(c), veh/h	398	0	339	229	0	213	531	913	955	318	873	895
V/C Ratio(X)	0.52	0.00	0.17	0.19	0.00	0.63	0.36	0.70	0.70	0.18	0.40	0.40
Avail Cap(c_a), veh/h	740	0	492	433	0	403	823	1533	1603	565	2214	2271
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.7	0.0	25.8	31.3	0.0	33.6	7.7	14.1	14.1	10.6	12.7	12.8
Incr Delay (d2), s/veh	1.0	0.0	0.2	0.4	0.0	3.0	0.4	1.2	1.1	0.3	0.4	0.4
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	2.2	0.0	1.1	0.9	0.0	3.0	1.9	10.7	11.2	0.6	5.0	5.1
LnGrp Delay(d),s/veh	34.8	0.0	26.0	31.7	0.0	36.6	8.1	15.3	15.3	10.9	13.1	13.1
LnGrp LOS	C		C	C		D	A	B	B	B	B	B
Approach Vol, veh/h		265			178			1497			771	
Approach Delay, s/veh		32.8			35.4			14.4			13.0	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	8.6	46.4		12.1	11.3	43.7		13.6
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	3.2	24.3		6.5	5.9	12.2		8.3
Green Ext Time (p_c), s	0.1	16.5		0.7	0.5	18.4		0.4

Intersection Summary		
HCM 2010 Ctrl Delay	17.1	
HCM 2010 LOS	B	

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	17	851	73	20	591	5	56	4	37	5	5	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	9.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	17	851	73	20	591	5	56	4	37	5	5	20
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	93	93	93	93	93	93	93	93	93	93	93	93
Heavy Vehicles, %	3	3	3	3	3	3	2	2	2	8	8	8
Mvmt Flow	18	915	78	22	635	5	60	4	40	5	5	22

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	643	0	0	996	0	0	1690	1679	956	1678	1715	640
Stage 1	-	-	-	-	-	-	993	993	-	683	683	-
Stage 2	-	-	-	-	-	-	697	686	-	995	1032	-
Critical Hdwy	4.13	-	-	4.13	-	-	7.12	6.52	6.22	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.18	5.58	-
Follow-up Hdwy	2.227	-	-	2.227	-	-	3.518	4.018	3.318	3.572	4.072	3.372
Pot Cap-1 Maneuver	937	-	-	691	-	-	74	95	313	73	87	465
Stage 1	-	-	-	-	-	-	296	323	-	430	440	-
Stage 2	-	-	-	-	-	-	431	448	-	287	303	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	937	-	-	691	-	-	62	86	312	57	79	464
Mov Cap-2 Maneuver	-	-	-	-	-	-	62	86	-	57	79	-
Stage 1	-	-	-	-	-	-	283	308	-	410	418	-
Stage 2	-	-	-	-	-	-	386	425	-	236	289	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.3	149.1	34.2
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	63	312	937	-	-	691	-	-	155
HCM Lane V/C Ratio	1.024	0.128	0.02	-	-	0.031	-	-	0.208
HCM Control Delay (s)	229.9	18.2	8.9	0	-	10.4	0	-	34.2
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	5	0.4	0.1	-	-	0.1	-	-	0.8

Lanes, Volumes, Timings
8: Bus & Staff Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	88	0	2	87	8	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	777			151	210	
Travel Time (s)	21.2			4.1	5.7	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Heavy Vehicles (%)	2%	2%	2%	2%	21%	21%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	88	0	2	87	8	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	2	2	2	2	21	21
Mvmt Flow	128	0	3	126	12	30

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	128	0	260	128
Stage 1	-	-	-	-	128	-
Stage 2	-	-	-	-	132	-
Critical Hdwy	-	-	4.12	-	6.61	6.41
Critical Hdwy Stg 1	-	-	-	-	5.61	-
Critical Hdwy Stg 2	-	-	-	-	5.61	-
Follow-up Hdwy	-	-	2.218	-	3.689	3.489
Pot Cap-1 Maneuver	-	-	1458	-	690	874
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	849	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1458	-	689	874
Mov Cap-2 Maneuver	-	-	-	-	689	-
Stage 1	-	-	-	-	853	-
Stage 2	-	-	-	-	847	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	814	-	-	1458	-
HCM Lane V/C Ratio	0.052	-	-	0.002	-
HCM Control Delay (s)	9.7	-	-	7.5	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

Lanes, Volumes, Timings
9: Enter Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	73	36	14	89	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	151			199	211	
Travel Time (s)	4.1			5.4	5.8	
Peak Hour Factor	0.69	0.69	0.69	0.69	0.69	0.69
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	0.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	73	36	14	89	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	69	69	69	69	69	69
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	106	52	20	129	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	158	0	302	132
Stage 1	-	-	-	-	132	-
Stage 2	-	-	-	-	170	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1422	-	690	917
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	860	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1422	-	680	917
Mov Cap-2 Maneuver	-	-	-	-	680	-
Stage 1	-	-	-	-	894	-
Stage 2	-	-	-	-	847	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1422	-
HCM Lane V/C Ratio	-	-	-	0.014	-
HCM Control Delay (s)	0	-	-	7.6	0
HCM Lane LOS	A	-	-	A	A
HCM 95th %tile Q(veh)	-	-	-	0	-

Lanes, Volumes, Timings
10: Exit Only Dwy & NE 122nd St

9/15/2016



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	73	0	0	63	40	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	199			270	210	
Travel Time (s)	5.4			7.4	5.7	
Peak Hour Factor	0.72	0.72	0.72	0.72	0.72	0.72
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	2.6

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	73	0	0	63	40	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	72	72	72	72	72	72
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	101	0	0	88	56	14

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	101	0	189	101
Stage 1	-	-	-	-	101	-
Stage 2	-	-	-	-	88	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1491	-	805	960
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	940	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1491	-	805	960
Mov Cap-2 Maneuver	-	-	-	-	805	-
Stage 1	-	-	-	-	928	-
Stage 2	-	-	-	-	940	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	9.7
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	832	-	-	1491	-
HCM Lane V/C Ratio	0.083	-	-	-	-
HCM Control Delay (s)	9.7	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

Lanes, Volumes, Timings
11: 172nd Ave NE & Enter Only Dwy

9/15/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	0	133	89	90	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	217			242	290	
Travel Time (s)	5.9			6.6	7.9	
Peak Hour Factor	0.67	0.67	0.67	0.67	0.67	0.67
Heavy Vehicles (%)	0%	0%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	133	89	90	14
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	67	67	67	67	67	67
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	0	0	199	133	134	21

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	675	145	155	0	-	0
Stage 1	145	-	-	-	-	-
Stage 2	530	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	422	908	1425	-	-	-
Stage 1	887	-	-	-	-	-
Stage 2	594	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	358	908	1425	-	-	-
Mov Cap-2 Maneuver	358	-	-	-	-	-
Stage 1	887	-	-	-	-	-
Stage 2	504	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	4.8	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1425	-	-	-	-
HCM Lane V/C Ratio	0.139	-	-	-	-
HCM Control Delay (s)	7.9	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	-	-

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	1	9	63	19	5	0	56	33	31	0	18	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			302			290			785	
Travel Time (s)		7.4			8.2			7.9			21.4	
Confl. Peds. (#/hr)	3		2				2					3
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	12%	12%	12%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	7.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	1	9	63	0	19	5	0	0	56	33	31
Peak Hour Factor	0.92	0.86	0.86	0.86	0.92	0.86	0.86	0.86	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	0	1	10	73	0	22	6	0	0	65	38	36
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	7.2	7.7	7.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	47%	1%	79%	0%
Vol Thru, %	27%	12%	21%	86%
Vol Right, %	26%	86%	0%	14%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	120	73	24	21
LT Vol	56	1	19	0
Through Vol	33	9	5	18
RT Vol	31	63	0	3
Lane Flow Rate	140	85	28	24
Geometry Grp	1	1	1	1
Degree of Util (X)	0.159	0.088	0.034	0.029
Departure Headway (Hd)	4.103	3.724	4.445	4.322
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	869	945	794	819
Service Time	2.152	1.814	2.539	2.397
HCM Lane V/C Ratio	0.161	0.09	0.035	0.029
HCM Control Delay	7.9	7.2	7.7	7.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.3	0.1	0.1

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	18	3
Peak Hour Factor	0.92	0.86	0.86	0.86
Heavy Vehicles, %	2	12	12	12
Mvmt Flow	0	0	21	3
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	7.5
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	24	6	38	10	0	15	0	116	33	20	64	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				10		10			10	10		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	7%	7%	7%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	24	6	38	10	0	15	0	116	33	20	64	0
Conflicting Peds, #/hr	0	0	0	10	0	10	0	0	10	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	5	5	5	2	2	2	7	7	7
Mvmt Flow	26	7	42	11	0	16	0	127	36	22	70	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	278	288	80	274	270	166	70	0	0	174	0	0
Stage 1	114	114	-	156	156	-	-	-	-	-	-	-
Stage 2	164	174	-	118	114	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.55	6.25	4.12	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4.045	3.345	2.218	-	-	2.263	-	-
Pot Cap-1 Maneuver	678	625	986	672	631	871	1531	-	-	1373	-	-
Stage 1	896	805	-	839	763	-	-	-	-	-	-	-
Stage 2	843	759	-	879	795	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	651	609	978	619	615	857	1518	-	-	1362	-	-
Mov Cap-2 Maneuver	651	609	-	619	615	-	-	-	-	-	-	-
Stage 1	896	791	-	832	757	-	-	-	-	-	-	-
Stage 2	820	753	-	813	781	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	9.7	10	0	1.8
HCM LOS	A	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1518	-	-	642	978	743	1362	-	-
HCM Lane V/C Ratio	-	-	-	0.051	0.043	0.037	0.016	-	-
HCM Control Delay (s)	0	-	-	10.9	8.8	10	7.7	0	-
HCM Lane LOS	A	-	-	B	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.2	0.1	0.1	0	-	-

Lanes, Volumes, Timings
3: SR 202 & NE 116 St

9/15/2016

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	110	214	870	165	250	527
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-2%		-2%			1%
Storage Length (ft)	250	0		375	200	
Storage Lanes	1	1		1	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		40			40
Link Distance (ft)	2140		1551			275
Travel Time (s)	41.7		26.4			4.7
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	1%	3%	3%
Shared Lane Traffic (%)						
Turn Type	Prot	pt+ov	NA	Perm	Prot	NA
Protected Phases	3	3 1	2		1	6
Permitted Phases				2		
Detector Phase	3	3	2	2	1	6
Switch Phase						
Minimum Initial (s)	5.0		5.0	5.0	5.0	5.0
Minimum Split (s)	25.0		27.0	27.0	10.0	25.0
Total Split (s)	27.0		65.5	65.5	29.0	85.5
Total Split (%)	22.2%		53.9%	53.9%	23.9%	70.4%
Yellow Time (s)	4.0		4.0	4.0	4.0	4.0
All-Red Time (s)	1.0		1.5	1.5	1.0	1.5
Lost Time Adjust (s)	-2.0		-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	3.0		3.5	3.5	3.0	3.5
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	None

Intersection Summary	
Area Type:	Other
Cycle Length: 121.5	
Actuated Cycle Length: 99.1	
Natural Cycle: 90	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 3: SR 202 & NE 116 St



HCM 2010 Signalized Intersection Summary
3: SR 202 & NE 116 St

9/15/2016

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	110	214	870	165	250	527
Number	3	18	2	12	1	6
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1900	1900	1900	1900	1835	1835
Adj Flow Rate, veh/h	112	150	888	54	255	538
Adj No. of Lanes	1	1	1	1	1	1
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	3	3
Cap, veh/h	237	530	1043	887	345	1441
Arrive On Green	0.13	0.13	0.55	0.55	0.20	0.78
Sat Flow, veh/h	1810	1615	1900	1615	1748	1835
Grp Volume(v), veh/h	112	150	888	54	255	538
Grp Sat Flow(s),veh/h/ln	1810	1615	1900	1615	1748	1835
Q Serve(g_s), s	4.4	5.3	30.7	1.2	10.6	6.9
Cycle Q Clear(g_c), s	4.4	5.3	30.7	1.2	10.6	6.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	237	530	1043	887	345	1441
V/C Ratio(X)	0.47	0.28	0.85	0.06	0.74	0.37
Avail Cap(c_a), veh/h	560	818	1520	1292	586	1942
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.2	19.3	14.8	8.2	29.3	2.5
Incr Delay (d2), s/veh	1.5	0.3	3.3	0.0	3.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.3	2.4	16.7	0.5	5.4	3.5
LnGrp Delay(d),s/veh	32.6	19.6	18.1	8.2	32.4	2.7
LnGrp LOS	C	B	B	A	C	A
Approach Vol, veh/h	262		942			793
Approach Delay, s/veh	25.2		17.5			12.2
Approach LOS	C		B			B

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	18.3	46.1				64.3		13.2
Change Period (Y+Rc), s	5.0	5.5				5.5		5.0
Max Green Setting (Gmax), s	24.0	60.0				80.0		22.0
Max Q Clear Time (g_c+I1), s	12.6	32.7				8.9		7.3
Green Ext Time (p_c), s	0.7	7.9				8.8		0.9

Intersection Summary	
HCM 2010 Ctrl Delay	16.4
HCM 2010 LOS	B

Lanes, Volumes, Timings
4: 162nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Volume (vph)	6	365	68	1	36	199	13	105	14	68	6	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%				-2%			0%			0%
Link Speed (mph)		35				35			25			25
Link Distance (ft)		2140				3057			693			326
Travel Time (s)		41.7				59.6			18.9			8.9
Confl. Peds. (#/hr)	15		12				3	12			3	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Heavy Vehicles (%)	3%	3%	3%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Yield				Yield			Yield			Yield

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBR
Lane Configurations	
Volume (vph)	9
Ideal Flow (vphpl)	1900
Grade (%)	
Link Speed (mph)	
Link Distance (ft)	
Travel Time (s)	
Confl. Peds. (#/hr)	15
Peak Hour Factor	0.96
Heavy Vehicles (%)	0%
Shared Lane Traffic (%)	
Sign Control	

Intersection Summary

Intersection	
Intersection Delay, s/veh	7.5
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	457	260	195	17
Demand Flow Rate, veh/h	470	260	195	17
Vehicles Circulating, veh/h	47	130	404	355
Vehicles Exiting, veh/h	325	469	113	35
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	34	3	12	15
Ped Cap Adj	0.995	1.000	0.998	0.998
Approach Delay, s/veh	8.3	6.2	7.7	4.8
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	470	260	195	17
Cap Entry Lane, veh/h	1078	992	754	792
Entry HV Adj Factor	0.972	1.000	1.000	1.000
Flow Entry, veh/h	457	260	195	17
Cap Entry, veh/h	1042	992	753	791
V/C Ratio	0.438	0.262	0.259	0.022
Control Delay, s/veh	8.3	6.2	7.7	4.8
LOS	A	A	A	A
95th %tile Queue, veh	2	1	1	0

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (vph)	32	301	42	54	152	67	40	102	161	50	44	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		3057			696			543			1446	
Travel Time (s)		59.6			13.6			14.8			39.4	
Confl. Peds. (#/hr)	11		2			9	2			9		11
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 (%)	4%	4%	4%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Intersection	
Intersection Delay, s/veh	8.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	386	282	312	126
Demand Flow Rate, veh/h	401	286	315	130
Vehicles Circulating, veh/h	157	181	410	257
Vehicles Exiting, veh/h	230	544	148	210
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	9	2	11
Ped Cap Adj	0.998	0.999	1.000	0.998
Approach Delay, s/veh	8.7	7.1	10.4	5.8
Approach LOS	A	A	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	401	286	315	130
Cap Entry Lane, veh/h	966	943	750	874
Entry HV Adj Factor	0.962	0.988	0.990	0.967
Flow Entry, veh/h	386	282	312	126
Cap Entry, veh/h	927	930	742	843
V/C Ratio	0.416	0.304	0.420	0.149
Control Delay, s/veh	8.7	7.1	10.4	5.8
LOS	A	A	B	A
95th %tile Queue, veh	2	1	2	1

Lanes, Volumes, Timings
6: Avondale Rd NE & NE 116th St

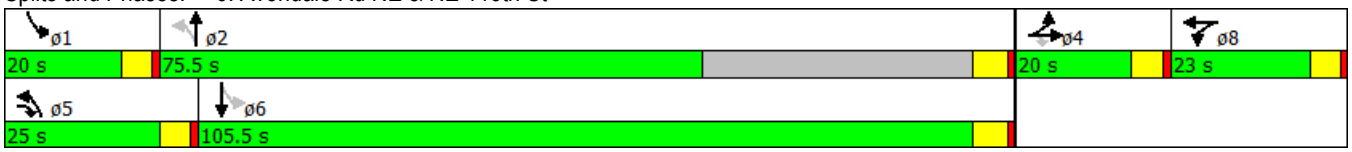
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	273	49	254	33	25	77	196	1396	25	28	680	58
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		0%			3%			0%			0%	
Storage Length (ft)	180		120	180		0	150		0	150		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			40			40	
Link Distance (ft)		317			484			1493			763	
Travel Time (s)		6.2			9.4			25.4			13.0	
Confl. Peds. (#/hr)			17				4					4
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 (%)	3%	3%	3%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)	41%											
Turn Type	Split	NA	pm+ov	Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	4	4	5	8	8		5	2		1	6	
Permitted Phases			4				2			6		
Detector Phase	4	4	5	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	
Minimum Split (s)	25.0	25.0	20.0	25.0	25.0		20.0	40.0		18.0	32.0	
Total Split (s)	20.0	20.0	25.0	23.0	23.0		25.0	75.5		20.0	105.5	
Total Split (%)	11.5%	11.5%	14.4%	13.3%	13.3%		14.4%	43.5%		11.5%	60.8%	
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.5		4.0	4.5	
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)	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.5		3.0	3.5	
Lead/Lag			Lead				Lead	Lag		Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	Min		None	Min	

Intersection Summary

Area Type: Other
Cycle Length: 173.5
Actuated Cycle Length: 96.9
Natural Cycle: 110
Control Type: Actuated-Uncoordinated

Splits and Phases: 6: Avondale Rd NE & NE 116th St



HCM 2010 Signalized Intersection Summary
6: Avondale Rd NE & NE 116th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	273	49	254	33	25	77	196	1396	25	28	680	58
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1845	1845	1845	1853	1853	1872	1881	1881	1900	1845	1845	1900
Adj Flow Rate, veh/h	317	0	93	34	26	79	202	1439	26	29	701	60
Adj No. of Lanes	2	0	1	1	1	0	1	2	0	1	2	0
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
Percent Heavy Veh, %	3	3	3	1	1	1	1	1	1	3	3	3
Cap, veh/h	523	0	378	189	43	132	519	1991	36	261	1658	142
Arrive On Green	0.15	0.00	0.15	0.11	0.11	0.10	0.10	0.55	0.54	0.05	0.51	0.50
Sat Flow, veh/h	3514	0	1514	1765	405	1231	1792	3592	65	1757	3267	279
Grp Volume(v), veh/h	317	0	93	34	0	105	202	715	750	29	376	385
Grp Sat Flow(s),veh/h/ln	1757	0	1514	1765	0	1636	1792	1787	1869	1757	1752	1794
Q Serve(g_s), s	7.6	0.0	4.4	1.6	0.0	5.5	4.3	26.7	26.8	0.7	12.1	12.1
Cycle Q Clear(g_c), s	7.6	0.0	4.4	1.6	0.0	5.5	4.3	26.7	26.8	0.7	12.1	12.1
Prop In Lane	1.00		1.00	1.00		0.75	1.00		0.03	1.00		0.16
Lane Grp Cap(c), veh/h	523	0	378	189	0	175	519	991	1036	261	889	911
V/C Ratio(X)	0.61	0.00	0.25	0.18	0.00	0.60	0.39	0.72	0.72	0.11	0.42	0.42
Avail Cap(c_a), veh/h	665	0	440	393	0	364	783	1432	1498	504	1990	2037
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	27.2	36.5	0.0	38.7	8.6	14.9	14.9	12.0	13.9	13.9
Incr Delay (d2), s/veh	1.1	0.0	0.3	0.5	0.0	3.3	0.5	1.2	1.2	0.2	0.4	0.4
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	3.7	0.0	1.9	0.8	0.0	2.6	2.1	13.5	14.1	0.3	5.9	6.1
LnGrp Delay(d),s/veh	36.9	0.0	27.5	37.0	0.0	41.9	9.1	16.1	16.1	12.2	14.3	14.3
LnGrp LOS	D		C	D		D	A	B	B	B	B	B
Approach Vol, veh/h		410			139			1667			790	
Approach Delay, s/veh		34.8			40.7			15.2			14.2	
Approach LOS		C			D			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	7.6	53.3		16.4	11.8	49.1		12.6
Change Period (Y+Rc), s	5.0	5.5		5.0	5.0	5.5		5.0
Max Green Setting (Gmax), s	15.0	70.0		15.0	20.0	100.0		18.0
Max Q Clear Time (g_c+I1), s	2.7	28.8		9.6	6.3	14.1		7.5
Green Ext Time (p_c), s	0.0	19.0		0.9	0.6	23.1		0.3

Intersection Summary		
HCM 2010 Ctrl Delay	18.8	
HCM 2010 LOS	B	

Notes

User approved pedestrian interval to be less than phase max green.

User approved volume balancing among the lanes for turning movement.

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	1033	76	8	646	11	50	3	28	3	2	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		100	0		0
Storage Lanes	0		0	0		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			14.0			14.3	
Confl. Peds. (#/hr)			3	3					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 (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Sign Control		Free			Free			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Int Delay, s/veh	9.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	30	1033	76	8	646	11	50	3	28	3	2	17
Conflicting Peds, #/hr	0	0	3	3	0	0	0	0	2	2	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	100	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	11	-	-	-11	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	1	1	1	1	1	1	0	0	0	0	0	0
Mvmt Flow	31	1065	78	8	666	11	52	3	29	3	2	18

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	679	0	0	1145	0	0	1868	1864	1109	1860	1897	677
Stage 1	-	-	-	-	-	-	1168	1168	-	690	690	-
Stage 2	-	-	-	-	-	-	700	696	-	1170	1207	-
Critical Hdwy	4.11	-	-	4.11	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.209	-	-	2.209	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	918	-	-	614	-	-	56	74	257	57	70	456
Stage 1	-	-	-	-	-	-	238	270	-	439	449	-
Stage 2	-	-	-	-	-	-	433	446	-	237	259	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	916	-	-	612	-	-	~ 48	65	256	44	62	454
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 48	65	-	44	62	-
Stage 1	-	-	-	-	-	-	215	244	-	397	439	-
Stage 2	-	-	-	-	-	-	405	436	-	187	234	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.1	202.2	31.2
HCM LOS			F	D

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	49	256	916	-	-	612	-	-	160
HCM Lane V/C Ratio	1.115	0.113	0.034	-	-	0.013	-	-	0.142
HCM Control Delay (s)	298.1	20.8	9.1	0	-	11	0	-	31.2
HCM Lane LOS	F	C	A	A	-	B	A	-	D
HCM 95th %tile Q(veh)	4.9	0.4	0.1	-	-	0	-	-	0.5

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Lanes, Volumes, Timings
8: Bus & Staff Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	69	0	0	64	2	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	777			151	210	
Travel Time (s)	21.2			4.1	5.7	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	69	0	0	64	2	4
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	78	0	0	72	2	4

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	150	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	72	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1520	-	847	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	956	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	847	988
Mov Cap-2 Maneuver	-	-	-	-	847	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	956	-

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

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	936	-	-	1520	-
HCM Lane V/C Ratio	0.007	-	-	-	-
HCM Control Delay (s)	8.9	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	0	-	-	0	-

Lanes, Volumes, Timings
9: Enter Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	73	0	0	64	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	151			199	211	
Travel Time (s)	4.1			5.4	5.8	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	73	0	0	64	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	78	0	0	69	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	147	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	69	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1520	-	850	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	850	988
Mov Cap-2 Maneuver	-	-	-	-	850	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1520	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Lanes, Volumes, Timings
10: Exit Only Dwy & NE 122nd St

9/15/2016

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	73	0	0	64	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	199			270	210	
Travel Time (s)	5.4			7.4	5.7	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%
Shared Lane Traffic (%)						
Sign Control	Free			Free	Stop	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	73	0	0	64	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	93	93	93	93	93	93
Heavy Vehicles, %	2	2	2	2	0	0
Mvmt Flow	78	0	0	69	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	78	0	147	78
Stage 1	-	-	-	-	78	-
Stage 2	-	-	-	-	69	-
Critical Hdwy	-	-	4.12	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.218	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1520	-	850	988
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1520	-	850	988
Mov Cap-2 Maneuver	-	-	-	-	850	-
Stage 1	-	-	-	-	950	-
Stage 2	-	-	-	-	959	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1520	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Lanes, Volumes, Timings
11: 172nd Ave NE & Enter Only Dwy

9/15/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	0	0	36	120	84	16
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)	25			25	25	
Link Distance (ft)	217			242	290	
Travel Time (s)	5.9			6.6	7.9	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	0%	0%	2%	2%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary	
Area Type:	Other

Control Type: Unsignalized

Intersection	
Int Delay, s/veh	1

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	0	0	36	120	84	16
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	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	0	0	2	2	2	2
Mvmt Flow	0	0	40	132	92	18

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	312	101	110	0	-	0
Stage 1	101	-	-	-	-	-
Stage 2	211	-	-	-	-	-
Critical Hdwy	6.4	6.2	4.12	-	-	-
Critical Hdwy Stg 1	5.4	-	-	-	-	-
Critical Hdwy Stg 2	5.4	-	-	-	-	-
Follow-up Hdwy	3.5	3.3	2.218	-	-	-
Pot Cap-1 Maneuver	685	960	1480	-	-	-
Stage 1	928	-	-	-	-	-
Stage 2	829	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	665	960	1480	-	-	-
Mov Cap-2 Maneuver	665	-	-	-	-	-
Stage 1	928	-	-	-	-	-
Stage 2	805	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	0	1.7	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1480	-	-	-	-
HCM Lane V/C Ratio	0.027	-	-	-	-
HCM Control Delay (s)	7.5	0	0	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-

Appendix B

Trip Generation Studies at Existing Schools

LWSD
Summary of Elementary School Trip Generation Rates

Scenario 1:
Original TIA Trip Generation (6 Studies - 4 with Typical Bussing, 2 with minimal bussing)

					AM PEAK HOUR				AFTERNOON PEAK HOUR				PM PEAK HOUR			
Elementary School	Date of Data Collection	Students	# of Busses	Bus Riders	Total Trips	In %	Out %	Trip Rate	Total Trips	In %	Out %	Trip Rate	Total Trips	In %	Out %	Trip Rate
Rosa Parks	Oct-13	650	1	28	616	52%	48%	0.95	341	49%	51%	0.52	164	45%	55%	0.25
Einstein	Oct-13	488	5	282	284	56%	44%	0.58	164	48%	52%	0.34	89	37%	63%	0.18
Redmond El	Apr-14	435	4	218	357	52%	48%	0.82	240	48%	52%	0.55	93	41%	59%	0.21
Redmond El	Dec-14	473	4	221	413	53%	47%	0.87	263	45%	55%	0.56	84	35%	65%	0.18
Mann	Oct-14	471	2	25	438	53%	47%	0.93	321	49%	51%	0.68				
Audubon	Jun-15	565	4	237	450	54%	46%	0.80	271	45%	55%	0.48	63	43%	57%	0.11
Sum / Weighted Average		**3,082**			**2,558**	**53%**	**47%**	**0.83**	**1,600**	**47%**	**53%**	**0.52**	**493**	**41%**	**59%**	**0.19**
North Redmond	**Proposed**	**665**			**552**	**53%**	**47%**	**0.83**	**346**	**47%**	**53%**	**0.52**	**126**	**41%**	**59%**	**0.19**

Scenario 1A:
Trip Generation based on Studies with Typical Bussing (4 Studies)

					AM PEAK HOUR				AFTERNOON PEAK HOUR			
Elementary School	Date of Data Collection	Students	# of Busses	Bus Riders	Total Trips	In %	Out %	Trip Rate	Total Trips	In %	Out %	Trip Rate
Einstein	Oct-13	488	5	282	284	56%	44%	0.58	164	48%	52%	0.34
Redmond El	Apr-14	435	4	218	357	52%	48%	0.82	240	48%	52%	0.55
Redmond El	Dec-14	473	4	221	413	53%	47%	0.87	263	45%	55%	0.56
Audubon	Jun-15	565	4	237	450	54%	46%	0.80	271	45%	55%	0.48
Sum / Weighted Average		**1,961**			**1,504**	**54%**	**46%**	**0.77**	**938**	**46%**	**54%**	**0.48**
North Redmond	**Proposed**	**665**			**512**	**54%**	**46%**	**0.77**	**319**	**46%**	**54%**	**0.48**

Scenario 2
Trip Generation based on Studies with Minimal Bussing[1] (3 Studies)

					AM PEAK HOUR				AFTERNOON PEAK HOUR			
Elementary School	Date of Data Collection	Students	# of Busses	Bus Riders	Total Trips	In %	Out %	Trip Rate	Total Trips	In %	Out %	Trip Rate
Rosa Parks	Oct-13	650	1	28	616	52%	48%	0.95	341	49%	51%	0.52
Mann	Apr-14	437	0	0	471	52%	48%	1.08	292	50%	50%	0.67
Mann	Oct-14	471	2	25	438	53%	47%	0.93	321	49%	51%	0.68
Sum / Weighted Average		**1,558**			**1,525**	**52%**	**48%**	**0.98**	**954**	**49%**	**51%**	**0.61**
North Redmond	**Proposed**	**665**			**652**	**52%**	**48%**	**0.98**	**406**	**49%**	**51%**	**0.61**

[1] Minimal bussing: Busses provided only for unique conditions such as grandfathering, to serve temporary overflow from other schools, or to service areas within the walk boundary that are not served by adequate safe walk routes. Ridership was minimal.

Scenario 2 Comparisons

	AM Peak	*Afternoon Peak*
Scenario 2 is X% Higher than Scenario 1 (used in original TIA)	*18%*	*17%*
Scenario 2 is X% Higher than the Scenario 1A (Typical Bussing)	*27%*	*27%*

Rosa Parks Elementary School Trip Generation Study Summary
TENW Project No. 4801

ROSA PARKS ELEMENTARY SCHOOL TRIP GENERATION RATES[1]

Peak Period	Total Trips	% In	% Out	Number of Students	Trip Gen Rate (trips/student)
AM Peak	616	52%	48%	650	0.95
Afternoon Peak	341	49%	51%	650	0.52
PM Peak	164	45%	55%	650	0.25

Notes:

1. Based on counts conducted on Tuesday and Thursday, October 22 and 24, 2013.

Rosa Parks Elementary School Trip Generation Study

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Tuesday 10/22/13			Thursday 10/24/13			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
7:45 - 8:45	329	296	625	317	290	607	323	293	616
							52%	48%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Tuesday 10/22/13			Thursday 10/24/13			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
2:30 - 3:30	157	175	332	177	172	349	167	174	341
							49%	51%	

PM PEAK HOUR

	Total Trips - PM Peak Hour								
	Tuesday 10/22/13			Thursday 10/24/13			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
4:00 - 5:00	69	81	150	77	101	178	73	91	164
							45%	55%	

Rosa Parks Elementary School Trip Generation Study

Day: Tuesday, October 22, 2013

AM PEAK

15-Minute Volumes

Drop Off / Pick Up

Time Starting	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
7:30	3	0	4	0	2	1	1	1	0	0	0	0	0	0	0	0	**10**	**2**	**12**
7:45	13	3	6	3	7	3	2	0	0	0	0	0	0	0	0	0	**28**	**9**	**37**
8:00	25	15	7	2	4	6	17	6	3	1	11	9	2	2	0	0	**69**	**41**	**110**
8:15	96	95	7	5	3	6	78	47	10	7	17	15	5	5	1	1	**217**	**181**	**398**
8:30	6	5	0	4	0	2	6	42	0	5	2	6	1	1	0	0	**15**	**65**	**80**
8:45	4	5	6	4	2	5	3	3	0	0	0	0	0	0	0	0	**15**	**17**	**32**

AM Peak Hour Volumes

Peak Hour	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
7:30-8:30	137	113	24	10	16	16	98	54	13	8	28	24	7	7	1	1	324	233	557
7:45-8:45	**140**	**118**	**20**	**14**	**14**	**17**	**103**	**95**	**13**	**13**	**30**	**30**	**8**	**8**	**1**	**1**	**329**	**296**	**625**
8:00-9:00	131	120	20	15	9	19	104	98	13	13	30	30	8	8	1	1	316	304	620

AFTERNOON PEAK

15-Minute Volumes

Time Starting	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
2:15	6	5	3	1	0	1	2	1	0	0	0	0	0	0	0	0	**11**	**8**	**19**
2:30	6	1	3	2	5	0	7	0	0	0	1	0	0	0	0	0	**22**	**3**	**25**
2:45	23	5	5	3	5	0	38	1	4	0	14	1	6	0	0	0	**95**	**10**	**105**
3:00	13	36	1	4	1	8	10	48	1	3	1	13	2	7	2	2	**31**	**121**	**152**
3:15	3	16	2	10	2	3	1	8	1	2	0	1	0	1	0	0	**9**	**41**	**50**
3:30	6	9	0	2	1	2	1	2	0	0	0	0	0	0	0	0	**8**	**15**	**23**

Afternoon Peak Hour Volumes

Peak Hour	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
2:15-3:15	48	47	12	10	11	9	57	50	5	3	16	14	8	7	2	2	159	142	301
2:30-3:30	**45**	**58**	**11**	**19**	**13**	**11**	**56**	**57**	**6**	**5**	**16**	**15**	**8**	**8**	**2**	**2**	**157**	**175**	**332**
2:45-3:45	45	66	8	19	9	13	50	59	6	5	15	15	8	8	2	2	143	187	330

PM Peak

15-Minute Volumes

Time Starting	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
4:00	11	14	10	15	14	13	**35**	**42**	**77**
4:15	1	8	1	9	0	3	**2**	**20**	**22**
4:30	4	2	4	1	3	4	**11**	**7**	**18**
4:45	9	3	1	5	11	4	**21**	**12**	**33**
5:00	1	16	6	4	7	13	**14**	**33**	**47**
5:15	1	5	1	0	1	3	**3**	**8**	**11**
5:30	2	3	3	0	1	1	**6**	**4**	**10**
5:45	2	0	4	2	9	3	**15**	**5**	**20**

PM Peak Hour Volumes

Peak Hour	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
4:00-5:00	**25**	**27**	**16**	**30**	**28**	**24**	**69**	**81**	**150**
4:15-5:15	15	29	12	19	21	24	48	72	120
4:30-5:30	15	26	12	10	22	24	49	60	109
4:45-5:45	13	27	11	9	20	21	44	57	101
5:00-6:00	6	24	14	6	18	20	38	50	88

Rosa Parks Elementary School Trip Generation Study

Day: Thursday, October 24, 2013

AM PEAK

15-Minute Volumes

Drop Off / Pick Up

Time Starting	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
7:30	9	0	2	0	2	1	0	0	0	0	0	0	0	0	0	0	**13**	**1**	**14**
7:45	15	5	6	0	3	3	3	1	0	0	0	0	0	0	0	0	**27**	**9**	**36**
8:00	26	17	3	1	4	5	15	2	4	1	13	7	3	2	0	0	**68**	**35**	**103**
8:15	87	87	4	7	0	4	85	50	6	8	14	18	7	7	1	1	**204**	**182**	**386**
8:30	10	13	4	4	2	3	2	40	0	1	0	2	0	1	0	0	**18**	**64**	**82**
8:45	4	9	2	4	1	2	5	4	0	0	0	0	0	0	0	0	**12**	**19**	**31**

AM Peak Hour Volumes

Peak Hour	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
7:30-8:30	137	109	15	8	9	13	103	53	10	9	27	25	10	9	1	1	312	227	539
7:45-8:45	**138**	**122**	**17**	**12**	**9**	**15**	**105**	**93**	**10**	**10**	**27**	**27**	**10**	**10**	**1**	**1**	**317**	**290**	**607**
8:00-9:00	127	126	13	16	7	14	107	96	10	10	27	27	10	10	1	1	302	300	602

AFTERNOON PEAK

15-Minute Volumes

Time Starting	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
2:15	3	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**4**	**7**
2:30	10	3	6	3	4	0	10	0	1	0	0	0	1	0	0	0	**32**	**6**	**38**
2:45	24	1	7	1	4	1	37	1	5	0	16	2	3	1	1	1	**97**	**8**	**105**
3:00	18	41	4	5	1	5	10	43	1	6	2	14	0	3	2	2	**38**	**119**	**157**
3:15	4	17	2	11	2	4	1	6	0	1	1	0	0	0	0	0	**10**	**39**	**49**
3:30	3	3	1	5	3	3	1	1	0	0	0	0	0	0	0	0	**8**	**12**	**20**

Afternoon Peak Hour Volumes

Peak Hour	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		P&R Access / NE Cedar Park		NE 94th Way (w/o 228th Way		NE 94th Way (e/o 228th Way NE		228th Way (s/o NE 94th Way)		227th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
2:15-3:15	55	48	17	10	9	6	57	44	7	6	18	16	4	4	3	3	170	137	307
2:30-3:30	**56**	**62**	**19**	**20**	**11**	**10**	**58**	**50**	**7**	**7**	**19**	**16**	**4**	**4**	**3**	**3**	**177**	**172**	**349**
2:45-3:45	49	62	14	22	10	13	49	51	6	7	19	16	3	4	3	3	153	178	331

PM Peak

15-Minute Volumes

Time Starting	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
4:00	20	27	8	11	11	5	**39**	**43**	**82**
4:15	8	18	2	10	4	11	**14**	**39**	**53**
4:30	2	6	2	4	1	1	**5**	**11**	**16**
4:45	1	1	3	1	15	6	**19**	**8**	**27**
5:00	10	5	7	3	11	10	**28**	**18**	**46**
5:15	0	10	4	5	8	10	**12**	**25**	**37**
5:30	0	0	0	1	0	5	**0**	**6**	**6**
5:45	0	0	9	0	6	1	**15**	**1**	**16**

PM Peak Hour Volumes

Peak Hour	Main Access (228th Ave NE) / NE Cedar Park		227th Way NE / NE 95th Pl		Bus Access (228th Ave NE) / NE 94th Way		TOTAL TRIPS		
	IN	OUT	IN	OUT	IN	OUT	IN	OUT	TOTAL
4:00-5:00	**31**	**52**	**15**	**26**	**31**	**23**	**77**	**101**	**178**
4:15-5:15	21	30	14	18	31	28	66	76	142
4:30-5:30	13	22	16	13	35	27	64	62	126
4:45-5:45	11	16	14	10	34	31	59	57	116
5:00-6:00	10	15	20	9	25	26	55	50	105

Einstein Elementary School Trip Generation Study Summary
TENW Project No. 4800

EINSTEIN ELEMENTARY SCHOOL TRIP GENERATION RATES[1]

Peak Period	Total Trips	% In	% Out	Number of Students	Trip Gen Rate (trips/student)
AM Peak	284	56%	44%	488	0.58
Afternoon Peak	164	48%	52%	488	0.34
PM Peak	89	37%	63%	488	0.18

Notes:

1. Based on counts conducted on Tuesday and Thursday, October 22 and 24, 2013.

Einstein Elementary School Trip Generation Study

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Tuesday 10/22/13			Thursday 10/24/13			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
8:00-9:00	164	126	290	156	121	277	160	124	284
							56%	44%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Tuesday 10/22/13			Thursday 10/24/13			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
3:00 - 4:00	72	85	157	84	87	171	78	86	164
							48%	52%	

PM PEAK HOUR

	Total Trips - PM Peak Hour								
	Tuesday 10/22/13			Thursday 10/24/13			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
4:00 - 5:00	41	70	111	25	42	67	33	56	89
							37%	63%	

Einstein Elementary School Trip Generation Study

Day: Tuesday, October 22, 2013

AM PEAK

15-Minute Volumes

Drop Off / Pick Up

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Time Starting	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00	16	8	0	0	**16**	**8**	**24**
8:15	19	7	0	0	**19**	**7**	**26**
8:30	53	32	0	0	**53**	**32**	**85**
8:45	76	79	0	0	**76**	**79**	**155**
9:00	6	15	0	0	**6**	**15**	**21**
9:15	3	5	0	0	**3**	**5**	**8**

AM Peak Hour Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Peak Hour	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00-9:00	**164**	**126**	**0**	**0**	**164**	**126**	**290**
8:15-9:15	154	133	0	0	154	133	287
8:30-9:30	138	131	0	0	138	131	269

AFTERNOON PEAK

15-Minute Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Time Starting	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	4	3	0	0	**4**	**3**	**7**
2:45	11	1	0	0	**11**	**1**	**12**
3:00	23	3	0	0	**23**	**3**	**26**
3:15	26	4	0	0	**26**	**4**	**30**
3:30	16	60	0	0	**16**	**60**	**76**
3:45	7	18	0	0	**7**	**18**	**25**

Afternoon Peak Hour Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Peak Hour	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	64	11	0	0	64	11	75
2:45-3:45	76	68	0	0	76	68	144
3:00-4:00	**72**	**85**	**0**	**0**	**72**	**85**	**157**

PM Peak

15-Minute Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Time Starting	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	8	16	0	0	**8**	**16**	**24**
4:15	17	13	0	0	**17**	**13**	**30**
4:30	11	29	0	0	**11**	**29**	**40**
4:45	5	12	0	0	**5**	**12**	**17**
5:00	1	7	0	0	**1**	**7**	**8**
5:15	1	3	0	0	**1**	**3**	**4**
5:30	3	3	0	0	**3**	**3**	**6**
5:45	5	1	0	0	**5**	**1**	**6**

PM Peak Hour Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Peak Hour	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**41**	**70**	**0**	**0**	**41**	**70**	**111**
4:15-5:15	34	61	0	0	34	61	95
4:30-5:30	18	51	0	0	18	51	69
4:45-5:45	10	25	0	0	10	25	35
5:00-6:00	10	14	0	0	10	14	24

Einstein Elementary School Trip Generation Study

Day: Thursday, October 24, 2013

AM PEAK

15-Minute Volumes

Drop Off / Pick Up

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Time Starting	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00	26	21	0	0	**26**	**21**	**47**
8:15	15	4	0	0	**15**	**4**	**19**
8:30	39	22	0	0	**39**	**22**	**61**
8:45	76	74	0	0	**76**	**74**	**150**
9:00	3	14	0	0	**3**	**14**	**17**
9:15	1	3	0	0	**1**	**3**	**4**
9:30	0	0	0	0	**0**	**0**	**0**

AM Peak Hour Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Peak Hour	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00-9:00	**156**	**121**	**0**	**0**	**156**	**121**	**277**
8:15-9:15	133	114	0	0	133	114	247
8:30-9:30	119	113	0	0	119	113	232

AFTERNOON PEAK

15-Minute Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Time Starting	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	3	5	0	0	**3**	**5**	**8**
2:45	9	7	0	0	**9**	**7**	**16**
3:00	27	1	0	0	**27**	**1**	**28**
3:15	39	4	0	0	**39**	**4**	**43**
3:30	13	64	0	0	**13**	**64**	**77**
3:45	5	18	0	0	**5**	**18**	**23**

Afternoon Peak Hour Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Peak Hour	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	78	17	0	0	78	17	95
2:45-3:45	88	76	0	0	88	76	164
3:00-4:00	**84**	**87**	**0**	**0**	**84**	**87**	**171**

PM Peak

15-Minute Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Time Starting	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	3	17	0	0	**3**	**17**	**20**
4:15	2	6	0	0	**2**	**6**	**8**
4:30	7	14	0	0	**7**	**14**	**21**
4:45	13	5	0	0	**13**	**5**	**18**
5:00	9	8	0	0	**9**	**8**	**17**
5:15	6	2	0	0	**6**	**2**	**8**
5:30	6	4	0	0	**6**	**4**	**10**
5:45	6	10	0	0	**6**	**10**	**16**

PM Peak Hour Volumes

	Main Access (NE 116th St) / School Access		116th St		TOTAL TRIPS		
Peak Hour	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**25**	**42**	**0**	**0**	**25**	**42**	**67**
4:15-5:15	31	33	0	0	31	33	64
4:30-5:30	35	29	0	0	35	29	64
4:45-5:45	34	19	0	0	34	19	53
5:00-6:00	27	24	0	0	27	24	51

Redmond Elementary School Trip Generation Study Summary
TENW Project No. 4826

REDMOND ELEMENTARY SCHOOL TRIP GENERATION RATES

Peak Period	Total Trips	% In	% Out	Number of Students[2]	Trip Gen Rate (trips/student)
AM Peak[1]	357	52%	48%	435	0.82
Afternoon Peak[1]	240	48%	52%	435	0.55
PM Peak[1]	93	41%	59%	435	0.21

Notes:

1. Based on counts conducted on Tuesday and Thursday, April 22 and 24, 2014.
2. Number of students provided by LWSD on 4/28/14.

Redmond Elementary School Trip Generation Study

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Tuesday 4/22/14			Thursday 4/24/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
8:15 - 9:15	197	174	371	174	169	343	185	172	357
							52%	48%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Tuesday 4/22/14			Thursday 4/24/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
3:00 - 4:00	115	123	238	116	125	241	116	124	240
							48%	52%	

PM PEAK HOUR

	Total Trips - PM Peak Hour								
	Tuesday 4/22/14			Thursday 4/24/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
Varies	36	56	92	39	54	93	38	55	93
							41%	59%	

Redmond Elementary School Trip Generation Study

Day: Tuesday, April 22, 2014

AM PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00	3	0	9	5	1	1	0	0	0	0	0	0	0	0	**13**	**6**	**19**
8:15	8	0	8	5	0	0	0	0	0	0	0	0	0	0	**16**	**5**	**21**
8:30	20	1	10	19	4	1	6	4	2	2	3	2	0	0	**45**	**29**	**74**
8:45	67	8	16	65	4	7	11	13	6	5	17	18	7	7	**128**	**123**	**251**
9:00	3	3	4	13	0	0	0	0	0	0	1	1	0	0	**8**	**17**	**25**
9:15	1	1	6	4	0	0	0	0	0	0	0	0	0	0	**7**	**5**	**12**

AM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00-9:00	98	9	43	94	9	9	17	17	8	7	20	20	7	7	202	163	365
8:15-9:15	**98**	**12**	**38**	**102**	**8**	**8**	**17**	**17**	**8**	**7**	**21**	**21**	**7**	**7**	**197**	**174**	**371**
8:30-9:30	91	13	36	101	8	8	17	17	8	7	21	21	7	7	188	174	362

AFTERNOON PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	2	0	0	3	4	4	0	0	0	0	0	0	0	0	**6**	**7**	**13**
2:45	2	0	0	1	4	4	0	0	0	0	0	0	0	0	**6**	**5**	**11**
3:00	6	0	0	1	0	0	5	0	0	0	2	0	0	0	**13**	**1**	**14**
3:15	23	0	18	2	5	1	4	1	0	0	6	0	4	0	**60**	**4**	**64**
3:30	25	20	3	38	1	5	2	9	2	2	5	13	0	4	**38**	**91**	**129**
3:45	3	6	1	20	0	0	0	1	0	0	0	0	0	0	**4**	**27**	**31**

Afternoon Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	33	0	18	7	13	9	9	1	0	0	8	0	4	0	85	17	102
2:45-3:45	56	20	21	42	10	10	11	10	2	2	13	13	4	4	117	101	218
3:00-4:00	**57**	**26**	**22**	**61**	**6**	**6**	**11**	**11**	**2**	**2**	**13**	**13**	**4**	**4**	**115**	**123**	**238**

PM Peak

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	1	0	0	13	1	1	**2**	**14**	**16**
4:15	2	0	2	5	0	0	**4**	**5**	**9**
4:30	14	0	3	14	0	0	**17**	**14**	**31**
4:45	5	0	4	21	1	1	**10**	**22**	**32**
5:00	2	1	2	10	2	2	**6**	**13**	**19**
5:15	1	1	1	5	1	1	**3**	**7**	**10**
5:30	0	0	2	1	1	1	**3**	**2**	**5**
5:45	0	0	0	0	3	3	**3**	**3**	**6**

PM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	22	0	9	53	2	2	33	55	88
4:15-5:15	23	1	11	50	3	3	37	54	91
4:30-5:30	**22**	**2**	**10**	**50**	**4**	**4**	**36**	**56**	**92**
4:45-5:45	8	2	9	37	5	5	22	44	66
5:00-6:00	3	2	5	16	7	7	15	25	40

Redmond Elementary School Trip Generation Study

Day: Thursday, April 24, 2014

AM PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00	2	0	9	2	1	1	0	0	0	0	0	0	0	0	**12**	**3**	**15**
8:15	9	0	4	6	2	1	0	0	0	0	0	0	0	0	**15**	**7**	**22**
8:30	21	2	8	17	3	3	7	5	1	1	4	3	2	2	**46**	**33**	**79**
8:45	59	8	11	54	6	7	12	12	4	4	14	14	3	3	**109**	**102**	**211**
9:00	0	2	1	19	1	1	0	2	0	0	2	3	0	0	**4**	**27**	**31**
9:15	0	0	3	1	1	1	0	0	0	0	0	0	0	0	**4**	**2**	**6**

AM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00-9:00	91	10	32	79	12	12	19	17	5	5	18	17	5	5	182	145	327
8:15-9:15	**89**	**12**	**24**	**96**	**12**	**12**	**19**	**19**	**5**	**5**	**20**	**20**	**5**	**5**	**174**	**169**	**343**
8:30-9:30	80	12	23	91	11	12	19	19	5	5	20	20	5	5	163	164	327

AFTERNOON PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	2	0	1	2	5	4	0	0	0	0	0	0	0	0	**8**	**6**	**14**
2:45	1	1	2	3	6	6	0	0	0	0	0	0	0	0	**9**	**10**	**19**
3:00	9	0	4	5	1	2	4	0	0	0	4	1	0	0	**22**	**8**	**30**
3:15	18	0	20	2	4	1	3	0	2	2	5	0	2	2	**54**	**7**	**61**
3:30	27	25	5	40	3	4	0	6	2	2	1	9	0	0	**38**	**86**	**124**
3:45	0	3	1	19	0	1	0	0	1	1	0	0	0	0	**2**	**24**	**26**

Afternoon Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	30	1	27	12	16	13	7	0	2	2	9	1	2	2	93	31	124
2:45-3:45	55	26	31	50	14	13	7	6	4	4	10	10	2	2	123	111	234
3:00-4:00	**54**	**28**	**30**	**66**	**8**	**8**	**7**	**6**	**5**	**5**	**10**	**10**	**2**	**2**	**116**	**125**	**241**

PM Peak

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	4	2	0	11	1	1	**5**	**14**	**19**
4:15	5	1	1	2	3	3	**9**	**6**	**15**
4:30	6	3	4	11	0	0	**10**	**14**	**24**
4:45	6	1	6	16	3	3	**15**	**20**	**35**
5:00	0	1	1	8	0	0	**1**	**9**	**10**
5:15	0	0	0	2	5	5	**5**	**7**	**12**
5:30	0	0	0	0	1	1	**1**	**1**	**2**
5:45	0	0	0	0	1	1	**1**	**1**	**2**

PM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**21**	**7**	**11**	**40**	**7**	**7**	**39**	**54**	**93**
4:15-5:15	17	6	12	37	6	6	35	49	84
4:30-5:30	12	5	11	37	8	8	31	50	81
4:45-5:45	6	2	7	26	9	9	22	37	59
5:00-6:00	0	1	1	10	7	7	8	18	26

Redmond Elementary School
TENW Project No. 4999

REDMOND ELEMENTARY SCHOOL TRIP GENERATION RATES

Peak Period	Total Trips	% In	% Out	Number of Students[2]	Trip Gen Rate (trips/student)
AM Peak[1]	413	53%	47%	473	0.87
Afternoon Peak[1]	263	45%	55%	473	0.56
PM Peak[1]	84	35%	65%	473	0.18

Notes:

1. Based on two-day average of counts conducted on Tuesday and Thursday, December 2 and 4, 2014.
2. Number of students provided by LWSD on 12/11/14.

Redmond Elementary School

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Tuesday 12/2/14			Thursday 12/4/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
8:15 - 9:15	216	195	411	220	194	414	218	195	413
							53%	47%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Tuesday 12/2/14			Thursday 12/4/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
3:00 - 4:00	119	147	266	119	141	260	119	144	263
							45%	55%	

PM PEAK HOUR

	Total Trips - PM Peak Hour								
	Tuesday 12/2/14			Thursday 12/4/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
4:00 - 5:00	28	56	84	30	53	83	29	55	84
							35%	65%	

Redmond Elementary School Trip Generation Study

Day: Tuesday, December 2, 2014

AM PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00	9	1	14	10	0	0	0	0	0	0	0	0	0	0	**23**	**11**	**34**
8:15	6	0	14	8	0	0	0	0	0	0	0	0	0	0	**20**	**8**	**28**
8:30	25	2	10	22	3	1	4	1	0	0	5	3	0	0	**47**	**29**	**76**
8:45	64	6	12	60	4	6	22	23	7	6	15	13	7	5	**131**	**119**	**250**
9:00	10	3	5	23	1	1	1	4	0	1	1	5	0	2	**18**	**39**	**57**
9:15	1	0	3	3	0	0	0	0	0	0	0	0	0	0	**4**	**3**	**7**

AM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00-9:00	104	9	50	100	7	7	26	24	7	6	20	16	7	5	221	167	388
8:15-9:15	**105**	**11**	**41**	**113**	**8**	**8**	**27**	**28**	**7**	**7**	**21**	**21**	**7**	**7**	**216**	**195**	**411**
8:30-9:30	100	11	30	108	8	8	27	28	7	7	21	21	7	7	200	190	390

AFTERNOON PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	1	0	1	3	0	0	0	0	0	0	0	0	0	0	**2**	**3**	**5**
2:45	3	1	3	12	0	0	0	0	0	0	0	0	0	0	**6**	**13**	**19**
3:00	9	1	6	8	1	0	4	1	1	0	3	0	0	0	**24**	**10**	**34**
3:15	27	2	9	6	1	0	6	1	1	0	5	0	6	0	**55**	**9**	**64**
3:30	20	25	9	48	4	6	2	10	0	2	2	10	0	6	**37**	**107**	**144**
3:45	2	4	0	16	0	0	1	1	0	0	0	0	0	0	**3**	**21**	**24**

Afternoon Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	40	4	19	29	2	0	10	2	2	0	8	0	6	0	87	35	122
2:45-3:45	59	29	27	74	6	6	12	12	2	2	10	10	6	6	122	139	261
3:00-4:00	**58**	**32**	**24**	**78**	**6**	**6**	**13**	**13**	**2**	**2**	**10**	**10**	**6**	**6**	**119**	**147**	**266**

PM Peak

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	2	3	0	11	0	0	**2**	**14**	**16**
4:15	0	0	0	10	0	0	**0**	**10**	**10**
4:30	7	1	11	7	0	0	**18**	**8**	**26**
4:45	3	2	5	22	0	0	**8**	**24**	**32**
5:00	1	0	0	3	0	0	**1**	**3**	**4**
5:15	1	1	1	3	0	0	**2**	**4**	**6**
5:30	0	0	1	1	0	0	**1**	**1**	**2**
5:45	3	0	11	2	0	0	**14**	**2**	**16**

PM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**12**	**6**	**16**	**50**	**0**	**0**	**28**	**56**	**84**
4:15-5:15	11	3	16	42	0	0	27	45	72
4:30-5:30	12	4	17	35	0	0	29	39	68
4:45-5:45	5	3	7	29	0	0	12	32	44
5:00-6:00	5	1	13	9	0	0	18	10	28

Redmond Elementary School Trip Generation Study

Day: Thursday, December 4, 2014

AM PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00	3	0	12	0	0	0	0	0	0	0	0	0	0	0	**15**	**0**	**15**
8:15	13	0	8	3	0	0	0	0	0	0	0	0	0	0	**21**	**3**	**24**
8:30	29	0	10	23	3	2	6	4	1	0	3	3	2	1	**54**	**33**	**87**
8:45	62	11	19	65	5	6	22	22	5	5	17	14	7	7	**137**	**130**	**267**
9:00	3	0	4	20	1	1	0	2	0	1	0	4	0	0	**8**	**28**	**36**
9:15	2	2	3	2	0	0	0	0	0	0	0	0	0	0	**5**	**4**	**9**

AM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
8:00-9:00	107	11	49	91	8	8	28	26	6	5	20	17	9	8	227	166	393
8:15-9:15	**107**	**11**	**41**	**111**	**9**	**9**	**28**	**28**	**6**	**6**	**20**	**21**	**9**	**8**	**220**	**194**	**414**
8:30-9:30	96	13	36	110	9	9	28	28	6	6	20	21	9	8	204	195	399

AFTERNOON PEAK

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**	**0**	**0**
2:45	4	0	2	3	0	0	0	0	0	0	0	0	0	0	**6**	**3**	**9**
3:00	6	0	3	2	1	0	2	0	0	0	4	0	1	0	**17**	**2**	**19**
3:15	21	1	20	7	3	0	8	1	2	0	4	0	6	0	**64**	**9**	**73**
3:30	18	24	10	45	2	6	4	12	0	2	0	8	1	8	**35**	**105**	**140**
3:45	1	3	1	20	0	0	0	1	0	0	1	1	0	0	**3**	**25**	**28**

Afternoon Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		Drop Off / Pick Up: NE 80th Street (West of Bus Exit Only Dwy)		NE 80th St (Bus Exit Only to Bus Enter Only Dwys)		NE 80th St (Bus Enter Only Dwy to 169th Ave NE)		168th Ave NE (south of NE 80th St)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	31	1	25	12	4	0	10	1	2	0	8	0	7	0	87	14	101
2:45-3:45	49	25	35	57	6	6	14	13	2	2	8	8	8	8	122	119	241
3:00-4:00	**46**	**28**	**34**	**74**	**6**	**6**	**14**	**14**	**2**	**2**	**9**	**9**	**8**	**8**	**119**	**141**	**260**

PM Peak

15-Minute Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	0	2	1	9	1	1	**2**	**12**	**14**
4:15	3	1	0	10	0	0	**3**	**11**	**14**
4:30	5	0	6	4	0	0	**11**	**4**	**15**
4:45	8	3	6	23	0	0	**14**	**26**	**40**
5:00	0	0	0	3	0	0	**0**	**3**	**3**
5:15	1	0	0	2	1	1	**2**	**3**	**5**
5:30	0	0	0	3	0	0	**0**	**3**	**3**
5:45	1	0	0	4	0	0	**1**	**4**	**5**

PM Peak Hour Volumes

	169th Ave NE/NE 82nd/North Driveway		169th Ave NE/South Driveway		NE 80th St/Bus Enter Only and Exit Only Dwys		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**16**	**6**	**13**	**46**	**1**	**1**	**30**	**53**	**83**
4:15-5:15	16	4	12	40	0	0	28	44	72
4:30-5:30	14	3	12	32	1	1	27	36	63
4:45-5:45	9	3	6	31	1	1	16	35	51
5:00-6:00	2	0	0	12	1	1	3	13	16

Horace Mann Elementary School Trip Generation Study Summary
TENW Project No. 4826

HORACE MANN ELEMENTARY SCHOOL TRIP GENERATION RATES

Peak Period	Total Trips	% In	% Out	Number of Students[1]	Trip Gen Rate (trips/student)
AM Peak[1]	471	52%	48%	437	1.08
Afternoon Peak[1]	292	50%	50%	437	0.67
PM Peak[2]	89	43%	57%	437	0.20

Notes:

1. Based on counts conducted on Tuesday and Thursday, April 22 and 24, 2014.
2. Based on counts conducted on Tuesday April 22 and Tuesday, April 29, 2014.
3. Student enrollment provided by LWSD on 4/28/14.

Horace Mann Elementary School Trip Generation Study

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Tuesday 4/22/14			Thursday 4/24/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
7:45 - 8:45	260	229	489	234	219	453	247	224	471
							52%	48%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Tuesday 4/22/14			Thursday 4/24/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
2:30 - 3:30	144	146	290	149	145	294	146	146	292
							50%	50%	

PM PEAK HOUR

	Total Trips - PM Peak Hour								
	Tuesday 4/22/14			Tuesday 4/29/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
4:00 - 5:00	38	49	87	39	52	91	38	51	89
							43%	57%	

Horace Mann Elementary School Trip Generation Study

Day: Tuesday, April 22, 2014

AM PEAK

15-Minute Volumes

Drop Off / Pick Up Locations

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:30	10	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**	**3**	**13**
7:45	19	7	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**20**	**8**	**28**
8:00	40	19	1	1	1	0	1	0	0	0	0	0	0	0	1	1	**44**	**21**	**65**
8:15	108	87	16	10	3	4	4	1	5	4	1	1	25	23	12	8	**174**	**138**	**312**
8:30	17	42	0	5	0	0	1	4	0	1	0	0	2	4	2	6	**22**	**62**	**84**
8:45	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**1**	**3**

AM Peak Hour Volumes

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:30-8:30	177	116	17	11	4	4	5	1	5	4	1	1	25	23	14	10	248	170	418
7:45-8:45	**184**	**155**	**17**	**16**	**4**	**4**	**6**	**5**	**5**	**5**	**1**	**1**	**27**	**27**	**16**	**16**	**260**	**229**	**489**
8:00-9:00	167	149	17	16	4	4	6	5	5	5	1	1	27	27	15	15	242	222	464

AFTERNOON PEAK

15-Minute Volumes

Drop Off / Pick Up Locations

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:15	5	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**	**3**	**8**
2:30	22	9	0	0	2	0	1	0	0	0	0	0	0	0	0	0	**25**	**9**	**34**
2:45	25	6	12	1	6	0	6	0	3	0	2	0	6	2	8	0	**68**	**9**	**77**
3:00	28	58	0	9	0	8	1	8	2	4	1	3	6	9	5	11	**43**	**110**	**153**
3:15	7	12	0	2	0	0	0	0	0	1	0	0	1	1	0	2	**8**	**18**	**26**
3:30	6	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**6**	**14**	**20**

Afternoon Peak Hour Volumes

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:15-3:15	80	76	12	10	8	8	8	8	5	4	3	3	12	11	13	11	141	131	272
2:30-3:30	**82**	**85**	**12**	**12**	**8**	**8**	**8**	**8**	**5**	**5**	**3**	**3**	**13**	**12**	**13**	**13**	**144**	**146**	**290**
2:45-3:45	66	90	12	12	6	8	7	8	5	5	3	3	13	12	13	13	125	151	276

PM Peak

15-Minute Volumes

	#1 Main Access (NE 104th Street)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	19	30	**19**	**30**	**49**
4:15	4	7	**4**	**7**	**11**
4:30	7	5	**7**	**5**	**12**
4:45	8	7	**8**	**7**	**15**
5:00	9	6	**9**	**6**	**15**
5:15	6	4	**6**	**4**	**10**
5:30	11	15	**11**	**15**	**26**
5:45	7	11	**7**	**11**	**18**

PM Peak Hour Volumes

	#1 Main Access (NE 104th Street)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**38**	**49**	**38**	**49**	**87**
4:15-5:15	28	25	28	25	53
4:30-5:30	30	22	30	22	52
4:45-5:45	34	32	34	32	66
5:00-6:00	33	36	33	36	69

Horace Mann Elementary School Trip Generation Study

Day: Thursday, April 24, 2014

AM PEAK

15-Minute Volumes

Drop Off / Pick Up Locations

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:30	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**12**	**3**	**15**
7:45	11	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**11**	**6**	**17**
8:00	45	16	1	0	1	0	1	0	0	0	0	0	0	0	0	0	**48**	**16**	**64**
8:15	89	94	15	9	4	1	4	4	5	5	2	1	27	26	18	8	**164**	**148**	**312**
8:30	10	29	0	6	0	1	0	1	0	0	0	0	1	2	0	10	**11**	**49**	**60**
8:45	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**3**	**5**

AM Peak Hour Volumes

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:30-8:30	157	119	16	9	5	1	5	4	5	5	2	1	27	26	18	8	235	173	408
7:45-8:45	**155**	**145**	**16**	**15**	**5**	**2**	**5**	**5**	**5**	**5**	**2**	**1**	**28**	**28**	**18**	**18**	**234**	**219**	**453**
8:00-9:00	146	142	16	15	5	2	5	5	5	5	2	1	28	28	18	18	225	216	441

AFTERNOON PEAK

15-Minute Volumes

Drop Off / Pick Up Locations

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:15	11	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**11**	**5**	**16**
2:30	18	6	0	0	2	0	2	0	1	0	0	0	0	0	1	0	**24**	**6**	**30**
2:45	22	5	13	0	6	0	3	0	5	0	2	0	5	0	2	0	**58**	**5**	**63**
3:00	29	56	3	13	0	8	2	7	1	5	0	2	6	9	8	8	**49**	**108**	**157**
3:15	17	21	0	1	0	0	0	0	0	1	0	0	1	2	0	1	**18**	**26**	**44**
3:30	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**	**11**	**21**

Afternoon Peak Hour Volumes

	#1 Main Access (NE 104th Street)		#2 NE 104th St (West of Enter Only Dwy)		#3 NE 104th St (Enter Only Dwy to Exit Only Dwy)		#4 NE 104th Street (East of Exit Only Dwy)		#5 170th Ave NE (North of NE 104th St)		#6 171st Ave NE (North of NE 104th St)		#7 NE 101st Place Cul-De-Sac		#8 LDS Church Parking Lot		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:15-3:15	80	72	16	13	8	8	7	7	7	5	2	2	11	9	11	8	142	124	266
2:30-3:30	**86**	**88**	**16**	**14**	**8**	**8**	**7**	**7**	**7**	**6**	**2**	**2**	**12**	**11**	**11**	**9**	**149**	**145**	**294**
2:45-3:45	78	93	16	14	6	8	5	7	6	6	2	2	12	11	10	9	135	150	285

PM Peak[1]

15-Minute Volumes

	#1 Main Access (NE 104th Street)		TOTAL VEHICLE TRIPS		
Time Starting	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00	19	23	**19**	**23**	**42**
4:15	6	16	**6**	**16**	**22**
4:30	1	4	**1**	**4**	**5**
4:45	13	9	**13**	**9**	**22**
5:00	10	8	**10**	**8**	**18**
5:15	12	7	**12**	**7**	**19**
5:30	6	17	**6**	**17**	**23**
5:45	15	7	**15**	**7**	**22**

PM Peak Hour Volumes

	#1 Main Access (NE 104th Street)		TOTAL VEHICLE TRIPS		
Peak Hour	IN	OUT	**IN**	**OUT**	**TOTAL**
4:00-5:00	**39**	**52**	**39**	**52**	**91**
4:15-5:15	30	37	30	37	67
4:30-5:30	36	28	36	28	64
4:45-5:45	41	41	41	41	82
5:00-6:00	43	39	43	39	82

Notes:
The PM Peak hour was counted on Tuesday, April 29, 2014.

Horace Mann Elementary School Trip Generation Study Summary
TENW Project No. 4826

HORACE MANN ELEMENTARY SCHOOL TRIP GENERATION RATES (OCTOBER 2014)

Peak Period	Total Trips	% In	% Out	Number of Students[1]	Trip Gen Rate (trips/student)
AM Peak[1]	438	53%	47%	471	0.93
Afternoon Peak[1]	321	49%	51%	471	0.68

Notes:

1. Based on counts conducted on Monday and Thursday, October 27 and 30, 2014.

3. Student enrollment provided by LWSD on 10/30/14.

Horace Mann Elementary School Trip Generation Study (October 2014)

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Monday 10/27/14			Thursday 10/30/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
7:45 - 8:45	245	220	465	221	190	411	233	205	438
							53%	47%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Monday 10/27/14			Thursday 10/30/14			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
2:30 - 3:30	140	148	288	173	181	354	156	165	321
							49%	51%	

Horace Mann Elementary School Trip Generation Study

Day: Monday, October 27, 2014

AM PEAK

15-Minute Volumes

	Drop Off / Pick Up Locations																		
	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:45	19	8	0	0	0	0	0	0	0	0	0	0	0	0	1	1	**20**	**9**	**29**
8:00	37	15	0	0	0	0	1	0	0	0	0	0	0	0	0	0	**38**	**15**	**53**
8:15	102	82	12	3	4	0	1	0	3	2	6	1	18	12	19	8	**165**	**108**	**273**
8:30	18	50	0	9	1	4	0	1	0	1	0	3	0	6	3	14	**22**	**88**	**110**

AM Peak Hour Volumes

	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:45-8:45	**176**	**155**	**12**	**12**	**5**	**4**	**2**	**1**	**3**	**3**	**6**	**4**	**18**	**18**	**23**	**23**	**245**	**220**	**465**

AFTERNOON PEAK

15-Minute Volumes

	Drop Off / Pick Up Locations																		
	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	26	8	1	0	0	0	3	0	0	0	0	0	0	0	1	0	**31**	**8**	**39**
2:45	25	9	11	0	8	0	1	0	2	0	2	0	5	0	10	0	**64**	**9**	**73**
3:00	20	51	1	8	0	7	0	4	1	3	1	3	7	11	5	14	**35**	**101**	**136**
3:15	9	24	1	2	0	1	0	0	0	0	0	0	0	1	0	2	**10**	**30**	**40**

Afternoon Peak Hour Volumes

	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	**80**	**92**	**14**	**10**	**8**	**8**	**4**	**4**	**3**	**3**	**3**	**3**	**12**	**12**	**16**	**16**	**140**	**148**	**288**

Horace Mann Elementary School Trip Generation Study

Day: Thursday, October 30, 2014

AM PEAK

15-Minute Volumes

	Drop Off / Pick Up Locations																		
	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:45	20	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**20**	**8**	**28**
8:00	36	12	0	0	0	0	1	0	1	0	0	0	0	0	1	1	**39**	**13**	**52**
8:15	95	88	11	3	5	1	1	0	4	4	1	1	16	10	14	5	**147**	**112**	**259**
8:30	15	34	0	7	0	2	0	1	0	1	0	0	0	6	0	6	**15**	**57**	**72**

AM Peak Hour Volumes

	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
7:45-8:45	**166**	**142**	**11**	**10**	**5**	**3**	**2**	**1**	**5**	**5**	**1**	**1**	**16**	**16**	**15**	**12**	**221**	**190**	**411**

AFTERNOON PEAK

15-Minute Volumes

	Drop Off / Pick Up Locations																		
	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Time Starting	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30	31	9	1	0	7	0	1	0	3	0	0	0	0	0	2	0	**45**	**9**	**54**
2:45	15	9	14	0	1	0	2	0	5	0	6	0	9	0	15	0	**67**	**9**	**76**
3:00	33	44	1	13	0	5	0	3	2	5	1	6	7	12	8	22	**52**	**110**	**162**
3:15	8	38	0	2	0	3	0	0	0	1	1	2	0	4	0	3	**9**	**53**	**62**

Afternoon Peak Hour Volumes

	#1 Main Access (NE 104th Street)		**#2** NE 104th St (West of Enter Only Dwy)		**#3** NE 104th St (Enter Only Dwy to Exit Only Dwy)		**#4** NE 104th Street (East of Exit Only Dwy)		**#5** 170th Ave NE (North of NE 104th St)		**#6** 171st Ave NE (North of NE 104th St)		**#7** NE 101st Pl/169th Ave NE		**#8** LDS Church Parking Lot		**TOTAL VEHICLE TRIPS**		
Peak Hour	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	IN	OUT	**IN**	**OUT**	**TOTAL**
2:30-3:30	**87**	**100**	**16**	**15**	**8**	**8**	**3**	**3**	**10**	**6**	**8**	**8**	**16**	**16**	**25**	**25**	**173**	**181**	**354**

Audubon Elementary School Trip Generation Study Summary
TENW Project No. 5079

AUDUBON ELEMENTARY SCHOOL TRIP GENERATION RATES[1]

Peak Period	Total Trips	% In	% Out	Number of Students	Trip Gen Rate (trips/student)
AM Peak	450	54%	46%	565	0.80
Afternoon Peak	271	45%	55%	565	0.48
PM Peak	63	43%	57%	565	0.11

Notes:

1. Based on counts conducted on Tuesday and Thursday, June 2 and 4, 2015.

Audubon Elementary School Trip Generation Study

2-Day Average Trip Generation

AM PEAK HOUR

	Total Trips - AM Peak Hour								
	Tuesday, June 2, 2015			Thursday, June 4, 2015			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
7:45-8:45 am				222	196	418	241	209	450
8:00-9:00 am	259	222	481						
							54%	46%	

AFTERNOON PEAK HOUR

	Total Trips - Afternoon Peak Hour								
	Tuesday, June 2, 2015			Thursday, June 4, 2015			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
2:45-3:45 pm	121	141	262	121	158	279	121	150	271
							45%	55%	

PM PEAK HOUR

	Total Trips - PM Peak Hour								
	Tuesday, June 2, 2015			Thursday, June 4, 2015			**2-Day Average**		
Peak Hour	IN	OUT	TOTAL	IN	OUT	TOTAL	**IN**	**OUT**	**TOTAL**
4:00-5:00 pm	27	46	73				27	36	63
5:00-6:00 pm				27	26	53			
							43%	57%	

Audubon Elementary School Trip Generation Study

Day: Tuesday, June 2, 2015

	Off-Site Drop Off / Pick Up Locations												
Interval	**#1** Staff/Bus Dwy (180th Ave NE)		**#2** Visitor/Staff (180th Ave NE)		**#3** NE 30th St & 181st Ave NE		**#4** NE 29th St		**#5** 177th Ave NE		**Total Trips**		
Begin	In	Out	In	Out	In	Out	In	Out	In	Out	**In**	**Out**	**Total**
7:30 AM	6	0	10	4	0	0	0	0	0	0	**16**	**4**	**20**
7:45 AM	4	0	7	2	0	0	0	0	0	0	**11**	**2**	**13**
8:00 AM	8	2	49	31	0	0	0	0	1	1	**58**	**34**	**92**
8:15 AM	2	6	117	99	14	10	3	2	10	6	**146**	**123**	**269**
8:30 AM	2	1	35	50	4	1	0	1	2	5	**43**	**58**	**101**
8:45 AM	1	1	11	6	0	0	0	0	0	0	**12**	**7**	**19**
Peak Hour	13	10	212	186	18	11	3	3	13	12	**259**	**222**	**481**
	23		398		29		6		25		481		

Audubon Elementary School Trip Generation Study

Day: Thursday, June 4, 2015

	Off-Site Drop Off / Pick Up Locations												
Interval	**#1** Staff/Bus Dwy (180th Ave NE)		**#2** Visitor/Staff (180th Ave NE)		**#3** NE 30th St & 181st Ave NE		**#4** NE 29th St		**#5** 177th Ave NE		**Total Trips**		
Begin	In	Out	In	Out	In	Out	In	Out	In	Out	**In**	**Out**	**Total**
7:30 AM	5	0	7	0	0	0	0	0	0	0	**12**	**0**	**12**
7:45 AM	5	0	8	1	0	0	0	0	1	0	**14**	**1**	**15**
8:00 AM	8	1	49	37	1	1	0	0	5	4	**63**	**43**	**106**
8:15 AM	1	5	113	103	13	12	2	1	8	6	**137**	**127**	**264**
8:30 AM	0	0	8	19	0	1	0	1	0	4	**8**	**25**	**33**
8:45 AM	0	0	1	4	0	0	0	0	0	0	**1**	**4**	**5**
Peak Hour	14	6	178	160	14	14	2	2	14	14	**222**	**196**	**418**
	20		338		28		4		28		418		

Audubon Elementary School Trip Generation Study

Day: Tuesday, June 2, 2015

	Off-Site Drop Off / Pick Up Locations												
Interval	**#1** Staff/Bus Dwy (180th Ave NE)		**#2** Visitor/Staff (180th Ave NE)		**#3** NE 30th St & 181st Ave NE		**#4** NE 29th St		**#5** 177th Ave NE		**Total Trips**		
Begin	In	Out	In	Out	In	Out	In	Out	In	Out	**In**	**Out**	**Total**
2:30 PM	2	2	23	6	0	0	0	0	1	0	**26**	**8**	**34**
2:45 PM	3	0	16	1	4	0	5	0	4	0	**32**	**1**	**33**
3:00 PM	3	7	29	53	5	4	2	7	2	4	**41**	**75**	**116**
3:15 PM	6	2	26	15	0	3	0	0	1	1	**33**	**21**	**54**
3:30 PM	3	8	12	36	0	0	0	0	0	0	**15**	**44**	**59**
3:45 PM	2	9	4	7	0	0	0	0	0	0	**6**	**16**	**22**
Peak Hour	15	17	83	105	9	7	7	7	7	5	**121**	**141**	**262**
	32		188		16		14		12		262		

Audubon Elementary School Trip Generation Study

Day: Thursday, June 4, 2015

	Off-Site Drop Off / Pick Up Locations												
Interval	**#1** Staff/Bus Dwy (180th Ave NE)		**#2** Visitor/Staff (180th Ave NE)		**#3** NE 30th St & 181st Ave NE		**#4** NE 29th St		**#5** 177th Ave NE		**Total Trips**		
Begin	In	Out	In	Out	In	Out	In	Out	In	Out	**In**	**Out**	**Total**
2:30 PM	3	1	20	3	0	0	0	0	0	0	**23**	**4**	**27**
2:45 PM	2	1	9	5	12	0	2	0	4	0	**29**	**6**	**35**
3:00 PM	2	7	34	51	3	15	5	5	3	5	**47**	**83**	**130**
3:15 PM	5	3	20	13	0	0	0	1	0	1	**25**	**18**	**43**
3:30 PM	4	9	16	42	0	0	0	0	0	0	**20**	**51**	**71**
3:45 PM	1	7	1	12	0	0	0	0	0	0	**2**	**19**	**21**
Peak Hour	13	20	79	111	15	15	7	6	7	6	**121**	**158**	**279**
	33		190		30		13		13		279		

Audubon Elementary School Trip Generation Study

Day: Tuesday, June 2, 2015

Interval	#1 Staff/Bus Dwy (180th Ave NE)		#2 Visitor/Staff (180th Ave NE)		Off-Site Drop Off / Pick Up Locations						Total Trips		
					#3 NE 30th St & 181st Ave NE		#4 NE 29th St		#5 177th Ave NE				
Begin	In	Out	In	Out	In	Out	In	Out	In	Out	**In**	**Out**	**Total**
4:00 PM	3	2	17	13	0	0	0	0	0	0	**20**	**15**	**35**
4:15 PM	3	6	2	14	0	0	0	0	0	0	**5**	**20**	**25**
4:30 PM	0	1	0	8	0	0	0	0	0	0	**0**	**9**	**9**
4:45 PM	0	0	2	2	0	0	0	0	0	0	**2**	**2**	**4**
5:00 PM	1	2	8	9	0	0	0	0	0	0	**9**	**11**	**20**
5:15 PM	5	3	1	4	0	0	0	0	0	0	**6**	**7**	**13**
5:30 PM	12	9	2	3	0	0	0	0	0	0	**14**	**12**	**26**
5:45 PM	2	5	0	2	0	0	0	0	0	0	**2**	**7**	**9**
Peak Hour	6	9	21	37							**27**	**46**	**73**
	15		58		0		0		0		73		

Audubon Elementary School Trip Generation Study

Day: Thursday, June 2, 2015

Interval	#1 Staff/Bus Dwy (180th Ave NE)		#2 Visitor/Staff (180th Ave NE)		Off-Site Drop Off / Pick Up Locations						Total Trips		
					#3 NE 30th St & 181st Ave NE		#4 NE 29th St		#5 177th Ave NE				
Begin	In	Out	In	Out	In	Out	In	Out	In	Out	**In**	**Out**	**Total**
4:00 PM	1	2	7	5	0	0	0	0	0	0	**8**	**7**	**15**
4:15 PM	0	3	2	9	0	0	0	0	0	0	**2**	**12**	**14**
4:30 PM	2	1	3	6	0	0	0	0	0	0	**5**	**7**	**12**
4:45 PM	5	4	1	0	0	0	0	0	0	0	**6**	**4**	**10**
5:00 PM	5	0	2	3	0	0	0	0	0	0	**7**	**3**	**10**
5:15 PM	7	6	1	1	0	0	0	0	0	0	**8**	**7**	**15**
5:30 PM	4	6	1	3	0	0	0	0	0	0	**5**	**9**	**14**
5:45 PM	6	6	1	1	0	0	0	0	0	0	**7**	**7**	**14**
Peak Hour	22	18	5	8							**27**	**26**	**53**
	40		13		0		0		0		53		

Appendix C

Detailed Trip Generation Estimates

North Redmond Elementary School
TENW Project No. 5224

North Redmond Elementary School Trip Generation
Scenario 1[1]

			Directional Distribution [3]		Vehicular Trip Generation		
Time Period	**New Students [2]**	**Trip Rate [3]**	**Entering**	**Exiting**	**In**	**Out**	**Total**
AM Peak Hour	665	0.83	53%	47%	293	259	552
Afternoon Peak Hour	665	0.52	47%	53%	163	183	346
PM Peak Hour	665	0.19	41%	59%	52	74	126

Note:
1. Scenario 1 based on average of 6 studies at local elementary schools (4 with typical bussing, 2 with minimal bussing)
2. Student enrollment provided by LWSD and includes permitting for new school + 5 portables.
3. Trip rates and directional distribution derived based on existing traffic counts conducted at 5 local elementary schools in Redmond.

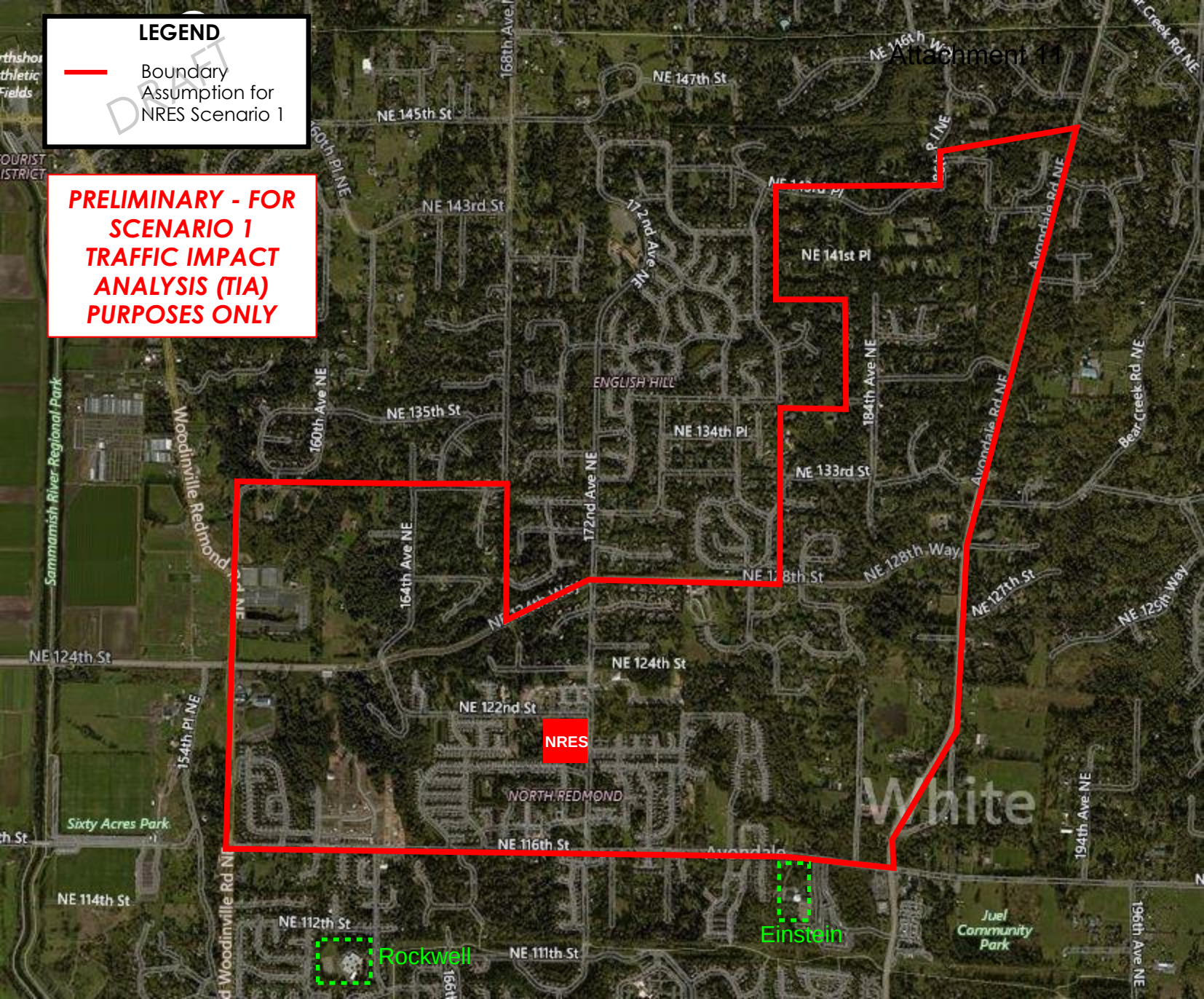
North Redmond Elementary School Trip Generation
Scenario 2 (Assumes Minimal Bussing)[1]

			Directional Distribution [3]		Vehicular Trip Generation		
Time Period	**New Students [2]**	**Trip Rate [3]**	**Entering**	**Exiting**	**In**	**Out**	**Total**
AM Peak Hour	665	0.98	52%	48%	339	313	652
Afternoon Peak Hour	665	0.61	49%	51%	199	207	406

Note:
1. Scenario 2 based on average of 3 studies at local elementary schools that had minimal or no bus service. Minimal bussing means that busses are only provided for unique conditions such as grandfathering, to serve temporary overflow from other schools, or to service areas within the walk boundary that are not served by adequate safe walk routes (minimal ridership). PM peak hour was not affected by bussing.
2. Student enrollment provided by LWSD and includes permitting for new school + 5 portables.
3. Trip rates and directional distribution derived based on existing traffic counts conducted at 3 local elementary schools in Redmond.

Appendix D

Preliminary Boundary Assumptions for Traffic Study


LEGEND
Boundary Assumption for NRES Scenario 1
DRAFT
PRELIMINARY - FOR SCENARIO 1 TRAFFIC IMPACT ANALYSIS (TIA) PURPOSES ONLY
NRES
Rockwell
Einstein
NE 147th St
NE 145th St
NE 143rd St
NE 141st Pl
NE 135th St
NE 134th Pl
NE 133rd St
NE 128th Way
NE 124th St
NE 122nd St
NE 116th St
NE 114th St
NE 112th St
NE 111th St
168th Ave NE
160th Pl NE
160th Ave NE
164th Ave NE
172nd Ave NE
184th Ave NE
194th Ave NE
196th Ave NE
154th Pl NE
Avondale Rd NE
Bear Creek Rd NE
Woodinville Redmond Rd NE
Sammamish River Regional Park
Sixty Acres Park
Juel Community Park
ENGLISH HILL
NORTH REDMOND
White

Attachment 11

LEGEND

- 1 mile radius
- LWSD Boundary
- Possible boundaries for other elementary schools

DRAFT

PRELIMINARY - FOR SCENARIO 2 TRAFFIC IMPACT ANALYSIS (TIA) PURPOSES ONLY

ENGLISH HILL

NE 124th Way

NE 124th St

NE 122nd St

NRES

NO REDMOND

60 Acres North Field

Sixty Acres Park

NE 116th St

NE 116th St

NE 116th St

AVONDALE

Einstein El

Juel Community Park

Rockwell El

162nd Ave NE

NE 111th St

166th Ave NE

Avondale Rd NE

NE 104th St

Google

Mann El

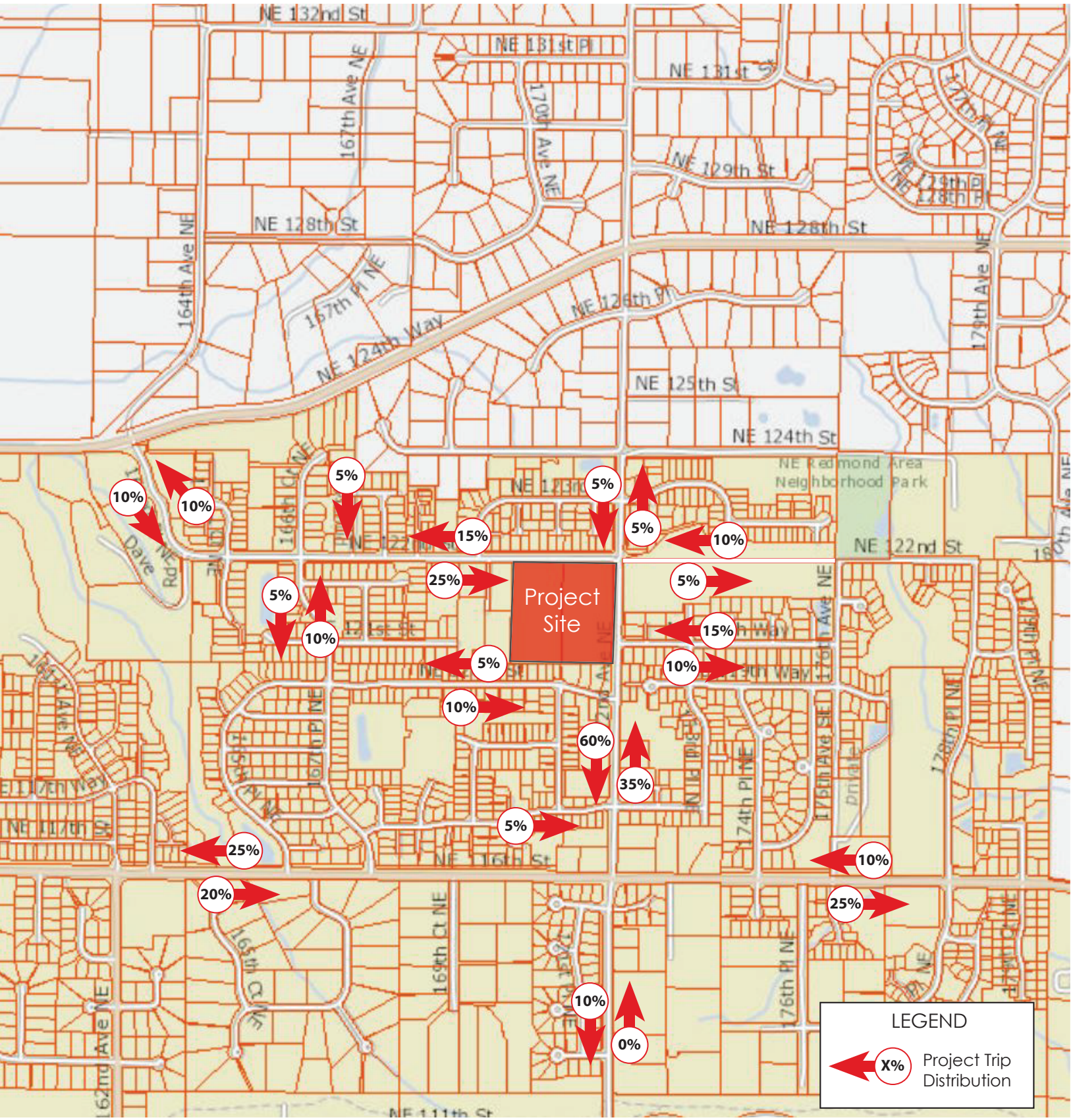
Map

3D

Imagery ©2016 Google, Map data ©2016 Google Terms Send feedback 1000 ft

Appendix E

Scenario 1 Trip Distributions and Trip Assignments



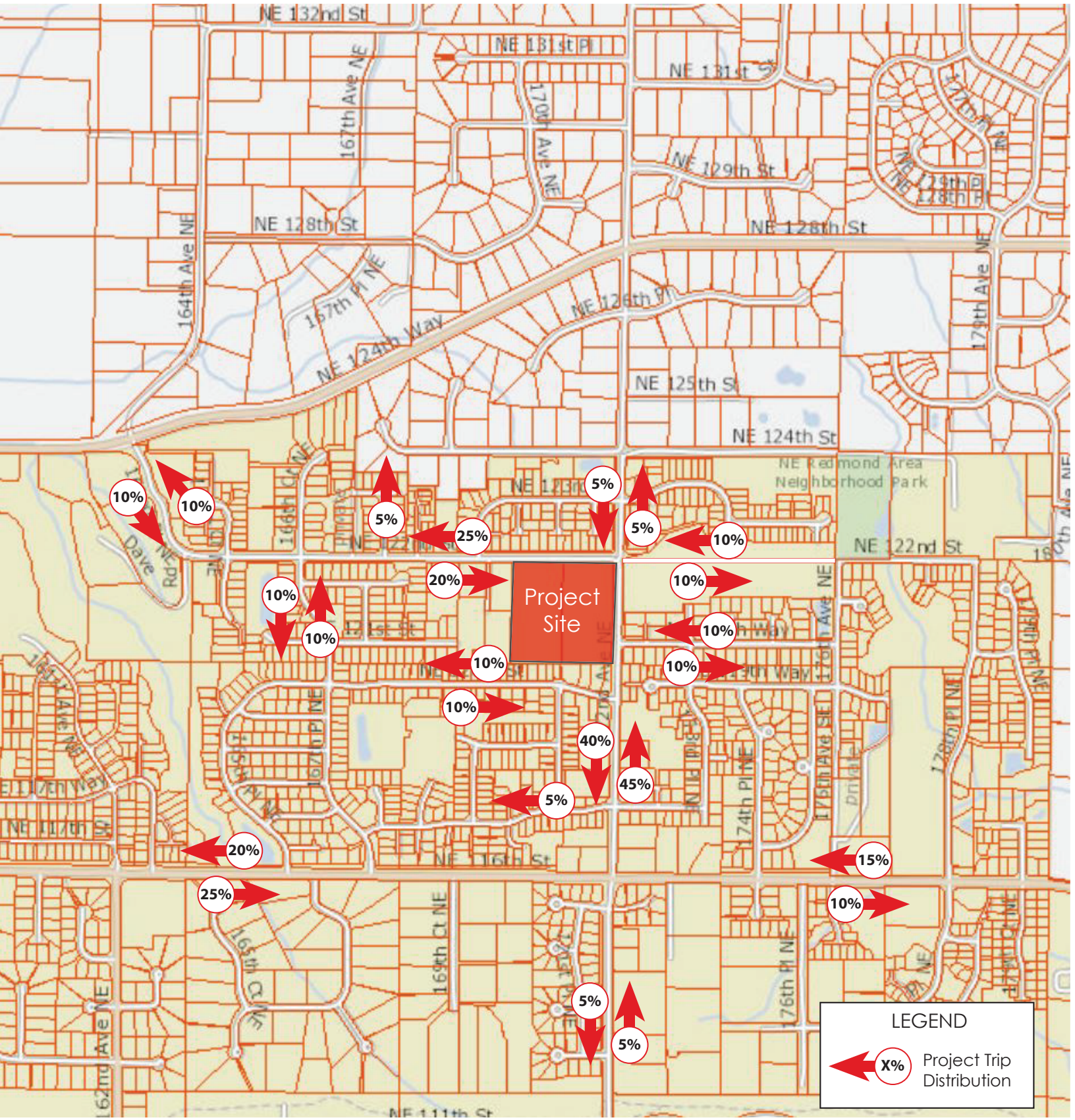
Appendix E1: AM Peak Hour Project Trip Distribution for Scenario 1

9/15/16



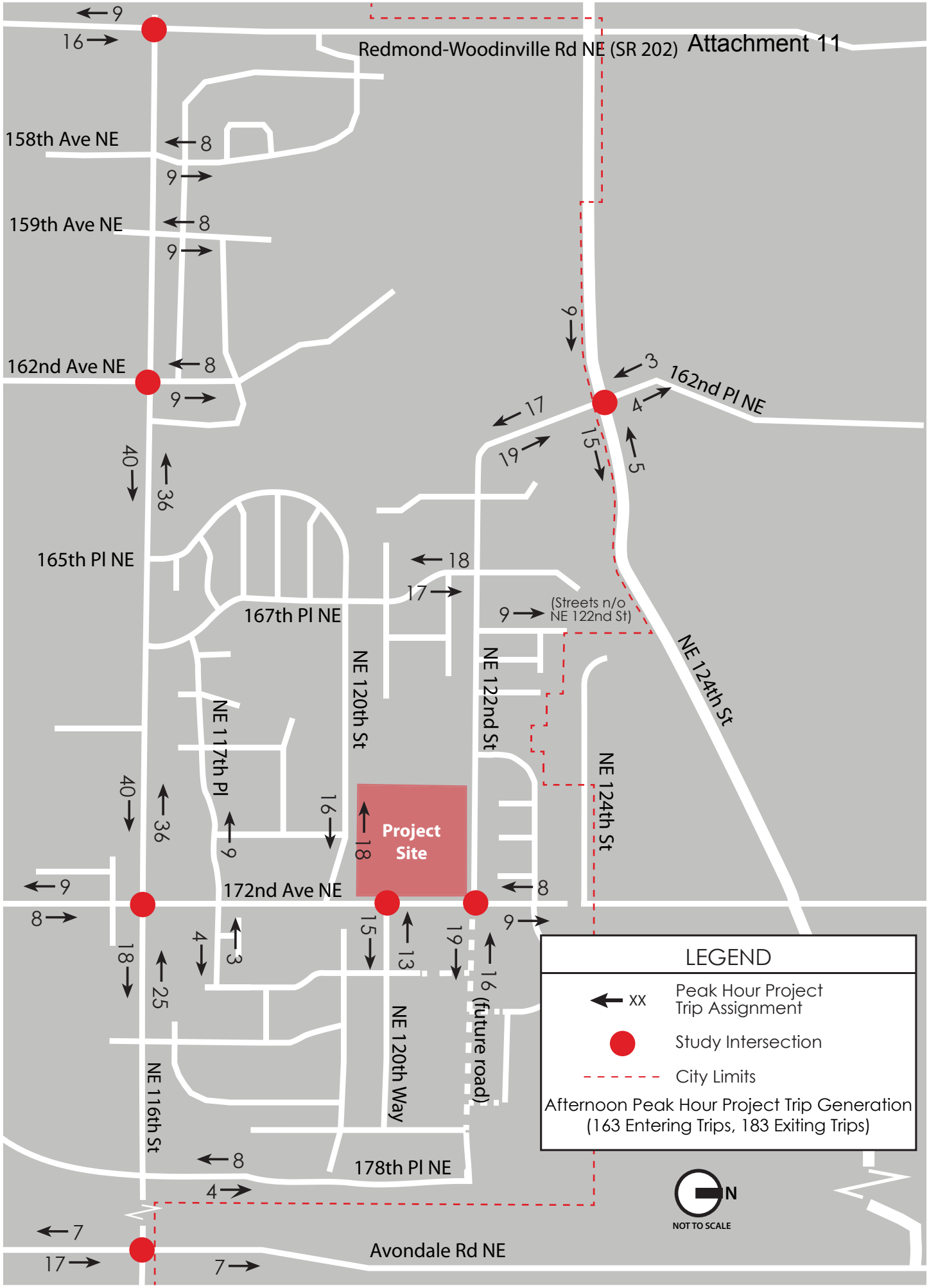
Appendix E2: AM Peak Hour Project Trip Assignment for Scenario 1

9/15/16



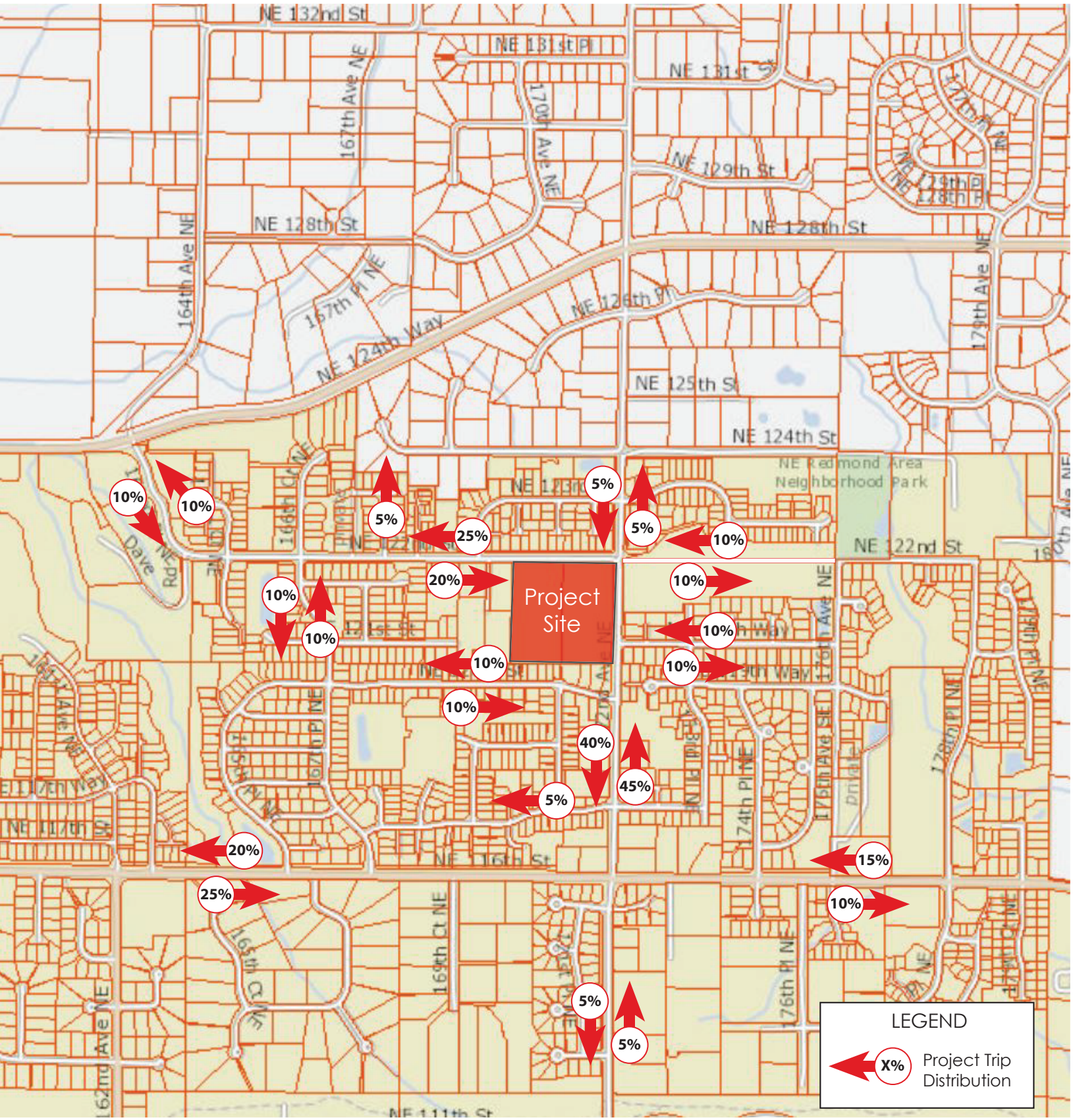
Appendix E3: Afternoon Peak Hour Project Trip Distribution for Scenario 1

9/15/16



Appendix E4: Afternoon Peak Hour Project Trip Assignment for Scenario 1

9/15/16



Appendix E5: PM Peak Hour Project Trip Distribution for Scenario 1

9/15/16

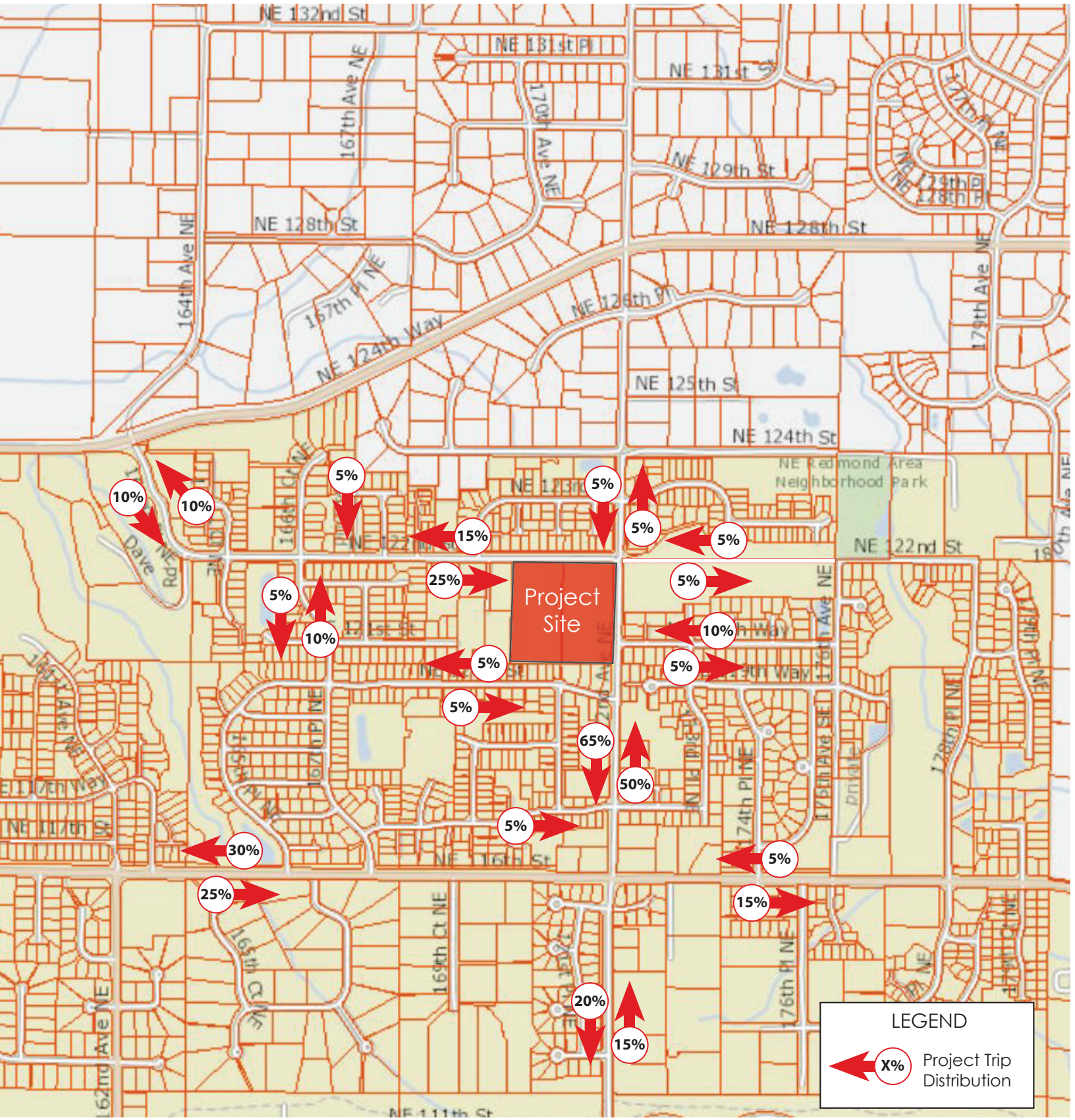


Appendix E6: PM Peak Hour Project Trip Assignment for Scenario 1

9/15/16

Appendix F

Scenario 2 Trip Distributions and Trip Assignments



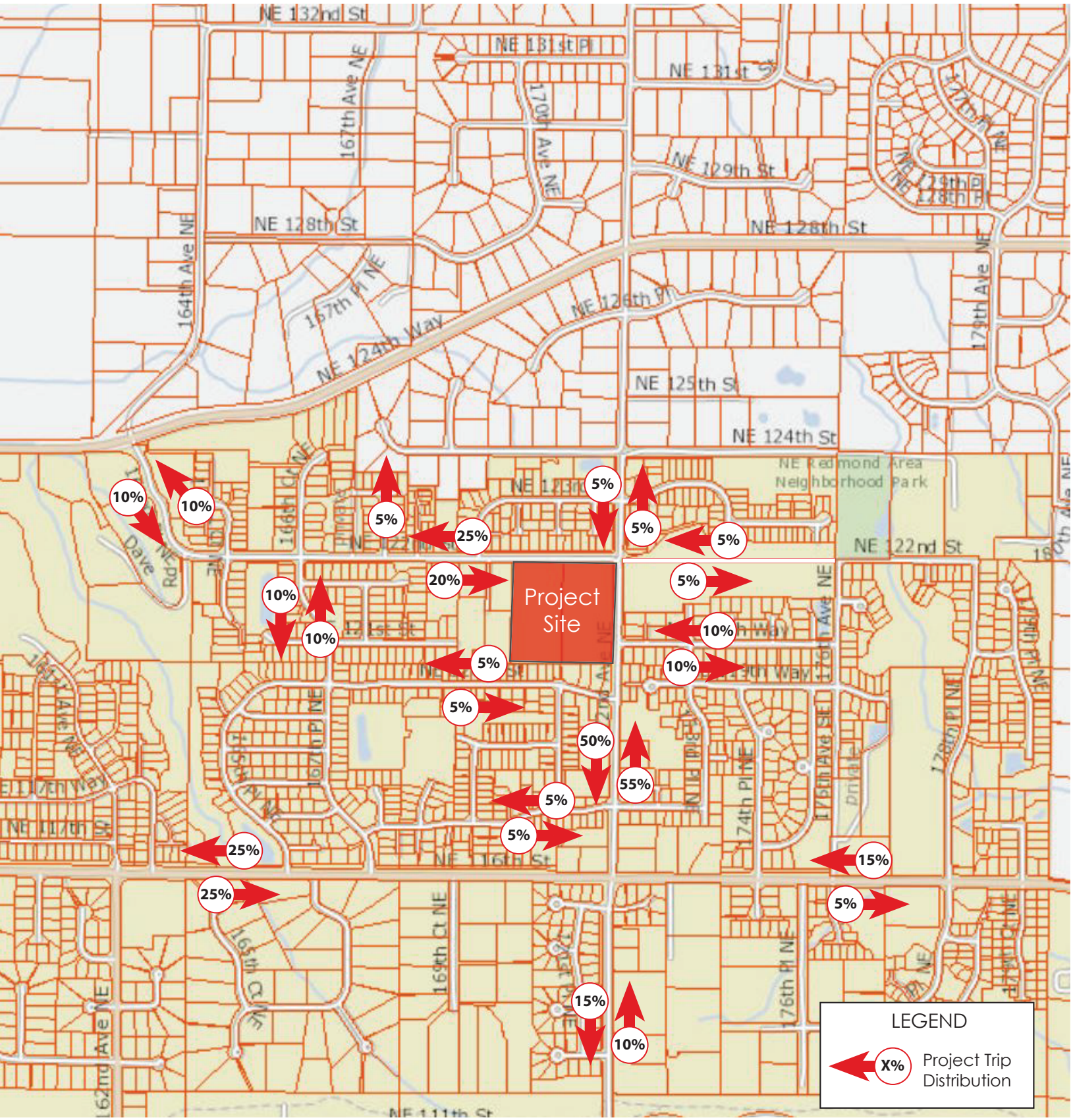
Appendix F1: AM Peak Hour Project Trip Distribution for Scenario 2

9/15/16



Appendix F2: AM Peak Hour Project Trip Assignment for Scenario 2

9/15/16



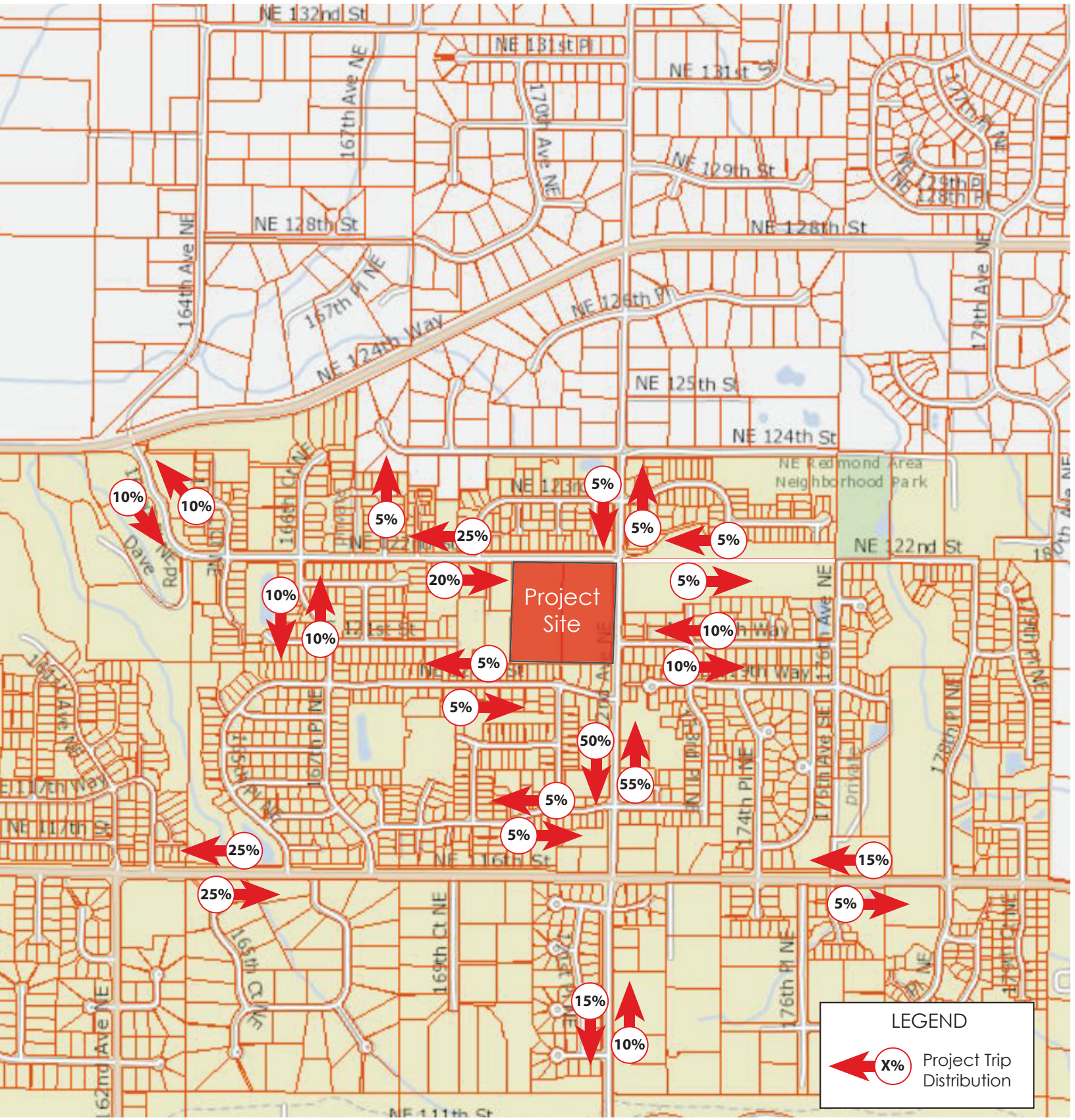
Appendix F3: Afternoon Peak Hour Project Trip Distribution for Scenario 2

9/15/16



Appendix F4: Afternoon Peak Hour Project Trip Assignment for Scenario 2

9/15/16



Appendix F5: PM Peak Hour Project Trip Distribution for Scenario 2

9/15/16

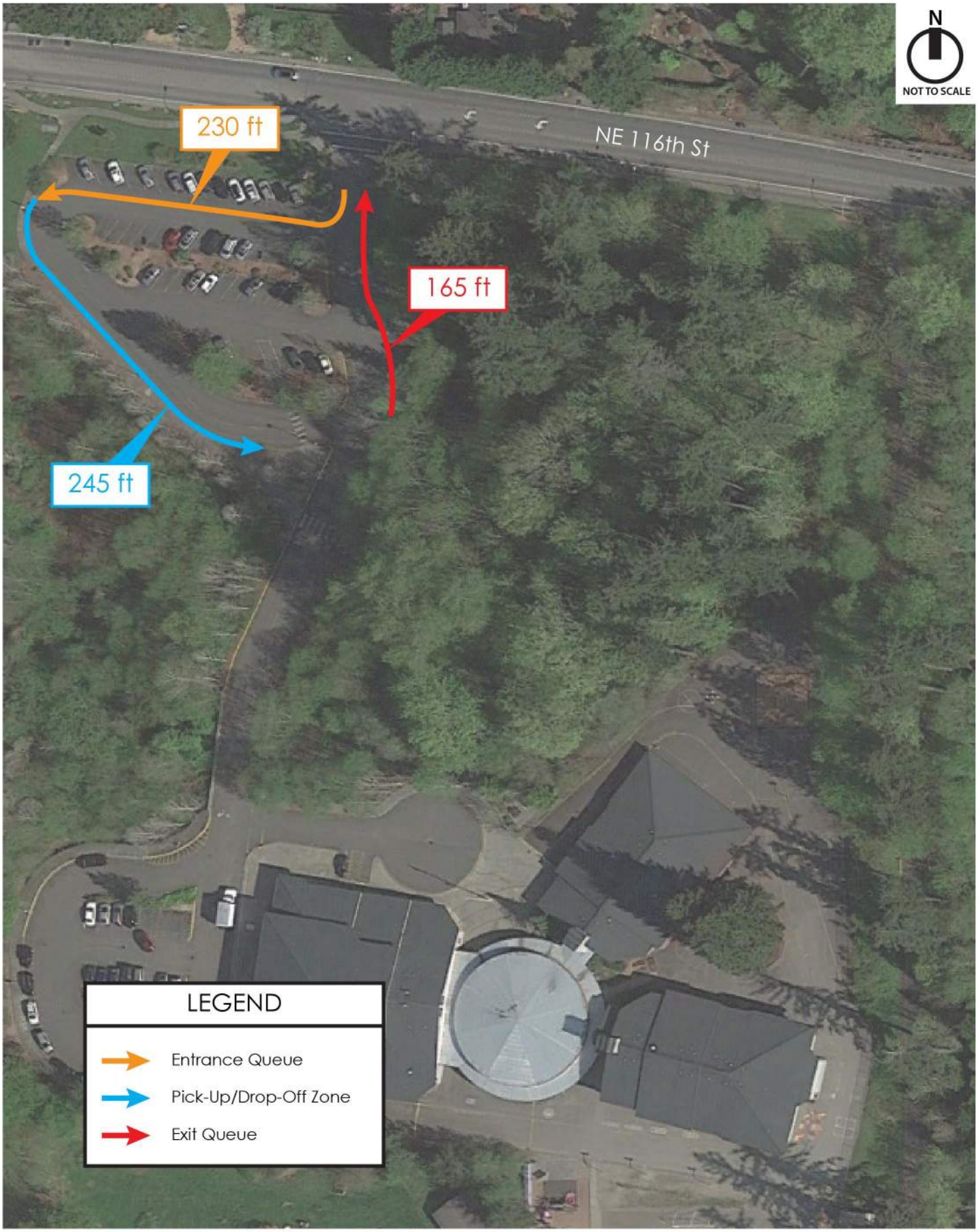


Appendix F6: PM Peak Hour Project Trip Assignment for Scenario 2

9/15/16

Appendix G

Queue Storage Diagrams for Existing Schools

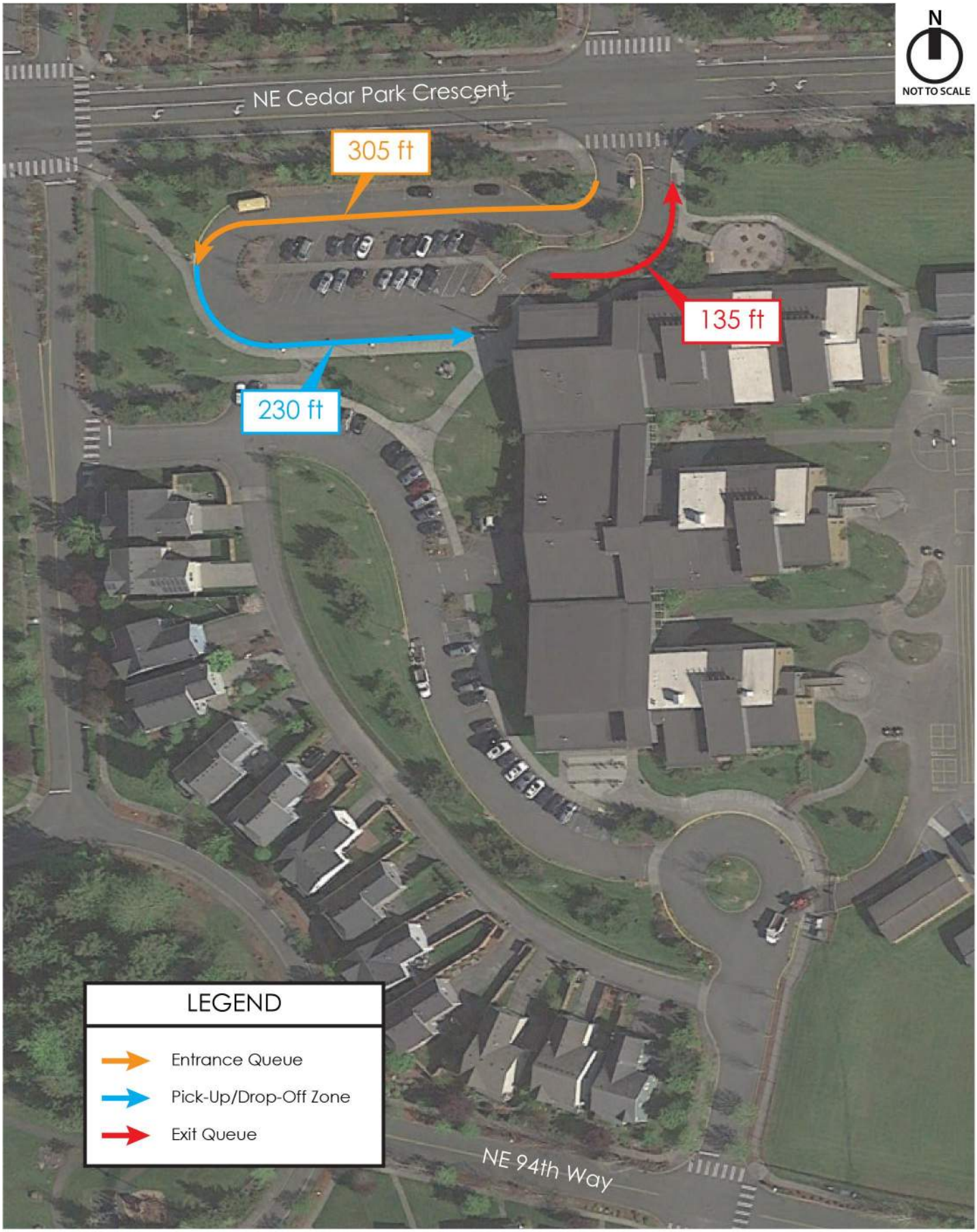


Appendix G1: Einstein Elementary School On-Site Queue Storage

North Redmond Elementary School - Redmond, WA

8/2/16

TENW

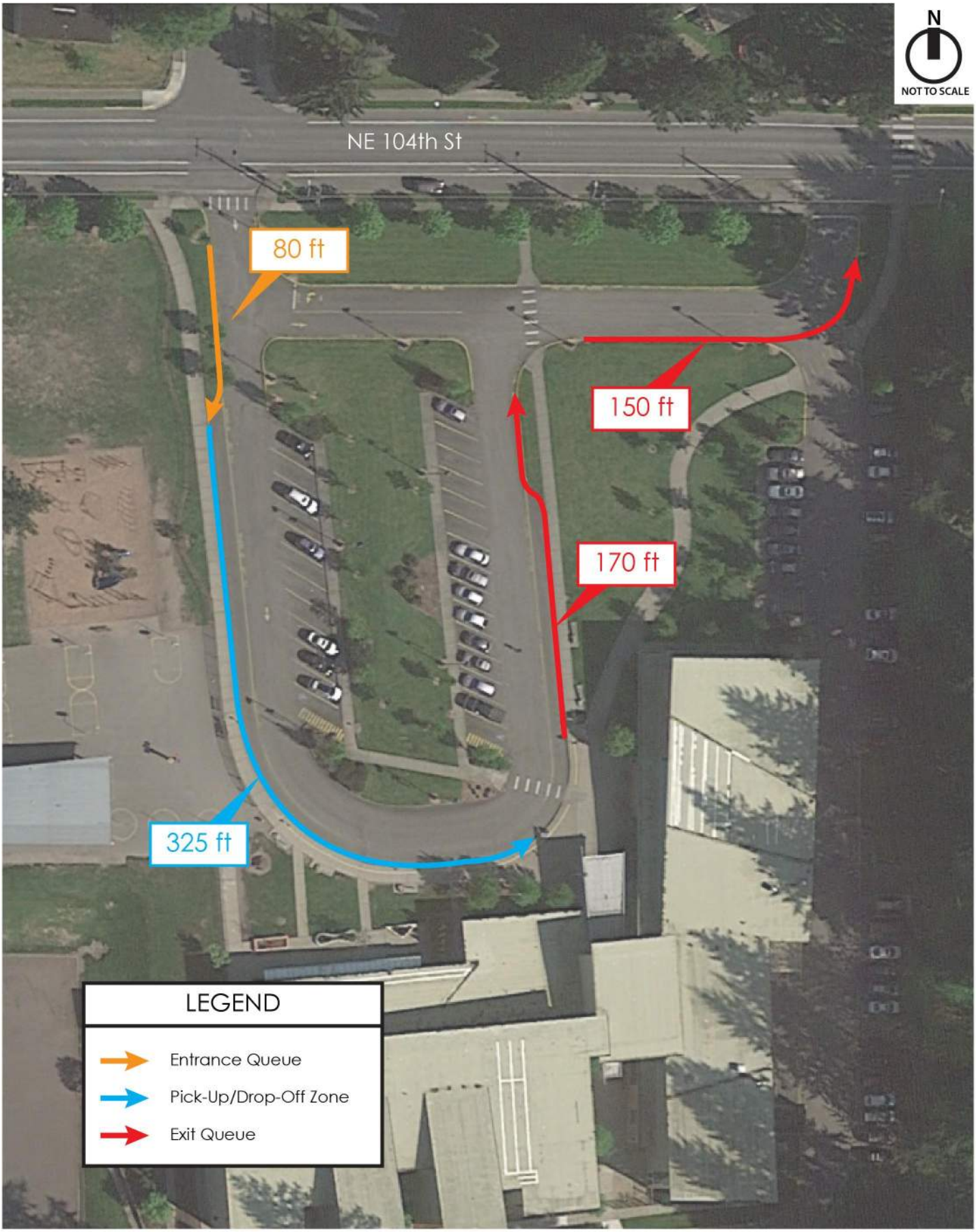


Appendix G2: Rosa Parks Elementary School On-Site Queue Storage

8/2/16

North Redmond Elementary School - Redmond, WA

TENW

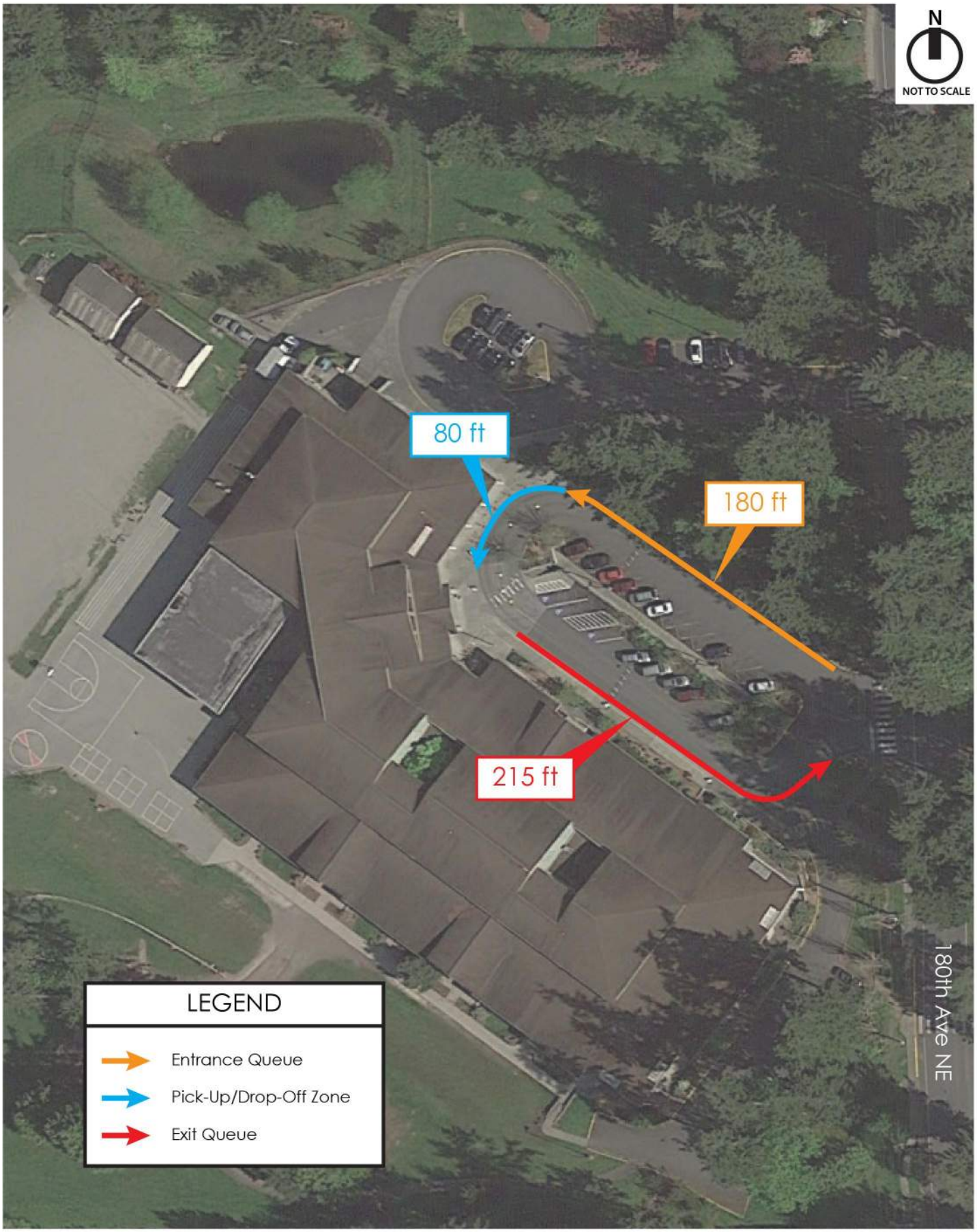


Appendix G3: Horace Mann Elementary School On-Site Queue Storage

8/2/16

North Redmond Elementary School - Redmond, WA

TENW

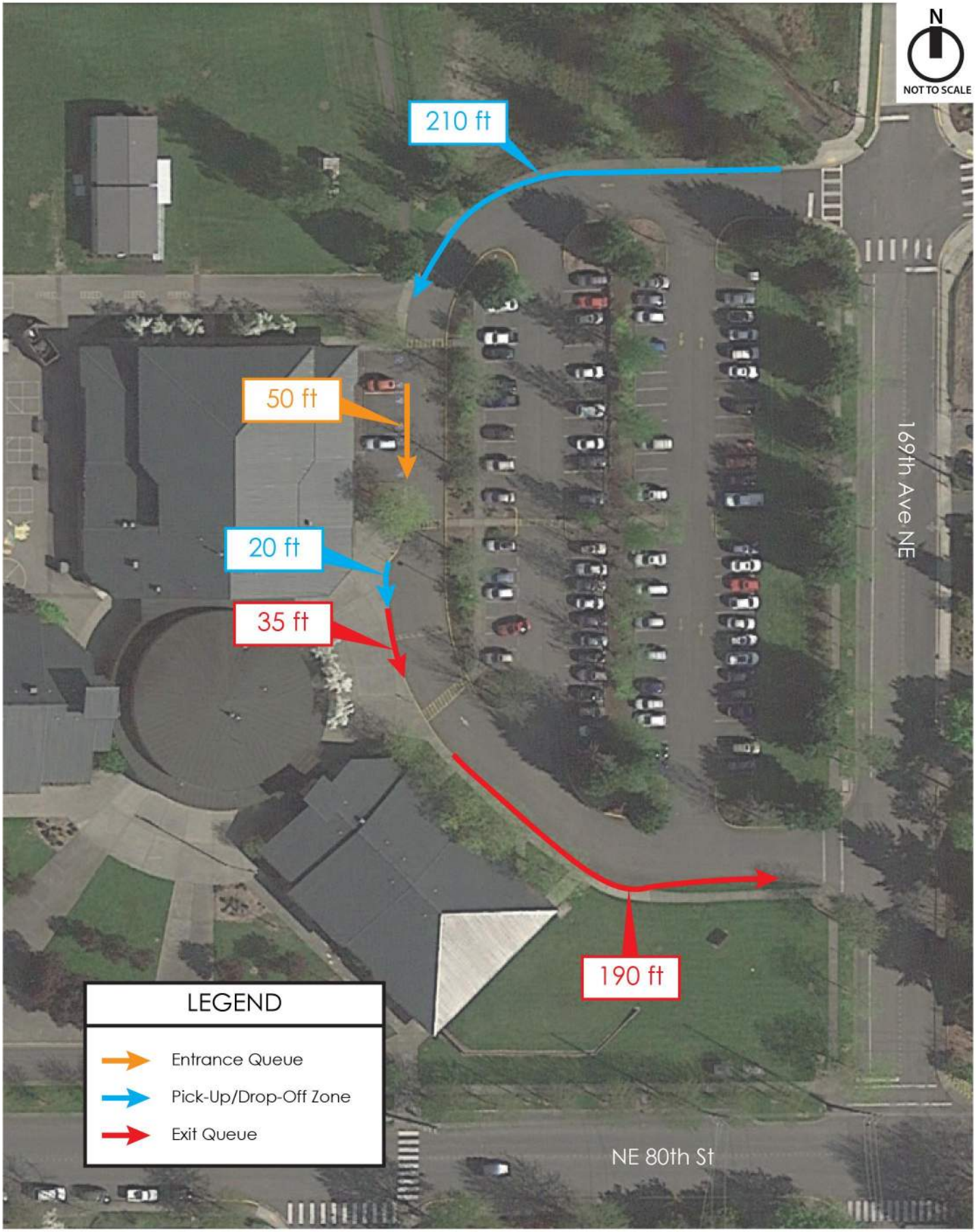


Appendix G4: Audubon Elementary School On-Site Queue Storage

8/2/16

North Redmond Elementary School - Redmond, WA

TENW



Appendix G5: Redmond Elementary School On-Site Queue Storage

8/2/16

North Redmond Elementary School - Redmond, WA

TENW

Appendix H

Signal Warrant Analysis at 162nd/24th

72-Hour Volume Summary - NE 124th Street / 162nd Place NE

Time	3-Day Average					Pipeline Growth*				Future Baseline Conditions					NRES Project Trips				Future With Project Conditions				
	EB (NE 124th St)	WB (NE 124th St)	NB (162nd Pl NE)	SB (162nd Pl NE)	Total Entering Volume	EB (NE 124th St)	WB (NE 124th St)	NB (162nd Pl NE)	SB (162nd Pl NE)	EB (NE 124th St)	WB (NE 124th St)	NB (162nd Pl NE)	SB (162nd Pl NE)	Total Entering Volume	EB (NE 124th St)	WB (NE 124th St)	NB (162nd Pl NE)	SB (162nd Pl NE)	EB (NE 124th St)	WB (NE 124th St)	NB (162nd Pl NE)	SB (162nd Pl NE)	Total Entering Volume
12:00 AM	49	22	1	1	73	3		1		52	22	2	1	77					52	22	2	1	77
1:00 AM	32	10	0	0	42	2		0		34	10	0	0	44					34	10	0	0	44
2:00 AM	19	12	1	0	32	1		1		20	12	2	0	34					20	12	2	0	34
3:00 AM	17	23	0	1	41	1		0		18	23	0	1	42					18	23	0	1	42
4:00 AM	29	41	1	3	74	2		1		31	41	2	3	77					31	41	2	3	77
5:00 AM	58	178	10	6	252	3		7		61	178	17	6	262					61	178	17	6	262
6:00 AM	157	530	16	13	716	9		11		166	530	27	13	736	0	0	1	0	166	530	28	13	738
7:00 AM	233	851	38	29	1,151	13		27		246	851	65	29	1,191	2	1	5	1	248	852	70	30	1,200
8:00 AM	320	879	52	33	1,284	18		37		338	879	89	33	1,339	0	21	25	7	338	900	114	40	1,392
9:00 AM	358	722	57	31	1,168	20		41		378	722	98	31	1,229	1	1	3	0	379	723	101	31	1,234
10:00 AM	403	519	45	29	996	23		32		426	519	77	29	1,051	1	1	2	0	427	520	79	29	1,055
11:00 AM	482	477	42	22	1,023	28		30		510	477	72	22	1,081	1	1	2	0	511	478	74	22	1,085
12:00 PM	509	474	42	22	1,047	29		30		538	474	72	22	1,106	1	1	2	0	539	475	74	22	1,110
1:00 PM	507	476	38	24	1,045	29		27		536	476	65	24	1,101	1	1	2	0	537	477	67	24	1,105
2:00 PM	578	437	38	20	1,073	33		27		611	437	65	20	1,133	2	5	8	1	613	442	73	21	1,149
3:00 PM	706	418	50	29	1,203	40		36		746	418	86	29	1,279	8	5	18	3	754	423	104	32	1,313
4:00 PM	870	427	62	27	1,386	50		44		920	427	106	27	1,480	1	3	4	1	921	430	110	28	1,488
5:00 PM	970	370	73	25	1,438	55		52		1,025	370	125	25	1,545	2	2	7	1	1,027	372	132	26	1,557
6:00 PM	781	352	49	18	1,200	45		35		826	352	84	18	1,280	0	0	1	0	826	352	85	18	1,282
7:00 PM	554	257	37	15	863	32		26		586	257	63	15	921	0	0	0	0	586	257	63	15	921
8:00 PM	465	211	23	10	709	27		16		492	211	39	10	752					492	211	39	10	752
9:00 PM	345	163	16	8	532	20		11		365	163	27	8	563					365	163	27	8	563
10:00 PM	185	109	7	5	306	11		5		196	109	12	5	322					196	109	12	5	322
11:00 PM	116	48	5	2	171	7		4		123	48	9	2	182					123	48	9	2	182
						501		501															
TOTAL	8,743	8,006	703	373	17,825	500		500		9,244	8,006	1,204	373	18,827	19	42	79	16	9,263	8,048	1,283	389	18,983

* Reflects 205 approved single-family lots in vicinity of 162nd Pl NE / NE 124th St intersection

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

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

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 1A
6:00	27	696	
7:00	65	1,097	
8:00	89	1,217	
9:00	98	1,100	
10:00	77	945	
11:00	72	987	
12:00	72	1,012	
13:00	65	1,012	
14:00	65	1,048	
15:00	86	1,164	
16:00	106	1,347	YES
17:00	125	1,395	YES
18:00	84	1,178	
19:00	63	843	
		WARRANT MET (3) =	**NO**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots).
(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 350 vehicles per hour on 1-lane major street (both approaches) and 105 vehicles per hour on 1-lane minor street approach.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

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

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 1B
6:00	27	696	
7:00	65	1,097	YES
8:00	89	1,217	YES
9:00	98	1,100	YES
10:00	77	945	YES
11:00	72	987	YES
12:00	72	1,012	YES
13:00	65	1,012	YES
14:00	65	1,048	YES
15:00	86	1,164	YES
16:00	106	1,347	YES
17:00	125	1,395	YES
18:00	84	1,178	YES
19:00	63	843	YES
		WARRANT MET (3) =	**YES**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots).
(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 525 vehicles per hour on 1-lane major street (both approaches) and 53 vehicles per hour on 1-lane minor street approach.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

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

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1)		
			Warrant 1 A/B	80% Condition A	80% Condition B
6:00	27	696			
7:00	65	1,097			YES
8:00	89	1,217	YES	YES	YES
9:00	98	1,100	YES	YES	YES
10:00	77	945			YES
11:00	72	987			YES
12:00	72	1,012			YES
13:00	65	1,012			YES
14:00	65	1,048			YES
15:00	86	1,164	YES	YES	YES
16:00	106	1,347	YES	YES	YES
17:00	125	1,395	YES	YES	YES
18:00	84	1,178	YES	YES	YES
19:00	63	843			YES
		WARRANT MET (3) =	**NO**		

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots).
(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 for Condition A and Condition B.

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

Warrant 2 - Four Hour Vehicular Volume

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 2
6:00	27	696	
7:00	65	1,097	
8:00	89	1,217	YES
9:00	98	1,100	YES
10:00	77	945	YES
11:00	72	987	YES
12:00	72	1,012	YES
13:00	65	1,012	YES
14:00	65	1,048	YES
15:00	86	1,164	YES
16:00	106	1,347	YES
17:00	125	1,395	YES
18:00	84	1,178	YES
17:00	63	843	YES
		WARRANT MET (3) =	**YES**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots).
(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.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

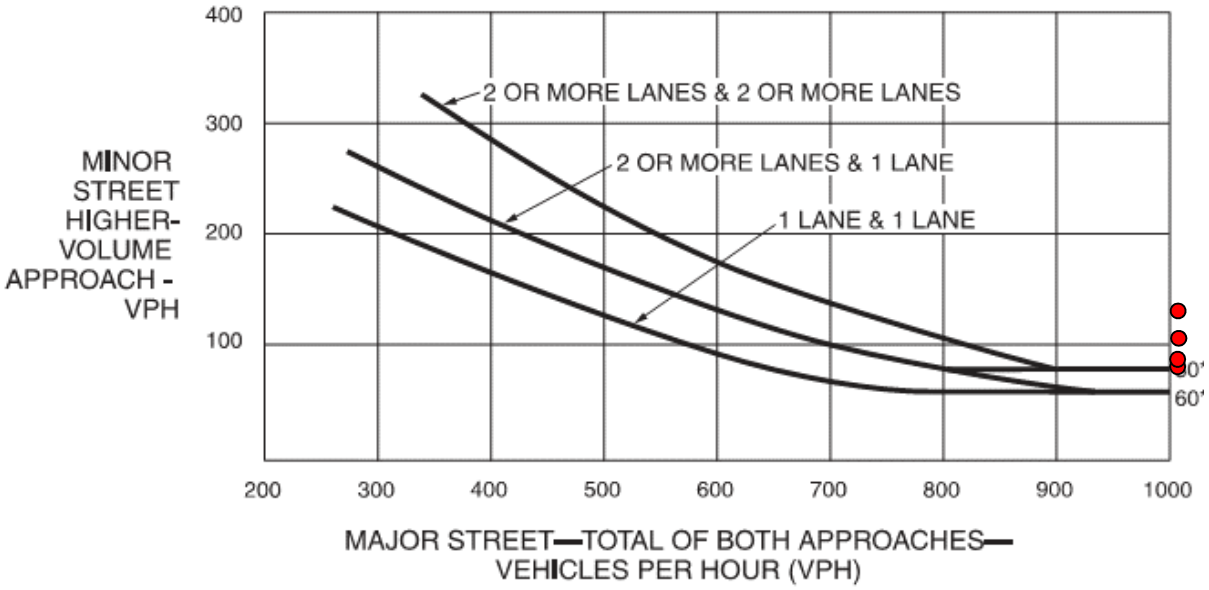
LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

Warrant 2 - Four Hour Vehicular Volume

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT MET (2) =

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

Warrant 3 - Peak Hour (AM 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

NE 124th St / 162nd Pl NE, NB approach (1 lane)

	NB Approach		
Control Delay (sec/veh) =	425.1	sec/veh	**Based on results from HCM 2010 analysis
Stopped Delay (sec/veh) =	327.0	sec/veh	
Total Volume (veh/hr) =	86	veh/hour	
Vehicle-Hours =	7.81	veh-hours	
CONDITION 1 MET =	**YES**		

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.

NE 124th St / 162nd Pl NE, NB approach (1 lane) =		86
CONDITION 2 MET =	**NO**	

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.

NE 124th St / 162nd Pl NE, TEV =		1,650
CONDITION 3 MET =	**YES**	

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

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

NE 124th St / 162nd Pl NE, NB approach (1 lane)

	NB Approach		
Control Delay (sec/veh) =	274.9	sec/veh	**Based on results from HCM 2010 analysis
Stopped Delay (sec/veh) =	211.5	sec/veh	
Total Volume (veh/hr) =	74	veh/hour	
Vehicle-Hours =	4.35	veh-hours	
CONDITION 1 MET =	**YES**		

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.

NE 124th St / 162nd Pl NE, NB approach (1 lane) =		74
CONDITION 2 MET =	**NO**	

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.

NE 124th St / 162nd Pl NE, TEV =		1,895
CONDITION 3 MET =	**YES**	

WARRANT MET =	**YES**

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

Warrant 3 - Peak Hour
Condition B

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 3
6:00	27	696	
7:00	65	1,097	
8:00	89	1,217	YES
9:00	98	1,100	YES
10:00	77	945	YES
11:00	72	987	
12:00	72	1,012	
13:00	65	1,012	
14:00	65	1,048	
15:00	86	1,164	YES
16:00	106	1,347	YES
17:00	125	1,395	YES
18:00	84	1,178	YES
19:00	63	843	
		WARRANT MET (3) =	**YES**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots).
(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.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the itnersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3.

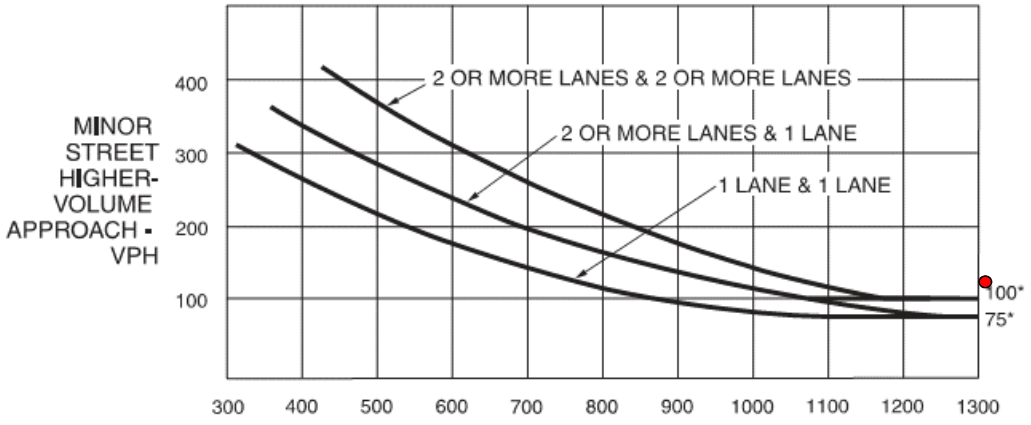
LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 Without Project Conditions

Warrant 3 - Peak Hour
Condition B

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 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.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the itnersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

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

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 1A
6:00	28	697	
7:00	70	1,100	
8:00	114	1,238	YES
9:00	101	1,102	
10:00	79	947	
11:00	74	989	
12:00	74	1,014	
13:00	67	1,014	
14:00	73	1,055	
15:00	104	1,177	
16:00	110	1,350	YES
17:00	132	1,399	YES
18:00	85	1,179	
19:00	63	843	
		WARRANT MET (3) =	**NO**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots) and NRES project traffic.
(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 350 vehicles per hour on 1-lane major street (both approaches) and 105 vehicles per hour on 1-lane minor street approach.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

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

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 1B
6:00	28	697	
7:00	70	1,100	YES
8:00	114	1,238	YES
9:00	101	1,102	YES
10:00	79	947	YES
11:00	74	989	YES
12:00	74	1,014	YES
13:00	67	1,014	YES
14:00	73	1,055	YES
15:00	104	1,177	YES
16:00	110	1,350	YES
17:00	132	1,399	YES
18:00	85	1,179	YES
19:00	63	843	YES
		WARRANT MET (3) =	**YES**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots) and NRES project traffic.
(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 525 vehicles per hour on 1-lane major street (both approaches) and 53 vehicles per hour on 1-lane minor street approach.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

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

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1)		
			Warrant 1 A/B	56% Condition A	56% Condition B
6:00	28	697			
7:00	70	1,100			YES
8:00	114	1,238	YES	YES	YES
9:00	101	1,102	YES	YES	YES
10:00	79	947			YES
11:00	74	989			YES
12:00	74	1,014			YES
13:00	67	1,014			YES
14:00	73	1,055			YES
15:00	104	1,177	YES	YES	YES
16:00	110	1,350	YES	YES	YES
17:00	132	1,399	YES	YES	YES
18:00	85	1,179	YES	YES	YES
19:00	63	843			YES
		WARRANT MET (3) =	**NO**		

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots) and NRES project traffic.
(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 56 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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

Warrant 2 - Four Hour Vehicular Volume

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 2
6:00	28	697	
7:00	70	1,100	
8:00	114	1,238	YES
9:00	101	1,102	YES
10:00	79	947	YES
11:00	74	989	YES
12:00	74	1,014	YES
13:00	67	1,014	YES
14:00	73	1,055	YES
15:00	104	1,177	YES
16:00	110	1,350	YES
17:00	132	1,399	YES
18:00	85	1,179	YES
17:00	63	843	YES
		WARRANT MET (3) =	**YES**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots) and NRES project traffic.
(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.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the intersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-2 may be used in place of Figure 4C-1.

10 of the 14 hours have a major street volume greater than 1,000 and a minor street volume greater than 60

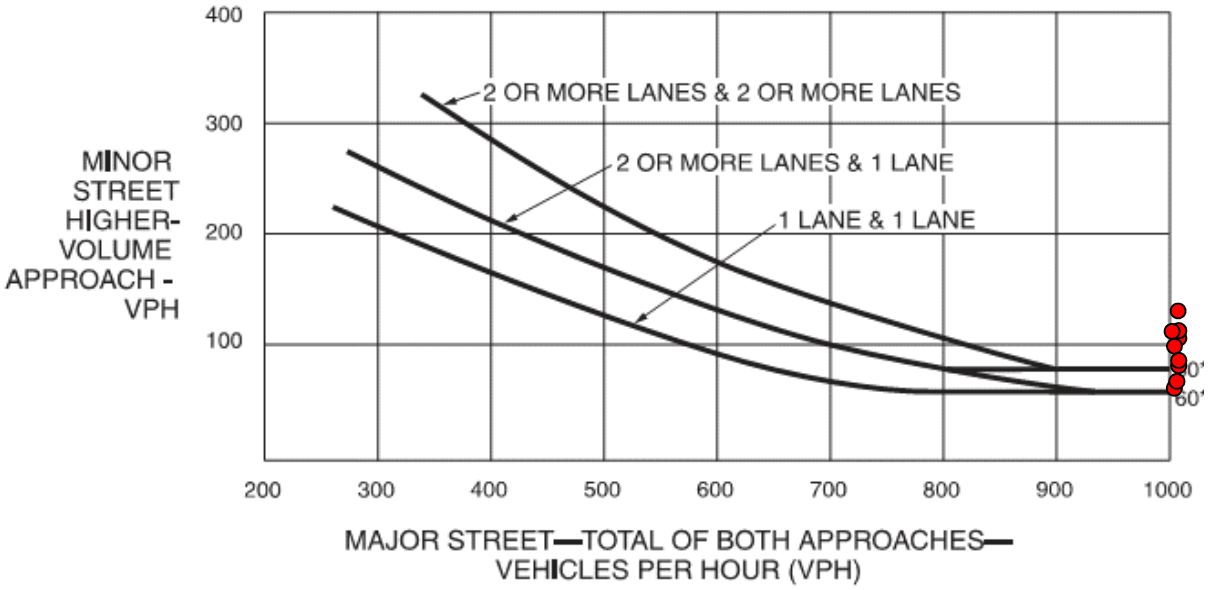
LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

Warrant 2 - Four Hour Vehicular Volume

Figure 4C-2. Warrant 2, Four-Hour Vehicular Volume (70% Factor)

(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 80 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 60 vph applies as the lower threshold volume for a minor-street approach with one lane.

WARRANT MET (2) =

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

Warrant 3 - Peak Hour (AM 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

NE 124th St / 162nd Pl NE, NB approach (1 lane)

	NB Approach		
Control Delay (sec/veh) =	782.9	sec/veh	**Based on results from HCM 2010 analysis
Stopped Delay (sec/veh) =	602.2	sec/veh	
Total Volume (veh/hr) =	86	veh/hour	
Vehicle-Hours =	14.39	veh-hours	
CONDITION 1 MET =	**YES**		

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.

NE 124th St / 162nd Pl NE, NB approach (1 lane) =		111
CONDITION 2 MET =	**YES**	

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.

NE 124th St / 162nd Pl NE, TEV =		1,703
CONDITION 3 MET =	**YES**	

WARRANT MET =	**YES**

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

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

NE 124th St / 162nd Pl NE, NB approach (1 lane)

	NB Approach		
Control Delay (sec/veh) =	287.8	sec/veh	**Based on results from HCM 2010 analysis
Stopped Delay (sec/veh) =	221.4	sec/veh	
Total Volume (veh/hr) =	74	veh/hour	
Vehicle-Hours =	4.55	veh-hours	
CONDITION 1 MET =	**YES**		

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.

NE 124th St / 162nd Pl NE, NB approach (1 lane) =		81
CONDITION 2 MET =	**NO**	

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.

NE 124th St / 162nd Pl NE, TEV =		1,907
CONDITION 3 MET =	**YES**	

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.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

Warrant 3 - Peak Hour
Condition B

Hour Begins	Minor Approach 162nd Place NE Highest NB/SB (2)	Major Approach NE 124th Street Total EB & WB (2)	MUTCD (1) Warrant 3
6:00	28	697	
7:00	70	1,100	
8:00	114	1,238	YES
9:00	101	1,102	YES
10:00	79	947	YES
11:00	74	989	
12:00	74	1,014	
13:00	67	1,014	
14:00	73	1,055	
15:00	104	1,177	YES
16:00	110	1,350	YES
17:00	132	1,399	YES
18:00	85	1,179	YES
19:00	63	843	
		WARRANT MET (3) =	**YES**

Notes:
(1) MUTCD - Manual on Uniform Traffic Control Devices, 2009.
(2) Three-day average of 24-hour volumes conducted on 8/5, 8/6, and 8/7, 2014 with pipeline growth (205 SF lots) and NRES project traffic.
(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.

Option:

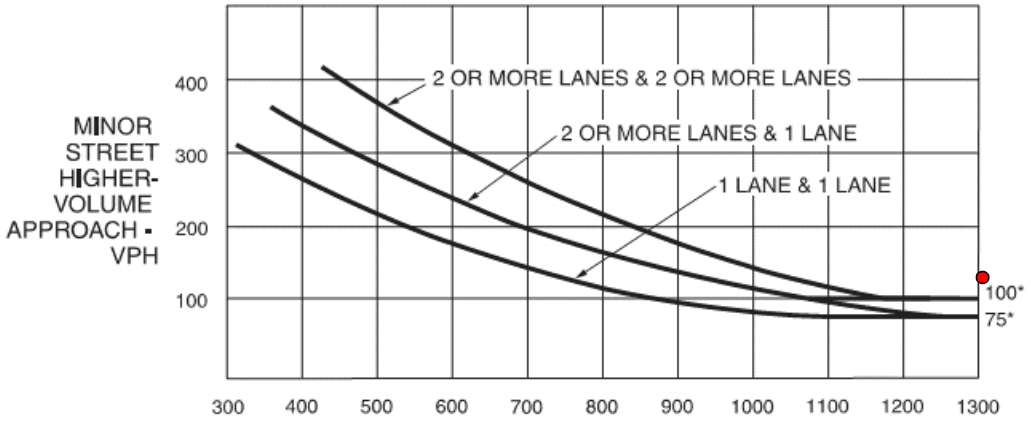
If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the itnersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3.

LWSD North Redmond Elementary School
TENW Project No. 5224

Signal Warrant Analysis for NE 124th Street / 162nd Place NE
2018 With Project Conditions

Warrant 3 - Peak Hour
Condition B

Figure 4C-4. Warrant 3, Peak Hour (70% Factor)
(COMMUNITY LESS THAN 10,000 POPULATION OR ABOVE 40 MPH ON MAJOR STREET)



*Note: 100 vph applies as the lower threshold volume for a minor-street approach with two or more lanes and 75 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:

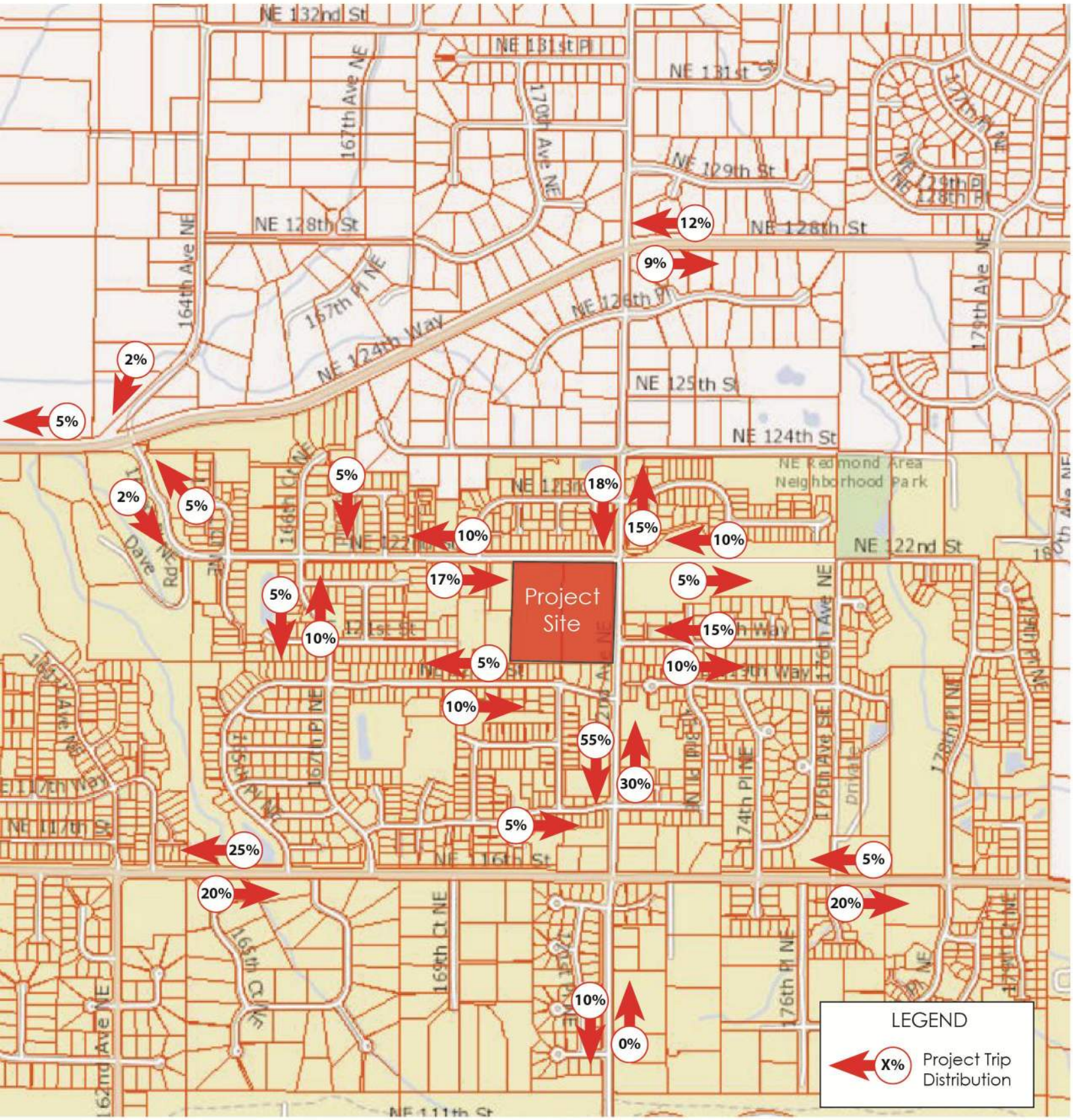
This signal warrant shall only be applied in unusual cases. Such cases include, but are not limited to, office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time.

Option:

If the posted or statutory speed limit or the 85th-percentile speed on the major street exceeds 40 mph, or if the itnersection lies within the built-up area of an isolated community having a population of less than 10,000, Figure 4C-4 may be used in place of Figure 4C-3.

Appendix I

Volume Forecasts with 172nd Ave NE Extension



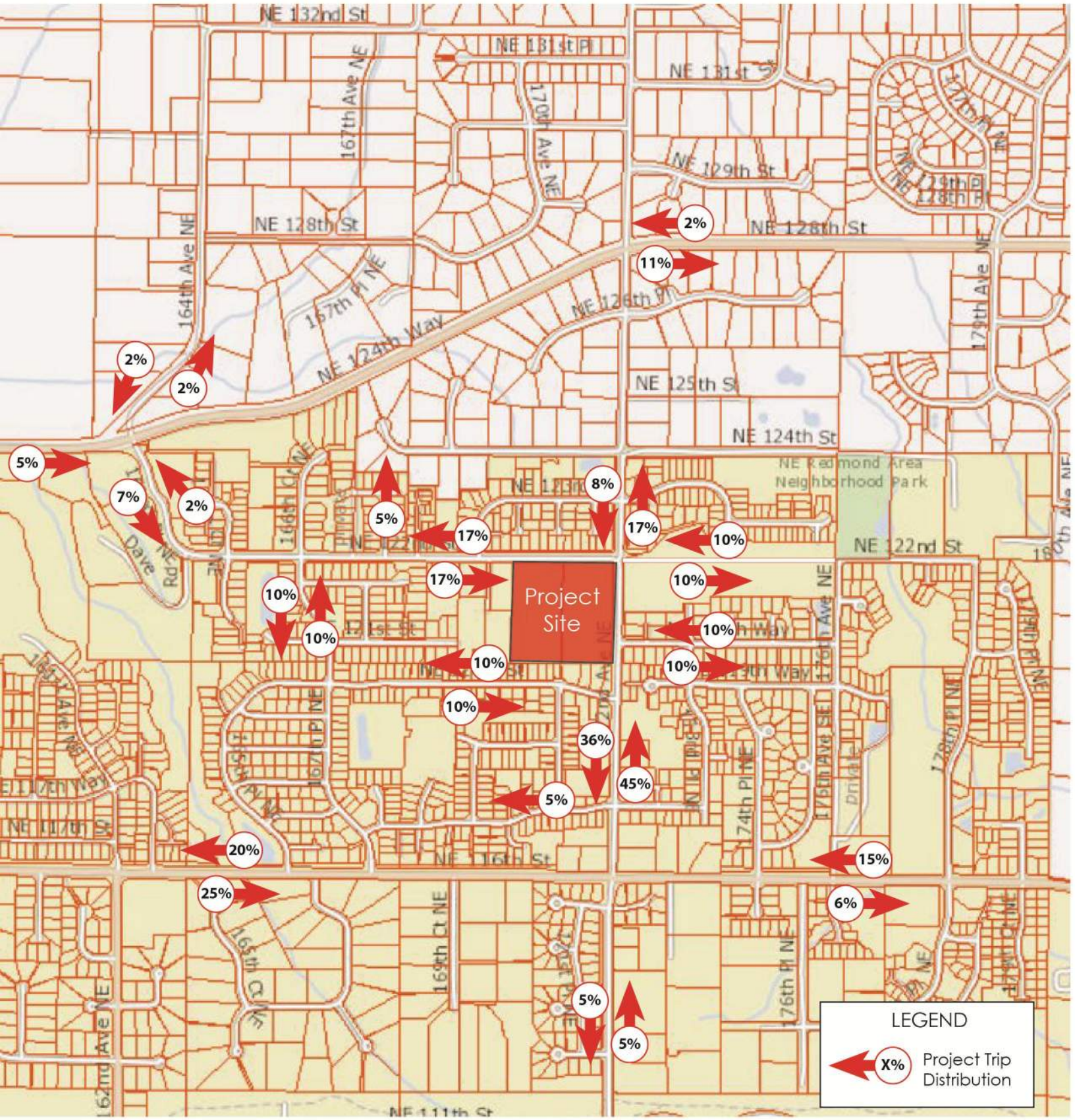
Appendix I1: AM Peak Hour Project Trip Distribution for Scenario 1 with 172nd Extension

10/21/16



Appendix I2: AM Peak Hour Project Trip Assignment for Scenario 1 with 172nd Extension

10/21/16

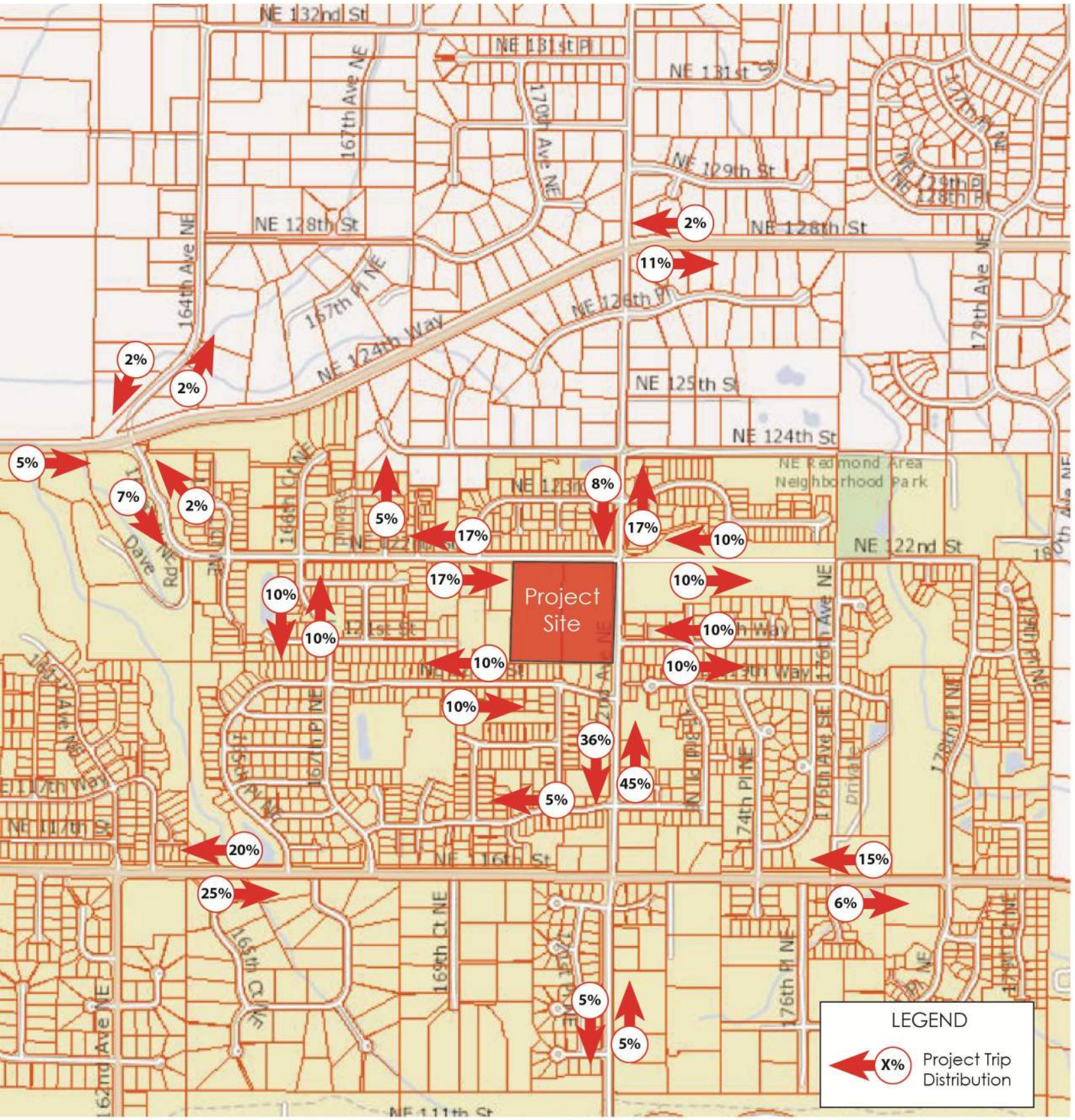


Appendix I3: Afternoon Peak Hour Project Trip Distribution for Scenario 1 with 172nd Extension 10/21/16



Appendix I4: Afternoon Peak Hour Project Trip Assignment for Scenario 1 with 172nd Extension

10/21/16



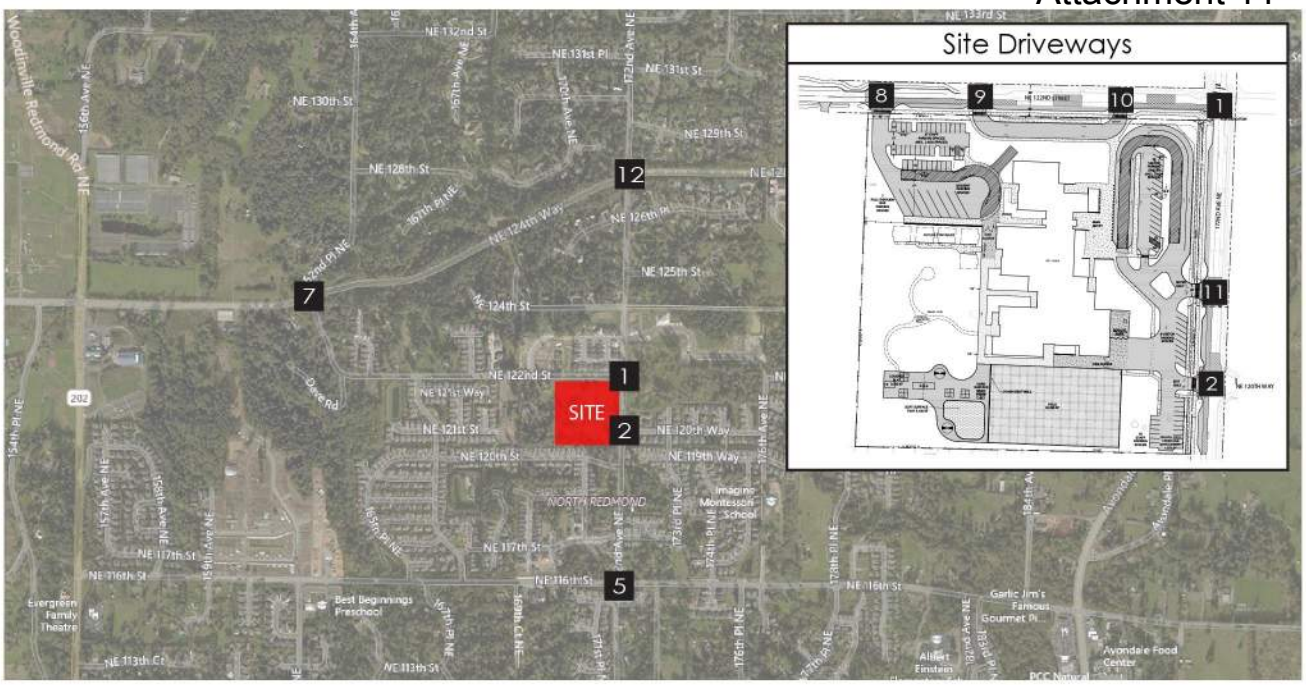
Appendix I5: PM Peak Hour Project Trip Distribution for Scenario 1 with 172nd Extension

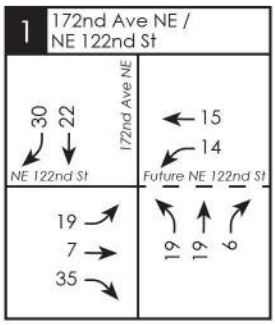
10/21/16

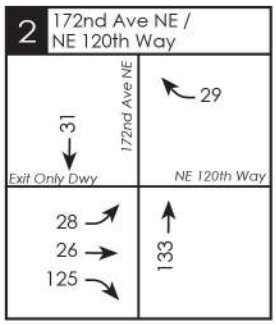


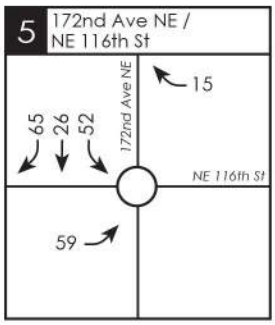
Appendix I6: PM Peak Hour Project Trip Assignment for Scenario 1 with 172nd Extension

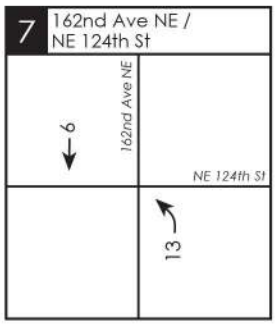
10/21/16

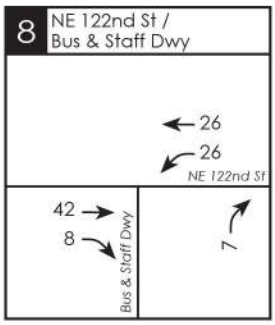


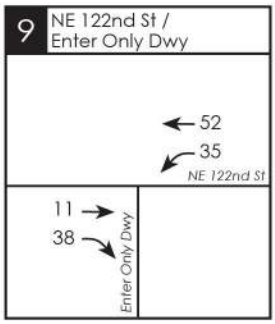


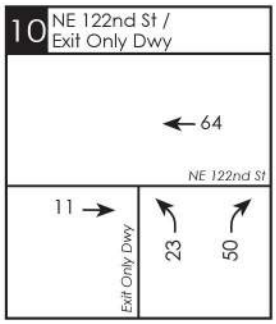


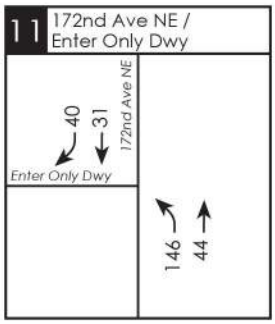


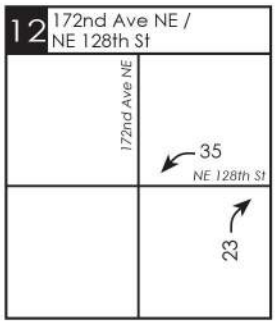


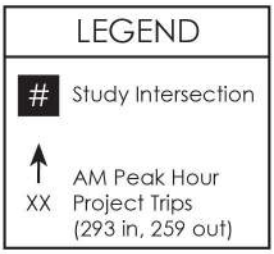




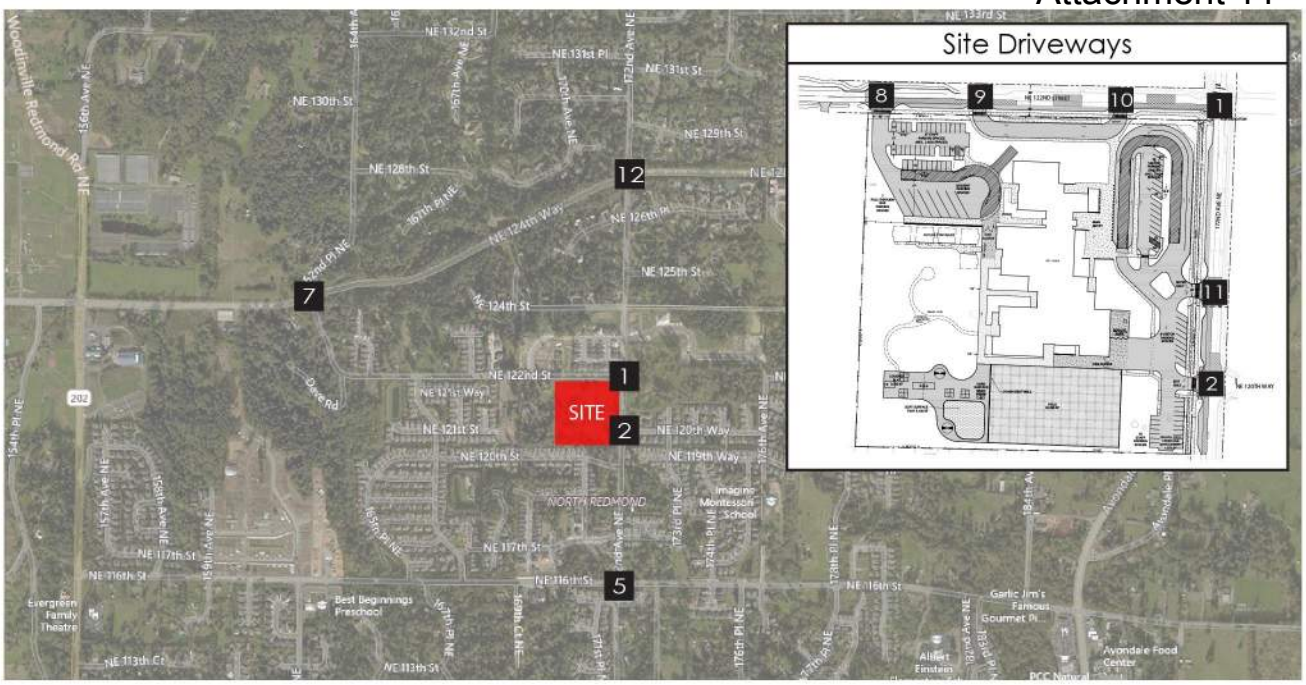


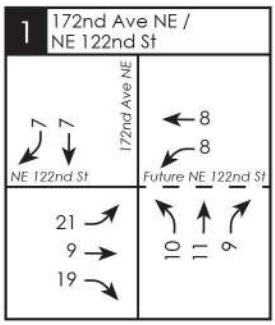


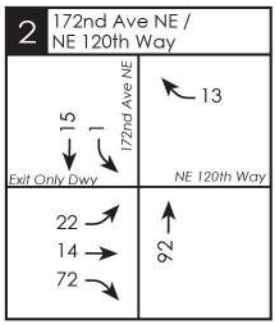


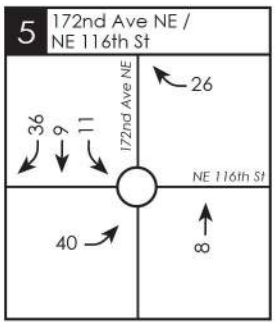


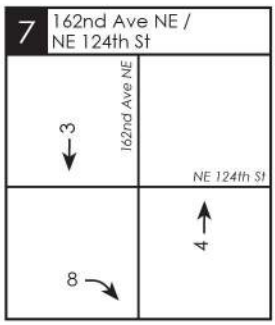
Appendix I7: AM Peak Hour Project Trip Assignment for Scenario 1 with 172nd Ave Extension 10/21/16

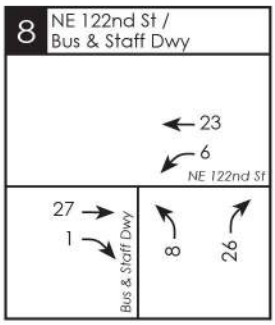


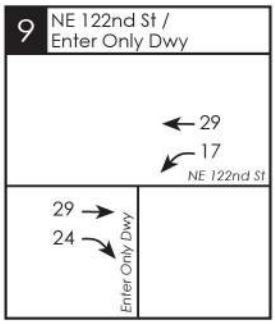


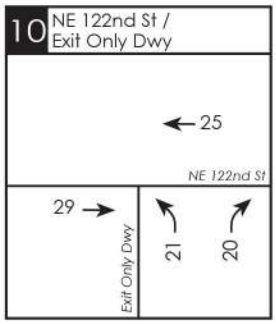


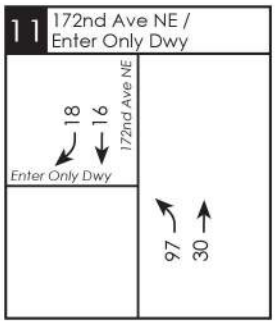


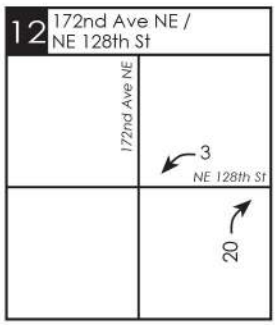


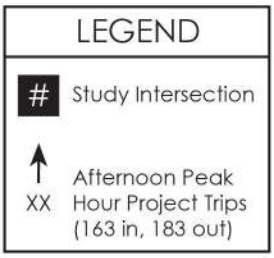




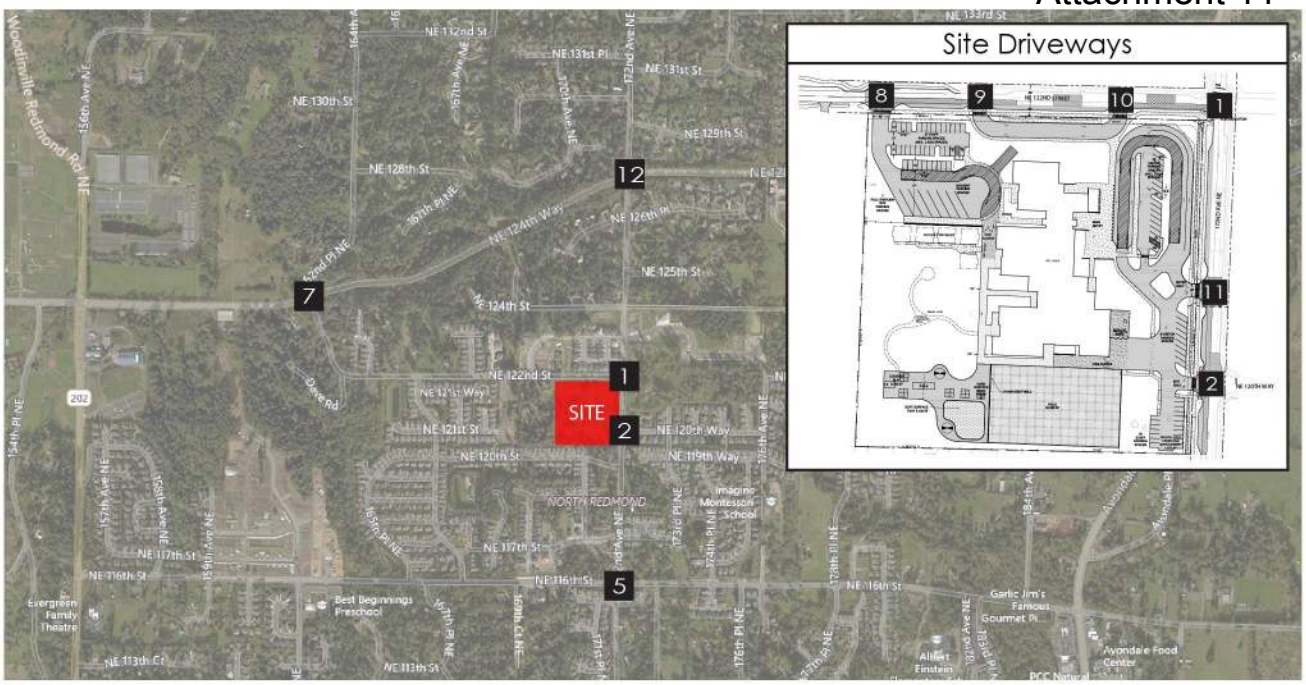


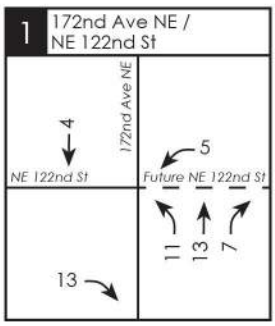


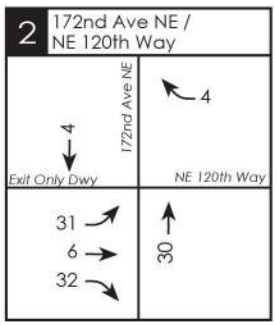


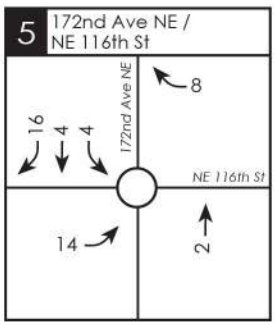


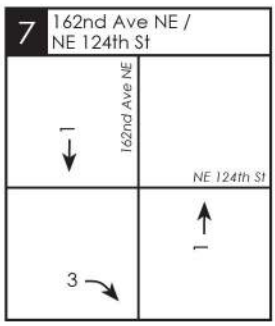
Appendix I8: Afternoon Peak Hour Project Trip Assignment for Scenario 1 with 172nd Ave Extension

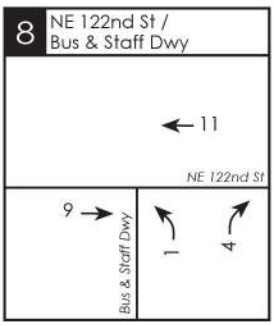

Site Driveways
N
NOT TO SCALE
SITE
NE 122nd St
NE 120th Way
NE 116th St
NE 124th St
172nd Ave NE
NORTH REDMOND
Imagine Montessori School
Best Beginnings Preschool
Evergreen Family Theatre
Garlic Jim's Famous Gourmet Pi...
Avondale Food Center
Albert Einstein
PCC Natural

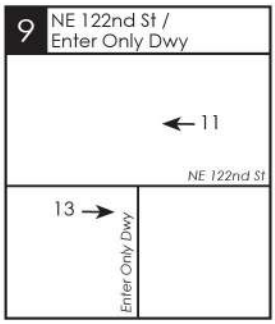

1 172nd Ave NE / NE 122nd St
NE 122nd St
Future NE 122nd St
172nd Ave NE
4
5
11
13
7
13

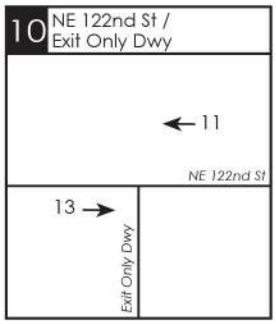

2 172nd Ave NE / NE 120th Way
Exit Only Dwy
NE 120th Way
172nd Ave NE
4
4
31
6
32
30

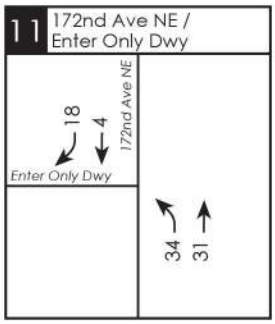

5 172nd Ave NE / NE 116th St
NE 116th St
172nd Ave NE
16
4
4
8
14
2

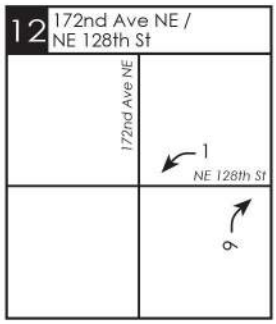

7 162nd Ave NE / NE 124th St
NE 124th St
162nd Ave NE
1
3
1

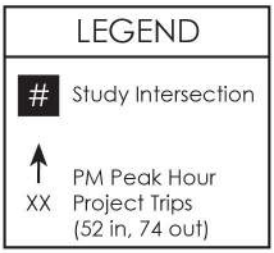

8 NE 122nd St / Bus & Staff Dwy
NE 122nd St
11
9
Bus & Staff Dwy
1
4

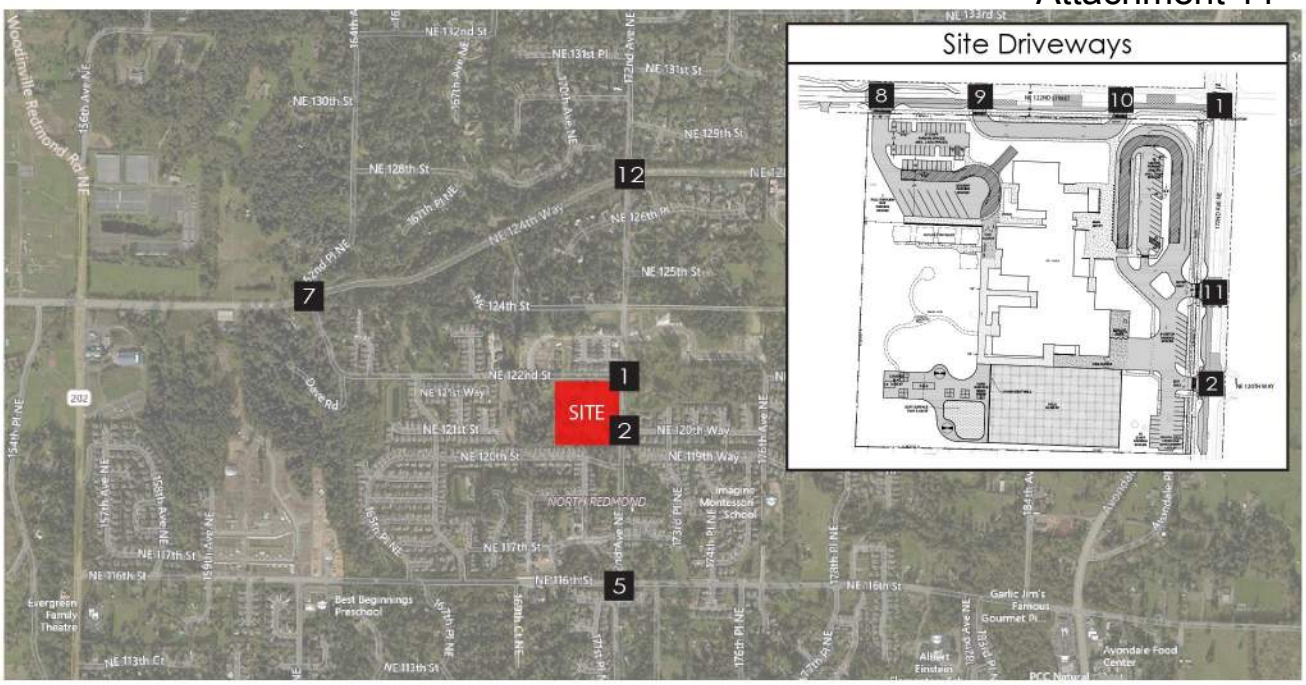

9 NE 122nd St / Enter Only Dwy
NE 122nd St
11
13
Enter Only Dwy


10 NE 122nd St / Exit Only Dwy
NE 122nd St
11
13
Exit Only Dwy


11 172nd Ave NE / Enter Only Dwy
Enter Only Dwy
172nd Ave NE
18
4
34
31


12 172nd Ave NE / NE 128th St
172nd Ave NE
NE 128th St
1
9


LEGEND
Study Intersection
XX PM Peak Hour Project Trips (52 in, 74 out)

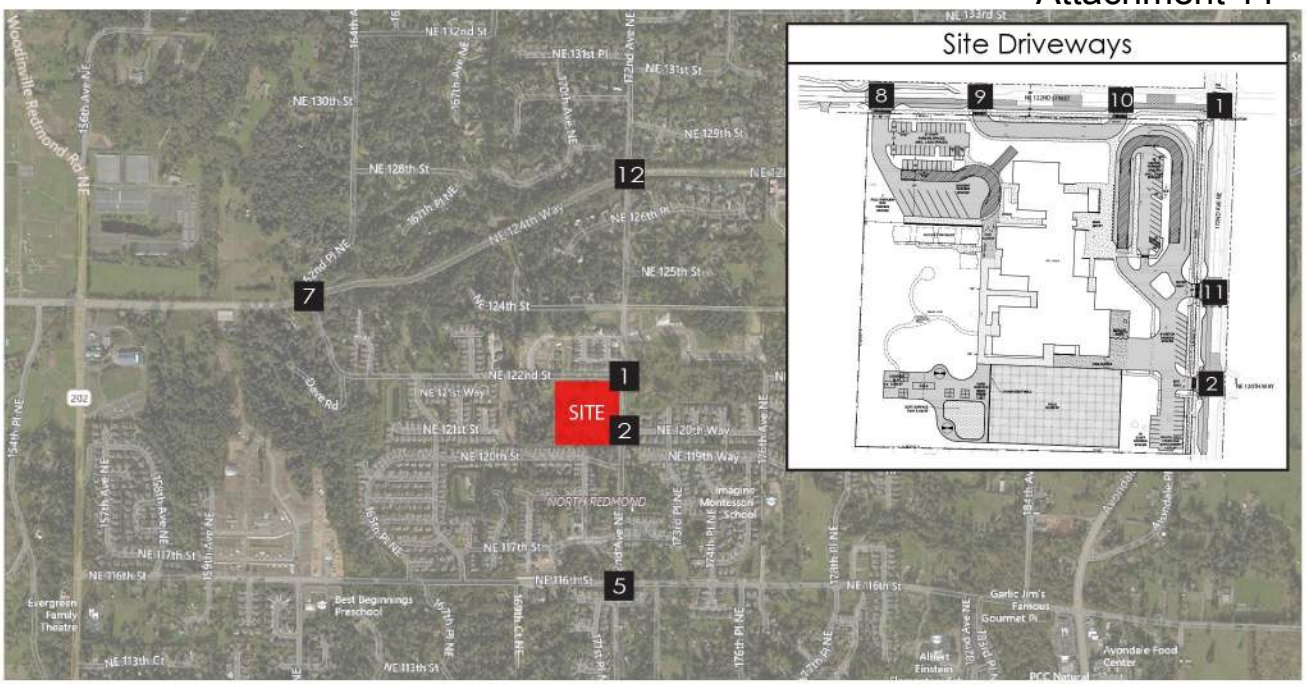


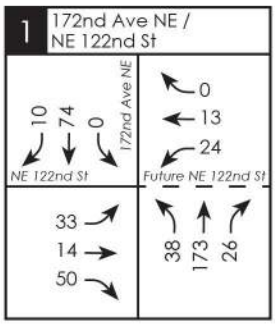
Appendix I10: 2022 With Scenario 1 and with 172nd Ave Extension AM Peak Hour Volumes

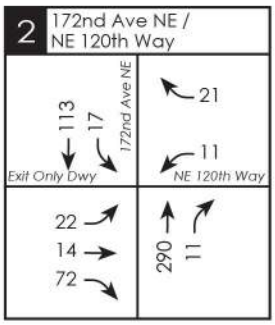
10/21/16

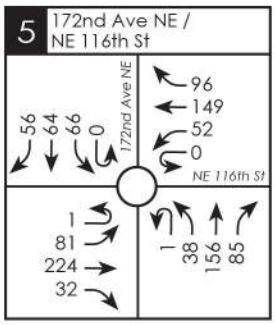
North Redmond Elementary School - Redmond, WA

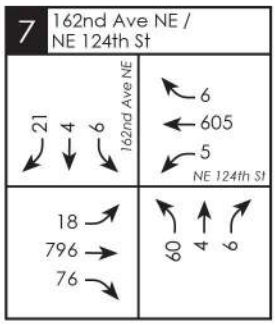
TENW

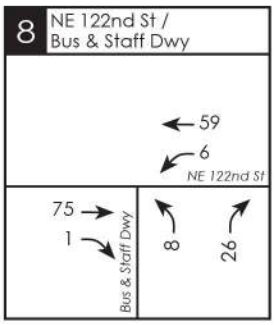


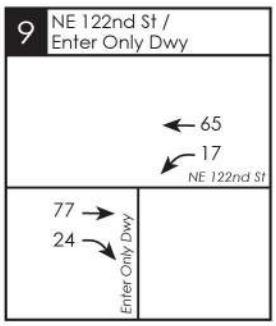


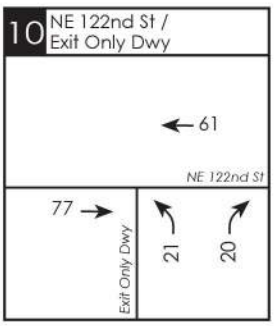


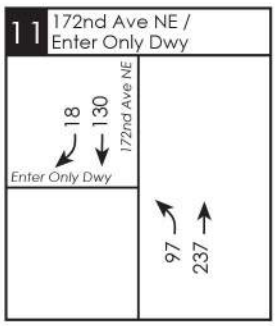


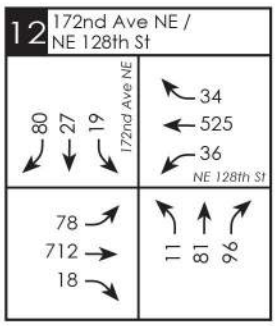


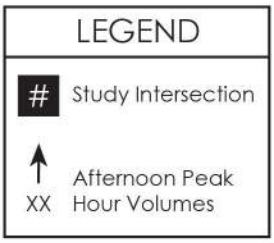




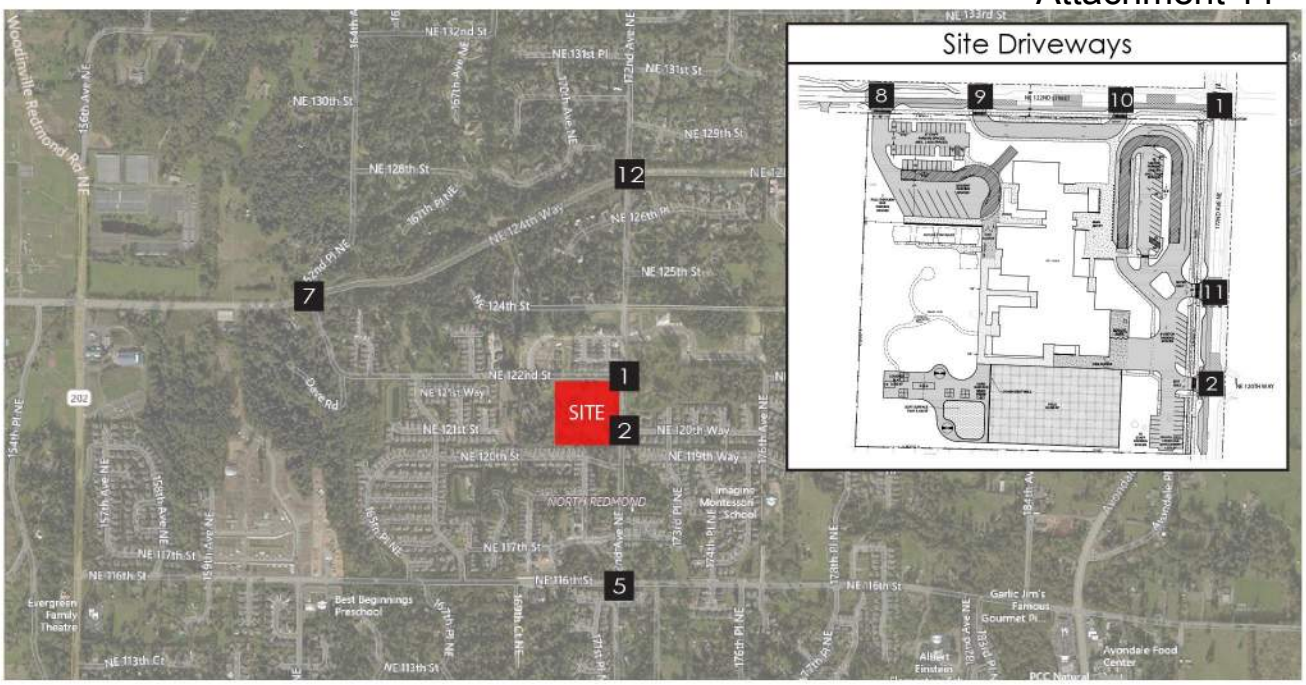


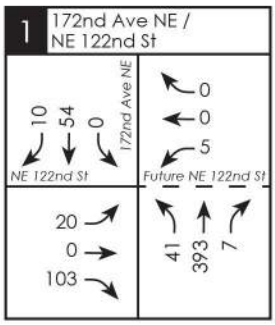


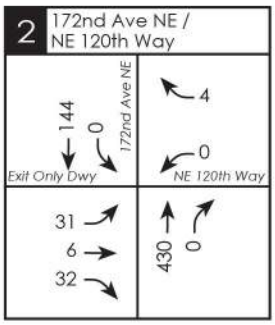


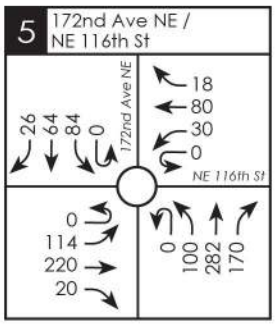


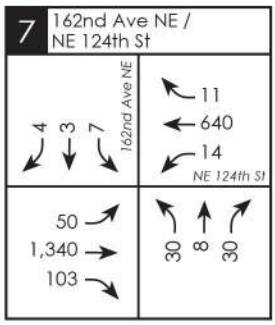
Appendix I11: 2022 With Scenario 1 and with 172nd Ave Extension Afternoon Peak Hour Volumes

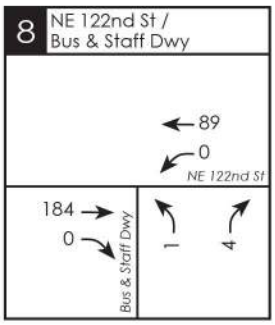


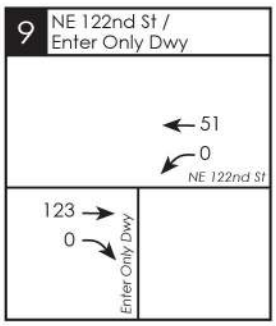


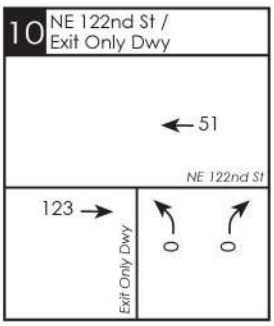


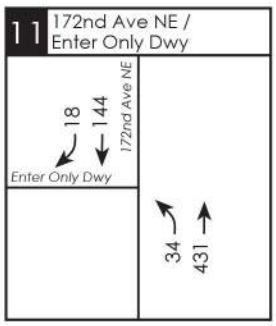


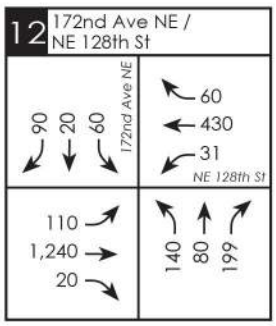


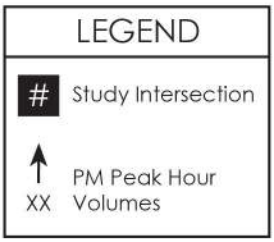










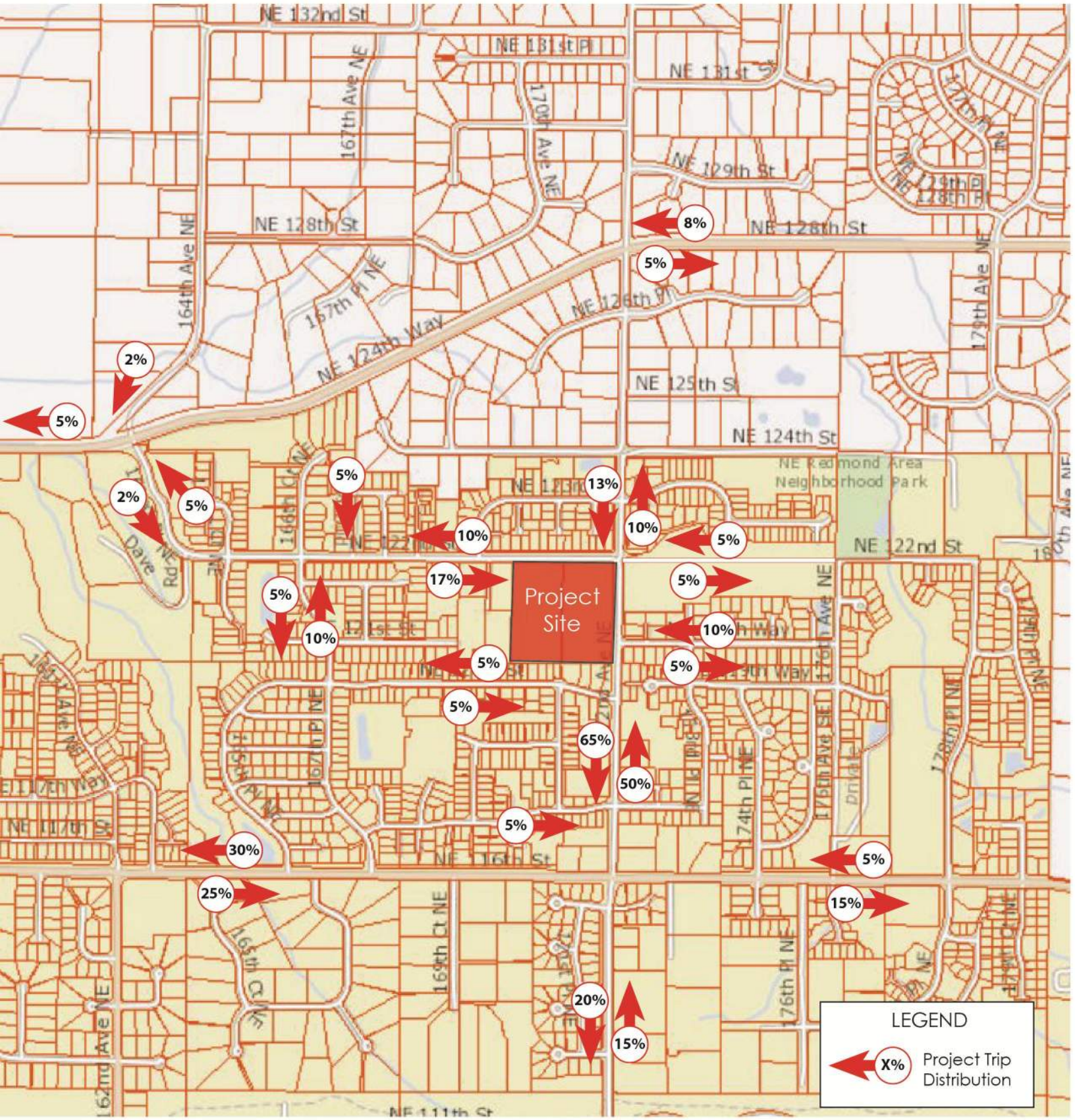


Appendix I12: 2022 With Scenario 1 and with 172nd Ave Extension PM Peak Hour Volumes

10/21/16

North Redmond Elementary School - Redmond, WA

TENW



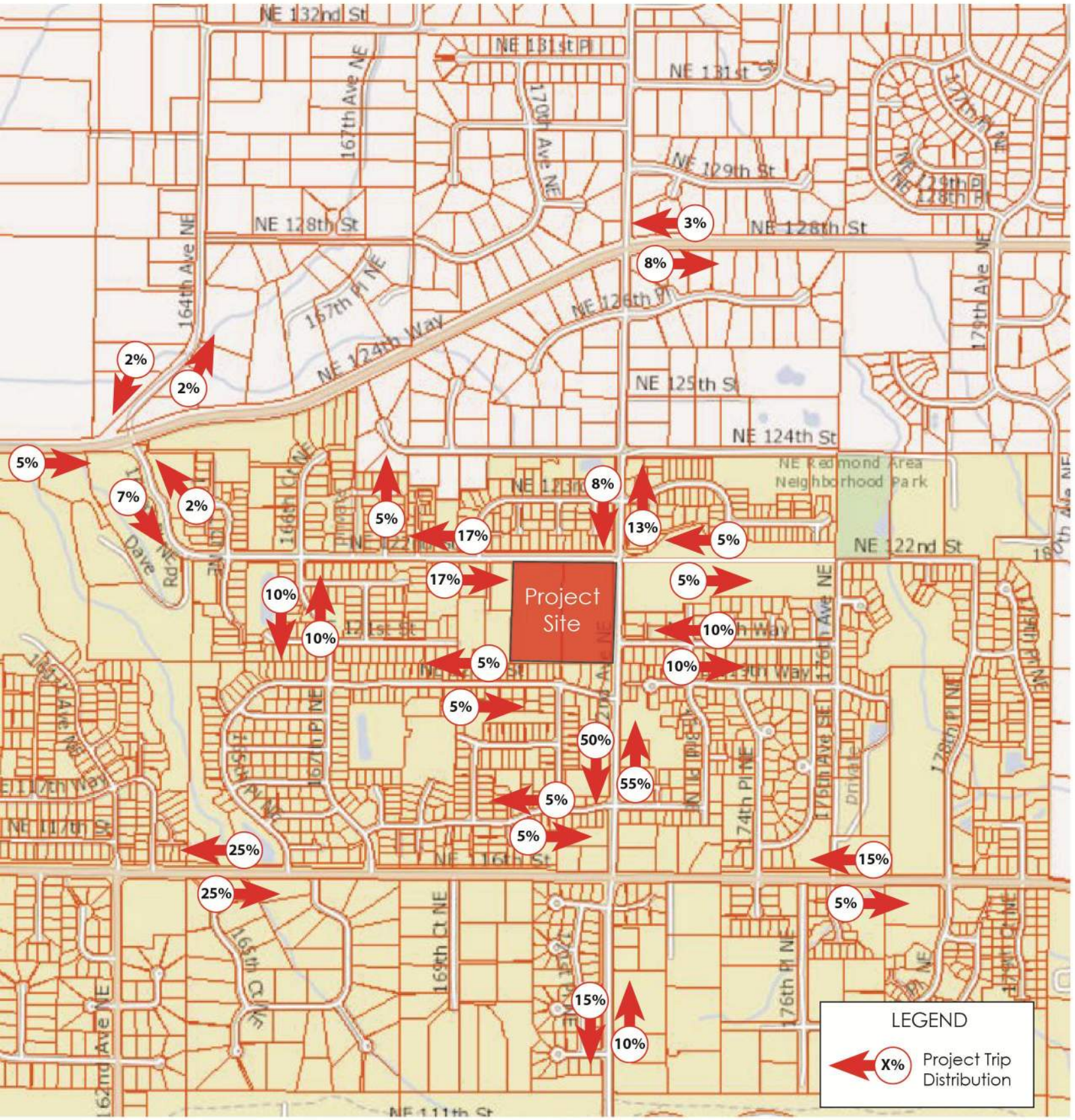
Appendix I13: AM Peak Hour Project Trip Distribution for Scenario 2 with 172nd Extension

10/21/16



Appendix I14: AM Peak Hour Project Trip Assignment for Scenario 2 with 172nd Extension

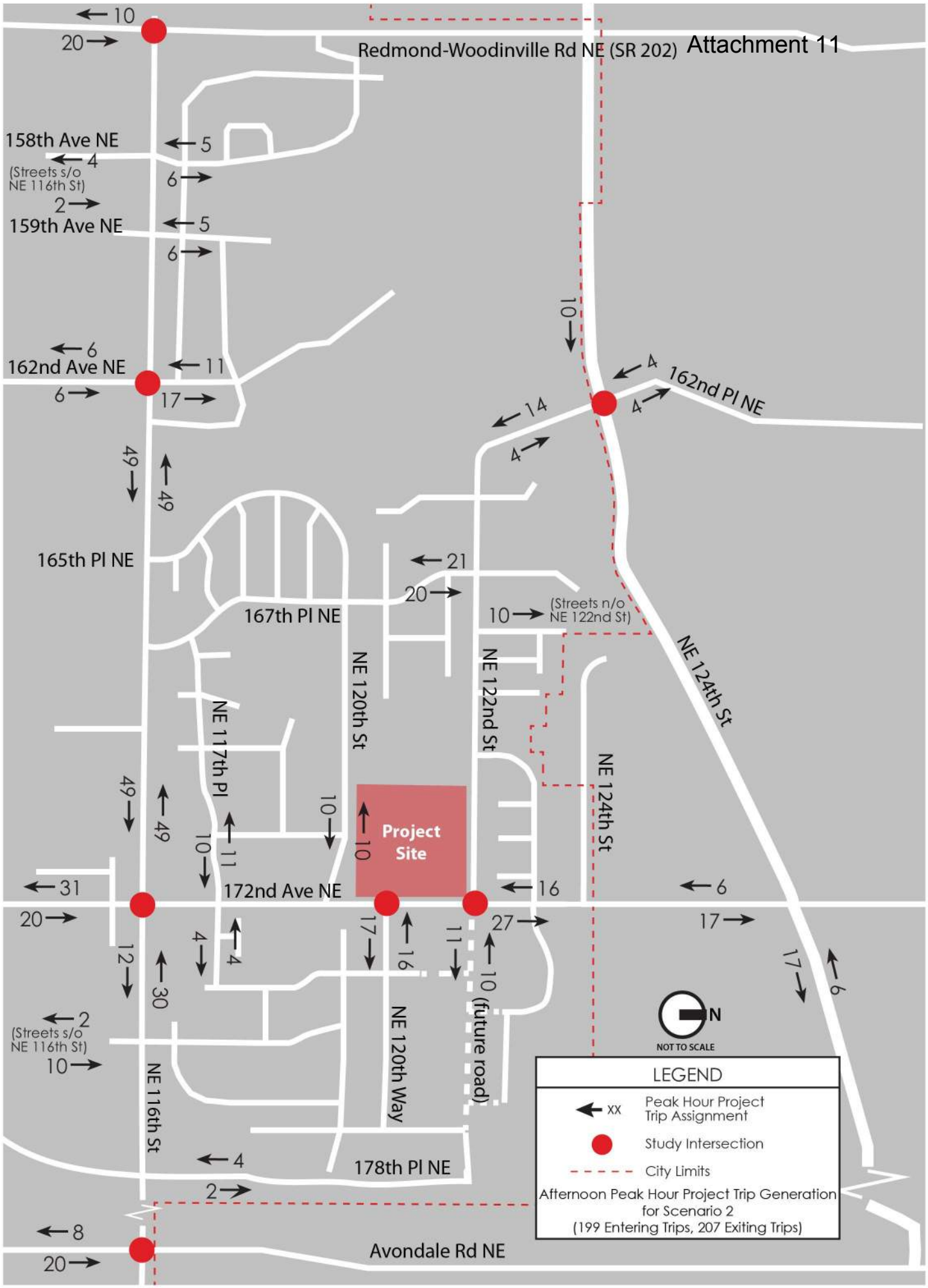
10/21/16



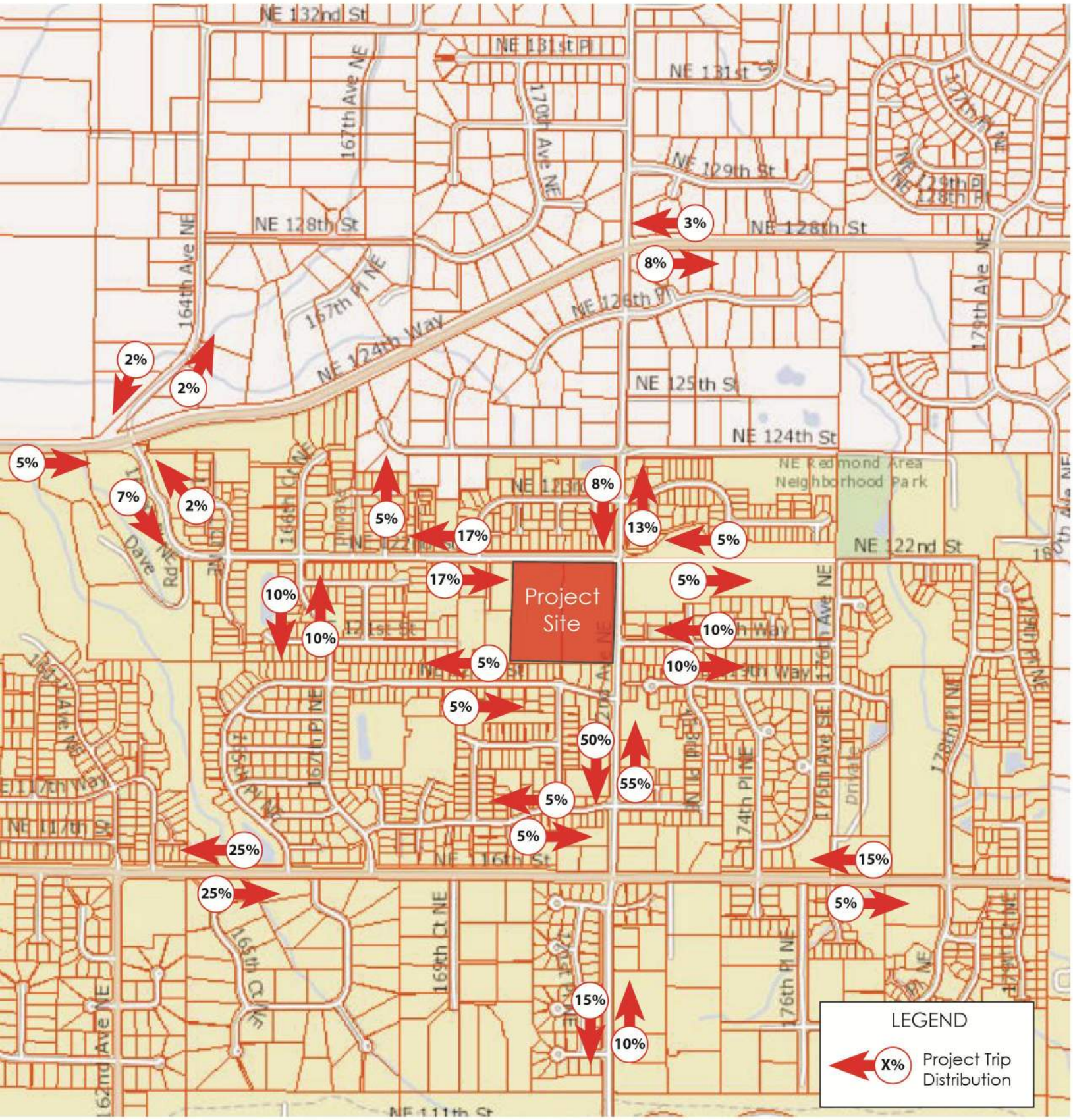
Appendix I15: Afternoon Peak Hour Project Trip Distribution for Scenario 2 with 172nd Extension 10/21/16

North Redmond Elementary School - Redmond, WA

TENW



Appendix I16: Afternoon Peak Hour Project Trip Assignment for Scenario 2 with 172nd Extension 10/21/16



Appendix I17: PM Peak Hour Project Trip Distribution for Scenario 2 with 172nd Extension

10/21/16

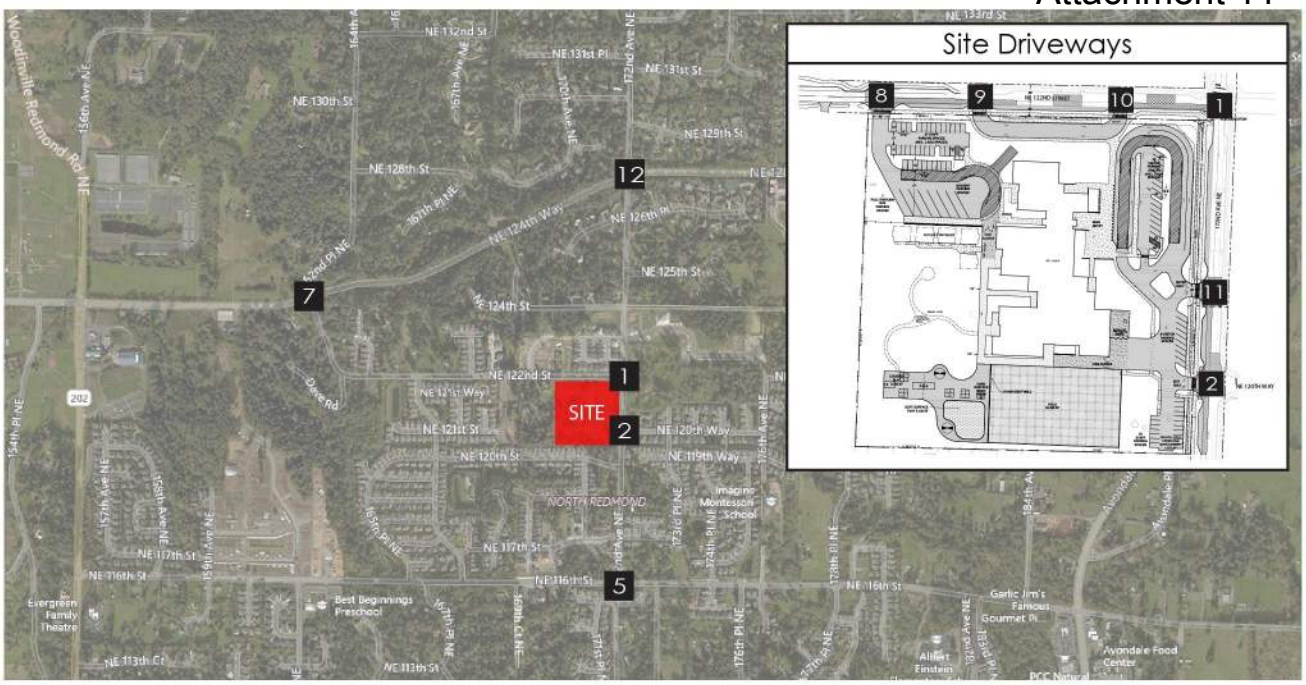
North Redmond Elementary School - Redmond, WA

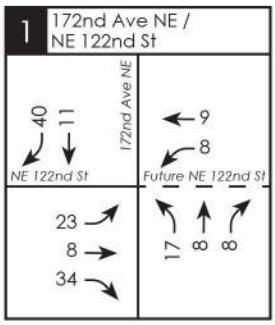
TENW

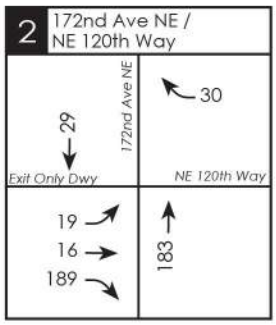


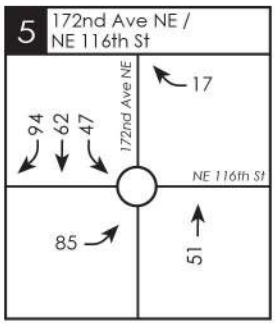
Appendix I18: PM Peak Hour Project Trip Assignment for Scenario 2 with 172nd Extension

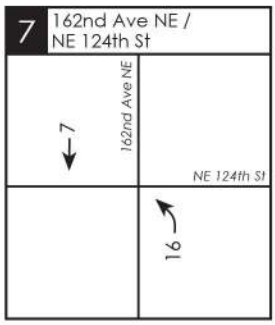
10/21/16

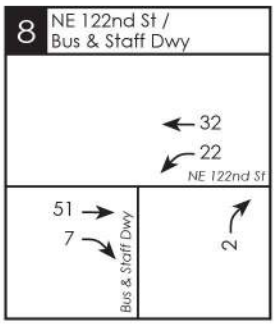


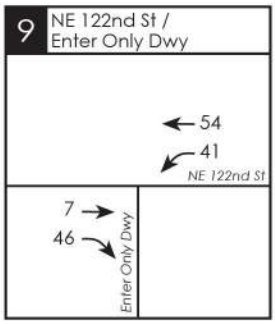


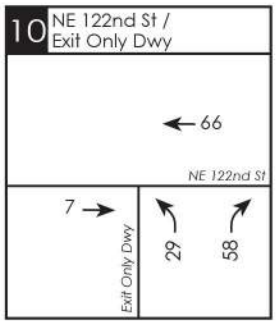


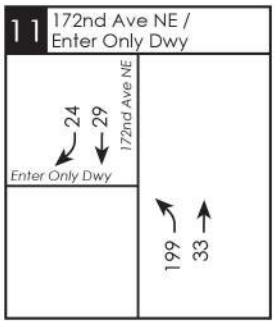


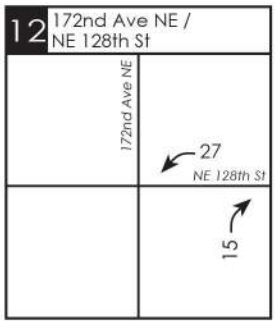


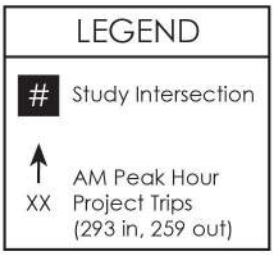




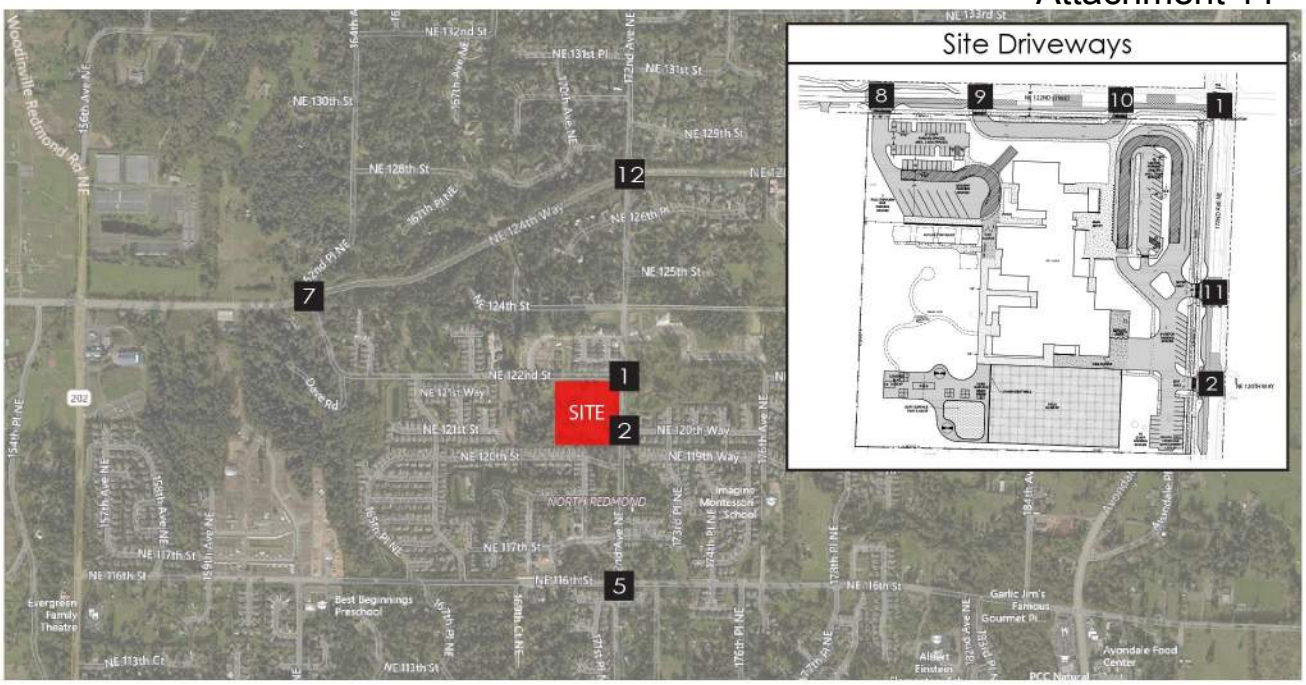


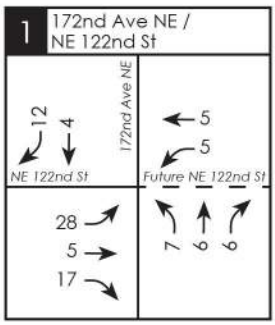


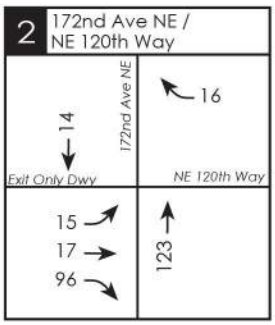


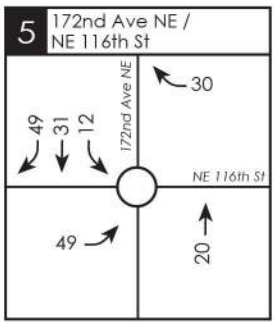


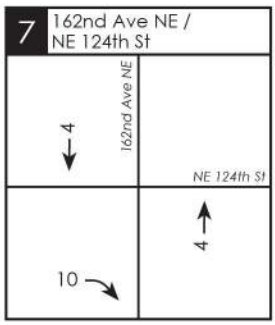
Appendix I19: AM Peak Hour Project Trip Assignment for Scenario 2 with 172nd Ave Extension 10/21/16

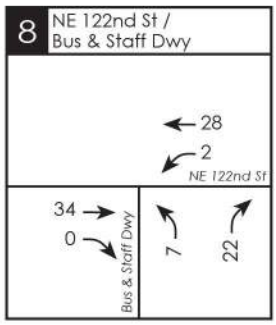


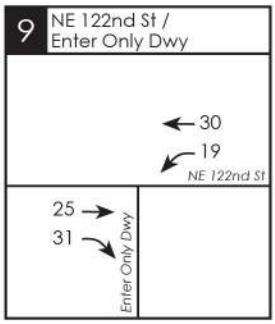


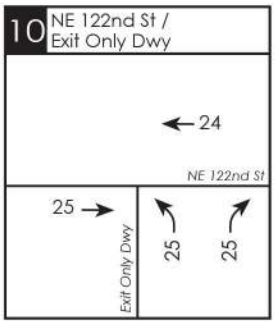


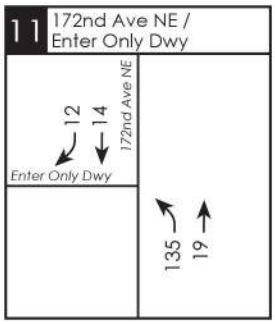


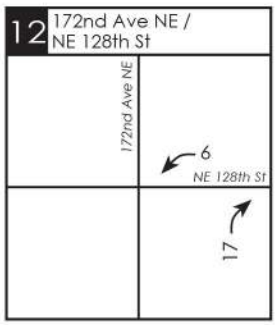


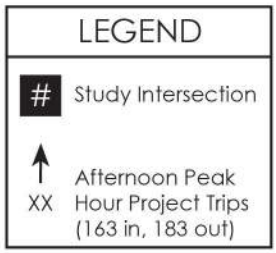




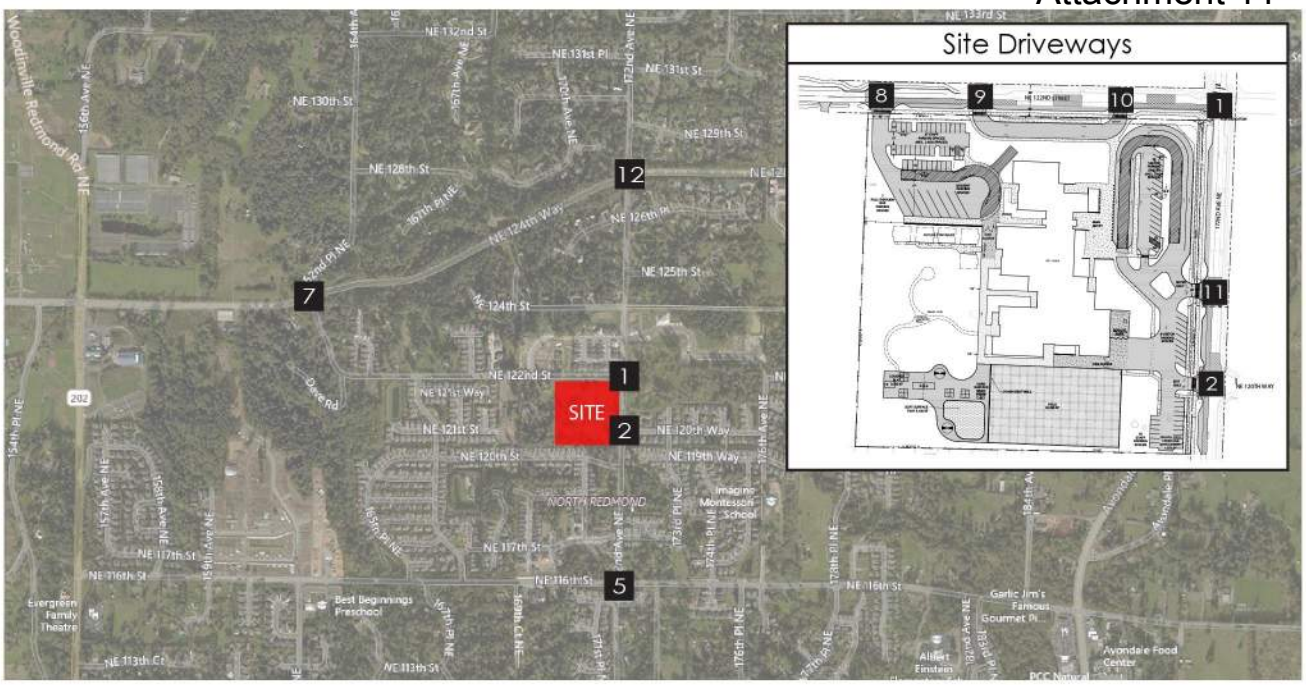


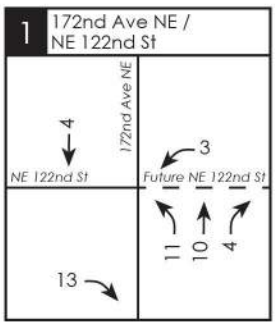


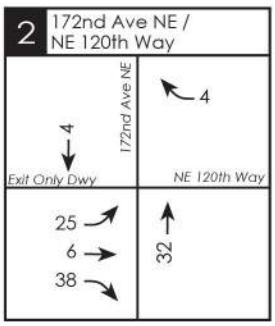


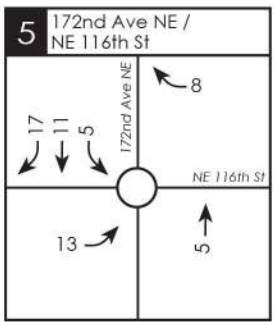


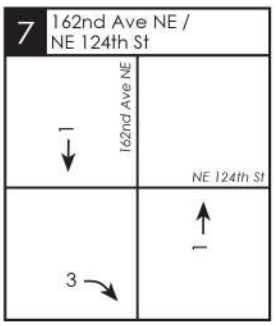
Appendix I20: Afternoon Peak Hour Project Trip Assignment for Scenario 2 with 172nd Ave Extension

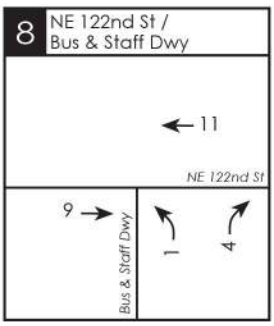


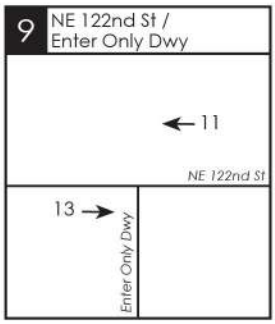


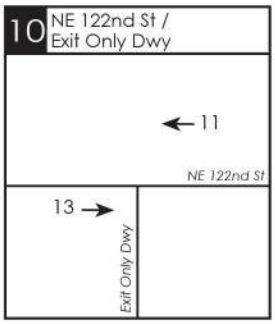


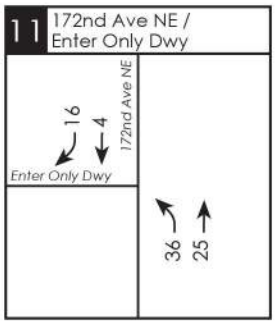


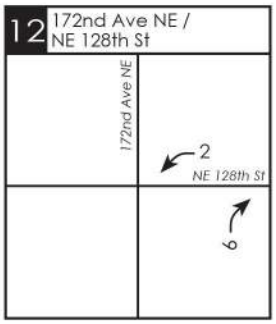


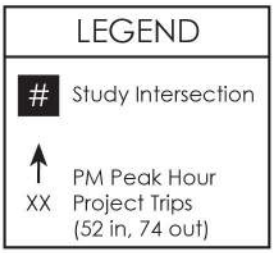




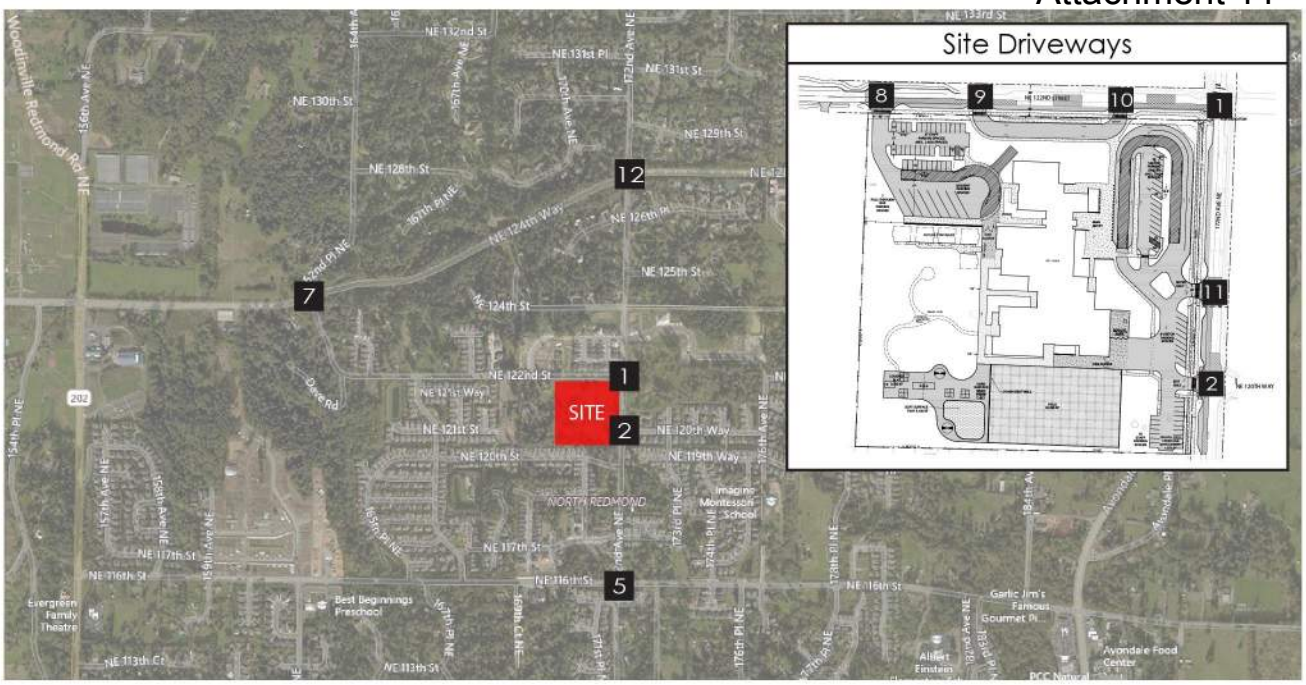


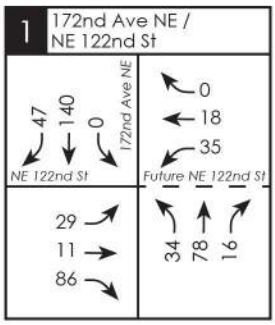


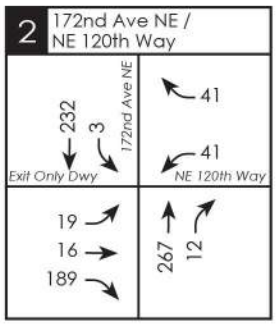


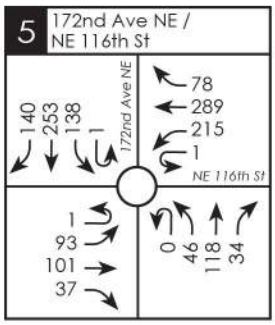


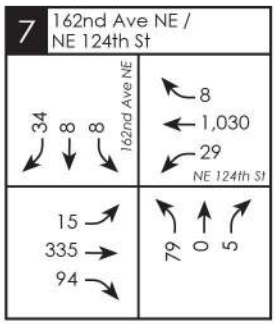
Appendix I21: PM Peak Hour Project Trip Assignment for Scenario 2 with 172nd Ave Extension 10/21/16

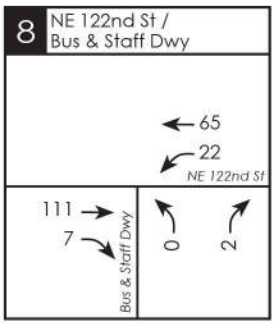


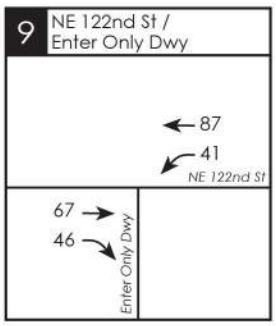


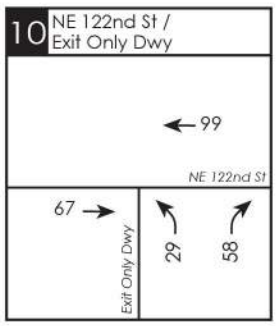


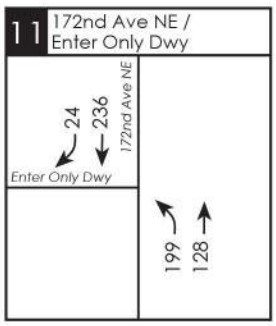


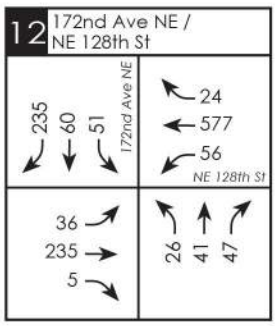


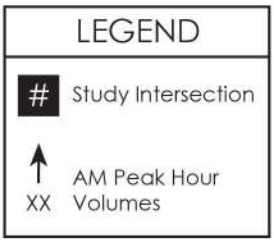










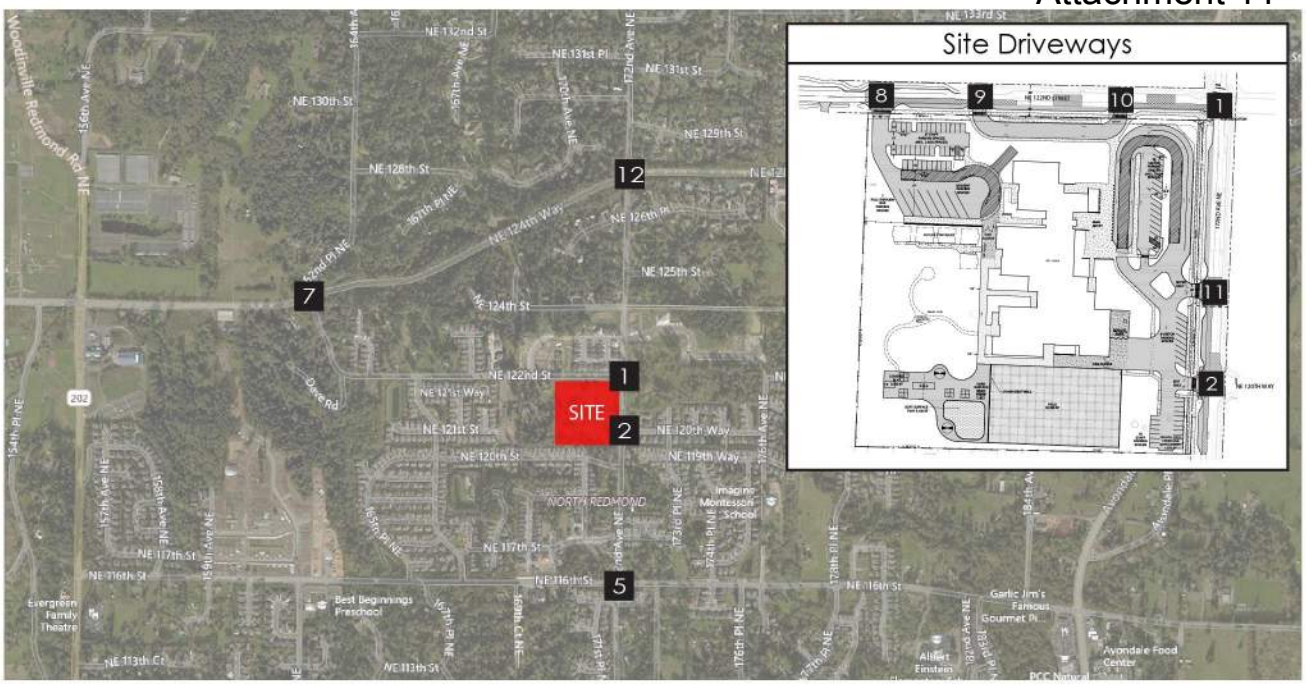


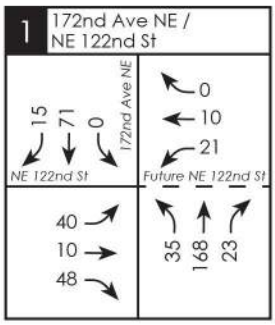
Appendix I22: 2022 With Scenario 2 and 172nd Ave Extension AM Peak Hour Volumes

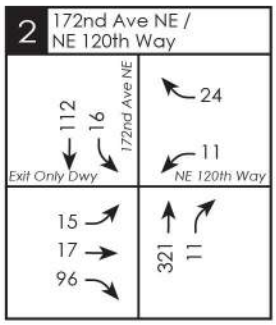
10/21/16

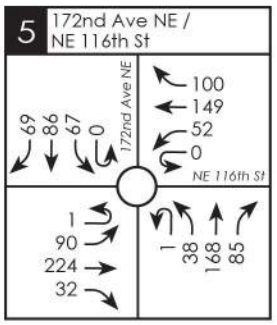
North Redmond Elementary School - Redmond, WA

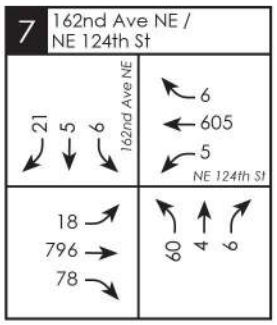
TENW

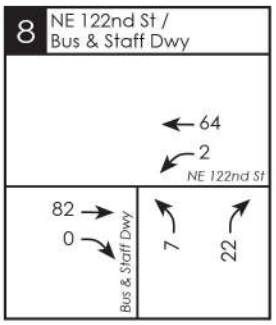


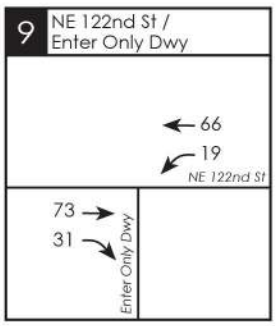


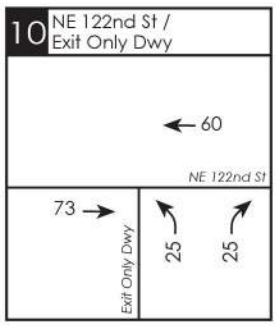


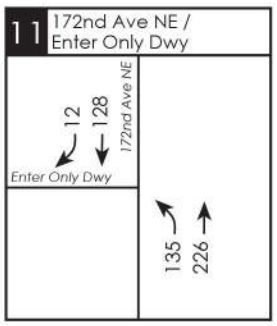


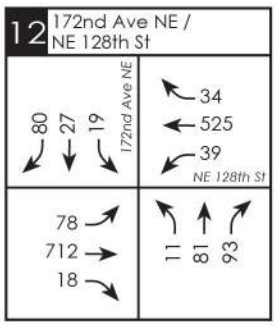


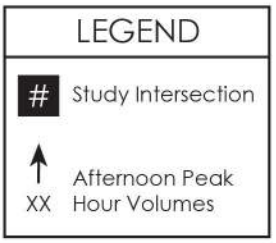




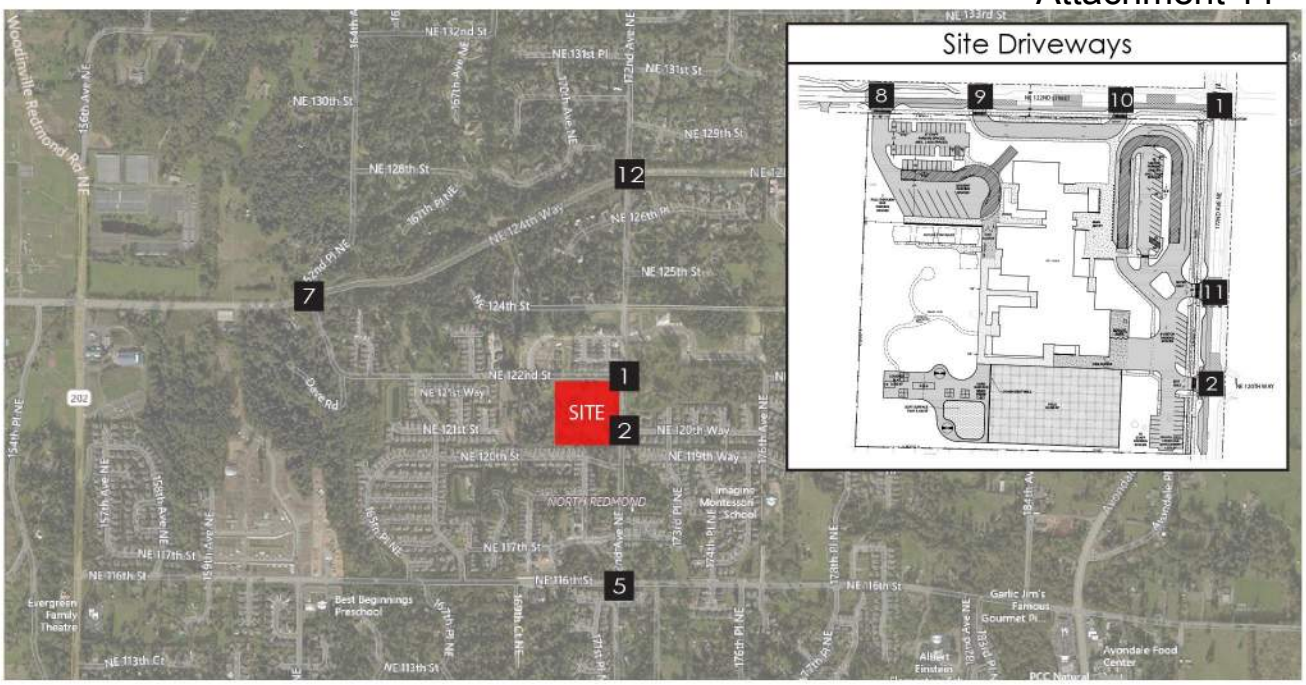


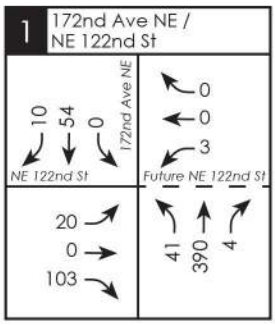


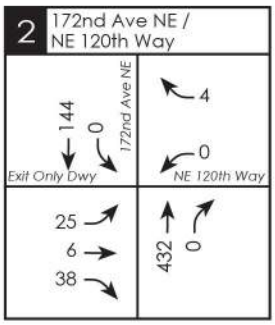


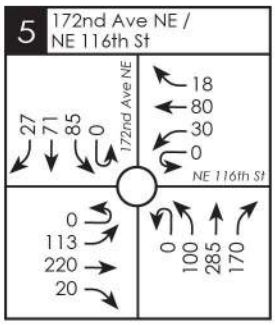


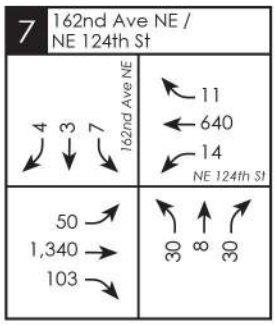
Appendix I23: 2022 With Scenario 2 and 172nd Ave Extension Afternoon Peak Hour Volumes 10/21/16

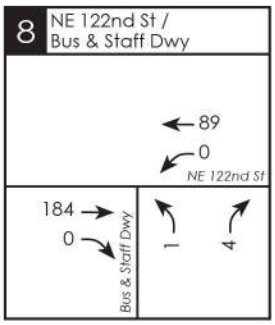


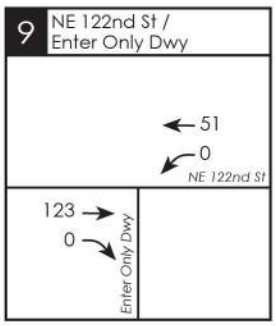


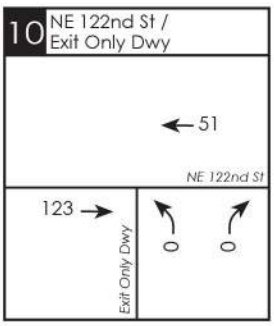


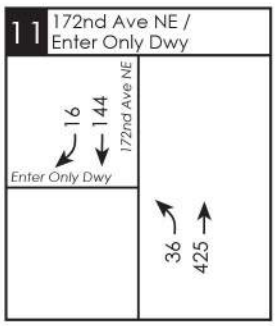


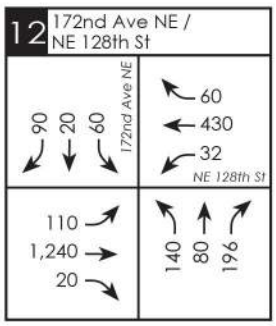


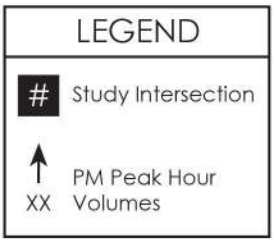












Appendix I24: 2022 With Scenario 2 and 172nd Ave Extension PM Peak Hour Volumes

10/21/16

North Redmond Elementary School - Redmond, WA

TENW

Appendix J

LOS Worksheets with 172nd Extension

2022 With Scenario 1

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	25	10	87	41	24	0	36	89	14	0	151	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			260			290			1691	
Travel Time (s)		7.4			7.1			7.9			46.1	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	25	10	87	0	41	24	0	0	36	89	14
Peak Hour Factor	0.92	0.71	0.71	0.71	0.92	0.71	0.71	0.71	0.92	0.71	0.71	0.71
Heavy Vehicles, %	2	8	8	8	2	2	2	2	2	6	6	6
Mvmt Flow	0	35	14	123	0	58	34	0	0	51	125	20
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9.5	9.4	9.9
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	26%	20%	63%	0%
Vol Thru, %	64%	8%	37%	80%
Vol Right, %	10%	71%	0%	20%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	139	122	65	188
LT Vol	36	25	41	0
Through Vol	89	10	24	151
RT Vol	14	87	0	37
Lane Flow Rate	196	172	92	265
Geometry Grp	1	1	1	1
Degree of Util (X)	0.271	0.233	0.137	0.35
Departure Headway (Hd)	4.976	4.878	5.396	4.757
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	715	729	657	749
Service Time	3.056	2.961	3.492	2.83
HCM Lane V/C Ratio	0.274	0.236	0.14	0.354
HCM Control Delay	9.9	9.5	9.4	10.4
HCM Lane LOS	A	A	A	B
HCM 95th-tile Q	1.1	0.9	0.5	1.6

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	151	37
Peak Hour Factor	0.92	0.71	0.71	0.71
Heavy Vehicles, %	2	4	4	4
Mvmt Flow	0	0	213	52
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	10.4
HCM LOS	B

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	26	125	41	0	40	0	217	12	3	234	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				7		7			7	7		
Peak Hour Factor	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	7.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	28	26	125	41	0	40	0	217	12	3	234	0
Conflicting Peds, #/hr	0	0	0	7	0	7	0	0	7	7	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	60	60	60	60	60	60	60	60	60	60	60	60
Heavy Vehicles, %	0	0	0	2	2	2	6	6	6	6	6	6
Mvmt Flow	47	43	208	68	0	67	0	362	20	5	390	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	812	789	397	801	779	386	390	0	0	389	0	0
Stage 1	400	400	-	379	379	-	-	-	-	-	-	-
Stage 2	412	389	-	422	400	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	300	325	657	303	327	662	1147	-	-	1148	-	-
Stage 1	630	605	-	643	615	-	-	-	-	-	-	-
Stage 2	621	612	-	609	602	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	267	321	653	182	323	654	1140	-	-	1141	-	-
Mov Cap-2 Maneuver	267	321	-	182	323	-	-	-	-	-	-	-
Stage 1	630	601	-	639	611	-	-	-	-	-	-	-
Stage 2	554	608	-	380	598	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16	28.8	0	0.1
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1140	-	-	291	653	283	1141	-	-
HCM Lane V/C Ratio	-	-	-	0.309	0.319	0.477	0.004	-	-
HCM Control Delay (s)	0	-	-	22.8	13.1	28.8	8.2	0	-
HCM Lane LOS	A	-	-	C	B	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1.3	1.4	2.4	0	-	-

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (vph)	1	67	101	37	1	215	289	76	46	67	34	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35				35			25		
Link Distance (ft)			3057				696			543		
Travel Time (s)			59.6				13.6			14.8		
Confl. Peds. (#/hr)	1	1		2		2		1	2		2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	4%	4%	4%	4%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Sign Control			Yield				Yield			Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBL	SBT	SBR
Lane Configurations			
Volume (vph)	143	217	111
Ideal Flow (vphpl)	1900	1900	1900
Link Speed (mph)		25	
Link Distance (ft)		1446	
Travel Time (s)		39.4	
Confl. Peds. (#/hr)	1		1
Peak Hour Factor	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%
Shared Lane Traffic (%)			
Sign Control		Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	37.6
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	249	700	177	568
Demand Flow Rate, veh/h	269	728	179	585
Vehicles Circulating, veh/h	717	227	399	689
Vehicles Exiting, veh/h	557	351	587	266
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	2	2	1
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	16.0	23.2	7.5	74.1
Approach LOS	C	C	A	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	269	728	179	585
Cap Entry Lane, veh/h	552	900	758	567
Entry HV Adj Factor	0.926	0.962	0.990	0.971
Flow Entry, veh/h	249	700	177	568
Cap Entry, veh/h	511	866	750	551
V/C Ratio	0.488	0.809	0.236	1.031
Control Delay, s/veh	16.0	23.2	7.5	74.1
LOS	C	C	A	F
95th %tile Queue, veh	3	9	1	16

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	335	94	29	1030	8	76	0	5	8	7	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			11.7			11.9	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	4%	4%	4%	5%	5%	5%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6		6	2		
Detector Phase	7	4		3	8		6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		28.0	28.0	28.0	28.0	28.0	
Total Split (s)	10.0	62.0		10.0	62.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	10.0%	62.0%		10.0%	62.0%		28.0%	28.0%	28.0%	28.0%	28.0%	
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	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 77.5
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: 162nd Pl NE & NE 124th St



HCM 2010 Signalized Intersection Summary
7: 162nd Pl NE & NE 124th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	335	94	29	1030	8	76	0	5	8	7	34
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.99		1.00	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1694	1694	1796	1946	1946	2004	1900	1827	1827	1900	1810	1900
Adj Flow Rate, veh/h	16	368	103	32	1132	9	84	0	0	9	8	37
Adj No. of Lanes	1	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	6	6	6	3	3	3	4	4	4	5	5	5
Cap, veh/h	228	842	236	666	1302	10	237	0	143	73	33	101
Arrive On Green	0.02	0.66	0.66	0.03	0.68	0.68	0.09	0.00	0.00	0.09	0.09	0.09
Sat Flow, veh/h	1613	1274	357	1853	1928	15	1458	0	1553	147	353	1090
Grp Volume(v), veh/h	16	0	471	32	0	1141	84	0	0	54	0	0
Grp Sat Flow(s),veh/h/ln	1613	0	1631	1853	0	1943	1458	0	1553	1590	0	0
Q Serve(g_s), s	0.2	0.0	9.7	0.4	0.0	32.5	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	9.7	0.4	0.0	32.5	3.6	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.01	1.00		1.00	0.17		0.69
Lane Grp Cap(c), veh/h	228	0	1078	666	0	1312	237	0	143	207	0	0
V/C Ratio(X)	0.07	0.00	0.44	0.05	0.00	0.87	0.35	0.00	0.00	0.26	0.00	0.00
Avail Cap(c_a), veh/h	312	0	1323	737	0	1577	547	0	508	566	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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	10.9	0.0	5.7	4.0	0.0	9.0	30.5	0.0	0.0	29.9	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.0	0.0	4.8	0.9	0.0	0.0	0.7	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	0.2	0.0	4.4	0.2	0.0	18.9	1.6	0.0	0.0	1.0	0.0	0.0
LnGrp Delay(d),s/veh	11.1	0.0	6.0	4.1	0.0	13.8	31.4	0.0	0.0	30.6	0.0	0.0
LnGrp LOS	B		A	A		B	C			C		
Approach Vol, veh/h		487			1173			84			54	
Approach Delay, s/veh		6.1			13.5			31.4			30.6	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		11.5	7.3	51.4		11.5	6.3	52.4
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	57.0		23.0	5.0	57.0
Max Q Clear Time (g_c+I1), s		4.2	2.4	11.7		5.6	2.2	34.5
Green Ext Time (p_c), s		0.7	0.0	18.2		0.6	0.0	13.0

Intersection Summary	
HCM 2010 Ctrl Delay	12.9
HCM 2010 LOS	B

Lanes, Volumes, Timings
12: 172nd Ave NE & NE 128th St

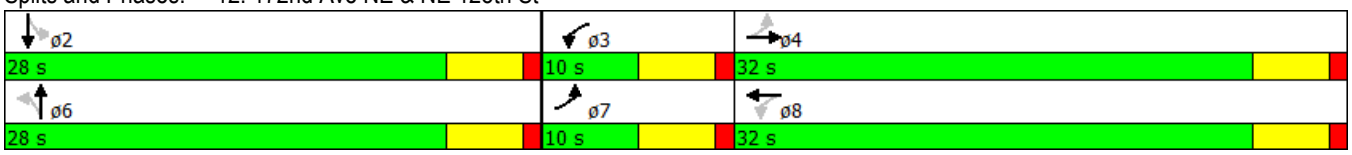
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	235	5	64	577	24	26	41	55	51	60	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	135		0	150		0	155		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		533			502			1691			561	
Travel Time (s)		8.1			7.6			46.1			15.3	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	13%	13%	13%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	27.0		10.0	28.0		27.0	27.0		28.0	28.0	
Total Split (s)	10.0	32.0		10.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	14.3%	45.7%		14.3%	45.7%		40.0%	40.0%		40.0%	40.0%	
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		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-Lag Optimize?												
Recall Mode	None	None		None	None		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 46.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 12: 172nd Ave NE & NE 128th St



HCM 2010 Signalized Intersection Summary
12: 172nd Ave NE & NE 128th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	235	5	64	577	24	26	41	55	51	60	235
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1681	1681	1900	1827	1827	1900	1845	1845	1900	1827	1827	1900
Adj Flow Rate, veh/h	39	253	5	69	620	26	28	44	59	55	65	253
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	13	13	13	4	4	4	3	3	3	4	4	4
Cap, veh/h	256	649	13	543	719	30	233	199	267	420	91	355
Arrive On Green	0.04	0.40	0.40	0.06	0.41	0.41	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1601	1643	32	1740	1741	73	1047	716	960	1261	327	1275
Grp Volume(v), veh/h	39	0	258	69	0	646	28	0	103	55	0	318
Grp Sat Flow(s),veh/h/ln	1601	0	1676	1740	0	1814	1047	0	1675	1261	0	1602
Q Serve(g_s), s	0.8	0.0	6.2	1.3	0.0	18.2	1.4	0.0	2.6	2.0	0.0	10.0
Cycle Q Clear(g_c), s	0.8	0.0	6.2	1.3	0.0	18.2	11.4	0.0	2.6	4.6	0.0	10.0
Prop In Lane	1.00		0.02	1.00		0.04	1.00		0.57	1.00		0.80
Lane Grp Cap(c), veh/h	256	0	662	543	0	750	233	0	466	420	0	446
V/C Ratio(X)	0.15	0.00	0.39	0.13	0.00	0.86	0.12	0.00	0.22	0.13	0.00	0.71
Avail Cap(c_a), veh/h	334	0	808	596	0	875	371	0	688	587	0	658
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.9	0.0	12.1	9.1	0.0	15.0	23.3	0.0	15.5	17.3	0.0	18.2
Incr Delay (d2), s/veh	0.3	0.0	0.4	0.1	0.0	7.9	0.2	0.0	0.2	0.1	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	2.9	0.6	0.0	10.6	0.4	0.0	1.3	0.7	0.0	4.7
LnGrp Delay(d),s/veh	12.2	0.0	12.5	9.2	0.0	22.8	23.6	0.0	15.8	17.4	0.0	20.3
LnGrp LOS	B		B	A		C	C		B	B		C
Approach Vol, veh/h		297			715			131			373	
Approach Delay, s/veh		12.4			21.5			17.4			19.9	
Approach LOS		B			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.6	8.3	27.1		20.6	7.3	28.1
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	27.0		23.0	5.0	27.0
Max Q Clear Time (g_c+I1), s		12.0	3.3	8.2		13.4	2.8	20.2
Green Ext Time (p_c), s		2.4	0.0	5.3		2.2	0.0	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	19.0
HCM 2010 LOS	B

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	33	14	50	24	13	0	38	173	26	0	74	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			276			290			1691	
Travel Time (s)		7.4			7.5			7.9			46.1	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	33	14	50	0	24	13	0	0	38	173	26
Peak Hour Factor	0.92	0.88	0.88	0.88	0.92	0.88	0.88	0.88	0.92	0.88	0.88	0.88
Heavy Vehicles, %	2	5	5	5	2	2	2	2	2	8	8	8
Mvmt Flow	0	37	16	57	0	27	15	0	0	43	197	30
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.5	8.4	9.8
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	16%	34%	65%	0%
Vol Thru, %	73%	14%	35%	88%
Vol Right, %	11%	52%	0%	12%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	237	97	37	84
LT Vol	38	33	24	0
Through Vol	173	14	13	74
RT Vol	26	50	0	10
Lane Flow Rate	269	110	42	95
Geometry Grp	1	1	1	1
Degree of Util (X)	0.335	0.142	0.059	0.127
Departure Headway (Hd)	4.484	4.651	5.058	4.788
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	803	770	707	748
Service Time	2.509	2.682	3.094	2.818
HCM Lane V/C Ratio	0.335	0.143	0.059	0.127
HCM Control Delay	9.8	8.5	8.4	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.5	0.5	0.2	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	74	10
Peak Hour Factor	0.92	0.88	0.88	0.88
Heavy Vehicles, %	2	17	17	17
Mvmt Flow	0	0	84	11
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.5
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	22	14	72	11	0	21	0	290	11	17	113	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				3		3			3	3		
Peak Hour Factor	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	10%	10%	10%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	3.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	22	14	72	11	0	21	0	290	11	17	113	0
Conflicting Peds, #/hr	0	0	0	3	0	3	0	0	3	3	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	76	76	76	76	76	76	76	76	76	76	76	76
Heavy Vehicles, %	0	0	0	0	0	0	10	10	10	8	8	8
Mvmt Flow	29	18	95	14	0	28	0	382	14	22	149	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	599	592	152	595	585	395	149	0	0	399	0	0
Stage 1	193	193	-	392	392	-	-	-	-	-	-	-
Stage 2	406	399	-	203	193	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.2	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.29	-	-	2.272	-	-
Pot Cap-1 Maneuver	416	422	900	419	426	659	1385	-	-	1128	-	-
Stage 1	813	745	-	637	610	-	-	-	-	-	-	-
Stage 2	626	606	-	804	745	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	391	412	898	354	416	656	1382	-	-	1125	-	-
Mov Cap-2 Maneuver	391	412	-	354	416	-	-	-	-	-	-	-
Stage 1	813	729	-	635	608	-	-	-	-	-	-	-
Stage 2	598	604	-	685	729	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.4	12.7	0	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1382	-	-	399	898	507	1125	-	-
HCM Lane V/C Ratio	-	-	-	0.119	0.105	0.083	0.02	-	-
HCM Control Delay (s)	0	-	-	15.2	9.5	12.7	8.3	0	-
HCM Lane LOS	A	-	-	C	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.4	0.3	0.1	-	-

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	1	81	224	32	52	149	96	1	38	156	85	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35			35				25		
Link Distance (ft)			3057			696				543		
Travel Time (s)			59.6			13.6				14.8		
Confl. Peds. (#/hr)	6	11		10	4		5	4	10		4	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%	4%	2%	2%	2%	2%	5%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield				Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBT	SBR
Lane Configurations		
Volume (vph)	64	56
Ideal Flow (vphpl)	1900	1900
Link Speed (mph)	25	
Link Distance (ft)	1446	
Travel Time (s)	39.4	
Confl. Peds. (#/hr)		11
Peak Hour Factor	0.84	0.84
Heavy Vehicles (%)	5%	5%
Shared Lane Traffic (%)		
Sign Control	Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	402	353	333	222
Demand Flow Rate, veh/h	422	367	340	233
Vehicles Circulating, veh/h	228	339	465	296
Vehicles Exiting, veh/h	301	466	185	410
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	5	10	11
Ped Cap Adj	0.998	0.999	0.999	0.998
Approach Delay, s/veh	10.2	10.8	12.3	7.6
Approach LOS	B	B	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	422	367	340	233
Cap Entry Lane, veh/h	900	805	710	840
Entry HV Adj Factor	0.952	0.962	0.980	0.954
Flow Entry, veh/h	402	353	333	222
Cap Entry, veh/h	855	774	695	800
V/C Ratio	0.470	0.456	0.480	0.278
Control Delay, s/veh	10.2	10.8	12.3	7.6
LOS	B	B	B	A
95th %tile Queue, veh	3	2	3	1

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

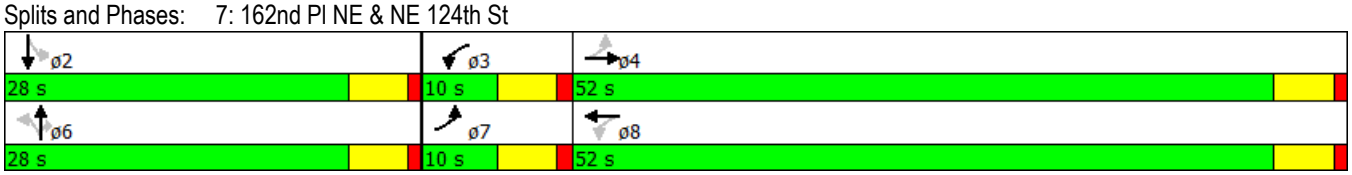
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	796	76	5	605	6	60	4	6	6	4	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			11.7			11.9	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6		6	2		
Detector Phase	7	4		3	8		6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		28.0	28.0	28.0	28.0	28.0	
Total Split (s)	10.0	52.0		10.0	52.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	11.1%	57.8%		11.1%	57.8%		31.1%	31.1%	31.1%	31.1%	31.1%	
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	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 65.2
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: 162nd Pl NE & NE 124th St



HCM 2010 Signalized Intersection Summary
7: 162nd Pl NE & NE 124th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	796	76	5	605	6	60	4	6	6	4	21
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1743	1743	1796	1946	1946	2004	1900	1863	1863	1900	1759	1900
Adj Flow Rate, veh/h	19	856	82	5	651	6	65	4	1	6	4	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	2	2	2	8	8	8
Cap, veh/h	488	1020	98	281	1223	11	241	7	126	86	23	79
Arrive On Green	0.02	0.65	0.65	0.01	0.64	0.64	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	1660	1567	150	1853	1925	18	1471	91	1565	144	280	974
Grp Volume(v), veh/h	19	0	938	5	0	657	69	0	1	33	0	0
Grp Sat Flow(s),veh/h/ln	1660	0	1717	1853	0	1943	1562	0	1565	1398	0	0
Q Serve(g_s), s	0.2	0.0	24.1	0.1	0.0	10.7	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	24.1	0.1	0.0	10.7	2.1	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.94		1.00	0.18		0.70
Lane Grp Cap(c), veh/h	488	0	1118	281	0	1234	248	0	126	187	0	0
V/C Ratio(X)	0.04	0.00	0.84	0.02	0.00	0.53	0.28	0.00	0.01	0.18	0.00	0.00
Avail Cap(c_a), veh/h	595	0	1405	430	0	1590	691	0	627	658	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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.4	0.0	7.7	8.4	0.0	5.8	25.2	0.0	24.3	24.8	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.8	0.0	0.0	0.4	0.6	0.0	0.0	0.4	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	0.1	0.0	12.4	0.0	0.0	5.8	1.1	0.0	0.0	0.5	0.0	0.0
LnGrp Delay(d),s/veh	4.5	0.0	11.5	8.4	0.0	6.1	25.9	0.0	24.3	25.2	0.0	0.0
LnGrp LOS	A		B	A		A	C		C	C		
Approach Vol, veh/h		957			662			70			33	
Approach Delay, s/veh		11.4			6.1			25.8			25.2	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		9.6	5.4	42.4		9.6	6.3	41.5
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	47.0		23.0	5.0	47.0
Max Q Clear Time (g_c+I1), s		4.2	2.1	26.1		4.1	2.2	12.7
Green Ext Time (p_c), s		0.4	0.0	11.3		0.4	0.0	14.4

Intersection Summary	
HCM 2010 Ctrl Delay	10.2
HCM 2010 LOS	B

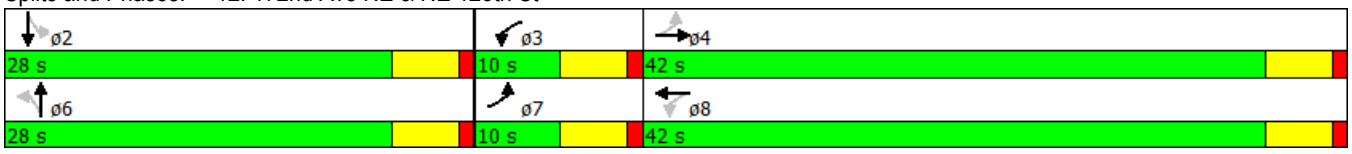
Lanes, Volumes, Timings
12: 172nd Ave NE & NE 128th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	712	18	36	525	34	11	81	96	19	27	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	135		0	150		0	155		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		533			502			1691			561	
Travel Time (s)		8.1			7.6			46.1			15.3	
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	27.0		10.0	28.0		27.0	27.0		28.0	28.0	
Total Split (s)	10.0	42.0		10.0	42.0		28.0	28.0		28.0	28.0	
Total Split (%)	12.5%	52.5%		12.5%	52.5%		35.0%	35.0%		35.0%	35.0%	
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		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-Lag Optimize?												
Recall Mode	None	None		None	None		None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 60.1	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 12: 172nd Ave NE & NE 128th St



HCM 2010 Signalized Intersection Summary
12: 172nd Ave NE & NE 128th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	78	712	18	36	525	34	11	81	96	19	27	80
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1863	1863	1900	1900	1900	1900	1881	1881	1900
Adj Flow Rate, veh/h	89	809	20	41	597	39	12	92	109	22	31	91
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	2	2	2	0	0	0	1	1	1
Cap, veh/h	416	953	24	281	863	56	285	155	184	223	82	242
Arrive On Green	0.06	0.52	0.52	0.04	0.50	0.50	0.20	0.20	0.20	0.20	0.20	0.20
Sat Flow, veh/h	1792	1828	45	1774	1730	113	1280	789	935	1182	419	1230
Grp Volume(v), veh/h	89	0	829	41	0	636	12	0	201	22	0	122
Grp Sat Flow(s),veh/h/ln	1792	0	1873	1774	0	1843	1280	0	1724	1182	0	1649
Q Serve(g_s), s	1.4	0.0	23.6	0.7	0.0	16.4	0.5	0.0	6.6	1.1	0.0	4.0
Cycle Q Clear(g_c), s	1.4	0.0	23.6	0.7	0.0	16.4	4.5	0.0	6.6	7.7	0.0	4.0
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.54	1.00		0.75
Lane Grp Cap(c), veh/h	416	0	977	281	0	920	285	0	339	223	0	324
V/C Ratio(X)	0.21	0.00	0.85	0.15	0.00	0.69	0.04	0.00	0.59	0.10	0.00	0.38
Avail Cap(c_a), veh/h	447	0	1114	352	0	1096	507	0	637	427	0	610
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.7	0.0	12.8	11.0	0.0	11.9	23.6	0.0	22.7	26.2	0.0	21.7
Incr Delay (d2), s/veh	0.3	0.0	5.7	0.2	0.0	1.5	0.1	0.0	1.7	0.2	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	0.7	0.0	13.5	0.3	0.0	8.7	0.2	0.0	3.3	0.4	0.0	1.9
LnGrp Delay(d),s/veh	9.0	0.0	18.5	11.2	0.0	13.4	23.7	0.0	24.4	26.4	0.0	22.4
LnGrp LOS	A		B	B		B	C		C	C		C
Approach Vol, veh/h		918			677			213			144	
Approach Delay, s/veh		17.6			13.3			24.3			23.0	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		17.2	7.5	37.4		17.2	8.9	36.0
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	37.0		23.0	5.0	37.0
Max Q Clear Time (g_c+I1), s		9.7	2.7	25.6		8.6	3.4	18.4
Green Ext Time (p_c), s		1.8	0.0	6.8		1.9	0.0	9.3

Intersection Summary	
HCM 2010 Ctrl Delay	17.2
HCM 2010 LOS	B

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (vph)	20	0	103	5	0	0	41	393	7	0	54	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			302			290			1691	
Travel Time (s)		7.4			8.2			7.9			46.1	
Confl. Peds. (#/hr)	3		2				2					3
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	12%	12%	12%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	0	103	0	5	0	0	0	41	393	7
Peak Hour Factor	0.92	0.85	0.85	0.85	0.92	0.85	0.85	0.85	0.92	0.85	0.85	0.85
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	0	24	0	121	0	6	0	0	0	48	462	8
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9	8.8	14.9
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	16%	100%	0%
Vol Thru, %	89%	0%	0%	84%
Vol Right, %	2%	84%	0%	16%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	441	123	5	64
LT Vol	41	20	5	0
Through Vol	393	0	0	54
RT Vol	7	103	0	10
Lane Flow Rate	519	145	6	75
Geometry Grp	1	1	1	1
Degree of Util (X)	0.637	0.194	0.009	0.103
Departure Headway (Hd)	4.419	4.829	5.714	4.946
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	815	741	623	722
Service Time	2.452	2.875	3.779	2.996
HCM Lane V/C Ratio	0.637	0.196	0.01	0.104
HCM Control Delay	14.9	9	8.8	8.6
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	4.7	0.7	0	0.3

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	54	10
Peak Hour Factor	0.92	0.85	0.85	0.85
Heavy Vehicles, %	2	12	12	12
Mvmt Flow	0	0	64	12
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.6
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	6	32	0	0	4	0	430	0	0	144	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				10		10			10	10		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	7%	7%	7%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	31	6	32	0	0	4	0	430	0	0	144	0
Conflicting Peds, #/hr	0	0	0	10	0	10	0	0	10	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	5	5	5	2	2	2	7	7	7
Mvmt Flow	35	7	36	0	0	5	0	489	0	0	164	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	665	663	174	666	663	509	164	0	0	499	0	0
Stage 1	164	164	-	499	499	-	-	-	-	-	-	-
Stage 2	501	499	-	167	164	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.55	6.25	4.12	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4.045	3.345	2.218	-	-	2.263	-	-
Pot Cap-1 Maneuver	376	384	875	369	378	558	1414	-	-	1040	-	-
Stage 1	843	766	-	548	539	-	-	-	-	-	-	-
Stage 2	556	547	-	828	757	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	370	381	868	343	375	549	1402	-	-	1031	-	-
Mov Cap-2 Maneuver	370	381	-	343	375	-	-	-	-	-	-	-
Stage 1	843	766	-	543	535	-	-	-	-	-	-	-
Stage 2	547	542	-	780	757	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.8	11.6	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1402	-	-	372	868	549	1031	-	-
HCM Lane V/C Ratio	-	-	-	0.113	0.042	0.008	-	-	-
HCM Control Delay (s)	0	-	-	15.9	9.3	11.6	0	-	-
HCM Lane LOS	A	-	-	C	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.1	0	0	-	-

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	114	220	20	30	80	18	100	282	170	84	64	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		3057			696			543			1446	
Travel Time (s)		59.6			13.6			14.8			39.4	
Confl. Peds. (#/hr)	11		2			9	2			9		11
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 (%)	4%	4%	4%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Intersection	
Intersection Delay, s/veh	16.1
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	366	132	569	180
Demand Flow Rate, veh/h	381	133	575	186
Vehicles Circulating, veh/h	189	521	449	218
Vehicles Exiting, veh/h	215	503	121	436
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	9	2	11
Ped Cap Adj	0.998	0.999	1.000	0.998
Approach Delay, s/veh	8.8	7.7	25.8	6.2
Approach LOS	A	A	D	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	381	133	575	186
Cap Entry Lane, veh/h	935	671	721	909
Entry HV Adj Factor	0.960	0.994	0.990	0.968
Flow Entry, veh/h	366	132	569	180
Cap Entry, veh/h	897	666	714	878
V/C Ratio	0.408	0.198	0.797	0.205
Control Delay, s/veh	8.8	7.7	25.8	6.2
LOS	A	A	D	A
95th %tile Queue, veh	2	1	8	1

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	1340	103	14	640	11	30	8	30	7	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			11.7			11.9	
Confl. Peds. (#/hr)			3	3					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 (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6		6	2		
Detector Phase	7	4		3	8		6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		28.0	28.0	28.0	28.0	28.0	
Total Split (s)	10.0	102.0		10.0	102.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	7.1%	72.9%		7.1%	72.9%		20.0%	20.0%	20.0%	20.0%	20.0%	
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	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 119.7
Natural Cycle: 140
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: 162nd Pl NE & NE 124th St



HCM 2010 Signalized Intersection Summary
7: 162nd Pl NE & NE 124th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	1340	103	14	640	11	30	8	30	7	3	4
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.98		0.98	0.98		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1778	1778	1796	1985	1985	2004	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	52	1381	106	14	660	11	31	8	17	7	3	4
Adj No. of Lanes	1	1	0	1	1	0	0	1	1	0	1	0
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
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	618	1322	102	90	1542	26	112	20	76	66	27	19
Arrive On Green	0.03	0.81	0.81	0.02	0.79	0.79	0.05	0.05	0.05	0.05	0.05	0.05
Sat Flow, veh/h	1693	1630	125	1890	1946	32	1211	420	1581	430	571	401
Grp Volume(v), veh/h	52	0	1487	14	0	671	39	0	17	14	0	0
Grp Sat Flow(s),veh/h/ln	1693	0	1755	1890	0	1979	1631	0	1581	1402	0	0
Q Serve(g_s), s	0.7	0.0	97.0	0.2	0.0	12.7	0.0	0.0	1.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.0	97.0	0.2	0.0	12.7	2.5	0.0	1.2	2.5	0.0	0.0
Prop In Lane	1.00		0.07	1.00		0.02	0.79		1.00	0.50		0.29
Lane Grp Cap(c), veh/h	618	0	1424	90	0	1568	132	0	76	112	0	0
V/C Ratio(X)	0.08	0.00	1.04	0.16	0.00	0.43	0.30	0.00	0.22	0.12	0.00	0.00
Avail Cap(c_a), veh/h	631	0	1424	139	0	1605	347	0	304	333	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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.6	0.0	11.3	39.8	0.0	3.9	55.4	0.0	54.8	54.6	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	36.3	0.8	0.0	0.2	1.2	0.0	1.5	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	0.3	0.0	59.8	0.4	0.0	7.0	1.3	0.0	0.6	0.5	0.0	0.0
LnGrp Delay(d),s/veh	2.6	0.0	47.6	40.6	0.0	4.1	56.6	0.0	56.3	55.1	0.0	0.0
LnGrp LOS	A		F	D		A	E		E	E		
Approach Vol, veh/h		1539			685			56			14	
Approach Delay, s/veh		46.1			4.8			56.5			55.1	
Approach LOS		D			A			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		10.7	6.9	102.0		10.7	9.1	99.7
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	97.0		23.0	5.0	97.0
Max Q Clear Time (g_c+I1), s		4.5	2.2	99.0		4.5	2.7	14.7
Green Ext Time (p_c), s		0.2	0.0	0.0		0.2	0.0	49.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.1
HCM 2010 LOS	C

Lanes, Volumes, Timings
12: 172nd Ave NE & NE 128th St

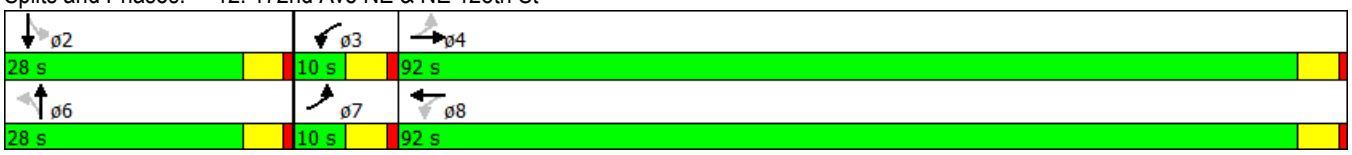
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	1240	20	31	430	60	140	80	199	60	20	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	135		0	150		0	155		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		533			502			1691			561	
Travel Time (s)		8.1			7.6			46.1			15.3	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	3%	3%	3%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	27.0		10.0	28.0		27.0	27.0		28.0	28.0	
Total Split (s)	10.0	92.0		10.0	92.0		28.0	28.0		28.0	28.0	
Total Split (%)	7.7%	70.8%		7.7%	70.8%		21.5%	21.5%		21.5%	21.5%	
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		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-Lag Optimize?												
Recall Mode	None	None		None	None		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 125.6
Natural Cycle: 130
Control Type: Actuated-Uncoordinated

Splits and Phases: 12: 172nd Ave NE & NE 128th St



HCM 2010 Signalized Intersection Summary
12: 172nd Ave NE & NE 128th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	110	1240	20	31	430	60	140	80	199	60	20	90
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1827	1827	1900	1900	1900	1900	1845	1845	1900
Adj Flow Rate, veh/h	112	1265	20	32	439	61	143	82	203	61	20	92
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	4	4	4	0	0	0	3	3	3
Cap, veh/h	609	1251	20	102	1046	145	209	87	215	69	52	237
Arrive On Green	0.04	0.68	0.68	0.03	0.67	0.67	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1792	1847	29	1740	1570	218	1301	486	1202	1079	288	1323
Grp Volume(v), veh/h	112	0	1285	32	0	500	143	0	285	61	0	112
Grp Sat Flow(s),veh/h/ln	1792	0	1876	1740	0	1788	1301	0	1688	1079	0	1611
Q Serve(g_s), s	2.5	0.0	87.0	0.7	0.0	16.7	14.0	0.0	21.4	1.6	0.0	7.9
Cycle Q Clear(g_c), s	2.5	0.0	87.0	0.7	0.0	16.7	21.9	0.0	21.4	23.0	0.0	7.9
Prop In Lane	1.00		0.02	1.00		0.12	1.00		0.71	1.00		0.82
Lane Grp Cap(c), veh/h	609	0	1271	102	0	1191	209	0	302	69	0	289
V/C Ratio(X)	0.18	0.00	1.01	0.31	0.00	0.42	0.68	0.00	0.94	0.88	0.00	0.39
Avail Cap(c_a), veh/h	610	0	1271	124	0	1212	209	0	302	69	0	289
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.2	0.0	20.7	34.7	0.0	10.0	56.1	0.0	52.1	64.0	0.0	46.5
Incr Delay (d2), s/veh	0.1	0.0	28.0	1.7	0.0	0.2	8.8	0.0	36.7	67.9	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.2	0.0	54.4	0.8	0.0	8.3	5.6	0.0	13.1	3.5	0.0	3.6
LnGrp Delay(d),s/veh	7.4	0.0	48.7	36.4	0.0	10.2	64.9	0.0	88.8	131.9	0.0	47.3
LnGrp LOS	A		F	D		B	E		F	F		D
Approach Vol, veh/h		1397			532			428			173	
Approach Delay, s/veh		45.3			11.8			80.8			77.2	
Approach LOS		D			B			F			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		28.0	8.4	92.0		28.0	9.9	90.5
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	87.0		23.0	5.0	87.0
Max Q Clear Time (g_c+I1), s		25.0	2.7	89.0		23.9	4.5	18.7
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	27.4

Intersection Summary	
HCM 2010 Ctrl Delay	46.5
HCM 2010 LOS	D

2022 With Scenario 2

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	29	11	86	35	18	0	34	78	16	0	140	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			260			290			1691	
Travel Time (s)		7.4			7.1			7.9			46.1	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles (%)	8%	8%	8%	2%	2%	2%	6%	6%	6%	4%	4%	4%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	9.6
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	29	11	86	0	35	18	0	0	34	78	16
Peak Hour Factor	0.92	0.73	0.73	0.73	0.92	0.73	0.73	0.73	0.92	0.73	0.73	0.73
Heavy Vehicles, %	2	8	8	8	2	2	2	2	2	6	6	6
Mvmt Flow	0	40	15	118	0	48	25	0	0	47	107	22
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9.3	9	9.5
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	27%	23%	66%	0%
Vol Thru, %	61%	9%	34%	75%
Vol Right, %	12%	68%	0%	25%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	128	126	53	187
LT Vol	34	29	35	0
Through Vol	78	11	18	140
RT Vol	16	86	0	47
Lane Flow Rate	175	173	73	256
Geometry Grp	1	1	1	1
Degree of Util (X)	0.238	0.23	0.107	0.33
Departure Headway (Hd)	4.89	4.788	5.315	4.64
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	729	744	669	771
Service Time	2.955	2.853	3.393	2.699
HCM Lane V/C Ratio	0.24	0.233	0.109	0.332
HCM Control Delay	9.5	9.3	9	10
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.9	0.9	0.4	1.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	140	47
Peak Hour Factor	0.92	0.73	0.73	0.73
Heavy Vehicles, %	2	4	4	4
Mvmt Flow	0	0	192	64
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	10
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	16	189	41	0	41	0	267	12	3	232	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				7		7			7	7		
Peak Hour Factor	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	12.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	16	189	41	0	41	0	267	12	3	232	0
Conflicting Peds, #/hr	0	0	0	7	0	7	0	0	7	7	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	57	57	57	57	57	57	57	57	57	57	57	57
Heavy Vehicles, %	0	0	0	2	2	2	6	6	6	6	6	6
Mvmt Flow	33	28	332	72	0	72	0	468	21	5	407	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	940	914	414	918	904	493	407	0	0	496	0	0
Stage 1	418	418	-	486	486	-	-	-	-	-	-	-
Stage 2	522	496	-	432	418	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	246	275	643	252	277	576	1130	-	-	1047	-	-
Stage 1	616	594	-	563	551	-	-	-	-	-	-	-
Stage 2	542	549	-	602	591	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	213	272	639	110	274	569	1123	-	-	1041	-	-
Mov Cap-2 Maneuver	213	272	-	110	274	-	-	-	-	-	-	-
Stage 1	616	590	-	560	548	-	-	-	-	-	-	-
Stage 2	471	546	-	273	587	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	71.9	0	0.1
HCM LOS	C	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1123	-	-	236	639	184	1041	-	-
HCM Lane V/C Ratio	-	-	-	0.26	0.519	0.782	0.005	-	-
HCM Control Delay (s)	0	-	-	25.5	16.5	71.9	8.5	0	-
HCM Lane LOS	A	-	-	D	C	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	3	5.3	0	-	-

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

10/28/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	16	189	31	0	41	0	267	12	3	232	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				7		7			7	7		
Peak Hour Factor	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Heavy Vehicles (%)	0%	0%	0%	2%	2%	2%	6%	6%	6%	6%	6%	6%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

10/28/2016

Intersection	
Int Delay, s/veh	9.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	19	16	189	31	0	41	0	267	12	3	232	0
Conflicting Peds, #/hr	0	0	0	7	0	7	0	0	7	7	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	57	57	57	57	57	57	57	57	57	57	57	57
Heavy Vehicles, %	0	0	0	2	2	2	6	6	6	6	6	6
Mvmt Flow	33	28	332	54	0	72	0	468	21	5	407	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	940	914	414	918	904	493	407	0	0	496	0	0
Stage 1	418	418	-	486	486	-	-	-	-	-	-	-
Stage 2	522	496	-	432	418	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.12	6.52	6.22	4.16	-	-	4.16	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.518	4.018	3.318	2.254	-	-	2.254	-	-
Pot Cap-1 Maneuver	246	275	643	252	277	576	1130	-	-	1047	-	-
Stage 1	616	594	-	563	551	-	-	-	-	-	-	-
Stage 2	542	549	-	602	591	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	213	272	639	110	274	569	1123	-	-	1041	-	-
Mov Cap-2 Maneuver	213	272	-	110	274	-	-	-	-	-	-	-
Stage 1	616	590	-	560	548	-	-	-	-	-	-	-
Stage 2	471	546	-	273	587	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	17.9	48.1	0	0.1
HCM LOS	C	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1123	-	-	236	639	203	1041	-	-
HCM Lane V/C Ratio	-	-	-	0.26	0.519	0.622	0.005	-	-
HCM Control Delay (s)	0	-	-	25.5	16.5	48.1	8.5	0	-
HCM Lane LOS	A	-	-	D	C	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	1	3	3.6	0	-	-

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBU
Lane Configurations												
Volume (vph)	1	93	101	37	1	215	289	78	46	118	34	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35				35			25		
Link Distance (ft)			3057				696			543		
Travel Time (s)			59.6				13.6			14.8		
Confl. Peds. (#/hr)	1	1		2		2		1	2		2	1
Peak Hour Factor	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
Heavy Vehicles (%)	8%	8%	8%	8%	4%	4%	4%	4%	1%	1%	1%	3%
Shared Lane Traffic (%)												
Sign Control			Yield				Yield			Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBL	SBT	SBR
Lane Configurations			
Volume (vph)	138	253	140
Ideal Flow (vphpl)	1900	1900	1900
Link Speed (mph)		25	
Link Distance (ft)		1446	
Travel Time (s)		39.4	
Confl. Peds. (#/hr)	1		1
Peak Hour Factor	0.83	0.83	0.83
Heavy Vehicles (%)	3%	3%	3%
Shared Lane Traffic (%)			
Sign Control		Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	57.3
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	280	702	238	641
Demand Flow Rate, veh/h	303	730	240	660
Vehicles Circulating, veh/h	756	322	427	689
Vehicles Exiting, veh/h	593	345	632	363
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	2	2	2	1
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	19.5	33.9	8.9	117.4
Approach LOS	C	D	A	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	303	730	240	660
Cap Entry Lane, veh/h	531	819	737	567
Entry HV Adj Factor	0.925	0.962	0.990	0.971
Flow Entry, veh/h	280	702	238	641
Cap Entry, veh/h	490	787	730	551
V/C Ratio	0.571	0.892	0.326	1.164
Control Delay, s/veh	19.5	33.9	8.9	117.4
LOS	C	D	A	F
95th %tile Queue, veh	4	12	1	22

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	335	94	29	1030	8	79	0	5	8	8	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			11.7			11.9	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles (%)	6%	6%	6%	3%	3%	3%	4%	4%	4%	5%	5%	5%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6		6	2		
Detector Phase	7	4		3	8		6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		28.0	28.0	28.0	28.0	28.0	
Total Split (s)	10.0	62.0		10.0	62.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	10.0%	62.0%		10.0%	62.0%		28.0%	28.0%	28.0%	28.0%	28.0%	
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	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 77.6
Natural Cycle: 100
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: 162nd Pl NE & NE 124th St



HCM 2010 Signalized Intersection Summary
7: 162nd Pl NE & NE 124th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	335	94	29	1030	8	79	0	5	8	8	34
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.99		1.00	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1694	1694	1796	1946	1946	2004	1900	1827	1827	1900	1810	1900
Adj Flow Rate, veh/h	16	368	103	32	1132	9	87	0	0	9	9	37
Adj No. of Lanes	1	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	6	6	6	3	3	3	4	4	4	5	5	5
Cap, veh/h	227	841	235	664	1299	10	240	0	147	73	36	102
Arrive On Green	0.02	0.66	0.66	0.03	0.67	0.67	0.09	0.00	0.00	0.09	0.09	0.09
Sat Flow, veh/h	1613	1274	357	1853	1928	15	1456	0	1553	143	379	1073
Grp Volume(v), veh/h	16	0	471	32	0	1141	87	0	0	55	0	0
Grp Sat Flow(s),veh/h/ln	1613	0	1631	1853	0	1943	1456	0	1553	1595	0	0
Q Serve(g_s), s	0.2	0.0	9.8	0.4	0.0	32.8	1.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	9.8	0.4	0.0	32.8	3.8	0.0	0.0	2.3	0.0	0.0
Prop In Lane	1.00		0.22	1.00		0.01	1.00		1.00	0.16		0.67
Lane Grp Cap(c), veh/h	227	0	1076	664	0	1310	240	0	147	210	0	0
V/C Ratio(X)	0.07	0.00	0.44	0.05	0.00	0.87	0.36	0.00	0.00	0.26	0.00	0.00
Avail Cap(c_a), veh/h	310	0	1316	734	0	1568	544	0	506	564	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	1.00	1.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	11.1	0.0	5.7	4.1	0.0	9.1	30.5	0.0	0.0	30.0	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.3	0.0	0.0	4.9	0.9	0.0	0.0	0.7	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	0.2	0.0	4.4	0.2	0.0	18.9	1.7	0.0	0.0	1.0	0.0	0.0
LnGrp Delay(d),s/veh	11.2	0.0	6.0	4.1	0.0	14.0	31.5	0.0	0.0	30.6	0.0	0.0
LnGrp LOS	B		A	A		B	C			C		
Approach Vol, veh/h		487			1173			87			55	
Approach Delay, s/veh		6.2			13.7			31.5			30.6	
Approach LOS		A			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		11.7	7.3	51.6		11.7	6.3	52.6
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	57.0		23.0	5.0	57.0
Max Q Clear Time (g_c+I1), s		4.3	2.4	11.8		5.8	2.2	34.8
Green Ext Time (p_c), s		0.7	0.0	18.2		0.7	0.0	12.9

Intersection Summary	
HCM 2010 Ctrl Delay	13.1
HCM 2010 LOS	B

Lanes, Volumes, Timings
12: 172nd Ave NE & NE 128th St

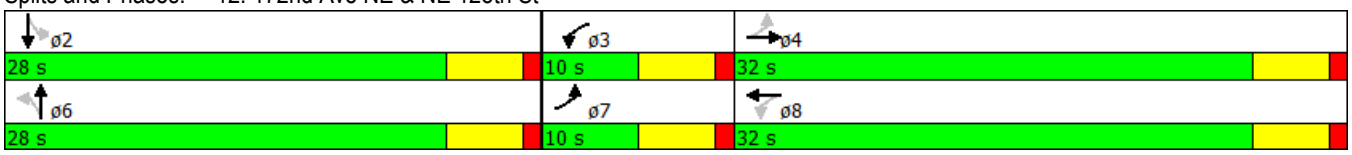
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	36	235	5	56	577	24	26	41	48	51	60	235
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	135		0	150		0	155		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		533			502			1691			561	
Travel Time (s)		8.1			7.6			46.1			15.3	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	13%	13%	13%	4%	4%	4%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	27.0		10.0	28.0		27.0	27.0		28.0	28.0	
Total Split (s)	10.0	32.0		10.0	32.0		28.0	28.0		28.0	28.0	
Total Split (%)	14.3%	45.7%		14.3%	45.7%		40.0%	40.0%		40.0%	40.0%	
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		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-Lag Optimize?												
Recall Mode	None	None		None	None		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 70
Actuated Cycle Length: 46.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated

Splits and Phases: 12: 172nd Ave NE & NE 128th St



HCM 2010 Signalized Intersection Summary
12: 172nd Ave NE & NE 128th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	235	5	56	577	24	26	41	48	51	60	235
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1681	1681	1900	1827	1827	1900	1845	1845	1900	1827	1827	1900
Adj Flow Rate, veh/h	39	253	5	60	620	26	28	44	52	55	65	253
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	13	13	13	4	4	4	3	3	3	4	4	4
Cap, veh/h	256	657	13	541	720	30	232	214	253	426	91	354
Arrive On Green	0.04	0.40	0.40	0.05	0.41	0.41	0.28	0.28	0.28	0.28	0.28	0.28
Sat Flow, veh/h	1601	1643	32	1740	1741	73	1047	772	912	1269	327	1275
Grp Volume(v), veh/h	39	0	258	60	0	646	28	0	96	55	0	318
Grp Sat Flow(s),veh/h/ln	1601	0	1676	1740	0	1814	1047	0	1684	1269	0	1602
Q Serve(g_s), s	0.8	0.0	6.1	1.1	0.0	18.2	1.4	0.0	2.4	1.9	0.0	10.0
Cycle Q Clear(g_c), s	0.8	0.0	6.1	1.1	0.0	18.2	11.4	0.0	2.4	4.4	0.0	10.0
Prop In Lane	1.00		0.02	1.00		0.04	1.00		0.54	1.00		0.80
Lane Grp Cap(c), veh/h	256	0	670	541	0	750	232	0	468	426	0	445
V/C Ratio(X)	0.15	0.00	0.39	0.11	0.00	0.86	0.12	0.00	0.21	0.13	0.00	0.71
Avail Cap(c_a), veh/h	334	0	809	602	0	876	372	0	692	595	0	659
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	11.8	0.0	11.9	9.0	0.0	15.0	23.3	0.0	15.5	17.1	0.0	18.2
Incr Delay (d2), s/veh	0.3	0.0	0.4	0.1	0.0	7.8	0.2	0.0	0.2	0.1	0.0	2.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.0	2.9	0.5	0.0	10.6	0.4	0.0	1.1	0.7	0.0	4.7
LnGrp Delay(d),s/veh	12.1	0.0	12.3	9.1	0.0	22.8	23.6	0.0	15.7	17.3	0.0	20.3
LnGrp LOS	B		B	A		C	C		B	B		C
Approach Vol, veh/h		297			706			124			373	
Approach Delay, s/veh		12.3			21.6			17.5			19.9	
Approach LOS		B			C			B			B	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		20.5	8.0	27.4		20.5	7.3	28.1
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	27.0		23.0	5.0	27.0
Max Q Clear Time (g_c+I1), s		12.0	3.1	8.1		13.4	2.8	20.2
Green Ext Time (p_c), s		2.3	0.0	5.3		2.2	0.0	3.0

Intersection Summary	
HCM 2010 Ctrl Delay	19.0
HCM 2010 LOS	B

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	40	10	48	21	10	0	35	168	23	0	71	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			276			290			1691	
Travel Time (s)		7.4			7.5			7.9			46.1	
Confl. Peds. (#/hr)	7											7
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	5%	5%	5%	2%	2%	2%	8%	8%	8%	17%	17%	17%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	40	10	48	0	21	10	0	0	35	168	23
Peak Hour Factor	0.92	0.88	0.88	0.88	0.92	0.88	0.88	0.88	0.92	0.88	0.88	0.88
Heavy Vehicles, %	2	5	5	5	2	2	2	2	2	8	8	8
Mvmt Flow	0	45	11	55	0	24	11	0	0	40	191	26
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	8.5	8.3	9.6
HCM LOS	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	15%	41%	68%	0%
Vol Thru, %	74%	10%	32%	83%
Vol Right, %	10%	49%	0%	17%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	226	98	31	86
LT Vol	35	40	21	0
Through Vol	168	10	10	71
RT Vol	23	48	0	15
Lane Flow Rate	257	111	35	98
Geometry Grp	1	1	1	1
Degree of Util (X)	0.319	0.144	0.049	0.128
Departure Headway (Hd)	4.474	4.642	5.035	4.724
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	804	772	710	758
Service Time	2.498	2.672	3.073	2.754
HCM Lane V/C Ratio	0.32	0.144	0.049	0.129
HCM Control Delay	9.6	8.5	8.3	8.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1.4	0.5	0.2	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	71	15
Peak Hour Factor	0.92	0.88	0.88	0.88
Heavy Vehicles, %	2	17	17	17
Mvmt Flow	0	0	81	17
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.5
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	15	17	96	11	0	24	0	321	11	16	112	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				3		3			3	3		
Peak Hour Factor	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	10%	10%	10%	8%	8%	8%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	3.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	15	17	96	11	0	24	0	321	11	16	112	0
Conflicting Peds, #/hr	0	0	0	3	0	3	0	0	3	3	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	74	74	74	74	74	74	74	74	74	74	74	74
Heavy Vehicles, %	0	0	0	0	0	0	10	10	10	8	8	8
Mvmt Flow	20	23	130	15	0	32	0	434	15	22	151	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	655	647	154	650	639	447	151	0	0	452	0	0
Stage 1	195	195	-	444	444	-	-	-	-	-	-	-
Stage 2	460	452	-	206	195	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.2	-	-	4.18	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.29	-	-	2.272	-	-
Pot Cap-1 Maneuver	382	392	897	385	397	616	1382	-	-	1078	-	-
Stage 1	811	743	-	597	579	-	-	-	-	-	-	-
Stage 2	585	574	-	801	743	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	355	382	895	307	387	613	1379	-	-	1075	-	-
Mov Cap-2 Maneuver	355	382	-	307	387	-	-	-	-	-	-	-
Stage 1	811	727	-	596	578	-	-	-	-	-	-	-
Stage 2	553	573	-	647	727	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	11.3	13.6	0	1.1
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1379	-	-	369	895	467	1075	-	-
HCM Lane V/C Ratio	-	-	-	0.117	0.145	0.101	0.02	-	-
HCM Control Delay (s)	0	-	-	16	9.7	13.6	8.4	0	-
HCM Lane LOS	A	-	-	C	A	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.4	0.5	0.3	0.1	-	-

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBL
Lane Configurations												
Volume (vph)	1	90	224	32	52	149	100	1	38	168	85	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)			35			35				25		
Link Distance (ft)			3057			696				543		
Travel Time (s)			59.6			13.6				14.8		
Confl. Peds. (#/hr)	6	11		10	4		5	4	10		4	5
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	5%	5%	5%	5%	4%	4%	4%	2%	2%	2%	2%	5%
Shared Lane Traffic (%)												
Sign Control			Yield			Yield				Yield		

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Lane Group	SBT	SBR
Lane Configurations		
Volume (vph)	86	69
Ideal Flow (vphpl)	1900	1900
Link Speed (mph)	25	
Link Distance (ft)	1446	
Travel Time (s)	39.4	
Confl. Peds. (#/hr)		11
Peak Hour Factor	0.84	0.84
Heavy Vehicles (%)	5%	5%
Shared Lane Traffic (%)		
Sign Control	Yield	

Intersection Summary

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	413	358	347	264
Demand Flow Rate, veh/h	433	372	354	277
Vehicles Circulating, veh/h	256	364	477	296
Vehicles Exiting, veh/h	317	467	212	440
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	5	10	11
Ped Cap Adj	0.998	0.999	0.999	0.998
Approach Delay, s/veh	11.0	11.4	13.0	8.4
Approach LOS	B	B	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	433	372	354	277
Cap Entry Lane, veh/h	875	785	701	840
Entry HV Adj Factor	0.953	0.962	0.980	0.953
Flow Entry, veh/h	413	358	347	264
Cap Entry, veh/h	832	755	686	799
V/C Ratio	0.496	0.474	0.505	0.330
Control Delay, s/veh	11.0	11.4	13.0	8.4
LOS	B	B	B	A
95th %tile Queue, veh	3	3	3	1

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

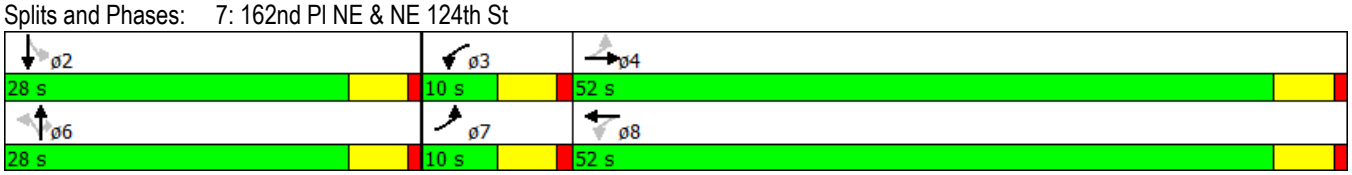
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	796	78	5	605	6	60	4	6	6	5	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			11.7			11.9	
Confl. Peds. (#/hr)									2	2		
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	8%	8%	8%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6		6	2		
Detector Phase	7	4		3	8		6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		28.0	28.0	28.0	28.0	28.0	
Total Split (s)	10.0	52.0		10.0	52.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	11.1%	57.8%		11.1%	57.8%		31.1%	31.1%	31.1%	31.1%	31.1%	
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	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 65.3
Natural Cycle: 90
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: 162nd Pl NE & NE 124th St



HCM 2010 Signalized Intersection Summary
7: 162nd Pl NE & NE 124th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	796	78	5	605	6	60	4	6	6	5	21
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1743	1743	1796	1946	1946	2004	1900	1863	1863	1900	1759	1900
Adj Flow Rate, veh/h	19	856	84	5	651	6	65	4	1	6	5	23
Adj No. of Lanes	1	1	0	1	1	0	0	1	1	0	1	0
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	3	3	3	3	3	3	2	2	2	8	8	8
Cap, veh/h	488	1019	100	280	1224	11	240	7	127	85	25	77
Arrive On Green	0.02	0.65	0.65	0.01	0.64	0.64	0.08	0.08	0.08	0.08	0.08	0.08
Sat Flow, veh/h	1660	1563	153	1853	1925	18	1470	90	1565	140	315	952
Grp Volume(v), veh/h	19	0	940	5	0	657	69	0	1	34	0	0
Grp Sat Flow(s),veh/h/ln	1660	0	1716	1853	0	1943	1561	0	1565	1407	0	0
Q Serve(g_s), s	0.2	0.0	24.3	0.1	0.0	10.7	0.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.2	0.0	24.3	0.1	0.0	10.7	2.2	0.0	0.0	2.2	0.0	0.0
Prop In Lane	1.00		0.09	1.00		0.01	0.94		1.00	0.18		0.68
Lane Grp Cap(c), veh/h	488	0	1119	280	0	1235	248	0	127	187	0	0
V/C Ratio(X)	0.04	0.00	0.84	0.02	0.00	0.53	0.28	0.00	0.01	0.18	0.00	0.00
Avail Cap(c_a), veh/h	595	0	1401	429	0	1586	689	0	625	659	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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	4.4	0.0	7.7	8.5	0.0	5.8	25.3	0.0	24.3	24.9	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	3.9	0.0	0.0	0.4	0.6	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	0.1	0.0	12.4	0.0	0.0	5.8	1.1	0.0	0.0	0.5	0.0	0.0
LnGrp Delay(d),s/veh	4.5	0.0	11.6	8.5	0.0	6.1	25.9	0.0	24.4	25.3	0.0	0.0
LnGrp LOS	A		B	A		A	C		C	C		
Approach Vol, veh/h		959			662			70			34	
Approach Delay, s/veh		11.5			6.1			25.9			25.3	
Approach LOS		B			A			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		9.7	5.4	42.5		9.7	6.3	41.6
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	47.0		23.0	5.0	47.0
Max Q Clear Time (g_c+I1), s		4.2	2.1	26.3		4.2	2.2	12.7
Green Ext Time (p_c), s		0.4	0.0	11.3		0.4	0.0	14.5

Intersection Summary	
HCM 2010 Ctrl Delay	10.3
HCM 2010 LOS	B

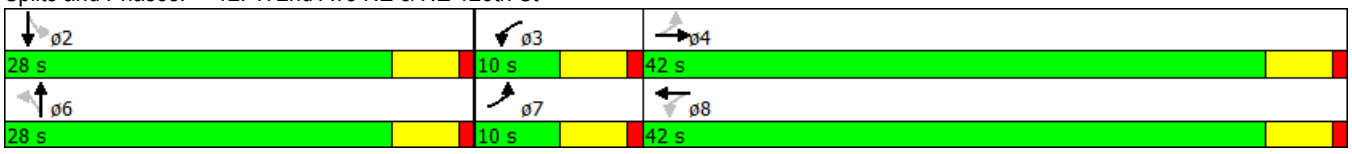
Lanes, Volumes, Timings
12: 172nd Ave NE & NE 128th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	78	712	18	39	525	34	11	81	93	19	27	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	135		0	150		0	155		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		533			502			1691			561	
Travel Time (s)		8.1			7.6			46.1			15.3	
Confl. Peds. (#/hr)							4					4
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	1%	1%	1%	2%	2%	2%	0%	0%	0%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	27.0		10.0	28.0		27.0	27.0		28.0	28.0	
Total Split (s)	10.0	42.0		10.0	42.0		28.0	28.0		28.0	28.0	
Total Split (%)	12.5%	52.5%		12.5%	52.5%		35.0%	35.0%		35.0%	35.0%	
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		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-Lag Optimize?												
Recall Mode	None	None		None	None		None	None		None	None	

Intersection Summary	
Area Type:	Other
Cycle Length: 80	
Actuated Cycle Length: 60	
Natural Cycle: 80	
Control Type: Actuated-Uncoordinated	

Splits and Phases: 12: 172nd Ave NE & NE 128th St



HCM 2010 Signalized Intersection Summary
12: 172nd Ave NE & NE 128th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	78	712	18	39	525	34	11	81	93	19	27	80
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1863	1863	1900	1900	1900	1900	1881	1881	1900
Adj Flow Rate, veh/h	89	809	20	44	597	39	12	92	106	22	31	91
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Percent Heavy Veh, %	1	1	1	2	2	2	0	0	0	1	1	1
Cap, veh/h	418	953	24	285	867	57	283	156	180	223	82	239
Arrive On Green	0.06	0.52	0.52	0.04	0.50	0.50	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1792	1828	45	1774	1730	113	1280	802	924	1185	419	1230
Grp Volume(v), veh/h	89	0	829	44	0	636	12	0	198	22	0	122
Grp Sat Flow(s),veh/h/ln	1792	0	1873	1774	0	1843	1280	0	1726	1185	0	1649
Q Serve(g_s), s	1.4	0.0	23.6	0.7	0.0	16.4	0.5	0.0	6.5	1.1	0.0	4.0
Cycle Q Clear(g_c), s	1.4	0.0	23.6	0.7	0.0	16.4	4.5	0.0	6.5	7.6	0.0	4.0
Prop In Lane	1.00		0.02	1.00		0.06	1.00		0.54	1.00		0.75
Lane Grp Cap(c), veh/h	418	0	977	285	0	923	283	0	336	223	0	321
V/C Ratio(X)	0.21	0.00	0.85	0.15	0.00	0.69	0.04	0.00	0.59	0.10	0.00	0.38
Avail Cap(c_a), veh/h	449	0	1114	352	0	1096	507	0	638	430	0	610
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	8.6	0.0	12.8	10.9	0.0	11.8	23.7	0.0	22.8	26.2	0.0	21.8
Incr Delay (d2), s/veh	0.3	0.0	5.7	0.2	0.0	1.5	0.1	0.0	1.6	0.2	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	0.7	0.0	13.5	0.4	0.0	8.5	0.2	0.0	3.2	0.4	0.0	1.9
LnGrp Delay(d),s/veh	8.9	0.0	18.5	11.2	0.0	13.3	23.8	0.0	24.4	26.4	0.0	22.5
LnGrp LOS	A		B	B		B	C		C	C		C
Approach Vol, veh/h		918			680			210			144	
Approach Delay, s/veh		17.6			13.1			24.4			23.1	
Approach LOS		B			B			C			C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		17.1	7.7	37.4		17.1	8.9	36.2
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	37.0		23.0	5.0	37.0
Max Q Clear Time (g_c+I1), s		9.6	2.7	25.6		8.5	3.4	18.4
Green Ext Time (p_c), s		1.8	0.0	6.8		1.8	0.0	9.3

Intersection Summary	
HCM 2010 Ctrl Delay	17.2
HCM 2010 LOS	B

Lanes, Volumes, Timings
1: 172nd Ave NE & NE 122nd St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		✣			✣			✣			✣	
Volume (vph)	20	0	103	3	0	0	41	390	4	0	54	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		270			302			290			1691	
Travel Time (s)		7.4			8.2			7.9			46.1	
Confl. Peds. (#/hr)	3		2				2					3
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	3%	3%	3%	12%	12%	12%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Stop			Stop	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

Intersection	
Intersection Delay, s/veh	13.1
Intersection LOS	B

Movement	EBU	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBU	NBL	NBT	NBR
Vol, veh/h	0	20	0	103	0	3	0	0	0	41	390	4
Peak Hour Factor	0.92	0.84	0.84	0.84	0.92	0.84	0.84	0.84	0.92	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	0	24	0	123	0	4	0	0	0	49	464	5
Number of Lanes	0	0	1	0	0	0	1	0	0	0	1	0

Approach	EB	WB	NB
Opposing Approach	WB	EB	SB
Opposing Lanes	1	1	1
Conflicting Approach Left	SB	NB	EB
Conflicting Lanes Left	1	1	1
Conflicting Approach Right	NB	SB	WB
Conflicting Lanes Right	1	1	1
HCM Control Delay	9.1	8.8	14.9
HCM LOS	A	A	B

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	16%	100%	0%
Vol Thru, %	90%	0%	0%	84%
Vol Right, %	1%	84%	0%	16%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	435	123	3	64
LT Vol	41	20	3	0
Through Vol	390	0	0	54
RT Vol	4	103	0	10
Lane Flow Rate	518	146	4	76
Geometry Grp	1	1	1	1
Degree of Util (X)	0.636	0.196	0.006	0.105
Departure Headway (Hd)	4.421	4.824	5.716	4.941
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	813	741	623	722
Service Time	2.457	2.872	3.783	2.993
HCM Lane V/C Ratio	0.637	0.197	0.006	0.105
HCM Control Delay	14.9	9.1	8.8	8.6
HCM Lane LOS	B	A	A	A
HCM 95th-tile Q	4.7	0.7	0	0.4

Intersection	
Intersection Delay, s/veh	
Intersection LOS	

Movement	SBU	SBL	SBT	SBR
Vol, veh/h	0	0	54	10
Peak Hour Factor	0.92	0.84	0.84	0.84
Heavy Vehicles, %	2	12	12	12
Mvmt Flow	0	0	64	12
Number of Lanes	0	0	1	0

Approach	SB
Opposing Approach	NB
Opposing Lanes	1
Conflicting Approach Left	WB
Conflicting Lanes Left	1
Conflicting Approach Right	EB
Conflicting Lanes Right	1
HCM Control Delay	8.6
HCM LOS	A

Lane

Lanes, Volumes, Timings
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	6	38	0	0	4	0	432	0	0	144	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		378			453			1446			242	
Travel Time (s)		10.3			12.4			39.4			6.6	
Confl. Peds. (#/hr)				10		10			10	10		
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles (%)	0%	0%	0%	5%	5%	5%	2%	2%	2%	7%	7%	7%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary	
Area Type:	Other
Control Type: Unsignalized	

HCM 2010 TWSC
2: 172nd Ave NE & Exit Only Dwy/NE 120th Way

9/15/2016

Intersection	
Int Delay, s/veh	1.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	25	6	38	0	0	4	0	432	0	0	144	0
Conflicting Peds, #/hr	0	0	0	10	0	10	0	0	10	10	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	5	5	5	2	2	2	7	7	7
Mvmt Flow	28	7	43	0	0	5	0	491	0	0	164	0

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	667	665	174	668	665	511	164	0	0	501	0	0
Stage 1	164	164	-	501	501	-	-	-	-	-	-	-
Stage 2	503	501	-	167	164	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.15	6.55	6.25	4.12	-	-	4.17	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.15	5.55	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.545	4.045	3.345	2.218	-	-	2.263	-	-
Pot Cap-1 Maneuver	375	383	875	368	377	557	1414	-	-	1038	-	-
Stage 1	843	766	-	547	538	-	-	-	-	-	-	-
Stage 2	555	546	-	828	757	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	369	380	868	339	374	548	1402	-	-	1029	-	-
Mov Cap-2 Maneuver	369	380	-	339	374	-	-	-	-	-	-	-
Stage 1	843	766	-	542	534	-	-	-	-	-	-	-
Stage 2	546	541	-	773	757	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	12.2	11.6	0	0
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1402	-	-	371	868	548	1029	-	-
HCM Lane V/C Ratio	-	-	-	0.095	0.05	0.008	-	-	-
HCM Control Delay (s)	0	-	-	15.7	9.4	11.6	0	-	-
HCM Lane LOS	A	-	-	C	A	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.2	0	0	-	-

Lanes, Volumes, Timings
5: 172nd Ave NE & NE 116th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Volume (vph)	113	220	20	30	80	18	100	285	170	85	71	27
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		3057			696			543			1446	
Travel Time (s)		59.6			13.6			14.8			39.4	
Confl. Peds. (#/hr)	11		2			9	2			9		11
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 (%)	4%	4%	4%	1%	1%	1%	1%	1%	1%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Yield			Yield			Yield			Yield	

Intersection Summary	
Area Type:	Other
Control Type: Roundabout	

Intersection	
Intersection Delay, s/veh	16.2
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	364	132	572	189
Demand Flow Rate, veh/h	379	133	578	195
Vehicles Circulating, veh/h	197	522	448	218
Vehicles Exiting, veh/h	216	504	128	437
Follow-Up Headway, s	3.186	3.186	3.186	3.186
Ped Vol Crossing Leg, #/h	11	9	2	11
Ped Cap Adj	0.998	0.999	1.000	0.998
Approach Delay, s/veh	8.9	7.7	26.1	6.3
Approach LOS	A	A	D	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Critical Headway, s	5.193	5.193	5.193	5.193
Entry Flow, veh/h	379	133	578	195
Cap Entry Lane, veh/h	928	670	722	909
Entry HV Adj Factor	0.960	0.994	0.990	0.968
Flow Entry, veh/h	364	132	572	189
Cap Entry, veh/h	890	665	714	878
V/C Ratio	0.409	0.199	0.801	0.215
Control Delay, s/veh	8.9	7.7	26.1	6.3
LOS	A	A	D	A
95th %tile Queue, veh	2	1	8	1

Lanes, Volumes, Timings
7: 162nd Pl NE & NE 124th St

9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	50	1340	103	14	640	11	30	8	30	7	3	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		11%			-11%			0%			0%	
Storage Length (ft)	150		0	150		0	0		0	0		0
Storage Lanes	1		0	1		0	0		1	0		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			30			30	
Link Distance (ft)		606			744			513			523	
Travel Time (s)		9.2			11.3			11.7			11.9	
Confl. Peds. (#/hr)			3	3					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 (%)	1%	1%	1%	1%	1%	1%	0%	0%	0%	0%	0%	0%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA	Perm	Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6		6	2		
Detector Phase	7	4		3	8		6	6	6	2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	10.0	26.0		10.0	26.0		28.0	28.0	28.0	28.0	28.0	
Total Split (s)	10.0	102.0		10.0	102.0		28.0	28.0	28.0	28.0	28.0	
Total Split (%)	7.1%	72.9%		7.1%	72.9%		20.0%	20.0%	20.0%	20.0%	20.0%	
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	
Total Lost Time (s)	5.0	5.0		5.0	5.0			5.0	5.0		5.0	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		None	None	None	None	None	

Intersection Summary

Area Type: Other
Cycle Length: 140
Actuated Cycle Length: 119.7
Natural Cycle: 140
Control Type: Actuated-Uncoordinated

Splits and Phases: 7: 162nd Pl NE & NE 124th St



HCM 2010 Signalized Intersection Summary
7: 162nd Pl NE & NE 124th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	50	1340	103	14	640	11	30	8	30	7	3	4
Number	7	4	14	3	8	18	1	6	16	5	2	12
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	0.98		0.98	0.98		0.98
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1778	1778	1796	1985	1985	2004	1900	1900	1900	1900	1900	1900
Adj Flow Rate, veh/h	52	1381	106	14	660	11	31	8	17	7	3	4
Adj No. of Lanes	1	1	0	1	1	0	0	1	1	0	1	0
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
Percent Heavy Veh, %	1	1	1	1	1	1	0	0	0	0	0	0
Cap, veh/h	618	1322	102	90	1542	26	112	20	76	66	27	19
Arrive On Green	0.03	0.81	0.81	0.02	0.79	0.79	0.05	0.05	0.05	0.05	0.05	0.05
Sat Flow, veh/h	1693	1630	125	1890	1946	32	1211	420	1581	430	571	401
Grp Volume(v), veh/h	52	0	1487	14	0	671	39	0	17	14	0	0
Grp Sat Flow(s),veh/h/ln	1693	0	1755	1890	0	1979	1631	0	1581	1402	0	0
Q Serve(g_s), s	0.7	0.0	97.0	0.2	0.0	12.7	0.0	0.0	1.2	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.7	0.0	97.0	0.2	0.0	12.7	2.5	0.0	1.2	2.5	0.0	0.0
Prop In Lane	1.00		0.07	1.00		0.02	0.79		1.00	0.50		0.29
Lane Grp Cap(c), veh/h	618	0	1424	90	0	1568	132	0	76	112	0	0
V/C Ratio(X)	0.08	0.00	1.04	0.16	0.00	0.43	0.30	0.00	0.22	0.12	0.00	0.00
Avail Cap(c_a), veh/h	631	0	1424	139	0	1605	347	0	304	333	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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	2.6	0.0	11.3	39.8	0.0	3.9	55.4	0.0	54.8	54.6	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	36.3	0.8	0.0	0.2	1.2	0.0	1.5	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	0.3	0.0	59.8	0.4	0.0	7.0	1.3	0.0	0.6	0.5	0.0	0.0
LnGrp Delay(d),s/veh	2.6	0.0	47.6	40.6	0.0	4.1	56.6	0.0	56.3	55.1	0.0	0.0
LnGrp LOS	A		F	D		A	E		E	E		
Approach Vol, veh/h		1539			685			56			14	
Approach Delay, s/veh		46.1			4.8			56.5			55.1	
Approach LOS		D			A			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		10.7	6.9	102.0		10.7	9.1	99.7
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	97.0		23.0	5.0	97.0
Max Q Clear Time (g_c+I1), s		4.5	2.2	99.0		4.5	2.7	14.7
Green Ext Time (p_c), s		0.2	0.0	0.0		0.2	0.0	49.0

Intersection Summary	
HCM 2010 Ctrl Delay	34.1
HCM 2010 LOS	C

Lanes, Volumes, Timings
12: 172nd Ave NE & NE 128th St

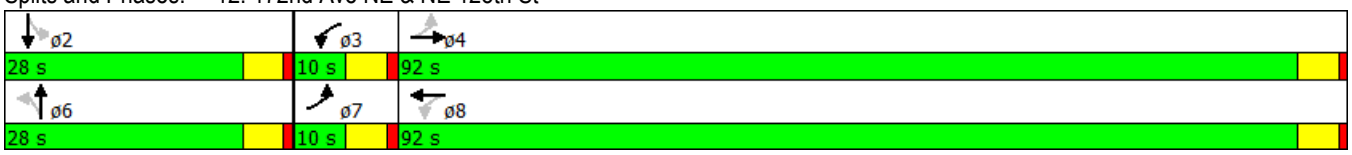
9/15/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	110	1240	20	32	430	60	140	80	196	60	20	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	135		0	150		0	155		0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		533			502			1691			561	
Travel Time (s)		8.1			7.6			46.1			15.3	
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Heavy Vehicles (%)	1%	1%	1%	4%	4%	4%	0%	0%	0%	3%	3%	3%
Shared Lane Traffic (%)												
Turn Type	pm+pt	NA		pm+pt	NA		Perm	NA		Perm	NA	
Protected Phases	7	4		3	8			6			2	
Permitted Phases	4			8			6			2		
Detector Phase	7	4		3	8		6	6		2	2	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	10.0	27.0		10.0	28.0		27.0	27.0		28.0	28.0	
Total Split (s)	10.0	92.0		10.0	92.0		28.0	28.0		28.0	28.0	
Total Split (%)	7.7%	70.8%		7.7%	70.8%		21.5%	21.5%		21.5%	21.5%	
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		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-Lag Optimize?												
Recall Mode	None	None		None	None		None	None		None	None	

Intersection Summary

Area Type: Other
Cycle Length: 130
Actuated Cycle Length: 124.9
Natural Cycle: 130
Control Type: Actuated-Uncoordinated

Splits and Phases: 12: 172nd Ave NE & NE 128th St



HCM 2010 Signalized Intersection Summary
12: 172nd Ave NE & NE 128th St

9/15/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	110	1240	20	32	430	60	140	80	196	60	20	90
Number	7	4	14	3	8	18	1	6	16	5	2	12
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1881	1881	1900	1827	1827	1900	1900	1900	1900	1845	1845	1900
Adj Flow Rate, veh/h	112	1265	20	33	439	61	143	82	200	61	20	92
Adj No. of Lanes	1	1	0	1	1	0	1	1	0	1	1	0
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	4	4	4	0	0	0	3	3	3
Cap, veh/h	609	1251	20	103	1046	145	209	88	214	72	52	237
Arrive On Green	0.04	0.68	0.68	0.03	0.67	0.67	0.18	0.18	0.18	0.18	0.18	0.18
Sat Flow, veh/h	1792	1847	29	1740	1570	218	1301	491	1198	1082	288	1323
Grp Volume(v), veh/h	112	0	1285	33	0	500	143	0	282	61	0	112
Grp Sat Flow(s),veh/h/ln	1792	0	1876	1740	0	1788	1301	0	1689	1082	0	1611
Q Serve(g_s), s	2.5	0.0	87.0	0.8	0.0	16.7	14.0	0.0	21.1	1.9	0.0	7.9
Cycle Q Clear(g_c), s	2.5	0.0	87.0	0.8	0.0	16.7	21.9	0.0	21.1	23.0	0.0	7.9
Prop In Lane	1.00		0.02	1.00		0.12	1.00		0.71	1.00		0.82
Lane Grp Cap(c), veh/h	609	0	1271	103	0	1191	209	0	302	72	0	288
V/C Ratio(X)	0.18	0.00	1.01	0.32	0.00	0.42	0.68	0.00	0.93	0.85	0.00	0.39
Avail Cap(c_a), veh/h	610	0	1271	124	0	1211	209	0	302	72	0	288
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	7.2	0.0	20.7	34.7	0.0	9.9	56.2	0.0	52.0	64.0	0.0	46.5
Incr Delay (d2), s/veh	0.1	0.0	28.1	1.8	0.0	0.2	8.8	0.0	34.5	58.6	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	0.0	54.4	0.8	0.0	8.3	5.6	0.0	12.8	3.3	0.0	3.6
LnGrp Delay(d),s/veh	7.4	0.0	48.8	36.4	0.0	10.2	65.0	0.0	86.5	122.6	0.0	47.4
LnGrp LOS	A		F	D		B	E		F	F		D
Approach Vol, veh/h		1397			533			425			173	
Approach Delay, s/veh		45.5			11.8			79.2			73.9	
Approach LOS		D			B			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4		6	7	8
Phs Duration (G+Y+Rc), s		28.0	8.5	92.0		28.0	9.9	90.6
Change Period (Y+Rc), s		5.0	5.0	5.0		5.0	5.0	5.0
Max Green Setting (Gmax), s		23.0	5.0	87.0		23.0	5.0	87.0
Max Q Clear Time (g_c+I1), s		25.0	2.8	89.0		23.9	4.5	18.7
Green Ext Time (p_c), s		0.0	0.0	0.0		0.0	0.0	27.4

Intersection Summary	
HCM 2010 Ctrl Delay	46.0
HCM 2010 LOS	D

Appendix K

MUTCD All-Way Stop Criteria at 172nd Ave NE/NE 122nd St

REVIEW OF ALL WAY STOP CONTROL (AWSC) GUIDELINES
172nd Ave NE/NE 122nd Street

MUTCD Section 2B.07 Multi-Way Stop Applications

Guidance:

3. The decision to install multi-way stop control should be based on an engineering study.
4. 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 signal is likely not warranted, therefore this does not apply.

   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: Collision history was not reviewed. Given the current intersection alignment as a curved road, history may not be relevant.

   C. Minimum volumes:

      i. 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

         TENW Response: It is extremely unlikely that this criteria would be met for 8 hours a day based on the projected AM, Afternoon, and PM peak hour volumes with the project and without or with the 172nd Ave NE connection.

      ii. 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

         TENW Response: It is extremely unlikely that this criteria would be met for 8 hours a day based on the projected AM, Afternoon, and PM peak hour volumes with the project and without or with the 172nd Ave NE connection.

      iii. 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: Although a speed study was not conducted, it is very unlikely that the 85th percentile approach speed on 172nd exceeds 40 mph as the posted speed limit is 25 mph.

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: Criteria C.1 and C.2 are unlikely to be satisfied to 80 percent of their minimum values for 8 hours a day based on the projected AM, Afternoon, and PM peak hour volumes with the project and without or with the 172nd Ave NE connection.

Option:

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

   A. The need to control left-turn conflicts;

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

   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; and

   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: All-way stop control could be considered due to an increased need to control vehicle/pedestrian conflicts associated with the intersection being adjacent to an elementary school.

Appendix L

Weekday Parking Studies at Existing Schools

Rosa Parks Elementary
Parking Data Summary
TENW Project No. 4801

WEEKDAY PARKING DEMAND SUMMARY

Existing Weekday Parking Demand

	Total Parking Demand (vehicles)	
Day	**8:45 AM**	**2:30 PM**
Tuesday 10/22/13	53	60
Thursday 10/24/13	59	54

Maximum peak parking demand observed = 60 vehicles (Tuesday 10/22/13 @ 2:30 PM)

Existing WEEKDAY PARKING RATES

	Maximum Peak Observed (vehicles)	Number of Students/Staff	Peak Parking Rate
Max Peak Demand	60	650 students	0.09 vehicles/student

Rosa Parks Elementary
Parking Data Summary
TENW Project No. 4801

WEEKDAY PARKING DEMAND - TUESDAY 10/22/13

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 8:45 AM Number	8:45 AM Percent Occupied	2:30 PM Number	2:30 PM Percent Occupied
Area #1 (Main Parking Lot)						
	General	30	29	97%	30	100%
	Principal	1	1	100%	1	100%
	Reserved	1	0	0%	1	100%
	ADA	2	0	0%	0	0%
	Other [1]	-	0	-	0	-
Area #2 (South Parking Lot)						
	General	27	19	70%	23	85%
	Reserved	6	1	17%	2	33%
	ADA	2	0	0%	0	0%
	Other [1]	-	3	-	3	-
	ON-SITE TOTAL	**69**	**53**		**60**	
	PERCENT OCCUPIED		**77%**		**87%**	

1. Vehicles parked in unmarked areas.

Rosa Parks Elementary
Parking Data Summary
TENW Project No. 4801

WEEKDAY PARKING DEMAND - THURSDAY 10/24/13

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 8:45 AM Number	8:45 AM Percent Occupied	2:30 PM Number	2:30 PM Percent Occupied
Area #1 (Main Parking Lot)						
	General	30	30	100%	25	83%
	Principal	1	1	100%	1	100%
	Reserved	1	1	100%	0	0%
	ADA	2	0	0%	1	50%
	Other [1]	-	2	-	-	-
Area #2 (South Parking Lot)						
	General	27	21	78%	22	81%
	Reserved	6	2	33%	3	50%
	ADA	2	0	0%	0	0%
	Other [1]	-	2	-	2	-
	ON-SITE TOTAL	**69**	**59**		**54**	
	PERCENT OCCUPIED		**86%**		**78%**	

1. Vehicles parked in unmarked areas.

Audubon Elementary School
Parking Data Summary
TENW Project No. 5079

WEEKDAY PARKING DEMAND SUMMARY

Existing Weekday Parking Demand

	Total Parking Demand (vehicles)	
Day	**Morning**	**Afternoon**
Tuesday 6/2/15	-	44
Wednesday 6/3/15	47	-
Thursday 6/4/15	55	57

Maximum peak parking demand observed = 57 vehicles (Thursday 6/4/15 @ 2:30 PM)

Existing WEEKDAY PARKING RATES

	Maximum Peak Observed (vehicles)	Number of Students/Staff	Peak Parking Rate
Max Peak Demand	57	565 students	0.10 vehicles/student

Audubon Elementary School
Parking Data Summary
TENW Project No. 5079

WEEKDAY PARKING DEMAND - TUESDAY 6/2/15

Type of Parking Stall	Number of Available Stalls	Number of Occupied Stalls Observed 2:25 PM	
		Number	Percent Occupied
Area #1 (North Staff Lot)			
Staff	17	13	76%
Unmarked[1]	-	0	-
Area #2 (Visitor)			
Visitor	32	20	63%
ADA	3	0	0%
Unmarked[1]	-	0	-
Area #3 (South Staff Lot)			
Staff	12	11	92%
Unmarked[1]	-	0	-
ON-SITE TOTAL	**64**	**44**	
PERCENT OCCUPIED		**69%**	

1. Vehicles parked in unmarked areas within the parking lot

Audubon Elementary School
Parking Data Summary
TENW Project No. 5079

WEEKDAY PARKING DEMAND - WEDNESDAY 6/3/15

Type of Parking Stall	Number of Available Stalls	Number of Occupied Stalls Observed 8:45 AM	
		Number	Percent Occupied
Area #1 (North Staff Lot)			
Staff	17	16	94%
Unmarked[1]	-	2	-
Area #2 (Visitor)			
Visitor	32	18	56%
ADA	3	0	0%
Unmarked[1]	-	0	-
Area #3 (South Staff Lot)			
Staff	12	11	92%
Unmarked[1]	-	0	-
ON-SITE TOTAL	**64**	**47**	
PERCENT OCCUPIED		**73%**	

1. Vehicles parked in unmarked areas within the parking lot

Audubon Elementary School
Parking Data Summary
TENW Project No. 5079

WEEKDAY PARKING DEMAND - THURSDAY 6/4/15

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 8:40 AM Number	8:40 AM Percent Occupied	2:30 PM Number	2:30 PM Percent Occupied
Area #1	(North Staff Lot)					
	Staff	17	17	100%	16	94%
	Unmarked[1]	-	2		2	
Area #2	(Visitor)					
	Visitor	32	24	75%	26	81%
	ADA	3	1	33%	2	67%
	Unmarked[1]	-	0		1	
Area #3	(South Staff Lot)					
	Staff	12	11	92%	10	83%
	Unmarked[1]	-	0		0	
	ON-SITE TOTAL	**64**	**55**		**57**	
	PERCENT OCCUPIED		**86%**		**89%**	

1. Vehicles parked in unmarked areas within the parking lot

Margaret Mead Elementary
Parking Data Summary
TENW Project No. 5224

WEEKDAY PARKING DEMAND SUMMARY

Existing Weekday Parking Demand

	Total Parking Demand (vehicles)	
Day	**8:45 AM**	**2:00 PM**
Thursday 5/26/16	59	53
Thursday 6/2/16	56	58

Maximum peak parking demand observed = 59 vehicles (Thursday 5/26/16 @ 8:45 AM)

Existing WEEKDAY PARKING RATES

	Maximum Peak Observed (vehicles)	Number of Students/Staff	Peak Parking Rate
Max Peak Demand	59	600 students	0.10 vehicles/student

Margaret Mead Elementary
Parking Data Summary
TENW Project No. 5224

WEEKDAY PARKING DEMAND - Thursday 5/26/16

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 8:45 AM Number	8:45 AM Percent Occupied	2:00 PM Number	2:00 PM Percent Occupied
Main Parking Lot						
	General	67	48	72%	43	64%
	Reserved	8	8	100%	7	88%
	ADA	3	0	0%	1	33%
	Loading Zone	-	2	-	2	-
	Other [1]	-	1	-	0	-
	ON-SITE TOTAL	**78**	**59**		**53**	
	PERCENT OCCUPIED		**76%**		**68%**	

1. Vehicles parked in unmarked areas.

Margaret Mead Elementary
Parking Data Summary
TENW Project No. 5224

WEEKDAY PARKING DEMAND - Thursday 6/2/16

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 8:45 AM Number	8:45 AM Percent Occupied	2:12 PM Number	2:12 PM Percent Occupied
Main Parking Lot						
	General	67	48	72%	47	70%
	Reserved	8	8	100%	6	75%
	ADA	3	0	0%	1	33%
	Loading Zone	-	0	-	4	-
	Other [1]	-	0	-	0	-
	ON-SITE TOTAL	**78**	**56**		**58**	
	PERCENT OCCUPIED		**72%**		**74%**	

1. Vehicles parked in unmarked areas.

Einstein Elementary School
Parking Data Summary
TENW Project No. 4800

EINSTEIN ELEMENTARY WEEKDAY PARKING DEMAND SUMMARY

Existing Weekday Parking Demand

	Total Parking Demand (vehicles)	
Day	**9:00 AM**	**3:00 PM**
Tuesday 10/22/2013	58	53
Thursday 10/24/2013	59	43

Maximum peak parking demand observed = 59 vehicles (Thursday 10/24/2013 @ 9:00 AM)

Existing WEEKDAY PARKING RATES

	Maximum Peak Observed (vehicles)	Number of Students/Staff	Peak Parking Rate
Max Peak Demand	59	488 students	0.12 vehicles/student

Einstein Elementary School
Parking Data Summary
TENW Project No. 4800

WEEKDAY PARKING DEMAND - TUESDAY 10/22/2013

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 9:00 AM Number	9:00 AM Percent Occupied	3:00 PM Number	3:00 PM Percent Occupied
Area #1	(North Lot)					
	General	51	31	61%	30	59%
	Other [1]	-	0	-	0	-
Area #2	(South Lot)					
	General	25	24	96%	22	88%
	Principal	1	1	100%	0	0%
	ADA	4	2	50%	1	25%
	Loading/Unloading	1	0	0%	0	0%
	Other [1]	-	0	-	0	-
	ON-SITE TOTAL	**82**	**58**		**53**	
	PERCENT OCCUPIED		**71%**		**65%**	

1. Vehicles parked in unmarked areas.

Einstein Elementary School
Parking Data Summary
TENW Project No. 4800

WEEKDAY PARKING DEMAND - THURSDAY 10/22/2013

Type of Parking Stall		Number of Available Stalls	Number of Occupied Stalls Observed 9:00 AM Number	9:00 AM Percent Occupied	3:00 PM Number	3:00 PM Percent Occupied
Area #1	(North Lot)					
	General	51	35	69%	25	49%
	Other [1]	-	0	-	0	-
Area #2	(South Lot)					
	General	25	21	84%	16	64%
	Principal	1	1	100%	1	100%
	ADA	4	2	50%	1	25%
	Loading/Unloading	1	0	0%	0	0%
	Other [1]	-	0	-	0	-
	ON-SITE TOTAL	**82**	**59**		**43**	
	PERCENT OCCUPIED		**72%**		**52%**	

1. Vehicles parked in unmarked areas.

Redmond Elementary
Parking Analysis
TENW Project No. 4999

EXISTING WEEKDAY ON-SITE PARKING DEMAND SUMMARY

Existing Weekday On-Site Parking Demand

	Total On-Site Parking Demand (vehicles)	
Day	**9:15 AM**	**2:50 PM**
Tuesday 12/2/14	61	70
Thursday 12/4/14	65	55

Maximum peak on-site parking demand observed = 70 vehicles (Tuesday 12/2/14 @ 2:50 PM)

Existing (Maximum) Weekday Parking Rates

	Maximum Peak Observed (vehicles)	Number of Students	Maximum Peak Parking Rate
Max Peak On-Site Demand	70	473 students	0.15 vehicles/student

Redmond Elementary
Parking Analysis
TENW Project No. 4999

EXISTING WEEKDAY ON-SITE PARKING DEMAND

TUESDAY 12/2/14

Type of Parking Stall	Number of Available Stalls	Number of Occupied Stalls Observed 9:15 AM Number	9:15 AM Percent Occupied	2:50 PM Number	2:50 PM Percent Occupied
Main Parking Lot (on-site)					
General	92	51	55%	63	68%
Visitor	8	8	100%	6	75%
ADA	6	2	33%	1	17%
ON-SITE TOTAL	**106**	**61**		**70**	
PERCENT OCCUPIED		**58%**		**66%**	

THURSDAY 12/4/14

Type of Parking Stall	Number ot Available Stalls	Number of Occupied Stalls Observed 9:15 AM Number	9:15 AM Percent Occupied	2:50 PM Number	2:50 PM Percent Occupied
Main Parking Lot (on-site)					
General	92	60	65%	50	54%
Visitor	8	4	50%	4	50%
ADA	6	1	17%	1	17%
ON-SITE TOTAL	**106**	**65**		**55**	
PERCENT OCCUPIED		**61%**		**52%**	

Appendix M

Ben Rush Elementary Event Parking Study Data (9/15/16)

Ben Rush Elementary
Parking Data Summary

EVENT PARKING DEMAND SUMMARY - BEN RUSH ELEMENTARY

Curriculum Night - Thursday 9/15/16 @ 7:00 PM

Maximum peak parking demand observed during event:

On-site demand	73
Off-site (street) demand	104
TOTAL DEMAND	**177**

EVENT PARKING DEMAND RATES

	Maximum Peak Observed (vehicles)	Enrollment	Peak Parking Demand Rate
Peak Demand	177	585 students	0.30 vehicles/student


Benjamin Rush
Elementary
152nd Ave NE
152nd Ave NE
Redmond West Wetlands

Ben Rush Elementary
Parking Data Summary

PARKING DEMAND -- CURRICULUM NIGHT: BEN RUSH ELEMENTARY THURSDAY 9/15/16

Type of Parking Stall	Number of Available Stalls	Number of Occupied Stalls Observed[1] 7:00 PM	
		Number	Percent
Area #1 (Main Parking Lot)			
General	43	43	100%
Carpool	4	4	100%
ADA	2	0	0%
Area #2 (Staff/Bus loop)			
Staff	23	23	100%
ADA	1	0	0%
Illegally Parked Vehicles[2]	-	3	
BEN RUSH ELEMENTARY ON-SITE TOTAL			
General	43	43	100%
Carpool	4	4	100%
Staff	23	23	100%
ADA	3	0	0%
Illegally Parked	-	3	
ON-SITE TOTAL	**73**	**73**	
PERCENT OCCUPIED		**100%**	
BEN RUSH ELEMENTARY OFF-SITE TOTAL			
General on-street [3]	-	104	
TOTAL EVENT PARKING DEMAND		**177**	

Notes:

1. Event parking demand conducted during Curriculum Night on Thursday, 9/15/16 at 7:00 p.m.
2. Illegally parked vehicles were located along the curb in the bus lane and the pick-up/drop-off loop.
3. See separate summary of on-street demand during event.

Ben Rush Elementary School
Event Parking Demand Summary

OFF-SITE PARKING DEMAND -- CURRICULUM NIGHT EVENT -- THURSDAY 9/15/16

	On-Street Parking Area (vehicles)										
Time	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8** [3]	**9**	**10**	**TOTAL**
Event parking demand [1]						62	26	5	26	0	119
less baseline count [2]						-14	-1	0	0	0	-15
Estimate of Event Only Parking Demand	**0**	**0**	**0**	**0**	**0**	**48**	**25**	**5**	**26**	**0**	**104**

Notes:

1. Event parking demand conducted during Curriculum Night on Thursday, 9/15/16 at 7:00 p.m.
2. Baseline counts counducted on Tuesday, 9/13/16 at 7:00 p.m.

OFF-SITE (ON-STREET) PARKING AREAS

