City of Seattle

Station Area Analysis

North Beacon Hill - Othello - Mount Baker

Draft Report

FEHR & PEERS

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EXECUTIVE SUMMARY

In the areas immediately surrounding the existing LINK light rail stations in North Beacon Hill, Othello, and Mount Baker / North Rainier, there is a proposal to increase building heights and density to accommodate additional residential and employment growth. This additional development is consistent with the Neighborhood Plans in each of these areas, which call for the development of vibrant mixed use centers around the transit stations. The analysis in this report evaluates potential transportation impacts under existing conditions, 2030 No Action, and 2030 With Action (additional building heights and density) conditions.

Existing conditions were analyzed based on counts from November, 2010. The 2030 background growth and trip generation were derived from the City of Seattle's travel demand forecasting model. 2030 trip generation in each study area was calculated using Fehr & Peers' proprietary Mixed Use Development (MXD) trip generation tool.

The Seattle travel model predicts background traffic growth of 20-40 percent on study area corridors by 2030. These increases in volume lead to higher levels of intersection delay resulting from expected growth, and provide a future base condition. This future base projection provides the basis of comparison for additional delay resulting from the proposed increase to station area building heights and density. The results of this analysis showed no significant traffic related impacts as a result of the proposed increase in building heights and density under 2030 conditions. However, in the Mount Baker area, portions of Hanford Street and MLK Way are currently lacking sidewalks. Due to the increase in future pedestrian volumes, this is deemed to be a potentially significant impact with the recommended mitigation of completing the sidewalk network. The increased project density is expected to add between 21-53 PM peak hour transit trips in each neighborhood. Based on information from King County Metro and Sound Transit, each area currently has adequate overall transit capacity (however King County Metro Route 7 can experience crowding during peak times). Given the robust transit system in the study areas and the relatively small increase in transit trips as a result of the height and density increases, no transit related impacts are anticipated.

This project also reviewed specific design element changes in each neighborhood. In Mount Baker there is a proposal to add a landscaped median and bike lanes on Beacon Avenue. This is discussed in Appendix A. Adequate right-of-way and capacity exists to accommodate these design changes under current and future conditions. Appendix B analyzes a proposal to provide off-peak parking in the outer lane of MLK Way in the Othello neighborhood. Based on existing traffic volumes, the results indicate that parking can be allowed at all times except 3:00 PM – 7:00 PM in the northbound and southbound directions, and 7:00 AM – 9:00 AM in the northbound direction. In the Mount Baker area there is a proposal to convert portions of MLK Way and Rainier Avenue into a one-way couplet near the Mount Baker Transit Station. The analysis of this proposal in 2030 conditions, provided in Appendix C, shows potential impacts at the intersection level, but an overall improvement in corridor travel times during the PM peak

hour. The one-way couplet configuration would also allow for a dedicated transit lane on Rainier Avenue, increased pedestrian space, and a short two-way cycletrack on MLK Way.

CHAPTER 1. INTRODUCTION

This report discusses traffic analysis results for the North Beacon Hill Neighborhood Planning Area, North Rainier / Mount Baker Station Area, and Othello Station Areas. Each neighborhood is currently served by LINK light rail operated by Sound Transit, which provides service between downtown Seattle and the Seattle-Tacoma International Airport. Additionally, all the neighborhoods are served by multiple King County Metro bus lines.

The focus of this document is to identify if there are any potentially significant negative transportation impacts related to proposed increases to building heights and densities in the neighborhoods. The additional land use intensity is proposed to help revitalize some underdeveloped properties and take advantage of the high quality transit services in each of the study areas.

In each of the three study areas, Fehr & Peers analyzed three different scenarios:

- Existing conditions, based on traffic counts taken in November 2010
- 2030 Base conditions, representing future traffic and land use conditions under expected growth levels (without any changes to heights or densities – No Action alternative)
- 2030 Project conditions, representing future traffic and land use conditions with increased employment and population resulting from increased building heights and densities (the With Action alternative) in the project areas

Both 2030 scenarios were modeled using the City of Seattle travel demand forecasting model to determine background traffic growth and project area trip distributions. The Seattle travel model's trip generation component was not used for this analysis because Fehr & Peers' evaluation of the model's performance indicates that the Seattle travel model is not sensitive to the vehicle trip generation reductions that are typical of increased height and density in transit station areas. To more accurately estimate the trip generation of the station areas, Fehr & Peers used their proprietary Mixed Use Development (MXD) trip generation tool. This tool, which has been endorsed by groups such as the American Society of Civil Engineers and the San Diego Area Council of Governments, and has been used for other environmental analyses in Seattle, considers factors such as urban form (density and diversity of land uses), demographics, level of transit service, and design of the bicycle and pedestrian system in the neighborhoods. The MXD tool was used in conjunction with the Seattle travel model to estimate future traffic flows and level of service (LOS) at key study intersections in each of the study areas. In addition to intersection analysis, transportation system design alternatives to improve the pedestrian, bicycle, and transit environments were evaluated in each of the three study areas. The results of the transportation system design evaluation are presented in Appendices A-C.

The remainder of this document is organized as follows: Chapter 2 provides the overall methodology for trip generation estimates LOS analysis. Chapter 3 presents the transportation analysis results for the North Beacon Hill Neighborhood Planning Area. Chapter 4 presents results for the Othello Station area, and Chapter 5 provides results for the North Rainier / Mount Baker Station Area.

CHAPTER 2. ANALYSIS METHODOLOGY

This section describes the transportation impact analysis techniques that were used in each of the three study areas. Based on other environmental documents prepared in the area, transportation impacts were assessed by evaluating LOS at key study intersections. These results were compared to intersection LOS thresholds defined by the Seattle Department of Planning and Development (DPD).

IMPACT THRESHOLD

A significant transportation impact was identified if the additional traffic associated with the increased heights and densities would cause an intersection to degrade from an acceptable LOS D or better to an unacceptable LOS E or F. This LOS D threshold has been identified by DPD for impact analyses throughout the City.

LOS ANALYSIS METHODOLOGY

LOS results were calculated for existing, future No Action, and future With Action conditions for intersections in each area utilizing *Highway Capacity Manual (HCM)* (Transportation Research Board, 2000) methodologies.

For roadway segments with signalized traffic control, roadway operations are typically defined by how well intersections along the roadway function, since intersections represent the points with the least capacity. The *HCM* describes intersection operations using the level of service (LOS) concept. LOS is a qualitative description of traffic flow based on such factors as speed, travel time, delay, and freedom to maneuver. Six levels are defined from LOS A, with the least congested operating conditions, to LOS F, with the most congested operating conditions. LOS E represents "at-capacity" operations. Operations are designated as LOS F when volumes exceed capacity, resulting in stop-and-go conditions and long delays at intersections.

The LOS method for signalized intersections analyzes operations based on average control vehicular delay, as described in Chapter 16 of the *HCM*. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The average control delay for signalized intersections was calculated using the Synchro analysis software. Control delay is related to LOS based on the thresholds shown in Table 1.

Operations of unsignalized intersections are evaluated using the method contained in Chapter 17 of the *HCM*. At two-way or side-street stop-controlled intersections, control delay is reported for the minor movement with the highest control delay, not for the intersection as a whole. For all-way stop-controlled intersections, the LOS is based on the weighted average control delay of all movements. The relationships between control delay and LOS for unsignalized intersections are also presented in Table 1.

Table 1 – LEVELS OF SERVICE CRITERIA FOR SIGNALIZED AND UNSIGNALIZED INTERSECTIONS		
Level of Service	**Signalized Intersection Delay per Vehicle (seconds)**	**Unsignalized Intersection Delay per Vehicle (seconds)**
A	0-10	0-10
B	>10-20	>10-15
C	>20-35	>15-25
D	>35-55	>25-35
E	>55-80	>35-50
F	>80	>50
Source: *Highway Capacity Manual* (Transportation Research Board, 2000).		

EXISTING CONDITIONS INTERSECTION LOS ANALYSIS

Existing conditions intersection LOS analysis was based on PM peak period traffic counts conducted on Wednesday, November 10, 2010. The intersection counts included data on light vehicles, heavy vehicles (including buses), pedestrians, and bicycles. Detailed count sheets are provided in Appendix D. The detailed LOS analysis calculation sheets for existing conditions are provided in Appendix E. Analysis results are described for each study area in the following chapters.

FUTURE (2030) CONDITIONS INTERSECTION ANALYSIS

2030 traffic volumes were developed for each study area under No Action and With Action conditions. As described in Chapter 1, future traffic forecasts were developed using the Seattle travel demand forecasting model and Fehr and Peers' MXD tool. PM peak period intersection LOS was calculated and potential impacts related to the height and density changes were determined using the impact thresholds described above. With the exception of roadway and intersection design changes in Beacon Hill (discussed below), all intersections were assumed to have identical configurations and traffic controls under 2030 conditions. However, it was assumed that the City would continue to refine and optimize traffic signal timings over the next 20 years. Detailed LOS analysis calculation sheets for 2030 conditions are provided in Appendices F and G.

As described in Chapter 1, the City is proposing to increase the building heights and land use densities for portions of each of the neighborhood planning areas. The local neighborhood plan updates refer to these specific areas as Town Centers. This additional height and density will allow for development beyond for what is expected to happen by 2030 assuming no change in the land use code. The additional height and density is proposed for these areas for the following reasons:

- Provide opportunities to meet citywide demands for additional housing and employment
- Clustering new development around high-quality transit minimizes the traffic related greenhouse gas (GHG) emissions associated with new development
- Provides opportunities to revitalize underutilized parcels and to bring additional public and private investments to the neighborhood areas

Table 2 summarizes the growth in households and employment anticipated to occur between 2010 and 2030 under No Action and With Action alternatives for each study area. Maps identifying the station areas are presented as Figures 5, 9, and 13. The No Action growth forecasts are based on land use data in the Seattle travel model and the With Action growth forecasts are based on data from DPD. As shown in Table 2, the amount of growth accommodated by the additional height and density is relatively modest with the largest increase projected to occur in Mount Baker (419 additional households and employees).

The existing household and employment numbers represent information from station-area transportation analysis zones (TAZ). These zones are larger geographic areas than the immediate station areas, but most future growth is expected to occur within the areas surrounding the light trail stations. These data show relatively minor growth in Beacon Hill, but a sizeable increase in housing units near the Mount Baker and Othello Station areas.

Table 2 – 2010-2030 HOUSEHOLD AND EMPLOYMENT GROWTH FORECASTS

	Existing Transportation Analysis Zone Area		2030 No Action Alternative Growth		2030 Proposed Height and Density Alternative Growth		2030 Additional Growth Allowed by Height and Density Alternative	
Neighborhood	**House-holds**	**Employment**	**House-holds**	**Employment**	**House-holds**	**Employment**	**House-holds**	**Employment**
North Beacon Hill Town Center	1,515	550	158	2	371	22	213	20
Mount Baker Town Center	628	2,117	994	579	1,243	749	249	170
Othello Town Center	2,583	835	1,013	138	1,118	242	105	104

Source: Fehr & Peers 2011

Trip Generation

To determine the number of PM peak period trips resulting from the No Action and With Action alternatives, Fehr & Peers used an innovative trip generation analysis technique, known as the mixed-use development (MXD) tool. The MXD tool is based on a growing body of research, which focuses on the relationship between travel and the built environment. This method supplements conventional trip generation methods to capture effects related to built environment variables (known as the Ds) such as **d**ensity, **d**iversity of land uses, **d**estinations (accessibility), **d**evelopment scale, pedestrian and bicycle **d**esign, and **d**istance to transit services, and **d**emographics.

The proposed increase in density adjacent to existing high-quality transit service influence trip generation in the neighborhood in a different manner than comparable levels of growth in a more suburban setting. Travelers have more travel mode alternatives and are closer to a wider array of trip destinations. Using the MXD tool to develop trip generation estimates avoids overestimating the number of vehicle trips that infill/transit-oriented development projects generate and provides a more reasonable picture of how travel characteristics change over time.

Traditional trip generation methodologies are not well suited to analyze height and density increases near transit stations. These methods often take trip generation estimates from the Institute of Transportation Engineers (ITE) and factor the results using mode split data from the City's travel model, US Census Bureau, or engineering judgment.

While traditional trip generation methods can account for the high share of non-auto modes in the City, they have limited ability to consider shifts in mode choice caused by density changes near transit for the following reasons:

- Typical mode split adjustments tend to assume continuation of current trends and have limited responsiveness to changes in the land use and the built environment (e.g., increased density, increased mix of uses) or transportation system (e.g., improved pedestrian and bicycle connectivity, improved transit service).
- Mode split data are often derived from the US Census Bureau. As time passes the mode split estimates may not be applicable given changes in development patterns and socioeconomic conditions.

The MXD tool overcomes many of these shortcomings and explicitly accounts for how built environment variables, such as building forms, the mix of land uses (jobs/housing balance), densities, transit accessibility, and neighborhood connectivity, affect travel behavior and mode choice.

The MXD tool was developed in cooperation with the US Environmental Protection Agency (EPA) and the Institute of Transportation Engineers (ITE). Over 200 mixed-use development sites across the United States were surveyed as part of the model development process and the tool

was validated using data from 16 independent mixed use sites. Additional details regarding the tool development, validation, and implementation can be found in Appendix H.

Figure 1 compares the traditional trip generation methodology to the enhanced MXD model applied for this analysis. Table 3 summarizes the PM peak hour trip generation results from the MXD tool.

Table 3 - PM PEAK HOUR MXD TRIP GENERATION RESULTS

	2030 No Action Growth			2030 With Action Growth		
Neighborhood	Auto Trips (mode share %)	Bicycle & Pedestrian (mode share %)	Transit (mode share%)	Auto Trips (mode share %)	Bicycle & Pedestrian (mode share %)	Transit (mode share%)
North Beacon Town Center	81 (79.4%)	9 (8.8%)	12 (11.8%)	190 (72.5%)	39 (14.9%)	33 (12.6%)
Mount Baker Town Center	861 (66.8%)	249 (19.3%)	179 (13.9%)	1087 (66.3%)	321 (19.6%)	232 (14.1%)
Othello Town Center	630 (77.8%)	96 (11.9%)	83 (10.3%)	766 (76.0%)	133 (13.2%)	109 (10.8%)

Source: Fehr & Peers, 2010

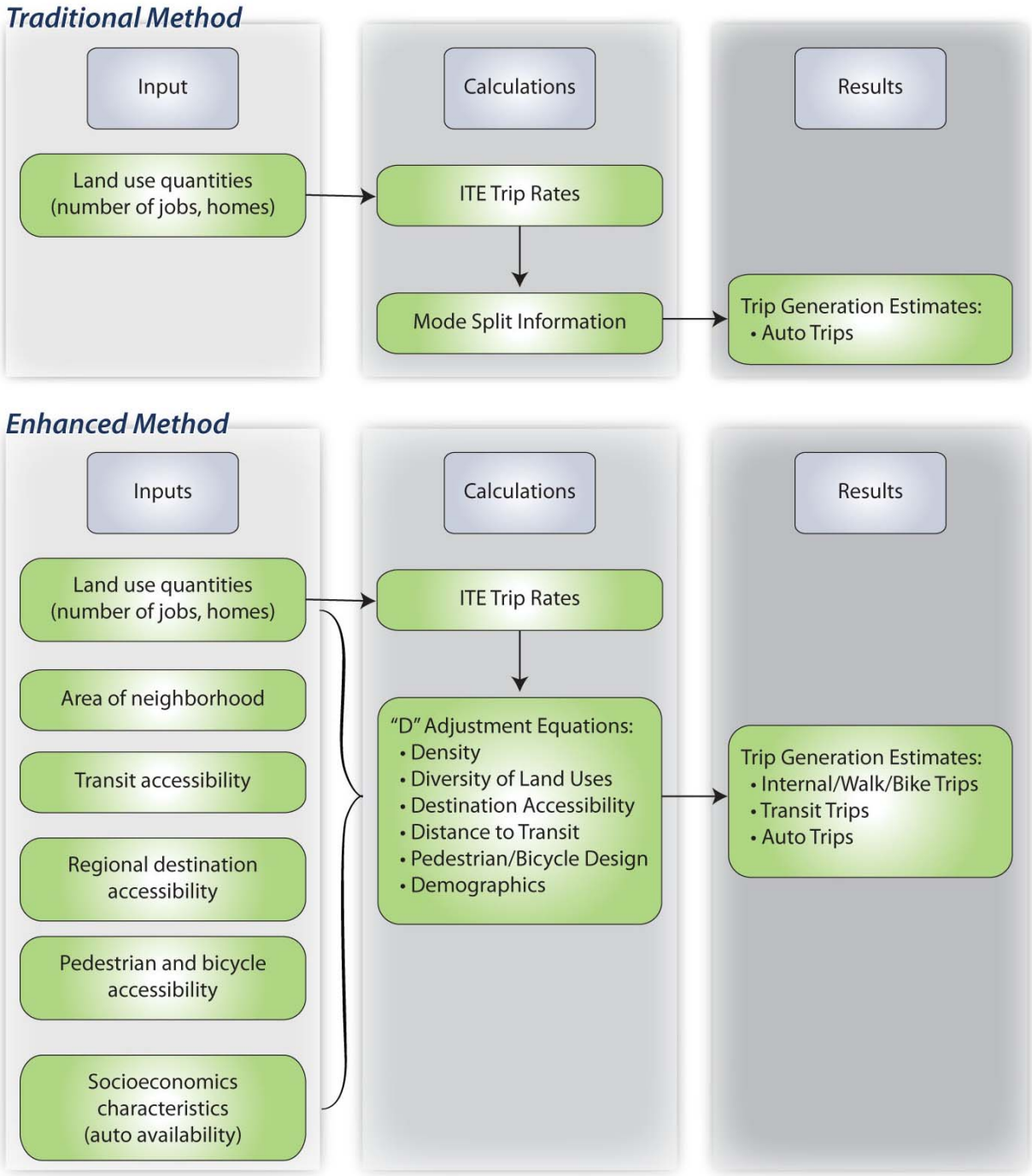
The results from the MXD tool demonstrate that at North Beacon and Othello, the proposed increase to density and diversity of development will generate a higher percentage of walking and cycling trips versus no action growth. This effect is less pronounced at Mount Baker, which already has more density and a greater mix of uses; however, the transit, walking, and cycling mode shares all increase slightly in the Mount Baker neighborhood as well.

The largest increase in PM peak hour transit ridership due to the increase in building height limits and density is forecasted for Mount Baker with a net increase of 53 transit trips. Due to the large amount of current capacity on transit facilities (including LINK and King County Metro bus operations), it is not expected that this small increase will constitute an impact.

The trip generation results from the MXD tool were input directly into the Seattle travel model for each of the three neighborhood areas for both 2030 No Action and With Action alternatives. Traffic associated with growth outside of the three study areas was estimated using the Seattle travel model's default trip generation data. Using this combination of the MXD tool and the

Seattle travel model provides accurate trip generation data for the study areas and a reasonable estimate of overall traffic growth from region-wide development.

Figure 1 – COMPARISON OF TRADITIONAL AND ENHANCED TRIP GENERATION MODELS



Trip Distribution

While the MXD tool provides an accurate estimate of the trips generated within each of the three study areas, the Seattle travel model was used to determine where those trips go. This trip distribution pattern is shown in Figures 2-4 and is described below:

North Beacon Hill Neighborhood Planning Area

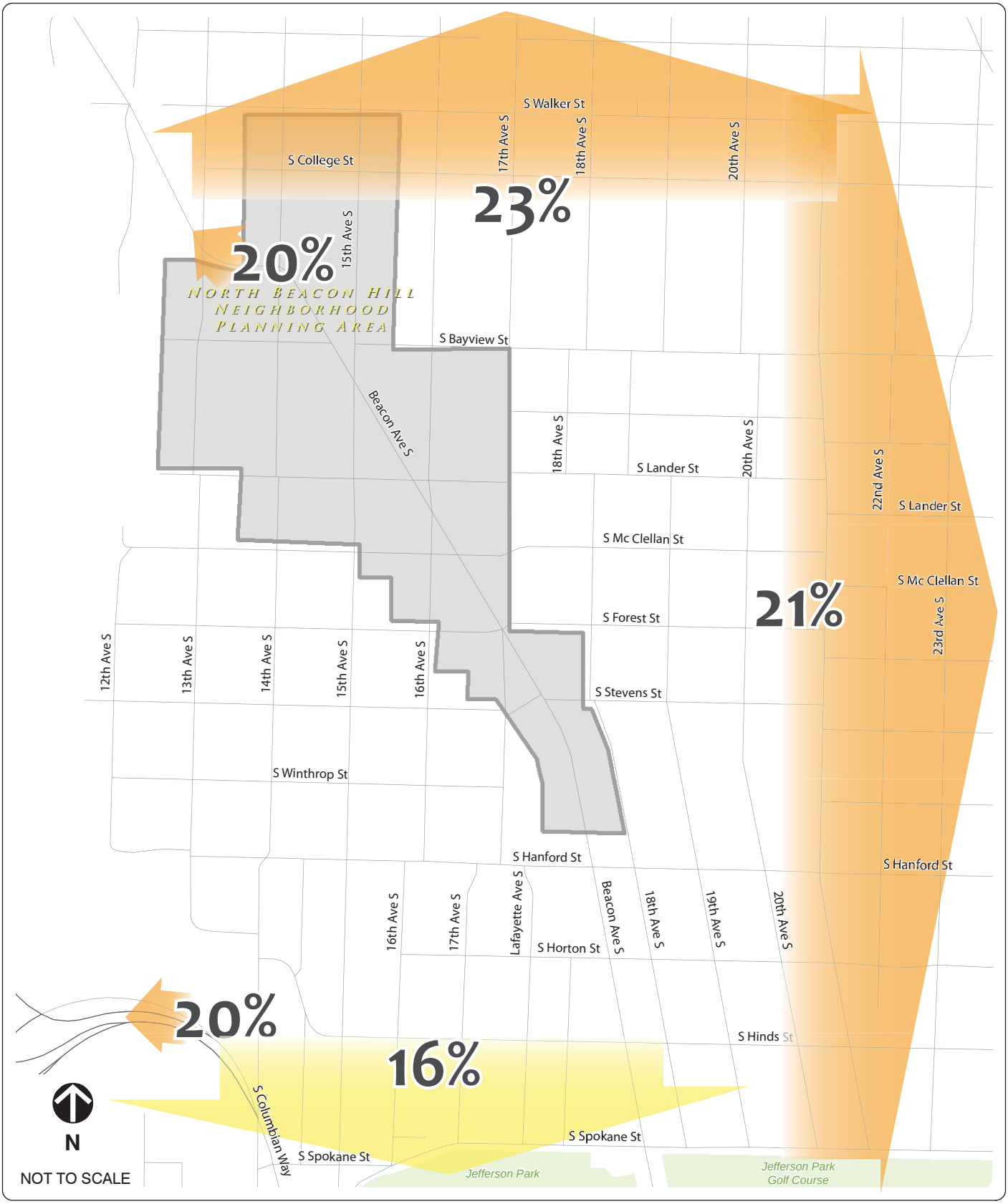
- 23% north via Avenues 13th – 21st
- 20% northwest via Beacon Avenue
- 20% west / I-5 via Columbian Way
- 16% south via Beacon Avenue and Columbian Way
- 21% east via College Street, McClellan Street, Hanford Street, and Spokane Street

Mount Baker Town Center

- 41% north via Rainier Avenue and MLK Way
- 23% west via College Street, McClellan Street, and Spokane Street
- 29% south via Rainier Avenue and MLK Way
- 7% east via McClellan Street, Mount Baker Blvd, and other routes

Othello Town Center

- 38% north via Rainier Avenue and MLK Way
- 20% west via Myrtle Street
- 37% south via MLK Way, Renton Avenue, and Rainier Avenue
- 5% east via Willow Street, Othello Street, and other routes



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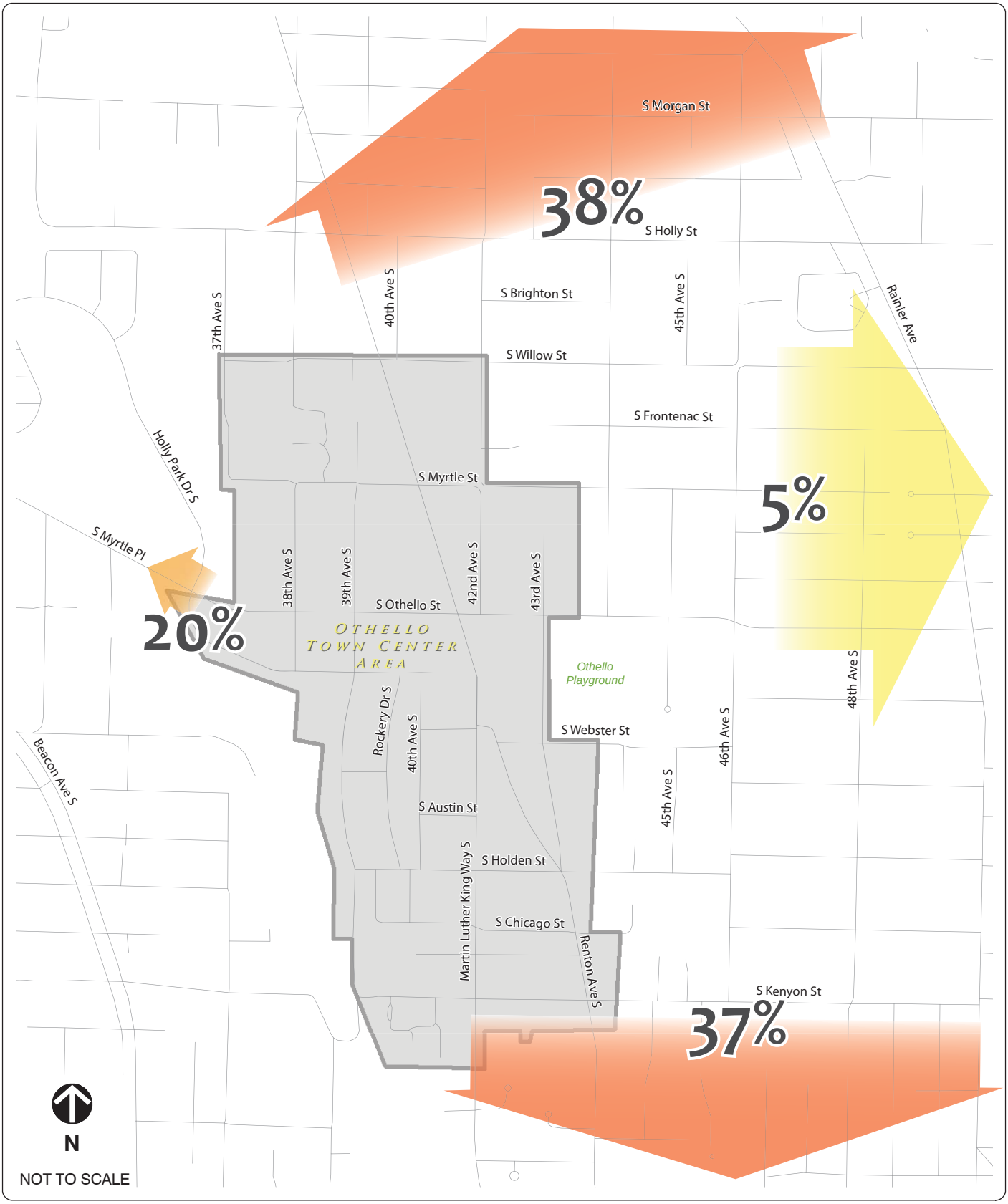
NORTH BEACON HILL NEIGHBORHOOD PLANNING AREA

FIGURE 2



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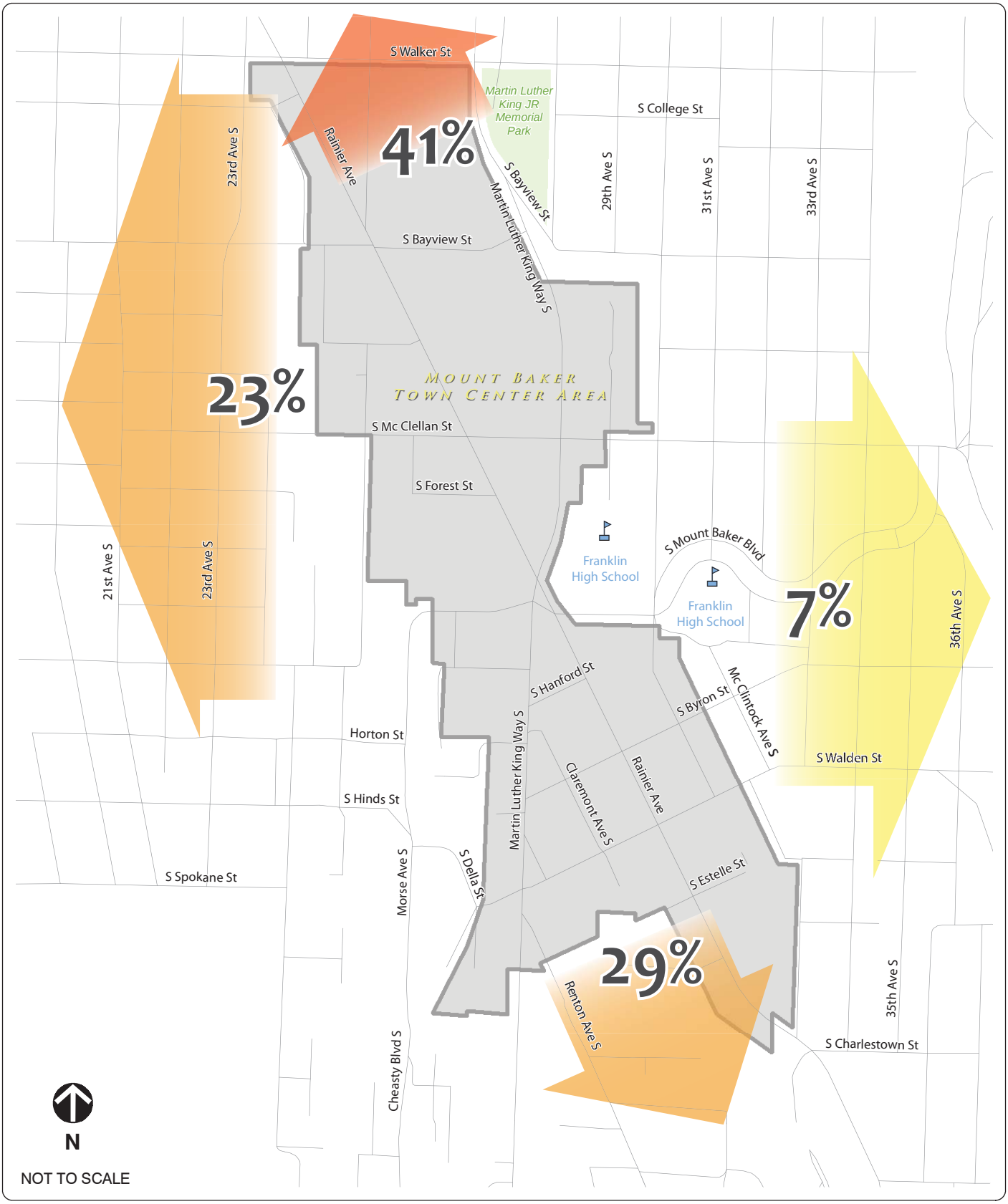
OTHELLO STATION AREA

FIGURE 3



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MOUNT BAKER STATION AREA

FIGURE 4

CHAPTER 3. NORTH BEACON HILL NEIGHBORHOOD PLANNING AREA

This section describes the existing and future conditions transportation analysis for the Beacon Hill Neighborhood Planning Area. As shown in Figure 5, the project area in Beacon Hill is along Beacon Avenue from 15th Avenue South to Spokane Street. In this area, Beacon Avenue generally has one northbound and one southbound travel lane and a two-way left turn lane in the center. Parking is generally available along both the east and west curbs and Beacon Avenue is marked with bicycle sharrows (see description of a sharrow on the right).

EXISTING CONDITIONS

Table 4 lists existing intersection conditions in the Beacon Hill area. Figure 6 provides the current intersection volumes and lane configurations.

Table 4 - PM PEAK HOUR LOS AND DELAY FOR NORTH BEACON HILL - EXISTING CONDITIONS

Intersection (Control Type)	LOS	Control Delay
15th Ave & Beacon Ave (signal)	C	26
McClellan St & Beacon Ave (signal)	B	12
Forest St. / 17th Ave & Beacon Ave (side-street stop-control)[1]	D	27

[1]For side-street stop-control, the Highway Capacity Manual (HCM) specifies that LOS and delay be reported for the highest-delayed movement at the intersection.

Source: Fehr & Peers 2011

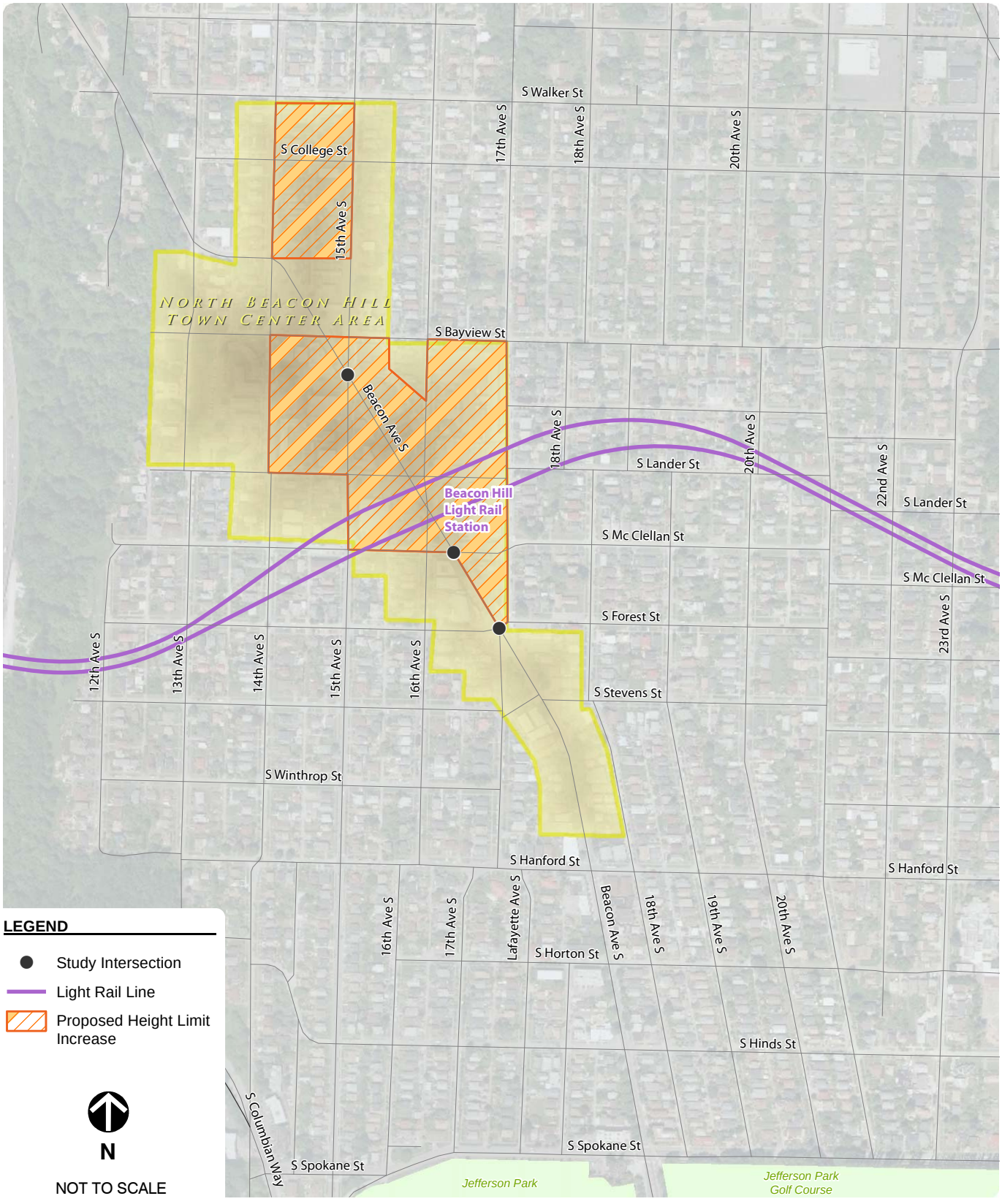
Under existing conditions, congestion is generally light with modest delays at 15th Avenue/Beacon Avenue intersection. The Forest Street/ 17th Avenue/Beacon Avenue intersection has a higher delay, but this delay is for vehicles making left turns from the westbound stop sign controlled approach. This intersection has an unusual design with five legs, which can lead to additional side street delay since there is more conflicting traffic to watch for before making a turn.

Bicycle Facilities Defined:

Bicycle Lane: A dedicated lane for bicycle travel, typically on the right shoulder of the road. A bicycle lane is typically 4-7 feet wide and may be adjacent to a parking lane.

Bicycle Route: A road that has signs which guide bicycles and notify drivers of the potential bicycle traffic. There are no dedicated bicycle lanes on a bicycle route.

Sharrow: Sharrows are a type of lane marking common on bicycle routes that indicate to bicyclists the safest place to ride within a travel lane. Sharrows also alert drivers that bicycles may be in the lane.



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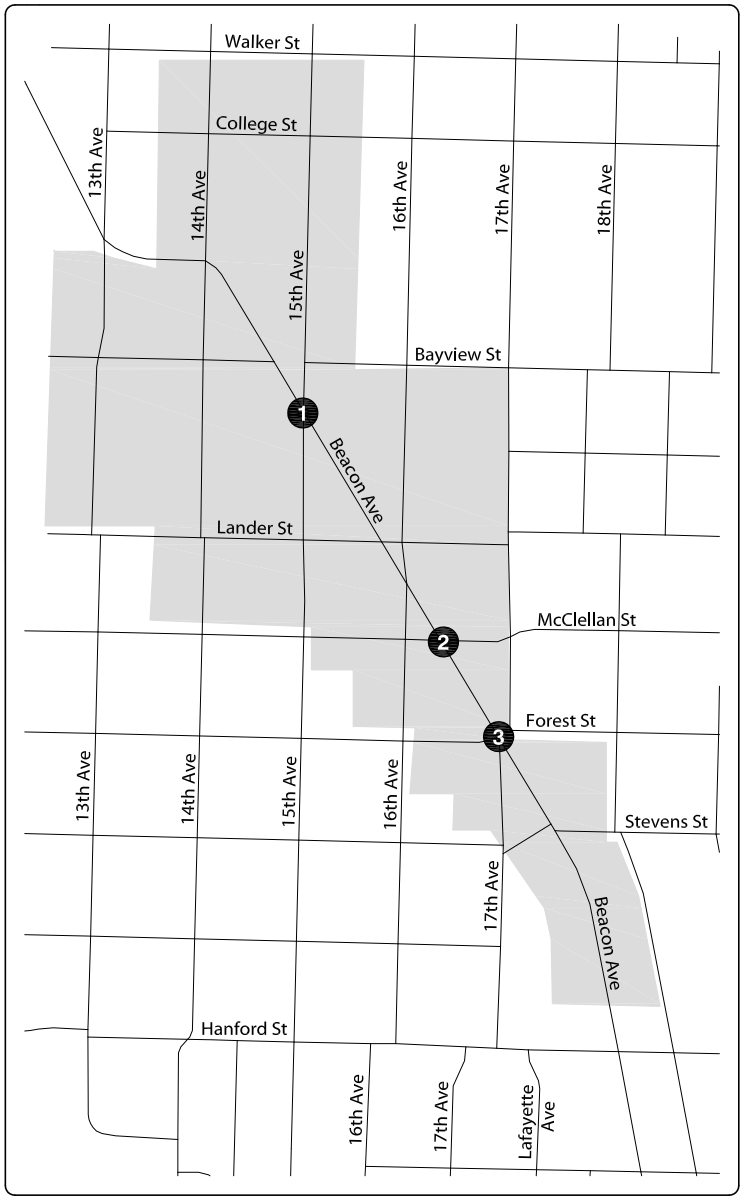
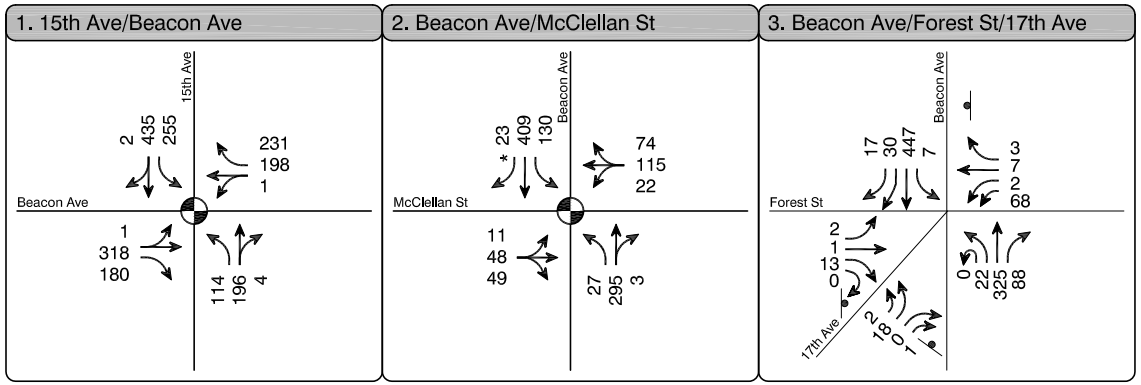
NORTH BEACON HILL NEIGHBORHOOD PLANNING AREA

FIGURE 5





LEGEND

- Turn Lane
- XX — PM Peak Hour Traffic Volume
- 1 — Study Intersection
- Traffic Signal
- Stop Sign
- * — Channelized Right Turn
- North Beacon Hill Planning Area

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NORTH BEACON HILL PLANNING AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - EXISTING CONDITIONS

FEHR & PEERS

FIGURE 6

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The overall average delay at the Forest Street/17th Avenue/Beacon Avenue intersection delay is about 5 seconds. To address some of these unusual design details, the City is proposing a series of modifications at this location in conjunction with overall streetscape improvements along Beacon Avenue. These improvements are described in detail in Appendix A, and briefly discussed in the Future Conditions section below.

NORTH BEACON HILL FUTURE CONDITIONS

As identified previously in Table 2, a modest amount of growth can be accommodated under current zoning and land use patterns in the Beacon Hill Neighborhood Planning Area by 2030. Specifically, the Seattle model estimates that this area will gain 2 jobs and 158 households between existing and 2030 conditions.

North Beacon Hill Town Center with Proposed Height and Density Increases

North Beacon Hill Neighborhood Plan Update, January 2010

The proposed height and density increases in the Beacon Hill Neighborhood Planning Area will result in an additional 20 jobs and 213 households when compared to the No Action alternative. This increase to housing options close to the light rail station is consistent with a goal stated in the *North Beacon Hill Neighborhood Plan Update* from January 2010.

Fehr & Peers' analysis determined that this increase in land use will add approximately 110 new PM peak-period vehicle trips in the Beacon Hill Neighborhood Planning Area when compared to No Action conditions. The additional land uses will also add approximately 30 bike/walking trips and 20 transit trips.

As mentioned earlier, the City of Seattle is considering streetscape improvements along Beacon Avenue between 15th Avenue and Spokane Street. Appendix A describes the proposed changes in detail; however, the main changes are summarized below:

- Installation of a planted median between Forest Street and Spokane Avenue with a full access intersection at Hanford Street
- Installation of back-in angled parking between 15th Avenue and Lander Street and between McClellan Street and Forest Street

As described in Appendix A, the median would eliminate left turns from certain side streets and vehicle access to/from 17th Avenue at Forest Street would be eliminated to reduce the complexity of the Beacon Avenue/Forest Street intersection. Both of these modifications lead to an increase in volume at the Beacon Avenue/McClellan Street intersection, particularly for vehicles making a westbound left turn.

Table 5, below, provides results of the 2030 intersection level analysis of Beacon Hill.

Table 5 – PM PEAK HOUR LOS AND DELAY FOR NORTH BEACON HILL - 2030 CONDITIONS

Intersection (Control Type)	No Action LOS	No Action Control Delay	With Action LOS	With Action Control Delay
15th Ave & Beacon Ave (signal)	C	34	C	35
McClellan St & Beacon Ave (signal)	B	19	C	20
Forest St. & Beacon Ave (side-street stop-control)[1]	E	47	E	45

[1] *For side-street stop-control, the Highway Capacity Manual (HCM) specifies that LOS and delay be reported for the highest-delayed movement at the intersection.*

Source: Fehr & Peers 2011

What if 17th Avenue / Forest Street remains as-is?

Operational analysis of this intersection shows that the westbound approach will operate at LOS F, with delay greater than 200 seconds in 2030.

Under real-world conditions, such poor operations would likely to shift traffic to the McClellan Street / Beacon Avenue intersection as motorists avoid delays during peak periods.

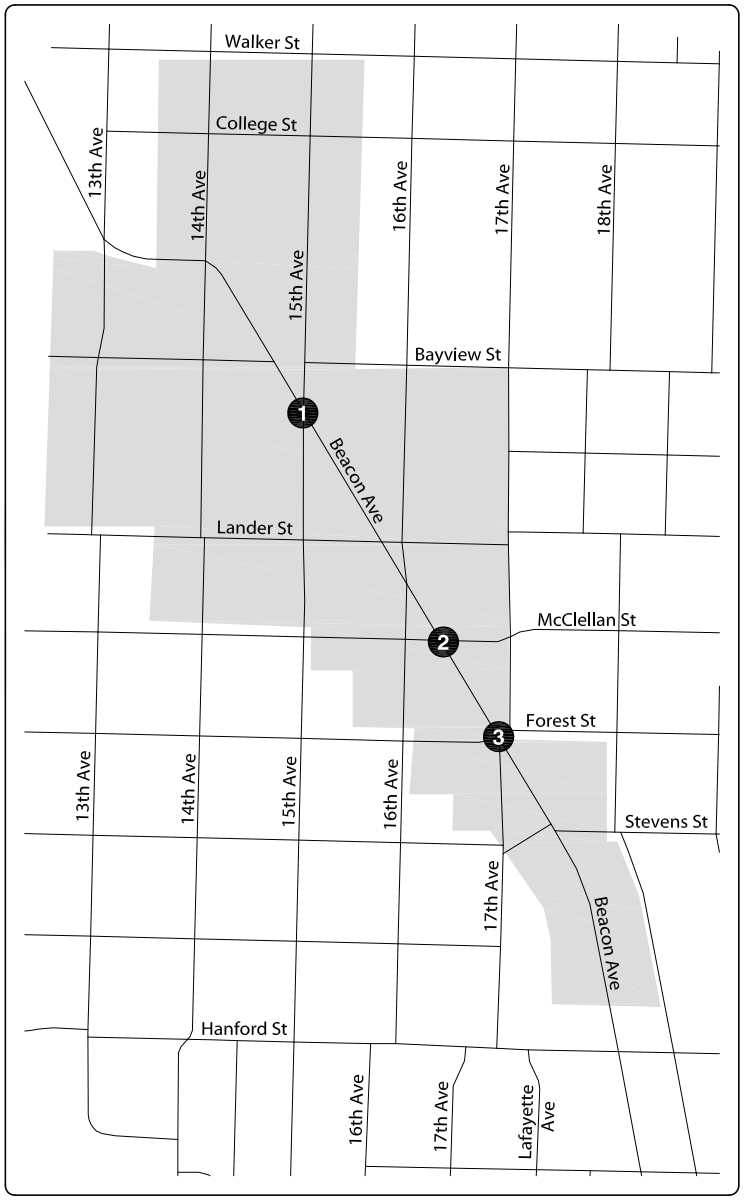
The increased land use intensity within the neighborhood planning area results in a very small increase in delay at the two signalized study intersections. At the Forest Street /Beacon Avenue intersection, the analysis results show a small decrease in delay (even with higher volumes north and southbound). However, this improvement in traffic conditions would not generally be perceptible and overall the operations at this intersection will be the same under No Action and With Action alternatives. In summary, the increased heights and densities within the Beacon Hill Neighborhood Planning Area do not result in a significant impact to traffic operations within the study area.

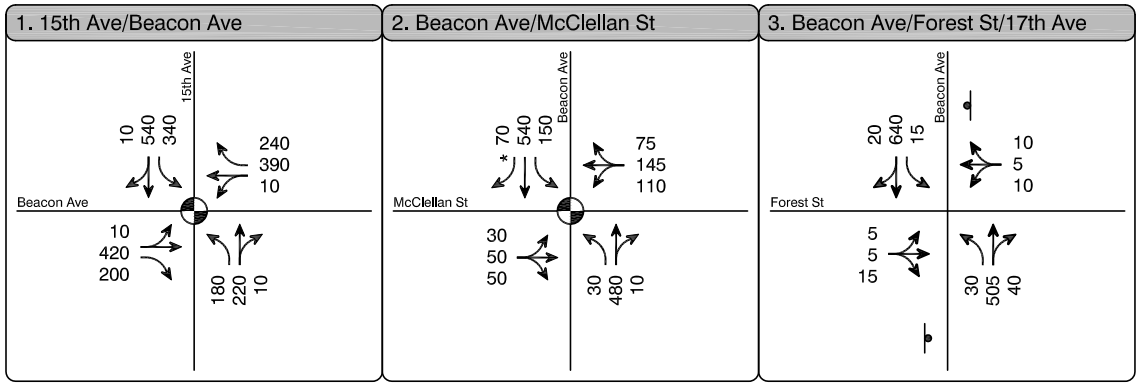
Table 5 shows that the Forest Street/Beacon Avenue intersection is expected to operate at LOS E conditions under No Project and With Project alternatives. While LOS E operations typically constitute unacceptable performance in the City of Seattle, an impact was not defined at this location because the With Project alternative will not lead to a further degradation in traffic

flow at this location. However, given the congestion level at this intersection, Fehr & Peers did evaluate potential traffic control improvements. An all-way stop was evaluated, but the high traffic volumes on Beacon Avenue would result in LOS F conditions. A traffic signal would result in acceptable operations at the intersection; however, volumes on Forest Street do not meet a signal warrant. Due to the dense street grid in the area, if delays regularly occur at this intersection, motorists may choose to use an alternate route (likely via the McClellan Street intersection) during peak traffic periods.

As outlined in Appendix A, bicycle lanes are proposed for Beacon Avenue from McClellan Street to Spokane Street. These will improve bicycle mobility in the neighborhood. However, even with the existing network of bicycle and pedestrian facilities, the additional pedestrian and bicycle trips associated with the increased building heights and density will not lead to any significant impacts to bicycle or pedestrian travel. No transit impacts are anticipated at this location either as the modest increase in transit trips (21 PM peak hour trips) will be accommodated by the future transit service in the area.

Figures 7 and 8, below, detail the PM peak hour intersection volumes and lane configurations for Beacon Hill under 2030 No Action and 2030 With Action conditions.





LEGEND

- Turn Lane
- XX — PM Peak Hour Traffic Volume
- 1 — Study Intersection
- Traffic Signal
- Stop Sign
- * — Channelized Right Turn
- North Beacon Hill Planning Area

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NOT TO SCALE

NORTH BEACON HILL PLANNING AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - 2030 NO ACTION

FIGURE 7

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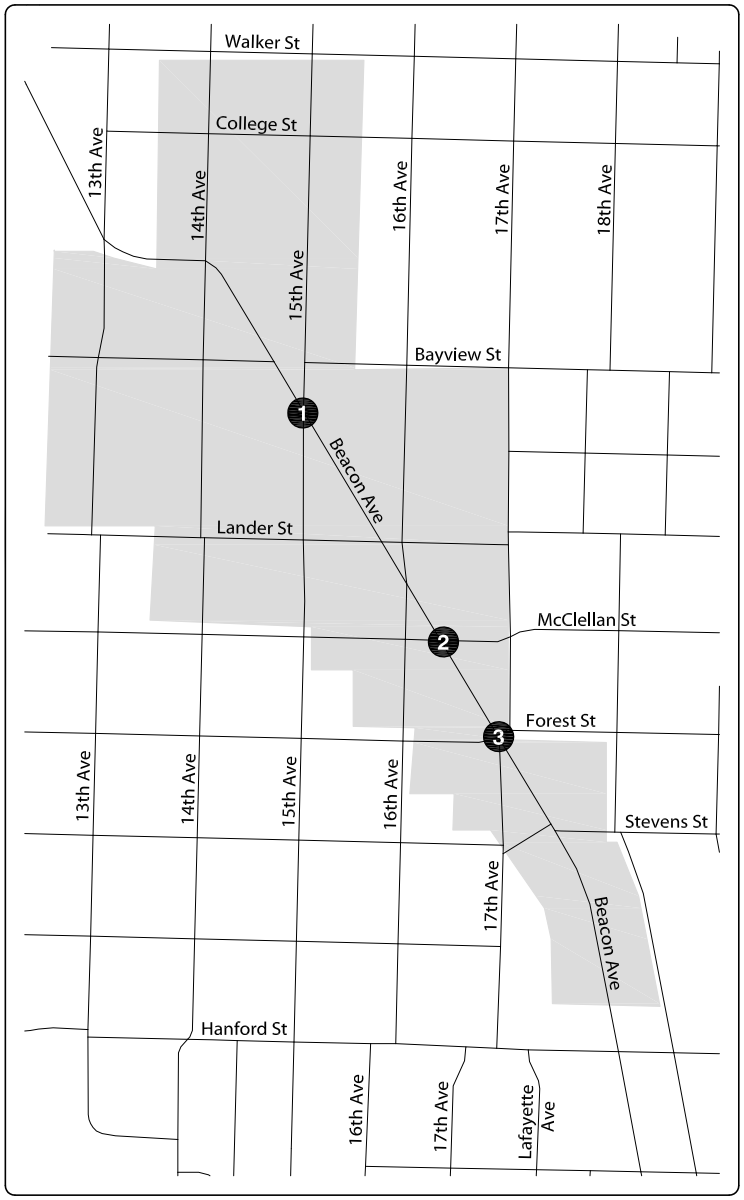

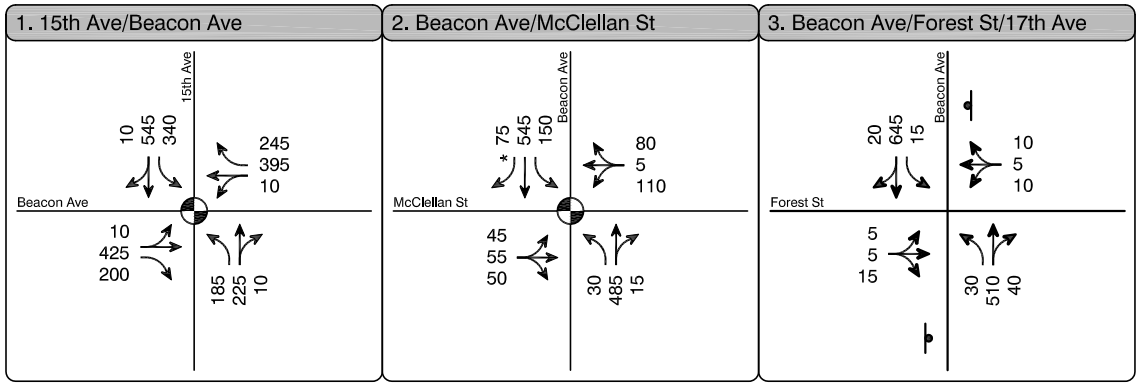

LEGEND

- Turn Lane
- XX — PM Peak Hour Traffic Volume
- 1 — Study Intersection
- Traffic Signal
- Stop Sign
- * — Channelized Right Turn
- North Beacon Hill Planning Area

N

NOT TO SCALE

NORTH BEACON HILL PLANNING AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - 2030 WITH ACTION

FIGURE 8

FEHR & PEERS

May 26, 2011 JS
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CHAPTER 4. OTHELLO STATION AREA

The Othello Station Area is centered around the LINK Light Rail station at the Othello Street/Martin Luther King, Jr. Way (MLK Way) intersection. It extends approximately from Willow Street on the north to Kenyon Street on the south. In this area, MLK Way provides two north and south travel lanes separated by the at-grade light rail lines in the median. East-west travel across the light rail line is allowed at Myrtle Street, Othello Street, Webster Street (providing access to Renton Avenue), and Kenyon Street. Figure 9 identifies the project area and study intersections, and Figure 10 provides the existing intersection volumes and lane configurations.

In addition to existing and future conditions, Appendix B presents the traffic operations results of allowing off-peak parking in the right lane of MLK Way in the area under current traffic conditions. The results indicate that parking can be allowed at all times except 3:00 PM – 7:00 PM in the northbound and southbound directions, and 7:00 AM – 9:00 AM in the northbound direction.

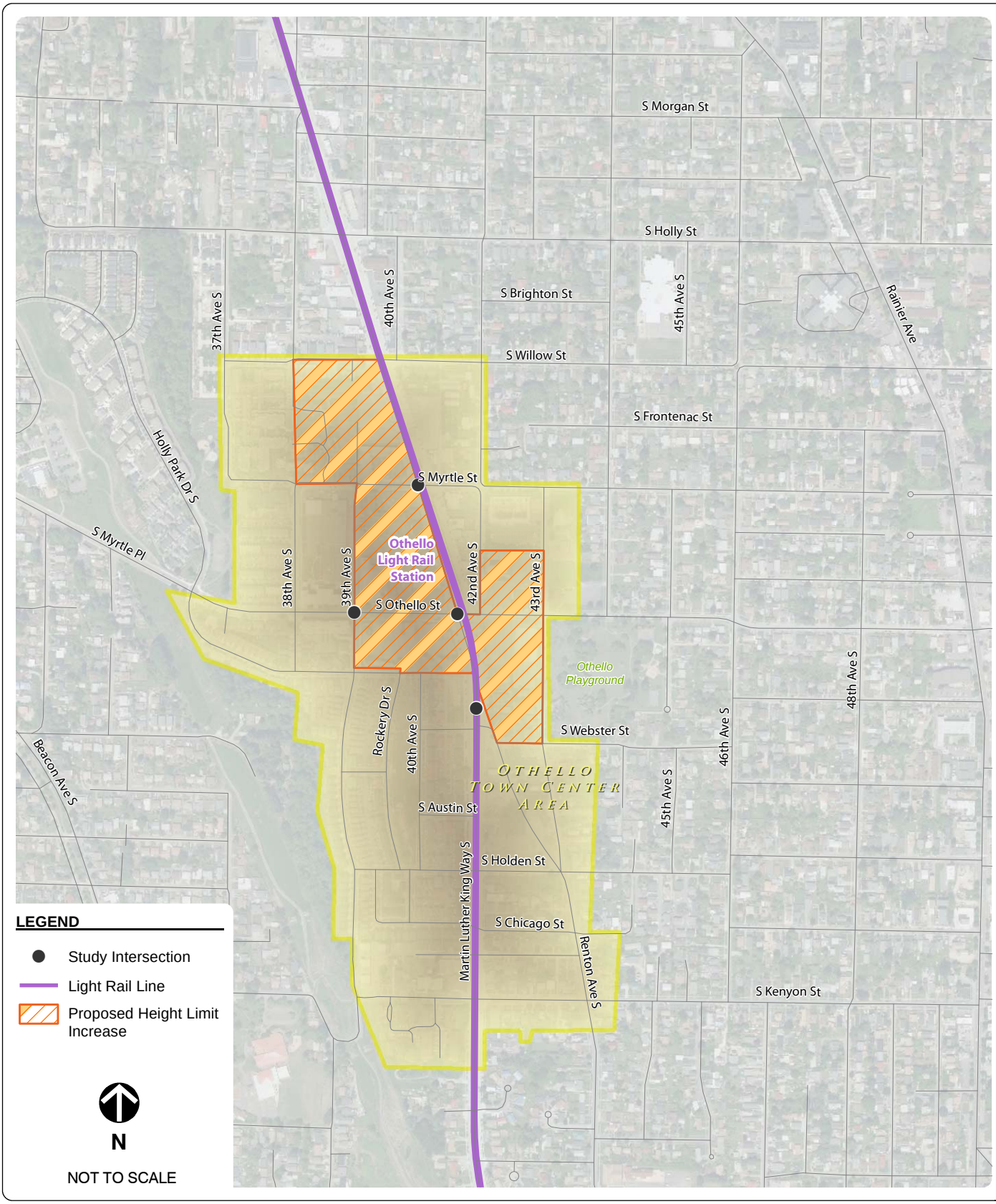
EXISTING CONDITIONS

Table 6 lists the existing intersection LOS and delay for the study intersections in Othello. All intersections generally experience limited congestion with modest delay during peak periods at Othello Street/MLK Way.

Table 6 - PM PEAK HOUR LOS AND DELAY FOR OTHELLO NEIGHBORHOOD PLANNING AREA - EXISTING CONDITIONS

Intersection (Control Type)	LOS	Delay
Othello St & MLK Way (signal)	C	29
Webster St & MLK Way (signal)	B	18
Othello St & 39th Ave (signal)	A	4
Myrtle St & MLK Way (signal)	B	16

Source: Fehr & Peers 2011



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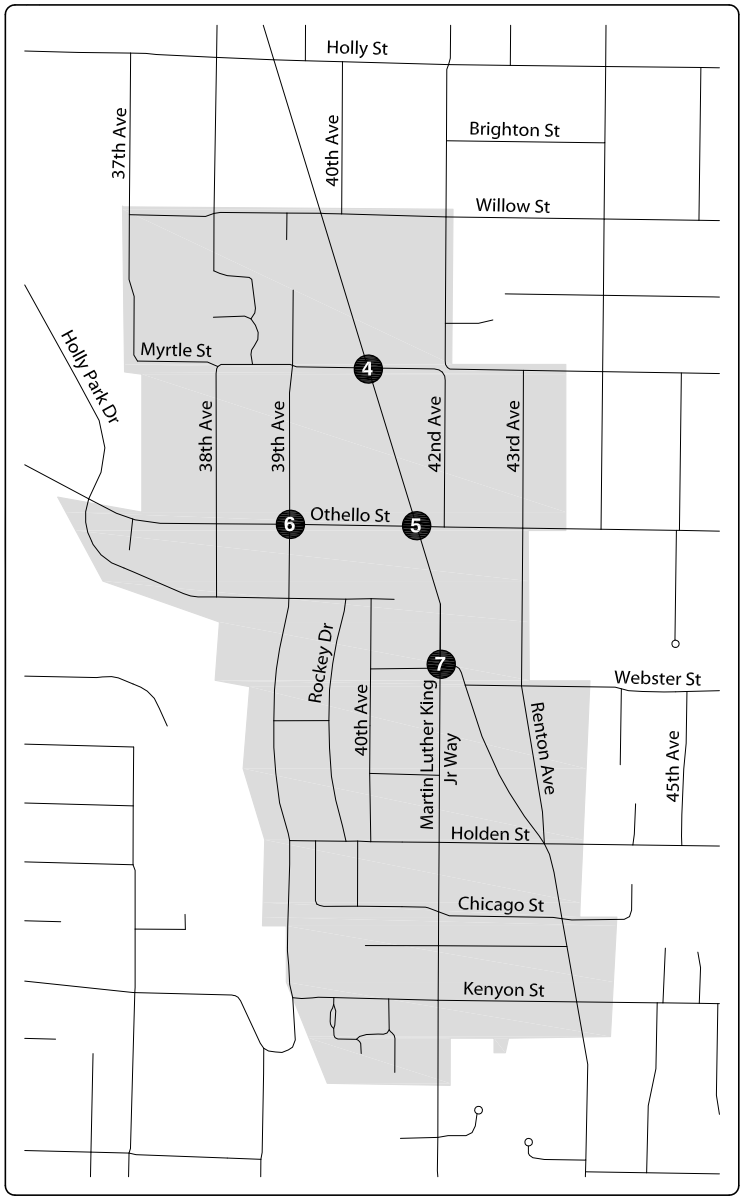
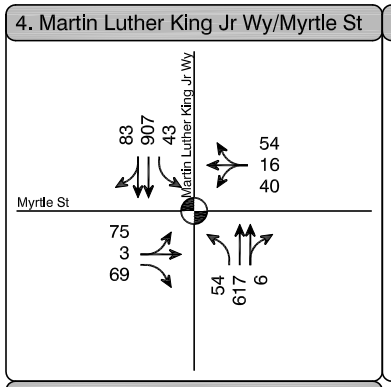
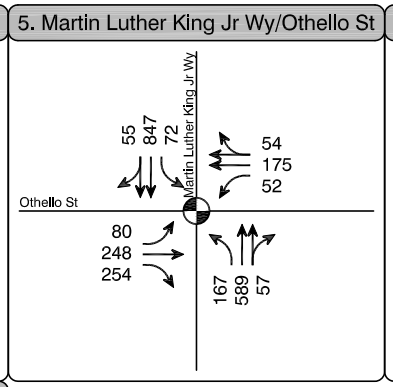
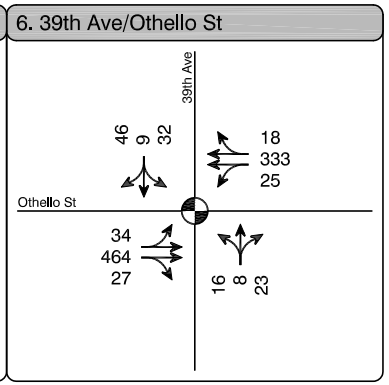
OTHELLO STATION AREA

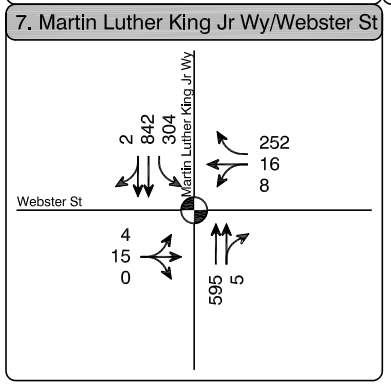
FIGURE 9











LEGEND

- Turn Lane
- XX PM Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Othello Station Area

N

NOT TO SCALE

OTHELLO STATION AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - EXISTING CONDITIONS

FIGURE 10

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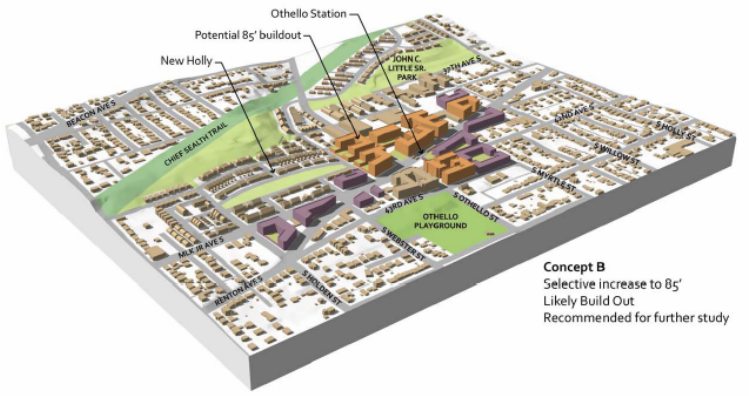
FUTURE (2030) CONDITIONS

As previously identified in Table 2, the proposed height and density increases in the Othello Neighborhood Planning Area will add approximately an additional 100 households and 100 jobs compared to No Action conditions. This additional development is consistent with the goal of maintaining a balance of affordable housing and a vibrant commercial center expressed in the January 2010 *Othello Neighborhood Plan Update*. These additional households and jobs are projected to add an additional 136 PM peak period vehicle trips, 37 additional bicycle and pedestrian trips, and 26 transit trips.



Othello Town Center with Proposed Height and Density Increases

Othello Neighborhood Plan Update, January 2010

In addition to the trips related to additional development within the neighborhood planning area, the Seattle travel model predicts substantial increases in traffic volumes on MLK Way (up to a 40 percent increase over 2010 conditions). Even with this degree of increase and the addition of project-related trips, all study intersections are forecasted to perform at acceptable levels and no significant transportation impacts are anticipated from the height and density increase.

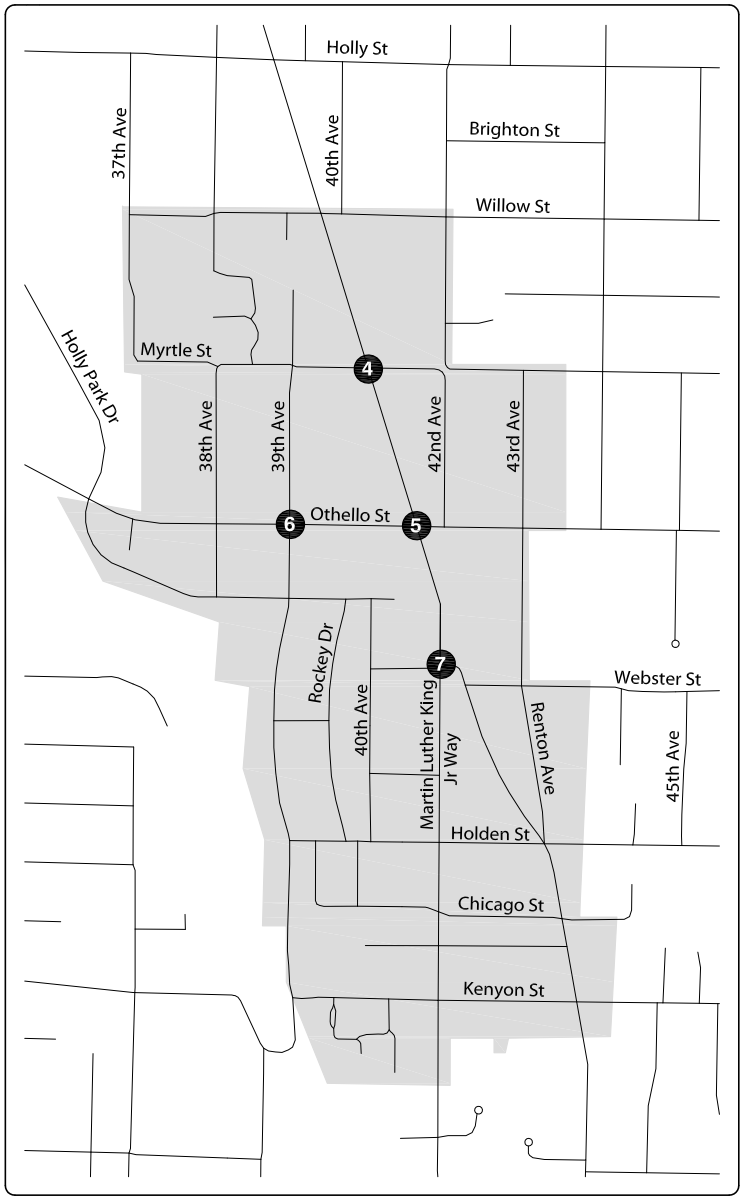
Given the robust pedestrian infrastructure in the area, no impact is expected from the additional bicycle and pedestrian volumes due to the proposed increase in height and density. Furthermore, the modest increase in transit trips (26 PM peak hour trips) will be accommodated by the robust transit service in the area.

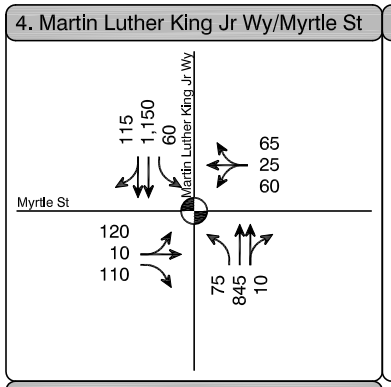
Table 7, below, identifies the 2030 intersection LOS and delay for both the No Action and With Action alternatives. Figures 11 and 12 provide the 2030 No Action and 2030 With Action intersection volumes and lane configurations.

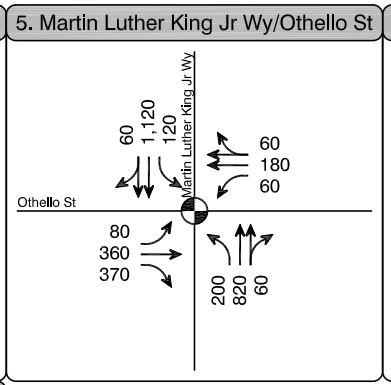
Table 7 – PM PEAK HOUR LOS AND DELAY FOR OTHELLO NEIGHBORHOOD PLANNING AREA - 2030 CONDITIONS

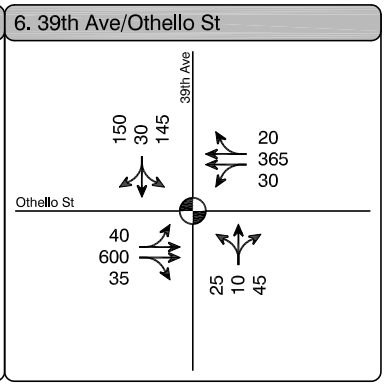
Intersection (Control Type)	No Action LOS	No Action Control Delay	With Action LOS	With Action Control Delay
Othello St & MLK Way (signal)	D	37	D	37
Webster St & MLK Way (signal)	B	20	C	20
Othello St & 39th Ave (signal)	A	9	A	9
Myrtle St & MLK Way (signal)	C	21	C	23

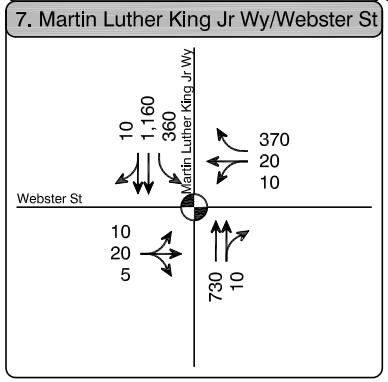
Source: Fehr & Peers 2011











LEGEND

- Turn Lane
- XX PM Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Othello Station Area

N

NOT TO SCALE

OTHELLO STATION AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - 2030 NO ACTION

FIGURE 11

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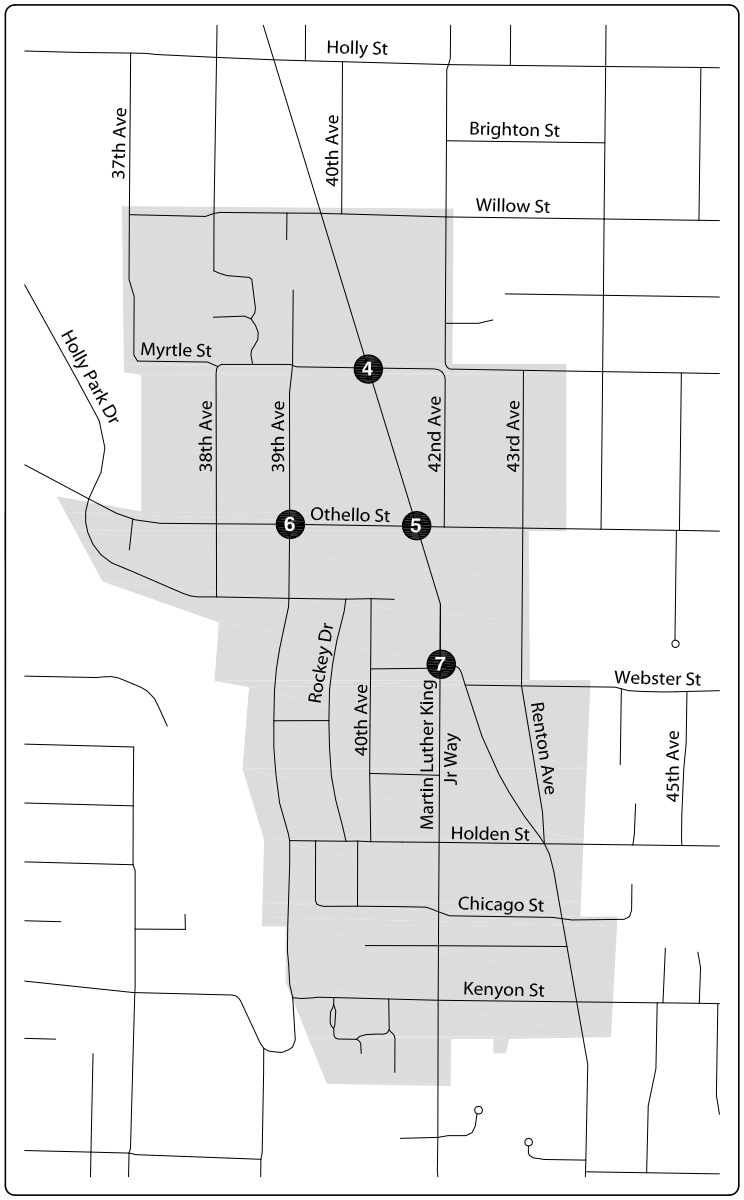

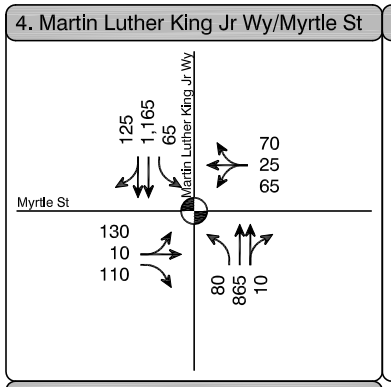

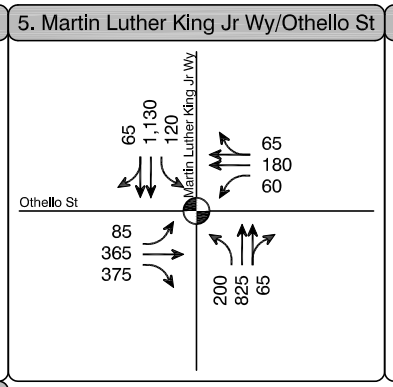

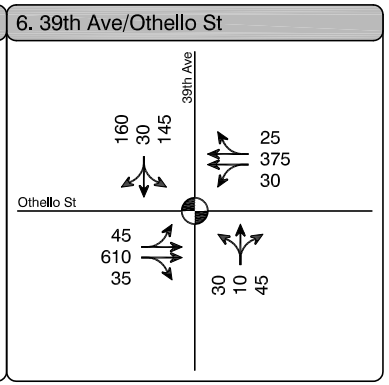

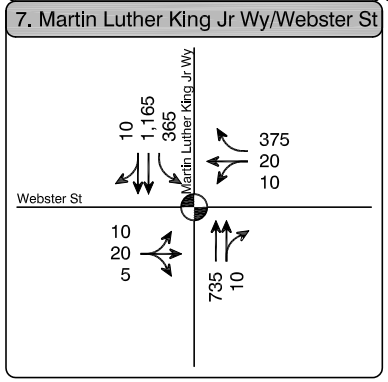

LEGEND

- Turn Lane
- XX PM Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Othello Station Area

N

NOT TO SCALE

OTHELLO STATION AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - 2030 WITH ACTION

FIGURE 12

FEHR & PEERS

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CHAPTER 5. MOUNT BAKER STATION AREA

The Mount Baker neighborhood Planning Area is focused along Rainier Avenue and Martin Luther King Jr. Way (MLK Way) between Bayview Street on the north and Hanford Street on the south. A key focus of this analysis is the major intersection of Rainier Avenue/MLK Way which currently intersect at a skewed angle. This intersection is located directly adjacent to the Mount Baker Light Rail Station and has a large volume of both pedestrian and vehicle traffic.

EXISTING CONDITIONS

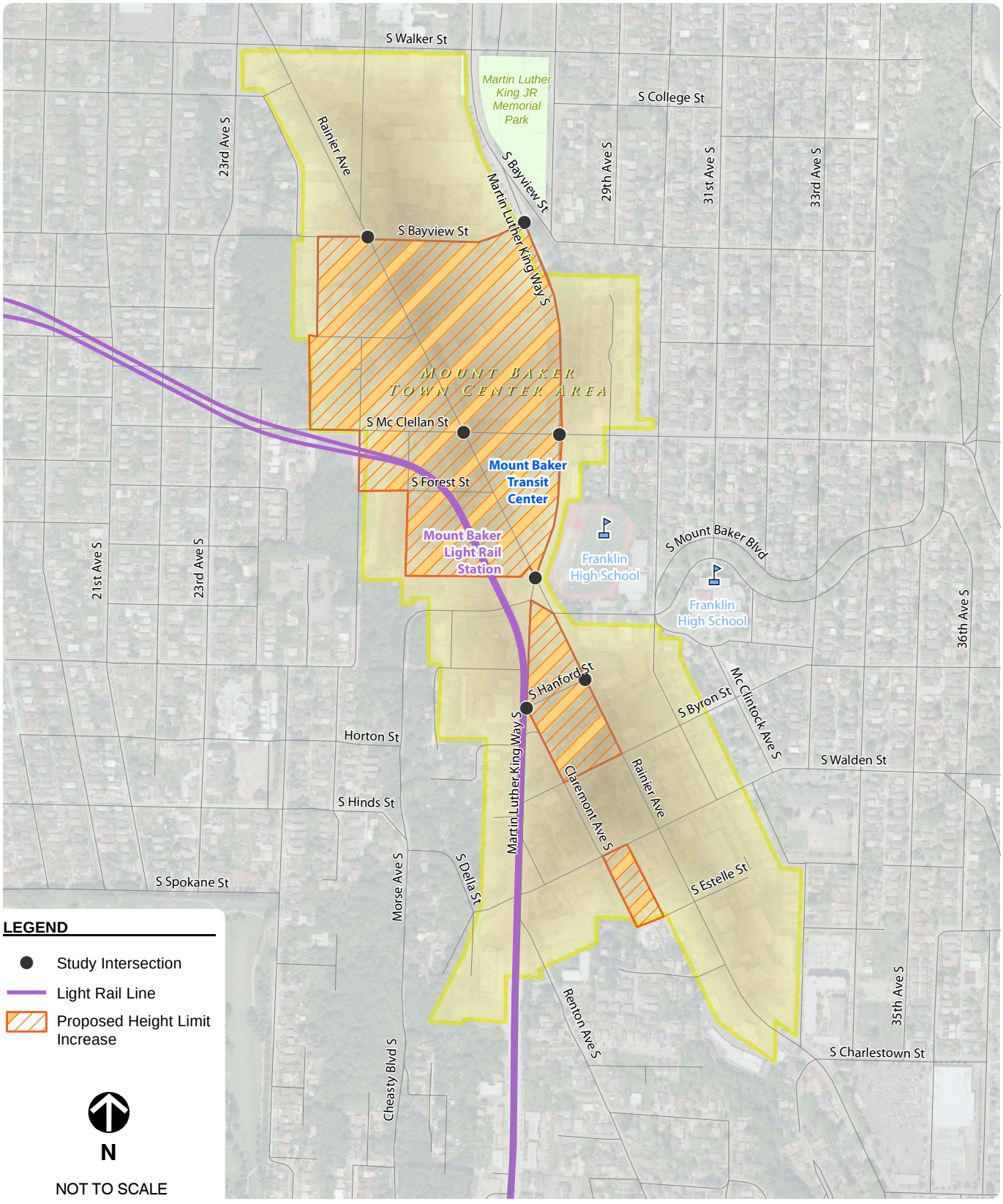
Table 8 lists existing intersection conditions in the Mount Baker Neighborhood Planning Area. Figure 13 identifies the project area and study intersections, and Figure 14 provides the existing intersection volumes and lane configurations.

Table 8 – PM PEAK HOUR LOS AND DELAY FOR MOUNT BAKER NEIGHBORHOOD PLANNING AREA - EXISTING CONDITIONS

Intersection (Control Type)	LOS	Delay
Bayview St & Rainier Ave (signal)	B	14
McClellan St & Rainier Ave (signal)	C	34
Rainier Ave & MLK Way (signal)	C	26
Hanford St & Rainier Ave (side-street stop-control)[1]	C	15
Bayview St & MLK Way (signal)	B	10
McClellan St & MLK Way (signal)	B	11
Hanford St & MLK Way (signal)	A	4

[1] *For side-street stop-control, the Highway Capacity Manual (HCM) specifies that LOS and delay be reported for the highest-delayed movement at the intersection.*

Source: Fehr & Peers 2011



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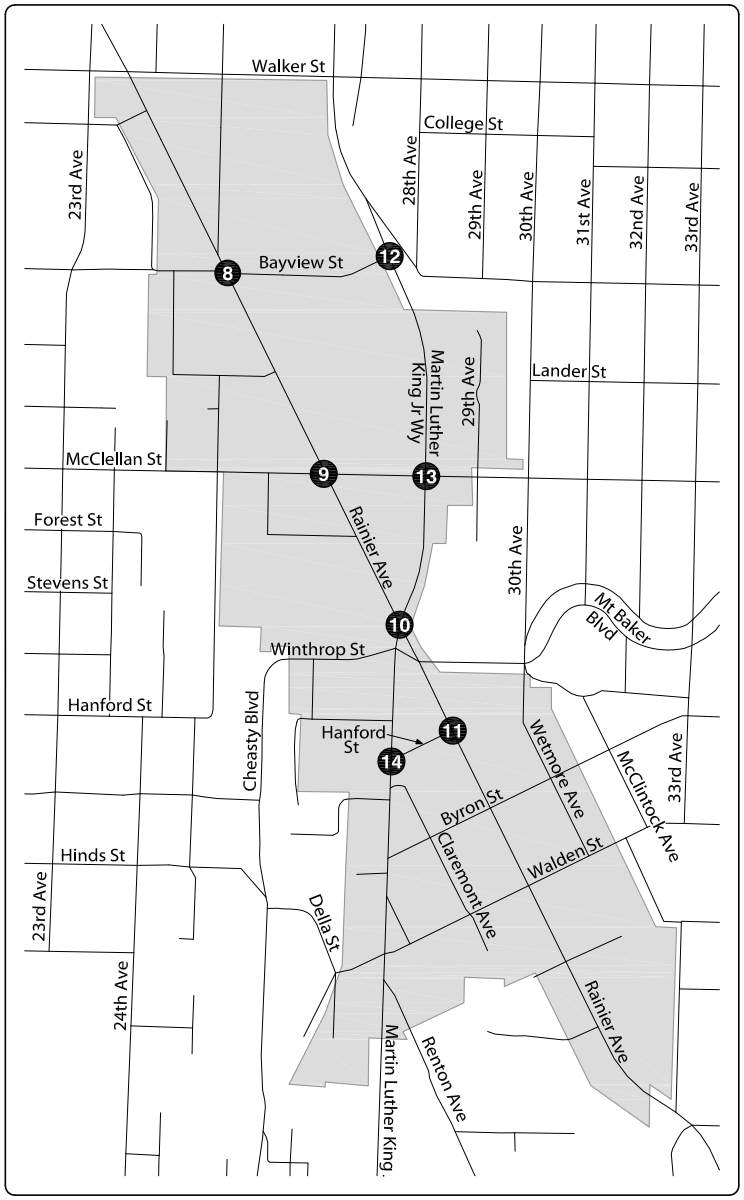
MOUNT BAKER STATION AREA

FIGURE 13



LEGEND

- Turn Lane
- XX PM Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Mount Baker Station Area

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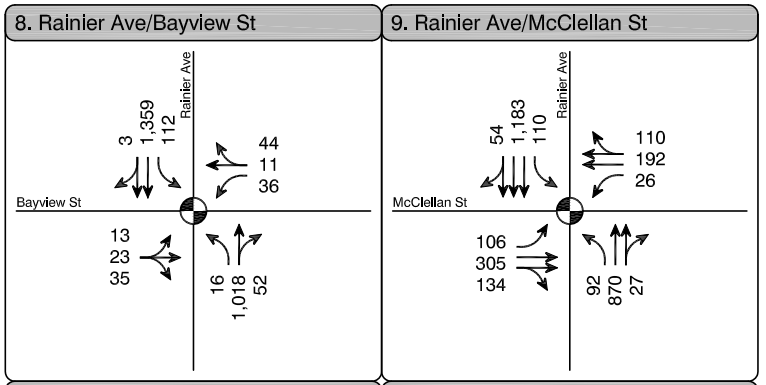

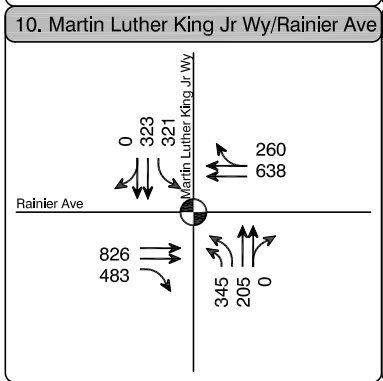

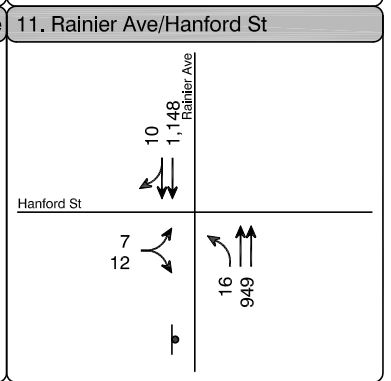

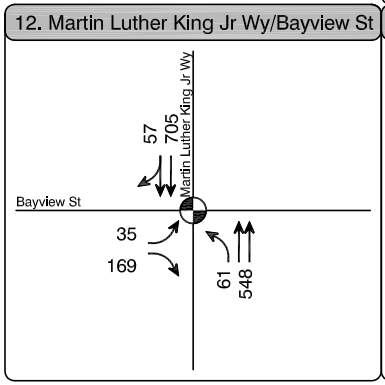

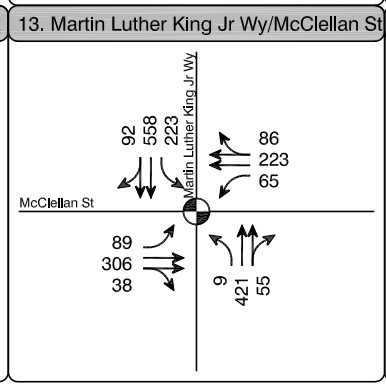

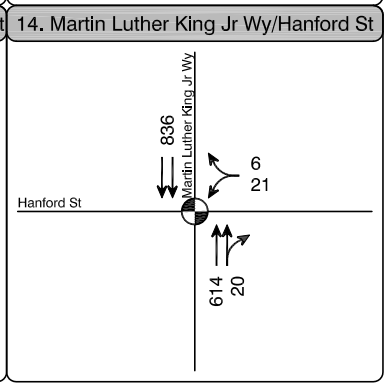

MOUNT BAKER STATION AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - EXISTING CONDITIONS

FIGURE 14

FEHR & PEERS

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As shown in Table 8, all intersections in the study area operate acceptably under existing conditions. It may come as a surprise that the Rainier Avenue/MLK Way intersection operates at LOS C under existing conditions, with an average of 26 seconds of delay per vehicle. This result is partially a limitation of the intersection LOS methodology, since the delays at this intersection affect not only traffic at Rainier Avenue and MLK Way, but also upstream intersections like Rainier Avenue/Forest Street and Rainier Avenue/McClellan Street. Field observations in the PM peak hour confirm the results in Table 8. Most legs of the Rainier Avenue/MLK Way intersection operate fairly well; however, southbound traffic on Rainier Avenue can back up into the upstream intersections. In particular, this southbound traffic congestion tends to degrade operations at the Rainier Avenue/McClellan Avenue intersection, which is reflected in its relatively high delay (compared to the other intersections in the study area).

FUTURE (2030) CONDITIONS

As indicated previously, the additional heights and density proposed for this area will increase the number of households in 2030 by 249 and the number of jobs by 170. A neighborhood town center development that concentrates housing (including a diversity of housing options), commercial, and employment options adjacent to the existing transit infrastructure was a goal identified in the January 2010 *North Rainier Neighborhood Plan Update*. These proposed height and density changes will help accomplish this goal.

Mount Baker Town Center with Proposed Height and Density Increases

North Rainier Neighborhood Plan Update, January 2010

As with the other study areas, increases in household and employment will increase the number of trips generated in the area. However, due to the rich transit opportunities and additional locations to live, shop and work within the same area, many of these trips will not involve a car. In the PM peak hour, Fehr & Peers analysis concludes that these increases will create an additional 226 vehicle trips, 72 additional pedestrian and bicycle trips, and 53 transit trips. Table 9 below shows the 2030 PM peak hour intersection operating conditions under No Action and With Action alternatives.

Table 9 – PM PEAK HOUR LOS AND DELAY FOR MOUNT BAKER NEIGHBORHOOD PLANNING AREA - 2030 CONDITIONS

Intersection (Control Type)	No Action LOS	No Action Control Delay	With Action LOS	With Action Control Delay
Bayview St & Rainier Ave (signal)	C	21	C	24
McClellan St & Rainier Ave (signal)	C	34	C	35
Rainier Ave & MLK Way (signal)	D	49	D	51
Hanford St & Rainier Ave (side-street stop-control)[1]	C	20	C	20
Bayview St & MLK Way (signal)	A	9	A	9
McClellan St & MLK Way (signal)	B	13	B	14
Hanford St & MLK Way (signal)	A	5	A	6

[1]*For side-street stop-control, the Highway Capacity Manual (HCM) specifies that LOS and delay be reported for the highest-delayed movement at the intersection.*

Source: Fehr & Peers 2011

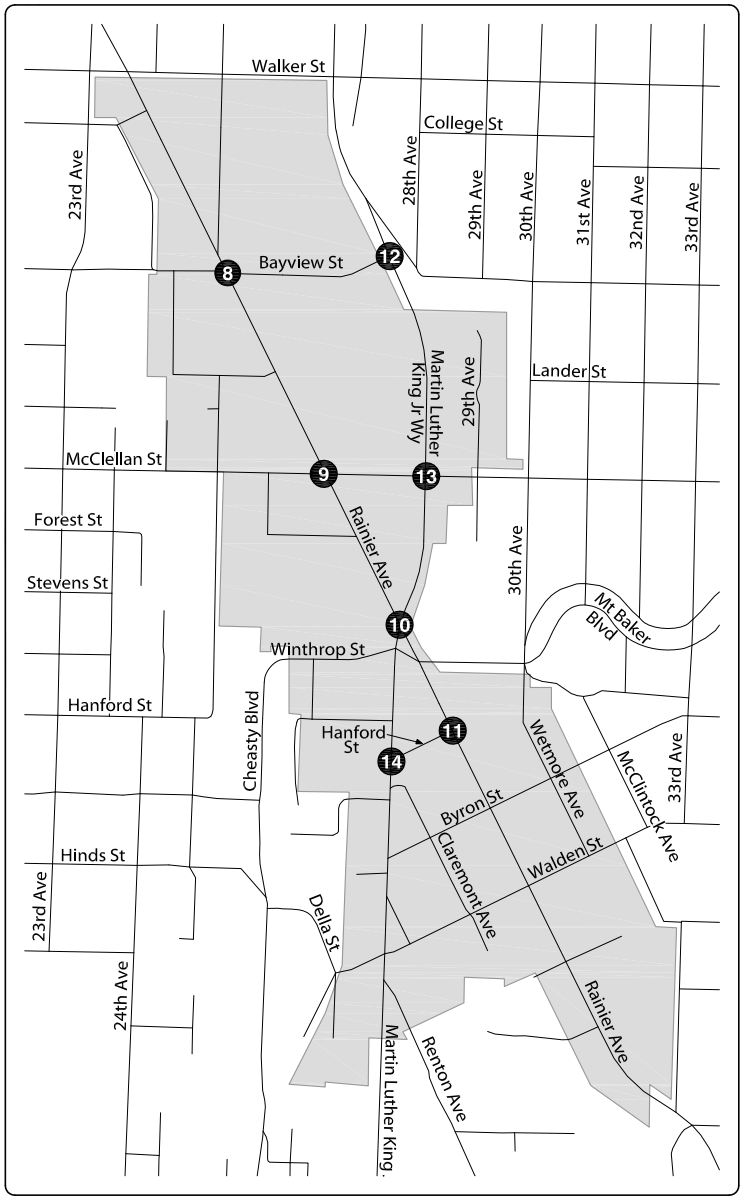
As Table 9 indicates, there are no significant adverse impacts to traffic operations as a result of the increased building heights and densities. Background growth in the corridor is expected to increase traffic by as much as 40 percent. Such growth constitutes the bulk of the increase in delay when compared to existing conditions. However, even with this large increase in background traffic, the proposed increase in heights and densities will only slightly increase delay at the study intersections along the Rainier Avenue and MLK Way corridors. As shown in Table 9, congestion is expected to increase at the Rainier Avenue/MLK Way intersection under 2030 conditions; however, overall operations are still expected to be within the City's LOS standard.

Figures 15 and 16 provide the 2030 intersection volumes and lane configurations.

In conducting a survey of pedestrian facilities in the area, it was noted that Hanford Street between MLK Way and Rainier Avenue and the east side of MLK Way north of McClellan Street in the study area are both lacking sidewalks. Due to the increase in pedestrian volumes related to the increase in local development and density, there is a potential impact to pedestrian circulation at these locations given the lack of pedestrian facilities. As mitigation, it is recommended that sidewalks be provided at both locations concurrent with the redevelopment of adjacent parcels.

Transit service is not anticipated to be significantly impacted in the Mount Baker area since the modest increase in transit trips (53 PM peak hour trips) will be accommodated the neighborhood's extensive transit system.

As a separate project, the City of Seattle is exploring innovative transportation system improvements in the Mount Baker Neighborhood Planning Area in an effort to improve the pedestrian, bicycle, and transit environment in the area. Specifically, the City is considering the feasibility of converting Rainier Avenue and MLK Way into a north-south couplet of one way streets between Bayview Street and Hanford Street. Appendix C contains a detailed description of this concept, along with traffic and transit operations under existing and 2030 With Action conditions. In general, the results of this analysis show that certain intersections will experience increased delay, but the overall corridor travel times will show slight decreases. Additionally the updated configuration will allow for increased pedestrian space, new bicycle facilities on MLK Way, and a dedicated transit lane on Rainier Avenue.



LEGEND

- Turn Lane
- XX PM Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Mount Baker Station Area

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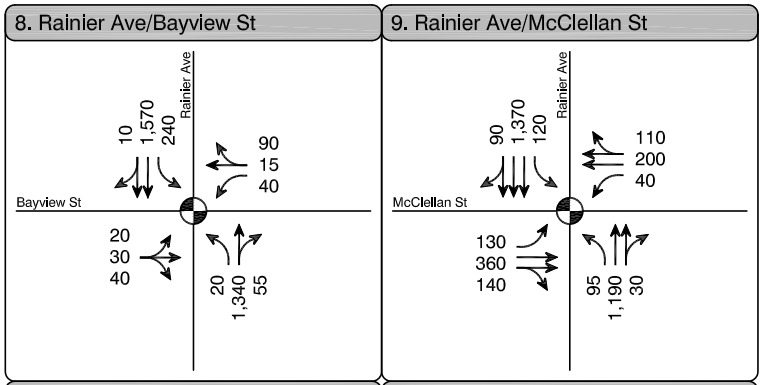
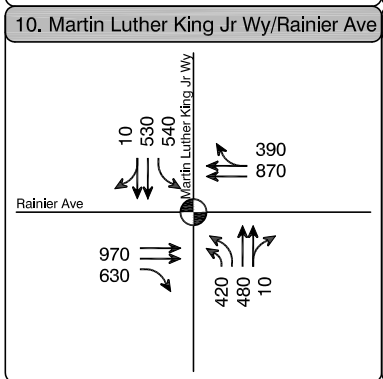
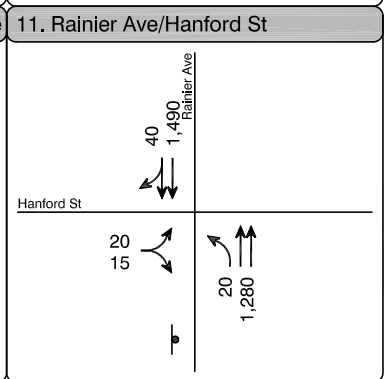
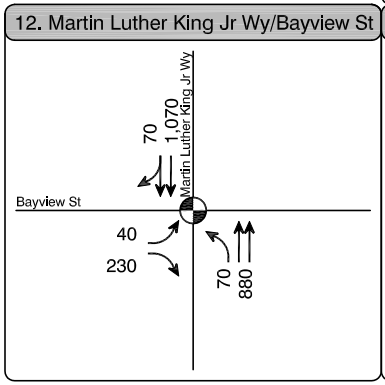
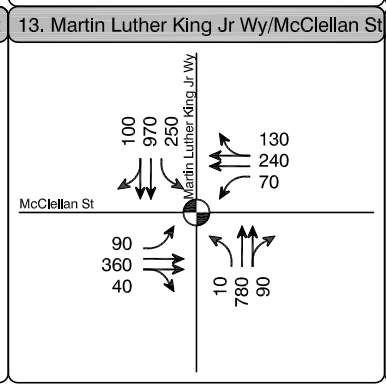
NOT TO SCALE

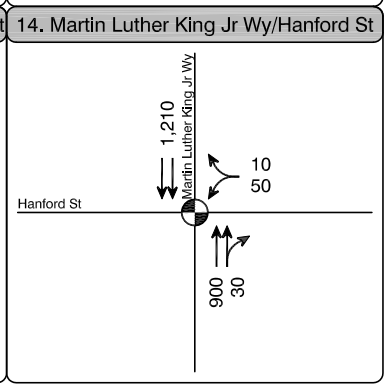












MOUNT BAKER STATION AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - 2030 NO ACTION

FEHR & PEERS

FIGURE 15

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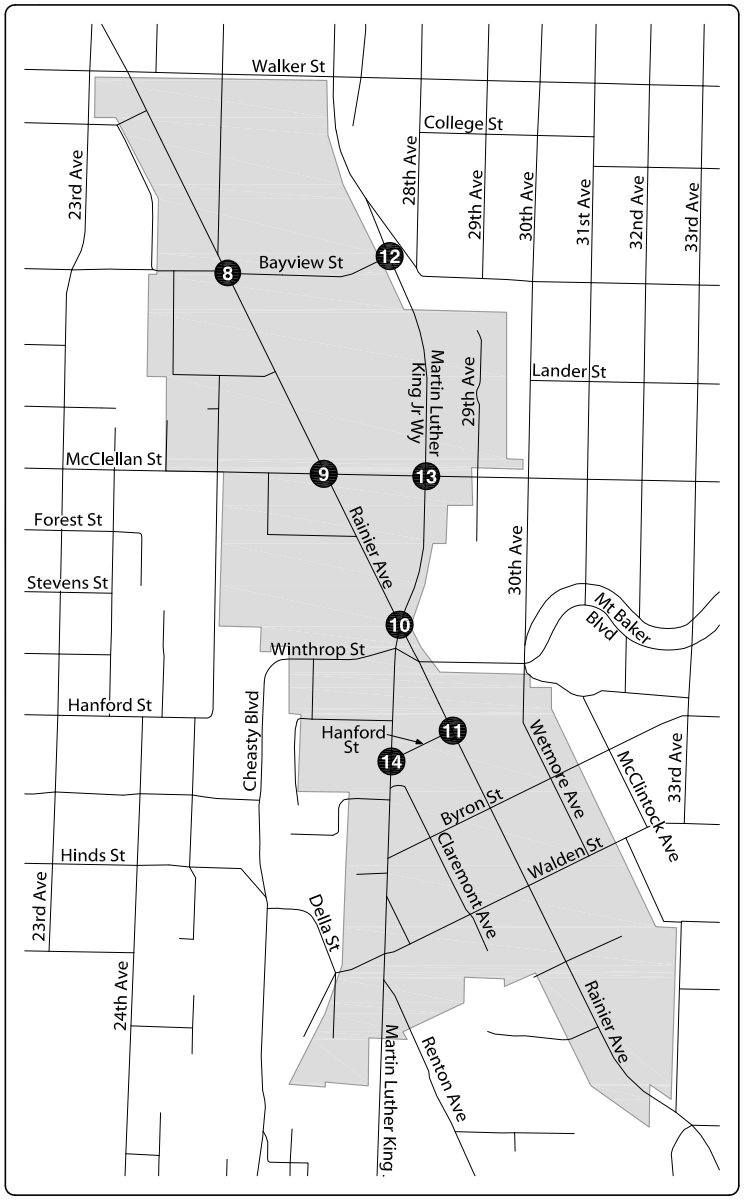

LEGEND

- Turn Lane
- XX PM Peak Hour Traffic Volume
- Study Intersection
- Traffic Signal
- Stop Sign
- Mount Baker Station Area

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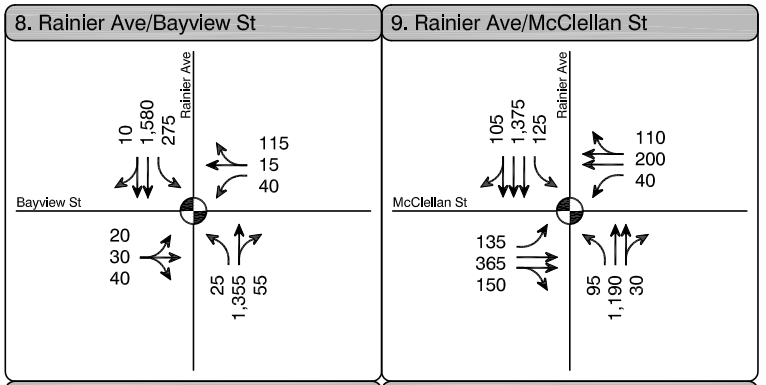
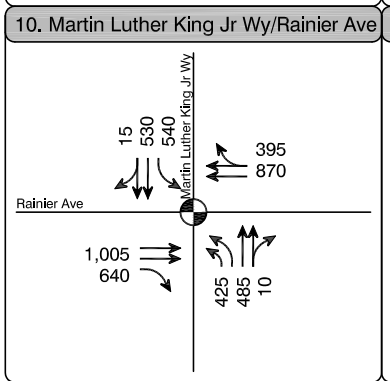
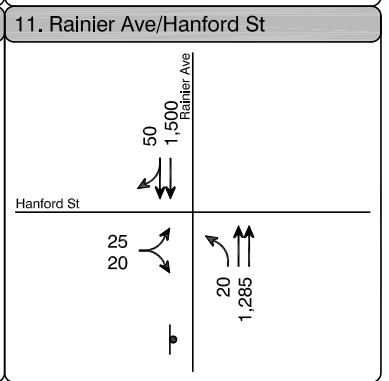
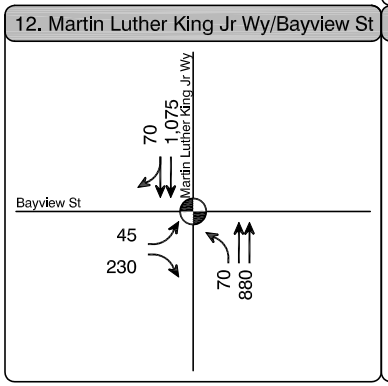
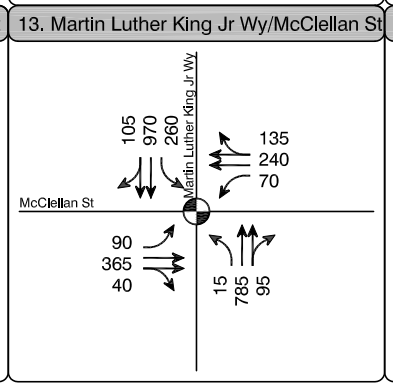
NOT TO SCALE

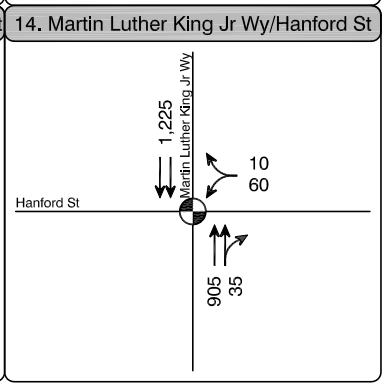












MOUNT BAKER STATION AREA PM PEAK HOUR TRAFFIC VOLUMES AND LANE CONFIGURATIONS - 2030 WITH ACTION

FIGURE 16

FEHR & PEERS

May 05, 2011 JS
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CHAPTER 6. CONCLUSIONS

Based on output from the Seattle travel model, background traffic increases along the major thoroughfares are expected to be between 20 and 40 percent in the study areas. Even with this high level of traffic growth, the additional traffic generated by the proposed height and density increases in the neighborhood planning areas are not expected to cause significant adverse transportation impacts to the roadway network. All three locations benefit from their proximity to existing transit services and the increase in density provides the ability for more pedestrian and bicycle trips.

In Mount Baker, the lack of sidewalks on Hanford Street and a portion of MLK Way could trigger an impact for pedestrians given the additional expected pedestrian activity related to increases in development and density. This potential impact can be mitigated by constructing sidewalks concurrent with new development.

The increased project density is expected to add between 21-53 PM peak hour transit trips in each neighborhood. Based on information from King County Metro and Sound Transit, each area currently has adequate overall transit capacity (however King County Metro Route 7 can experience crowding during peak times). Given the robust transit system in the study areas and the relatively small increase in transit trips as a result of the height and density increases, no transit related impacts are anticipated.

The appendices to this report evaluate future design options for the North Beacon Hill and Mount Baker Neighborhood Planning Areas. These design options provide benefits for non-motorized travel and will also help in accommodating neighborhood growth by providing options for local residents to reach neighborhood destinations by foot or bicycle. A final appendix evaluates the potential for on-street parking along MLK Way in the Othello neighborhood. The results indicate that parking can be allowed except from 3:00 PM – 7:00 PM in the northbound and southbound directions, and from 7:00 AM – 9:00 AM in the northbound direction.

APPENDIX A:
NORTH BEACON HILL NEIGHBORHOOD DESIGN PROPOSAL ANALYSIS

APPENDIX A – NORTH BEACON HILL NEIGHBORHOOD DESIGN PROPOSAL ANALYSIS

Fehr & Peers analyzed numerous potential design options as requested by the City of Seattle. Many of these design options have their origin in the January 2010 *North Beacon Hill Neighborhood Plan Update*. This plan update contained the goal to make North Beacon Hill a pleasant place to walk with streetscapes that improve pedestrian and bicycle mobility.

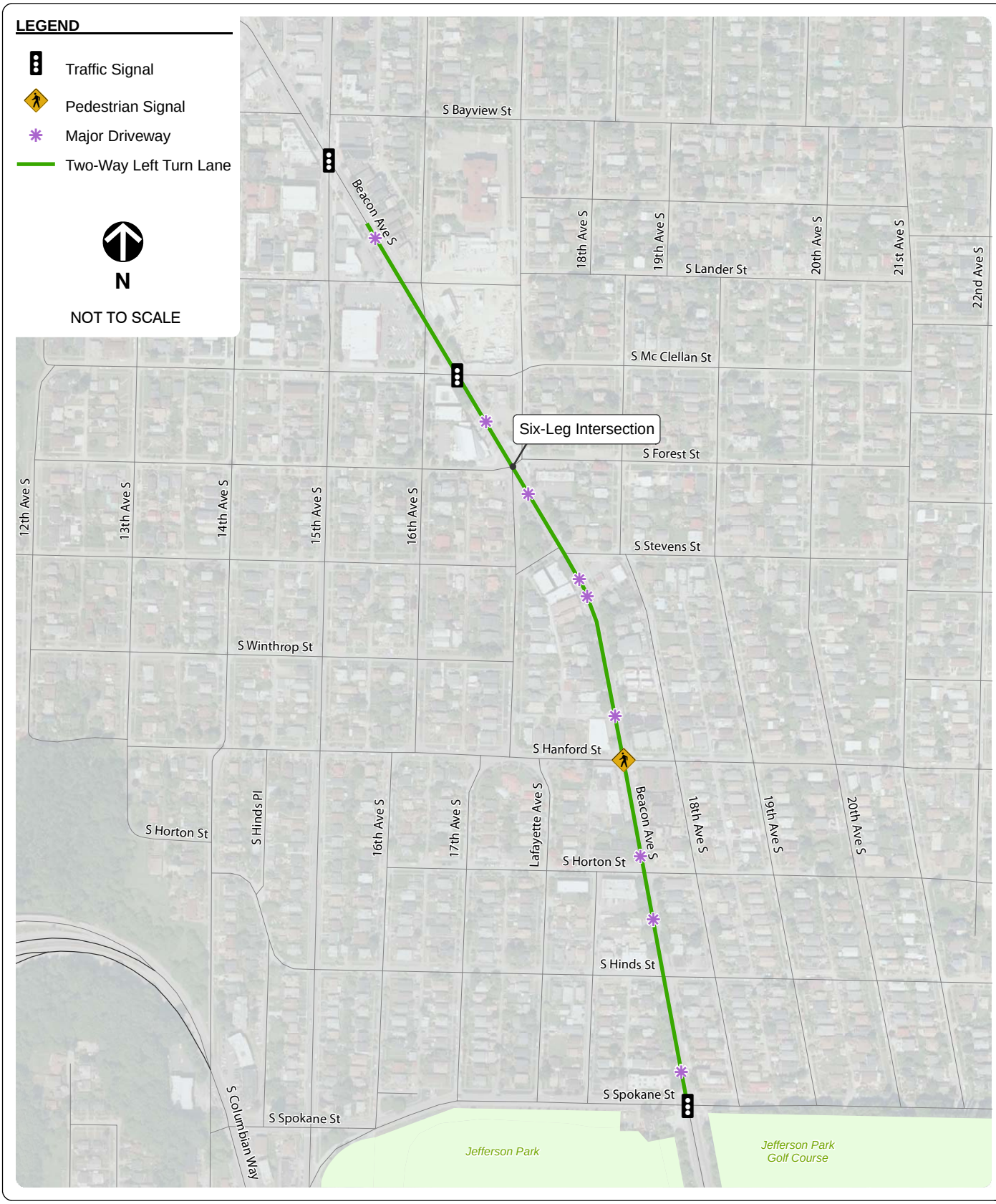
Figure A1, below identifies current roadway conditions in the North Beacon Hill area. Currently, Beacon Avenue features a center two-way left turn lane from Lander Street south to Spokane Street. Most intersections along this segment have stop signs on the minor approaches with full signals at 15th Avenue/Beacon Avenue, McClellan Street/Beacon Avenue, and Spokane Street/Beacon Avenue. Additionally, there is a pedestrian-activated signal at the Hanford Street/Beacon Avenue intersection.

The *North Beacon Hill Neighborhood Plan Update* recommends the following pedestrian environment and traffic calming improvements for Beacon Avenue:

- Removal of the two-way left turn lane and addition of back-in angle parking on one side of Beacon Avenue from 15th Avenue South to Lander Street and between McClellan Street and Forest Street.
- Removal of the two-way left turn lane and a narrowing of the street between Lander Street and McClellan Street.
- Removal of the two-way left turn lane and addition of raised, planted medians on Beacon Avenue from McClellan Street to Spokane Street[1].
- Addition of bicycle lanes on Beacon Avenue from McClellan Street to Spokane Street per the *Seattle Bicycle Master Plan.*

Potential transportation issues related to the proposed improvements and Fehr & Peers recommendations are summarized below. Recommendations are also detailed on Figure A2.

[1] There is insufficient right-of-way to provide diagonal parking and a median in the same cross section.



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BEACON HILL - EXISTING CONDITIONS

FIGURE A1

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BEACON HILL - RECOMMENDATIONS

FIGURE A2

Back-In Angled Parking

The *North Beacon Hill Neighborhood Plan Update* recommends adding back-in angled parking on one side of Beacon Avenue between Lander Street and 15th Avenue and between Forest Street and McClellan Street. This configuration of parking provides motorists with improved visibility of bicyclists, pedestrians, cars, and trucks as they exit a parking space. It also removes the risk that a motorist may open a door into the path of a bicyclist. Additionally, changing from parallel to angled parking will result in the increase of 6-8 curb parking spaces on this block.

The standard roadway space required for back-in angled parking is 16 feet. Due to this requirement, the segments with this parking configuration cannot accommodate bicycle lanes in both directions and parallel parking on the opposite side of the street.

To accommodate both parking and bicycle travel, we recommend maintaining the "sharrow" markings that are already present on Beacon Avenue in the areas in back-in angled parking. Such treatment balances the need to retain on-street parking capacity with the needs of cyclists. Figure A3 shows an example cross section of back-in angled parking north of Lander Street. As described below, in areas without back-in angled parking, we recommend a bicycle lane, consistent with the recommendations of the *Seattle Bicycle Master Plan*.

Conversion of Lander Street/Beacon Avenue and McClellan Street/Beacon Avenue to four-way stop control.

This alternative was considered as a traffic calming element. However, analysis showed that such configuration under existing conditions would lead to LOS degrading from C and B, respectively, to E and F.

Such an alternative would lead to unacceptable increases in vehicle delay on Beacon Avenue.

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SE10-0210_3_Lander

BEACON AVENUE IMPROVEMENTS – NEAR LANDER STREET

FIGURE A3

Landscaped Median/Beacon Avenue Channelization

In addition to the parking and streetscape enhancements described above, the *North Beacon Hill Neighborhood Plan Update* identified the desire to add planted medians along Beacon Avenue between Spokane Street and Lander Street. This section described potential design details related to a planted median.

Parking Considerations

Replacing the existing two-way left turn lane on Beacon Avenue between Spokane Street and Lander Street with a landscaped median accomplishes the community's desire for a green connection between the light rail station area and Jefferson Park. However, to accommodate a 10-11-foot landscaped median and the bicycle lanes recommended in the *Seattle Bicycle Master Plan*, on-street parallel parking would have to be eliminated from one side of the street.[2] This design would result in a loss of approximately 75 spaces (see Table A2 for a detailed accounting of parking spaces lost). Based on a review of the land uses along Beacon Avenue, Fehr & Peers recommends eliminating parking on the east side of the street for the entire length between Lander Street and Spokane Street. Most of the businesses are located along the west side of Beacon Avenue and eliminating parking on the east side of the street would inconvenience fewer retail patrons.

Almost all of the curb spaces removed would be in front of residential properties. Underutilized driveway and alley spaces are likely to only add a minimal amount of potential parking. Alleys in the affected area are only located on blocks on the west side of Beacon Avenue and are too narrow to accommodate parking. Driveway entrances on Beacon Avenue are limited, however, aerial photos indicate that there are unused parking spots on 18th Avenue, which is the street immediately east of Beacon Avenue. Figure A4 shows the potential road configuration with medians and parking restrictions on Beacon Avenue near Hanford Street.

[2] An alternative proposal is to provide a four-foot wide landscaped median. This narrow median would allow parking lanes to remain on both sides of Beacon Avenue.

TABLE A2. ON-STREET PARKING SPACES REMOVED PER BLOCK

Segment of Beacon Avenue	Approximate Number of Curb Parking Spaces Removed to Accommodate Bicycle Lanes
Lander Street to McClellan Street	0
McClellan Street to Forest Street	5
Forest Street to Stevens Street	6
Stevens Street to Hanford Street	26
Hanford Street to Horton Street	12
Horton Street to Hinds Street	15
Hinds Street to Spokane Street	9

Source: Fehr & Peers, 2011

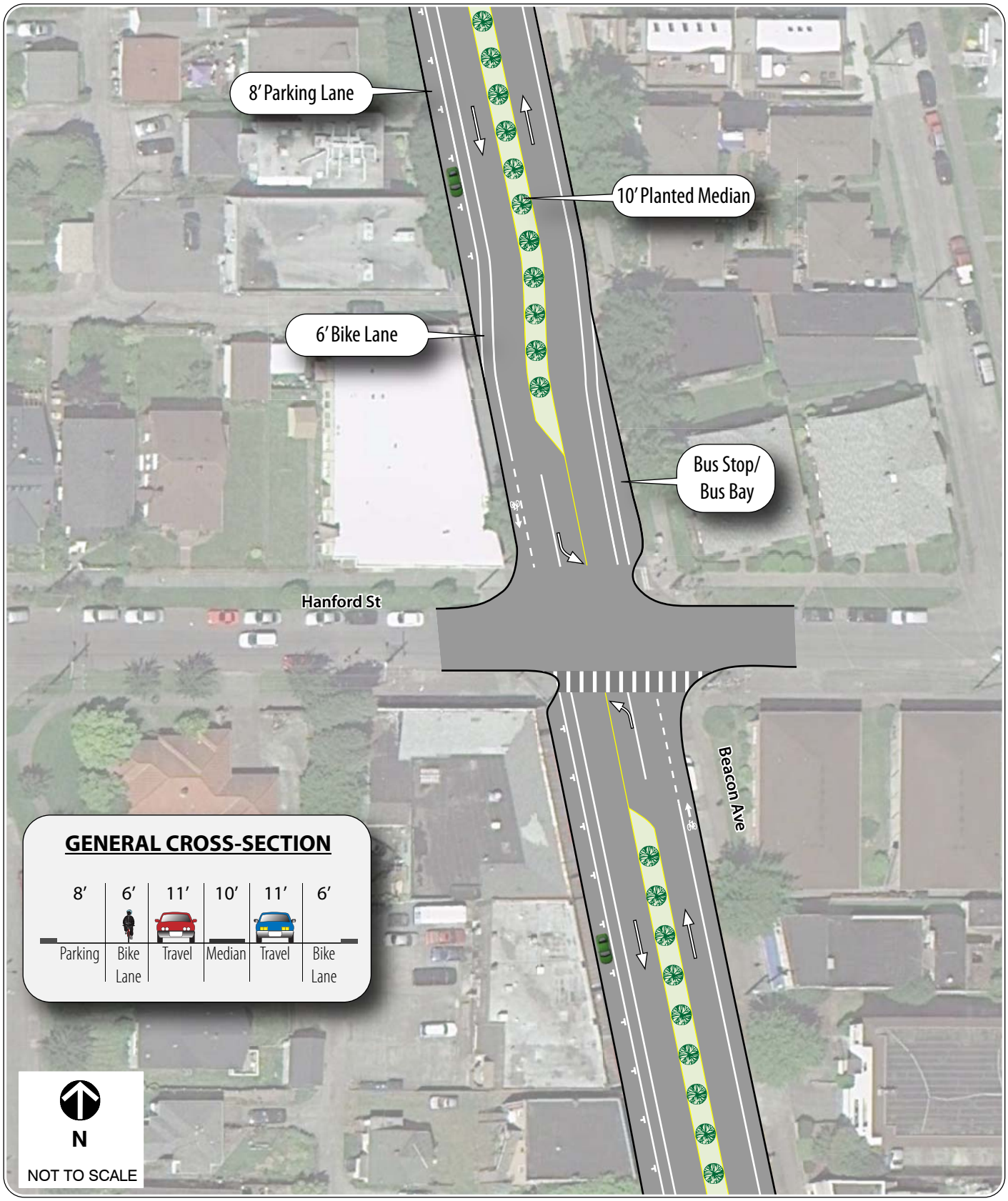
Related recommendations to channelizing Beacon Avenue

In addition to parking changes, Fehr & Peers recommends other changes to Beacon Avenue. These are:

- **Left Turn Locations.** Where the median is installed, local vehicle access to driveways on Beacon Avenue and local streets will be restricted to right turns only. However, a mountable median design with pedestrian and bicycle permeability should be implemented to accommodate active transportation modes and emergency vehicles. To provide local circulation, we recommend allowing left turns from Beacon Avenue at Forest Street, Hanford Street, and Spokane Street. Forest and Hanford Streets would require 50 foot left turn pockets. The existing left turn pocket at Spokane Street should remain.

- **Bicycle Facilities.** The *Seattle Bicycle Master Plan* recommends bicycle lanes on Beacon Avenue from McClellan Street through the southern end of the study area. By removing the center turn lanes and parking on one side of the street, bike lanes can be accommodated within the existing right-of-way (ROW). This design would provide a seven-foot wide parallel parking lane on the west side of Beacon Avenue, six-foot bicycle lanes on both sides of the street, and two 11-foot travel lanes. This configuration leaves sufficient ROW for a 10-11-foot wide median for planting. At intersections that permit left-turn traffic, the median should be eliminated to accommodate left turn pockets that are 50-feet long. Curb extensions (in the parking lane) at intersections to reduce pedestrian crossing distance are also recommended.

- **Bus Stop Locations.** The removal of parking from the east side of Beacon Avenue will mean that buses using existing stops at Spokane Street, Hinds Street, Hanford Street, and Stevens Street will block the bicycle lane and part of the through-lane when making stops. While this configuration will generally allow vehicles to pass the bus (with the exception of wide vehicles and large trucks), we recommend that a bus bay be created immediately north of Hanford Street, at the location of the existing bus stop. This bus bay can be created by eliminating 3-4 parking spaces on the west side of Beacon Avenue approaching Hanford Street and shifting the lanes and median over eight feet to accommodate the bus bay. This potential bus bay configuration is shown on Figure A4.



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SE10-0210_1_Hanford

BEACON AVENUE IMPROVEMENTS – NEAR HANFORD STREET

FIGURE A4

17th Avenue / Forest Street / Beacon Avenue Intersection

The City recently made some changes at this intersection (e.g., removed right-turn channelization on the southbound approach from 17th Avenue) to improve sight lines and pedestrian/bicycle travel. However, this intersection still has an unusual 5-legged configuration that can be difficult to negotiate for all modes. For example, vehicles travelling northbound on Beacon Avenue can make an unimpeded right turn onto 17th Avenue northbound at relatively high speed. Such movements make pedestrian crossings more difficult. Additionally, turning from 17th Avenue onto Beacon Avenue can be difficult because motorists have to watch for gaps in traffic on both Beacon Avenue and Forest Street. Due to background traffic growth on Beacon Avenue, this intersection is expected to perform at LOS F in 2030, due to long delays at the side-street approaches.

To reduce vehicle and pedestrian conflicts at this intersection, Fehr & Peers recommends closing off the northbound and southbound 17th Avenue approaches. Curb cuts should be provided to retain bicycle and pedestrian access between Beacon Avenue and 17th Avenue. Current traffic volumes are low on both approaches with approximately 70 southbound and 25 northbound vehicles during the peak PM hour. Traffic on the north leg of 17th Avenue can easily access Beacon Avenue via the signalized intersection at McClellan Street, and traffic on the south leg of 17th Street can access Beacon Avenue via Stevens Street or Forest Street (via 16th Avenue).

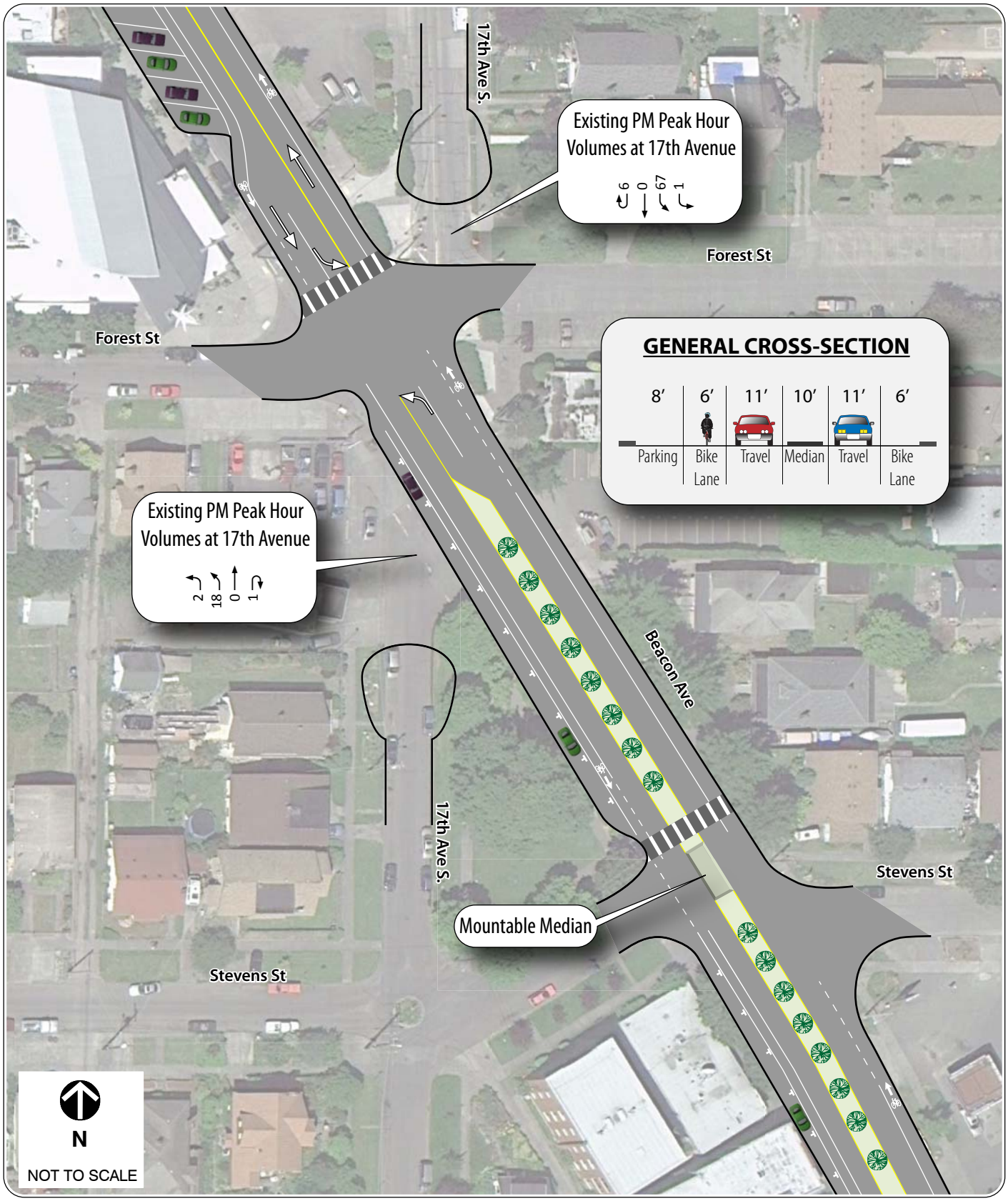
The *Seattle Right-of-Way Improvements Manual* (section 4.22) notes that cul-de-sacs are required at all street dead-ends. The manual provides cul-de-sac designs for new platted streets and for streets within an existing 60-foot right-of-way (ROW). Cul-de-sac specifications for construction within existing ROW have a turnaround width of approximately 40 feet. To the north of Beacon Avenue, 17th Avenue is approximately 30 feet wide. To the south, it is approximately 25 feet wide. The City would need to expand the existing road footprint to construct cul-de-sacs to meet city specifications. This expansion would entail paving over existing green space and possible ROW acquisition.

Alternatives to standard cul-de-sac designs that would not require road footprint expansion require approval of the SDOT director, which may be warranted due to the short segment length and local neighborhood grid. The southern road segment approaching the cul-de-sac would be approximately 150 feet in length, fronting three homes. The northern road segment would be approximately 230 feet in length. If a cul-de-sac is not constructed to SDOT specifications, it should include mountable curbs for emergency vehicles to maintain north-south travel on 17th Avenue.

Figure A5 shows the proposed intersection reconfiguration.

Conclusions

North Beacon Hill benefits from having a dense street grid and relatively well-developed pedestrian amenities. Additionally, the wealth of transit options provides mobility options for local residents and neighborhood visitors. The proposed design changes reviewed in this document will further improve bicycle and pedestrian mobility by providing dedicated bicycle lanes on Beacon Avenue and potentially more pedestrian space near the existing Beacon Hill LINK light rail station. Additionally, the landscaped median will provide a visually attractive green connection between the neighborhood and Jefferson Park to the south. It will also concentrate east-west movements across and from Beacon Avenue, thus improving pedestrian conditions north and south on Beacon Avenue.



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SE10-0210_2_Stevens

BEACON AVENUE IMPROVEMENTS – FOREST STREET TO STEVENS STREET

FIGURE A5

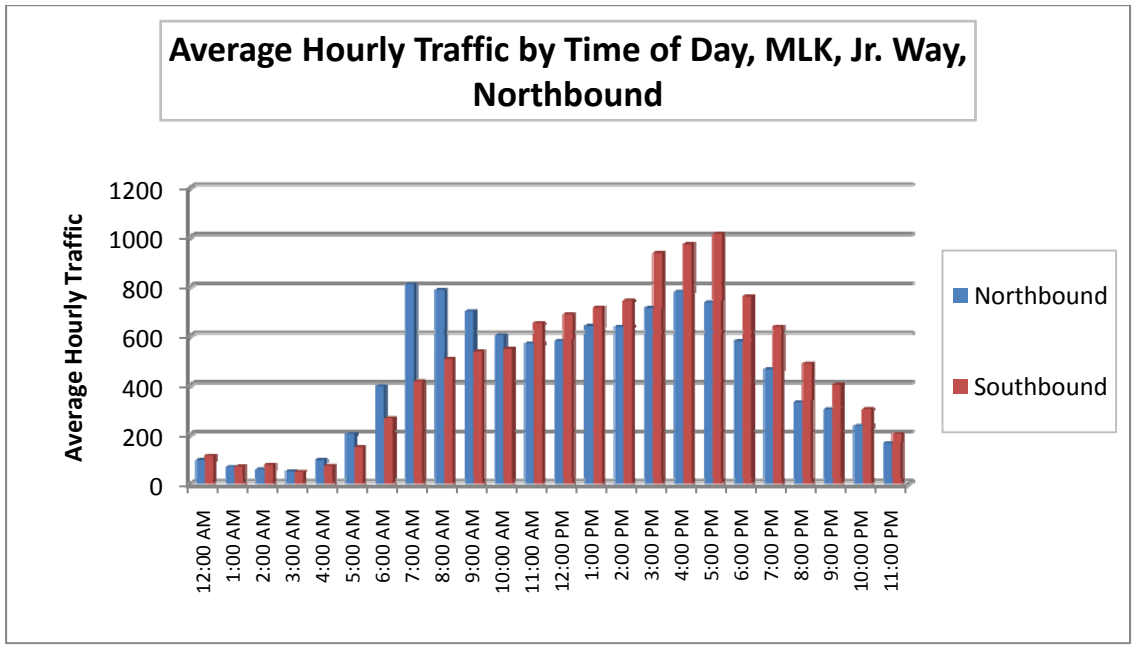
APPENDIX B:
MLK WAY PARKING STUDY, OTHELLO STATION AREA

APPENDIX B – MLK WAY PARKING STUDY, OTHELLO STATION AREA

To provide extra parking opportunities in the Othello Station area, Fehr & Peers analyzed the option of converting the existing right lane of Martin Luther King Jr. (MLK) Way between Willow Street and Webster Street into a parking lane during non-peak periods. Such a configuration would likely have a side benefit of calming traffic on the corridor and facilitating easier pedestrian crossings of MLK Way.

Traffic volume data on northbound and southbound MLK Way south of the Myrtle Street intersection was collected for 48 consecutive hours on Wednesday-Thursday November 17-18, 2010. Full results from these counts are provided at the end of this Appendix.

The counts show that on northbound MLK Way between 10:00 AM and 3:00 PM, the volume of traffic is approximately 17-30 percent lower than during either the AM or PM peak period. On southbound MLK Way, there is a no pronounced peak in AM volume. Rather, volume builds throughout the day with a PM peak period beginning at 3:00PM. Between the hours of 10:00AM and 3:00PM, the volume of traffic southbound is approximately 27-46 percent lower than the PM peak period.



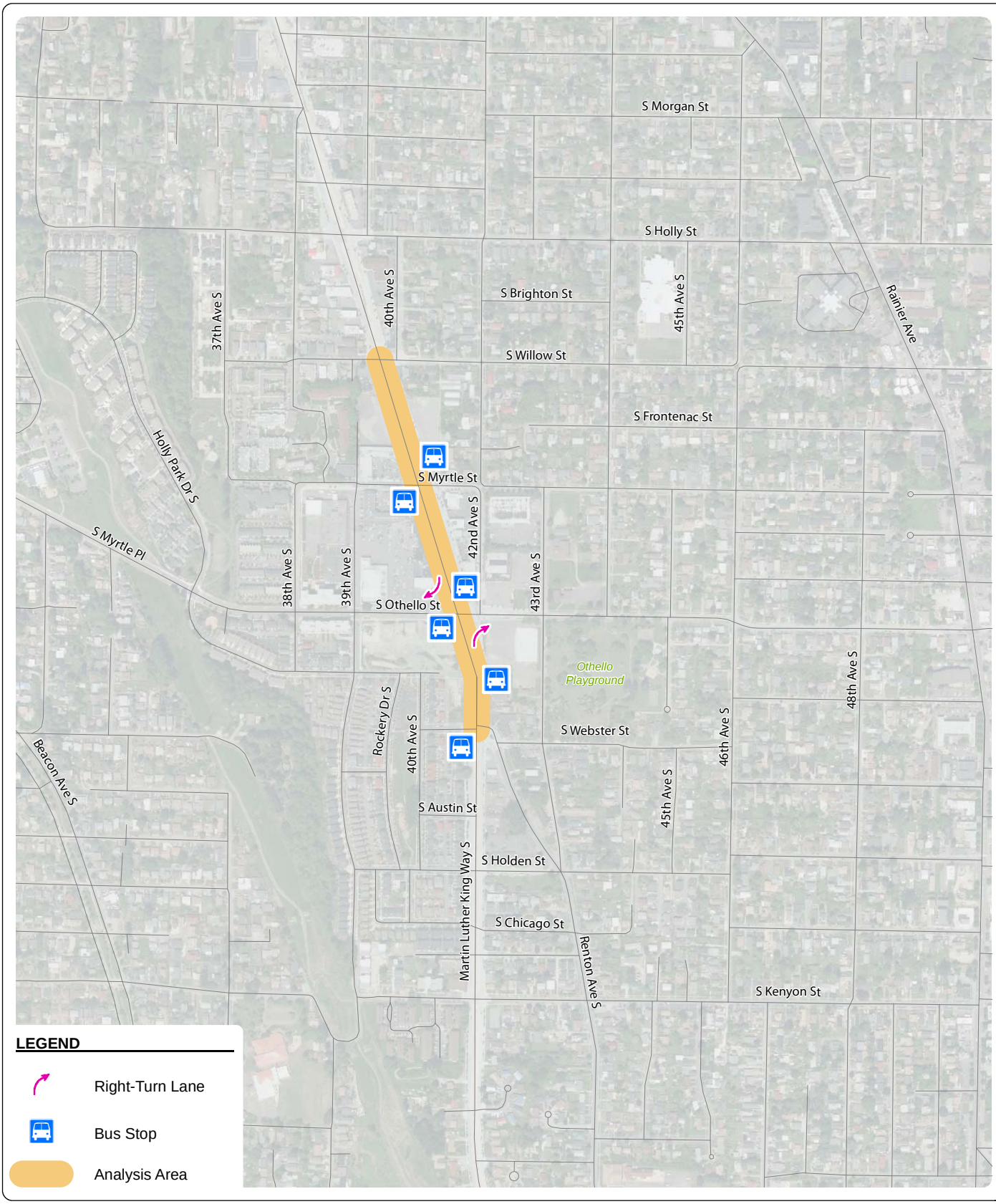
Southbound Parking

Under existing conditions a single southbound through lane provides adequate capacity to maintain LOS of C or better at all times except between 3:00-7:00 PM. Therefore, Fehr & Peers recommends allowing parking with only a PM peak period restriction. While not necessary to maintain satisfactory LOS, Fehr & Peers recommends that parking be restricted within 100 feet of the Othello Street intersection to facilitate right turns at the intersection.

Northbound Parking

Unlike the southbound direction, northbound traffic on MLK Way shows a clear AM peak between 7:00-9:00 AM. There is also a northbound peak in the PM period between 4:00-6:00 PM, however the northbound volume is lower than the southbound volume during the PM period. Outside of these times, a single northbound through lane provides adequate capacity to maintain LOS of C or better through the study area. Thus, Fehr & Peers recommends right lane parking restrictions between 7:00-9:00 AM. During the PM peak period, Fehr & Peers recommends parking restrictions between 3:00-7:00 PM (consistent with the restrictions in the southbound direction). While not necessary to maintain satisfactory LOS, Fehr & Peers recommends that parking be restricted within 100 feet of the Othello Street intersection to facilitate right turns at the intersection.

Figure B1 identifies the study area and shows the recommended right turn pocket locations and existing bus stop locations where parking will not be allowed.



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OTHELLO STATION AREA - STREET PARKING RECOMMENDATIONS

FIGURE B1

LOCATION: Martin Luther King Jr Way S South of S Myrtle St
QC JOB #: 10559423
SPECIFIC LOCATION: 500 ft from S Myrtle St
DIRECTION: NB
CITY/STATE: Seattle, WA
DATE: Nov 17 2010 - Nov 18 2010

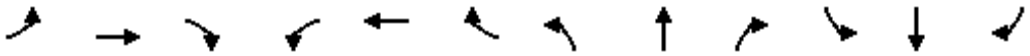
Start Time	Mon	Tue	Wed 17-Nov-10	Thu 18-Nov-10	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			95	98		96			96	
1:00 AM			77	59		68			68	
2:00 AM			58	59		58			58	
3:00 AM			49	53		51			51	
4:00 AM			105	90		97			97	
5:00 AM			200	204		202			202	
6:00 AM			399	392		395			395	
7:00 AM			**825**	**792**		**808**			**808**	
8:00 AM			791	782		786			786	
9:00 AM			725	673		699			699	
10:00 AM			615	587		601			601	
11:00 AM			577	562		569			569	
12:00 PM			591	568		579			579	
1:00 PM			631	649		640			640	
2:00 PM			620	652		636			636	
3:00 PM			699	726		712			712	
4:00 PM			**764**	**790**		**777**			**777**	
5:00 PM			752	718		735			735	
6:00 PM			570	587		578			578	
7:00 PM			456	475		465			465	
8:00 PM			318	345		331			331	
9:00 PM			311	291		301			301	
10:00 PM			226	242		234			234	
11:00 PM			160	171		165			165	
Day Total			10614	10565		10583			10583	
% Weekday Average			100.3%	99.8%						
% Week Average			100.3%	99.8%		100.0%				
AM Peak Volume			7:00 AM 825	7:00 AM 792		7:00 AM 808			7:00 AM 808	
PM Peak Volume			4:00 PM 764	4:00 PM 790		4:00 PM 777			4:00 PM 777	

Comments: 48 Hours

LOCATION: Martin Luther King Jr Way S South of S Myrtle St
QC JOB #: 10559423
SPECIFIC LOCATION: 500 ft from S Myrtle St
DIRECTION: SB
CITY/STATE: Seattle, WA
DATE: Nov 17 2010 - Nov 18 2010

Start Time	Mon	Tue	Wed 17-Nov-10	Thu 18-Nov-10	Fri	Average Weekday Hourly Traffic	Sat	Sun	Average Week Hourly Traffic	Average Week Profile
12:00 AM			119	109		114			114	
1:00 AM			76	64		70			70	
2:00 AM			87	68		77			77	
3:00 AM			47	50		48			48	
4:00 AM			69	78		73			73	
5:00 AM			149	149		149			149	
6:00 AM			258	272		265			265	
7:00 AM			404	426		415			415	
8:00 AM			511	501		506			506	
9:00 AM			529	544		536			536	
10:00 AM			542	552		547			547	
11:00 AM			**652**	**651**		**651**			**651**	
12:00 PM			706	669		687			687	
1:00 PM			712	717		714			714	
2:00 PM			732	753		742			742	
3:00 PM			958	911		934			934	
4:00 PM			962	979		970			970	
5:00 PM			**1009**	**1017**		**1013**			**1013**	
6:00 PM			770	746		758			758	
7:00 PM			618	655		636			636	
8:00 PM			478	496		487			487	
9:00 PM			394	410		402			402	
10:00 PM			270	335		302			302	
11:00 PM			198	207		202			202	
Day Total			11250	11359		11298			11298	
% Weekday Average			99.6%	100.5%						
% Week Average			99.6%	100.5%		100.0%				
AM Peak Volume			11:00 AM 652	11:00 AM 651		11:00 AM 651			11:00 AM 651	
PM Peak Volume			5:00 PM 1009	5:00 PM 1017		5:00 PM 1013			5:00 PM 1013	

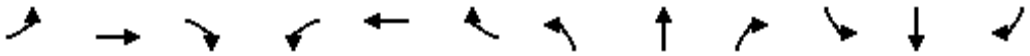
Comments: 48 Hours



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	248	254	52	175	54	167	589	57	72	847	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.97		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1900	1583	1787	3336		1770	1821		1770	1818	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1900	1583	1787	3336		1770	1821		1770	1818	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.95	0.92
Growth Factor (vph)	75%	75%	75%	75%	75%	75%	83%	83%	83%	73%	73%	73%
Adj. Flow (vph)	65	202	207	42	143	44	151	515	51	57	651	44
RTOR Reduction (vph)	0	0	166	0	27	0	0	3	0	0	2	0
Lane Group Flow (vph)	65	202	41	42	160	0	151	563	0	57	693	0
Confl. Peds. (#/hr)	60					60						50
Heavy Vehicles (%)	2%	0%	2%	1%	1%	1%	2%	3%	2%	2%	3%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	5.6	23.5	23.5	5.6	23.5		13.2	67.9		7.0	61.7	
Effective Green, g (s)	5.6	23.5	23.5	5.6	23.5		13.2	67.9		7.0	61.7	
Actuated g/C Ratio	0.05	0.20	0.20	0.05	0.20		0.11	0.57		0.06	0.51	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	83	372	310	83	653		195	1030		103	935	
v/s Ratio Prot	c0.04	c0.11		0.02	0.05		c0.09	0.31		0.03	c0.38	
v/s Ratio Perm			0.03									
v/c Ratio	0.78	0.54	0.13	0.51	0.25		0.77	0.55		0.55	0.74	
Uniform Delay, d1	56.6	43.4	39.8	55.8	40.8		52.0	16.4		55.0	22.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.77		1.31	0.49	
Incremental Delay, d2	37.0	1.6	0.2	4.8	0.2		16.0	1.9		5.1	4.3	
Delay (s)	93.6	45.0	40.0	60.6	41.0		68.0	14.5		77.2	15.5	
Level of Service	F	D	D	E	D		E	B		E	B	
Approach Delay (s)		49.5			44.6			25.8			20.1	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	31.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

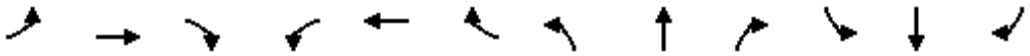
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	15	0	8	16	252	0	595	5	304	842	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00		1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	0.97		1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99	1.00		1.00		1.00	1.00	
Frt		1.00			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.99			0.98	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1879			1847	1543		1860		1770	1862	
Flt Permitted		0.96			0.93	1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1819			1742	1543		1860		1770	1862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	70%	70%	70%	70%	70%	70%	83%	83%	83%	73%	73%	73%
Adj. Flow (vph)	3	11	0	6	12	192	0	537	5	241	668	2
RTOR Reduction (vph)	0	0	0	0	0	174	0	0	0	0	0	0
Lane Group Flow (vph)	0	14	0	0	18	18	0	542	0	241	670	0
Confl. Peds. (#/hr)	1		18	18		1			6			3
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm		Perm				Prot		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		11.4			11.4	11.4		75.7		20.9	100.6	
Effective Green, g (s)		11.4			11.4	11.4		75.7		20.9	100.6	
Actuated g/C Ratio		0.10			0.10	0.10		0.63		0.17	0.84	
Clearance Time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		173			165	147		1173		308	1561	
v/s Ratio Prot								c0.29		c0.14	0.36	
v/s Ratio Perm		0.01			0.01	c0.01						
v/c Ratio		0.08			0.11	0.12		0.46		0.78	0.43	
Uniform Delay, d1		49.5			49.7	49.7		11.5		47.4	2.4	
Progression Factor		1.00			1.00	1.00		1.00		0.76	2.54	
Incremental Delay, d2		0.2			0.3	0.4		1.3		9.7	0.7	
Delay (s)		49.7			49.9	50.1		12.9		45.8	6.9	
Level of Service		D			D	D		B		D	A	
Approach Delay (s)		49.7			50.1			12.9			17.2	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	20.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	3	69	40	16	54	54	617	6	43	907	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.86		1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		0.96		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1760	1209		1638		1770	1841		1770	1823	
Flt Permitted		0.73	1.00		0.89		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1344	1209		1487		1770	1841		1770	1823	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor (vph)	70%	70%	70%	70%	70%	70%	83%	83%	83%	73%	73%	73%
Adj. Flow (vph)	57	2	52	30	12	41	49	557	5	34	720	66
RTOR Reduction (vph)	0	0	42	0	33	0	0	0	0	0	2	0
Lane Group Flow (vph)	0	59	10	0	50	0	49	562	0	34	784	0
Confl. Peds. (#/hr)			71	71					12			
Heavy Vehicles (%)	3%	2%	15%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		22.7	22.7		22.7		7.6	79.9		5.4	77.7	
Effective Green, g (s)		22.7	22.7		22.7		7.6	79.9		5.4	77.7	
Actuated g/C Ratio		0.19	0.19		0.19		0.06	0.67		0.05	0.65	
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		254	229		281		112	1226		80	1180	
v/s Ratio Prot							c0.03	0.31		0.02	c0.43	
v/s Ratio Perm		c0.04	0.01		0.03							
v/c Ratio		0.23	0.04		0.18		0.44	0.46		0.42	0.66	
Uniform Delay, d1		41.3	39.8		40.8		54.1	9.6		55.8	13.1	
Progression Factor		1.00	1.00		1.00		0.82	1.31		1.00	1.00	
Incremental Delay, d2		0.5	0.1		0.3		2.4	1.1		3.6	3.0	
Delay (s)		41.7	39.8		41.1		46.6	13.7		59.4	16.0	
Level of Service		D	D		D		D	B		E	B	
Approach Delay (s)		40.8			41.1			16.3			17.8	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX C:
MOUNT BAKER ONE-WAY COUPLET ANALYSIS

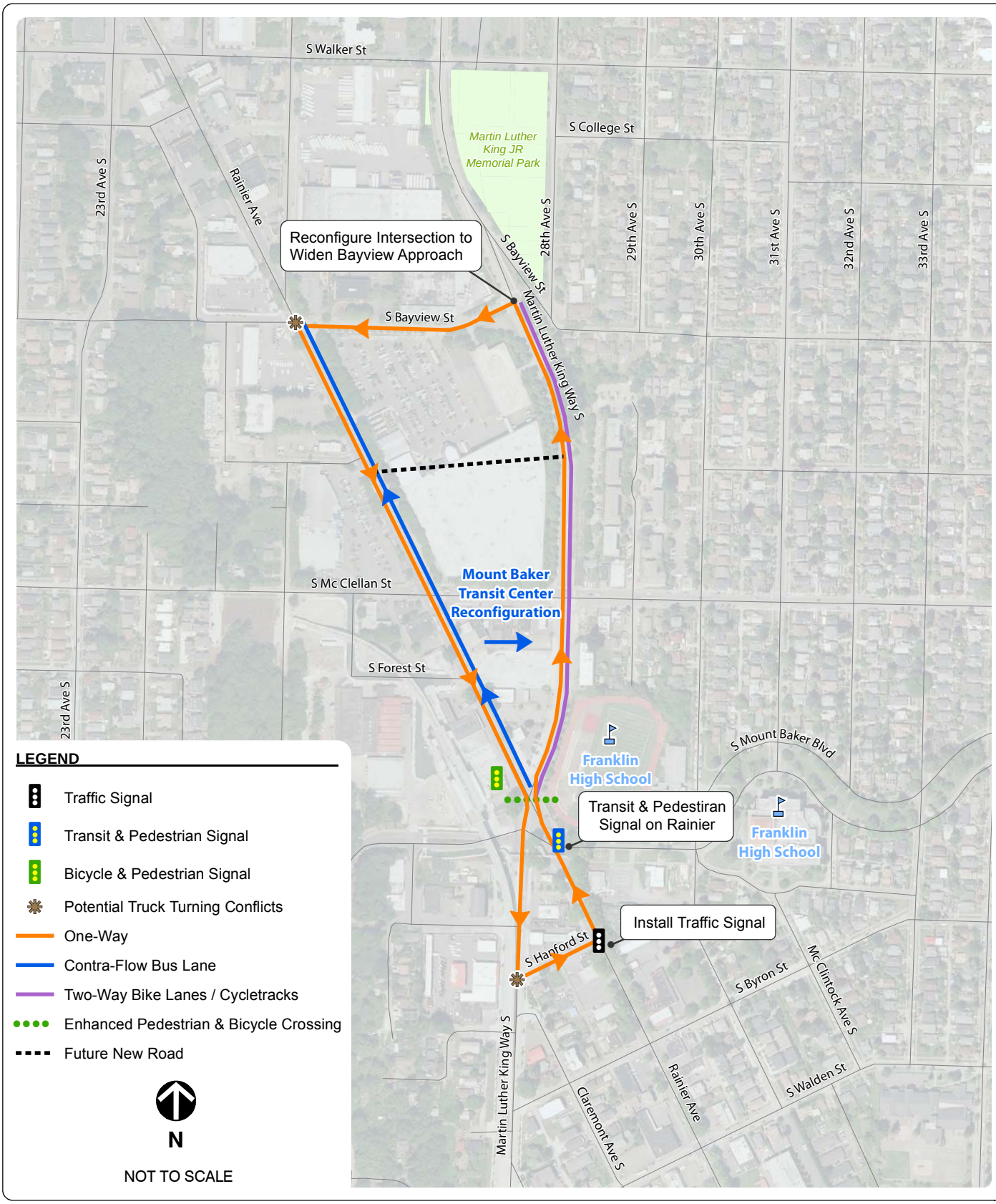
APPENDIX C – MOUNT BAKER ONE-WAY COUPLET

To provide for more efficient vehicle, pedestrian, and transit circulation in the Mount Baker station area and improve overall conditions and safety for pedestrians, the City is considering a proposal to convert Rainier Avenue and Martin Luther King Jr. (MLK) Way into one-way streets between Bayview Street and Hanford Street. Figure C1 shows how the streets will be configured under this option. Chapter 5 of this report provided intersection-level operations analysis (including LOS results) for the current roadway configuration under existing, 2030 No Action, and 2030 with increased building height conditions (2030 With Action). This appendix provides analysis of the operating conditions of the one-way couplet proposal under 2030 With Action conditions. This scenario represents the highest level of reasonably foreseeable traffic flows in 2030 and therefore represents a "worst case" scenario. Future intersection operations, travel times, transit operations, bicycle facility recommendations, and potential freight impacts of the existing roadway configuration are compared with the one-way couplet concept.

As shown on Figure C1, north of Hanford Street, Rainier Avenue will be one-way in the northbound direction, with this northbound traffic transitioning to MLK Way north of the of the existing Rainier Avenue/MLK Way intersection. MLK Way will then be northbound-only to Bayview Street. South from Bayview Street, all traffic on Rainier Avenue (with the exception of a transit-only lane discussed below) will be one-way in the southbound direction. At the existing intersection with MLK Way, this southbound traffic will proceed to MLK Way, which will be southbound-only to Hanford Street. Such a configuration greatly simplifies the operations at the existing Rainier Avenue/MLK Way intersection and reduces delay for vehicles at this location. Southbound traffic will be controlled by pedestrian/bicycle activated signals to allow for bicycle and pedestrian crossings. Northbound traffic will also be controlled by a pedestrian/bicycle signal, however, this approach will also have a transit signal to allow northbound buses to enter the transit-only lane on Rainier Avenue. Due to right-of-way (ROW) limitations, there will be no transit-only lane on MLK Way between Hanford Street and Rainier Avenue.

As shown in Figure C1, Bayview Street will be converted to a westbound-only configuration to allow continuation of northbound travel on Rainier Avenue and allow vehicles southbound on MLK Way to transition to Rainier Avenue. Similarly, Hanford Street will be restricted to eastbound travel to allow for continuation of southbound traffic on Rainier Avenue. See Figure C5 for a conceptual configuration of the Rainier Avenue/Bayview Street intersection and Figure C2 for a potential configuration at the Rainier Avenue/Hanford Street intersection.

A key benefit of the one-way conversions of Rainier Avenue and MLK Way is that it allows for more pedestrian/bicycle space in the project area, as one-way streets can generally carry the same volume of traffic with fewer lanes when compared to conventional two-way streets. The one-way configuration also provides shorter crossing distances for pedestrians at the MLK Way/Rainier Avenue intersection as the current number of road lanes will be reduced.



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MOUNT BAKER - ONE-WAY COUPLET

FIGURE C1

Design Considerations

Transit

In addition to light rail service, the Mount Baker station area is a major corridor for bus operations and contains the Mount Baker Transit Center. The following bus lines provide service to or through the project area:

- Route 7 provides north/south service on Rainier Avenue.
- Route 8 provides north/south service on MLK Way. Northbound service transitions to Rainier Avenue north of MLK Way, and returns to MLK Way at McClellan Street. Southbound service stops inside the Mount Baker Transit Center at Bay 2.
- Route 9 provides north/south service on Rainier Avenue.
- Route 14 provides service to area via McClellan Street and MLK Way and stops at Bay 3 in the Mount Baker Transit Center.
- Route 34 provides north/south service on Rainier Avenue.
- Route 38 has its eastern terminus at the Mount Baker Transit Center and provides service west on McClellan Street.
- Route 42 provides service to the north on Rainier Avenue and to the south on MLK Way
- Route 48 has its southern terminus at the Mount Baker Transit Center and provides service north on Rainier Avenue.

Currently over 1,000 bus riders per day board northbound buses on Rainier Avenue in the project area and most transit service is provided along Rainier Avenue. Due to the likelihood of potential transit travel time increases and stop relocations under a one-way couplet configuration, Fehr & Peers recommends the following:

- While all vehicle traffic on Rainier Avenue will be southbound between Bayview Avenue and MLK Way, we suggest creating a northbound contra-flow bus lane on the east side of Rainier Avenue from MLK Way to Bayview Avenue. This configuration leads to minimal service impacts along Rainier Avenue and the addition of a dedicated lane is forecasted to improve corridor transit times (see Figure C). Based on current schedules, it is estimated that approximately 20 buses per hour in the peak PM period will use this transit lane. Alternatively if existing northbound buses currently on Rainier Avenue shift to MLK

Forest Street Bus Loop Alternative

Utilizing the Forest Street loop between McClellan Street and Rainier Avenue as a bus turn-around area was considered as part of this analysis. However, this option was found to pose substantial engineering and local access challenges and may be costly to implement.

-The loop has insufficient capacity as a waiting area for multiple buses.

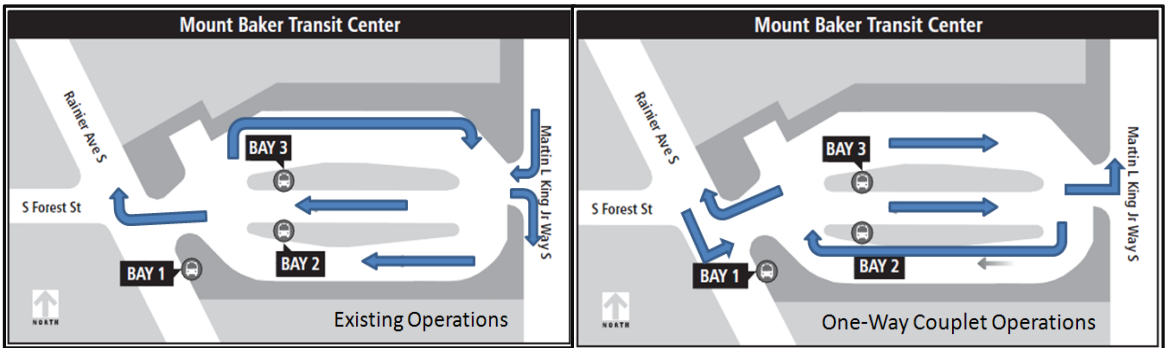
-Clearance under the light rail tracks for trolley buses would require re-grading (lowering) of Forest Street.

-Bus loading and waiting would conflict with alley access that local businesses have requested remain open.

-The steep grade on McClellan Street would require an additional traffic signal 250 feet east of the existing McClellan Street / Rainier Avenue intersection.

Way, over 1,000 riders per day will need to make a longer, more circuitous trip to reach the new bus stops, which will also be located further away from the Mount Baker Light Rail Station.

- Buses currently enter the Mount Baker Transit Center from MLK Way and usually exit via Rainier Avenue (east to west). Due to the new configuration of MLK Way, the Mount Baker Transit Center layout and shelters will likely have to be reconfigured to allow buses to use the station in a west to east direction, as buses will enter from Rainier Avenue. This change in direction may require reconstruction of shelters and waiting islands to allow for boarding on the opposite side of the existing bus bays, and is illustrated below.

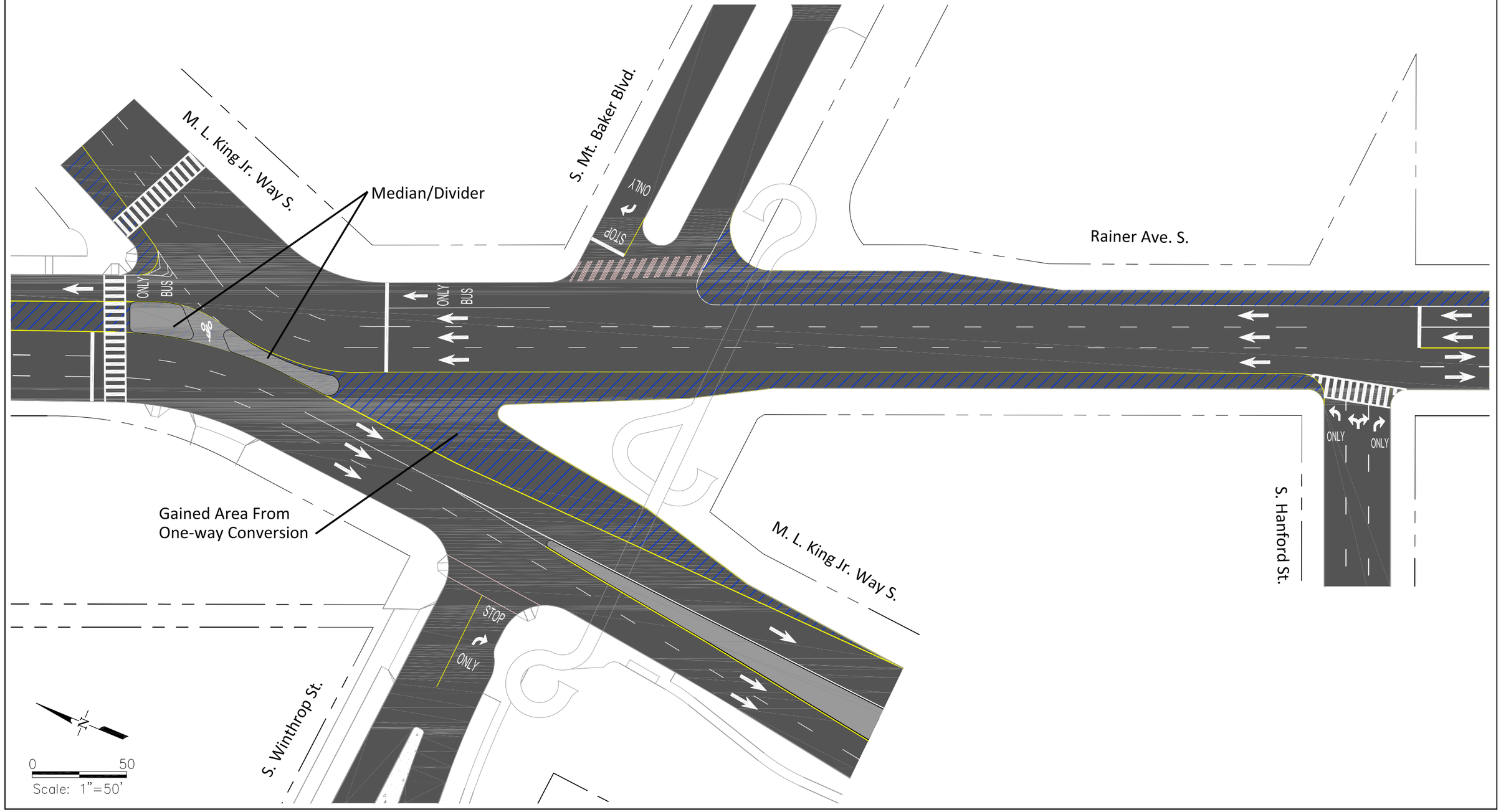


- A transit/pedestrian/bicycle signal must be added at the existing MLK Way/Rainier Avenue intersection to allow for this configuration to operate. This signal will allow buses in the right lane heading north on Rainier Ave to enter the bus lane to proceed north on Rainier Avenue. This signal could run concurrently with a pedestrian phase and allow for crossing of northbound MLK Way at the existing crosswalk and a bicycle phase to allow northbound cyclists to access a potential cycle track on the west side of MLK Way. This signal will allow northbound buses to continue serving existing stop at Rainier Avenue and Mount Baker Boulevard. Figure C2 shows the proposed layout of this intersection under the one-way couplet scenario.

- Due to the road layout, several transit stops will have to be relocated and/or consolidated:
    - Fehr & Peers suggests consolidating southbound service at these existing stops: Rainier Avenue/MLK Way, MLK Way/Winthrop Street, and Rainier Avenue/S McClellan Street into a new stop located on the west side of Rainier Avenue adjacent to the Mount Baker Light Rail Transit Plaza. The new consolidated stop will have service level and ridership that mirrors the bus stop directly across Rainier Avenue (Mount Baker Transit Center Bay 1). Additionally the move facilitates more direct connections heading southbound on MLK Way or Rainier Avenue from the Mount Baker Light Rail station.
    - The stop at MLK Way/Hanford Street currently has 46 average daily boardings and alightings. To accommodate one-way traffic on MLK Way, it is required that this stop be

consolidated with the stop at Rainier Avenue/Mount Baker Boulevard, which is 370 feet to the north.

- The stop at MLK Way/Bayview Street currently has 14 average daily boardings and alightings. To accommodate one-way traffic on MLK Way, it is required that this stop be relocated to the west side of MLK Way north of the intersection with Bayview Street.



FEHR & PEERS

POTENTIAL MLK WAY AND RAINIER AVE STREET INTERSECTION CONFIGURATION
ONE-WAY COUPLET SCENARIO

FIGURE C2

May 06, 2011 FPA
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Truck Volumes

Rainier Avenue north of MLK Way and MLK Way south of Rainier Avenue are designated as Major Truck Streets. At the intersections of MLK Way/Hanford Street and Rainier Avenue/Bayview Street, an analysis using an AASHTO WB-50 design truck with a 41-foot turning radius indicated that insufficient ROW exists for right-turn truck movements if the trucks are expected to stay within their own lane. However, sufficient space within the reconfigured intersections exists if trucks are able to "off-track" and use both right-turn lanes. Similar off-tracking turning maneuvers are commonplace in urban settings. Design approaches to widen these intersections could be implemented, but would require additional ROW and longer crossing distances for pedestrians.

Fehr & Peers reviewed traffic count data taken during 4:00-6:00 PM on November 16, 2010. The results, provided in Table C1, show that during the PM peak period, large truck volume is very low. While truck volumes may be higher during other times of the day, vehicle volumes are typically highest in the PM peak. Since this analysis is most concerned with the volume of vehicle/truck conflicts, the PM peak represents the most appropriate period to measure potential conflicts. Based on the traffic counts, Fehr & Peers does not recommend that intersections be expanded to develop the large curb radii required to keep trucks within a single lane.

TABLE C1. PM PEAK PERIOD TRUCK VOLUME AT SELECT INTERSECTIONS

Intersection Location	Standard Semi Truck (Approx. 40-50 feet)	Double Trailers (Approx. 33 feet per trailer)	Percent of Total Intersection Volume
MLK Way & Rainier Ave.	4	5	0.14%
Rainier Ave. & Bayview Street	5	5	0.19%
MLK Way & Hanford Street	2	1	0.11%
Rainier Ave. & Hanford Street	3	4	0.17%

Source: Fehr & Peers, 2011

Shared Bus Lane on Rainier Avenue.

Designating the proposed northbound bus lane on Rainier Avenue as a shared bus/bike lane is feasible, but has numerous disadvantages and is not recommended.

-The proposed transit lane width is 12 feet. However, best practice documents recommend a shared lane be expanded to 16 feet to accommodate cyclists and a high volume of buses. Such width reduces the gains in pedestrian space resulting from the one-way conversion.

-Due to a high volume of transit passengers at the Rainier Avenue stop at the Mount Baker Transit Center, cyclists would pass buses only to be passed themselves farther north at McClellan Street.

-The lane would be relatively short (1/3 mile) and be redundant with the proposed facility on MLK Way.

Bicycle Facilities

The *Seattle Bicycle Master Plan* recommends the addition of bicycle lanes on MLK Way from Rainier Avenue north to the existing lanes near I-90. As a result of implementing the one-way couplet, it is envisioned that MLK Way will be reduced to three travel lanes in the study area. It is currently five lanes wide and the remaining two lanes provide more than adequate space for adding bicycle facilities. One potential option is to add two-way "cycle track" on the west side of this segment. This design would necessitate a dedicated bicycle signal at the MLK Way/Bayview Street and MLK Way/Rainier Avenue intersections, and potentially at MLK Way/McClellan Street intersection. If the cycle track is pursued further, additional design analysis will be required to identify the appropriate traffic control devices at these intersections and at driveways along MLK Way.

While this new cycle track would only be 1/3 mile in length (from Rainier Avenue to Bayview Street), it could serve as a catalyst for northern extension of bicycle facilities on MLK Way to meet the existing facilities at I-90. In addition to providing consistency with the *Bicycle Master Plan*, and an initial segment of lanes on MLK Way, the project area lanes would connect with recommended bicycle lanes on McClellan Street, provide a community asset, and facilitate bicycle connections to the light rail station.

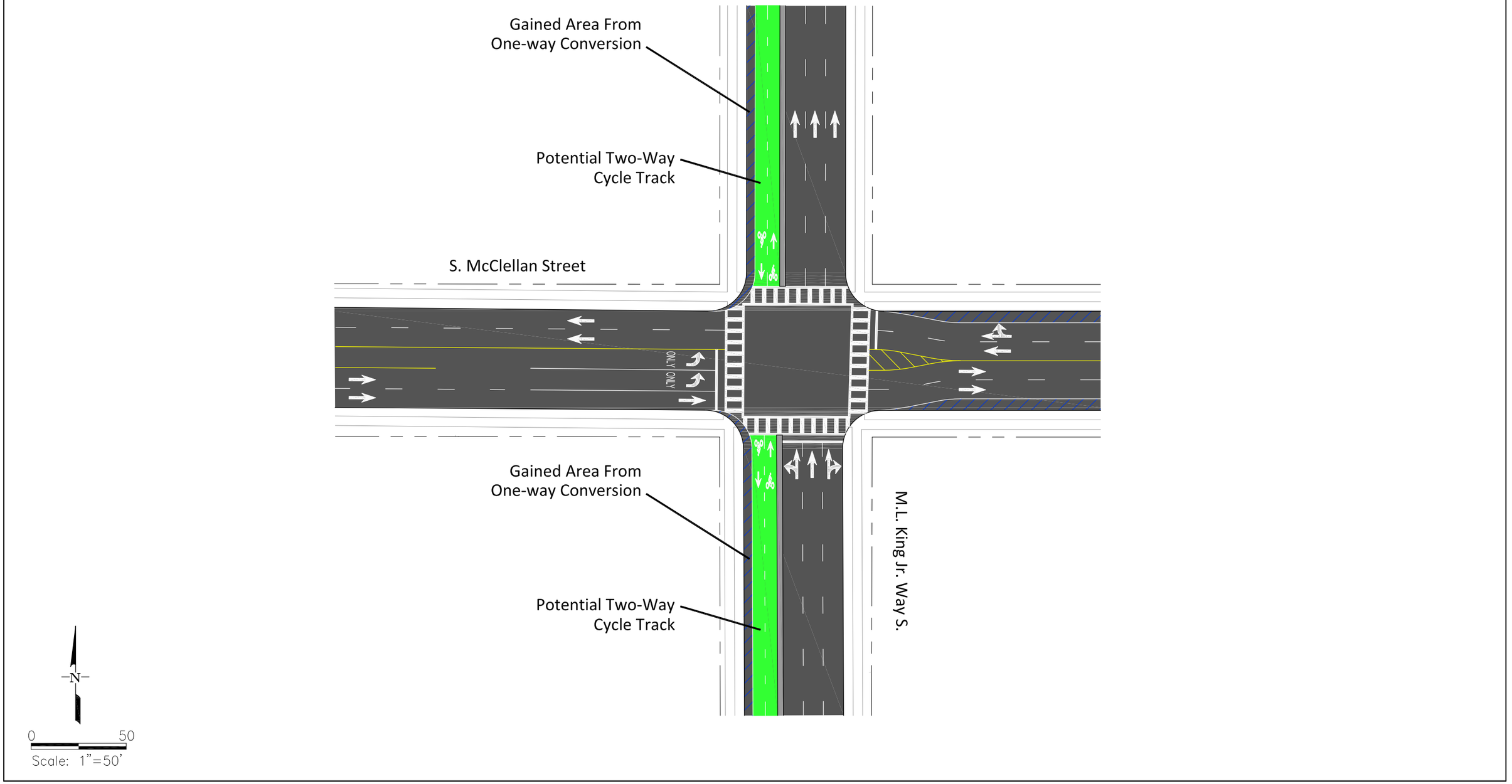
Figure C3 presents a potential roadway layout for MLK Way and the cycle-track at McClellan Street.

Future Road Connection

The current Lowe's site presents a substantial barrier for bicycle and pedestrian travel between Rainier Avenue and MLK Way. As the site redevelops in the future, Fehr & Peers recommends that a new street alignment be provided mid-block to provide for shorter walking and bicycling distances.

Pedestrian Considerations

As part of the couplet concept, all crosswalk treatments should be designed as fully ADA-compliant with ramps, safety pads, and audible signal alerts. There are currently no sidewalks on Hanford Street between MLK Way and Rainier Avenue and on the east side of MLK Way north of McClellan Street. If such facilities are not constructed concurrent with new development, they should be provided as part of the roadway reconfiguration to complete the local pedestrian network.



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POTENTIAL MLK WAY AND McCLELLAN STREET INTERSECTION CONFIGURATION
ONE-WAY COUPLET SCENARIO

FIGURE C3

Apr 29, 2011 FPA
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2030 Couplet Operations

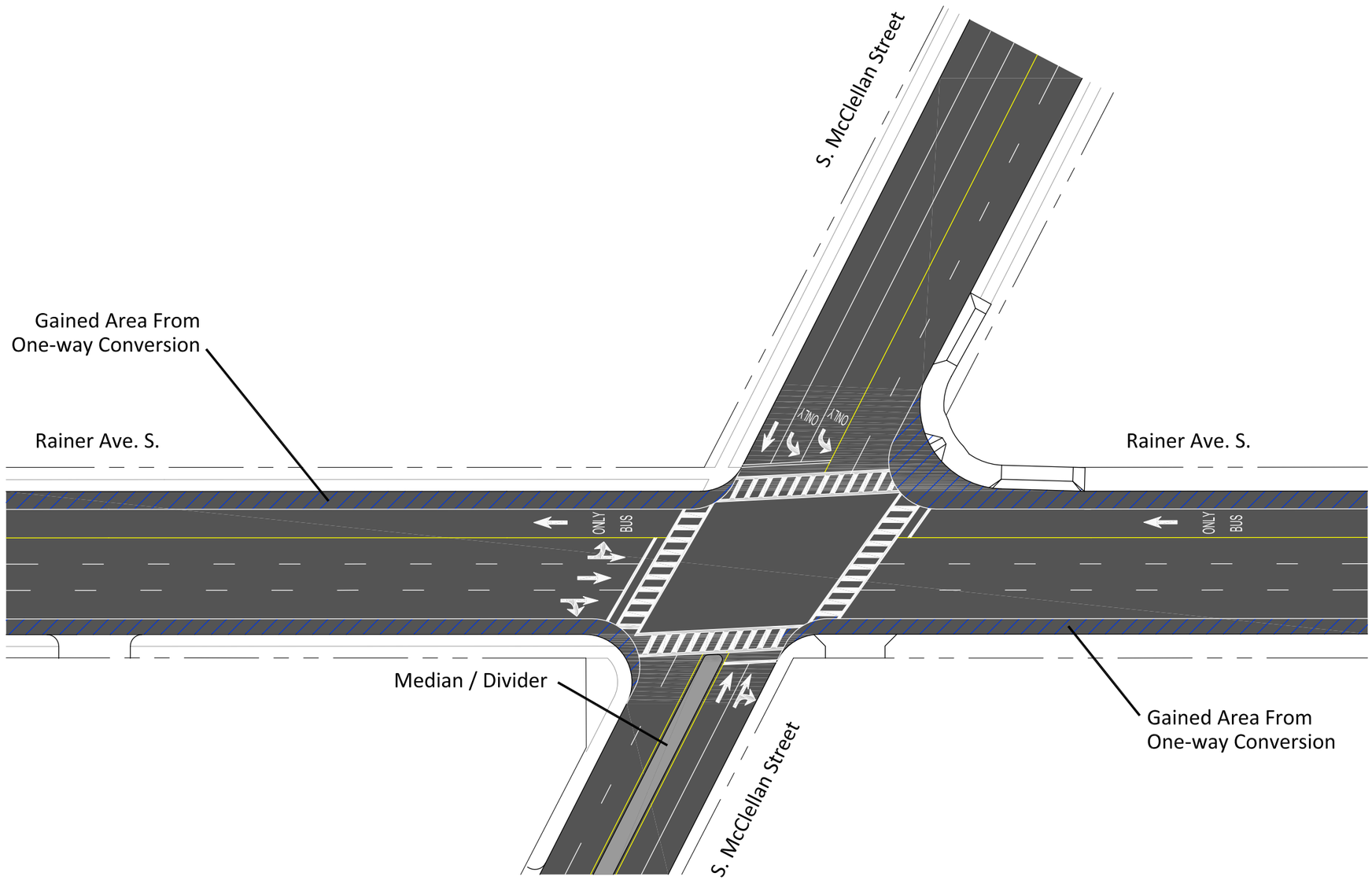
This section compares 2030 With Action PM peak-hour traffic operations under the current roadway configuration and under the proposed one-way couplet. Both scenarios used the project trip generation and distribution methods described in Chapter 2 of this report.

Intersection Analysis

Level of Service (LOS) for both the current roadway configuration and one-way couplet configuration was calculated using HCM 2000 methodology, described in Chapter 2 of this report.

The couplet scenario assumes several specific design changes that affect intersection performance:

- The McClellan Street intersection approaches at Rainier Avenue and MLK Way were reconfigured to match the new roadway configuration and the anticipated shift in volumes. These intersections are shown in Figures C3 and C4.
- Both Bayview Street and Hanford Street are one-way, west and east respectively, and are three lanes in width. These roadway segments are shown in Figures C5 and C2.
- The intersection of Rainier Avenue and Bayview Street is reconfigured with a pair of half-signals. The signal on the east side of the intersection controls the westbound approach on Bayview Street, the northbound bus lane, and the pedestrian crosswalks. The signal on the west side of the intersection controls the eastbound approach on Bayview Street (which is right turn only), the southbound traffic on Rainier Avenue, and the pedestrian crosswalks. Through traffic on Bayview Street is prohibited, but the new median divider will be mountable for emergency vehicles. This configuration maximizes the amount of green time for the heaviest traffic volumes and results in a decrease in overall average delay compared to the current configuration. Pedestrian crossings will not be permitted across Rainier Avenue immediately north of these reconfigured intersections due to the heavy volume of traffic turning right from Bayview Street onto Rainier Avenue. This intersection configuration is shown in Figure C5.
- The intersection of Rainier Avenue & Hanford street is signalized and crosswalks are installed.
- As shown in Figure C2, the intersection of MLK Way and Rainier Avenue has been reconfigured to eliminate most conflicting vehicle movements.



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POTENTIAL RAINIER AVENUE AND McCLELLAN STREET INTERSECTION CONFIGURATION
ONE-WAY COUPLET SCENARIO

FIGURE C4

Apr 29, 2011 FPA
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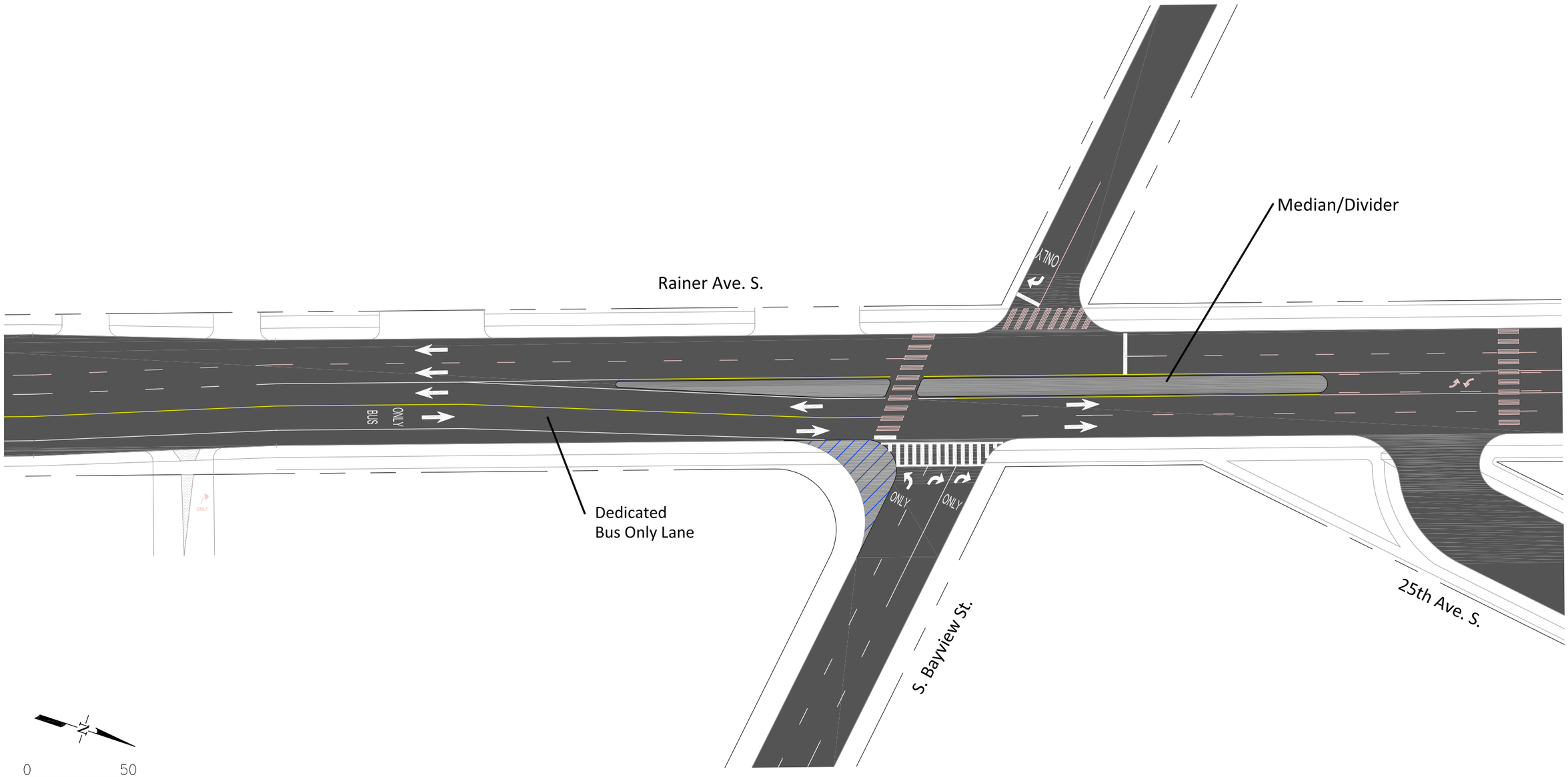

FEHR PEERS

POTENTIAL RAINIER AVE AND BAYVIEW STREET INTERSECTION CONFIGURATION
ONE-WAY COUPLET SCENARIO

FIGURE C5

May 16, 2011 FPA
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Table C2, below, compares intersection-level LOS under the current roadway configuration and the one-way couplet design, based on 2030 With Action traffic volumes.

TABLE C2. 2030 WITH ACTION INTERSECTION LOS, CURRENT CONFIGURATION AND ONE-WAY COUPLET

Intersection	Current Roadway Configuration LOS	Current Roadway Configuration Delay	One-Way Couplet LOS	One-Way Couplet Delay
Rainier Ave & Bayview St (West)	C[1]	24[1]	A	9
Rainier Ave & Bayview St (East)	C[1]	24[1]	C	21
MLK Way & Bayview St	A	9	C	24
Rainier Ave & McClellan St	C	35	F	110
MLK Way & McClellan St	B	14	D	53
Rainier Ave & MLK Way (West)	D[2]	51[2]	A	8
Rainier Ave & MLK Way (East)	D[2]	51[2]	A	9
Rainier Ave & Hanford St	C[3]	20[3]	D	52
MLK Way & Hanford St	A	6	C	26

[1] *There is only one Rainier Ave/Bayview St signal under existing conditions.*
[2] *There is only one Rainier Ave/MLK Way signal under existing conditions.*
[3] *Unsignalized intersection*
Source: Fehr & Peers 2011

The intersection LOS results show significant decreases in delay at the MLK Way/Rainier Avenue and the Bayview Street/Rainier Avenue intersections, due to the reconfiguration of these intersections. The results indicate increased delay at the Hanford Street intersections with Rainier Avenue and MLK Way, as a result large increases in traffic volumes on Hanford. The results also show a significant increase in delay at the intersections with McClellan Street, with Rainier Avenue and McClellan Street operating at LOS F. These changes are due to the following:

- The current configuration effectively spreads corridor delay out at more intersections. Conversely, the couplet scenario concentrates delay at a few critical intersections.

- Due to the reconfiguration of Bayview Street and Hanford Street as one-way roads, volumes increase on McClellan Street since it serves as an important alternate route. This increased volume may be reduced if a future road connection is provided through the Lowe's property.

- Prior to roadway change, motorists travelling west on McClellan Street with an ultimate destination south of the study area could turn left at MLK Way or Rainier Avenue. These left turns are now concentrated at Rainier Avenue. The same is true with eastbound to northbound travel.

- The addition of a dedicated left turn lane on southbound Rainier improves LOS at McClellan Street and Rainier Avenue to LOS C. However, such a configuration creates a roadway that is 5 lanes across (three southbound through lanes, a southbound left-turn lane, and the northbound bus lane) and reduces the benefits of shorter crossing distances for pedestrians and increased pedestrian space.

- Reconfiguring the intersection of Hanford Street/Rainier Avenue to be similar to Rainier Avenue/Bayview Street intersection (as seen in Figure C5 and discussed previously) would greatly decrease delay at this location. However, this type of configuration would make the intersection less accommodating for pedestrians due to the prohibition of pedestrian crossings of Rainier Avenue south of the intersection and increased crossing distances. However, pedestrian mobility will still be enhanced compared to the current configuration due to the addition of a signal and crosswalk north of the intersection.

Travel Times

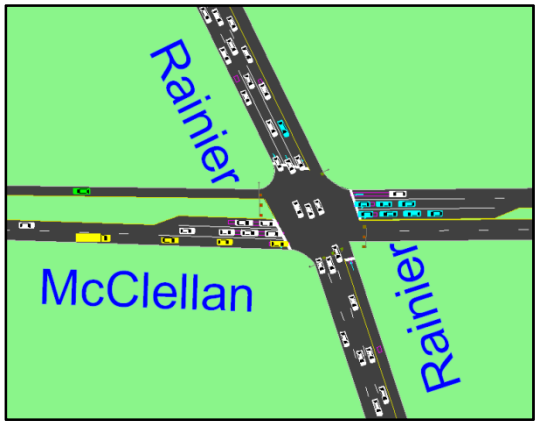
The intersection LOS analysis indicates that traffic operations at some locations improve with the couplet configuration, while others perform worse. To put these mixed results into context, Fehr & Peers evaluated another measure of roadway efficiency–corridor travel times. For example, the travel time analysis can help determine which is more efficient for the study area a whole: a smaller delay at many intersections or higher delays at fewer intersections.

This study method used SimTraffic microsimulation software. This program models driver behavior based on how individual vehicles move through the roadway network. This tool simulates pedestrians, buses, trucks, and cars. The traffic volumes used for analysis are identical to the intersection-based analysis discussed in the previous section.

Figures C6 and C7 present the PM peak hour 2030 travel times for six different travel scenarios:

- Rainier Avenue South, Bayview Street to Hanford Street
- Rainier Avenue North, Hanford Street to Bayview Street
- MLK Way South, Bayview Street to Hanford Street
- MLK Way North, Hanford Street to Bayview Street
- Rainier Avenue South to MLK Way South, Bayview Street to Hanford Street
- Rainier Avenue North to MLK Way North, Hanford Street to Bayview Street

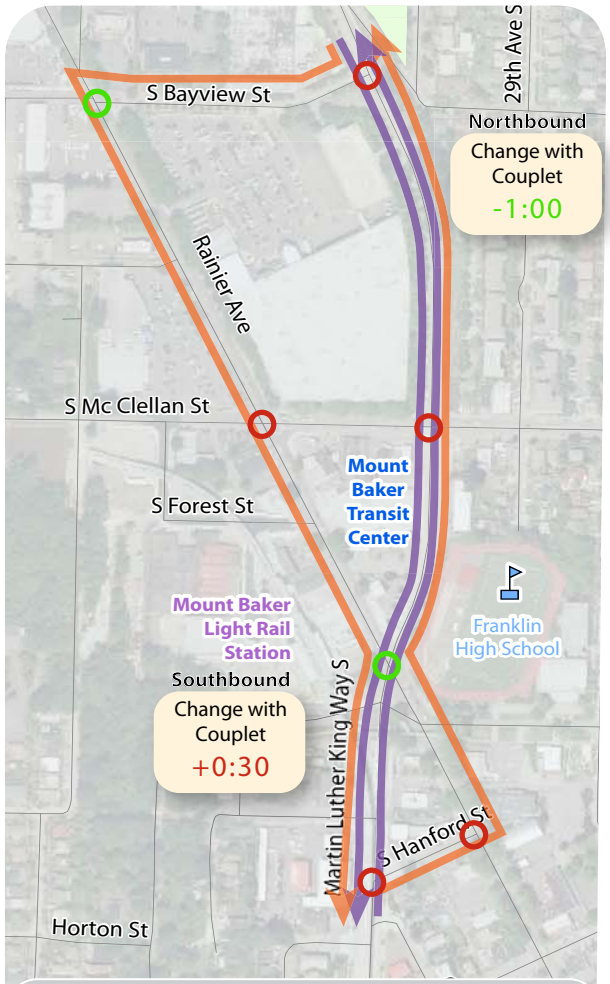
The results of this analysis indicate that the couplet configuration provides for lower vehicle travel times under most of the scenarios, but will result in increased travel times north through the corridor on Rainier Avenue and south through the corridor on MLK Way. Overall our analysis of this section of roadway concluded that vehicle hours traveled was reduced by about 6% under the couplet configuration, indicating that the overall network vehicle delay is slightly lower in the couplet configuration.



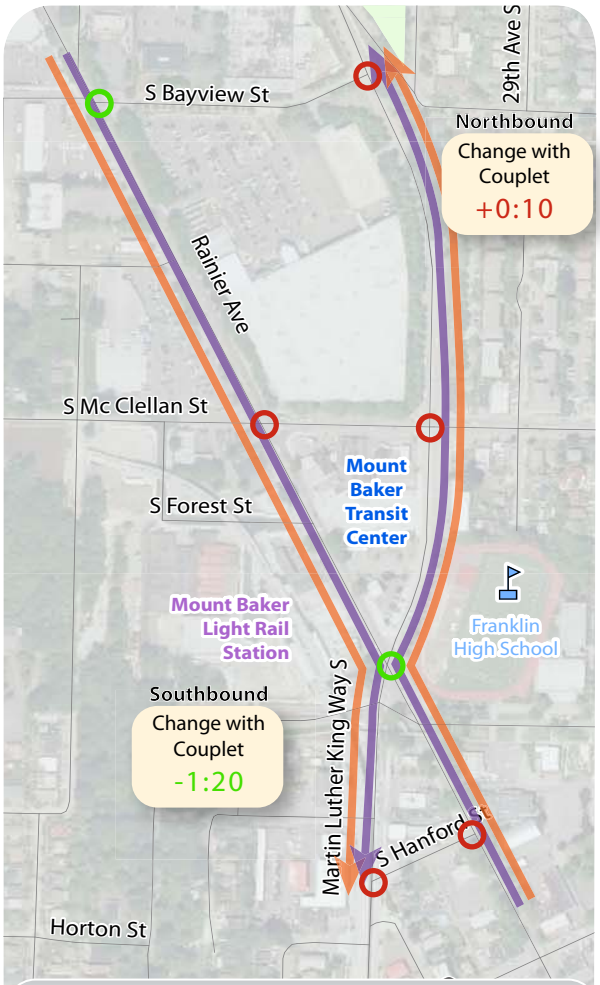
SimTraffic traffic simulation software

As seen in Figures C6 and C7, the largest decreases in travel times are on MLK Way north and Rainier Avenue south. On MLK Way north under current roadway configurations, the traffic simulation indicated that it could take up to two signal cycles to proceed through the MLK Way/Rainier Avenue intersection. In other words, to accommodate the heavy volume of traffic on Rainier Avenue, not enough green time is able to be allocated for all vehicles waiting at MLK Way North to proceed through the intersection in a single traffic signal cycle. Because the traffic signal cycle at this intersection is over two minutes long, failure to progress through the intersection leads to some vehicles experiencing nearly three minutes of delay on this route. Since the couplet configuration simplifies traffic operations at this intersection, overall travel times improve significantly. Similarly, removing the delay at this intersection for southbound traffic on Rainier Avenue resulted in significant travel time decreases for vehicles travelling southbound from Rainier Avenue to MLK Way.

By utilizing the northbound bus lane, transit travel times on Rainier Avenue northbound are forecasted to be around twenty seconds faster than under the current roadway configuration. Transit vehicles will also benefit from decreased travel times on Rainier Avenue south, even with the additional length required to jog back to Rainier Avenue on Hanford Street. This is due to improved operations of the Rainier Avenue/MLK Way intersection versus current configurations.



	2030 ACTION	
	Current Configuration	One-Way Couplet
MLK Way North (Hanford St to Bayview St)	3:30	2:30
MLK Way South (Bayview St to Hanford St)	2:30	3:00



	2030 ACTION	
	Current Configuration	One-Way Couplet
Rainier Ave North to MLK Way North (Hanford St to Bayview St)	1:50	2:00
Rainier Ave South to MLK Way South (Bayview St to Hanford St)	3:20	2:00

Intersection Delay Increase With Couplet

Intersection Delay Decrease With Couplet

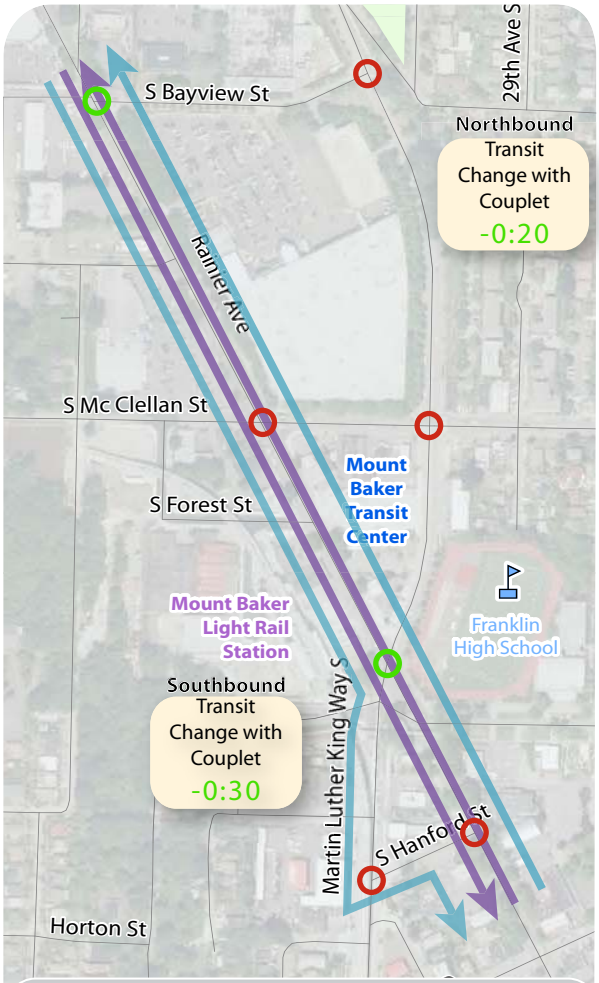
FEHR PEERS

2030 PM PEAK HOUR CORRIDOR TRAVEL TIMES
MOUNT BAKER

\\FPSE2\Data2\2010Projects\SE10-0210_Seattle_Station_Area_Planning\Graphics\Draft\AI\fig0x_tt_3scen1_v2.ai

FIGURE C6

	2030 ACTION	
	Current Configuration	One-Way Couplet
Rainier Ave North (Hanford St to Bayview St)	2:30	3:00
Rainier Ave South (Bayview St to Hanford St)	3:00	2:30



	2030 ACTION	
	Current Configuration	One-Way Couplet
Rainier Ave North (Transit)	2:30	2:10
Rainier Ave South (Transit)	3:00	2:30

Intersection Delay Increase With Couplet

Intersection Delay Decrease With Couplet

FEHR PEERS

2030 PM PEAK HOUR CORRIDOR TRAVEL TIMES
MOUNT BAKER

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FIGURE C7

Potential Trip Diversion

Traffic diversion and neighborhood cut-through is often a concern when changes are proposed for major arterial streets. To address this concern, Fehr & Peers analyzed output from the City of Seattle Travel Model. The travel model considers the effects of traffic congestion related to changes in the roadway network and will reroute vehicles if an alternate path has a shorter travel time. The results of the travel model run indicated a small degree of diversion for the couplet configuration, as compared to the current roadway, in the 2030 PM peak period. In particular, the model predicted the majority of the diverted traffic would shift to parallel routes to the west of the study area, including Beacon Avenue and Interstate 5.

On 31st Avenue, where there has been local concern over through traffic, the travel model predicted a potential increase of approximately 30 southbound vehicles (a 10-15 percent increase in traffic) during the course of the PM peak hour, but a commensurate decrease in northbound traffic volumes in the PM peak hour. To put this amount of traffic in context, the increase in southbound traffic would be approximately one vehicle every two minutes; however, as described above, this increase would be tempered by a similar decrease in northbound traffic.

In developing the LOS and travel times presented previously, the simulation model assumed comparable traffic volumes for both the current and couplet configurations. In other words, no traffic diversion was assumed under the couplet scenario to provide for an apples-to-apples comparison. The results of the more detailed and accurate simulation model generally show that even with relatively high traffic volumes, the couplet configuration resulted in improved corridor travel times over current configuration. This result suggests that traffic diversion is unlikely to be a major issue stemming from the couplet configuration.

CONCLUSIONS

The one-way couplet configuration has the potential to improve the pedestrian environment in the Mount Baker area by increasing the amount of pedestrian space within the existing right-of-way, and facilitating shorter and easier crossings of MLK Way and Rainier Avenue. It also provides space for adding bicycle facilities on MLK Way and simplifying transit operations through the addition of a dedicated transit lane. However, care will have to be taken to ensure pedestrian safety at the intersections of Bayview Street/Rainier Avenue and Hanford Street/Rainier Avenue, where the couplet segments combine and diverge. At these same locations, potential issues relating to truck turning movements may also require further analysis to confirm whether additional ROW is necessary to accommodate truck movements.

In terms of traffic operations, when evaluated by travel time, the one-way couplet performs more efficiently than the current roadway configurations under 2030 With Action conditions. This increase in efficiency decreases delays for motorists and transit vehicles in the corridor. However, when evaluated on an intersection level, certain intersections (specifically McClellan Street/Rainier Avenue) performed worse under the couplet configuration. Intersection LOS at these locations could be improved by the addition of turning lanes, but such actions would require expanding the roadway width and would need to balance needs for improving pedestrian safety and mobility.

APPENDIX D:
NOVEMBER 2010 TRAFFIC COUNT SHEETS

Type of peak hour being reported: Intersection Peak

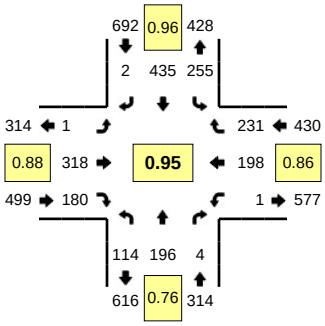
Method for determining peak hour: Total Entering Volume

LOCATION: 15th Ave S -- Beacon Ave S

QC JOB #: 10559401

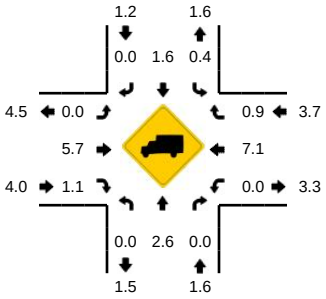
CITY/STATE: Seattle, WA

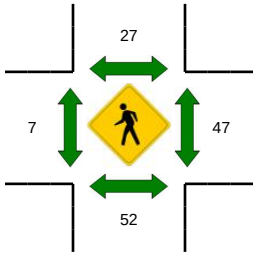
DATE: 11/16/2010

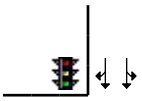


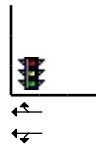
Peak-Hour: 4:45 PM -- 5:45 PM

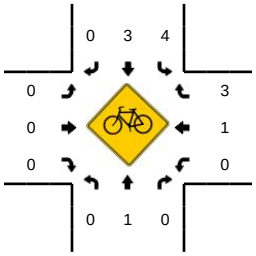
Peak 15-Min: 5:25 PM -- 5:40 PM

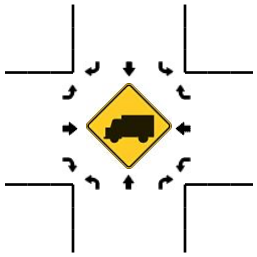


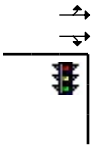


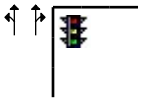


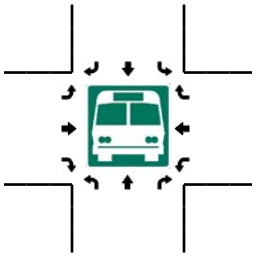












5-Min Count Period Beginning At	15th Ave S (Northbound)				15th Ave S (Southbound)				Beacon Ave S (Eastbound)				Beacon Ave S (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	15	14	0	0	10	27	0	0	0	18	14	0	0	4	9	0	111	
4:05 PM	7	8	0	0	13	23	0	0	1	22	14	0	0	18	15	0	121	
4:10 PM	8	17	0	0	20	34	0	0	0	31	18	0	0	19	20	0	167	
4:15 PM	9	11	2	0	23	28	0	0	0	23	7	0	0	16	22	0	141	
4:20 PM	9	13	0	0	10	22	0	0	0	26	21	0	0	24	14	0	139	
4:25 PM	10	7	0	0	26	23	0	0	0	24	16	0	0	19	28	0	153	
4:30 PM	13	8	0	0	22	34	1	0	1	19	18	0	0	22	20	0	158	
4:35 PM	12	10	0	0	22	35	0	0	0	23	11	0	0	15	21	0	149	
4:40 PM	13	8	1	0	9	32	0	0	0	30	17	0	0	22	14	0	146	
4:45 PM	7	12	0	0	23	33	0	0	0	30	16	0	0	21	29	0	171	
4:50 PM	10	18	1	0	23	41	0	0	0	18	10	0	0	13	16	0	150	
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5:00 PM	15	17	0	0	22	35	0	0	0	29	20	0	0	7	20	0	165	1788
5:05 PM	8	15	0	0	23	40	0	0	1	35	24	0	0	14	20	0	180	1847
5:10 PM	10	17	0	0	22	38	0	0	0	18	12	0	0	8	17	0	142	1822
5:15 PM	6	18	0	0	16	34	0	0	0	35	14	0	0	21	13	0	157	1838
5:20 PM	5	7	0	0	19	36	0	0	0	30	19	0	0	24	18	0	158	1857
5:25 PM	13	24	2	0	23	36	1	0	0	19	21	0	0	26	11	0	176	1880
5:30 PM	11	19	1	0	24	34	0	0	0	20	6	0	0	15	22	0	152	1874
5:35 PM	12	26	0	0	20	33	1	0	0	31	14	0	0	20	25	0	182	1907
5:40 PM	13	14	0	0	26	33	0	0	0	30	11	0	0	19	28	0	174	1935
5:45 PM	9	20	0	0	26	31	0	0	0	23	14	0	0	10	17	0	150	1914
5:50 PM	10	18	0	0	22	20	0	0	0	30	16	0	0	10	13	0	139	1903
5:55 PM	4	14	0	0	13	30	0	0	0	26	7	0	0	15	25	0	134	1909

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	144	276	12	0	268	412	8	0	0	280	164	0	0	244	232	0	2040
Heavy Trucks	0	0	0		0	0	0		0	12	4		0	12	4		32
Pedestrians		60				40				8				52			160
Bicycles	0	0	0		1	2	0		0	0	0		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

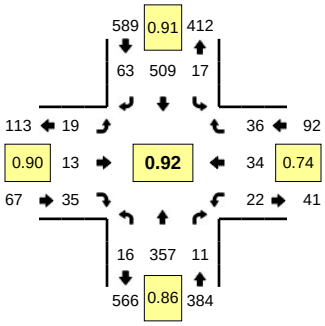
Method for determining peak hour: Total Entering Volume

LOCATION: Beacon Ave S -- S Lander St

QC JOB #: 10559402

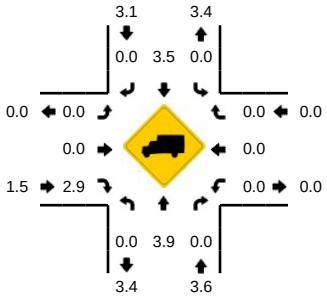
CITY/STATE: Seattle, WA

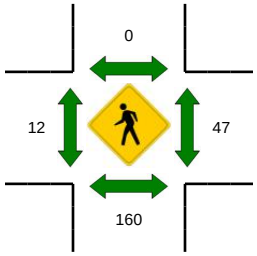
DATE: 11/16/2010

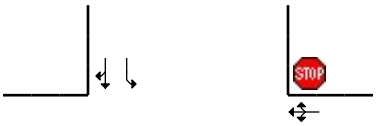


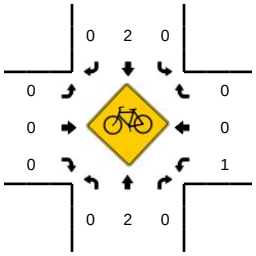
Peak-Hour: 5:00 PM -- 6:00 PM

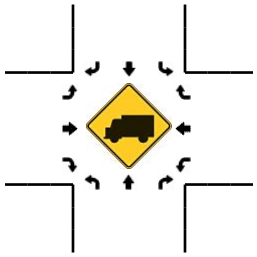
Peak 15-Min: 5:30 PM -- 5:45 PM

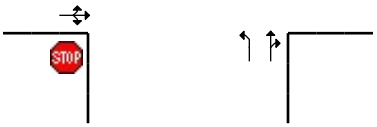


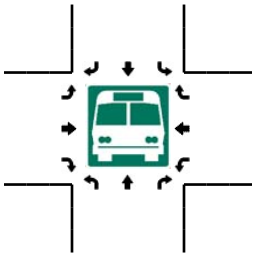












5-Min Count Period Beginning At	Beacon Ave S (Northbound)				Beacon Ave S (Southbound)				S Lander St (Eastbound)				S Lander St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	16	0	0	1	28	3	0	0	1	1	0	1	3	6	0	63	
4:05 PM	7	28	2	0	0	30	6	0	3	1	4	0	3	0	2	0	86	
4:10 PM	1	33	0	0	1	39	5	0	3	0	1	0	4	6	1	0	94	
4:15 PM	1	41	0	0	1	47	6	0	2	0	4	0	2	4	2	0	110	
4:20 PM	2	37	0	0	1	30	4	0	1	3	2	0	5	2	1	0	88	
4:25 PM	3	34	0	0	0	44	3	0	4	1	1	0	1	0	1	0	92	
4:30 PM	0	29	2	0	2	30	6	0	1	2	1	0	2	2	1	0	78	
4:35 PM	2	42	0	0	0	41	6	0	1	3	5	0	2	5	2	0	109	
4:40 PM	3	36	0	0	1	36	4	0	3	0	3	0	0	3	3	0	92	
4:45 PM	3	33	0	0	1	42	7	0	2	0	1	0	1	0	3	0	93	
4:50 PM	1	25	0	0	0	40	6	0	2	2	2	0	0	0	3	0	81	
4:55 PM	2	18	0	0	2	29	4	0	1	1	5	0	2	4	0	0	68	1054
5:00 PM	0	24	1	0	0	45	4	0	0	1	5	0	2	1	5	0	88	1079
5:05 PM	1	23	1	0	1	45	6	0	1	1	5	0	1	2	6	0	93	1086
5:10 PM	1	33	0	0	0	46	4	0	1	1	2	0	2	3	1	0	94	1086
5:15 PM	3	28	1	0	1	44	6	0	5	0	3	0	0	2	1	0	94	1070
5:20 PM	2	34	2	0	1	35	5	0	0	1	4	0	0	4	5	0	93	1075
5:25 PM	3	37	0	0	3	39	5	0	0	1	2	0	3	3	5	0	101	1084
5:30 PM	1	38	1	0	3	48	9	0	2	0	0	0	1	3	6	0	112	1118
5:35 PM	1	24	1	0	2	41	1	0	3	2	1	0	5	5	1	0	87	1096
5:40 PM	1	35	0	0	2	51	4	0	1	1	3	0	3	4	3	0	108	1112
5:45 PM	3	34	3	0	1	38	9	0	2	2	5	0	2	4	0	0	103	1122
5:50 PM	0	25	0	0	3	44	5	0	2	2	2	0	3	1	2	0	89	1130
5:55 PM	0	22	1	0	0	33	5	0	2	1	3	0	0	2	1	0	70	1132

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	388	8	0	28	560	56	0	24	12	16	0	36	48	40	0	1228
Heavy Trucks	0	16	0		0	12	0		0	0	0		0	0	0		28
Pedestrians		68				0				4				24			96
Bicycles	0	0	0		0	0	0		0	0	0		1	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

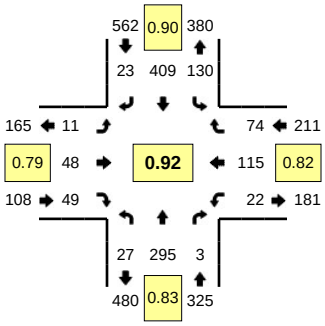
Method for determining peak hour: Total Entering Volume

LOCATION: Beacon Ave S -- S McClellan St

QC JOB #: 10559403

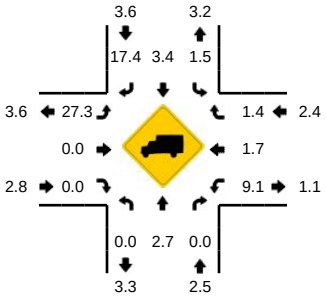
CITY/STATE: Seattle, WA

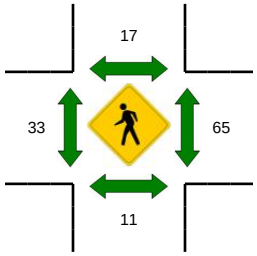
DATE: 11/16/2010

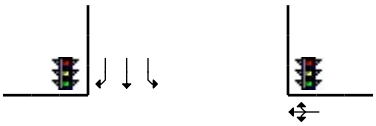


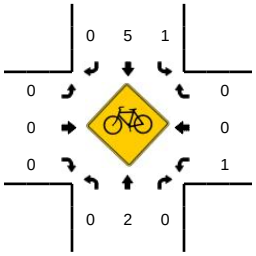
Peak-Hour: 4:50 PM -- 5:50 PM

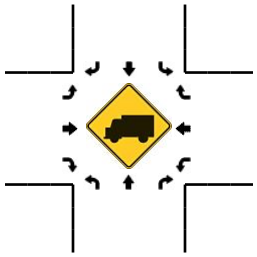
Peak 15-Min: 5:35 PM -- 5:50 PM

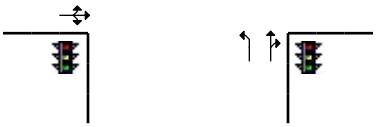


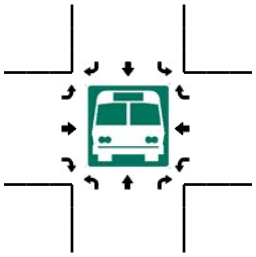












5-Min Count Period Beginning At	Beacon Ave S (Northbound)				Beacon Ave S (Southbound)				S McClellan St (Eastbound)				S McClellan St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	18	0	0	4	21	0	0	0	3	4	0	3	6	3	0	63	
4:05 PM	5	19	2	0	8	25	2	1	2	2	9	0	3	8	12	0	98	
4:10 PM	3	27	0	0	8	33	4	0	1	6	2	0	1	8	5	0	98	
4:15 PM	3	35	0	0	11	43	3	0	2	3	3	0	2	10	5	0	120	
4:20 PM	3	32	0	0	2	28	0	0	3	5	3	0	1	12	9	0	98	
4:25 PM	3	23	1	0	7	39	2	0	1	4	8	0	1	5	8	0	102	
4:30 PM	2	25	0	0	6	29	2	0	1	1	3	0	1	7	5	0	82	
4:35 PM	1	38	0	0	6	39	3	0	1	4	1	0	3	12	10	0	118	
4:40 PM	0	24	0	0	14	24	2	0	1	4	0	0	2	9	11	0	91	
4:45 PM	3	28	0	0	4	38	0	0	0	3	8	0	3	12	7	0	106	
4:50 PM	1	23	0	0	11	32	1	0	0	4	4	0	3	5	4	0	88	
4:55 PM	5	14	0	0	9	23	3	0	0	2	2	0	1	15	5	0	79	1143
5:00 PM	3	20	0	0	18	35	1	0	2	1	4	0	4	10	3	0	101	1181
5:05 PM	2	23	0	0	9	35	0	0	1	3	5	0	0	13	2	0	93	1176
5:10 PM	3	27	0	0	11	43	1	0	0	2	3	0	1	5	7	0	103	1181
5:15 PM	1	24	1	0	9	37	4	0	0	3	5	0	2	13	7	0	106	1167
5:20 PM	2	25	0	0	9	25	2	0	3	6	4	0	2	12	11	0	101	1170
5:25 PM	6	28	0	0	6	38	1	0	0	6	3	0	0	7	11	0	106	1174
5:30 PM	1	34	1	0	10	28	3	0	1	7	4	0	2	7	5	0	103	1195
5:35 PM	1	20	0	0	13	40	1	0	1	4	2	0	6	14	3	0	105	1182
5:40 PM	1	22	0	0	13	32	4	0	1	4	4	0	0	9	12	0	102	1193
5:45 PM	1	35	1	0	12	41	2	0	2	6	9	0	1	5	4	0	119	1206
5:50 PM	1	21	0	0	7	35	1	0	0	2	4	0	1	7	3	0	82	1200
5:55 PM	1	15	0	0	12	26	2	0	0	4	1	0	2	6	7	0	76	1197

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	308	4	0	152	452	28	0	16	56	60	0	28	112	76	0	1304
Heavy Trucks	0	8	0		0	12	4		4	0	0		0	0	0		28
Pedestrians		16				12				20				44			92
Bicycles	0	0	0		1	2	0		0	0	0		0	0	0		3
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

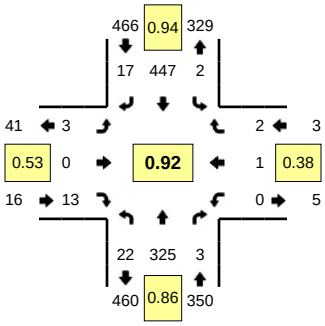
Method for determining peak hour: Total Entering Volume

LOCATION: Beacon Ave S -- Forest St

QC JOB #: 10559404

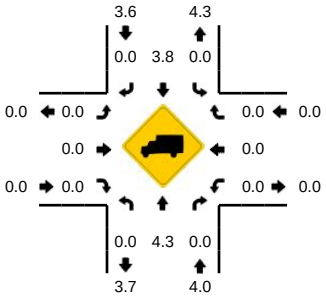
CITY/STATE: Seattle, WA

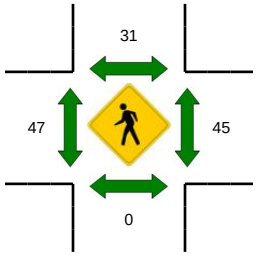
DATE: 11/16/2010

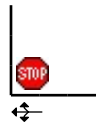


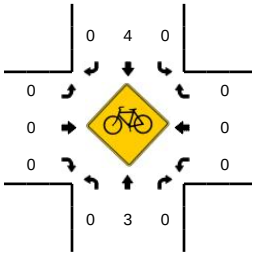
Peak-Hour: 4:15 PM -- 5:15 PM

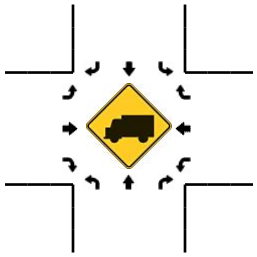
Peak 15-Min: 4:35 PM -- 4:50 PM

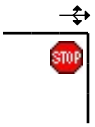


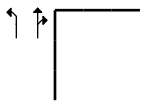


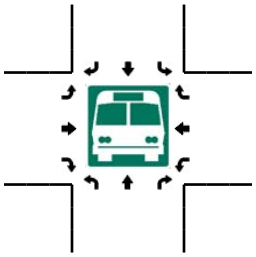












5-Min Count Period Beginning At	Beacon Ave S (Northbound)				Beacon Ave S (Southbound)				Forest St (Eastbound)				Forest St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	3	23	0	0	1	32	1	0	0	0	1	0	0	0	0	0	61	
4:05 PM	2	24	0	0	0	37	1	0	0	0	1	0	0	0	0	0	65	
4:10 PM	0	39	0	0	0	31	1	0	1	0	0	0	0	0	0	0	72	
4:15 PM	2	23	0	0	0	40	2	0	1	0	3	0	0	0	0	0	71	
4:20 PM	2	35	0	0	0	36	4	0	0	0	0	0	0	0	0	0	77	
4:25 PM	2	27	0	0	0	41	2	0	0	0	4	0	0	0	0	0	76	
4:30 PM	1	29	0	0	0	33	0	0	0	0	0	0	0	0	1	0	64	
4:35 PM	1	38	2	0	1	35	1	0	0	0	1	0	0	0	0	0	79	
4:40 PM	1	27	0	0	0	34	1	0	0	0	1	0	0	0	0	0	64	
4:45 PM	3	32	0	0	0	47	1	0	0	0	1	0	0	0	0	0	84	
4:50 PM	1	16	1	0	0	30	1	0	1	0	1	0	0	0	0	0	51	
4:55 PM	2	23	0	0	0	28	1	0	0	0	1	0	0	0	0	0	55	819
5:00 PM	3	23	0	0	0	43	1	0	0	0	0	1	0	0	0	0	71	829
5:05 PM	0	24	0	0	0	44	0	0	0	0	0	0	0	1	1	0	70	834
5:10 PM	4	28	0	0	1	36	3	0	0	0	1	0	0	0	0	0	73	835
5:15 PM	1	23	0	0	0	43	1	0	0	0	0	0	0	0	0	0	68	832
5:20 PM	1	26	0	0	0	37	0	0	0	1	0	0	0	0	0	0	65	820
5:25 PM	3	37	0	0	0	39	1	0	0	0	1	0	0	0	0	0	81	825
5:30 PM	1	30	0	0	0	31	1	0	1	0	0	1	0	0	0	0	65	826
5:35 PM	1	24	0	0	0	44	1	0	1	0	0	0	0	0	0	0	71	818
5:40 PM	1	32	0	0	0	41	0	0	0	0	3	0	0	0	0	0	77	831
5:45 PM	1	25	0	0	0	37	3	0	0	0	3	0	0	0	0	0	69	816
5:50 PM	2	23	0	0	1	42	0	0	0	0	1	0	1	0	0	0	70	835
5:55 PM	2	19	0	0	0	31	2	0	0	0	0	0	0	0	0	0	54	834

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	388	8	0	4	464	12	0	0	0	12	0	0	0	0	0	908
Heavy Trucks	0	20	0		0	12	0		0	0	0		0	0	0		32
Pedestrians		0				24				56				40			120
Bicycles	0	2	0		0	0	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

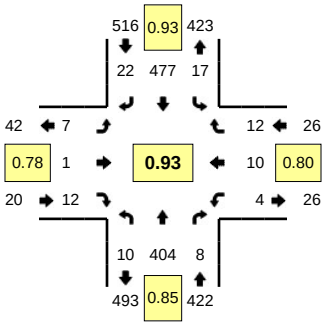
Method for determining peak hour: Total Entering Volume

LOCATION: Beacon Ave S -- Hanford St

QC JOB #: 10559405

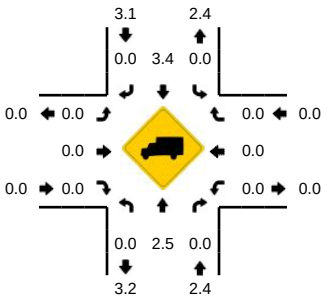
CITY/STATE: Seattle, WA

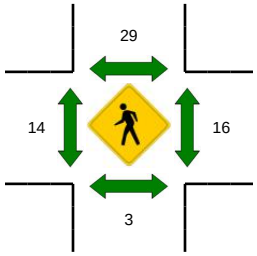
DATE: 11/16/2010

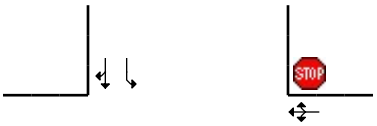


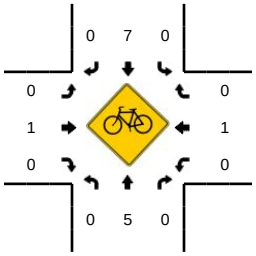
Peak-Hour: 4:55 PM -- 5:55 PM

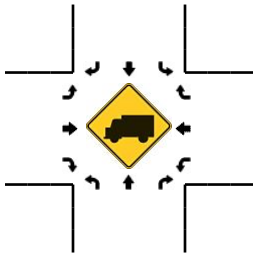
Peak 15-Min: 5:40 PM -- 5:55 PM

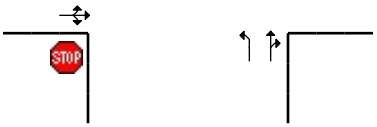


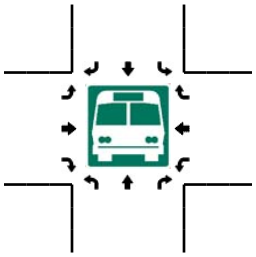












5-Min Count Period Beginning At	Beacon Ave S (Northbound)				Beacon Ave S (Southbound)				Hanford St (Eastbound)				Hanford St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	26	2	0	1	31	0	0	1	1	2	0	0	2	2	0	69	
4:05 PM	2	28	1	0	3	34	3	0	1	0	0	0	1	1	2	0	76	
4:10 PM	1	41	0	0	3	36	3	0	2	0	1	0	0	0	2	0	89	
4:15 PM	0	24	1	0	1	50	0	1	1	0	0	0	0	1	2	0	81	
4:20 PM	0	38	0	0	1	29	0	0	1	0	2	0	1	0	0	0	72	
4:25 PM	0	37	1	0	0	49	2	0	2	0	0	0	0	1	1	0	93	
4:30 PM	0	34	1	0	0	33	3	0	0	1	0	0	0	0	1	0	73	
4:35 PM	0	39	1	0	2	30	1	0	1	0	1	0	1	0	4	0	80	
4:40 PM	1	35	3	0	0	34	1	0	1	0	3	0	0	0	2	0	80	
4:45 PM	2	43	0	0	2	51	1	0	0	0	0	0	0	1	2	0	102	
4:50 PM	0	23	0	0	3	40	0	0	2	0	0	0	1	0	1	0	70	
4:55 PM	1	34	0	0	3	31	1	0	2	0	0	0	2	1	0	0	75	960
5:00 PM	0	29	2	0	0	35	4	0	0	0	1	0	0	2	0	0	73	964
5:05 PM	2	30	0	0	2	42	3	0	0	0	1	0	0	0	0	0	80	968
5:10 PM	0	33	2	0	1	39	0	0	0	0	1	0	0	2	4	0	82	961
5:15 PM	1	29	0	0	0	46	2	0	0	1	0	0	0	2	2	0	83	963
5:20 PM	1	28	1	0	1	30	4	0	1	0	1	0	0	0	2	0	69	960
5:25 PM	2	42	0	0	1	43	1	0	0	0	3	0	0	1	0	0	93	960
5:30 PM	0	35	1	0	0	41	2	0	1	0	2	0	0	0	1	0	83	970
5:35 PM	0	34	1	0	2	42	1	0	1	0	0	0	1	0	0	0	82	972
5:40 PM	1	38	1	0	2	37	3	0	1	0	1	0	0	1	3	0	88	980
5:45 PM	1	34	0	0	4	48	1	0	1	0	2	0	0	0	0	0	91	969
5:50 PM	1	38	0	0	1	43	0	0	0	0	0	0	1	1	0	0	85	984
5:55 PM	1	22	0	0	3	34	1	0	2	0	1	0	1	0	2	0	67	976

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	440	4	0	28	512	16	0	8	0	12	0	4	8	12	0	1056
Heavy Trucks	0	12	0		0	16	0		0	0	0		0	0	0		28
Pedestrians		12				8				16				12			48
Bicycles	0	2	0		0	1	0		0	0	0		0	1	0		4
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

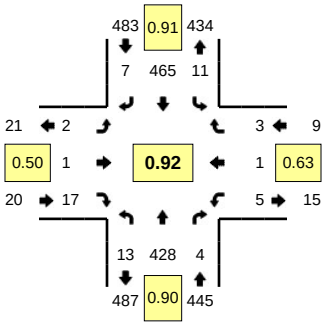
Method for determining peak hour: Total Entering Volume

LOCATION: Beacon Ave S -- Hinds St

QC JOB #: 10559406

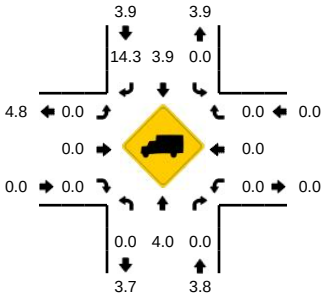
CITY/STATE: Seattle, WA

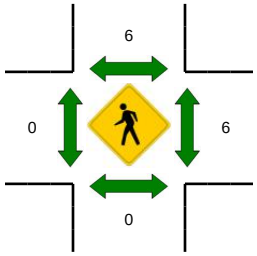
DATE: 11/16/2010

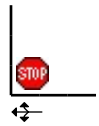


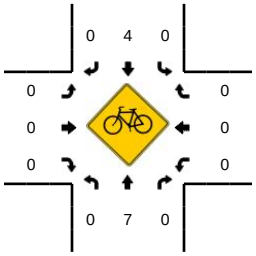
Peak-Hour: 4:10 PM -- 5:10 PM

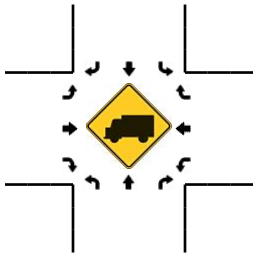
Peak 15-Min: 4:35 PM -- 4:50 PM

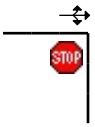


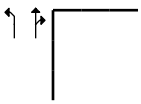


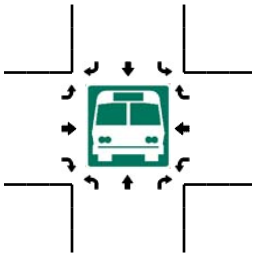












5-Min Count Period Beginning At	Beacon Ave S (Northbound)				Beacon Ave S (Southbound)				Hinds St (Eastbound)				Hinds St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	27	0	0	0	29	0	0	1	0	1	0	0	0	2	0	60	
4:05 PM	3	29	0	0	2	34	3	0	2	0	0	0	0	0	0	0	73	
4:10 PM	1	35	0	0	0	34	0	0	0	0	2	0	1	0	0	0	73	
4:15 PM	1	28	0	0	0	46	4	0	1	0	3	0	0	0	0	0	83	
4:20 PM	1	38	0	0	1	28	1	0	0	0	2	0	0	0	0	0	71	
4:25 PM	0	38	0	0	1	52	0	0	0	0	1	0	0	0	0	0	92	
4:30 PM	2	37	0	0	0	32	0	1	0	0	1	0	0	0	1	0	74	
4:35 PM	1	36	1	0	1	38	0	0	0	0	3	0	2	0	1	0	83	
4:40 PM	2	41	0	0	0	40	0	0	0	0	1	0	0	0	0	0	84	
4:45 PM	2	39	1	0	1	48	0	0	0	0	1	0	0	0	0	0	92	
4:50 PM	1	25	0	0	3	35	0	0	1	0	0	0	1	1	1	0	68	
4:55 PM	0	39	1	0	1	33	1	0	0	0	1	0	0	0	0	0	76	929
5:00 PM	2	33	0	0	0	36	1	0	0	0	1	0	1	0	0	0	74	943
5:05 PM	0	39	1	0	2	43	0	0	0	1	1	0	0	0	0	0	87	957
5:10 PM	0	30	1	0	0	36	0	0	0	0	0	0	0	0	0	0	67	951
5:15 PM	0	25	1	0	0	42	2	0	1	0	3	0	0	0	0	0	74	942
5:20 PM	0	23	0	0	0	18	0	0	2	0	3	0	1	0	0	0	47	918
5:25 PM	1	41	1	0	1	29	4	0	2	0	1	0	0	0	0	0	80	906
5:30 PM	0	29	0	0	0	33	1	0	1	0	1	0	0	0	0	0	65	897
5:35 PM	0	32	0	0	1	42	1	0	0	0	1	0	0	0	1	0	78	892
5:40 PM	0	38	1	0	0	34	1	0	0	0	0	0	0	0	0	0	74	882
5:45 PM	2	24	0	0	2	31	1	0	0	0	2	0	0	0	1	0	63	853
5:50 PM	0	31	0	0	1	31	0	0	0	0	0	0	0	0	0	0	63	848
5:55 PM	0	16	0	0	0	32	0	1	0	0	1	0	0	0	2	0	52	824

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	20	464	8	0	8	504	0	0	0	0	20	0	8	0	4	0	1036
Heavy Trucks	0	20	0		0	24	0		0	0	0		0	0	0		44
Pedestrians		0				0				0				0			0
Bicycles	0	2	0		0	0	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

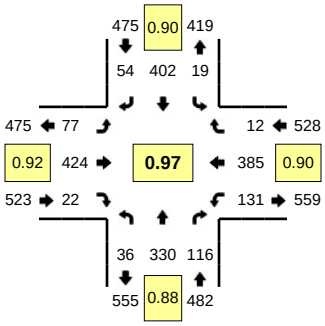
Method for determining peak hour: Total Entering Volume

LOCATION: Beacon Ave S -- S Spokane St

QC JOB #: 10559407

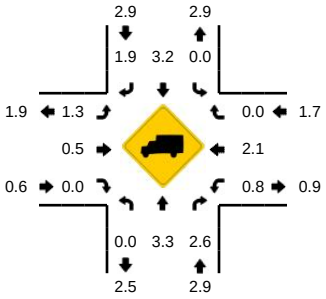
CITY/STATE: Seattle, WA

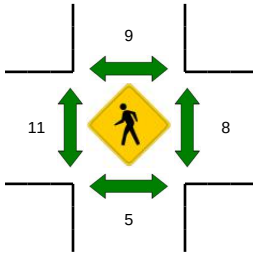
DATE: 11/16/2010

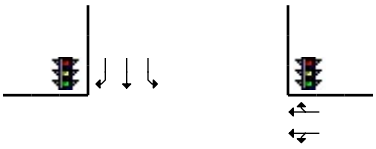


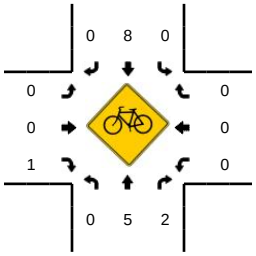
Peak-Hour: 4:55 PM -- 5:55 PM

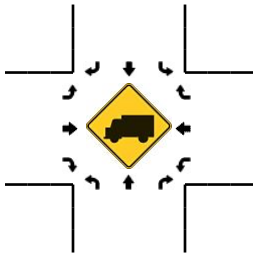
Peak 15-Min: 5:30 PM -- 5:45 PM

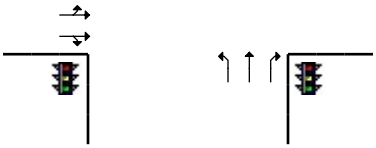


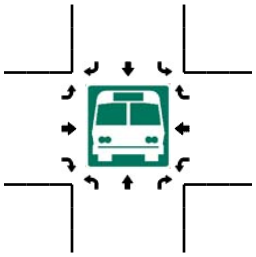












5-Min Count Period Beginning At	Beacon Ave S (Northbound)				Beacon Ave S (Southbound)				S Spokane St (Eastbound)				S Spokane St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	20	6	0	2	28	7	0	2	25	4	0	8	35	1	0	142	
4:05 PM	6	24	13	0	2	24	5	0	5	28	0	0	12	24	0	0	143	
4:10 PM	4	37	12	0	1	32	4	0	4	21	3	0	7	32	2	0	159	
4:15 PM	2	22	11	0	0	38	5	0	2	29	2	0	7	41	1	0	160	
4:20 PM	6	34	13	0	3	28	3	0	3	23	3	0	7	27	1	0	151	
4:25 PM	1	34	8	0	1	44	4	0	4	25	1	0	12	31	1	0	166	
4:30 PM	8	32	17	0	2	33	2	0	3	32	2	0	7	27	1	0	166	
4:35 PM	4	29	13	0	1	35	4	0	11	18	1	0	8	41	2	0	167	
4:40 PM	5	33	20	0	3	33	3	0	4	27	6	0	11	38	1	0	184	
4:45 PM	7	37	11	0	3	36	3	0	9	39	1	0	7	17	2	0	172	
4:50 PM	1	22	13	0	0	46	7	0	5	22	0	0	7	25	2	0	150	
4:55 PM	2	23	13	0	2	19	7	0	9	32	4	0	15	35	1	0	162	1922
5:00 PM	6	31	14	0	2	31	3	0	3	26	1	0	10	22	2	0	151	1931
5:05 PM	5	25	12	0	1	38	5	0	7	39	2	0	12	28	1	0	175	1963
5:10 PM	3	32	9	0	2	37	1	0	4	42	4	0	12	30	0	0	176	1980
5:15 PM	1	22	11	0	1	36	6	0	5	34	0	0	15	29	1	0	161	1981
5:20 PM	4	24	4	0	1	30	3	0	5	38	0	0	13	35	0	0	157	1987
5:25 PM	3	34	11	0	3	36	3	0	8	36	2	0	3	32	1	0	172	1993
5:30 PM	2	28	13	0	0	38	5	0	6	36	6	0	11	32	1	0	178	2005
5:35 PM	4	19	10	0	2	31	6	0	10	33	0	0	9	37	1	0	162	2000
5:40 PM	3	33	8	0	2	24	5	0	8	42	1	0	9	40	2	0	177	1993
5:45 PM	0	28	8	0	2	42	4	0	3	33	1	0	12	35	2	0	170	1991
5:50 PM	3	31	3	0	1	40	6	0	9	33	1	0	10	30	0	0	167	2008
5:55 PM	4	13	8	0	0	34	2	0	11	31	2	0	4	31	0	0	140	1986

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	36	320	124	0	16	372	64	0	96	444	28	0	116	436	16	0	2068
Heavy Trucks	0	16	0		0	16	0		0	4	0		0	0	0		36
Pedestrians		4				24				24				8			60
Bicycles	0	0	1		0	1	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

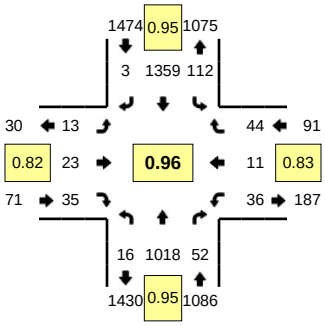
Method for determining peak hour: Total Entering Volume

LOCATION: Rainier Ave S -- S Bayview St

QC JOB #: 10559408

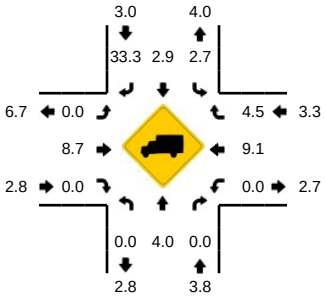
CITY/STATE: Seattle, WA

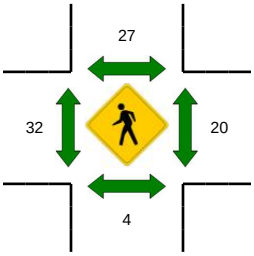
DATE: 11/16/2010

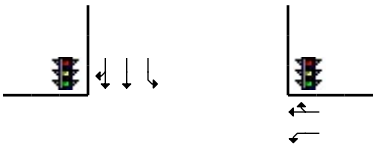


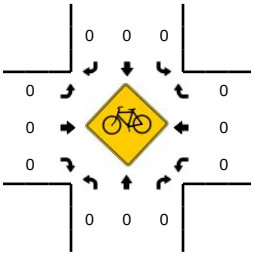
Peak-Hour: 4:55 PM -- 5:55 PM

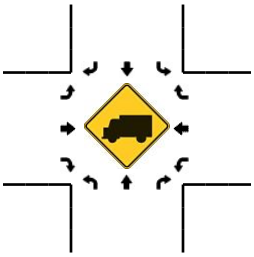
Peak 15-Min: 5:05 PM -- 5:20 PM

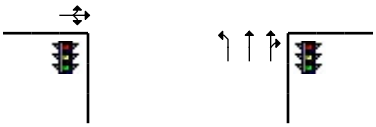


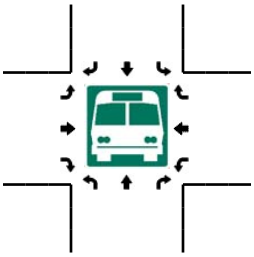












5-Min Count Period Beginning At	Rainier Ave S (Northbound)				Rainier Ave S (Southbound)				S Bayview St (Eastbound)				S Bayview St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	71	4	0	5	91	0	0	0	4	4	0	4	2	2	0	188	
4:05 PM	3	72	1	0	9	128	0	0	2	0	5	0	3	1	10	0	234	
4:10 PM	1	96	2	0	13	115	1	0	0	0	3	0	3	1	1	0	236	
4:15 PM	1	70	9	0	12	96	0	0	1	2	4	0	5	0	1	0	201	
4:20 PM	1	91	1	0	6	126	0	0	0	1	2	0	0	1	3	0	232	
4:25 PM	0	74	3	0	4	102	0	0	1	2	3	0	2	1	2	0	194	
4:30 PM	3	79	0	0	10	113	1	0	2	2	2	0	0	0	1	0	213	
4:35 PM	2	74	1	0	12	114	1	0	1	2	3	0	6	3	8	0	227	
4:40 PM	0	106	3	0	13	86	1	0	1	2	6	0	1	1	3	0	223	
4:45 PM	3	80	0	0	9	118	0	0	1	0	3	0	1	4	2	0	221	
4:50 PM	5	95	2	0	4	96	0	0	0	0	6	0	0	0	8	0	216	
4:55 PM	0	86	2	0	11	123	0	0	2	1	2	0	2	1	4	0	234	2619
5:00 PM	2	92	1	0	8	101	0	0	0	3	4	0	3	1	1	0	216	2647
5:05 PM	1	95	5	0	9	117	0	0	2	3	5	0	3	1	3	0	244	2657
5:10 PM	1	96	2	0	6	119	0	0	2	3	2	0	7	2	4	0	244	2665
5:15 PM	2	79	6	0	12	112	0	0	1	0	3	0	1	1	3	0	220	2684
5:20 PM	2	80	1	0	5	98	0	0	2	3	4	0	3	1	3	0	202	2654
5:25 PM	1	87	10	0	12	124	0	0	1	1	1	0	2	0	2	0	241	2701
5:30 PM	2	79	4	0	13	107	0	0	1	2	1	0	2	1	9	0	221	2709
5:35 PM	2	82	5	0	12	118	0	0	1	6	2	0	3	1	4	0	236	2718
5:40 PM	0	87	6	0	9	112	0	0	0	0	4	0	4	0	4	0	226	2721
5:45 PM	1	66	4	0	8	125	3	0	0	0	3	0	2	2	5	0	219	2719
5:50 PM	2	89	6	0	7	103	0	0	1	1	4	0	4	0	2	0	219	2722
5:55 PM	1	62	6	0	12	86	0	0	0	2	3	0	6	1	8	0	187	2675

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	16	1080	52	0	108	1392	0	0	20	24	40	0	44	16	40	0	2832
Heavy Trucks	0	24	0		0	32	0		0	0	0		0	4	0		60
Pedestrians		4				16				28				28			76
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

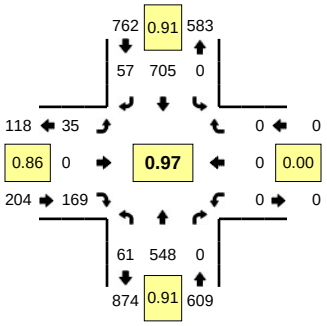
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S Bayview St

QC JOB #: 10559409

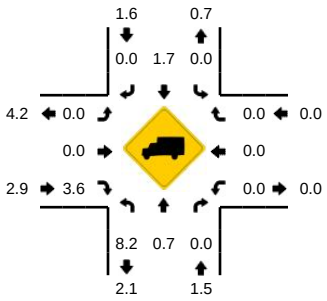
CITY/STATE: Seattle, WA

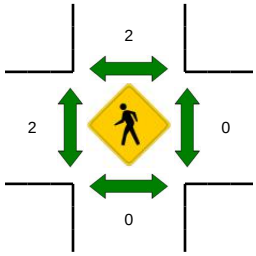
DATE: 11/16/2010

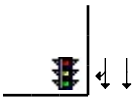


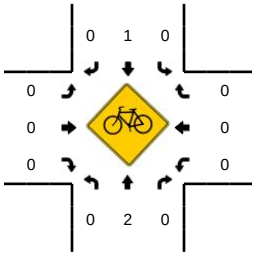
Peak-Hour: 4:40 PM -- 5:40 PM

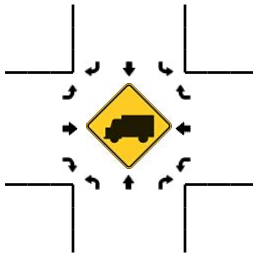
Peak 15-Min: 5:25 PM -- 5:40 PM

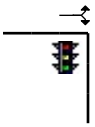


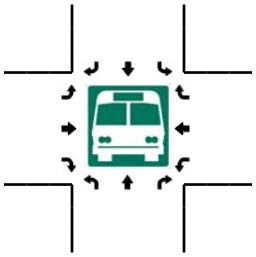












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S Bayview St (Eastbound)				S Bayview St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	4	34	0	0	0	56	8	0	10	0	11	0	0	0	0	0	123	
4:05 PM	6	48	0	0	0	47	9	0	3	0	10	0	0	0	0	0	123	
4:10 PM	5	35	0	0	0	68	4	0	3	0	22	0	0	0	0	0	137	
4:15 PM	5	40	0	0	0	57	4	0	8	0	17	0	0	0	0	0	131	
4:20 PM	2	30	0	0	0	58	7	0	3	0	13	0	0	0	0	0	113	
4:25 PM	4	49	0	0	0	53	2	0	4	0	10	0	0	0	0	0	122	
4:30 PM	2	47	0	0	0	48	9	0	5	0	13	0	0	0	0	0	124	
4:35 PM	5	50	0	0	0	58	6	0	6	0	19	0	0	0	0	0	144	
4:40 PM	6	41	0	0	0	66	3	0	5	0	8	0	0	0	0	0	129	
4:45 PM	8	48	0	0	0	53	5	0	5	0	10	0	0	0	0	0	129	
4:50 PM	5	53	0	0	0	50	6	0	1	0	13	0	0	0	0	0	128	
4:55 PM	5	48	0	0	0	58	2	0	1	0	22	0	0	0	0	0	136	1539
5:00 PM	4	30	0	0	0	54	5	0	3	0	15	0	0	0	0	0	111	1527
5:05 PM	2	54	0	0	0	54	7	0	7	0	15	0	0	0	0	0	139	1543
5:10 PM	8	38	0	0	0	68	4	0	2	0	10	0	0	0	0	0	130	1536
5:15 PM	8	38	0	0	0	58	5	0	2	0	13	0	0	0	0	0	124	1529
5:20 PM	5	45	0	0	0	70	7	0	2	0	14	0	0	0	0	0	143	1559
5:25 PM	2	56	0	0	0	52	6	0	3	0	15	0	0	0	0	0	134	1571
5:30 PM	5	40	0	0	0	54	2	0	2	0	17	0	0	0	0	0	120	1567
5:35 PM	3	57	0	0	0	68	5	0	2	0	17	0	0	0	0	0	152	1575
5:40 PM	5	39	0	0	0	53	11	0	3	0	11	0	0	0	0	0	122	1568
5:45 PM	4	46	0	0	0	61	4	0	3	0	11	0	0	0	0	0	129	1568
5:50 PM	6	39	0	0	0	55	7	0	4	0	6	0	0	0	0	0	117	1557
5:55 PM	4	55	0	0	0	57	7	0	1	0	8	0	0	0	0	0	132	1553

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	612	0	0	0	696	52	0	28	0	196	0	0	0	0	0	1624
Heavy Trucks	8	4	0		0	4	0		0	0	8		0	0	0		24
Pedestrians		0				4				0				0			4
Bicycles	0	2	0		0	0	0		0	0	0		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

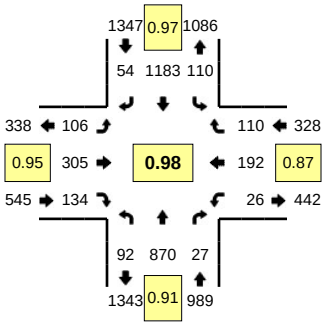
Method for determining peak hour: Total Entering Volume

LOCATION: Rainier Ave S -- S McClellan St

QC JOB #: 10559410

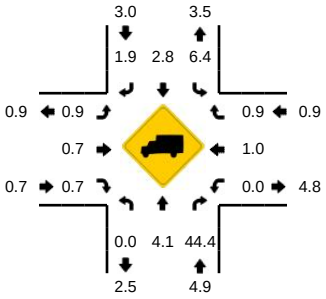
CITY/STATE: Seattle, WA

DATE: 11/16/2010

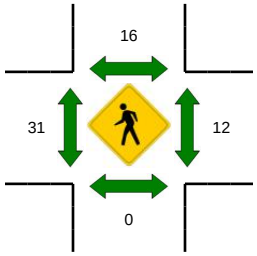


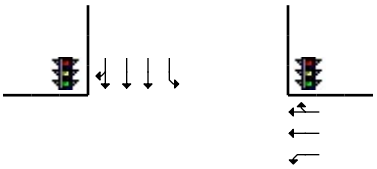
Peak-Hour: 4:55 PM -- 5:55 PM

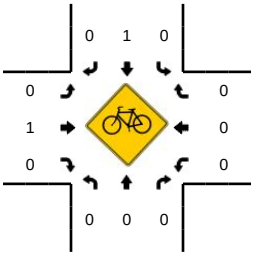
Peak 15-Min: 4:55 PM -- 5:10 PM

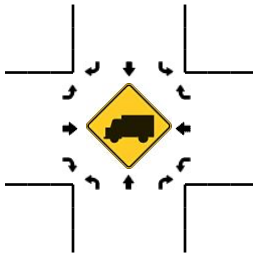


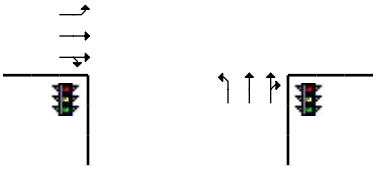
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

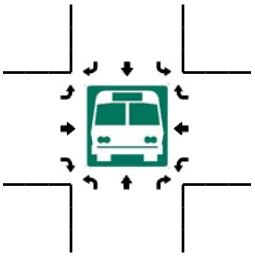












5-Min Count Period Beginning At	Rainier Ave S (Northbound)				Rainier Ave S (Southbound)				S McClellan St (Eastbound)				S McClellan St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	6	77	1	0	7	103	8	0	6	23	6	0	2	15	2	0	256	
4:05 PM	8	64	2	0	16	107	1	0	9	10	8	0	2	18	7	0	252	
4:10 PM	10	81	1	0	4	96	7	0	12	23	9	0	1	18	3	0	265	
4:15 PM	12	55	0	0	14	99	9	0	4	15	9	0	0	20	8	0	245	
4:20 PM	9	82	5	0	7	93	2	0	9	17	10	0	0	7	7	0	248	
4:25 PM	5	59	4	0	12	99	3	0	7	26	7	0	0	25	7	0	254	
4:30 PM	12	78	3	0	5	79	1	0	10	21	12	0	0	14	8	0	243	
4:35 PM	9	61	1	0	8	95	6	0	7	23	6	0	2	26	10	0	254	
4:40 PM	8	100	1	0	6	98	4	0	10	16	8	0	3	8	6	0	268	
4:45 PM	5	75	3	0	6	99	4	0	10	27	9	0	2	21	6	0	267	
4:50 PM	9	84	0	0	6	86	3	0	0	15	13	0	1	25	7	0	249	
4:55 PM	3	76	4	0	8	96	10	0	11	31	14	0	5	6	11	0	275	3076
5:00 PM	11	93	2	0	10	101	4	0	14	21	14	0	0	14	10	0	294	3114
5:05 PM	6	55	0	0	17	97	5	0	9	20	10	0	4	19	11	0	253	3115
5:10 PM	12	91	0	0	6	94	7	0	12	25	7	0	0	15	6	0	275	3125
5:15 PM	9	56	5	0	10	105	3	0	6	25	11	0	2	21	9	0	262	3142
5:20 PM	13	80	2	0	3	100	1	0	10	22	10	0	4	15	9	0	269	3163
5:25 PM	5	47	3	0	12	89	4	0	7	20	12	0	1	29	8	0	237	3146
5:30 PM	6	91	2	0	8	109	7	0	7	26	10	0	2	10	14	0	292	3195
5:35 PM	4	59	3	0	9	94	5	0	7	40	9	0	1	20	12	0	263	3204
5:40 PM	11	81	1	0	0	104	1	0	5	19	17	0	2	9	6	0	256	3192
5:45 PM	5	60	1	0	18	100	5	0	10	29	7	0	3	19	10	0	267	3192
5:50 PM	7	81	4	0	9	94	2	0	8	27	13	0	2	15	4	0	266	3209
5:55 PM	9	51	3	0	7	87	4	0	0	15	11	0	2	14	6	0	209	3143

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	80	896	24	0	140	1176	76	0	136	288	152	0	36	156	128	0	3288
Heavy Trucks	0	36	12		4	28	0		4	4	0		0	4	0		92
Pedestrians		0				12				64				8			84
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

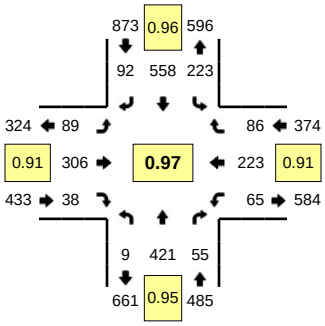
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S McClellan St

QC JOB #: 10559411

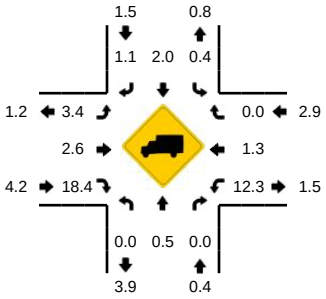
CITY/STATE: Seattle, WA

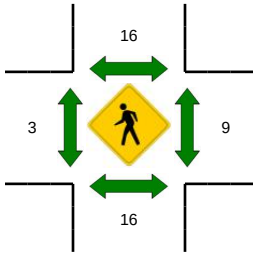
DATE: 11/16/2010

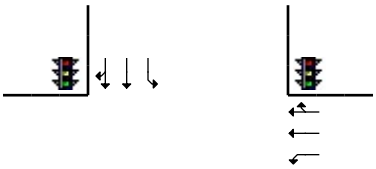


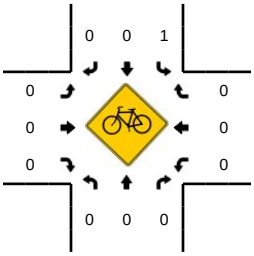
Peak-Hour: 4:40 PM -- 5:40 PM

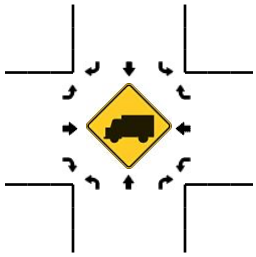
Peak 15-Min: 5:25 PM -- 5:40 PM

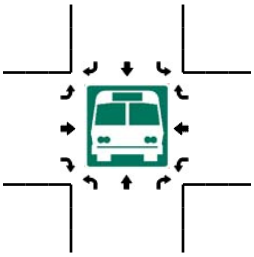












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S McClellan St (Eastbound)				S McClellan St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	1	31	4	0	12	41	14	0	10	23	3	0	4	8	6	0	157	
4:05 PM	0	27	3	0	14	37	5	0	6	18	7	0	4	16	10	0	147	
4:10 PM	1	32	3	0	24	59	6	0	10	26	3	0	8	20	6	0	198	
4:15 PM	0	27	3	0	17	44	11	0	3	21	4	0	7	13	7	0	157	
4:20 PM	1	31	5	0	10	49	11	0	4	29	2	0	3	15	4	0	164	
4:25 PM	2	37	6	0	13	44	5	0	10	26	3	0	11	17	10	0	184	
4:30 PM	0	28	7	0	16	42	2	0	7	22	5	0	7	19	8	0	163	
4:35 PM	1	40	5	0	24	43	11	0	4	25	1	0	6	18	12	0	190	
4:40 PM	0	37	5	0	17	49	8	0	6	20	5	0	6	16	8	0	177	
4:45 PM	1	35	3	0	16	45	3	0	6	25	6	0	4	19	10	0	173	
4:50 PM	1	43	4	0	9	44	10	0	6	11	1	0	4	18	13	0	164	
4:55 PM	1	30	4	0	25	47	7	0	9	35	4	0	6	16	6	0	190	2064
5:00 PM	2	34	8	0	21	40	9	0	3	24	2	0	4	19	8	0	174	2081
5:05 PM	0	35	4	0	17	45	8	0	8	26	5	0	9	16	7	0	180	2114
5:10 PM	1	32	4	0	21	53	3	0	7	29	2	0	6	21	8	0	187	2103
5:15 PM	0	31	5	0	10	48	10	0	3	27	3	0	5	18	6	0	166	2112
5:20 PM	1	37	5	0	21	55	7	0	10	26	1	0	7	24	3	0	197	2145
5:25 PM	1	30	5	0	17	42	7	0	9	17	4	0	4	15	6	0	157	2118
5:30 PM	1	37	4	0	22	40	9	0	13	27	3	0	8	19	6	0	189	2144
5:35 PM	0	40	4	0	27	50	11	0	9	39	2	0	2	22	5	0	211	2165
5:40 PM	0	38	4	0	17	39	7	0	4	22	3	0	4	13	13	0	164	2152
5:45 PM	1	27	6	0	12	51	7	0	4	27	4	0	5	20	3	0	167	2146
5:50 PM	1	28	7	0	16	36	11	0	11	23	5	0	2	15	9	0	164	2146
5:55 PM	0	35	4	0	19	41	9	0	7	27	3	0	4	10	8	0	167	2123

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	8	428	52	0	264	528	108	0	124	332	36	0	56	224	68	0	2228
Heavy Trucks	0	4	0		0	4	0		4	8	4		8	0	0		32
Pedestrians		20				16				0				8			44
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

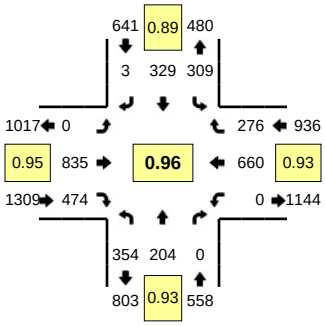
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- Rainier Ave S

QC JOB #: 10559412

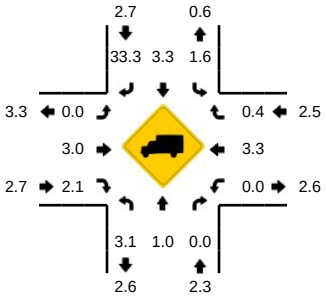
CITY/STATE: Seattle, WA

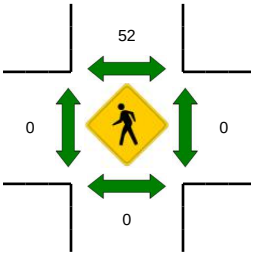
DATE: 11/16/2010

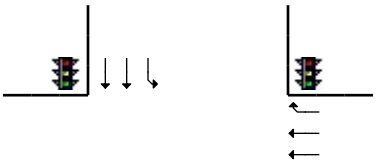


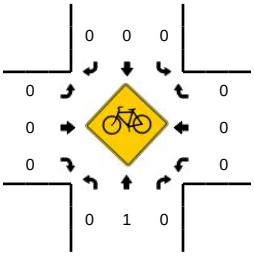
Peak-Hour: 4:20 PM -- 5:20 PM

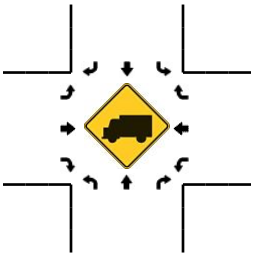
Peak 15-Min: 5:00 PM -- 5:15 PM

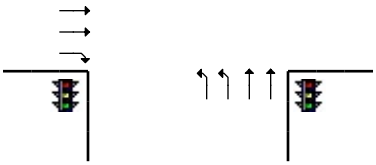


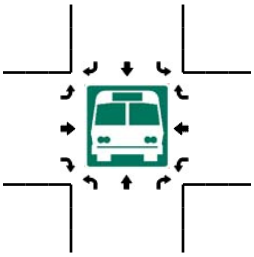












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				Rainier Ave S (Eastbound)				Rainier Ave S (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	30	20	0	0	19	19	0	0	0	82	46	0	0	69	13	0	298	
4:05 PM	30	14	0	0	23	31	0	0	0	56	37	0	0	42	18	0	251	
4:10 PM	15	13	0	0	31	20	0	0	0	79	47	0	0	67	18	0	290	
4:15 PM	36	20	0	0	28	31	0	0	0	59	35	0	0	37	11	0	257	
4:20 PM	30	11	0	0	24	22	0	0	0	80	45	0	0	48	24	0	284	
4:25 PM	34	23	0	0	31	39	0	0	0	53	34	0	0	45	23	0	282	
4:30 PM	27	14	0	0	12	18	0	0	0	80	43	0	0	65	25	0	284	
4:35 PM	28	21	0	0	34	37	1	0	0	44	39	0	0	57	23	0	284	
4:40 PM	30	16	0	0	19	27	0	0	0	75	47	0	0	52	20	0	286	
4:45 PM	40	18	0	0	25	37	1	0	0	64	25	0	0	54	22	0	286	
4:50 PM	31	19	0	0	15	22	0	0	0	84	42	0	0	54	30	0	297	
4:55 PM	34	15	0	0	32	26	0	0	0	65	38	0	0	46	20	0	276	3375
5:00 PM	23	19	0	0	18	21	0	0	0	85	55	0	0	64	23	0	308	3385
5:05 PM	30	16	0	0	35	32	0	0	0	63	33	0	0	44	23	0	276	3410
5:10 PM	29	17	0	0	22	20	1	0	0	79	42	0	0	78	21	0	309	3429
5:15 PM	18	15	0	0	42	28	0	0	0	63	31	0	0	53	22	0	272	3444
5:20 PM	28	20	0	0	15	25	0	0	0	79	43	0	0	56	18	0	284	3444
5:25 PM	16	13	0	0	33	32	0	0	0	66	42	0	0	35	22	0	259	3421
5:30 PM	25	25	0	0	23	12	1	0	0	90	40	0	0	62	21	0	299	3436
5:35 PM	25	18	0	0	27	34	0	0	0	63	35	0	0	40	19	0	261	3413
5:40 PM	26	21	0	0	18	17	0	0	0	85	39	0	0	64	22	0	292	3419
5:45 PM	19	13	0	0	26	31	1	0	0	70	41	0	0	50	18	0	269	3402
5:50 PM	24	16	0	0	20	21	0	0	0	91	36	0	0	54	23	0	285	3390
5:55 PM	32	21	0	0	31	18	0	0	0	66	20	0	0	36	16	0	240	3354

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	328	208	0	0	300	292	4	0	0	908	520	0	0	744	268	0	3572
Heavy Trucks	8	0	0		0	8	0		0	20	4		0	12	0		52
Pedestrians		0				52				0				0			52
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

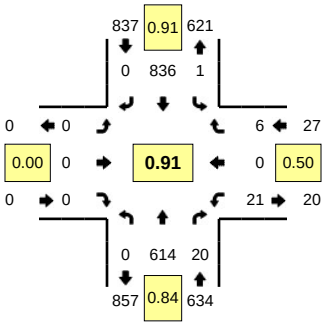
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S Hanford St

QC JOB #: 10559413

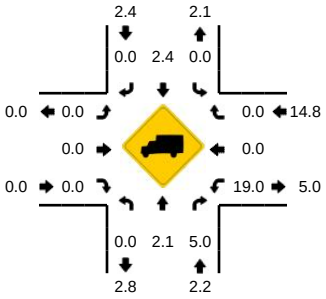
CITY/STATE: Seattle, WA

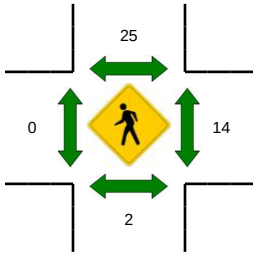
DATE: 11/16/2010

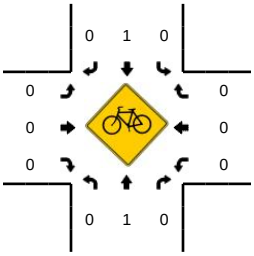


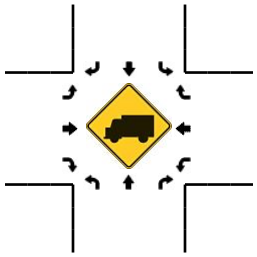
Peak-Hour: 4:15 PM -- 5:15 PM

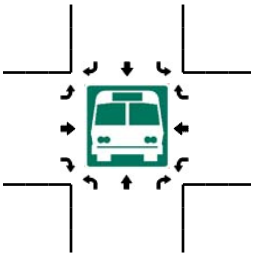
Peak 15-Min: 4:40 PM -- 4:55 PM











5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S Hanford St (Eastbound)				S Hanford St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	58	1	0	0	82	0	0	0	0	0	0	1	0	0	0	142	
4:05 PM	0	42	1	0	0	64	0	0	0	0	0	0	0	0	0	0	107	
4:10 PM	0	35	2	0	0	69	0	0	0	0	0	0	1	0	0	0	107	
4:15 PM	0	55	5	0	0	64	0	0	0	0	0	0	1	0	0	0	125	
4:20 PM	0	50	2	0	0	70	0	0	0	0	0	0	2	0	0	0	124	
4:25 PM	0	53	0	0	0	68	0	0	0	0	0	0	4	0	1	0	126	
4:30 PM	0	44	1	0	0	73	0	0	0	0	0	0	3	0	1	0	122	
4:35 PM	0	38	2	0	0	68	0	0	0	0	0	0	4	0	1	0	113	
4:40 PM	0	67	3	0	0	91	0	0	0	0	0	0	1	0	0	0	162	
4:45 PM	0	57	1	0	0	61	0	0	0	0	0	0	0	0	0	0	119	
4:50 PM	0	57	4	0	0	67	0	1	0	0	0	0	0	0	1	0	130	
4:55 PM	0	42	0	0	0	64	0	0	0	0	0	0	1	0	2	0	109	1486
5:00 PM	0	53	1	0	0	79	0	0	0	0	0	0	0	0	0	0	133	1477
5:05 PM	0	49	0	0	0	51	0	0	0	0	0	0	3	0	0	0	103	1473
5:10 PM	0	49	1	0	0	80	0	0	0	0	0	0	2	0	0	0	132	1498
5:15 PM	0	40	1	0	0	48	0	0	0	0	0	0	2	0	0	0	91	1464
5:20 PM	0	41	1	0	0	80	0	0	0	0	0	0	0	0	1	0	123	1463
5:25 PM	0	42	2	0	0	71	0	0	0	0	0	0	1	0	0	0	116	1453
5:30 PM	0	43	2	0	0	66	0	0	0	0	0	0	1	0	0	0	112	1443
5:35 PM	0	52	2	0	0	58	0	0	0	0	0	0	0	0	0	0	112	1442
5:40 PM	0	52	0	0	0	73	0	0	0	0	0	0	1	0	0	0	126	1406
5:45 PM	0	37	1	0	0	65	0	0	0	0	0	0	1	0	1	0	105	1392
5:50 PM	0	32	1	0	0	67	0	0	0	0	0	0	0	0	1	0	101	1363
5:55 PM	0	41	2	0	0	35	0	0	0	0	0	0	0	0	3	0	81	1335

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	724	32	0	0	876	0	4	0	0	0	0	4	0	4	0	1644
Heavy Trucks	0	12	4		0	24	0		0	0	0		0	0	0		40
Pedestrians		0				36				0				12			48
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

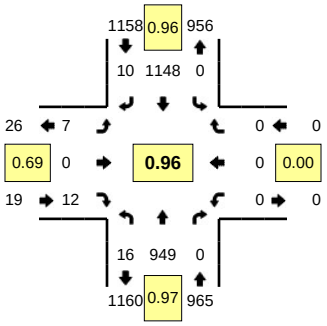
Method for determining peak hour: Total Entering Volume

LOCATION: Rainier Ave S -- S Hanford St

QC JOB #: 10559414

CITY/STATE: Seattle, WA

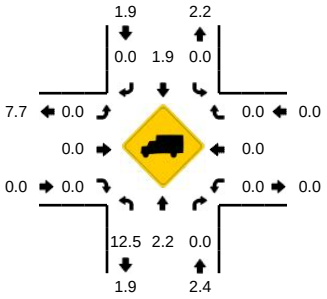
DATE: 11/16/2010

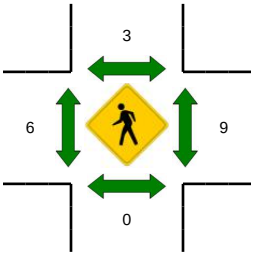


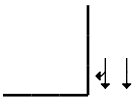
Peak-Hour: 4:35 PM -- 5:35 PM

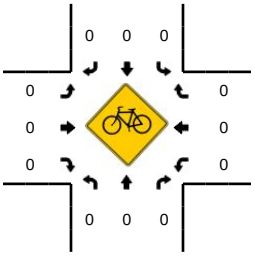
Peak 15-Min: 5:10 PM -- 5:25 PM

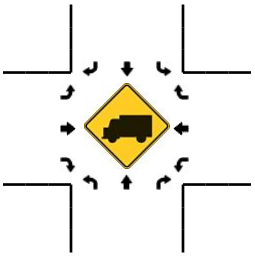
Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

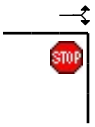


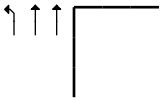


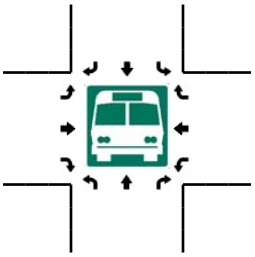












5-Min Count Period Beginning At	Rainier Ave S (Northbound)				Rainier Ave S (Southbound)				S Hanford St (Eastbound)				S Hanford St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	75	0	0	0	104	2	0	1	0	1	0	0	0	0	0	183	
4:05 PM	0	69	0	0	0	79	2	0	0	0	3	0	0	0	0	0	153	
4:10 PM	1	79	0	0	0	101	1	0	1	0	1	0	0	0	0	0	184	
4:15 PM	0	61	0	0	0	90	1	0	0	0	3	0	0	0	0	0	155	
4:20 PM	0	67	0	0	0	99	3	0	1	0	1	0	0	0	0	0	171	
4:25 PM	3	73	0	0	0	84	1	0	0	0	1	0	0	0	0	0	162	
4:30 PM	4	84	0	0	0	80	3	0	0	0	1	0	0	0	0	0	172	
4:35 PM	6	83	0	0	0	77	0	0	0	0	1	0	0	0	0	0	167	
4:40 PM	0	72	0	0	0	97	1	0	0	0	3	0	0	0	0	0	173	
4:45 PM	2	86	0	0	0	89	1	0	1	0	1	0	0	0	0	0	180	
4:50 PM	0	85	0	0	0	98	0	0	0	0	1	0	0	0	0	0	184	
4:55 PM	2	76	0	0	0	94	1	0	0	0	1	0	0	0	0	0	174	2058
5:00 PM	2	81	0	0	0	100	1	0	1	0	1	0	0	0	0	0	186	2061
5:05 PM	2	77	0	0	0	98	1	0	0	0	1	0	0	0	0	0	179	2087
5:10 PM	0	86	0	0	0	89	3	0	1	0	0	0	0	0	0	0	179	2082
5:15 PM	0	87	0	0	0	106	1	0	1	0	0	0	0	0	0	0	195	2122
5:20 PM	0	75	0	0	0	107	0	0	0	0	0	0	0	0	0	0	182	2133
5:25 PM	1	66	0	0	0	78	1	0	1	0	3	0	0	0	0	0	150	2121
5:30 PM	1	75	0	0	0	115	0	0	2	0	0	0	0	0	0	0	193	2142
5:35 PM	0	64	0	0	0	95	1	0	0	0	1	0	0	0	0	0	161	2136
5:40 PM	0	78	0	0	0	93	1	0	0	0	1	0	0	0	0	0	173	2136
5:45 PM	3	73	0	0	0	91	1	0	1	0	0	0	0	0	0	0	169	2125
5:50 PM	1	74	0	0	0	97	0	0	0	0	1	0	0	0	0	0	173	2114
5:55 PM	2	67	0	0	0	102	0	0	0	0	0	0	0	0	0	0	171	2111

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	992	0	0	0	1208	16	0	8	0	0	0	0	0	0	0	2224
Heavy Trucks	0	40	0		0	12	0		0	0	0		0	0	0		52
Pedestrians		0				4				12				8			24
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

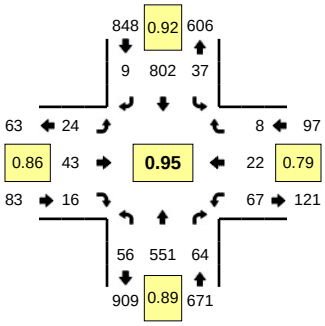
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S Walden St

QC JOB #: 10559415

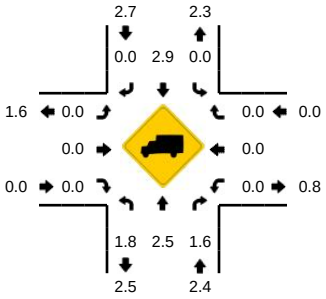
CITY/STATE: Seattle, WA

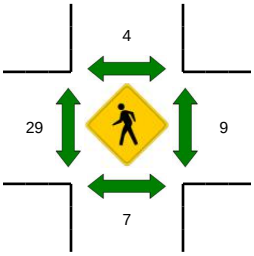
DATE: 11/16/2010

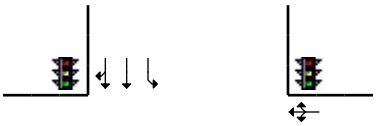


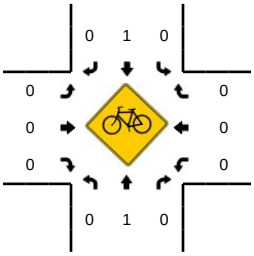
Peak-Hour: 4:15 PM -- 5:15 PM

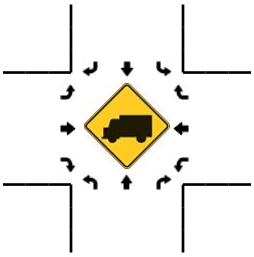
Peak 15-Min: 4:25 PM -- 4:40 PM

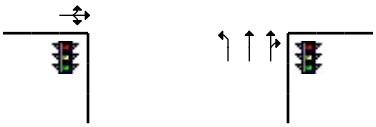


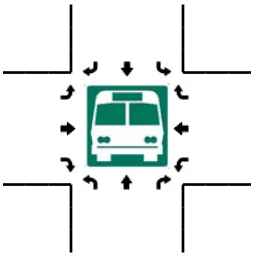












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S Walden St (Eastbound)				S Walden St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	33	3	6	2	60	2	3	3	3	1	0	9	4	0	0	131	
4:05 PM	2	43	5	3	2	71	3	0	0	6	0	0	6	3	2	0	146	
4:10 PM	1	30	3	2	2	68	1	0	1	3	2	0	7	1	0	0	121	
4:15 PM	2	60	4	0	2	60	0	0	2	3	0	0	8	4	1	0	146	
4:20 PM	4	35	4	4	2	56	1	7	2	2	4	0	3	3	0	0	127	
4:25 PM	5	53	9	0	0	79	2	0	4	3	3	0	2	0	0	0	160	
4:30 PM	1	46	4	6	0	73	0	3	2	3	1	0	5	1	1	0	146	
4:35 PM	4	37	3	2	4	69	2	1	1	3	2	0	11	1	0	0	140	
4:40 PM	0	41	7	2	1	58	2	1	1	7	1	0	6	2	1	0	130	
4:45 PM	2	55	4	1	0	83	0	1	2	1	0	0	7	1	1	0	158	
4:50 PM	2	61	8	2	2	58	0	1	1	5	1	0	3	6	1	0	151	
4:55 PM	5	42	4	3	1	71	1	2	0	2	0	0	5	0	0	0	136	1692
5:00 PM	3	41	1	2	0	51	0	4	3	4	3	0	5	1	0	0	118	1679
5:05 PM	2	45	6	1	1	76	0	2	4	5	1	0	4	1	1	0	149	1682
5:10 PM	2	35	10	1	1	68	1	1	2	5	0	0	8	2	2	0	138	1699
5:15 PM	1	44	6	3	1	49	2	2	2	4	1	0	8	2	0	0	125	1678
5:20 PM	3	39	7	0	0	71	1	3	1	6	1	0	10	3	1	0	146	1697
5:25 PM	0	41	7	2	3	70	0	1	3	1	1	0	7	2	1	0	139	1676
5:30 PM	0	36	5	3	1	60	3	1	4	5	3	0	6	4	1	0	132	1662
5:35 PM	4	59	4	4	1	56	0	0	2	1	2	0	1	1	0	0	135	1657
5:40 PM	1	39	3	2	0	65	2	0	1	3	4	0	10	2	0	0	132	1659
5:45 PM	2	33	2	4	1	65	0	1	0	7	2	0	8	1	2	0	128	1629
5:50 PM	1	43	5	4	1	66	1	0	2	2	1	0	4	2	2	0	134	1612
5:55 PM	0	39	3	1	1	34	1	3	3	4	0	0	4	4	1	0	98	1574

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	40	544	64	32	16	884	16	16	28	36	24	0	72	8	4	0	1784
Heavy Trucks	0	16	0		0	24	0		0	0	0		0	0	0		40
Pedestrians		8				0				20				4			32
Bicycles	0	1	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

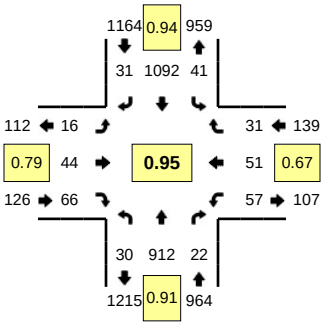
Method for determining peak hour: Total Entering Volume

LOCATION: Rainier Ave S -- S Walden St

QC JOB #: 10559416

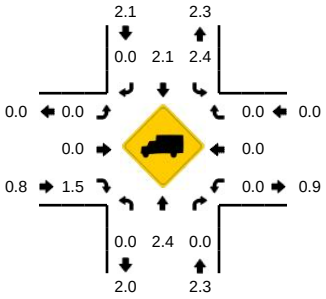
CITY/STATE: Seattle, WA

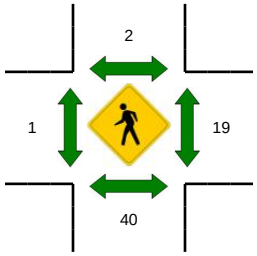
DATE: 11/16/2010

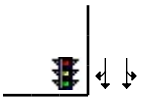


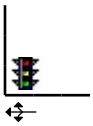
Peak-Hour: 4:35 PM -- 5:35 PM

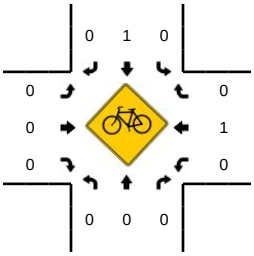
Peak 15-Min: 5:10 PM -- 5:25 PM

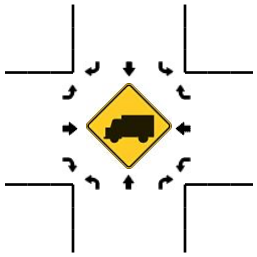


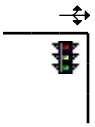


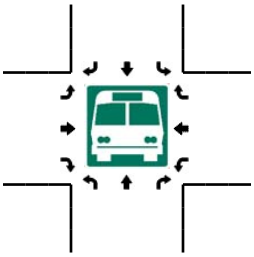












5-Min Count Period Beginning At	Rainier Ave S (Northbound)				Rainier Ave S (Southbound)				S Walden St (Eastbound)				S Walden St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	2	67	2	0	5	89	0	0	1	5	6	0	9	3	2	0	191	
4:05 PM	6	70	1	0	5	84	1	0	3	4	2	0	4	1	6	0	187	
4:10 PM	6	69	1	0	3	91	1	0	2	3	9	0	5	3	4	0	197	
4:15 PM	3	69	5	0	5	93	1	0	0	3	6	0	5	2	2	0	194	
4:20 PM	2	53	2	0	5	87	0	0	1	3	3	0	6	3	0	0	165	
4:25 PM	0	87	2	0	1	92	1	0	1	4	7	0	4	1	3	0	203	
4:30 PM	0	76	0	0	4	72	1	0	1	6	2	0	4	8	8	0	182	
4:35 PM	6	83	3	0	4	85	1	0	1	2	3	0	2	4	1	0	195	
4:40 PM	4	70	4	0	1	86	3	0	1	6	8	0	7	2	1	0	193	
4:45 PM	2	95	1	0	4	96	1	0	3	0	3	0	4	3	2	0	214	
4:50 PM	1	72	2	0	4	76	3	0	0	7	4	0	10	4	1	0	184	
4:55 PM	0	83	3	0	3	94	5	0	1	3	6	0	1	0	6	0	205	2310
5:00 PM	1	67	0	0	6	82	2	0	2	2	4	0	2	4	1	0	173	2292
5:05 PM	2	82	3	0	5	100	1	0	2	1	5	0	2	3	2	0	208	2313
5:10 PM	0	77	2	0	2	75	4	0	0	8	11	0	8	11	4	0	202	2318
5:15 PM	2	70	1	0	4	108	3	0	1	3	7	0	6	8	2	0	215	2339
5:20 PM	4	74	1	0	1	101	3	0	0	5	5	0	6	7	4	0	211	2385
5:25 PM	5	78	1	0	3	91	4	0	4	1	5	0	3	0	4	0	199	2381
5:30 PM	3	61	1	0	4	98	1	0	1	6	5	0	6	5	3	0	194	2393
5:35 PM	2	67	2	0	2	109	0	0	0	2	3	0	3	1	2	0	193	2391
5:40 PM	5	75	1	0	4	71	7	0	1	3	3	0	7	7	4	0	188	2386
5:45 PM	2	76	0	0	4	103	2	0	2	4	4	0	7	1	0	0	205	2377
5:50 PM	4	63	4	0	5	82	3	0	1	5	8	0	11	4	3	0	193	2386
5:55 PM	6	72	0	0	5	99	3	0	0	2	7	0	4	3	1	0	202	2383

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	24	884	16	0	28	1136	40	0	4	64	92	0	80	104	40	0	2512
Heavy Trucks	0	40	0		4	8	0		0	0	0		0	0	0		52
Pedestrians		32				0				0				0			32
Bicycles	0	0	0		0	0	0		0	0	0		0	1	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

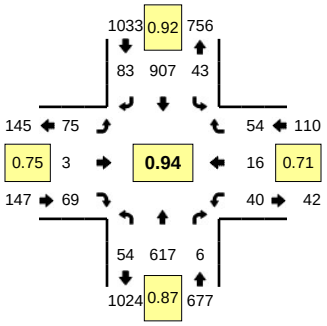
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S Myrtle St

QC JOB #: 10559417

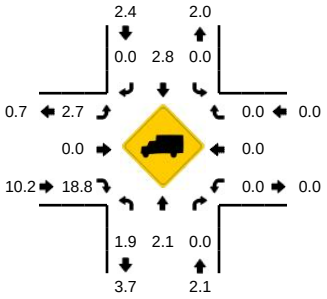
CITY/STATE: Seattle, WA

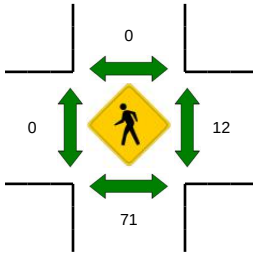
DATE: 11/17/2010

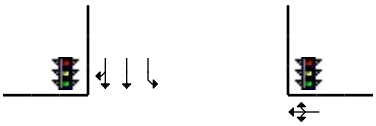


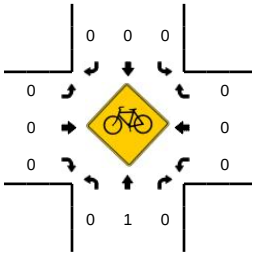
Peak-Hour: 4:55 PM -- 5:55 PM

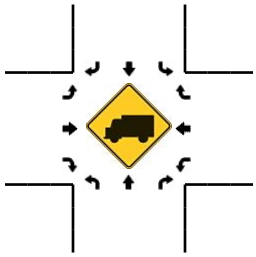
Peak 15-Min: 5:05 PM -- 5:20 PM

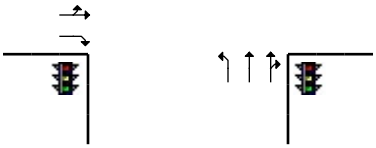


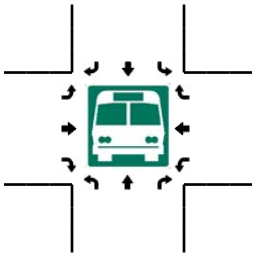












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S Myrtle St (Eastbound)				S Myrtle St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	6	52	0	1	8	77	4	2	10	1	4	0	3	0	0	0	168	
4:05 PM	9	47	2	1	2	56	10	0	5	1	2	0	4	1	5	0	145	
4:10 PM	5	75	0	1	5	90	5	0	4	2	1	0	3	2	1	0	194	
4:15 PM	6	31	1	1	3	50	11	1	16	6	9	0	10	2	6	0	153	
4:20 PM	7	74	1	2	2	81	9	3	8	1	2	0	1	4	3	0	198	
4:25 PM	5	38	0	2	6	62	4	1	8	0	6	0	2	0	0	0	134	
4:30 PM	5	61	0	2	1	87	6	0	3	1	5	0	2	1	4	0	178	
4:35 PM	1	41	1	2	3	77	2	0	10	3	6	0	4	3	3	0	156	
4:40 PM	5	54	1	0	2	68	7	0	8	0	5	0	3	3	5	0	161	
4:45 PM	1	51	0	4	0	76	6	0	11	0	1	0	3	3	2	0	158	
4:50 PM	2	54	0	2	0	75	4	0	4	1	2	0	2	1	0	0	147	
4:55 PM	4	46	4	0	4	80	6	0	5	1	4	0	4	0	7	0	165	1957
5:00 PM	5	35	0	0	5	54	7	2	5	0	3	0	4	0	10	0	130	1919
5:05 PM	6	43	0	0	4	77	11	0	17	0	5	0	5	2	8	0	178	1952
5:10 PM	5	81	0	1	2	55	4	1	5	0	7	0	2	0	5	0	168	1926
5:15 PM	0	59	1	0	0	90	4	0	11	0	6	0	2	3	2	0	178	1951
5:20 PM	2	39	0	2	6	63	7	3	5	1	6	0	2	2	5	0	143	1896
5:25 PM	4	76	0	0	1	81	8	0	2	0	6	0	0	1	2	0	181	1943
5:30 PM	6	39	1	0	3	87	11	1	3	0	4	0	4	0	4	0	163	1928
5:35 PM	4	35	0	5	2	66	6	1	8	1	10	0	4	2	4	0	148	1920
5:40 PM	5	50	0	0	3	93	4	1	4	0	8	0	5	3	4	0	180	1939
5:45 PM	2	65	0	0	2	79	6	1	5	0	4	0	4	1	1	0	170	1951
5:50 PM	3	49	0	0	1	82	9	0	5	0	6	0	4	2	2	0	163	1967
5:55 PM	3	63	1	1	0	67	7	0	7	0	2	0	3	1	2	0	157	1959

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	44	732	4	4	24	888	76	4	132	0	72	0	36	20	60	0	2096
Heavy Trucks	0	20	0		0	32	0		4	0	12		0	0	0		68
Pedestrians		104				0				0				24			128
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

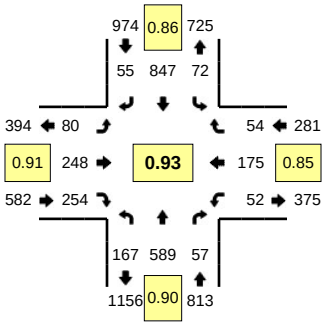
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S Othello St

QC JOB #: 10559418

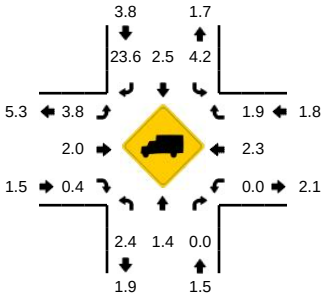
CITY/STATE: Seattle, WA

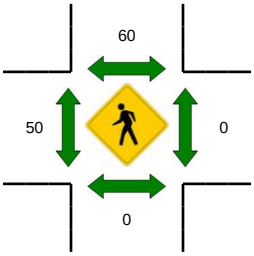
DATE: 11/17/2010

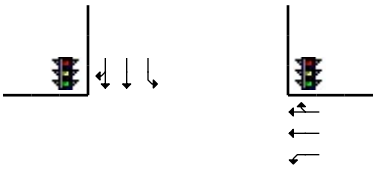


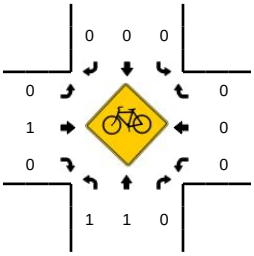
Peak-Hour: 4:50 PM -- 5:50 PM

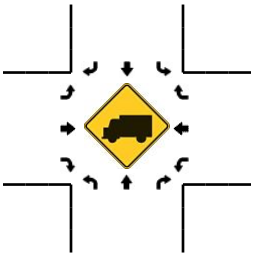
Peak 15-Min: 5:35 PM -- 5:50 PM

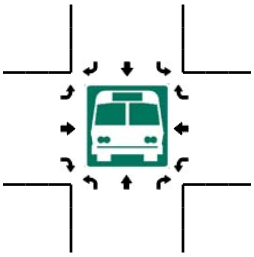












Quality Counts
TRANSPORTATION DATA COLLECTION SERVICES

5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S Othello St (Eastbound)				S Othello St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	10	47	1	0	11	62	6	0	7	22	16	0	2	14	5	0	203	
4:05 PM	9	54	4	1	4	65	5	0	7	16	23	0	12	15	10	0	225	
4:10 PM	18	55	8	1	6	62	6	0	5	19	14	0	6	12	11	0	223	
4:15 PM	12	43	3	0	2	69	6	0	7	21	20	0	3	13	8	0	207	
4:20 PM	18	69	6	0	3	84	4	0	6	17	15	0	2	8	5	0	237	
4:25 PM	25	38	4	0	6	52	4	0	11	17	26	0	5	10	7	0	205	
4:30 PM	17	51	4	0	7	84	4	0	4	12	23	0	4	14	7	0	231	
4:35 PM	14	41	3	0	10	53	6	1	8	22	24	0	7	17	6	0	212	
4:40 PM	15	60	8	1	10	76	6	0	2	9	16	0	10	11	2	0	226	
4:45 PM	8	44	5	0	3	83	3	0	8	20	18	0	2	23	5	0	222	
4:50 PM	15	44	3	0	7	57	0	0	6	27	26	0	2	9	8	0	204	
4:55 PM	13	49	7	0	7	70	2	0	7	25	16	0	7	21	3	0	227	2622
5:00 PM	6	38	2	0	1	61	3	0	4	29	22	0	2	7	5	0	180	2599
5:05 PM	14	63	5	0	10	60	6	0	12	10	5	0	11	9	1	0	206	2580
5:10 PM	12	59	5	1	4	51	6	1	7	23	27	0	4	19	5	0	224	2581
5:15 PM	18	49	5	0	5	79	8	0	3	16	25	0	0	18	5	0	231	2605
5:20 PM	20	46	2	0	8	61	2	0	10	21	17	0	7	16	4	0	214	2582
5:25 PM	11	58	3	0	5	66	6	1	6	18	27	0	4	14	3	0	222	2599
5:30 PM	15	42	8	1	2	94	5	0	5	13	20	0	4	13	7	0	229	2597
5:35 PM	13	37	3	1	7	77	1	0	7	26	30	0	4	20	7	0	233	2618
5:40 PM	12	45	7	0	9	73	8	0	7	23	21	0	3	12	3	0	223	2615
5:45 PM	15	59	7	0	5	98	8	0	6	17	18	0	4	17	3	0	257	2650
5:50 PM	13	49	3	0	5	65	6	0	10	20	18	0	2	10	2	0	203	2649
5:55 PM	16	54	5	0	3	69	7	1	3	18	22	0	3	16	3	0	220	2642

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	160	564	68	4	84	992	68	0	80	264	276	0	44	196	52	0	2852
Heavy Trucks	4	4	0		0	12	16		0	0	0		0	4	0		40
Pedestrians		0				88				32				0			120
Bicycles	1	0	0		0	0	0		0	0	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

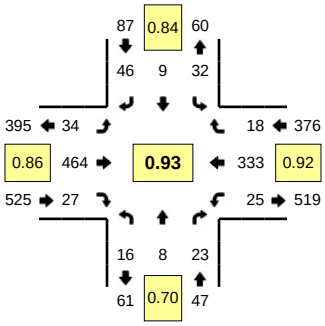
Method for determining peak hour: Total Entering Volume

LOCATION: 39th Ave S -- S Othello St

QC JOB #: 10559419

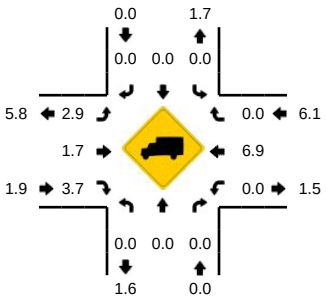
CITY/STATE: Seattle, WA

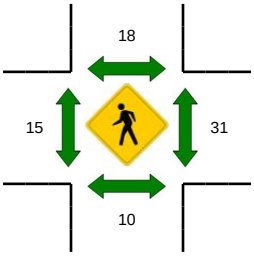
DATE: 11/17/2010

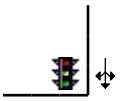


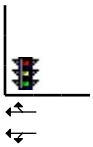
Peak-Hour: 4:45 PM -- 5:45 PM

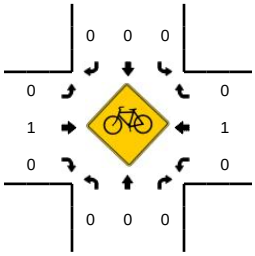
Peak 15-Min: 4:45 PM -- 5:00 PM

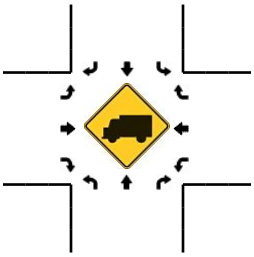


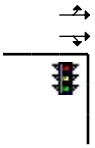


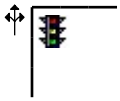


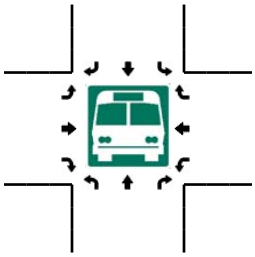












5-Min Count Period Beginning At	39th Ave S (Northbound)				39th Ave S (Southbound)				S Othello St (Eastbound)				S Othello St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	2	4	0	4	0	5	0	1	37	1	0	1	25	1	0	81	
4:05 PM	4	0	7	0	4	0	7	0	1	26	1	0	1	27	1	0	79	
4:10 PM	3	0	1	0	0	0	4	0	2	29	2	0	3	35	1	0	80	
4:15 PM	2	2	0	0	6	2	3	0	3	46	1	0	2	17	0	0	84	
4:20 PM	2	2	5	0	3	1	4	0	1	29	1	0	3	26	5	0	82	
4:25 PM	4	1	4	0	4	2	3	0	1	25	2	0	0	27	0	0	73	
4:30 PM	2	2	3	0	5	2	6	0	3	34	1	0	3	25	0	0	86	
4:35 PM	2	2	2	0	3	0	3	0	2	35	2	0	1	27	2	0	81	
4:40 PM	3	1	1	0	1	1	5	0	1	37	1	0	2	22	1	0	76	
4:45 PM	1	1	1	0	3	1	5	0	2	46	1	0	2	36	1	0	100	
4:50 PM	1	1	1	0	1	1	1	0	2	44	3	0	1	20	2	0	78	
4:55 PM	1	1	1	0	2	2	5	0	7	46	2	0	2	27	3	0	99	999
5:00 PM	1	0	2	0	3	0	4	0	0	36	3	0	0	25	0	0	74	992
5:05 PM	2	1	5	0	3	1	5	0	5	26	3	0	2	30	2	0	85	998
5:10 PM	3	1	1	0	5	1	4	0	2	47	3	0	3	24	1	0	95	1013
5:15 PM	2	0	2	0	2	0	2	0	3	37	2	0	2	30	1	0	83	1012
5:20 PM	1	0	1	0	2	1	3	0	1	30	1	0	3	35	1	0	79	1009
5:25 PM	2	1	3	0	5	1	2	0	7	35	2	0	0	24	2	0	84	1020
5:30 PM	2	1	2	0	1	1	8	0	3	37	3	0	3	27	2	0	90	1024
5:35 PM	0	0	2	0	3	0	4	0	2	35	1	0	4	30	2	0	83	1026
5:40 PM	0	1	2	0	2	0	3	0	0	45	3	0	3	25	1	0	85	1035
5:45 PM	4	1	1	0	2	3	2	0	1	38	2	0	1	35	0	0	90	1025
5:50 PM	1	2	2	0	2	1	3	0	1	45	0	0	2	25	3	0	87	1034
5:55 PM	1	1	4	0	2	0	4	0	2	23	2	0	9	25	5	0	78	1013

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	12	12	12	0	24	16	44	0	44	544	24	0	20	332	24	0	1108
Heavy Trucks	0	0	0		0	0	0		4	8	0		0	16	0		28
Pedestrians		8				12				28				32			80
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

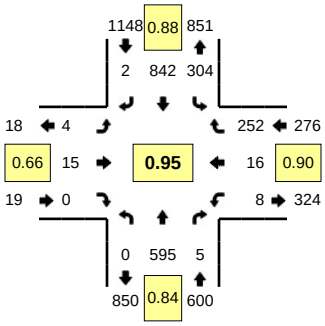
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- S Webster St

QC JOB #: 10559420

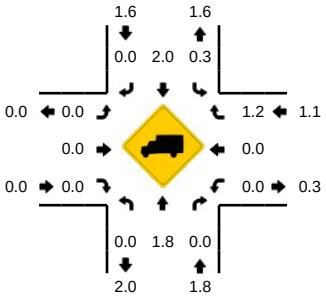
CITY/STATE: Seattle, WA

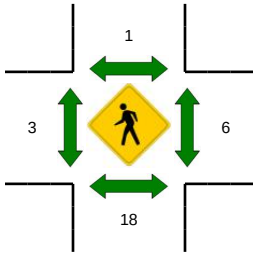
DATE: 11/17/2010

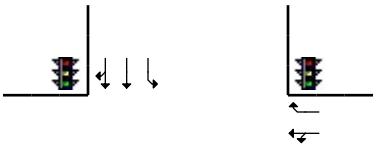


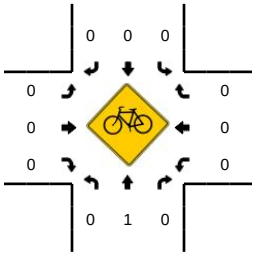
Peak-Hour: 5:00 PM -- 6:00 PM

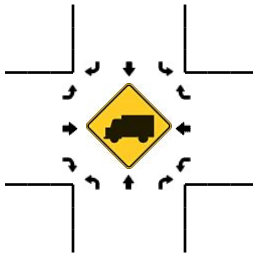
Peak 15-Min: 5:45 PM -- 6:00 PM

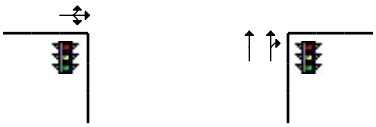


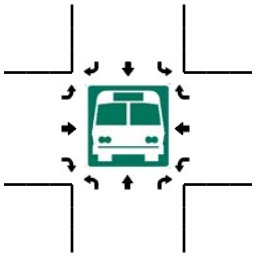












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				S Webster St (Eastbound)				S Webster St (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	39	0	0	21	45	0	0	0	2	0	0	0	7	21	0	135	
4:05 PM	0	51	0	0	32	77	0	0	0	0	0	0	0	2	37	0	199	
4:10 PM	0	47	0	0	26	69	0	0	1	0	0	0	1	3	19	0	166	
4:15 PM	0	38	3	0	16	68	0	0	1	0	0	0	1	1	21	0	149	
4:20 PM	0	66	2	0	22	72	0	0	1	0	0	0	1	2	13	0	179	
4:25 PM	0	48	0	0	23	54	1	1	1	0	1	0	0	3	17	0	149	
4:30 PM	0	48	1	0	14	78	0	0	0	1	0	0	1	3	18	0	164	
4:35 PM	0	56	0	0	43	70	0	0	0	0	0	0	0	0	21	0	190	
4:40 PM	0	39	2	0	19	73	0	0	0	0	0	0	0	2	27	0	162	
4:45 PM	0	41	0	0	32	72	0	0	0	0	0	0	0	1	16	0	162	
4:50 PM	0	39	0	0	23	56	0	0	0	3	0	0	3	5	20	0	149	
4:55 PM	0	47	0	0	20	68	1	0	0	0	0	0	1	0	23	0	160	1964
5:00 PM	0	33	0	0	27	72	0	0	0	4	0	0	4	2	24	0	166	1995
5:05 PM	0	61	1	0	19	53	0	0	1	1	0	0	1	2	23	0	162	1958
5:10 PM	0	45	0	0	21	47	0	0	0	1	0	0	0	2	24	0	140	1932
5:15 PM	0	66	1	0	16	89	2	0	0	2	0	0	2	0	20	0	198	1981
5:20 PM	0	34	0	0	34	57	0	0	1	0	0	0	0	1	28	0	155	1957
5:25 PM	0	56	1	0	25	77	0	0	0	0	0	0	0	2	18	0	179	1987
5:30 PM	0	34	0	0	32	88	0	0	0	0	0	0	0	2	19	0	175	1998
5:35 PM	0	40	1	0	21	84	0	0	1	1	0	0	0	1	19	0	168	1976
5:40 PM	0	48	1	0	20	72	0	0	0	2	0	0	0	1	20	0	164	1978
5:45 PM	0	60	0	0	34	73	0	0	1	3	0	0	0	1	20	0	192	2008
5:50 PM	0	36	0	0	30	59	0	0	0	1	0	0	1	2	20	0	149	2008
5:55 PM	0	82	0	0	25	71	0	0	0	0	0	0	0	0	17	0	195	2043

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	712	0	0	356	812	0	0	4	16	0	0	4	12	228	0	2144
Heavy Trucks	0	8	0		0	20	0		0	0	0		0	0	4		32
Pedestrians		20				0				4				4			28
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Railroad																	
Stopped Buses																	

Comments: Renton Ave

Report generated on 11/23/2010 5:26 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

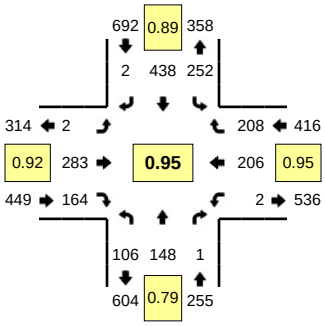
Method for determining peak hour: Total Entering Volume

LOCATION: 15th Ave S -- Beacon Ave S

QC JOB #: 10559421

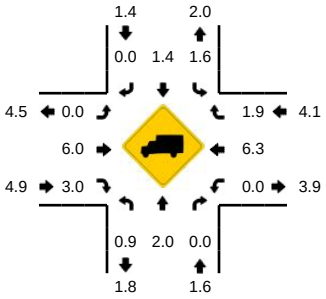
CITY/STATE: Seattle, WA

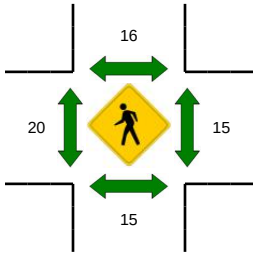
DATE: 11/17/2010

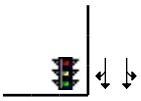


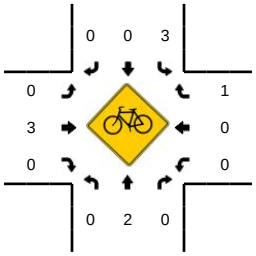
Peak-Hour: 4:20 PM -- 5:20 PM

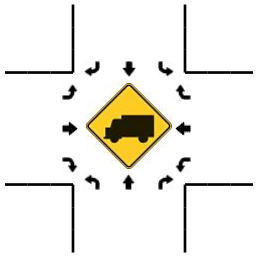
Peak 15-Min: 4:35 PM -- 4:50 PM

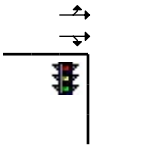


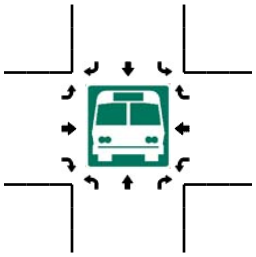












5-Min Count Period Beginning At	15th Ave S (Northbound)				15th Ave S (Southbound)				Beacon Ave S (Eastbound)				Beacon Ave S (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	7	13	0	0	21	26	0	0	0	20	10	0	0	15	17	0	129	
4:05 PM	6	16	0	0	19	31	0	0	0	24	13	0	0	12	13	0	134	
4:10 PM	11	17	0	0	12	24	0	0	0	18	10	0	0	20	8	0	120	
4:15 PM	10	7	0	0	22	40	0	0	0	33	17	0	0	15	12	0	156	
4:20 PM	13	16	0	0	24	39	0	0	0	21	14	0	0	17	23	0	167	
4:25 PM	14	17	0	0	27	41	0	0	0	13	7	0	1	18	13	0	151	
4:30 PM	9	11	0	0	12	30	0	0	0	27	19	0	0	10	16	0	134	
4:35 PM	5	7	0	0	28	39	0	0	0	32	12	0	0	18	28	0	169	
4:40 PM	5	15	0	0	31	39	1	0	0	26	17	0	0	19	15	0	168	
4:45 PM	10	13	0	0	20	36	0	0	0	22	11	0	0	17	12	0	141	
4:50 PM	12	17	0	0	17	34	0	0	0	24	9	0	0	24	14	0	151	
4:55 PM	5	6	0	0	16	33	0	0	0	21	16	0	0	17	26	0	140	1760
5:00 PM	9	12	1	0	24	31	0	0	0	17	15	0	0	11	15	0	135	1766
5:05 PM	9	14	0	0	15	25	0	0	0	26	14	0	0	13	9	0	125	1757
5:10 PM	4	2	0	0	12	51	0	0	1	28	14	0	1	20	22	0	155	1792
5:15 PM	11	18	0	0	26	40	1	0	1	26	16	0	0	22	15	0	176	1812
5:20 PM	6	13	1	0	22	32	0	0	0	19	9	0	0	6	15	0	123	1768
5:25 PM	11	15	0	0	18	30	0	0	0	31	9	0	0	12	10	0	136	1753
5:30 PM	10	20	0	0	27	34	0	0	1	27	19	0	0	18	22	0	178	1797
5:35 PM	12	16	0	0	18	47	0	0	0	28	4	0	0	8	13	0	146	1774
5:40 PM	8	8	0	0	31	35	0	0	0	23	14	0	0	9	13	0	141	1747
5:45 PM	8	13	1	0	23	37	0	0	0	28	21	0	0	14	27	0	172	1778
5:50 PM	2	0	1	0	9	20	0	0	1	20	8	0	0	13	10	0	84	1711
5:55 PM	10	19	0	0	25	24	1	0	0	19	7	0	0	11	16	0	132	1703

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	80	140	0	0	316	456	4	0	0	320	160	0	0	216	220	0	1912
Heavy Trucks	0	0	0		4	8	0		0	12	4		0	20	12		60
Pedestrians		12				24				28				24			88
Bicycles	0	0	0		0	0	0		0	1	0		0	0	0		1
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:27 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

Type of peak hour being reported: Intersection Peak

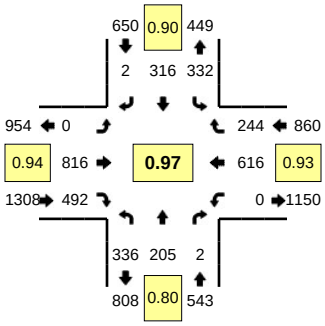
Method for determining peak hour: Total Entering Volume

LOCATION: Martin Luther King Jr Way S -- Rainier Ave S

QC JOB #: 10559422

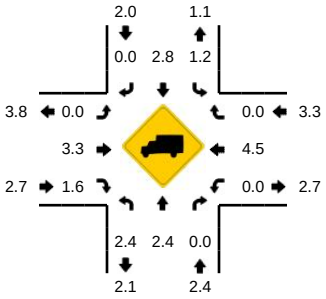
CITY/STATE: Seattle, WA

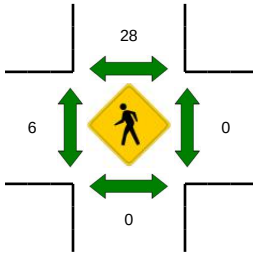
DATE: 11/17/2010

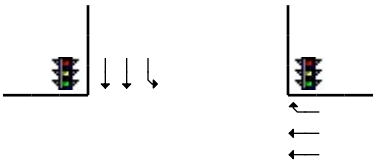


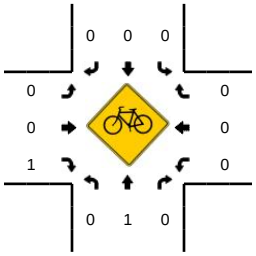
Peak-Hour: 4:55 PM -- 5:55 PM

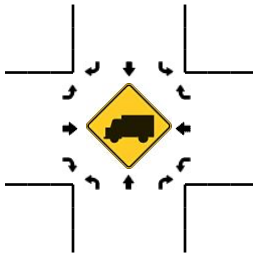
Peak 15-Min: 5:40 PM -- 5:55 PM

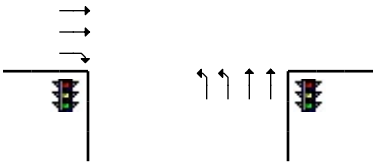


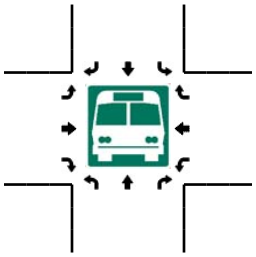












5-Min Count Period Beginning At	Martin Luther King Jr Way S (Northbound)				Martin Luther King Jr Way S (Southbound)				Rainier Ave S (Eastbound)				Rainier Ave S (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	34	25	0	0	20	32	0	0	0	61	34	0	0	56	22	0	284	
4:05 PM	18	11	0	0	23	31	1	0	0	67	40	0	0	50	19	0	260	
4:10 PM	35	23	0	0	26	28	0	0	0	58	39	0	0	59	19	0	287	
4:15 PM	18	11	0	0	31	26	0	0	0	64	41	0	0	39	21	0	251	
4:20 PM	35	25	0	0	28	27	0	0	0	53	37	0	0	53	22	0	280	
4:25 PM	19	16	0	0	29	40	0	0	0	70	42	0	0	57	22	0	295	
4:30 PM	29	24	0	0	29	28	0	0	0	67	30	0	0	53	23	0	283	
4:35 PM	25	16	0	0	27	25	0	0	0	77	43	0	0	61	18	0	292	
4:40 PM	27	13	0	0	24	23	0	0	0	69	32	0	0	52	18	0	258	
4:45 PM	33	24	0	0	24	34	0	0	0	64	42	0	0	39	12	0	272	
4:50 PM	41	17	1	0	21	25	0	0	0	66	30	0	0	52	22	0	275	
4:55 PM	23	6	0	0	28	22	0	0	0	66	51	0	0	53	21	0	270	3307
5:00 PM	24	20	0	0	21	19	0	0	0	63	46	0	0	47	22	0	262	3285
5:05 PM	23	10	0	0	27	24	0	0	0	73	48	0	0	52	27	0	284	3309
5:10 PM	49	23	0	0	22	23	2	0	0	56	37	0	0	53	18	0	283	3305
5:15 PM	28	13	0	0	27	33	0	0	0	71	48	0	0	49	20	0	289	3343
5:20 PM	40	28	1	0	31	32	0	0	0	61	30	0	0	53	13	0	289	3352
5:25 PM	24	17	1	0	29	30	0	0	0	77	35	0	0	51	20	0	284	3341
5:30 PM	19	15	0	0	28	20	0	0	0	63	49	0	0	61	19	0	274	3332
5:35 PM	24	13	0	0	26	28	0	0	0	76	38	0	0	36	18	0	259	3299
5:40 PM	34	31	0	0	34	24	0	0	0	65	37	0	0	51	27	0	303	3344
5:45 PM	19	15	0	0	32	36	0	0	0	80	36	0	0	50	18	0	286	3358
5:50 PM	29	14	0	0	27	25	0	0	0	65	37	0	0	60	21	0	278	3361
5:55 PM	20	13	0	0	32	25	0	0	0	75	42	0	0	35	12	0	254	3345

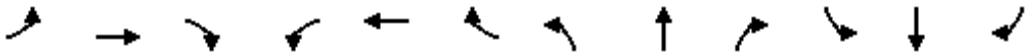
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	328	240	0	0	372	340	0	0	0	840	440	0	0	644	264	0	3468
Heavy Trucks	12	4	0		0	4	0		0	16	12		0	32	0		80
Pedestrians		0				56				4				0			60
Bicycles	0	1	0		0	0	0		0	0	1		0	0	0		2
Railroad																	
Stopped Buses																	

Comments:

Report generated on 11/23/2010 5:27 PM

SOURCE: Quality Counts, LLC (http://www.qualitycounts.net)

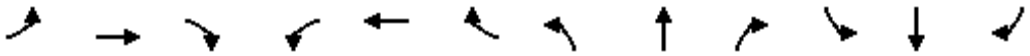
APPENDIX E:
EXISTING CONDITIONS SYNCHRO ANALYSIS RESULTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	318	180	1	198	231	114	196	4	255	435	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.90		1.00	0.94	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1827	1398		1826	1456	1770	1854		1787	1880	
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1826	1398		1825	1456	1770	1854		1787	1880	
Peak-hour factor, PHF	0.86	0.86	0.86	0.83	0.83	0.83	0.73	0.73	0.73	0.96	0.96	0.96
Adj. Flow (vph)	1	370	209	1	239	278	156	268	5	266	453	2
RTOR Reduction (vph)	0	0	0	0	0	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	371	209	0	240	278	156	272	0	266	455	0
Confl. Peds. (#/hr)	27		52	52		27	7		47	47		7
Confl. Bikes (#/hr)						1			1			3
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Turn Type	Perm		Perm	Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		20.1	20.1		20.1	20.1	16.8	16.8		23.1	23.1	
Effective Green, g (s)		20.1	20.1		20.1	20.1	16.8	16.8		23.1	23.1	
Actuated g/C Ratio		0.28	0.28		0.28	0.28	0.23	0.23		0.32	0.32	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		510	390		509	406	413	433		573	603	
v/s Ratio Prot							0.09	c0.15		0.15	c0.24	
v/s Ratio Perm		c0.20	0.15		0.13	0.19						
v/c Ratio		0.73	0.54		0.47	0.68	0.38	0.63		0.46	0.75	
Uniform Delay, d1		23.5	22.0		21.5	23.1	23.2	24.8		19.5	21.9	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		5.1	1.4		0.7	4.7	0.6	2.9		0.6	5.3	
Delay (s)		28.6	23.4		22.2	27.9	23.8	27.6		20.1	27.2	
Level of Service		C	C		C	C	C	C		C	C	
Approach Delay (s)		26.7			25.3			26.2			24.6	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	25.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	48	49	22	115	74	27	295	3	130	409	23
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.99			0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		0.99	1.00		0.99	1.00	
Frt		0.94			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1696			1740		1757	1858		1712	1806	
Flt Permitted		0.96			0.96		0.43	1.00		0.40	1.00	
Satd. Flow (perm)		1634			1680		799	1858		715	1806	
Peak-hour factor, PHF	0.79	0.79	0.79	0.81	0.81	0.81	0.84	0.84	0.84	0.89	0.89	0.89
Adj. Flow (vph)	14	61	62	27	142	91	32	351	4	146	460	26
RTOR Reduction (vph)	0	46	0	0	30	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	91	0	0	230	0	32	354	0	146	483	0
Confl. Peds. (#/hr)	17		11	11		17	33		65	65		33
Confl. Bikes (#/hr)									2			5
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		12.6			12.6		21.2	20.0		27.8	23.3	
Effective Green, g (s)		12.6			12.6		21.2	20.0		27.8	23.3	
Actuated g/C Ratio		0.26			0.26		0.43	0.41		0.57	0.47	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		419			431		368	757		496	857	
v/s Ratio Prot							0.00	0.19		c0.03	c0.27	
v/s Ratio Perm		0.06			c0.14		0.04			0.14		
v/c Ratio		0.22			0.53		0.09	0.47		0.29	0.56	
Uniform Delay, d1		14.4			15.7		8.1	10.7		5.5	9.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			1.3		0.1	0.5		0.3	0.9	
Delay (s)		14.6			17.0		8.2	11.1		5.9	10.1	
Level of Service		B			B		A	B		A	B	
Approach Delay (s)		14.6			17.0			10.9			9.1	
Approach LOS		B			B			B			A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	49.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

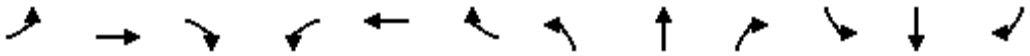
c Critical Lane Group

2: Forest St & Beacon Ave Performance by movement

Movement	EBL	EBT	EBR	WBL2	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Delay / Veh (s)	11.8	12.3	14.6	23.5		27.3	11.9	11.4	3.1	2.0	8.9	3.2
Travel Time (hr)	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.6
Vehicles Exited	1	1	5	18	0	2	1	5	87	24	2	137
Hourly Exit Rate	4	4	20	72	0	8	4	20	348	96	8	548
Input Volume	3	1	16	74	2	9	4	24	353	96	9	532
% of Volume	133	400	125	97	0	89	100	83	99	100	89	103

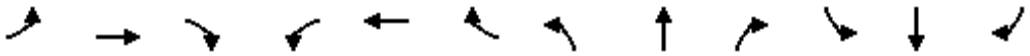
2: Forest St & Beacon Ave Performance by movement

Movement	SBR	SBR2	NEL2	NEL	NER2	All
Delay / Veh (s)	3.5	3.2		19.3		5.2
Travel Time (hr)	0.0	0.0	0.0	0.0	0.0	1.6
Vehicles Exited	9	5	0	5	0	302
Hourly Exit Rate	36	20	0	20	0	1208
Input Volume	33	18	3	20	1	1198
% of Volume	109	111	0	100	0	101



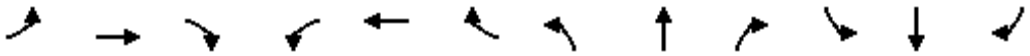
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	248	254	52	175	54	167	589	57	72	847	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1900	1583	1787	3380		1770	3460		1770	3454	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1900	1583	1787	3380		1770	3460		1770	3454	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.95	0.92
Adj. Flow (vph)	87	270	276	57	190	59	182	620	62	78	892	60
RTOR Reduction (vph)	0	0	216	0	27	0	0	5	0	0	3	0
Lane Group Flow (vph)	87	270	60	57	222	0	182	677	0	78	949	0
Confl. Peds. (#/hr)	60					60						50
Heavy Vehicles (%)	2%	0%	2%	1%	1%	1%	2%	3%	2%	2%	3%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	9.9	26.3	26.3	6.9	23.3		16.7	62.2		8.6	54.1	
Effective Green, g (s)	9.9	26.3	26.3	6.9	23.3		16.7	62.2		8.6	54.1	
Actuated g/C Ratio	0.08	0.22	0.22	0.06	0.19		0.14	0.52		0.07	0.45	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	146	416	347	103	656		246	1793		127	1557	
v/s Ratio Prot	c0.05	c0.14		0.03	0.07		c0.10	0.20		0.04	c0.27	
v/s Ratio Perm			0.04									
v/c Ratio	0.60	0.65	0.17	0.55	0.34		0.74	0.38		0.61	0.61	
Uniform Delay, d1	53.1	42.6	38.0	55.1	41.7		49.6	17.3		54.1	24.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.88	0.89		1.31	0.53	
Incremental Delay, d2	6.4	3.5	0.2	6.3	0.3		10.5	0.6		7.7	1.6	
Delay (s)	59.5	46.1	38.3	61.3	42.0		54.4	16.0		78.7	14.9	
Level of Service	E	D	D	E	D		D	B		E	B	
Approach Delay (s)		44.5			45.6			24.1			19.7	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	15	0	8	16	252	0	595	5	304	842	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00		0.95		1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.98		1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99	1.00		1.00		1.00	1.00	
Frt		1.00			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.99			0.98	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1881			1854	1560		3534		1770	3538	
Flt Permitted		0.96			0.92	1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1819			1730	1560		3534		1770	3538	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	4	16	0	9	17	274	0	647	5	330	915	2
RTOR Reduction (vph)	0	0	0	0	0	247	0	0	0	0	0	0
Lane Group Flow (vph)	0	20	0	0	26	27	0	652	0	330	917	0
Confl. Peds. (#/hr)	1		18	18		1			6			3
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm		Perm				Prot		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		11.7			11.7	11.7		68.3		28.0	100.3	
Effective Green, g (s)		11.7			11.7	11.7		68.3		28.0	100.3	
Actuated g/C Ratio		0.10			0.10	0.10		0.57		0.23	0.84	
Clearance Time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		177			169	152		2011		413	2957	
v/s Ratio Prot								c0.18		c0.19	0.26	
v/s Ratio Perm		0.01			0.02	c0.02						
v/c Ratio		0.11			0.15	0.18		0.32		0.80	0.31	
Uniform Delay, d1		49.4			49.6	49.7		13.7		43.3	2.2	
Progression Factor		1.00			1.00	1.00		1.00		0.64	1.27	
Incremental Delay, d2		0.3			0.4	0.6		0.4		8.9	0.2	
Delay (s)		49.7			50.0	50.3		14.1		36.7	3.0	
Level of Service		D			D	D		B		D	A	
Approach Delay (s)		49.7			50.3			14.1			11.9	
Approach LOS		D			D			B			B	

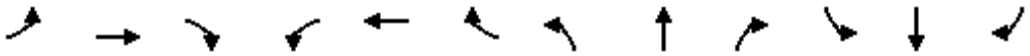
Intersection Summary			
HCM Average Control Delay	18.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	34	464	27	25	333	18	16	8	23	32	9	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.99			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			1.00	
Frt		0.99			0.99			0.93			0.93	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		3494			3495			1692			1680	
Flt Permitted		0.91			0.91			0.85			0.86	
Satd. Flow (perm)		3204			3174			1465			1467	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	37	504	29	27	362	20	17	9	25	35	10	50
RTOR Reduction (vph)	0	6	0	0	6	0	0	21	0	0	42	0
Lane Group Flow (vph)	0	564	0	0	403	0	0	30	0	0	53	0
Confl. Peds. (#/hr)	18		10	10		18	15		31	31		15
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		10.2			10.2			3.3			3.3	
Effective Green, g (s)		10.2			10.2			3.3			3.3	
Actuated g/C Ratio		0.47			0.47			0.15			0.15	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1520			1506			225			225	
v/s Ratio Prot												
v/s Ratio Perm		c0.18			0.13			0.02			c0.04	
v/c Ratio		0.37			0.27			0.13			0.23	
Uniform Delay, d1		3.6			3.4			7.9			8.0	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.2			0.1			0.3			0.5	
Delay (s)		3.8			3.5			8.1			8.5	
Level of Service		A			A			A			A	
Approach Delay (s)		3.8			3.5			8.1			8.5	
Approach LOS		A			A			A			A	

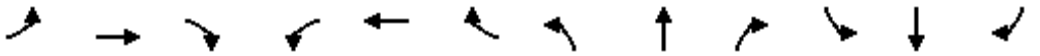
Intersection Summary			
HCM Average Control Delay	4.3	HCM Level of Service	A
HCM Volume to Capacity ratio	0.34		
Actuated Cycle Length (s)	21.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	50.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



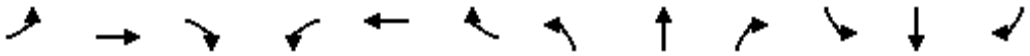
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	75	3	69	40	16	54	54	617	6	43	907	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.92		1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		0.98		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.93		1.00	1.00		1.00	0.99	
Flt Protected		0.95	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1760	1287		1668		1770	3498		1770	3464	
Flt Permitted		0.62	1.00		0.87		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1147	1287		1482		1770	3498		1770	3464	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	82	3	75	43	17	59	59	671	7	47	986	90
RTOR Reduction (vph)	0	0	60	0	34	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	85	15	0	85	0	59	678	0	47	1072	0
Confl. Peds. (#/hr)			71	71					12			
Heavy Vehicles (%)	3%	2%	15%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		24.6	24.6		24.6		8.2	75.9		7.5	75.2	
Effective Green, g (s)		24.6	24.6		24.6		8.2	75.9		7.5	75.2	
Actuated g/C Ratio		0.21	0.21		0.21		0.07	0.63		0.06	0.63	
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		235	264		304		121	2212		111	2171	
v/s Ratio Prot							c0.03	0.19		0.03	c0.31	
v/s Ratio Perm		c0.07	0.01		0.06							
v/c Ratio		0.36	0.06		0.28		0.49	0.31		0.42	0.49	
Uniform Delay, d1		41.0	38.4		40.2		53.9	10.1		54.2	12.1	
Progression Factor		1.00	1.00		1.00		0.96	0.53		1.00	1.00	
Incremental Delay, d2		1.0	0.1		0.5		2.9	0.3		2.6	0.8	
Delay (s)		41.9	38.5		40.7		54.4	5.7		56.8	12.9	
Level of Service		D	D		D		D	A		E	B	
Approach Delay (s)		40.3			40.7			9.6			14.8	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	23	35	36	11	44	16	1018	52	112	1359	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	10	12	12	10	10	10	10	10	10	10
Total Lost time (s)		4.0		4.0	4.0		2.1	4.5		2.1	4.5	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.93		1.00	0.88		1.00	0.99		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1676		1743	1544		1620	3107		1636	3204	
Flt Permitted		0.93		0.51	1.00		0.16	1.00		0.21	1.00	
Satd. Flow (perm)		1579		935	1544		268	3107		368	3204	
Peak-hour factor, PHF	0.74	0.74	0.74	0.81	0.81	0.81	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	18	31	47	44	14	54	17	1107	57	118	1431	3
RTOR Reduction (vph)	0	27	0	0	48	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	69	0	44	20	0	17	1162	0	118	1434	0
Confl. Peds. (#/hr)	27		4	4		27	32		20	20		32
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	15	0	0	10	0
Turn Type	Perm			Perm			D.P+P			D.P+P		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4			6			2		
Actuated Green, G (s)		13.9		13.9	13.9		111.0	104.6		111.0	108.9	
Effective Green, g (s)		15.4		15.4	15.4		114.0	106.1		114.0	110.4	
Actuated g/C Ratio		0.11		0.11	0.11		0.81	0.76		0.81	0.79	
Clearance Time (s)		5.5		5.5	5.5		3.6	6.0		3.6	6.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		174		103	170		253	2355		371	2527	
v/s Ratio Prot					0.01		0.00	0.37		c0.02	c0.45	
v/s Ratio Perm		0.04		c0.05			0.05			0.24		
v/c Ratio		0.40		0.43	0.12		0.07	0.49		0.32	0.57	
Uniform Delay, d1		58.0		58.2	56.2		3.5	6.6		3.4	5.7	
Progression Factor		1.00		1.07	1.32		0.70	2.08		1.00	1.00	
Incremental Delay, d2		0.5		1.0	0.1		0.0	0.6		0.2	0.9	
Delay (s)		58.5		63.4	74.4		2.5	14.2		3.6	6.6	
Level of Service		E		E	E		A	B		A	A	
Approach Delay (s)		58.5			70.1			14.1			6.4	
Approach LOS		E			E			B			A	

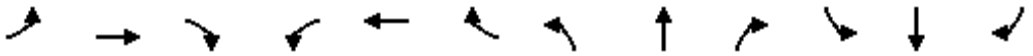
Intersection Summary			
HCM Average Control Delay	13.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	6.1
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	106	305	134	26	192	110	92	870	27	110	1183	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	10	10	10	10	12	10	10	10	10	10	10
Total Lost time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.95		1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1608	3171		1668	3102		1604	3127		1636	4589	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1608	3171		1668	3102		1604	3127		1636	4589	
Peak-hour factor, PHF	0.95	0.95	0.95	0.84	0.84	0.84	0.92	0.92	0.92	0.97	0.97	0.97
Adj. Flow (vph)	112	321	141	31	229	131	100	946	29	113	1220	56
RTOR Reduction (vph)	0	37	0	0	59	0	0	2	0	0	3	0
Lane Group Flow (vph)	112	425	0	31	301	0	100	973	0	113	1273	0
Confl. Peds. (#/hr)	16					16	31		12	12		31
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	5%	5%	5%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	10	0	0	10	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	13.7	29.4		6.3	22.0		21.5	67.3		14.0	59.8	
Effective Green, g (s)	15.2	30.9		7.8	23.5		23.0	68.8		15.5	61.3	
Actuated g/C Ratio	0.11	0.22		0.06	0.17		0.16	0.49		0.11	0.44	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	175	700		93	521		264	1537		181	2009	
v/s Ratio Prot	0.07	c0.13		0.02	c0.10		0.06	c0.31		0.07	c0.28	
v/s Ratio Perm												
v/c Ratio	0.64	0.61		0.33	0.58		0.38	0.63		0.62	0.63	
Uniform Delay, d1	59.8	49.1		63.6	53.7		52.1	26.3		59.5	30.6	
Progression Factor	1.00	1.00		0.93	0.89		0.76	0.58		0.89	0.92	
Incremental Delay, d2	7.7	1.5		2.0	1.5		0.3	1.8		4.1	1.3	
Delay (s)	67.5	50.6		61.1	49.5		40.0	17.1		57.0	29.5	
Level of Service	E	D		E	D		D	B		E	C	
Approach Delay (s)		53.9			50.5			19.2			31.8	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM Average Control Delay	33.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

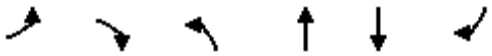
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	826	483	0	638	260	345	205	0	321	323	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	10	9	9	10	10	10	10	10	10
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00		0.95	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00		1.00	0.92	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3271	1516		3154	1300	3204	3303		1636	3271	
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3271	1516		3154	1300	3204	3303		1636	3271	
Peak-hour factor, PHF	0.92	0.92	0.92	0.94	0.94	0.94	0.82	0.82	0.82	0.89	0.89	0.89
Adj. Flow (vph)	0	898	525	0	679	277	421	250	0	361	363	0
RTOR Reduction (vph)	0	0	0	0	0	102	0	0	0	0	0	0
Lane Group Flow (vph)	0	898	525	0	679	175	421	250	0	361	363	0
Confl. Peds. (#/hr)						52						
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	3%	3%	3%
Turn Type			Perm			Perm	custom			Split		
Protected Phases		2			6		4	4		3	3	
Permitted Phases			2			6	4					
Actuated Green, G (s)		63.6	63.6		63.6	63.6	21.2	21.2		35.7	35.7	
Effective Green, g (s)		66.1	66.1		66.1	66.1	23.7	23.7		38.2	38.2	
Actuated g/C Ratio		0.47	0.47		0.47	0.47	0.17	0.17		0.27	0.27	
Clearance Time (s)		6.5	6.5		6.5	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1544	716		1489	614	542	559		446	893	
v/s Ratio Prot		0.27			0.22		c0.13	0.08		c0.22	0.11	
v/s Ratio Perm			c0.35			0.13						
v/c Ratio		0.58	0.73		0.46	0.28	0.78	0.45		0.81	0.41	
Uniform Delay, d1		26.9	29.8		24.9	22.5	55.6	52.3		47.5	41.6	
Progression Factor		0.25	0.28		0.76	0.88	0.83	0.80		0.88	0.87	
Incremental Delay, d2		1.5	6.2		0.9	1.0	6.1	0.2		9.4	0.1	
Delay (s)		8.3	14.7		19.9	20.9	52.1	42.2		51.1	36.4	
Level of Service		A	B		B	C	D	D		D	D	
Approach Delay (s)		10.6			20.1			48.4			43.7	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	26.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

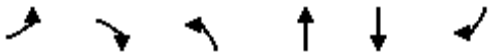
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	7	12	16	949	1148	10
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.79	0.79	0.96	0.96	0.95	0.95
Hourly flow rate (vph)	9	15	17	989	1208	11
Pedestrians	6				3	
Lane Width (ft)	10.0				10.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)				741	688	
pX, platoon unblocked	0.86	0.81	0.81			
vC, conflicting volume	1750	615	1225			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1023	65	815			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	95	98	97			
cM capacity (veh/h)	197	803	654			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	24	17	494	494	806	413
Volume Left	9	17	0	0	0	0
Volume Right	15	0	0	0	0	11
cSH	376	654	1700	1700	1700	1700
Volume to Capacity	0.06	0.03	0.29	0.29	0.47	0.24
Queue Length 95th (ft)	4	2	0	0	0	0
Control Delay (s)	15.2	10.7	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	15.2	0.2			0.0	
Approach LOS	C					

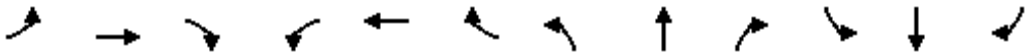
Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	45.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	35	169	61	548	705	57
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1463	1309	1492	2985	2917	
Flt Permitted	0.95	1.00	0.28	1.00	1.00	
Satd. Flow (perm)	1463	1309	432	2985	2917	
Peak-hour factor, PHF	0.81	0.81	0.91	0.91	0.90	0.90
Adj. Flow (vph)	43	209	67	602	783	63
RTOR Reduction (vph)	0	184	0	0	6	0
Lane Group Flow (vph)	43	25	67	602	840	0
Confl. Peds. (#/hr)	2		2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	1%	1%	2%	2%
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	8.3	8.3	52.7	52.7	44.0	
Effective Green, g (s)	8.3	8.3	52.7	52.7	44.0	
Actuated g/C Ratio	0.12	0.12	0.75	0.75	0.63	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	173	155	389	2247	1834	
v/s Ratio Prot	c0.03		0.01	c0.20	c0.29	
v/s Ratio Perm		0.02	0.12			
v/c Ratio	0.25	0.16	0.17	0.27	0.46	
Uniform Delay, d1	28.0	27.7	2.8	2.7	6.8	
Progression Factor	0.99	1.36	1.08	1.49	1.00	
Incremental Delay, d2	0.3	0.2	0.1	0.3	0.8	
Delay (s)	28.1	37.9	3.1	4.3	7.6	
Level of Service	C	D	A	A	A	
Approach Delay (s)	36.3			4.2	7.6	
Approach LOS	D			A	A	

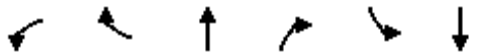
Intersection Summary			
HCM Average Control Delay	10.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.42		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	89	306	38	65	223	86	9	421	55	223	558	92
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Width	11	10	10	11	10	10	9	10	10	10	10	10
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.98		1.00	0.96		1.00	0.98		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1483	2663		1500	2780		1451	2954		1484	2915	
Flt Permitted	0.51	1.00		0.44	1.00		0.38	1.00		0.47	1.00	
Satd. Flow (perm)	800	2663		694	2780		580	2954		727	2915	
Peak-hour factor, PHF	0.88	0.88	0.88	0.95	0.95	0.95	0.94	0.94	0.94	0.96	0.96	0.96
Adj. Flow (vph)	101	348	43	68	235	91	10	448	59	232	581	96
RTOR Reduction (vph)	0	15	0	0	64	0	0	12	0	0	16	0
Lane Group Flow (vph)	101	376	0	68	262	0	10	495	0	232	661	0
Confl. Peds. (#/hr)	16		16	16		16	3		9	9		3
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	0%	0%	0%	1%	1%	1%
Parking (#/hr)		5										
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	15.9	15.9		15.9	15.9		45.1	45.1		45.1	45.1	
Effective Green, g (s)	15.9	15.9		15.9	15.9		45.1	45.1		45.1	45.1	
Actuated g/C Ratio	0.23	0.23		0.23	0.23		0.64	0.64		0.64	0.64	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	182	605		158	631		374	1903		468	1878	
v/s Ratio Prot		c0.14			0.09			0.17			0.23	
v/s Ratio Perm	0.13			0.10			0.02			c0.32		
v/c Ratio	0.55	0.62		0.43	0.41		0.03	0.26		0.50	0.35	
Uniform Delay, d1	23.9	24.3		23.2	23.1		4.5	5.3		6.5	5.7	
Progression Factor	0.75	0.75		1.00	1.00		0.26	0.61		0.75	0.77	
Incremental Delay, d2	1.8	1.3		0.7	0.2		0.1	0.3		3.4	0.5	
Delay (s)	19.8	19.5		23.9	23.2		1.3	3.6		8.3	4.9	
Level of Service	B	B		C	C		A	A		A	A	
Approach Delay (s)		19.6			23.3			3.5			5.7	
Approach LOS		B			C			A			A	

Intersection Summary			
HCM Average Control Delay	11.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	62.0%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

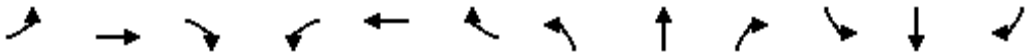


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	21	6	614	20	0	836
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.99		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.97		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1276		2936			2956
Flt Permitted	0.96		1.00			1.00
Satd. Flow (perm)	1276		2936			2956
Peak-hour factor, PHF	0.48	0.48	0.84	0.84	0.90	0.90
Adj. Flow (vph)	44	12	731	24	0	929
RTOR Reduction (vph)	8	0	1	0	0	0
Lane Group Flow (vph)	48	0	754	0	0	929
Confl. Peds. (#/hr)	2	25		14	14	
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	15%	15%	2%	2%	2%	2%
Turn Type						
Protected Phases	8		2			6
Permitted Phases						
Actuated Green, G (s)	18.3		112.7			112.7
Effective Green, g (s)	18.3		112.7			112.7
Actuated g/C Ratio	0.13		0.81			0.81
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	2.0		2.0			2.0
Lane Grp Cap (vph)	167		2363			2380
v/s Ratio Prot	c0.04		0.26			c0.31
v/s Ratio Perm						
v/c Ratio	0.29		0.32			0.39
Uniform Delay, d1	55.0		3.6			3.9
Progression Factor	1.15		0.85			0.20
Incremental Delay, d2	0.3		0.3			0.4
Delay (s)	63.3		3.4			1.2
Level of Service	E		A			A
Approach Delay (s)	63.3		3.4			1.2
Approach LOS	E		A			A

Intersection Summary			
HCM Average Control Delay	4.2	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	49.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

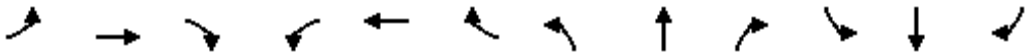
APPENDIX F:
2030 NO ACTION CONDITIONS SYNCHRO ANALYSIS RESULTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	420	200	10	390	240	180	220	10	340	540	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.87		1.00	0.91	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1824	1351		1823	1413	1770	1838		1787	1874	
Flt Permitted		0.97	1.00		0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1772	1351		1638	1413	1770	1838		1787	1874	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	11	457	217	11	424	261	196	239	11	354	562	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	468	217	0	435	261	196	248	0	354	571	0
Confl. Peds. (#/hr)	37		60	60		37	15		60	60		15
Confl. Bikes (#/hr)			5			5			5			5
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Turn Type	Perm		Perm	Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		25.3	25.3		25.3	25.3	16.5	16.5		28.3	28.3	
Effective Green, g (s)		25.3	25.3		25.3	25.3	16.5	16.5		28.3	28.3	
Actuated g/C Ratio		0.31	0.31		0.31	0.31	0.20	0.20		0.34	0.34	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		546	416		505	435	356	369		616	646	
v/s Ratio Prot							0.11	c0.14		0.20	c0.30	
v/s Ratio Perm		0.26	0.16		c0.27	0.18						
v/c Ratio		0.86	0.52		0.86	0.60	0.55	0.67		0.57	0.88	
Uniform Delay, d1		26.7	23.4		26.7	24.1	29.5	30.3		22.0	25.4	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		12.6	1.2		14.0	2.2	1.8	4.8		1.3	13.6	
Delay (s)		39.3	24.6		40.8	26.3	31.3	35.1		23.3	39.0	
Level of Service		D	C		D	C	C	D		C	D	
Approach Delay (s)		34.6			35.4			33.4			33.0	
Approach LOS		C			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	82.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	50	50	110	145	75	30	480	10	150	540	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00			0.99		1.00	1.00		0.99	1.00	
Frt		0.95			0.97		1.00	1.00		1.00	0.98	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1683			1735		1765	1852		1723	1779	
Flt Permitted		0.88			0.85		0.21	1.00		0.24	1.00	
Satd. Flow (perm)		1499			1497		386	1852		444	1779	
Peak-hour factor, PHF	0.79	0.79	0.79	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	63	63	129	171	88	33	522	11	163	587	76
RTOR Reduction (vph)	0	32	0	0	15	0	0	1	0	0	6	0
Lane Group Flow (vph)	0	132	0	0	373	0	33	532	0	163	657	0
Confl. Peds. (#/hr)	30		25	25		30	40		80	80		40
Confl. Bikes (#/hr)			5			5			5			10
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		18.9			18.9		26.2	24.9		31.0	27.3	
Effective Green, g (s)		18.9			18.9		26.2	24.9		31.0	27.3	
Actuated g/C Ratio		0.32			0.32		0.44	0.42		0.52	0.46	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		476			476		200	775		311	816	
v/s Ratio Prot							0.00	0.29		c0.03	c0.37	
v/s Ratio Perm		0.09			c0.25		0.07			0.24		
v/c Ratio		0.28			0.78		0.17	0.69		0.52	0.80	
Uniform Delay, d1		15.2			18.4		10.8	14.1		9.3	13.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.3			8.2		0.4	2.5		1.6	5.8	
Delay (s)		15.5			26.7		11.2	16.6		10.9	19.6	
Level of Service		B			C		B	B		B	B	
Approach Delay (s)		15.5			26.7			16.3			17.9	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	59.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

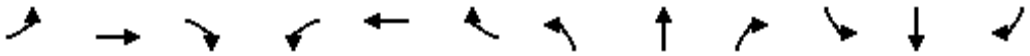
c Critical Lane Group

4: Forest St & Beacon Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.0
Delay / Veh (s)	45.0	42.1	17.7	41.2	46.7	22.0	14.5	7.1	6.1	11.1	3.1	2.6
Total Stops	1	2	7	10	3	8	7	7	1	2	10	1
Travel Dist (mi)	0.2	0.3	1.0	1.3	0.4	1.0	5.7	93.8	7.1	0.6	27.8	0.9
Travel Time (hr)	0.0	0.0	0.1	0.2	0.1	0.1	0.2	3.5	0.3	0.0	1.1	0.0
Avg Speed (mph)	10	9	13	9	8	12	24	27	27	20	26	24
Fuel Used (gal)	0.0	0.0	0.0	0.1	0.0	0.0	0.1	2.3	0.2	0.0	0.7	0.0
HC Emissions (g)	0	0	0	0	0	0	1	42	3	0	14	1
CO Emissions (g)	1	2	6	13	5	10	23	670	51	7	279	11
NOx Emissions (g)	0	0	0	1	0	1	3	107	8	1	38	2
Vehicles Entered	1	2	7	10	3	8	9	152	11	4	185	6
Vehicles Exited	1	2	7	9	3	7	9	148	12	4	186	6
Hourly Exit Rate	4	8	28	36	12	28	36	592	48	16	744	24
Input Volume	7	10	30	39	13	26	36	601	48	16	731	22
% of Volume	57	80	93	92	92	108	100	99	100	100	102	109
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

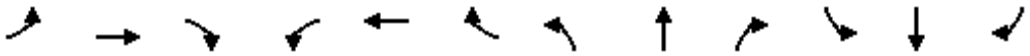
4: Forest St & Beacon Ave Performance by movement

Movement	All
Total Delay (hr)	0.8
Delay / Veh (s)	7.1
Total Stops	59
Travel Dist (mi)	140.1
Travel Time (hr)	5.6
Avg Speed (mph)	26
Fuel Used (gal)	3.5
HC Emissions (g)	62
CO Emissions (g)	1077
NOx Emissions (g)	163
Vehicles Entered	398
Vehicles Exited	394
Hourly Exit Rate	1576
Input Volume	1579
% of Volume	100
Denied Entry Before	0
Denied Entry After	0



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	360	370	60	180	60	200	820	60	120	1120	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.95	1.00	0.98		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1900	1508	1787	3360		1770	3433		1770	3457	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1900	1508	1787	3360		1770	3433		1770	3457	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.95	0.92
Adj. Flow (vph)	87	391	402	65	196	65	217	863	65	130	1179	65
RTOR Reduction (vph)	0	0	212	0	28	0	0	4	0	0	3	0
Lane Group Flow (vph)	87	391	190	65	233	0	217	924	0	130	1241	0
Confl. Peds. (#/hr)	70		30	30		70			50			70
Heavy Vehicles (%)	2%	0%	2%	1%	1%	1%	2%	3%	2%	2%	3%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	7.9	28.8	28.8	5.6	26.5		17.2	56.2		13.4	52.4	
Effective Green, g (s)	7.9	28.8	28.8	5.6	26.5		17.2	56.2		13.4	52.4	
Actuated g/C Ratio	0.07	0.24	0.24	0.05	0.22		0.14	0.47		0.11	0.44	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	117	456	362	83	742		254	1608		198	1510	
v/s Ratio Prot	c0.05	c0.21		0.04	0.07		c0.12	c0.27		0.07	c0.36	
v/s Ratio Perm			0.13									
v/c Ratio	0.74	0.86	0.52	0.78	0.31		0.85	0.57		0.66	0.82	
Uniform Delay, d1	55.1	43.6	39.6	56.6	39.1		50.2	23.2		51.1	29.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.96	0.84		1.24	0.71	
Incremental Delay, d2	22.3	14.7	1.4	37.0	0.2		21.3	1.3		6.1	4.1	
Delay (s)	77.3	58.3	41.0	93.6	39.4		69.6	20.9		69.3	25.3	
Level of Service	E	E	D	F	D		E	C		E	C	
Approach Delay (s)		52.3			50.2			30.1			29.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



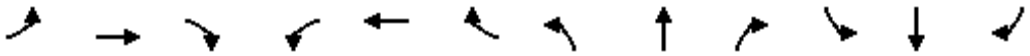
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	20	5	10	20	370	0	730	10	360	1160	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00		0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.95		1.00		1.00	1.00	
Flpb, ped/bikes		1.00			0.99	1.00		1.00		1.00	1.00	
Frt		0.98			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.99			0.98	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1819			1848	1497		3530		1770	3532	
Flt Permitted		0.92			0.91	1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1706			1716	1497		3530		1770	3532	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	22	5	11	22	402	0	793	11	391	1261	11
RTOR Reduction (vph)	0	4	0	0	0	360	0	0	0	0	0	0
Lane Group Flow (vph)	0	34	0	0	33	42	0	804	0	391	1272	0
Confl. Peds. (#/hr)	15		30	30		15			15			15
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm		Perm				Prot		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		12.4			12.4	12.4		64.2		31.4	99.6	
Effective Green, g (s)		12.4			12.4	12.4		64.2		31.4	99.6	
Actuated g/C Ratio		0.10			0.10	0.10		0.54		0.26	0.83	
Clearance Time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		176			177	155		1889		463	2932	
v/s Ratio Prot								0.23		c0.22	c0.36	
v/s Ratio Perm		0.02			0.02	c0.03						
v/c Ratio		0.19			0.19	0.27		0.43		0.84	0.43	
Uniform Delay, d1		49.2			49.2	49.6		16.8		42.0	2.7	
Progression Factor		1.00			1.00	1.00		1.00		0.71	1.45	
Incremental Delay, d2		0.5			0.5	0.9		0.7		8.7	0.3	
Delay (s)		49.7			49.7	50.5		17.5		38.3	4.2	
Level of Service		D			D	D		B		D	A	
Approach Delay (s)		49.7			50.5			17.5			12.2	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	600	35	30	365	20	25	10	45	145	30	150
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.98			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			0.99	
Frt		0.99			0.99			0.92			0.94	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		3490			3489			1663			1678	
Flt Permitted		0.91			0.88			0.86			0.82	
Satd. Flow (perm)		3191			3096			1446			1404	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	652	38	33	397	22	27	11	49	158	33	163
RTOR Reduction (vph)	0	6	0	0	6	0	0	31	0	0	62	0
Lane Group Flow (vph)	0	727	0	0	446	0	0	56	0	0	292	0
Confl. Peds. (#/hr)	30		20	20		30	25		40	40		25
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		14.9			14.9			13.4			13.4	
Effective Green, g (s)		14.9			14.9			13.4			13.4	
Actuated g/C Ratio		0.41			0.41			0.37			0.37	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1310			1271			534			518	
v/s Ratio Prot												
v/s Ratio Perm		c0.23			0.14			0.04			c0.21	
v/c Ratio		0.55			0.35			0.11			0.56	
Uniform Delay, d1		8.2			7.4			7.5			9.1	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.2			0.1			1.4	
Delay (s)		8.7			7.5			7.6			10.5	
Level of Service		A			A			A			B	
Approach Delay (s)		8.7			7.5			7.6			10.5	
Approach LOS		A			A			A			B	

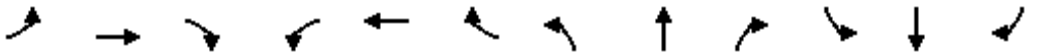
Intersection Summary			
HCM Average Control Delay	8.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	36.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	120	10	110	60	25	65	75	845	10	60	1150	115
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.90		0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.98	1.00		0.97		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.94		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1730	1267		1642		1770	3495		1770	3433	
Flt Permitted		0.57	1.00		0.79		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1027	1267		1318		1770	3495		1770	3433	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	130	11	120	65	27	71	82	918	11	65	1250	125
RTOR Reduction (vph)	0	0	93	0	26	0	0	0	0	0	5	0
Lane Group Flow (vph)	0	141	27	0	137	0	82	929	0	65	1370	0
Confl. Peds. (#/hr)	30		85	85		30			20			20
Heavy Vehicles (%)	3%	2%	15%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		26.8	26.8		26.8		8.8	73.6		7.6	72.4	
Effective Green, g (s)		26.8	26.8		26.8		8.8	73.6		7.6	72.4	
Actuated g/C Ratio		0.22	0.22		0.22		0.07	0.61		0.06	0.60	
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		229	283		294		130	2144		112	2071	
v/s Ratio Prot							c0.05	0.27		0.04	c0.40	
v/s Ratio Perm		c0.14	0.02		0.10							
v/c Ratio		0.62	0.09		0.47		0.63	0.43		0.58	0.66	
Uniform Delay, d1		42.0	37.0		40.4		54.0	12.2		54.6	15.7	
Progression Factor		1.00	1.00		1.00		0.95	0.73		1.00	1.00	
Incremental Delay, d2		4.9	0.1		1.2		8.0	0.5		7.4	1.7	
Delay (s)		46.8	37.1		41.6		59.2	9.5		62.1	17.4	
Level of Service		D	D		D		E	A		E	B	
Approach Delay (s)		42.4			41.6			13.5			19.4	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	20.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



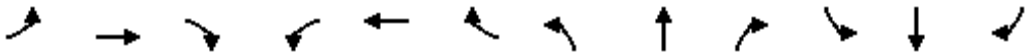
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	30	40	40	15	90	20	1340	55	240	1570	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	10	12	12	10	10	10	10	10	10	10
Total Lost time (s)		4.0		4.0	4.0		2.1	4.5		2.1	4.5	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.95		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.94		1.00	0.87		1.00	0.99		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1686		1743	1520		1620	3114		1636	3199	
Flt Permitted		0.80		0.52	1.00		0.11	1.00		0.12	1.00	
Satd. Flow (perm)		1364		948	1520		193	3114		205	3199	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	22	33	43	43	16	98	22	1457	60	253	1653	11
RTOR Reduction (vph)	0	21	0	0	87	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	77	0	43	27	0	22	1515	0	253	1664	0
Confl. Peds. (#/hr)	27		4	4		27	32		20	20		32
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	15	0	0	10	0
Turn Type	Perm			Perm			D.P+P			D.P+P		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4			6			2		
Actuated Green, G (s)		14.2		14.2	14.2		110.7	95.9		110.7	107.6	
Effective Green, g (s)		15.7		15.7	15.7		113.7	97.4		113.7	109.1	
Actuated g/C Ratio		0.11		0.11	0.11		0.81	0.70		0.81	0.78	
Clearance Time (s)		5.5		5.5	5.5		3.6	6.0		3.6	6.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		153		106	170		204	2166		333	2493	
v/s Ratio Prot					0.02		0.00	c0.49		c0.09	0.52	
v/s Ratio Perm		c0.06		0.05			0.08			0.53		
v/c Ratio		0.50		0.41	0.16		0.11	0.70		0.76	0.67	
Uniform Delay, d1		58.5		57.8	56.2		4.9	12.6		22.0	7.1	
Progression Factor		1.00		1.15	1.56		0.43	1.89		1.00	1.00	
Incremental Delay, d2		0.9		0.9	0.1		0.0	1.0		8.6	1.4	
Delay (s)		59.4		67.5	87.5		2.1	25.0		30.6	8.5	
Level of Service		E		E	F		A	C		C	A	
Approach Delay (s)		59.4			82.0			24.6			11.5	
Approach LOS		E			F			C			B	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	76.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	360	140	40	200	110	95	1190	30	120	1370	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	10	10	10	10	12	10	10	10	10	10	10
Total Lost time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1608	3184		1668	3107		1604	3130		1636	4570	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1608	3184		1668	3107		1604	3130		1636	4570	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.97	0.97
Adj. Flow (vph)	137	379	147	43	217	120	103	1293	33	124	1412	93
RTOR Reduction (vph)	0	31	0	0	55	0	0	1	0	0	5	0
Lane Group Flow (vph)	137	495	0	43	282	0	103	1325	0	124	1500	0
Confl. Peds. (#/hr)	16					16	31		12	12		31
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	5%	5%	5%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	10	0	0	10	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	14.7	28.8		7.2	21.3		21.6	66.0		15.0	59.4	
Effective Green, g (s)	16.2	30.3		8.7	22.8		23.1	67.5		16.5	60.9	
Actuated g/C Ratio	0.12	0.22		0.06	0.16		0.17	0.48		0.12	0.43	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	186	689		104	506		265	1509		193	1988	
v/s Ratio Prot	0.09	c0.16		0.03	c0.09		0.06	c0.42		0.08	c0.33	
v/s Ratio Perm												
v/c Ratio	0.74	0.72		0.41	0.56		0.39	0.88		0.64	0.75	
Uniform Delay, d1	59.8	50.9		63.2	53.9		52.2	32.6		58.9	33.3	
Progression Factor	1.00	1.00		0.89	0.90		0.61	0.40		0.85	0.86	
Incremental Delay, d2	14.1	3.6		2.4	1.2		0.3	6.4		4.1	2.1	
Delay (s)	73.9	54.5		58.8	49.6		32.2	19.3		54.5	30.8	
Level of Service	E	D		E	D		C	B		D	C	
Approach Delay (s)		58.5			50.6			20.2			32.6	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM Average Control Delay	34.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

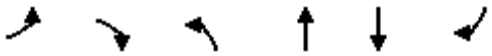
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	970	630	0	870	390	420	480	10	540	530	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	10	9	9	10	10	10	10	10	10
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00		0.95	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00		1.00	0.92	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3271	1516		3154	1300	3204	3293		1636	3262	
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3271	1516		3154	1300	3204	3293		1636	3262	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1032	670	0	926	415	457	522	11	587	576	11
RTOR Reduction (vph)	0	0	0	0	0	120	0	1	0	0	1	0
Lane Group Flow (vph)	0	1032	670	0	926	295	457	532	0	587	586	0
Confl. Peds. (#/hr)						52						
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	3%	3%	3%
Turn Type			Perm			Perm	custom			Split		
Protected Phases		2			6		4	4		3	3	
Permitted Phases			2			6	4					
Actuated Green, G (s)		56.9	56.9		56.9	56.9	19.5	19.5		44.1	44.1	
Effective Green, g (s)		59.4	59.4		59.4	59.4	22.0	22.0		46.6	46.6	
Actuated g/C Ratio		0.42	0.42		0.42	0.42	0.16	0.16		0.33	0.33	
Clearance Time (s)		6.5	6.5		6.5	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1388	643		1338	552	503	517		545	1086	
v/s Ratio Prot		0.32			0.29		0.14	c0.16		c0.36	0.18	
v/s Ratio Perm			c0.44			0.23						
v/c Ratio		0.74	1.04		0.69	0.53	0.91	1.03		1.08	0.54	
Uniform Delay, d1		33.9	40.3		32.8	30.0	58.0	59.0		46.7	38.0	
Progression Factor		0.26	0.33		0.93	1.04	0.85	0.85		0.91	0.87	
Incremental Delay, d2		3.3	45.3		2.2	2.7	18.6	45.8		57.9	0.2	
Delay (s)		12.3	58.4		32.7	33.9	67.7	96.2		100.3	33.3	
Level of Service		B	E		C	C	E	F		F	C	
Approach Delay (s)		30.5			33.1			83.1			66.8	
Approach LOS		C			C			F			E	

Intersection Summary			
HCM Average Control Delay	49.3	HCM Level of Service	D
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

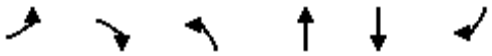
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	20	15	20	1280	1490	40
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.96	0.96	0.95	0.95
Hourly flow rate (vph)	22	16	21	1333	1568	42
Pedestrians	6				3	
Lane Width (ft)	10.0				10.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				Raised	Raised	
Median storage veh)				1	1	
Upstream signal (ft)				741	688	
pX, platoon unblocked	0.85	0.74	0.74			
vC, conflicting volume	2307	811	1617			
vC1, stage 1 conf vol	1595					
vC2, stage 2 conf vol	711					
vCu, unblocked vol	1013	42	1131			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	89	98	95			
cM capacity (veh/h)	191	756	452			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	38	21	667	667	1046	565
Volume Left	22	21	0	0	0	0
Volume Right	16	0	0	0	0	42
cSH	280	452	1700	1700	1700	1700
Volume to Capacity	0.14	0.05	0.39	0.39	0.62	0.33
Queue Length 95th (ft)	9	3	0	0	0	0
Control Delay (s)	19.8	13.3	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	19.8	0.2			0.0	
Approach LOS	C					

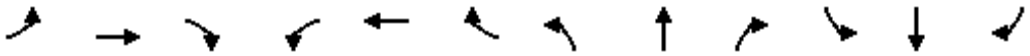
Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	57.5%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	40	230	70	880	1070	70
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1463	1309	1492	2985	2924	
Flt Permitted	0.95	1.00	0.16	1.00	1.00	
Satd. Flow (perm)	1463	1309	247	2985	2924	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.95
Adj. Flow (vph)	43	250	74	926	1126	74
RTOR Reduction (vph)	0	200	0	0	5	0
Lane Group Flow (vph)	43	50	74	926	1195	0
Confl. Peds. (#/hr)	2		2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	1%	1%	2%	2%
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	9.1	9.1	51.9	51.9	41.8	
Effective Green, g (s)	9.1	9.1	51.9	51.9	41.8	
Actuated g/C Ratio	0.13	0.13	0.74	0.74	0.60	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	190	170	283	2213	1746	
v/s Ratio Prot	0.03		0.02	c0.31	c0.41	
v/s Ratio Perm		c0.04	0.17			
v/c Ratio	0.23	0.29	0.26	0.42	0.68	
Uniform Delay, d1	27.3	27.5	4.5	3.4	9.6	
Progression Factor	0.81	0.56	0.66	0.92	1.00	
Incremental Delay, d2	0.2	0.2	0.2	0.5	2.2	
Delay (s)	22.3	15.7	3.1	3.6	11.8	
Level of Service	C	B	A	A	B	
Approach Delay (s)	16.7			3.6	11.8	
Approach LOS	B			A	B	

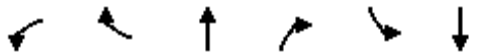
Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	360	40	70	240	130	10	780	90	250	970	100
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Width	11	10	10	11	10	10	9	10	10	10	10	10
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1485	2669		1501	2742		1453	2961		1489	2939	
Flt Permitted	0.45	1.00		0.40	1.00		0.21	1.00		0.27	1.00	
Satd. Flow (perm)	702	2669		639	2742		320	2961		427	2939	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.94	0.94	0.94	0.96	0.96	0.96
Adj. Flow (vph)	98	391	43	74	253	137	11	830	96	260	1010	104
RTOR Reduction (vph)	0	13	0	0	104	0	0	11	0	0	9	0
Lane Group Flow (vph)	98	421	0	74	286	0	11	915	0	260	1105	0
Confl. Peds. (#/hr)	16		16	16		16	3		9	9		3
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	0%	0%	0%	1%	1%	1%
Parking (#/hr)		5										
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	16.9	16.9		16.9	16.9		44.1	44.1		44.1	44.1	
Effective Green, g (s)	16.9	16.9		16.9	16.9		44.1	44.1		44.1	44.1	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.63	0.63		0.63	0.63	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	169	644		154	662		202	1865		269	1852	
v/s Ratio Prot		c0.16			0.10			0.31			0.38	
v/s Ratio Perm	0.14			0.12			0.03			c0.61		
v/c Ratio	0.58	0.65		0.48	0.43		0.05	0.49		0.97	0.60	
Uniform Delay, d1	23.4	23.9		22.8	22.5		5.0	6.9		12.3	7.7	
Progression Factor	0.73	0.69		1.00	1.00		0.46	0.53		0.75	0.49	
Incremental Delay, d2	2.4	1.5		0.9	0.2		0.3	0.5		40.2	1.1	
Delay (s)	19.4	18.0		23.6	22.7		2.5	4.1		49.4	4.8	
Level of Service	B	B		C	C		A	A		D	A	
Approach Delay (s)		18.2			22.8			4.1			13.3	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM Average Control Delay	12.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	77.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

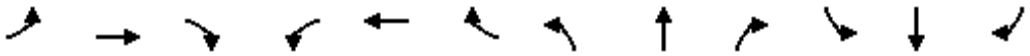


Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	50	10	900	30	0	1210
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.99		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.98		1.00			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1284		2935			2956
Flt Permitted	0.96		1.00			1.00
Satd. Flow (perm)	1284		2935			2956
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	54	11	978	33	0	1315
RTOR Reduction (vph)	6	0	1	0	0	0
Lane Group Flow (vph)	59	0	1010	0	0	1315
Confl. Peds. (#/hr)	2	25		14	14	
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	15%	15%	2%	2%	2%	2%
Turn Type						
Protected Phases	8		2			6
Permitted Phases						
Actuated Green, G (s)	18.5		112.5			112.5
Effective Green, g (s)	18.5		112.5			112.5
Actuated g/C Ratio	0.13		0.80			0.80
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	2.0		2.0			2.0
Lane Grp Cap (vph)	170		2358			2375
v/s Ratio Prot	c0.05		0.34			c0.44
v/s Ratio Perm						
v/c Ratio	0.35		0.43			0.55
Uniform Delay, d1	55.3		4.1			4.9
Progression Factor	1.21		1.15			0.26
Incremental Delay, d2	0.3		0.5			0.6
Delay (s)	67.1		5.2			1.8
Level of Service	E		A			A
Approach Delay (s)	67.1		5.2			1.8
Approach LOS	E		A			A

Intersection Summary			
HCM Average Control Delay	5.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

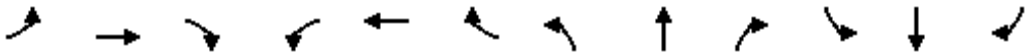
APPENDIX G:
2030 WITH ACTION CONDITIONS SYNCHRO ANALYSIS RESULTS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	425	200	10	395	245	185	225	10	340	545	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.86		1.00	0.91	1.00	0.99		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1824	1341		1823	1409	1770	1838		1787	1874	
Flt Permitted		0.97	1.00		0.90	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1775	1341		1644	1409	1770	1838		1787	1874	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.96	0.96	0.96
Adj. Flow (vph)	11	462	217	11	429	266	201	245	11	354	568	10
RTOR Reduction (vph)	0	0	0	0	0	0	0	2	0	0	1	0
Lane Group Flow (vph)	0	473	217	0	440	266	201	254	0	354	577	0
Confl. Peds. (#/hr)	40		65	65		40	20		65	65		20
Confl. Bikes (#/hr)						1			1			3
Heavy Vehicles (%)	4%	4%	4%	4%	4%	4%	2%	2%	2%	1%	1%	1%
Turn Type	Perm		Perm	Perm		Perm	Split			Split		
Protected Phases		4			8		2	2		6	6	
Permitted Phases	4		4	8		8						
Actuated Green, G (s)		26.3	26.3		26.3	26.3	17.0	17.0		28.7	28.7	
Effective Green, g (s)		26.3	26.3		26.3	26.3	17.0	17.0		28.7	28.7	
Actuated g/C Ratio		0.31	0.31		0.31	0.31	0.20	0.20		0.34	0.34	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		556	420		515	441	358	372		611	640	
v/s Ratio Prot							0.11	c0.14		0.20	c0.31	
v/s Ratio Perm		0.27	0.16		c0.27	0.19						
v/c Ratio		0.85	0.52		0.85	0.60	0.56	0.68		0.58	0.90	
Uniform Delay, d1		27.0	23.6		27.1	24.4	30.1	31.0		22.7	26.3	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.9	1.1		13.0	2.3	2.0	5.1		1.3	16.0	
Delay (s)		38.9	24.7		40.1	26.8	32.2	36.1		24.0	42.3	
Level of Service		D	C		D	C	C	D		C	D	
Approach Delay (s)		34.5			35.0			34.4			35.4	
Approach LOS		C			D			C			D	

Intersection Summary			
HCM Average Control Delay	34.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	84.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	55	50	110	145	80	30	485	15	150	545	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.99			0.99		1.00	1.00		0.99	1.00	
Frt		0.96			0.97		1.00	1.00		1.00	0.98	
Flt Protected		0.99			0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1687			1726		1765	1847		1723	1775	
Flt Permitted		0.82			0.84		0.19	1.00		0.23	1.00	
Satd. Flow (perm)		1398			1466		359	1847		423	1775	
Peak-hour factor, PHF	0.79	0.79	0.79	0.85	0.85	0.85	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	57	70	63	129	171	94	33	527	16	163	592	82
RTOR Reduction (vph)	0	26	0	0	16	0	0	2	0	0	7	0
Lane Group Flow (vph)	0	164	0	0	378	0	33	541	0	163	667	0
Confl. Peds. (#/hr)	35		35	35		35	45		85	85		45
Confl. Bikes (#/hr)									2			5
Heavy Vehicles (%)	3%	3%	3%	2%	2%	2%	2%	2%	2%	4%	4%	4%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		19.4			19.4		26.3	25.0		31.1	27.4	
Effective Green, g (s)		19.4			19.4		26.3	25.0		31.1	27.4	
Actuated g/C Ratio		0.32			0.32		0.44	0.42		0.52	0.46	
Clearance Time (s)		4.0			4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		451			473		188	768		299	809	
v/s Ratio Prot							0.00	0.29		c0.03	c0.38	
v/s Ratio Perm		0.12			c0.26		0.07			0.25		
v/c Ratio		0.36			0.80		0.18	0.70		0.55	0.82	
Uniform Delay, d1		15.6			18.6		11.2	14.5		9.6	14.3	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5			9.1		0.4	3.0		2.0	6.8	
Delay (s)		16.1			27.7		11.6	17.5		11.7	21.1	
Level of Service		B			C		B	B		B	C	
Approach Delay (s)		16.1			27.7			17.1			19.3	
Approach LOS		B			C			B			B	

Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	60.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	73.0%	ICU Level of Service	D
Analysis Period (min)	15		

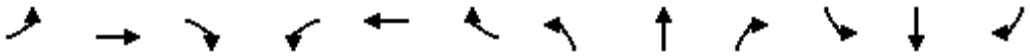
c Critical Lane Group

4: Forest St & Beacon Ave Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Delay (hr)	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.0
Delay / Veh (s)	35.9	40.1	15.7	39.5	45.3	18.3	15.3	7.2	6.2	10.6	3.0	2.6
Total Stops	1	2	7	9	3	8	8	7	1	2	9	1
Travel Dist (mi)	0.1	0.3	1.0	1.2	0.4	1.1	5.8	93.0	7.4	0.5	28.2	0.9
Travel Time (hr)	0.0	0.0	0.1	0.1	0.1	0.1	0.2	3.4	0.3	0.0	1.1	0.0
Avg Speed (mph)	9	9	14	9	8	13	24	27	27	20	26	24
Fuel Used (gal)	0.0	0.0	0.0	0.1	0.0	0.0	0.1	2.3	0.2	0.0	0.7	0.0
HC Emissions (g)	0	0	0	0	0	0	1	44	3	0	13	0
CO Emissions (g)	1	1	6	12	5	10	24	708	52	9	269	8
NOx Emissions (g)	0	0	0	1	0	1	3	114	9	1	36	1
Vehicles Entered	1	2	7	9	3	8	9	151	12	4	188	6
Vehicles Exited	1	2	7	8	3	8	9	146	12	4	188	6
Hourly Exit Rate	4	8	28	32	12	32	36	584	48	16	752	24
Input Volume	7	10	30	39	13	26	36	607	48	16	736	22
% of Volume	57	80	93	82	92	123	100	96	100	100	102	109
Denied Entry Before	0	0	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0	0	0

4: Forest St & Beacon Ave Performance by movement

Movement	All
Total Delay (hr)	0.8
Delay / Veh (s)	7.0
Total Stops	58
Travel Dist (mi)	140.0
Travel Time (hr)	5.5
Avg Speed (mph)	26
Fuel Used (gal)	3.5
HC Emissions (g)	64
CO Emissions (g)	1103
NOx Emissions (g)	167
Vehicles Entered	400
Vehicles Exited	394
Hourly Exit Rate	1576
Input Volume	1590
% of Volume	99
Denied Entry Before	0
Denied Entry After	0

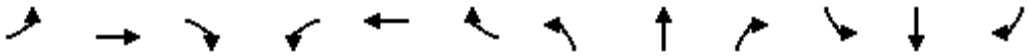


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	365	375	60	180	65	200	825	65	120	1130	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.94	1.00	0.97		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	1900	1490	1787	3335		1770	3417		1770	3454	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1770	1900	1490	1787	3335		1770	3417		1770	3454	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.92	0.92	0.95	0.92
Adj. Flow (vph)	92	397	408	65	196	71	217	868	71	130	1189	71
RTOR Reduction (vph)	0	0	212	0	32	0	0	5	0	0	3	0
Lane Group Flow (vph)	92	397	196	65	235	0	217	934	0	130	1257	0
Confl. Peds. (#/hr)	80		40	40		80			65			65
Heavy Vehicles (%)	2%	0%	2%	1%	1%	1%	2%	3%	2%	2%	3%	2%
Turn Type	Prot		Perm	Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4									
Actuated Green, G (s)	8.0	29.0	29.0	5.6	26.6		17.2	56.0		13.4	52.2	
Effective Green, g (s)	8.0	29.0	29.0	5.6	26.6		17.2	56.0		13.4	52.2	
Actuated g/C Ratio	0.07	0.24	0.24	0.05	0.22		0.14	0.47		0.11	0.44	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	118	459	360	83	739		254	1595		198	1502	
v/s Ratio Prot	c0.05	c0.21		0.04	0.07		c0.12	c0.27		0.07	c0.36	
v/s Ratio Perm			0.13									
v/c Ratio	0.78	0.86	0.55	0.78	0.32		0.85	0.59		0.66	0.84	
Uniform Delay, d1	55.1	43.6	39.7	56.6	39.1		50.2	23.5		51.1	30.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.97	0.82		1.26	0.68	
Incremental Delay, d2	27.1	15.5	1.7	37.0	0.2		21.2	1.4		5.8	4.4	
Delay (s)	82.2	59.1	41.4	93.6	39.4		69.7	20.6		70.1	24.8	
Level of Service	F	E	D	F	D		E	C		E	C	
Approach Delay (s)		53.5			50.0			29.8			29.0	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	20	5	10	20	375	0	735	10	365	1165	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00		0.95		1.00	0.95	
Frpb, ped/bikes		0.99			1.00	0.88		1.00		1.00	1.00	
Flpb, ped/bikes		0.99			0.99	1.00		1.00		1.00	1.00	
Frt		0.98			1.00	0.85		1.00		1.00	1.00	
Flt Protected		0.99			0.98	1.00		1.00		0.95	1.00	
Satd. Flow (prot)		1813			1855	1386		3529		1770	3532	
Flt Permitted		0.92			0.91	1.00		1.00		0.95	1.00	
Satd. Flow (perm)		1701			1723	1386		3529		1770	3532	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	11	22	5	11	22	408	0	799	11	397	1266	11
RTOR Reduction (vph)	0	4	0	0	0	366	0	0	0	0	0	0
Lane Group Flow (vph)	0	34	0	0	33	43	0	810	0	397	1277	0
Confl. Peds. (#/hr)	20		40	20		40			20			20
Heavy Vehicles (%)	0%	0%	0%	0%	0%	2%	2%	2%	2%	2%	2%	2%
Turn Type	Perm			Perm		Perm				Prot		
Protected Phases		4			8			2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)		12.5			12.5	12.5		63.8		31.7	99.5	
Effective Green, g (s)		12.5			12.5	12.5		63.8		31.7	99.5	
Actuated g/C Ratio		0.10			0.10	0.10		0.53		0.26	0.83	
Clearance Time (s)		4.0			4.0	4.0		4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0		3.0		3.0	3.0	
Lane Grp Cap (vph)		177			179	144		1876		468	2929	
v/s Ratio Prot								0.23		c0.22	c0.36	
v/s Ratio Perm		0.02			0.02	c0.03						
v/c Ratio		0.19			0.18	0.30		0.43		0.85	0.44	
Uniform Delay, d1		49.1			49.1	49.7		17.1		41.9	2.7	
Progression Factor		1.00			1.00	1.00		1.00		0.69	1.54	
Incremental Delay, d2		0.5			0.5	1.1		0.7		8.6	0.3	
Delay (s)		49.6			49.6	50.8		17.8		37.5	4.5	
Level of Service		D			D	D		B		D	A	
Approach Delay (s)		49.6			50.7			17.8			12.3	
Approach LOS		D			D			B			B	

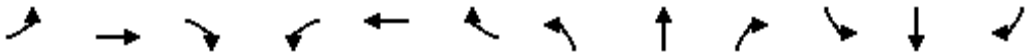
Intersection Summary			
HCM Average Control Delay	20.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	610	35	30	375	25	30	10	45	145	30	160
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0			4.0			4.0	
Lane Util. Factor		0.95			0.95			1.00			1.00	
Frpb, ped/bikes		1.00			1.00			0.98			0.99	
Flpb, ped/bikes		1.00			1.00			1.00			0.99	
Frt		0.99			0.99			0.93			0.94	
Flt Protected		1.00			1.00			0.98			0.98	
Satd. Flow (prot)		3487			3481			1667			1671	
Flt Permitted		0.90			0.89			0.83			0.82	
Satd. Flow (perm)		3163			3092			1407			1400	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	663	38	33	408	27	33	11	49	158	33	174
RTOR Reduction (vph)	0	6	0	0	7	0	0	31	0	0	67	0
Lane Group Flow (vph)	0	744	0	0	461	0	0	62	0	0	298	0
Confl. Peds. (#/hr)	35		25	25		35	30		42	45		30
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)		15.8			15.8			13.7			13.7	
Effective Green, g (s)		15.8			15.8			13.7			13.7	
Actuated g/C Ratio		0.42			0.42			0.37			0.37	
Clearance Time (s)		4.0			4.0			4.0			4.0	
Vehicle Extension (s)		3.0			3.0			3.0			3.0	
Lane Grp Cap (vph)		1333			1303			514			511	
v/s Ratio Prot												
v/s Ratio Perm		c0.24			0.15			0.04			c0.21	
v/c Ratio		0.56			0.35			0.12			0.58	
Uniform Delay, d1		8.2			7.4			7.9			9.6	
Progression Factor		1.00			1.00			1.00			1.00	
Incremental Delay, d2		0.5			0.2			0.1			1.7	
Delay (s)		8.7			7.5			8.0			11.3	
Level of Service		A			A			A			B	
Approach Delay (s)		8.7			7.5			8.0			11.3	
Approach LOS		A			A			A			B	

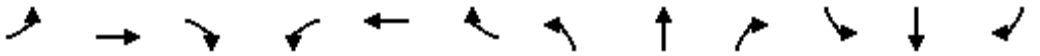
Intersection Summary			
HCM Average Control Delay	8.9	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	37.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group



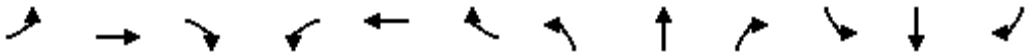
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	10	110	65	25	70	80	865	10	65	1165	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	0.89		0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes		0.98	1.00		0.97		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.94		1.00	1.00		1.00	0.99	
Flt Protected		0.96	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1725	1253		1632		1770	3495		1770	3423	
Flt Permitted		0.56	1.00		0.75		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1010	1253		1244		1770	3495		1770	3423	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	141	11	120	71	27	76	87	940	11	71	1266	136
RTOR Reduction (vph)	0	0	93	0	25	0	0	0	0	0	6	0
Lane Group Flow (vph)	0	152	27	0	149	0	87	951	0	71	1396	0
Confl. Peds. (#/hr)	35		95	95		35			25			25
Heavy Vehicles (%)	3%	2%	15%	2%	2%	2%	2%	3%	2%	2%	3%	2%
Turn Type	Perm		Perm	Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8								
Actuated Green, G (s)		27.3	27.3		27.3		10.3	73.0		7.7	70.4	
Effective Green, g (s)		27.3	27.3		27.3		10.3	73.0		7.7	70.4	
Actuated g/C Ratio		0.23	0.23		0.23		0.09	0.61		0.06	0.59	
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		230	285		283		152	2126		114	2008	
v/s Ratio Prot							c0.05	c0.27		0.04	c0.41	
v/s Ratio Perm		c0.15	0.02		0.12							
v/c Ratio		0.66	0.10		0.52		0.57	0.45		0.62	0.70	
Uniform Delay, d1		42.1	36.6		40.7		52.7	12.6		54.7	17.3	
Progression Factor		1.00	1.00		1.00		0.91	0.87		1.00	1.00	
Incremental Delay, d2		6.9	0.1		1.8		4.2	0.6		10.1	2.0	
Delay (s)		49.1	36.8		42.4		52.2	11.6		64.9	19.3	
Level of Service		D	D		D		D	B		E	B	
Approach Delay (s)		43.6			42.4			15.0			21.5	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM Average Control Delay	22.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	98.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	30	40	40	15	115	25	1355	55	275	1580	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	12	10	12	12	10	10	10	10	10	10	10
Total Lost time (s)		4.0		4.0	4.0		2.1	4.5		2.1	4.5	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes		0.99		1.00	0.94		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		0.99		0.99	1.00		1.00	1.00		1.00	1.00	
Frt		0.94		1.00	0.87		1.00	0.99		1.00	1.00	
Flt Protected		0.99		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1688		1743	1511		1620	3114		1636	3199	
Flt Permitted		0.67		0.52	1.00		0.11	1.00		0.11	1.00	
Satd. Flow (perm)		1149		948	1511		190	3114		193	3199	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95
Adj. Flow (vph)	22	33	43	43	16	125	27	1473	60	289	1663	11
RTOR Reduction (vph)	0	21	0	0	111	0	0	2	0	0	0	0
Lane Group Flow (vph)	0	77	0	43	30	0	27	1531	0	289	1674	0
Confl. Peds. (#/hr)	27		4	4		27	32		20	20		32
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	4%	4%	4%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	15	0	0	10	0
Turn Type	Perm			Perm			D.P+P			D.P+P		
Protected Phases		4			4		5	2		1	6	
Permitted Phases	4			4			6			2		
Actuated Green, G (s)		14.2		14.2	14.2		110.7	94.0		110.7	107.5	
Effective Green, g (s)		15.7		15.7	15.7		113.7	95.5		113.7	109.0	
Actuated g/C Ratio		0.11		0.11	0.11		0.81	0.68		0.81	0.78	
Clearance Time (s)		5.5		5.5	5.5		3.6	6.0		3.6	6.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		129		106	169		202	2124		344	2491	
v/s Ratio Prot					0.02		0.00	c0.49		c0.11	0.52	
v/s Ratio Perm		c0.07		0.05			0.10			0.57		
v/c Ratio		0.59		0.41	0.18		0.13	0.72		0.84	0.67	
Uniform Delay, d1		59.1		57.8	56.3		5.1	13.9		29.0	7.2	
Progression Factor		1.00		1.11	1.48		0.40	1.84		1.00	1.00	
Incremental Delay, d2		4.8		0.9	0.2		0.1	1.2		16.0	1.5	
Delay (s)		63.9		65.1	83.6		2.1	26.8		45.1	8.7	
Level of Service		E		E	F		A	C		D	A	
Approach Delay (s)		63.9			79.3			26.4			14.0	
Approach LOS		E			E			C			B	

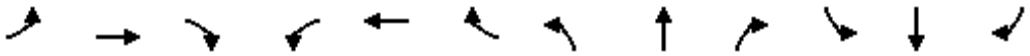
Intersection Summary			
HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	10.6
Intersection Capacity Utilization	87.7%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	135	365	150	40	200	110	95	1190	30	125	1375	105
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	9	10	10	10	10	12	10	10	10	10	10	10
Total Lost time (s)	4.5	4.5		4.5	4.5		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.91	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.95		1.00	1.00		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1608	3178		1668	3107		1604	3130		1636	4560	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1608	3178		1668	3107		1604	3130		1636	4560	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92	0.97	0.97	0.97
Adj. Flow (vph)	142	384	158	43	217	120	103	1293	33	129	1418	108
RTOR Reduction (vph)	0	34	0	0	55	0	0	1	0	0	6	0
Lane Group Flow (vph)	142	508	0	43	282	0	103	1325	0	129	1520	0
Confl. Peds. (#/hr)	16					16	31		12	12		31
Confl. Bikes (#/hr)			1									1
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	5%	5%	5%	3%	3%	3%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	10	0	0	10	0
Turn Type	Prot			Prot			Prot			Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	14.9	29.2		7.0	21.3		21.5	65.5		15.3	59.3	
Effective Green, g (s)	16.4	30.7		8.5	22.8		23.0	67.0		16.8	60.8	
Actuated g/C Ratio	0.12	0.22		0.06	0.16		0.16	0.48		0.12	0.43	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.5	5.5		5.5	5.5	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	188	697		101	506		264	1498		196	1980	
v/s Ratio Prot	0.09	c0.16		0.03	c0.09		0.06	c0.42		0.08	c0.33	
v/s Ratio Perm												
v/c Ratio	0.76	0.73		0.43	0.56		0.39	0.88		0.66	0.77	
Uniform Delay, d1	59.9	50.8		63.4	53.9		52.2	33.0		58.9	33.6	
Progression Factor	1.00	1.00		0.90	0.91		0.62	0.42		0.85	0.86	
Incremental Delay, d2	15.8	3.8		2.6	1.2		0.3	6.8		4.6	2.2	
Delay (s)	75.6	54.6		59.7	50.3		32.8	20.5		54.7	31.2	
Level of Service	E	D		E	D		C	C		D	C	
Approach Delay (s)		59.0			51.3			21.4			33.0	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM Average Control Delay	35.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

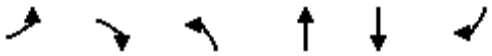
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1005	640	0	870	395	425	485	10	540	530	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	10	10	11	10	9	9	10	10	10	10	10	10
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		0.95	1.00		0.95	1.00	0.97	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00		1.00	0.92	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	1.00	
Flt Protected		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		3271	1516		3154	1300	3204	3293		1636	3258	
Flt Permitted		1.00	1.00		1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		3271	1516		3154	1300	3204	3293		1636	3258	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1069	681	0	926	420	462	527	11	587	576	16
RTOR Reduction (vph)	0	0	0	0	0	122	0	1	0	0	1	0
Lane Group Flow (vph)	0	1069	681	0	926	298	462	537	0	587	591	0
Confl. Peds. (#/hr)						52						
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	2%	2%	2%	3%	3%	3%
Turn Type			Perm			Perm	custom			Split		
Protected Phases		2			6		4	4		3	3	
Permitted Phases			2			6	4					
Actuated Green, G (s)		56.9	56.9		56.9	56.9	19.5	19.5		44.1	44.1	
Effective Green, g (s)		59.4	59.4		59.4	59.4	22.0	22.0		46.6	46.6	
Actuated g/C Ratio		0.42	0.42		0.42	0.42	0.16	0.16		0.33	0.33	
Clearance Time (s)		6.5	6.5		6.5	6.5	6.5	6.5		6.5	6.5	
Vehicle Extension (s)		2.0	2.0		2.0	2.0	2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		1388	643		1338	552	503	517		545	1084	
v/s Ratio Prot		0.33			0.29		0.14	c0.16		c0.36	0.18	
v/s Ratio Perm			c0.45			0.23						
v/c Ratio		0.77	1.06		0.69	0.54	0.92	1.04		1.08	0.54	
Uniform Delay, d1		34.5	40.3		32.8	30.1	58.1	59.0		46.7	38.1	
Progression Factor		0.28	0.34		0.94	1.06	0.89	0.90		0.92	0.88	
Incremental Delay, d2		3.8	50.3		2.2	2.8	20.0	48.4		57.8	0.3	
Delay (s)		13.5	64.0		33.2	34.6	72.0	101.5		100.7	33.8	
Level of Service		B	E		C	C	E	F		F	C	
Approach Delay (s)		33.2			33.6			87.8			67.1	
Approach LOS		C			C			F			E	

Intersection Summary			
HCM Average Control Delay	51.2	HCM Level of Service	D
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

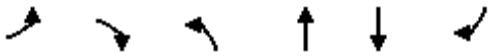
c Critical Lane Group



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	25	20	20	1285	1500	50
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.96	0.96	0.95	0.95
Hourly flow rate (vph)	27	22	21	1339	1579	53
Pedestrians	6				3	
Lane Width (ft)	10.0				10.0	
Walking Speed (ft/s)	4.0				4.0	
Percent Blockage	0				0	
Right turn flare (veh)						
Median type				Raised	Raised	
Median storage veh)				1	1	
Upstream signal (ft)				741	688	
pX, platoon unblocked	0.84	0.73	0.73			
vC, conflicting volume	2325	822	1638			
vC1, stage 1 conf vol	1611					
vC2, stage 2 conf vol	714					
vCu, unblocked vol	976	1	1124			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	86	97	95			
cM capacity (veh/h)	191	788	446			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	49	21	669	669	1053	579
Volume Left	27	21	0	0	0	0
Volume Right	22	0	0	0	0	53
cSH	287	446	1700	1700	1700	1700
Volume to Capacity	0.17	0.05	0.39	0.39	0.62	0.34
Queue Length 95th (ft)	12	3	0	0	0	0
Control Delay (s)	20.1	13.5	0.0	0.0	0.0	0.0
Lane LOS	C	B				
Approach Delay (s)	20.1	0.2			0.0	
Approach LOS	C					

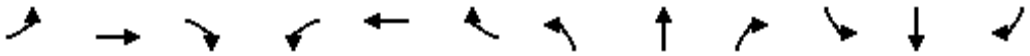
Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	58.1%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	45	230	70	880	1075	70
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	0.95	1.00	0.95	1.00	1.00	
Satd. Flow (prot)	1463	1309	1492	2985	2924	
Flt Permitted	0.95	1.00	0.16	1.00	1.00	
Satd. Flow (perm)	1463	1309	245	2985	2924	
Peak-hour factor, PHF	0.92	0.92	0.95	0.95	0.95	0.95
Adj. Flow (vph)	49	250	74	926	1132	74
RTOR Reduction (vph)	0	199	0	0	5	0
Lane Group Flow (vph)	49	51	74	926	1201	0
Confl. Peds. (#/hr)	2		2			2
Confl. Bikes (#/hr)						1
Heavy Vehicles (%)	3%	3%	1%	1%	2%	2%
Turn Type		Perm	pm+pt			
Protected Phases	4		5	2	6	
Permitted Phases		4	2			
Actuated Green, G (s)	9.1	9.1	51.9	51.9	41.8	
Effective Green, g (s)	9.1	9.1	51.9	51.9	41.8	
Actuated g/C Ratio	0.13	0.13	0.74	0.74	0.60	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	190	170	281	2213	1746	
v/s Ratio Prot	0.03		0.02	c0.31	c0.41	
v/s Ratio Perm		c0.04	0.17			
v/c Ratio	0.26	0.30	0.26	0.42	0.69	
Uniform Delay, d1	27.4	27.6	4.6	3.4	9.6	
Progression Factor	0.76	0.66	0.66	0.92	1.00	
Incremental Delay, d2	0.2	0.2	0.2	0.5	2.2	
Delay (s)	20.9	18.3	3.2	3.6	11.9	
Level of Service	C	B	A	A	B	
Approach Delay (s)	18.8			3.6	11.9	
Approach LOS	B			A	B	

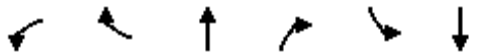
Intersection Summary			
HCM Average Control Delay	9.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.1%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	90	365	40	70	240	135	15	785	95	260	970	105
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Lane Width	11	10	10	11	10	10	9	10	10	10	10	10
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	0.98		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1485	2670		1501	2738		1453	2959		1489	2937	
Flt Permitted	0.45	1.00		0.40	1.00		0.21	1.00		0.27	1.00	
Satd. Flow (perm)	696	2670		631	2738		317	2959		421	2937	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.95	0.95	0.94	0.94	0.94	0.96	0.96	0.96
Adj. Flow (vph)	98	397	43	74	253	142	16	835	101	271	1010	109
RTOR Reduction (vph)	0	13	0	0	108	0	0	11	0	0	10	0
Lane Group Flow (vph)	98	427	0	74	287	0	16	925	0	271	1109	0
Confl. Peds. (#/hr)	16		16	16		16	3		9	9		3
Heavy Vehicles (%)	4%	4%	4%	3%	3%	3%	0%	0%	0%	1%	1%	1%
Parking (#/hr)		5										
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			4			2			2	
Permitted Phases	4			4			2			2		
Actuated Green, G (s)	17.0	17.0		17.0	17.0		44.0	44.0		44.0	44.0	
Effective Green, g (s)	17.0	17.0		17.0	17.0		44.0	44.0		44.0	44.0	
Actuated g/C Ratio	0.24	0.24		0.24	0.24		0.63	0.63		0.63	0.63	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	169	648		153	665		199	1860		265	1846	
v/s Ratio Prot		c0.16			0.11			0.31			0.38	
v/s Ratio Perm	0.14			0.12			0.05			c0.64		
v/c Ratio	0.58	0.66		0.48	0.43		0.08	0.50		1.02	0.60	
Uniform Delay, d1	23.4	23.9		22.7	22.4		5.1	7.0		13.0	7.8	
Progression Factor	0.72	0.69		1.00	1.00		0.44	0.54		0.77	0.49	
Incremental Delay, d2	2.3	1.5		0.9	0.2		0.4	0.5		54.2	1.1	
Delay (s)	19.2	17.9		23.6	22.6		2.6	4.3		64.3	4.9	
Level of Service	B	B		C	C		A	A		E	A	
Approach Delay (s)		18.1			22.7			4.2			16.5	
Approach LOS		B			C			A			B	

Intersection Summary			
HCM Average Control Delay	14.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	78.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	60	10	905	35	15	1210
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.5		4.5			4.5
Lane Util. Factor	1.00		0.95			0.95
Frpb, ped/bikes	0.99		1.00			1.00
Flpb, ped/bikes	1.00		1.00			1.00
Frt	0.98		0.99			1.00
Flt Protected	0.96		1.00			1.00
Satd. Flow (prot)	1288		2932			2953
Flt Permitted	0.96		1.00			0.93
Satd. Flow (perm)	1288		2932			2760
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	65	11	984	38	16	1315
RTOR Reduction (vph)	5	0	1	0	0	0
Lane Group Flow (vph)	71	0	1021	0	0	1331
Confl. Peds. (#/hr)	2	25		14	14	
Confl. Bikes (#/hr)				1		
Heavy Vehicles (%)	15%	15%	2%	2%	2%	2%
Turn Type					Perm	
Protected Phases	8		2			6
Permitted Phases					6	
Actuated Green, G (s)	20.1		110.9			110.9
Effective Green, g (s)	20.1		110.9			110.9
Actuated g/C Ratio	0.14		0.79			0.79
Clearance Time (s)	4.5		4.5			4.5
Vehicle Extension (s)	2.0		2.0			2.0
Lane Grp Cap (vph)	185		2323			2186
v/s Ratio Prot	c0.06		0.35			
v/s Ratio Perm						c0.48
v/c Ratio	0.38		0.44			0.61
Uniform Delay, d1	54.3		4.6			5.8
Progression Factor	1.24		0.82			0.51
Incremental Delay, d2	0.3		0.5			0.8
Delay (s)	67.7		4.3			3.7
Level of Service	E		A			A
Approach Delay (s)	67.7		4.3			3.7
Approach LOS	E		A			A

Intersection Summary			
HCM Average Control Delay	6.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

APPENDIX H:
MXD MODEL APPLICATION INFORMATION

APPENDIX H – MXD MODEL APPLICATION

Fehr & Peers' Mixed Use Analysis Tool (MXD) is an advanced method for estimating trip generation rates for developments in urban areas with a diversity of land use types and access to transit. This method evaluates multiple site and regional characteristics to estimate the number of internal trips, external vehicle trips, external transit trips, and external walk/bike trips. For the Seattle Station Area Analysis, the MXD tool was used to calculate trip rates for both 2030 No Action and 2030 With Action conditions.

The MXD tool was developed as a collaborative effort between Fehr & Peers and urban planning faculty at the University of Utah, University of Texas, and University of California, Berkeley. The principle sponsor of the research was the US EPA. Travel data was collected at over 200 mixed-use sites and site variables were analyzed using regression analysis to determine what variables are correlated most strongly with site trip generation and mode split. In simple terms, the MXD tool is a type of mode choice model that predicts the probability that a trip will be made by a specific mode (internal, external vehicle, external transit, and external walk/bike) given a set of urban form, demographic, and transit service input variables. The input variables that were used in calculating the trip probabilities described below.

Traditionally, vehicle trip generation estimates are calculated using data developed by the Institute of Transportation Engineers (ITE). ITE trip generation rates are developed by using surveys of daily and peak period trips at existing sites, usually in suburban settings with limited transit service and low proportions of walking or cycling. In applying these rates to an urban infill development project, adjustments are often made using location-specific factors that reduce the number of vehicle trips based on expected rates of internal capture (for example, if an office worker travels to a commercial establishment in the same development), pass-by traffic, and predicted rates of transit utilization. As discussed below, the MXD tool is similar to this methodology (in that it initially uses full ITE trip rates), but the tool relies on input data and validated relationships (as opposed to judgment and rules of thumb) to more accurately adjust the trip rate.

MXD Model Structure and Outputs

The MXD tool's methodology involves four steps to estimate project trip generation. The four steps and outputs are:

1. Compute daily, AM peak hour, and PM peak hour trip generation estimates using the equations from the ITE Trip Generation document (these are referred to as "Raw ITE Trips"). These estimates do not assume any internalization between adjacent compatible uses, and only minimal trips made by walking and/or transit modes.
2. Compute the probability of a trip staying internal to the mixed use development.
3. Compute the probability an external trip will be made by walking.
4. Compute the probability an external trip will be made by transit.

Mathematically, if we call the above probabilities generated in steps 2-4 above Pinternal, Pwalk, and Ptransit, respectively, the desired result of number of external vehicle trips is given by:

External Vehicle Trips = Raw ITE Trips * (1- Pinternal) * (1 – Pwalk – Ptransit)

Model Validation

A set of 22 independent mixed use sites that were not included in the initial model were tested to validate the model. Validation sites were mixed use developments and areas ranging in size from approximately five acres to over 1,000 acres.

Among the validation sites, the MXD tool produced a significantly lower root mean squared error (RMSE) and better R squared statistic than traditional (ITE) methods when comparing estimated and observed external vehicle trips. Estimates from the ITE Trip Generation document or SANDAG's Traffic Generators had an RMSE of 44% and R squared of 0.65, modified estimates using ITE's or SANDAG's traditional trip internalization techniques had an RMSE of 32% and R squared of 0.81, whereas modified estimates using the model developed had an RMSE of only 24% and R squared of 0.90.

MXD Model Inputs

To estimate the probability that a trip will be internal or external, the input variables listed in the table below are considered in the MXD tool.

TABLE H1. INTERNAL CAPTURE (PINTERNAL) VARIABLES, SOURCE, AND INFLUENCE

Variable Description	Source	Influence
Employment	MXD area 2030 proposed employment	Increased local employment increases likelihood of internal capture
Land Area	ArcGIS measurement of MXD area	Increased MXD land area increases likelihood of internal capture
Jobs/Population	MXD area 2030 proposed employment and 2030 proposed households	Increased jobs/housing balance increases likelihood of internal capture
Intersections per Square Mile	Aerial photography counts, adjusted, if needed, for 2030 conditions	Increased network connectivity/walkability increases likelihood of internal capture
Average Household Size	Local 2000 Census block group, adjusted, if needed, for 2030 conditions	Increased average household size decreases likelihood of internal capture
Vehicles Owned per Capita	Local 2000 Census block group, adjusted, if needed, for 2030 conditions	Increased vehicles ownership decreases likelihood of internal capture

Source: Fehr & Peers, 2011

Due to the relatively small size of the study areas in this project, all internal trips are assumed to be made via walking or biking and will therefore not generate impacts to the local vehicle roadway network. The remaining project trips, those that are deemed to be external in nature, are then analyzed using the walk and transit probability input variables identified in Tables H2 and H3.

TABLE H2. WALKING PROBABILITY (PWALK) VARIABLES, SOURCE, AND INFLUENCE

Variable Description	Source	Influence
Employment	2030 employment within one mile of MXD area, from Seattle travel model	Increased local employment increases likelihood of walking trips
Land Area	ArcGIS measurement of MXD area	Increased MXD land area decreases likelihood of external walking trips
Jobs/Population	MXD area 2030 proposed employment and 2030 proposed households	Increased jobs/housing balance increases likelihood of walking trips
Retail Jobs/Population	MXD area 2030 proposed retail employment and 2030 proposed households	Increased retail employment increases likelihood of walking trips
Intersections per Square Mile	Aerial photography counts, adjusted, if needed, for 2030 conditions	Increased network connectivity/walkability increases likelihood of walking trips
Average Household Size	Local 2000 Census block group, adjusted, if needed, for 2030 conditions	Increased average household size decreases likelihood of walking trips
Vehicles Owned per Capita	Local 2000 Census block group, adjusted, if needed, for 2030 conditions	Increased vehicle ownership decreases likelihood of walking trips

Source: Fehr & Peers, 2011

TABLE H3. TRANSIT PROBABILITY (PTRANSIT) VARIABLES, SOURCE, AND INFLUENCE

Variable Description	Source	Influence
Population + Employment per square mile	MXD Area 2030 Proposed Employment and 2030 Proposed Households, ArcGIS Measurement of MXD Area	Increased local density increases likelihood of transit trips
Intersections per Square Mile	Aerial Photography Counts, adjusted, if needed, for 2030 conditions	Increased network connectivity/walkability increases likelihood of transit trips
Average Household Size	Local 2000 Census Block Group, adjusted, if needed, for 2030 conditions	Increased average household size decreases likelihood of walking trips
Employment Within 30 Minute Transit Trip	Walkscore.com Transit Reachable Areas within 30 Minutes, Employment Data from 2030 Seattle Travel Model and 2030 Puget Sound Regional Council Model	Increased regional employment near transit increases likelihood of transit trips
Proportion of Households Within ¼ Mile of Transit	ArcGIS Distance Measurements	Increased access to transit increases likelihood of transit trips
Average Household Size	Local 2000 Census Block Group, adjusted, if needed, for 2030 conditions	Increased average household size decreases likelihood of transit trips
Vehicles Owned per Capita	Local 2000 Census Block Group, adjusted, if needed, for 2030 conditions	Increased vehicle ownership decreases likelihood of transit trips

Source: Fehr & Peers, 2011

Many of the variables in Tables H2 and H3 are examples of the "Ds" that are known to influence travel behavior - density, diversity, development scale, demographics, design, and distance to transit. The probability estimates that result from using the variables in Tables H2 and H3 are then applied to the number of external trips to forecasts the number of external transit or walking/biking trips.

The final result of the trip generation analysis is the number of net external vehicle trips. These are the trips that leave the site and travel through the roads and intersections in the study area. Table H4 below identifies the raw PM peak hour ITE trip generation estimates for the 2030 With Action project and the trip generation estimates from the MXD tool. Table 3 in the report provides further information on the mode split results for each study area. As shown in Table H4, the Mount Baker study area had the largest reduction in external vehicle trip rates, owing to the density and size (development scale) of the MXD area and the wealth of transit options available.

TABLE H4. RAW ITE TRIP RATES AND MXD MODEL EXTERNAL VEHICLE TRIP RATES BY MXD AREA

MXD Area	Raw ITE PM Peak Hour Trips	MXD PM Peak Hour External Vehicle Trips	Reduction
Beacon Hill	261	190	27%
Mount Baker	1,641	1,087	34%
Othello	1,008	766	24%

Source: Fehr & Peers, 2011