City of Bellevue

East Link Light Rail B7/C9T to NE 2nd Portal (B7 – Revised) Alternative

TM04 - South Bellevue Traffic Impact Analysis

215382/TM04

Final Draft | April 2011

Draft

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Appendix A

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1 Executive summary

This technical memo compares the traffic impacts associated with the B7-Revised alternative's A-2 Station to the B7/C9T alternative. The analysis and findings presented in this report are based on a set of traffic counts and forecasts that differ from those assumed in Sound Transit's East Link Project Draft Environmental Impact Statement and Supplemental Draft Environmental Impact Statement. Therefore, the findings in this memo are not directly comparable to these previous studies. In addition, this analysis is not a typical "traffic impact analysis" that compares a "build" to a "no build" scenario. This analysis considers two build alternatives, B7/C9T and B7-Revised, and compares the estimated future traffic conditions under each alternative for the study intersections along Bellevue Way.

The analysis presented in this memo uses a common set of counts and travel demand forecasting assumptions to provide an "apples-to-apples" comparison between the B7/C9T and B7-Revised alternatives. The Bellevue, Kirkland, and Redmond (BKR) travel demand forecasting model was used to generate future traffic forecasts for both alternatives.

The analysis focuses on three off-site intersections along Bellevue Way in the vicinity of the proposed A-2 Station and two internal intersections providing access to the station. Future year 2030 traffic forecasts for the B7/C9T and B7-Revised alignments were developed for these study locations using the BKR model. Future traffic operations were analyzed and compared between the two alternatives.

Without the mitigations described below, the major findings are:

- In both the B7/C9T and B7-Revised alternatives, the Bellevue Way / SE 30th Street intersection would operate at LOS F conditions during the AM and PM peak hours.
- In the B7/C9T alternative, the LOS F condition is caused by delays at the SE 30th Street stop controlled approaches. The northbound and southbound movements on Bellevue Way at SE 30th Street are uncontrolled and would experience only minimal delay at this location. The high volumes and the uncontrolled traffic flow on Bellevue Way would result in few acceptable gaps for vehicles making left or right turns.
- At Bellevue Way / SE 30th Street under the B7-Revised alternative, the LOS F condition is primarily caused by heavy delays to eastbound right turning traffic trying to exit the station and access I-90. Delays would be the result of the heavy southbound traffic on Bellevue Way generating few acceptable gaps for cars and buses making the right-turn to access I-90. The movement from SE 30th Street would be particularly difficult for right turning cars and buses attempting to weave across multiple travel lanes on Bellevue Way to access the eastbound I-90 on-ramp.

- In the B7-Revised alternative, right-turns from the new road bridge from A-2 Station as well as the boat access ramp onto northbound Bellevue Way would also operate at LOS F during the PM peak hour for the same reason as the eastbound right-turn – the high volumes on northbound Bellevue Way would result in few acceptable gaps for vehicles making the right-turn. This would result in significant queuing on SE 30th Street from Bellevue Way onto the overcrossing.
- Vehicle queues along SE 30th Street and 113th Avenue SE would likely extend from Bellevue Way to the A-2 Station driveway and could spill back into the station's internal roadways.
- Under the B7/C9T alternative, the Bellevue Way / South Bellevue PNR / 112th Avenue SE intersection would operate at LOS F in the AM and PM peak hours. The removal of the existing South Bellevue PNR lot under the B7-Revised alternative would eliminate one approach and simplify the signal phasing at this location. This would improve traffic operations to LOS D during the PM peak hour and LOS B during the AM peak hour.
- The two internal A-2 Station intersections operate acceptably at LOS B and C with single-lane approaches and all-way stop control.

The B7-Revised alternative with the A-2 Station would require a series of traffic mitigation measures at the Bellevue Way / SE 30th Street intersection to accommodate the forecasted traffic flows and operate within the City and WSDOT's traffic LOS thresholds. All of these improvements would require the approval of WSDOT as this intersection is located within WSDOT jurisdiction. The improvements include:

- A partial signal at Bellevue Way / SE 30th Street;
- A dedicated acceleration lane for right-turns onto northbound Bellevue Way from the new road bridge as well as the boat access ramp;
- A dedicated right-turn lane from the I-90 off-ramps to the new road bridge and the boat access ramp;
- A second right-turn lane from SE 30th Street onto southbound Bellevue Way; and
- A third southbound travel lane on Bellevue Way from north of SE 30th Street to the I-90 on-ramp, which includes a right-turn pocket from southbound Bellevue Way onto SE 30th Street.

The analysis also finds that:

- The new partial signal recommended at SE 30th Street and Bellevue Way would operate at LOS B with an average of 16 seconds of delay in the PM peak for the southbound Bellevue Way movement. At present, the southbound movement (and the entire intersection) is not signal controlled.

- The 2030 PM peak hour travel time from SE 10th Street to SE 30th Street would decrease by 70 seconds on average for the B7-Revised alternative versus that for the B7 alternative – due to the simplification of the South Bellevue PNR signal.
- Transit travel times for buses serving A-2 Station in B7-Revised would be longer than those in B7, which would serve the existing South Bellevue Park-and-Ride (PNR). For B7-Revised, northbound buses would incur an additional 3.5 minutes of travel time, while southbound buses would incur an additional 1.9 minutes of travel time versus that for B7. The increased travel time would result in added Sound Transit operating costs of between $750,000 to $1.0m per year and two additional buses for routes 532 and 535. Procurement costs for these buses would be about $1.7m in total ($2007). Travel times would also increase for King County Metro resulting in additional operating and bus procurement costs. However, these costs are not available from King County Metro.
- The likelihood of traffic diversion away from Bellevue Way and through the Enatai Neighborhood is relatively low. For A-2 Station trips, the Enatai Neighborhood "cut-through" would be small because these trips travel in the opposite direction to the peak direction of travel and congestion on Bellevue Way (i.e., towards Bellevue in the AM peak and towards I-90 in the PM peak). The extent of I-90 related cut-through traffic would require additional study.

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Key Traffic Impact Issues

- The A-2 Station under the B7-Revised alternative would focus traffic at the Bellevue Way / SE 30th Street intersection.
- With or without the A-2 Station, this intersection (Bellevue Way / SE 30th Street) would operate at LOS F conditions, exceeding the City of Bellevue's acceptable LOS threshold of LOS D
- A series of improvements at this intersection would allow it to operate within the City's LOS D threshold. These improvements include: (i) a partial traffic signal that controls southbound and eastbound movements at SE 30th Street and Bellevue Way; (ii) a second right-turn lane from SE30th Street onto southbound Bellevue Way; (iii) a third southbound travel lane along southbound Bellevue Way from approximately 200 feet north of the SE 30th Street intersection to the I-90 on-ramp; (iv) a right-turn pocket along southbound Bellevue Way into SE 30th Street; (v) a northbound acceleration lane on Bellevue Way for right-turns off the new road bridge and boat access ramp; and (vi) a dedicated right-turn lane off the I-90 off-ramps onto the new road bridge and boat access ramp.
- Improvements were discussed with WSDOT, and while further analysis would be required to justify these improvements no fatal flaws were identified.
- The other study intersections along Bellevue Way north of SE 30th Street and the local streets within the Enatai neighborhood would not experience significant traffic impacts from the A-2 Station.
- Longer bus travel times would be experienced by Sound Transit and King County Metro buses when accessing B7-Revised's A-2 Station. For Sound Transit this would result in additional operating costs of $750,000 to $1.0m and two additional vehicles.

2 Background

2.1 Project description

The East Link project is an extension to Sound Transit's Link light rail system that will provide light rail service across Lake Washington, linking Seattle, Bellevue, and Redmond (Overlake).

For the segment of East Link between the Lake Washington crossing and downtown Bellevue, Sound Transit has developed the B7 alternative to a conceptual engineering level of design (approximately five percent design) as part of the Draft Environmental Impact Statement (DEIS) for the project which was issued in December 2008.

A Supplemental Draft EIS, which analyzes new alternatives developed since the DEIS, was published in November 2010. That supplemental document includes updated conceptual engineering for the Sound Transit B7 alternative and a C9T alternative that could connect B7 to a station at the Bellevue Transit Center. A Final EIS is expected in the summer of 2011.

At the September 13, 2010, Bellevue City Council Study Session, the council discussed the need for design variations and for additional analysis of revised East Link B7 and C9T alternatives. The objectives of the additional analysis would be to improve performance, to reduce impacts, and to reduce costs, as compared with the Sound Transit B7 and C9T alternatives. As a result of that discussion the council initiated the development of a modified B7 alternative ("B7-Revised"). The council directed City staff to develop an "apples-to-apples" comparison of the Sound Transit B7 and C9T alternatives with a B7-Revised alternative. ARUP were commissioned by the City to develop the B7-Revised alternative.

The B7-Revised alternative begins at the transition from East Link Segment A to Segment B at the east shore of Lake Washington and connects with a new elevated station (A-2 Station) over south Bellevue Way/I-90 ramps. The alignment continues east from the station along the north side of I-90 and turns north into the BNSF corridor with an at-grade profile. The alignment transitions to elevated as it leaves the BNSF corridor, crosses over SE 8th Street, and transitions back to at-grade prior to a new station (East Main Station) just south of Main Street on the current Red Lion Hotel site. The alignment crosses under Main Street and turns west on the current Sheraton Hotel site before entering a tunnel portal at NE 2nd Street. The B7-Revised alternative is approximately three miles long with a combination of at-grade, elevated, and open-cut sections.

2.2 Technical memo scope

This technical memo compares the traffic impacts associated with the B7-Revised alternative's A-2 Station to the B7/C9T alternative. The analysis and findings presented in this report are based on a set of traffic counts and forecasts that differ from those assumed in Sound Transit's East Link Project Draft Environmental Impact Statement and Supplemental Draft Environmental Impact Statement.

Therefore, the findings in this memo are not directly comparable to these previous studies. In addition, this analysis is not a typical "traffic impact analysis" that compares a "build" to a "no build" scenario. This analysis considers two build alternatives, B7/C9T and B7-Revised, and compares the estimated future traffic conditions under each alternative for the study intersections along Bellevue Way.

The analysis presented in this study uses a common set of counts and travel demand forecasting assumptions to provide an "apples-to-apples" comparison between the B7/C9T and B7-Revised alternatives. The Bellevue, Kirkland, and Redmond (BKR) travel demand forecasting model was used to generate future traffic forecasts for both alternatives.

The analysis focuses on three off-site intersections along Bellevue Way in the vicinity of the proposed A-2 Station and two internal intersections providing access to the station. Future year 2030 traffic forecasts for the B7/C9T and B7-Revised alignments were developed using the BKR model. Future traffic operations were analyzed and compared between the two alternatives. Study intersections with level of service (LOS) traffic operations.

Roadway improvements to mitigate potential traffic impacts associated with the proposed A-2 Station are identified. Recommendations are made for the internal station roadway sizing, traffic control at internal intersections, access to parking, and transit circulation. The traffic impact analysis and access plan was developed in parallel with the A-2 Station Design Concept (from TM03).

This memo does not assess traffic operations along the greater B7-Revised alternative – this would be covered in TM 10 after the "tipping point analysis". The analysis also does not assess how congestion on mainline I-90 or queuing at the westbound I-90 ramp meter would impact traffic flows along southbound Bellevue Way during peak periods. This issue has been documented in previous studies (such as the DEIS) but has yet to be analyzed in detail – it is recommended that this be the subject of a future study.

2.3 Technical memo objectives

The objective of this technical memo is to analyze future traffic operations along Bellevue Way under the B7/C9T and B7-Revised alternatives. This analysis will help identify the potential traffic impacts of the A-2 Station on the surrounding roadway network – specifically:

- Estimating future year 2030 AM and PM peak hour traffic operations with the B7/C9T and B7-Revised alternatives at three intersections along Bellevue Way:
  - SE 30th Street
  - The existing South Bellevue Park-and–Ride (PNR)
  - 112th Avenue SE
- Analyzing a minimum build access plan to A-2 Station, which assumes a minimum number of travel lanes and lower cost traffic control devices (i.e.,

stop control instead of new traffic signals). This was first analyzed to determine the traffic impacts associated with the A-2 Station.

- Identifying roadway improvements and traffic control measures required to adequately mitigate off-site traffic impacts associated with the A-2 Station
- Recommending an access plan for the A-2 Station. This includes recommendations for the sizing and traffic control at internal roadways and parking access points for the A-2 Station
- Analyzing PM peak hour travel times along southbound Bellevue Way for the B7/C9T and B7-Revised alternatives to identify how A-2 Station traffic mitigation measures would impact traffic flow along the corridor. As stated previously, the ramp meter and I-90 congestion are not included in this analysis.
- Estimating the travel times for buses accessing the A-2 Station versus the existing South Bellevue PNR. Access time would represent the time to pull off Bellevue Way, access a facility, then return to Bellevue Way (similar to how this was calculated for the South Bellevue Station: Alternative Location Analysis (SBSALA) Study. This analysis would indicate the impacts of the A-2 Station location and configuration on bus transit running times.

2.4 Key meetings and background documents

Identify relevant meetings to the technical memo

Date	Agency/Stakeholder	Attendees
December 16, 2010	City of Bellevue kick-off meeting	Ref: Kick-off Minutes-Issue 2 Issue Date: 1/10/2011
January 6, 2011	Sound Transit kick-off meeting	Ref: ST Meeting 1 Minutes (Issue 2) Issue Date: 1/20/2011
January 13, 2011	B7-Revised optimization workshop	Ref: Optimization Workshop Minutes Issue 2 Issue Date: 2/2/2011
January 13, 2011	WSDOT Meeting City of Bellevue	Ref: WSDOT Meeting 1 Minutes (Issue 1) Issue Date: 1/26/2011
January 25, 2011	Open House 1	Ref: OH Notes WB 2011 01 25 Issue Date: 1/31/2011
February 3, 2011	Staff Check-in 3 – Station and Alignment Update	Ref: Staff Check-in3 Minutes (Draft 2) Issue Date: 2/16/2011
February 24, 2011	Staff Check-in 5 – Station, Sturtevant, Public Meeting	Not finalized at time of submittal.
March 23, 2011	Technical Memo 03 Feedback from WSDOT	Ref: WSDOT Meeting 3 Minutes (Issue 1) Issue Date: 3/30/2011

Table 1 – Relevant meetings

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Relevant documents and reports used to support the analysis included the following:

Document	Referred to in Technical Memo as:	Relevance to Technical Memo:
Central Puget Sound Regional Transit Authority (October 2007). *East Link Integration_2007_10_07.* Seattle, WA: Sound Transit	Sound Transit East Link Integration Plan	Identifies revised transit feeder services to South Bellevue station (and thus A-2 Station)
Central Puget Sound Regional Transit Authority, Washington State Department of Transportation, and Federal Transit Administration, et al (December 2008). *East Link Project: Draft Environmental Impact Statement.* Seattle, WA: Sound Transit.	DEIS	Traffic conditions for B7/C9T using the PSRC Model
Central Puget Sound Regional Transit Authority, Washington State Department of Transportation, and Federal Transit Administration, et al (October 2010). *East Link Project: Supplemental Draft Environmental Impact Statement.* Seattle, WA: Sound Transit.	SDEIS	Traffic conditions for B7/C9T using the PSRC Model
KPFF (July 2010). South Bellevue Station: Alternative Location Analysis. Bellevue, WA: City of Bellevue Transportation Department.	SBSALA	Synchro analysis

Table 2 – Relevant documents and reports

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3 Sound Transit methodology and data

The project team has been directed by Bellevue City Council to prepare an "apples-to-apples" comparison of the B7-Revised alternative with the Sound Transit Draft Environmental Impact Statement (DEIS) and Supplemental Draft Environmental Impact Statement (SDEIS) B7/C9T alternative. Such a comparison requires consistency of three elements – base data and information, key assumptions, and methodology. The following sections and tables outline the key aspects of the traffic analysis, how these aspects were addressed for the Sound Transit B7/C9T alternative and whether this analysis is considered a true "apples-to-apples" comparison. Comment is made particularly for changes in approach.

3.1 Base data and information

In previous studies such as the DEIS and SDEIS, which assessed traffic operations along the B7/C9T alternative, the Puget Sound Regional Council (PSRC) Model was adopted. For the comparison of traffic operations for the B7/C9T and B7-Revised alternatives, the Bellevue, Kirkland, and Redmond (BKR) travel demand forecasting model (or the BKR Model) was adopted. Compared to the PSRC Model, the BKR Model has greater detail for the localized road network and traffic analysis zones.

Thus, all base data and information for B7/C9T and B7-Revised for this study are consistent and could be considered an "apples-to-apples" comparison. Key base data for the analysis includes the following:

Item	Sent by:	Received on:
BKR Model Files	City of Bellevue	2010-12-17
KPFF Synchro Analysis		2010-12-17
Intersection Counts and Synchro (2006-2009)		2010-12-23
UDTF Synchro Format Configuration		2011-01-07
SE30th and Bellevue Way Base Model Counts		2011-02-16
Comparison of New Traffic Counts		2011-02-17
Traffic Counts for Four New Intersections		2011-02-17
Base Year Traffic Volumes from Model		2011-02-18
South Bellevue Travel Time Study		2011-02-25
2007 Traffic Counts	Sound Transit	2011-01-18
A-2 Ridership Output		2011-02-08

Table 3 - Key base data

Also, Synchro/SimTraffic models were provided by the City of Bellevue staff. Lane configurations, signal timings, and traffic volume assumptions were provided in these models.

3.2 Key assumptions

Key assumptions for the traffic impact analysis are as follows:

B7-Revised	B7/C9T	"Apples-to-Apples"	Comment
2030 BKR Model network and land use files updated to most recent assumptions	Same	Yes	
A-2 Station serves as both an LRT Station and a PNR	A-2 Station is not built	No	B7/C9T and B7-Revised assume different stations
South Bellevue PNR removed	South Bellevue PNR is still operational	No	
A-2 Parking Stalls: 1,450	No A-2 Station	No	
South Bellevue PNR Stalls: 0	South Bellevue PNR Stalls: 546	No	
I-90 ramp queuing is not analyzed	Same	Yes	These issues are not considered in DEIS/SDEIS.
Cut-through traffic on 108th Avenue SE is acknowledged, but not specifically analyzed	Same	Yes	

Table 4 - Comparison with Sound Transit DEIS and SDEIS key assumptions

3.3 Methodology

B7-Revised	B7/C9T	"Apples-to-Apples"	Comment
BKR Model used for traffic generation	Same	Yes	PSRC Model used in DEIS and SDEIS
Traffic operations at the study intersections analyzed using methodologies contained in the *2000 Highway Capacity Manual (HCM)* (Transportation Research Board, 2000).	Same	Yes	The DEIS, SDEIS, and SBSALA studies all based their traffic analysis on HCM results.

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B7-Revised	B7/C9T	"Apples-to-Apples"	Comment
Southbound Bellevue Way flow under PM peak hour conditions modelled using traffic microsimulation analysis (Synchro/SimTraffic). Simulation allows for a more robust modelling of closely spaced intersections along congested corridors.	Same	Yes	The City of Bellevue has developed Synchro / SimTraffic models of southbound Bellevue Way for these analysis purposes.
Bus access time measured as the time to pull off of Bellevue Way, serve A-2 Station, and then return to Bellevue Way (same direction)	Buses would serve South Bellevue PNR	Yes	This methodology was used in the SBSALA Study to compare impacts on transit travel times.

Table 5 - Comparison with Sound Transit DEIS and SDEIS methodology

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4 Study area and analysis methodology

This section describes the study area and the traffic analysis methodologies.

4.1 Study area

The study area for the A-2 Station traffic analysis includes three intersections along Bellevue Way north of Interstate 90 (I-90):

- Bellevue Way / SE 30th Street (stop control on SE 30th)
- Bellevue Way / South Bellevue Park and Ride / 112th Avenue SE (traffic signal)
- Bellevue Way / 112th Avenue SE (traffic signal)

I-90 serves as the major freeway link between Bellevue and Seattle. The I-90 interchange ramps at Bellevue Way provide access to the westbound and eastbound travel lanes and the I-90 express lanes. Bellevue Way is a four-lane north-south arterial that provides freeway access to I-90 and serves as a primary travel route from the freeway to downtown Bellevue.

Figure 1 presents the location of the A-2 Station and key intersections within the study area, including internal intersections providing access to the parking structure and transit center.

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Figure 1 – Traffic analysis study area and key study intersections

4.2 Proposed A-2 Station circulation

The A-2 Station and access plan evaluated in this traffic impact analysis contains many of the elements included in the SBSALA A-2 Station. The major differences involve the layout of internal circulation and parking access.

The A-2 Station analyzed in this traffic impact analysis is described below. The mitigation measures included in this study helped refine the configuration and layout of the optimized A-2 Station design.

4.2.1 Optimized A-2 Station design (TM03)

Figure 2 presents the optimized A-2 Station design and concept (from TM03). The optimized design has the following elements:

- A five-level structure including a transit center and parking.
- A transit center on the top level (Level 5) with bus/van layover, bus/van bays, and kiss-and-ride facilities.
- Four levels of parking to accommodate up to 1,450 vehicles.
- A terraced parking structure to reduce visual impacts along 113th Avenue SE.
- A new road bridge over the I-90 ramps to provide access to the station without having to cross Bellevue Way at-grade.
- A ramp on the east side of the facility to link to the Level 5 transit center.
- One dedicated entry/exit point at Level 4 from the east side ramp, one entry point at Level 3 on the north end of the facility allowing “right-in” movements only, and an exit point at Level 3 onto 113th SE Avenue.
- The Bellevue Way / SE 30th Street intersection is converted from full access today (i.e., allowing all turning movements) to right-in/right-out access only from both the north and southbound directions. This configuration restricts all left-turn movements. This is recommended because of the high traffic volumes along Bellevue Way and the close proximity to the I-90 ramps.
- Internal intersections have single-lane approaches with all-way stop control.

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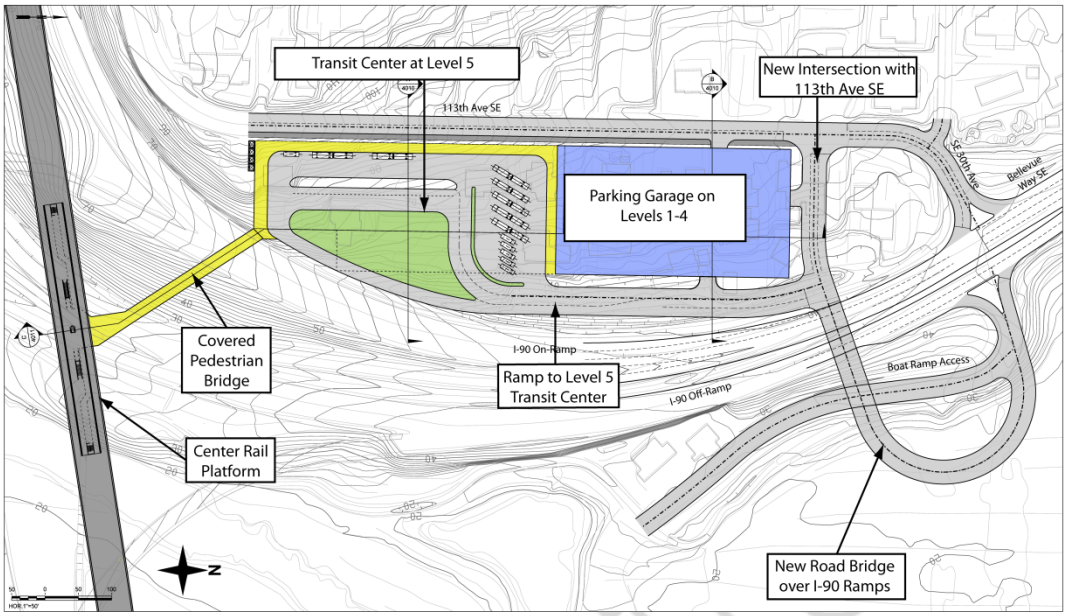

Figure 2 – Optimized A-2 Station configuration

4.3 Intersection traffic analysis methodology

This study includes: (i) an intersection based traffic impact analysis; (ii) microsimulation analysis of PM peak hour travel times along southbound Bellevue Way; and (iii) an estimate and comparison of bus travel times to the existing South Bellevue Park-and-Ride and to the A-2 Station, respectively.

Traffic operations at the study intersections were analyzed using methodologies contained in the *2000 Highway Capacity Manual (HCM)* (Transportation Research Board, 2000). The HCM provides analysis methods and equations that estimate the peak hour delay experienced by vehicles at signalized and unsignalized (i.e., stop-controlled) intersections. Inputs to the HCM intersection calculations include peak hour traffic volumes, intersection geometrics (number of lanes), traffic signal timing parameters, and other data such as pedestrian volumes and the percentage of trucks.

The HCM delay estimates are used to assign a level of service (LOS) rating, which describes overall intersection operating conditions. LOS ranges from LOS A, indicating free flow traffic conditions with little or no delay, to LOS F, representing over-saturated conditions where traffic flows exceed capacity. LOS F conditions typically result in excessive queuing and delays.

At signalized intersections, LOS is based on the weighted average delay for all movements (measured in seconds per vehicle). At intersections with stop control on the minor side street approaches, LOS is reported for the worst side street

controlled approach. For all-way stop-controlled intersections, LOS is based on the weighted average delay of all movements.

Note 1: HCM delay estimates and LOS thresholds are expressed as the average control delay (seconds per vehicle). Control delay includes the delay at the intersection that is attributable to the traffic control (initial deceleration delay, queue move-up time, stopped delay, and acceleration delay).

Source: 2000 Highway Capacity Manual (Transportation Research Board), Chapter 16 – Signalized Intersections and Chapter 17, Unsignalized Intersections

Table 6 presents the HCM LOS delay thresholds for signalized and unsignalized intersections. The City of Bellevue defines LOS D as the acceptable LOS for intersections. Intersections that exceed LOS D (i.e., E or F) are considered deficient from a traffic operations perspective. WSDOT considers intersections that exceed LOS D (i.e., F) to be deficient. The DEIS, SDEIS, and SBSALA Study were used in this LOS analysis.

Level of Service (LOS)	Signalized intersection delay (sec/veh) [1]	Unsignalized intersection delay (sec/veh) [1]	General description
A	0 – 10.0	0 – 10.0	Free flow conditions
B	10.1 – 20.0	10.1 – 15.0	Limited congestion and short delays
C	20.1 – 35.0	15.1 – 25.0	Some congestion with average delays
D	35.1 – 55.0	25.1 – 35.0	Significant congestion and delays
E	55.1 – 80.0	35.1 – 50.0	Severe congestion and delays develop as intersection demand nears capacity.
F	*> 80.0*	*> 50.0*	Intersection capacity is exceeded. Extreme delays and queues result.

Note 1: HCM delay estimates and LOS thresholds are expressed as the average control delay (seconds per vehicle). Control delay includes the delay at the intersection that is attributable to the traffic control (initial deceleration delay, queue move-up time, stopped delay, and acceleration delay).
Source: 2000 Highway Capacity Manual (Transportation Research Board), Chapter 16 – Signalized Intersections and Chapter 17, Unsignalized Intersections

Table 6 – Intersection Level of Service thresholds

A 1.5-mile segment on southbound Bellevue Way from SE 10th Street to SE 30th Street (was analyzed under 2030 PM peak hour conditions to provide a more detailed assessment of traffic flow under the B7/C9T and B7-Revised alternatives. The analysis was conducted using the traffic microsimulation software program Synchro / SimTraffic. Microsimulation programs simulate individual users on the transportation system. Simulation programs capture queue interactions between closely spaced intersections, lane changing, and the effects of complex traffic signal coordination systems on traffic flow. An example Synchro / SimTraffic model was provided by City staff for use in the analysis.

The microsimulation analysis is meant to serve as a comparative operations study between the B7/C9T and B7-Revised alternatives. It is not considered a complete modeling effort, as this would require the following:

- The microsimulation considers an area that is well outside of the study area included in the HCM-based traffic analysis. The City's Synchro / SimTraffic model was adjusted to reflect the new forecasts, but additional review is required for the area north of the Bellevue Way/112th Avenue intersection.
- An exhaustive calibration/validation procedure to ensure that the model effectively replicates existing "real-world" conditions. Additional data collection is required (traffic counts, "floating car" travel time runs, observed origin-destination travel patterns at the I-90 ramps, etc.).
- An analysis of the I-90 ramp meter and HOV/Express lanes. Information on the operation and metering rate is required.
- An analysis of traffic flows from Bellevue Way to the westbound and eastbound I-90 ramps. The relative flows to each ramp influences weaving and congestion and Bellevue Way.

A more detailed microsimulation analysis that addresses these issues should be analyzed as part of a subsequent study.

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5 Existing conditions

Traffic conditions along Bellevue Way are characterized by congestion mainly during the afternoon and evening peak periods. Bellevue Way from 112th Avenue SE to I-90 has an average daily traffic (ADT) volume of 38,800 vehicles and posted speed limits between 30 and 40 miles per hour (mph). Minor streets intersecting Bellevue Way have ADT volumes in the range of 7,000 and 15,000 vehicles and posted speed limits of 30 to 35 mph. The peak direction of travel on Bellevue Way occurs northbound in the AM (2,100 vehicles per hour) and southbound during the PM (2,300 vehicles per hour).

Figure 3 presents the AM and PM peak hour existing conditions traffic volumes. The counts were collected in 2007 and 2010. Note 1 – Level of Service (seconds of control delay per vehicle) calculated using methodologies published in the Highway Capacity Manual (Transportation Research Board, 2000).
Note 2 - LOS for side-street stop controlled intersections is reported for the worst stop controlled approach/ movement.
Note 3 – Average eastbound delay is reported since volume for worst approach (eastbound left-turns) at SE 30th is one car. Control delay for eastbound right-turns is 36 seconds.
Bold indicates that the intersection exceeds the City's LOS D threshold.

Source: Arup, 2011

Table 7 presents the intersection LOS analysis for the three intersections along Bellevue Way.

Intersection	Traffic Control	Peak Hour	LOS (Delay) [1]
Bellevue Way/112th Avenue	Signal	AM	B (14)
		PM	C (26)
Bellevue Way/S Bellevue Park & Ride/112th Avenue SE	Signal	AM	B (10)
		PM	**E (68)**
Bellevue Way/SE 30th Street	Side-street stop control [1]	AM	C (21)
		PM	**F (50)** [3]

Note 1 – Level of Service (seconds of control delay per vehicle) calculated using methodologies published in the Highway Capacity Manual (Transportation Research Board, 2000).
Note 2 - LOS for side-street stop controlled intersections is reported for the worst stop controlled approach/ movement.
Note 3 – Average eastbound delay is reported since volume for worst approach (eastbound left-turns) at SE 30th is one car. Control delay for eastbound right-turns is 36 seconds.
Bold indicates that the intersection exceeds the City's LOS D threshold.

Source: Arup, 2011

Table 7 – Existing Conditions Intersection Level of Service

Traffic operations at these intersections are summarized below:

- The Bellevue Way / SE 30th Street and Bellevue Way / South Bellevue PNR / 112th Avenue SE intersections operate at LOS F during the PM peak hour.

This exceeds the City's LOS D threshold. The eastbound movements at SE 30th Street and the westbound movements from the PNR lot experience the majority of the delay at these intersections.

- These intersections operate at LOS C or better during the AM peak hour.
- The Bellevue Way / 112th Avenue intersection operates within the City's LOS thresholds during both the AM and PM peak hours.
- Existing conditions results for the Bellevue Way / SE 30th Street intersection differ slightly from DEIS results as new counts were collected in 2009 such that AM peak hour LOS improves, while PM peak hour LOS remains the same.

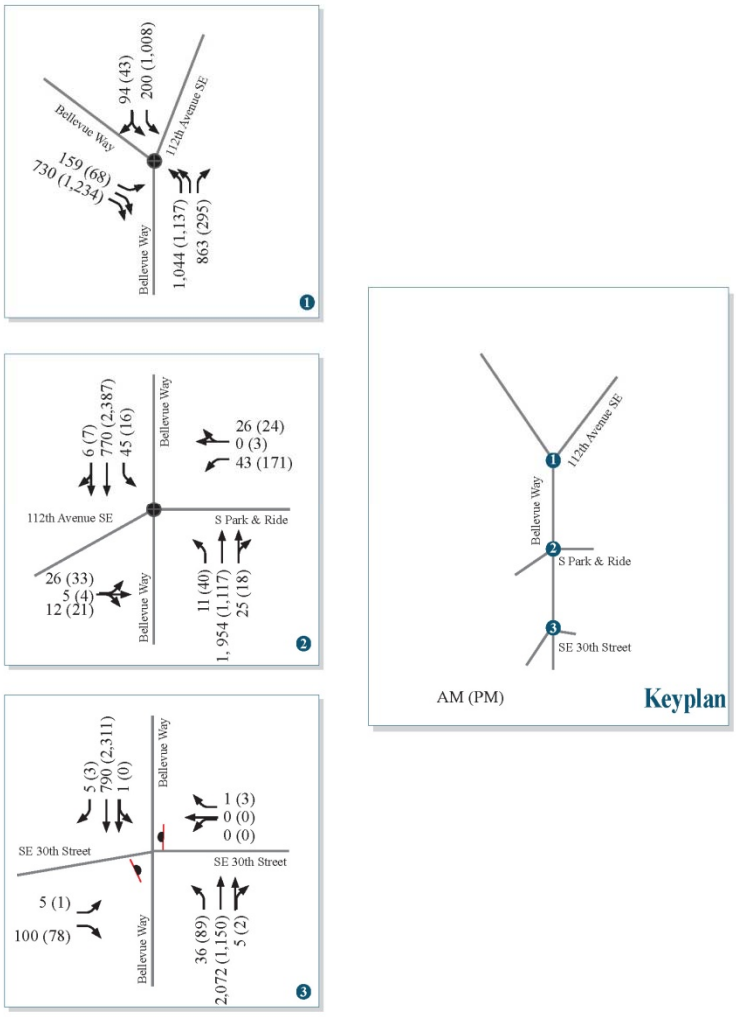

Figure 3 – Existing traffic volumes at study intersections

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6 Travel demand forecasting

6.1 Key model assumptions

The BKR Model was used to develop future year 2030 traffic volumes for the B7/C9T and B7-Revised alternatives. The 2030 BKR Model network and land use files were updated to reflect the different station locations and roadway network assumptions. Source: City of Bellevue, 2011; Project Team, 2011.

Table 8 presents the key assumptions for the two models.

Assumption	B7/C9T	B7-Revised
Segment B LRT Station Location	118th Street	A-2 (southwest corner of Bellevue Way & SE 30th Street)
Number of Parking Spaces at Segment B LRT Station	1,000	1,450
South Bellevue Park-and-Ride	Operational with 546 spaces	Removed

Source: City of Bellevue, 2011; Project Team, 2011.

Table 8 – Travel Demand Forecasting Assumptions

In the B7/C9T alternative, the South Bellevue Park-and-Ride lot remains with 546 spaces and is still served by some transit routes. The park-and-ride lot is assumed to still operate at the existing level of utilization. In the B7-Revised alternative, the South Bellevue PNR would be closed.

Raw model data, or information taken directly from the model, is not typically used in traffic forecasting processes. Model data is usually post-processed in some manner to make forecast results more consistent with observed travel patterns or other forecast data.

6.2 Traffic forecasting process and adjustments

The following steps summarize the traffic forecasting process and the various adjustments made to the forecasts:

- BKR Model turning volumes were obtained from the base year 2006 model.
- The future year 2030 BKR Model was run for the B7/C9T and B7-Revised alternatives.
- Raw BKR Model volumes were adjusted to account for differences between the base year 2006 model and the observed traffic counts. The correction used in this analysis is referred to as the "difference method". The difference method corrects for the error between the base year and the counts by

calculating the increment of growth between the base year and future year volumes and adding the difference to the existing counts.

- The BKR Model's vehicle trip generation estimate for A-2 Station was adjusted to better match the trip generation forecast developed with the Sound Transit ridership model (see TM07). This adjustment ensures that peak hour vehicle trips used in the traffic impact analysis are consistent with the LRT ridership forecast and the sizing of the A-2 Station garage. Vehicle trips for the B7/C9T alternative were not adjusted. The peak hour traffic flows are assumed to be 43% of the three-hour PM peak period traffic activity, as assumed by Sound Transit in previous DEIS/SDEIS work.
- The vehicle trip generation estimate from the Sound Transit Model is for PM peak hour only. The AM peak hour trip generation for the A-2 Station was developed by reversing the in and out vehicle trips from the PM peak hour estimate.

6.3 2030 peak hour traffic forecasts for A-2 Station

Note 1: Buses account for 30-35 inbound trips and an equal number of outbound trips during the peak hour.

Note 2: Peak hour flows are assumed to be 43% of the three-hour PM peak period activity.

Source: Sound Transit Ridership Model 2010/2011; Project Team 2011

Table 9 presents the AM and PM peak hour trip generation for the A-2 Station under B7-Revised.

Type of Trip	AM Peak Hour (1-Hour) Vehicle Trips			PM Peak Hour (1-Hour) Vehicle Trips		
	In	Out	Total	In	Out	Total
Park-and-Ride	685	0	685	0	685	685
Kiss-and-Ride	130	130	260	130	130	260
Total	815	130	945	130	815	945

Note 1: Buses account for 30-35 inbound trips and an equal number of outbound trips during the peak hour.

Note 2: Peak hour flows are assumed to be 43% of the three-hour PM peak period activity.

Source: Sound Transit Ridership Model 2010/2011; Project Team 2011

Table 9 – BKR vehicle trip generation – A-2 Station (B7-Revised)

The distribution of A-2 Station vehicle trips to major gateways at the edges of the study network was developed using existing travel patterns and the BKR model. Currently, approximately 55 percent of South Bellevue Park and Ride vehicle trips travel to/from Bellevue north of the study area, while 45 percent of trips use I-90 to travel to/from the study area. The BKR model indicates that a larger share of trips will use I-90 to access the A-2 Station in the future.

The trip distribution used in the traffic analysis starts with the existing distribution and applies a minor adjustment to assign an additional five percent of the A-2 Station traffic to I-90. Source: BKR Travel Demand Model 2010/2011; Cambridge Systematics 2011

Table 10 and Figure 4 present the projected distribution of the A-2 Station trips.

	Study Area Gateway	Percentage of A-2 Station trips
1.	Bellevue Way north of Bellevue Way / 112th Avenue SE intersection	35%
2.	112th Avenue SE north of Bellevue Way / 112th Avenue SE intersection	15%
3.	113th Avenue south of A-2 Station	<1%
4.	I-90 to/from the West	5%
5.	I-90 to/from the East	45%

Source: BKR Travel Demand Model 2010/2011; Cambridge Systematics 2011

Table 10 – BKR vehicle trip distribution – A-2 Station (B7-Revised alternative)

The traffic models and the A-2 trip generation/distribution assumptions described above were used to develop adjusted 2030 AM and PM peak hour forecasts.

Figure 4 and Figure 5 present the adjusted traffic forecasts for the B7/C9T and B7-Revised alternatives.

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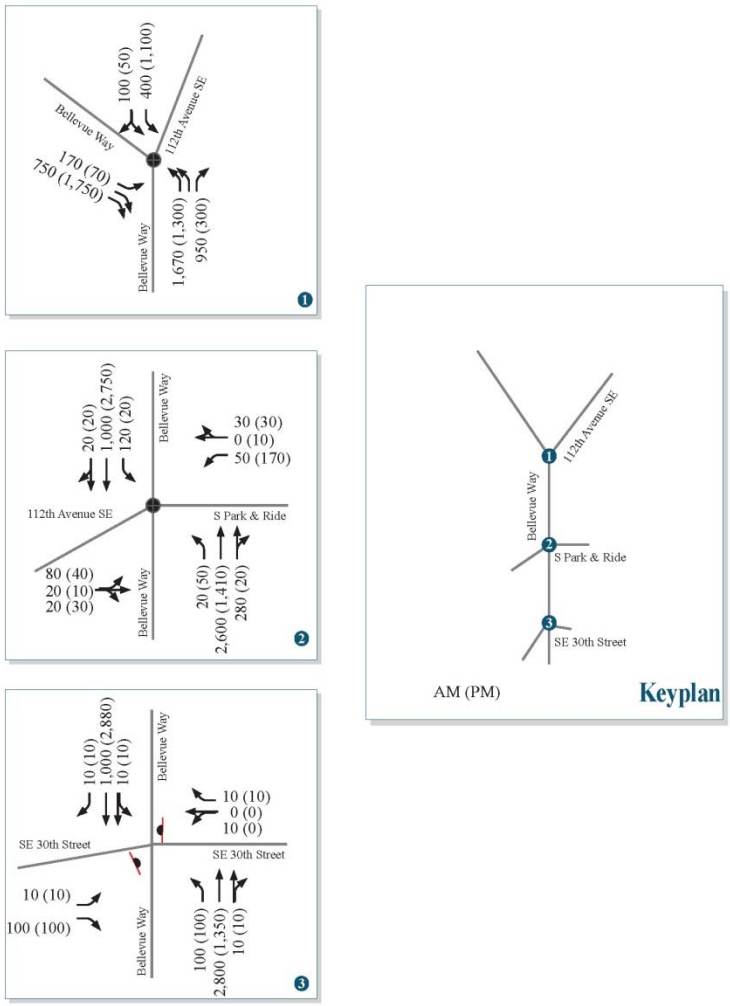

Figure 4 – B7/C9T 2030 Traffic Volumes at Study Intersections

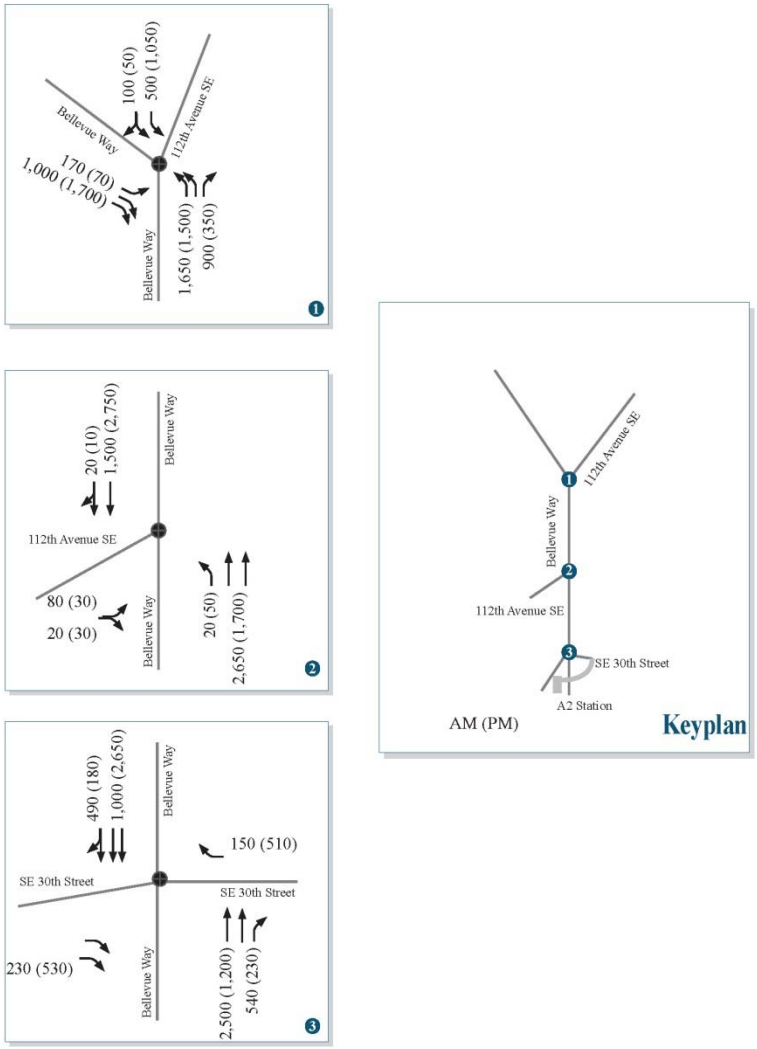

Figure 5 – B7-Revised 2030 Traffic Volumes at Study Intersections

7 Future 2030 traffic conditions

7.1 2030 traffic conditions

The adjusted 2030 AM and PM peak hour forecasts were used to generate the future year 2030 intersection LOS results for the B7/C9T and B7-Revised alternatives. Initial traffic control and lane configuration assumptions for the B7/C9T and B7-Revised alternatives within the study area are summarized below:

- Bellevue Way / 112th Avenue
  - B7/C9T and B7-Revised have the same traffic control and lane configuration assumptions
- Bellevue Way / South Bellevue PNR 112th Avenue
  - B7/C9T assumes the PNR is operational (a four-leg intersection remains) with a traffic signal
  - B7-Revised assumes that the PNR (and the east leg at the intersection serving the PNR) are removed; the traffic signal remains to serve vehicles and pedestrians crossing Bellevue Way at 112th Avenue SE.
- Bellevue Way / SE 30th Street
  - B7/C9T assumes a full-access intersection with permitted left-turns at all approaches and stop control on SE 30th Street (assumes no traffic signal)
  - B7-Revised assumes right-in/right-out access from Bellevue Way to SE 30th Street, stop control on the eastbound and westbound right-turn movements from SE 30th Street to Bellevue Way, one lane at the eastbound and westbound approaches, and restrictions on all left-turn movements (assumes no traffic signal)
- SE 30th Street from the A-2 Station to Bellevue Way
  - B7/C9T assumes one lane in each direction (existing configuration)
  - B7-Revised assumes one lane in each direction
- Internal A-2 Station intersections providing access to the parking garage and ramp
  - B7/C9T (not applicable as no station proposed at A-2 location)
  - B7-Revised assumes single-lane approaches with all-way stop control

Note 1 - Level of Service (seconds of control delay per vehicle) calculated using methodologies published in the Highway Capacity Manual (Transportation Research Board, 2000).
Note 2 – LOS for side-street stop controlled intersections is reported for the worst stop controlled approach/movement. No signal is assumed at this intersection, so LOS represents operations on the side street.
Note 3 - LOS for all-way stop controlled intersection is reported as the average delay for all approaches at the intersection.

Bold results indicate that the intersection exceeds the City's LOS D threshold.

Source: Arup, 2011

Table 11 presents the projected 2030 LOS results at the study intersections.

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Intersection	Traffic control	Peak hour	LOS / Delay [1]	
			B7/C9T	B7-Revised
Bellevue Way/112th Avenue	Signal	AM	D (36)	C (29)
		PM	C (40)	C (34)
Bellevue Way/S Bellevue Park & Ride/112th Avenue SE	Signal	AM	**F (113)**	B (12)
		PM	**F (100)**	C (29)
Bellevue Way/SE 30th Street	Side-Street Stop Control [2]	AM	**F (>150)**	**F (100)**
		PM	**F (>150)**	**F (115)**
Internal ramp intersection	All-Way Stop Control [3]	AM	-	C (21)
		PM	-	C (16)
Internal garage intersection	All-Way Stop Control	AM	-	C (17)
		PM	-	B (14)

Note 1 - Level of Service (seconds of control delay per vehicle) calculated using methodologies published in the Highway Capacity Manual (Transportation Research Board, 2000).
Note 2 – LOS for side-street stop controlled intersections is reported for the worst stop controlled approach/movement. No signal is assumed at this intersection, so LOS represents operations on the side street.
Note 3 - LOS for all-way stop controlled intersection is reported as the average delay for all approaches at the intersection.
Bold results indicate that the intersection exceeds the City's LOS D threshold.

Source: Arup, 2011

Table 11 – Future year (2030) peak hour intersection level of service

The major findings are summarized below:

- In both the B7/C9T and B7-Revised alternatives, the Bellevue Way / SE 30th Street intersection would operate at LOS F conditions during the AM and PM peak hours.
- In the B7/C9T alternative, the LOS F condition would be caused by delays at the SE 30th Street stop controlled approaches. The northbound and southbound movements on Bellevue Way at SE 30th Street would be uncontrolled and experience only minimal delay at this location. The high volumes and the uncontrolled traffic flow on Bellevue Way would result in few acceptable gaps for vehicles making left or right turns.
- At Bellevue Way / SE 30th Street under the B7-Revised alternative, the LOS F result would be primarily caused by heavy delays to eastbound right turning traffic trying to exit the station and access I-90. Delays would be the result of the heavy southbound traffic on Bellevue Way generating few acceptable gaps for cars and buses making the right-turn to access I-90. The movement from SE 30th Street would be particularly difficult for right turning cars and buses

attempting to weave across multiple travel lanes on Bellevue Way to access the eastbound I-90 on-ramp.

- In the B7-Revised alternative, right-turns onto northbound Bellevue Way from the new road bridge or boat access ramp would also operate at LOS F during the PM peak hour for the same reason as the eastbound right-turn – the high volumes on northbound Bellevue Way would result in few acceptable gaps for vehicles making the right-turn. This would result in significant queuing on SE 30th Street from Bellevue Way onto the overcrossing.
- Vehicle queues along SE 30th and 113th Avenue would likely extend from Bellevue Way to the A-2 Station driveway and could spill back into the station's internal roadways.
- Under the B7/C9T alternative, the Bellevue Way / South Bellevue PNR / 112th Avenue intersection would operate at LOS F in the AM and PM peak hours. The removal of the existing South Bellevue PNR lot under the B7-Revised alternative would eliminate one approach and simplify the signal phasing at this location. This would improve traffic operations to LOS D during the PM peak hour and LOS B during the AM peak hour.
- The two internal A-2 Station intersections operate acceptably at LOS B and C with single-lane approaches and all-way stop control.

7.2 Potential off-site mitigation measures

The 2030 traffic analysis presented above indicates that the Bellevue Way / SE 30th intersection would operate at LOS F during both the AM and PM peak hours under the B7-Revised alternative.

Figure 6 presents the potential measures required to mitigate the traffic impacts at this intersection.

These improvements include:

- **Partial signal at Bellevue Way / SE 30th Street** - Providing a partial signal at the Bellevue Way / SE 30th Street intersection would control southbound traffic on Bellevue Way and eastbound traffic on SE 30th Street. Stopping the heavy southbound traffic flow will allow eastbound vehicles the opportunity to make the right-turn to southbound Bellevue Way. The signal would impart some additional delay (approximately 16 seconds) on southbound Bellevue Way traffic, as no traffic control exists today for this movement. The northbound traffic from the I-90 off-ramps would continue uninterrupted. WSDOT approval is required for this improvement as well as a safety assessment.[1] The partial signal was discussed with WSDOT and while further justification will be required, no fatal flaws were indentified with the proposal.
- **Second right-turn lane from SE 30th Street onto southbound Bellevue Way** - This second right-turn lane would be required to improve LOS and provide

[1] Other options were also considered, but assessed to be too disruptive to traffic and ramp operations or too costly. These options included a roundabout as well as a dedicated on-ramp to westbound I-90 from SE 30th Street.

adequate queuing space. This second lane would extend from Bellevue Way to the A-2 Station access.

- **Third southbound travel lane on Bellevue Way** - A third southbound travel lane on Bellevue Way would increase the capacity and queue storage at the southbound approach affected by the proposed partial traffic signal noted above, particularly as the new partial signal would impart some additional delay on this southbound movement. This lane would start approximately 200 feet north of SE 30th Street to the I-90 on-ramps. The right-of-way required for this third lane would be obtained by using the existing northbound left-turn pocket that was removed (see Section 4.2.1 as well as TM-03 for a description of the optimized station concept) and right-of-way to the west side of Bellevue Way. The analysis assumes that this lane is fully utilized with no restrictions.
- The ultimate configuration and operation of this third lane would require coordination between WSDOT and the City. The new third southbound lane could be restricted to HOV only (when HOV restrictions are in place on I-90) because the HOV lane on the westbound I-90 on-ramp begins just downstream of SE 30th Street. For purposes of this analysis, no lane restrictions are assumed. Analyzing lane restrictions would require more advanced microsimulation analysis, which could be done as part of a future study.
- **Right-turn pocket for southbound Bellevue Way at SE 30th Street –** A right-turn pocket would be created just north of the SE 30th Street and Bellevue Way intersection to allow vehicles to safely decelerate to make this movement.
- **Dedicated acceleration lane for right-turns onto northbound Bellevue Way from new road bridge and boat access ramp -** An acceleration lane is required to provide adequate merging distance for right-turns onto northbound Bellevue Way from the new road bridge or boat access ramp. The acceleration lane would operate as a third lane with a "free" right-turn movement.
- **Right-turn lane from I-90 off-ramps to the new road bridge and boat access ramp** – A dedicated right-turn lane would allow vehicles to safely decelerate off the ramps and make this turn without impacting mainline traffic.

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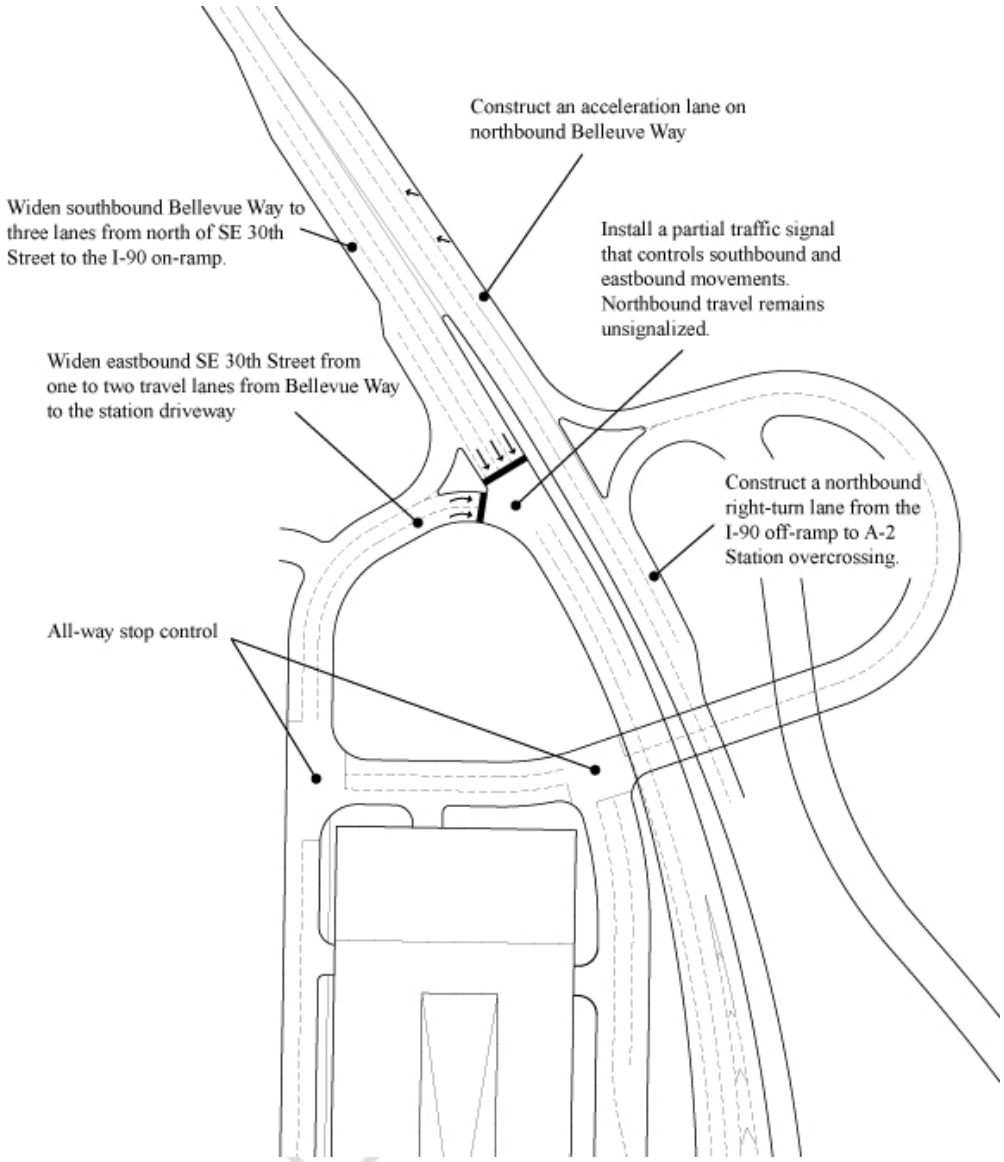

Figure 6 – Potential off-site mitigations around A-2 Station

Note 1: Level of Service (seconds of control delay per vehicle) calculated using methodologies published in the Highway Capacity Manual (Transportation Research Board, 2000).

Note 2: LOS for side-street stop controlled intersections is reported for the worst stop controlled approach/movement.
Note 3: Traffic on southbound Bellevue Way in the PM peak would operate at LOS B (16 seconds of delay)
Bold results indicate that the intersection exceeds the City's LOS D threshold.

Source: Arup, 2011

Table 12 compares the traffic operations for the Bellevue Way / SE 30th Street intersection with the mitigations detailed above to the unmitigated result.

Intersection	Traffic control	Peak hour	LOS / Delay[1]	
			B7-Revised no mitigation	B7-Revised with mitigations
Bellevue/ SE 30th Street	Side-street stop[2] / partial signal (SB/EB movements)	AM	**F (99)**	A (4)
		PM	***F (>150)***	B (15) [3]

Note 1: Level of Service (seconds of control delay per vehicle) calculated using methodologies published in the Highway Capacity Manual (Transportation Research Board, 2000).
Note 2: LOS for side-street stop controlled intersections is reported for the worst stop controlled approach/movement.
Note 3: Traffic on southbound Bellevue Way in the PM peak would operate at LOS B (16 seconds of delay)
Bold results indicate that the intersection exceeds the City's LOS D threshold.

Source: Arup, 2011

Table 12 – Future year (2030) intersection Level of Service with mitigations

The traffic analysis of the mitigation measures at Bellevue Way / SE 30th Street indicates that the improvements would be effective at reducing overall intersection delay and queuing and while restoring LOS to acceptable levels.

7.3 Southbound Bellevue Way travel time analysis

A more detailed evaluation of 2030 PM peak hour travel time on southbound Bellevue Way and 112th Avenue SE was conducted using a traffic microscopic simulation ("microsimulation") tool. A 1.5-mile segment on southbound Bellevue Way from SE 10th Street to SE 30th Street was analyzed along with a 1.4-mile segment on 112th Avenue SE from SE 8th Street to where it intersects Bellevue Way.

Microsimulation allows for a more robust and realistic modeling of traffic flow. The analysis was conducted using the traffic microsimulation software program Synchro / SimTraffic. The SimTraffic network model was obtained from City staff. As stated previously, there are several caveats to this analysis: an existing conditions model has not been validated, the model extends beyond our current study area, and there are a number of phenomena that are challenging to model and outside the scope of this study (e.g., HOV restrictions, ramp metering, bus-

only lanes, etc.). Despite these caveats, the analysis presented here is still useful for comparison purposes.

SimTraffic models were developed for the B7/C9T and the B7-Revised alternatives. The 2030 B7/C9T and B7-Revised traffic forecasts presented in this memo were assumed for the three study intersections from 112th Avenue SE to SE 30th Street. The traffic volumes and signal timings for the intersections on Bellevue Way north of 112th Avenue SE (outside of the study area) were obtained from the City of Bellevue's traffic engineering department.

For the B7-Revised alternative, the analysis assumes the full set of traffic mitigation measures recommended in Section 7.2. The analysis compares the B7-Revised results to the B7/C9T alternative as reported by the City of Bellevue. The travel time analysis:

- Provides a more detailed analysis of how the new partial signal at Bellevue Way SE and SE 30th Street would impact traffic flow along southbound Bellevue Way; and
- Provides an additional "apples-to-apples" comparison with the B7/C9T alternative.

Note 1: Assumes mitigation measures at the Bellevue Way / SE 30th Street intersection.

Source: City of Bellevue, 2011; Arup 2011

Table 13 presents the 2030 PM peak hour travel time analysis results for southbound Bellevue Way from SE 10th Street to SE 30th Street and on 112th Street from SE 9th to SB Bellevue Way.

Travel segment	2030 southbound travel time (seconds)	
	B7	B7-Revised [1]
SB Bellevue Way from SE 10th to SE 30th	403	333
112th Avenue SE from SE 9th to SB Bellevue Way	335	174

Note 1: Assumes mitigation measures at the Bellevue Way / SE 30th Street intersection.

Source: City of Bellevue, 2011; Arup 2011

Table 13 – 2030 PM Peak Hour Travel Time Analysis on Southbound Bellevue Way

The travel time analysis indicates that the introduction of the partial signal, combined with the other mitigation measures at SE 30th Street and Bellevue Way, would result in a decrease in southbound travel times on Bellevue Way and 112th Avenue SE. The analysis indicates the following:

- In the B7/C9T alternative, the majority of the southbound delay would be caused by the signal at the South Bellevue PNR.
- In the B7-Revised alternative, removing the South Bellevue PNR would simplify the signal by removing the PNR leg of the intersection and its associated signal phase. This would allow for a shorter cycle that can be coordinated with the southbound phase of the partial signal at SE 30th Street.

- The introduction of the partial signal at SE 30th Street appears to have very little impact on southbound traffic flow. The analysis indicates that the southbound movements at both of these signals could be coordinated to effectively promote traffic flow. Also, the majority of green time at this signal would be given to the southbound phase. This result would support the HCM-based traffic impact results, which indicate that the partial signal would result in only 16 seconds of additional delay to southbound traffic at SE 30th Street.
- The closing of the PNR lot would reassign all existing traffic demand to the A-2 Station in the B7-Revised alternative. Approximately 200 cars would be removed from the southbound traffic stream between the PNR and SE 30th Street. These vehicles would be reassigned as eastbound right-turn movements at SE 30th Street. This minor reduction in traffic also explains some of the improvement in southbound travel times.
- The recommended mitigation measures would provide benefits that outweigh the minor delays imposed on southbound traffic at the SE 30th Street partial signal. This analysis assumes that the third southbound travel lane added at SE 30th Street is fully utilized and not restricted to HOV only.

7.4 Bus travel time analysis and cost impacts

7.4.1 Bus travel time analysis

The location of A-2 Station and the bus transit center would impact the travel time for Sound Transit and King County Metro buses along Bellevue Way. Currently, buses serve the South Bellevue PNR. Under the B7-Revised alternative, northbound buses from the I-90 off-ramps entering and exiting the A-2 Station would use the new overcrossing to access Bellevue Way. Southbound buses from Bellevue would use SE 30th Street to access A-2. Once inside the station, buses would use the main ramp to access the transit center on the top level of the garage. Buses circulating within the station would incur additional delay at the two stop controlled internal intersections.

The existing South Bellevue PNR provides convenient bus access to and from Bellevue Way. Buses traveling northbound on Bellevue Way serve an on-street stop along the east side of Bellevue Way. Southbound buses enter the PNR at the north driveway (located upstream of the traffic signal) and serve a stop internal to the PNR lot. Southbound buses exit the lot at the traffic signal to travel southbound on Bellevue Way.

The following method was used to estimate the travel time impacts associated with the A-2 Station:

- The SBSALA Study methodology only included the delay associated with traffic reentering Bellevue Way. Internal travel time was not factored in. This does not affect northbound buses because there is no increase in travel distance. However, it does affect southbound buses that must travel approximately 500 feet on an internal roadway to reach their assigned berth. An internal speed of 10 mph was assumed.

- The travel distances along the internal station roadways used by northbound and southbound buses were calculated
  - Northbound routes: 3,335 ft
  - Southbound routes: 2,985 ft
- A speed of 10 mph was assumed for buses circulating within the station. This travel speed captures the travel time along the roadways plus the delay associated with internal intersections. This was done to be consistent with the SBSALA Study.
- Bus dwell times were excluded from the analysis because they are assumed to be the same in the existing and the future
- Total travel times for northbound and southbound inbound/outbound buses serving the A-2 Station were compared to travel times for the existing South Bellevue PNR from the SBSALA Study.

Note 1: Existing northbound bus delay is 0.3 minutes associated with northbound buses merging on to northbound Bellevue Way. Southbound delay is 1.2 minutes associated with southbound buses making the westbound left-turn from Park and Ride driveway to southbound Bellevue Way, plus a travel time of 35 seconds along internal roadways.

Source: City of Bellevue, 2011; Arup 2011; SBSALA Study 2010

Table 14 presents the results of the bus travel time analysis.

Travel direction	Transit Travel Time Comparison (minutes)		
	Existing South Bellevue Park-and-Ride [1]	**A-2 Station**	**Change in Transit Travel Time**
Northbound	0.3	3.8	3.5
Southbound	*1.8*	*3.7*	1.9

Note 1: Existing northbound bus delay is 0.3 minutes associated with northbound buses merging on to northbound Bellevue Way. Southbound delay is 1.2 minutes associated with southbound buses making the westbound left-turn from Park and Ride driveway to southbound Bellevue Way, plus a travel time of 35 seconds along internal roadways.

Source: City of Bellevue, 2011; Arup 2011; SBSALA Study 2010

Table 14 - Transit travel time comparison: South Bellevue Park-and-Ride and A-2 Station

The analysis indicates that the A-2 Station would add approximately 3.5 minutes to buses traveling northbound on Bellevue Way and 1.9 minutes to buses traveling southbound.

7.4.2 Potential cost impacts

The location of A-2 Station relative to the existing South Bellevue PNR would result in longer travel times, as well as higher operating costs. Sound Transit estimates that:

- Operating costs would increase by $750,000 to $1,000,000 annually.
- Two additional buses would be required to maintain headway on the service. The cost to procure the two vehicles would be $1.7m (2007$). The lifespan of these vehicles would be 12 years, thus this capital expense would be incurred every 12 years.

King County Metro buses would also likely experience additional operational cost associated with this additional travel time, however, an estimate of these costs has not been provided.

7.5 Potential for Enatai neighborhood traffic diversion

The traffic impact analysis also evaluated the potential for traffic diversion (i.e., "cut-through" traffic) away from Bellevue Way and through the Enatai neighborhood. Traffic diversions occur when congestion along a major arterial builds up and travel times degrade to the point that a less direct travel route on local streets becomes more attractive. As the travel experience degrades, more traffic would divert from the major arterial and use minor streets to avoid the traffic.

7.5.1 Travel time comparison

The potential exists for vehicles traveling along Bellevue Way to/from areas to the north (north of SE 8th Street) to use a series of local streets through the Enatai neighborhood (108th Avenue, SE 34th Street, and 113th Avenue) to reach the A-2 Station and I-90.

Figure 7 illustrates two of these competing routes to the A-2 Station and SE 30th Street as summarized below:

- The most direct route from Bellevue Way to SE 30th Street would be on Bellevue Way. From SE 16th Street to the A-2 Station, the driving distance would be approximately 1.0 mile. There are a series of traffic signals and the road has posted speed limit of 40 mph. If an average travel speed of 35 mph were attained (assuming some congestion), the travel time would be about 1 minute and 40 seconds.
- The Enatai neighborhood cut-through route from SE 16th Street using 107th Avenue SE, 108th Avenue SE, SE 34th Street, and 113th Avenue SE would be approximately 1.7 miles. Most of the route is a two-lane roadway (one lane in each direction) with a posted speed limit of 25 mph. If an average travel speed of 25 mph were attained (assuming free-flow travel), the travel time would be about 4 minutes and 5 seconds.
- Using these assumptions, the Bellevue Way route would be almost 60 percent faster than the Enatai neighborhood cut-through. However, this gap would narrow if congestion worsens along Bellevue Way.

To try and quantify the potential for traffic diversion as congestion worsens, it is important to differentiate between traffic with an origin or destination at the A-2 Station and background traffic to/from I-90.

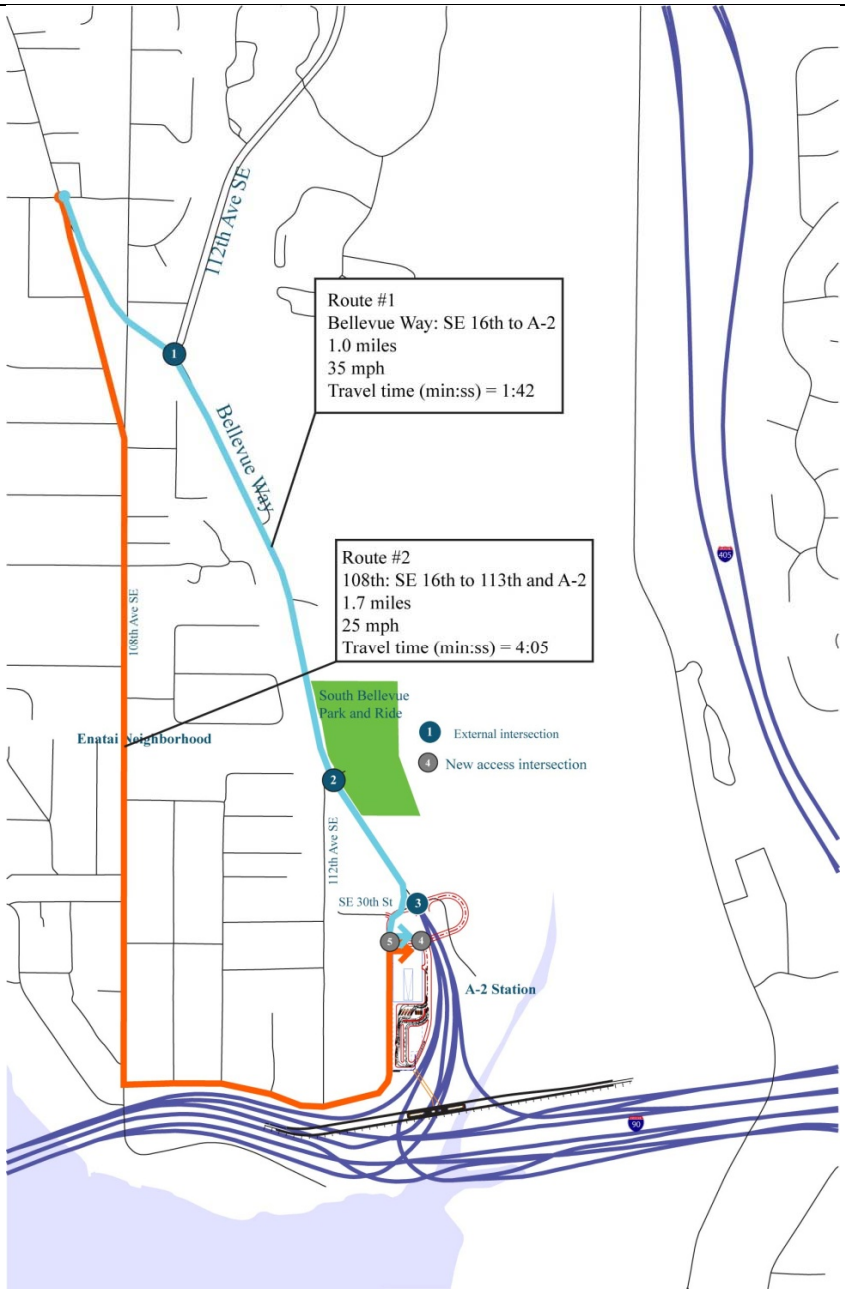

Figure 7 – Example of competing travel paths to A-2 Station

7.5.2 Potential cut-through movements by A-2 Station users

The traffic impact analysis, travel time studies, and traffic forecasts indicate that significant cut-through volumes for A-2 generated station trips only would be unlikely for the following reasons:

- Only a small percentage of A-2 Station vehicle trips (less than 1 percent) would be distributed to 113th Avenue and the Enatai neighborhood. This relatively small share, approximately 50 to 60 vehicles, represents the traffic that would use the Enatai neighborhood cut-through.
- The predominant travel patterns for A-2 Station traffic on Bellevue Way heading to/from destinations in Bellevue north of the study area would occur in the opposite direction of the peak travel commute. At present, the peak direction of travel in the AM peak is northbound on Bellevue Way towards Bellevue. In the AM peak, the southbound Bellevue Way direction has lower traffic volumes and is less congested. Traffic heading to the A-2 Station on southbound Bellevue Way would not experience significant enough delays along this route to divert to the Enatai neighborhood cut-through. The opposite would occur during the PM peak hour.

7.5.3 Potential cut-through movements by I-90 users

At present, some cut-through traffic heading to I-90 has been noted by nearby residents, particularly during the PM peak for southbound movements towards I-90. In the future, traffic traveling to/from I-90 specifically might use the neighborhood cut-through route depending on future congestion and travel times between the competing Bellevue Way and Enatai cut-through routes.

While it is expected that the A-2 Station itself would not generate significant cut-through traffic to add to existing cut-through volumes, a more complete analysis of cut-through volumes for I-90 users on 108th Avenue SE and parallel streets east of the study area is outside the scope of this study. Such a study would be useful to fully understand traffic operations in the wider area of South Bellevue and could include a microsimulation analysis of southbound Bellevue Way. The microsimulation assessment would include the ramp meter, the effects of I-90 congestion spillback, the full package of mitigation measures recommended in this study, and the internal A-2 Station roadways. Also, modeling the internal roadways would be important because these locations would impart travel time delay on I-90 traffic using this route as a cut-through.

8 Preliminary findings

The B7-Revised alternative with A-2 Station would require a series of traffic mitigation measures at the Bellevue Way / SE 30th Street intersection to accommodate forecasted traffic flows and operate within the City's traffic LOS thresholds. The recommended improvements would include:

- A partial traffic signal for southbound and eastbound traffic at SE 30th Street and Bellevue Way to allow traffic leaving the station to safely and efficiently enter the southbound Bellevue Way stream and the I-90 on-ramps;
- Construct an acceleration lane on northbound Bellevue Way to allow for a "free" right-turn from the new road bridge and boat access ramp to northbound Bellevue Way. The acceleration lane provides for a safe transition for drivers merging with vehicles exiting I-90 at a high rate of speed.
- A dedicated right-turn lane from the I-90 off-ramps to the new road bridge and the boat access ramp to allow for safe deceleration of vehicles making this movement from the off-ramps;
- A second eastbound right-turn lane to provide sufficient capacity to serve the project A-2 Station traffic and still maintain adequate traffic flow along southbound Bellevue Way; and
- A third southbound travel lane on Bellevue Way from north of SE 30th Street to the I-90 on-ramp, which includes a right-turn pocket from southbound Bellevue Way onto SE 30th Street.

The analysis also finds that for the B7-Revised alternative with A-2 Station:

- The new partial signal recommended at SE 30th Street and Bellevue Way would operate at LOS B with an average of 16 seconds of delay in the PM peak for the southbound Bellevue Way movement. At present, the southbound movement (and the entire intersection) is not signal controlled.
- The 2030 PM peak hour travel time from SE 10th Street to SE 30th Street would decrease by 70 seconds on average for the B7-Revised alternative versus that for the B7 alternative – due to the simplification of the South Bellevue PNR signal.
- Transit travel times for buses serving A-2 Station in B7-Revised would be slightly longer than those in B7, which would serve the existing South Bellevue PNR. For B7-Revised, northbound buses would incur an additional 3.5 minutes of travel time, while southbound buses would incur an additional 1.9 minutes of travel time versus that for B7. Sound Transit estimates that operating costs would increase by $750,000 to $1,000,000 annually and two additional vehicles would be required for service. Additional costs would be incurred by King County Metro, however these have not been provided.
- Significant cut-through traffic for A-2 Station would not be expected and would not coincide with existing peak travel patterns in the area (i.e., towards Bellevue in the AM peak and towards I-90 in the PM peak), although the scope of I-90 related cut-through traffic would require additional study.

9 Next steps

As noted, additional traffic studies could be useful to fully understand traffic operations in the wider area of South Bellevue – this could include a microsimulation analysis of southbound Bellevue Way. This could include:

- Assessing the impacts of the westbound I-90 ramp meter on queuing along southbound Bellevue Way;
- Assessing traffic congestion on mainline I-90 and its impacts on Bellevue Way;
- Evaluating restrictions on the third southbound travel lane at the Bellevue Way / SE 30th Street intersection to HOV only traffic;
- Estimating the volume of cut-through traffic for I-90 users as congestion increases along Bellevue Way; and
- Conducting a safety analysis of the proposed partial signal at SE 30th Street and Bellevue Way.

Draft

Appendix A

Traffic technical calculation sheets

Draft

SE 30th and Bellevue Way - Existing AM Peak Hour Unsignalized

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1

Average Delay (sec/veh): 0.7 Worst Case Level Of Service: C[20.6]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L - T - R			L - T - R			L - T - R			L - T - R		
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0 1 1 0			0 1 1 0 1			1 0 0 0 1			0 1 0 0 1		
Volume Module:												
Base Vol:	36	2072	5	1	790	5	5	0	100	0	0	1
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	36	2072	5	1	790	5	5	0	100	0	0	1
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	36	2072	5	1	790	5	5	0	100	0	0	1
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	36	2072	5	1	790	5	5	0	100	0	0	1
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.5	xxxx	6.9	7.5	6.5	6.9
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	795	xxxx	xxxxx	2077	xxxx	xxxxx	1900	xxxx	395	2544	2944	1039
Potent Cap.:	835	xxxx	xxxxx	271	xxxx	xxxxx	43	xxxx	610	14	15	231
Move Cap.:	835	xxxx	xxxxx	271	xxxx	xxxxx	41	xxxx	610	11	14	231
Volume/Cap:	0.04	xxxx	xxxx	0.00	xxxx	xxxx	0.12	xxxx	0.16	0.00	0.00	0.00
Level Of Service Module:												
2Way95thQ:	0.1	xxxx	xxxxx	0.0	xxxx	xxxxx	0.4	xxxx	0.6	xxxx	xxxx	0.0
Control Del:	9.5	xxxx	xxxxx	18.3	xxxx	xxxxx	103.7	xxxx	12.1	xxxxx	xxxx	20.6
LOS by Move:	A	*	*	C	*	*	F	*	B	*	*	C
Movement:	LT - LTR - RT			LT - LTR - RT			LT - LTR - RT			LT - LTR - RT		
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	0.0	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	18.3	xxxx	xxxxx	xxxxx	xxxx	xxxxx	xxxxx	xxxx	xxxxx
Shared LOS:	*	*	*	C	*	*	*	*	*	*	*	*
ApproachDel:	xxxxxx			xxxxxx			16.4			20.6		
ApproachLOS:	*			*			C			C		

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis
108: Park & Ride & Bel Way

Existing AM volumes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	5	12	43	0	26	11	1954	25	45	770	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.96		1.00	0.85		1.00	1.00		1.00	1.00	
Flt Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1738		1770	1583		1770	3533		1770	3535	
Flt Permitted		0.81		0.77	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1444		1428	1583		1770	3533		1770	3535	
Peak-hour factor, PHF	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	27	5	13	61	0	37	12	2057	26	47	811	6
RTOR Reduction (vph)	0	12	0	0	34	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	33	0	61	3	0	12	2082	0	47	817	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		7.5		7.5	7.5		1.2	77.1		6.0	81.9	
Effective Green, g (s)		9.5		9.5	9.5		3.2	79.1		8.0	83.9	
Actuated g/C Ratio		0.09		0.09	0.09		0.03	0.75		0.08	0.79	
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		130		128	142		54	2646		134	2809	
v/s Ratio Prot					0.00		0.01	c0.59		c0.03	0.23	
v/s Ratio Perm		0.02		c0.04								
v/c Ratio		0.26		0.48	0.02		0.22	0.79		0.35	0.29	
Uniform Delay, d1		44.8		45.7	43.8		50.0	8.1		46.3	2.9	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.4		1.0	0.0		0.8	1.5		0.6	0.0	
Delay (s)		45.1		46.7	43.8		50.7	9.6		46.9	2.9	
Level of Service		D		D	D		D	A		D	A	
Approach Delay (s)		45.1			45.6			9.8			5.3	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	10.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	105.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Bel Way & 112th

Existing AM volumes

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	159	730	1044	863	200	94
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1770	3539	3539	1583	3327	
Flt Permitted	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	1770	3539	3539	1583	3327	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	167	768	1099	908	211	99
RTOR Reduction (vph)	0	0	0	363	85	0
Lane Group Flow (vph)	167	768	1099	545	225	0
Turn Type	Prot			Perm		
Protected Phases	1	6	2		8	
Permitted Phases				2		
Actuated Green, G (s)	12.6	65.1	47.5	47.5	9.9	
Effective Green, g (s)	14.6	67.1	49.5	49.5	11.9	
Actuated g/C Ratio	0.17	0.79	0.58	0.58	0.14	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	304	2794	2061	922	466	
v/s Ratio Prot	c0.09	0.22	0.31		c0.07	
v/s Ratio Perm				c0.34		
v/c Ratio	0.55	0.27	0.53	0.59	0.48	
Uniform Delay, d1	32.2	2.4	10.8	11.3	33.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.1	0.2	1.0	2.8	0.3	
Delay (s)	33.3	2.7	11.7	14.1	34.0	
Level of Service	C	A	B	B	C	
Approach Delay (s)		8.1	12.8		34.0	
Approach LOS		A	B		C	

Intersection Summary			
HCM Average Control Delay	13.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	68.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

SE 30th and Bellevue Way - Existing PM Peak Hour Unsignalized

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1

Average Delay (sec/veh): 1.9 Worst Case Level Of Service: F[50.4]

Approach:	North Bound					South Bound					East Bound					West Bound				
Movement:	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R	L	-	T	-	R
Control:	Uncontrolled					Uncontrolled					Stop Sign					Stop Sign				
Rights:	Include					Include					Include					Include				
Lanes:	1	0	1	1	0	0	1	1	0	1	1	0	0	0	1	0	1	0	0	1
Volume Module:																				
Base Vol:	89	1150		2		0	2311		3		1		0		78	0		0		3
Growth Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00		1.00		1.00	1.00		1.00		1.00
Initial Bse:	89	1150		2		0	2311		3		1		0		78	0		0		3
User Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00		1.00		1.00	1.00		1.00		1.00
PHF Adj:	1.00	1.00		1.00		1.00	1.00		1.00		1.00		1.00		1.00	1.00		1.00		1.00
PHF Volume:	89	1150		2		0	2311		3		1		0		78	0		0		3
Reduct Vol:	0	0		0		0	0		0		0		0		0	0		0		0
FinalVolume:	89	1150		2		0	2311		3		1		0		78	0		0		3
Critical Gap Module:																				
Critical Gp:	4.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx					7.5	xxxx			6.9	7.5		6.5		6.9
FollowUpTim:	2.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx					3.5	xxxx			3.3	3.5		4.0		3.3
Capacity Module:																				
Cnflict Vol:	2314	xxxx	xxxxx	xxxx	xxxx	xxxxx					3064	xxxx			1156	2485		3643		576
Potent Cap.:	219	xxxx	xxxxx	xxxx	xxxx	xxxxx					5	xxxx			193	15		5		466
Move Cap.:	219	xxxx	xxxxx	xxxx	xxxx	xxxxx					4	xxxx			193	6		3		466
Volume/Cap:	0.41	xxxx	xxxx	xxxx	xxxx	xxxx					0.27	xxxx			0.40	0.00		0.00		0.01
Level Of Service Module:																				
2Way95thQ:	1.8	xxxx	xxxxx	xxxx	xxxx	xxxxx					0.5	xxxx			1.8	xxxx		xxxx		0.0
Control Del:	32.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx					1194	xxxx			35.7	xxxxx		xxxx		12.8
LOS by Move:	D	*	*	*	*	*					F	*			E	*		*		B
Movement:	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT	LT	-	LTR	-	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx					xxxx	xxxx			xxxxx	0		xxxx		xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	0.0	xxxx	xxxxx					xxxxx	xxxx			xxxxx	xxxxx		xxxx		xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	9.0	xxxx	xxxxx					xxxxx	xxxx			xxxxx	xxxxx		xxxx		xxxxx
Shared LOS:	*	*	*	A	*	*					*	*			*	*		*		*
ApproachDel:	xxxxxx			xxxxxx							50.4					12.8				
ApproachLOS:	*			*							F					B				

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis
108: Park & Ride & Bel Way

Existing PM volumes

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	4	21	171	3	24	40	1177	18	16	2387	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.95		1.00	0.87		1.00	1.00		1.00	1.00	
Flt Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1723		1770	1613		1770	3531		1770	3538	
Flt Permitted		0.85		0.74	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1512		1384	1613		1770	3531		1770	3538	
Peak-hour factor, PHF	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	35	4	22	244	4	34	42	1239	19	17	2513	7
RTOR Reduction (vph)	0	17	0	0	26	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	44	0	244	12	0	42	1257	0	17	2520	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		18.0		18.0	18.0		3.8	53.1		2.5	51.8	
Effective Green, g (s)		20.0		20.0	20.0		5.8	55.1		4.5	53.8	
Actuated g/C Ratio		0.23		0.23	0.23		0.07	0.62		0.05	0.61	
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		341		312	364		116	2196		90	2148	
v/s Ratio Prot					0.01		c0.02	0.36		0.01	c0.71	
v/s Ratio Perm		0.03		c0.18								
v/c Ratio		0.13		0.78	0.03		0.36	0.57		0.19	1.17	
Uniform Delay, d1		27.4		32.3	26.8		39.6	9.8		40.3	17.4	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.1		11.2	0.0		0.7	0.2		0.4	83.2	
Delay (s)		27.4		43.4	26.8		40.3	10.1		40.7	100.6	
Level of Service		C		D	C		D	B		D	F	
Approach Delay (s)		27.4			41.2			11.0			100.2	
Approach LOS		C			D			B			F	

Intersection Summary			
HCM Average Control Delay	67.5	HCM Level of Service	E
HCM Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	87.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
14: Bel Way & 112th

Existing PM volumes

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	68	1234	1137	295	1008	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.99	
Flt Protected	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (prot)	1770	3539	3539	1583	3427	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (perm)	1770	3539	3539	1583	3427	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	72	1299	1197	311	1061	45
RTOR Reduction (vph)	0	0	0	124	3	0
Lane Group Flow (vph)	72	1299	1197	187	1103	0
Turn Type	Prot			Perm		
Protected Phases	1	6	2		8	
Permitted Phases				2		
Actuated Green, G (s)	7.4	67.3	54.9	54.9	42.7	
Effective Green, g (s)	9.4	69.3	56.9	56.9	44.7	
Actuated g/C Ratio	0.08	0.58	0.47	0.47	0.37	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	139	2044	1678	751	1277	
v/s Ratio Prot	0.04	c0.37	c0.34		c0.32	
v/s Ratio Perm				0.12		
v/c Ratio	0.52	0.64	0.71	0.25	0.86	
Uniform Delay, d1	53.1	16.9	25.1	18.8	34.8	
Progression Factor	1.27	0.56	1.00	1.00	1.00	
Incremental Delay, d2	1.0	1.1	2.6	0.8	6.1	
Delay (s)	68.5	10.5	27.7	19.6	40.9	
Level of Service	E	B	C	B	D	
Approach Delay (s)		13.6	26.0		40.9	
Approach LOS		B	C		D	

Intersection Summary			
HCM Average Control Delay	25.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

SE 30th and Bellevue Way - B7 AM Peak Hour Unsignalized

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1

Average Delay (sec/veh): 102.8 Worst Case Level Of Service: F[12271.5]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0 1 1 0			0 1 1 0 1			1 0 0 0 1			0 1 0 0 1		
Volume Module:												
Base Vol:	100	1350	10	10	2880	10	10	0	100	10	0	10
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	100	1350	10	10	2880	10	10	0	100	10	0	10
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	100	1350	10	10	2880	10	10	0	100	10	0	10
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	100	1350	10	10	2880	10	10	0	100	10	0	10
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.5	xxxx	6.9	7.5	6.5	6.9
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	2890	xxxx	xxxxx	1360	xxxx	xxxxx	3775	xxxx	1440	3015	4465	680
Potent Cap.:	130	xxxx	xxxxx	512	xxxx	xxxxx	1	xxxx	124	6	1	398
Move Cap.:	130	xxxx	xxxxx	512	xxxx	xxxxx	1	xxxx	124	0	0	398
Volume/Cap:	0.77	xxxx	xxxx	0.02	xxxx	xxxx	19.12	xxxx	0.80	23.76	0.00	0.03
Level Of Service Module:												
2Way95thQ:	4.5	xxxx	xxxxx	0.1	xxxx	xxxxx	2.6	xxxx	4.8	xxxx	xxxx	0.1
Control Del:	92.1	xxxx	xxxxx	12.2	xxxx	xxxxx	19676	xxxx	101.3	xxxxx	xxxx	14.3
LOS by Move:	F	*	*	B	*	*	F	*	F	*	*	B
Movement:	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT	LT	LTR	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	0	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	0.1	xxxx	xxxxx	xxxxx	xxxx	xxxxx	2.6	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	12.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	24529	xxxx	xxxxx
Shared LOS:	*	*	*	B	*	*	*	*	*	F	*	*
ApproachDel:	xxxxxx			xxxxxx			1880.8			xxxxxx		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	170	750	1670	950	400	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1770	3539	3539	1583	3371	
Flt Permitted	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1770	3539	3539	1583	3371	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	789	1758	1000	421	105
RTOR Reduction (vph)	0	0	0	268	20	0
Lane Group Flow (vph)	179	789	1758	732	506	0
Turn Type	Prot			Perm		
Protected Phases	1	6	2		8	
Permitted Phases				2		
Actuated Green, G (s)	14.3	87.8	68.5	68.5	22.2	
Effective Green, g (s)	16.3	89.8	70.5	70.5	24.2	
Actuated g/C Ratio	0.14	0.75	0.59	0.59	0.20	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	240	2648	2079	930	680	
v/s Ratio Prot	c0.10	0.22	c0.50		c0.15	
v/s Ratio Perm				0.46		
v/c Ratio	0.75	0.30	0.85	0.79	0.74	
Uniform Delay, d1	49.9	4.9	20.3	19.0	45.0	
Progression Factor	1.00	1.00	1.59	2.84	1.00	
Incremental Delay, d2	10.5	0.3	0.4	0.6	3.9	
Delay (s)	60.3	5.2	32.6	54.5	48.9	
Level of Service	E	A	C	D	D	
Approach Delay (s)		15.4	40.6		48.9	
Approach LOS		B	D		D	

Intersection Summary			
HCM Average Control Delay	35.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	80.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
108: S Park & Ride & Bel Way

B7-AM Peak
4/1/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	80	20	20	50	0	30	20	2600	280	120	1000	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.98		1.00	0.85		1.00	0.99		1.00	1.00	
Flt Protected		0.97		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1762		1770	1583		1770	3488		1770	3529	
Flt Permitted		0.77		0.67	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1408		1253	1583		1770	3488		1770	3529	
Peak-hour factor, PHF	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	21	21	71	0	43	21	2737	295	126	1053	21
RTOR Reduction (vph)	0	7	0	0	37	0	0	5	0	0	1	0
Lane Group Flow (vph)	0	119	0	71	6	0	21	3027	0	126	1073	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		14.2		14.2	14.2		3.0	78.0		12.8	87.8	
Effective Green, g (s)		16.2		16.2	16.2		5.0	80.0		14.8	89.8	
Actuated g/C Ratio		0.13		0.13	0.13		0.04	0.67		0.12	0.75	
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		190		169	214		74	2325		218	2641	
v/s Ratio Prot					0.00		0.01	c0.87		c0.07	0.30	
v/s Ratio Perm		c0.08		0.06								
v/c Ratio		0.63		0.42	0.03		0.28	1.30		0.58	0.41	
Uniform Delay, d1		49.0		47.6	45.1		55.8	20.0		49.7	5.5	
Progression Factor		1.00		1.00	1.00		1.00	1.00		1.03	0.57	
Incremental Delay, d2		4.6		0.6	0.0		0.8	139.2		2.1	0.4	
Delay (s)		53.6		48.2	45.1		56.5	159.2		53.5	3.5	
Level of Service		D		D	D		E	F		D	A	
Approach Delay (s)		53.6			47.0			158.5			8.8	
Approach LOS		D			D			F			A	

Intersection Summary			
HCM Average Control Delay	112.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	110.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

SE 30th and Bellevue Way - B7 PM Peak Hour Unsignalized

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1

Average Delay (sec/veh): 18.1 Worst Case Level Of Service: F[3119.5]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	1 0 1 1 0			0 1 1 0 1			1 0 0 0 1			0 1 0 0 1		
Volume Module:												
Base Vol:	100	2800	10	10	1000	10	10	0	100	10	0	10
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	100	2800	10	10	1000	10	10	0	100	10	0	10
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	100	2800	10	10	1000	10	10	0	100	10	0	10
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
FinalVolume:	100	2800	10	10	1000	10	10	0	100	10	0	10
Critical Gap Module:												
Critical Gp:	4.1	xxxx	xxxxx	4.1	xxxx	xxxxx	7.5	xxxx	6.9	7.5	6.5	6.9
FollowUpTim:	2.2	xxxx	xxxxx	2.2	xxxx	xxxxx	3.5	xxxx	3.3	3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	1010	xxxx	xxxxx	2810	xxxx	xxxxx	2620	xxxx	500	3525	4035	1405
Potent Cap.:	694	xxxx	xxxxx	140	xxxx	xxxxx	12	xxxx	522	2	3	131
Move Cap.:	694	xxxx	xxxxx	140	xxxx	xxxxx	9	xxxx	522	2	2	131
Volume/Cap:	0.14	xxxx	xxxx	0.07	xxxx	xxxx	1.06	xxxx	0.19	6.24	0.00	0.08
Level Of Service Module:												
2Way95thQ:	0.5	xxxx	xxxxx	0.2	xxxx	xxxxx	2.0	xxxx	0.7	xxxx	xxxx	0.2
Control Del:	11.1	xxxx	xxxxx	32.8	xxxx	xxxxx	828.8	xxxx	13.5	xxxxx	xxxx	34.7
LOS by Move:	B	*	*	D	*	*	F	*	B	*	*	D
Movement:	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT	LT -	LTR -	RT
Shared Cap.:	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	xxxx	xxxx	xxxxx	2	xxxx	xxxxx
SharedQueue:	xxxxx	xxxx	xxxxx	0.2	xxxx	xxxxx	xxxxx	xxxx	xxxxx	2.5	xxxx	xxxxx
Shrd ConDel:	xxxxx	xxxx	xxxxx	32.8	xxxx	xxxxx	xxxxx	xxxx	xxxxx	6204	xxxx	xxxxx
Shared LOS:	*	*	*	D	*	*	*	*	*	F	*	*
ApproachDel:	xxxxxx			xxxxxx			87.6			3119.5		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis
108: S Park & Ride & Bel Way

B7-PM Peak
4/1/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	10	30	170	10	30	50	1410	20	20	2750	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Util. Factor		1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frt		0.95		1.00	0.89		1.00	1.00		1.00	1.00	
Flt Protected		0.98		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1725		1770	1652		1770	3532		1770	3535	
Flt Permitted		0.85		0.68	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1505		1259	1652		1770	3532		1770	3535	
Peak-hour factor, PHF	0.95	0.95	0.95	0.70	0.70	0.70	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	42	11	32	243	14	43	53	1484	21	21	2895	21
RTOR Reduction (vph)	0	18	0	0	34	0	0	1	0	0	0	0
Lane Group Flow (vph)	0	67	0	243	23	0	53	1504	0	21	2916	0
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		23.2		23.2	23.2		6.2	78.8		3.0	75.6	
Effective Green, g (s)		25.2		25.2	25.2		8.2	80.8		5.0	77.6	
Actuated g/C Ratio		0.21		0.21	0.21		0.07	0.67		0.04	0.65	
Clearance Time (s)		5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)		316		264	347		121	2378		74	2286	
v/s Ratio Prot					0.01		c0.03	0.43		0.01	c0.82	
v/s Ratio Perm		0.04		c0.19								
v/c Ratio		0.21		0.92	0.07		0.44	0.63		0.28	1.28	
Uniform Delay, d1		39.2		46.4	38.0		53.7	11.2		55.8	21.2	
Progression Factor		1.00		1.00	1.00		1.00	1.00		0.96	1.18	
Incremental Delay, d2		0.1		34.4	0.0		0.9	1.3		0.3	125.3	
Delay (s)		39.3		80.8	38.0		54.6	12.4		53.8	150.4	
Level of Service		D		F	D		D	B		D	F	
Approach Delay (s)		39.3			72.7			13.9			149.7	
Approach LOS		D			E			B			F	

Intersection Summary			
HCM Average Control Delay	99.7	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	99.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	70	1750	1300	300	1100	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.99	
Flt Protected	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (prot)	1770	3539	3539	1583	3426	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (perm)	1770	3539	3539	1583	3426	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	74	1842	1368	316	1158	53
RTOR Reduction (vph)	0	0	0	115	3	0
Lane Group Flow (vph)	74	1842	1368	201	1208	0
Turn Type	Prot			Perm		
Protected Phases	1	6	2		8	
Permitted Phases				2		
Actuated Green, G (s)	6.4	66.6	55.2	55.2	43.4	
Effective Green, g (s)	8.4	68.6	57.2	57.2	45.4	
Actuated g/C Ratio	0.07	0.57	0.48	0.48	0.38	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	124	2023	1687	755	1296	
v/s Ratio Prot	0.04	c0.52	0.39		c0.35	
v/s Ratio Perm				0.13		
v/c Ratio	0.60	0.91	0.81	0.27	0.93	
Uniform Delay, d1	54.2	23.0	26.8	18.8	35.8	
Progression Factor	1.00	1.00	1.39	2.57	1.00	
Incremental Delay, d2	5.1	7.6	3.7	0.7	12.0	
Delay (s)	59.2	30.6	41.0	49.2	47.8	
Level of Service	E	C	D	D	D	
Approach Delay (s)		31.7	42.6		47.8	
Approach LOS		C	D		D	

Intersection Summary			
HCM Average Control Delay	39.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

SE 30th and Bellevue Way - B7R Unmitigated AM Peak Hour Unsignalized


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                      Level Of Service Computation Report
            2000 HCM Unsignalized Method (Base Volume Alternative)
******************************************************************************
Intersection #1
******************************************************************************
Average Delay (sec/veh):      10.2        Worst Case Level Of Service: F[ 99.8]
******************************************************************************
Approach:       North Bound      South Bound       East Bound       West Bound
Movement:      L  -  T  -  R    L  -  T  -  R    L  -  T  -  R    L  -  T  -  R
------------|---------------||---------------||---------------||---------------|
Control:        Uncontrolled     Uncontrolled      Stop Sign        Stop Sign
Rights:            Include          Include          Include          Include
Lanes:         0  0  2  0  1    0  0  2  0  1    0  0  0  0  1    0  1  0  0  1
------------|---------------||---------------||---------------||---------------|
Volume Module:
Base Vol:        0 2500   540      0 1000   490      0    0   530      0    0   150
Growth Adj:   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
Initial Bse:     0 2500   540      0 1000   490      0    0   530      0    0   150
User Adj:     1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Adj:      1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00   1.00 1.00  1.00
PHF Volume:      0 2500   540      0 1000   490      0    0   530      0    0   150
Reduct Vol:      0    0     0      0    0     0      0    0     0      0    0     0
FinalVolume:     0 2500   540      0 1000   490      0    0   530      0    0   150
------------|---------------||---------------||---------------||---------------|
Critical Gap Module:
Critical Gp:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   6.9   7.5  6.5   6.9
FollowUpTim:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx   3.3   3.5  4.0   3.3
------------|---------------||---------------||---------------||---------------|
Capacity Module:
Cnflict Vol: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   500  3000 3990  1250
Potent Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   522     6    3   167
Move Cap.:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx   522     0    3   167
Volume/Cap:  xxxx xxxx  xxxx  xxxx xxxx  xxxx  xxxx xxxx  1.02  xxxx 0.00  0.90
------------|---------------||---------------||---------------||---------------|
Level Of Service Module:
2Way95thQ:   xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx  14.6  xxxx xxxx   6.5
Control Del:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx  71.8 xxxxx xxxx  99.8
LOS by Move:   *    *     *     *    *     *     *    *     F     *    *     F
Movement:     LT - LTR - RT    LT - LTR - RT    LT - LTR - RT    LT - LTR - RT
Shared Cap.: xxxx xxxx xxxxx  xxxx xxxx xxxxx  xxxx xxxx xxxxx     0 xxxx xxxxx
SharedQueue:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shrd ConDel:xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx xxxxx xxxx xxxxx
Shared LOS:    *    *     *     *    *     *     *    *     *     *    *     *
ApproachDel:    xxxxxx           xxxxxx             71.8             99.8
ApproachLOS:        *                *                F                F
******************************************************************************
Note: Queue reported is the number of cars per lane.
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SE 30th and Bellevue Way - B7R Unmitigated PM Peak Hour Unsignalized

Level Of Service Computation Report
2000 HCM Unsignalized Method (Base Volume Alternative)

Intersection #1

Average Delay (sec/veh): 132.6 Worst Case Level Of Service: F[1216.1]

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Uncontrolled			Uncontrolled			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Lanes:	0 0 2	0	1	0 0 2	0	1	0 0 0	0	1	0 1	0	0 1
Volume Module:												
Base Vol:	0 1200	230		0 2650	180		0 0	530		0	0	510
Growth Adj:	1.00 1.00	1.00		1.00 1.00	1.00		1.00 1.00	1.00		1.00 1.00		1.00
Initial Bse:	0 1200	230		0 2650	180		0 0	530		0	0	510
User Adj:	1.00 1.00	1.00		1.00 1.00	1.00		1.00 1.00	1.00		1.00 1.00		1.00
PHF Adj:	1.00 1.00	1.00		1.00 1.00	1.00		1.00 1.00	1.00		1.00 1.00		1.00
PHF Volume:	0 1200	230		0 2650	180		0 0	530		0	0	510
Reduct Vol:	0 0	0		0 0	0		0 0	0		0	0	0
FinalVolume:	0 1200	230		0 2650	180		0 0	530		0	0	510
Critical Gap Module:												
Critical Gp:	xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx xxxx	6.9		7.5	6.5	6.9
FollowUpTim:	xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx xxxx	3.3		3.5	4.0	3.3
Capacity Module:												
Cnflict Vol:	xxxx xxxx	xxxxx		xxxx xxxx	xxxxx		xxxx xxxx	1325		2525	4030	600
Potent Cap.:	xxxx xxxx	xxxxx		xxxx xxxx	xxxxx		xxxx xxxx	149		14	3	449
Move Cap.:	xxxx xxxx	xxxxx		xxxx xxxx	xxxxx		xxxx xxxx	149		0	3	449
Volume/Cap:	xxxx xxxx	xxxx		xxxx xxxx	xxxx		xxxx xxxx	3.56		xxxx	0.00	1.14
Level Of Service Module:												
2Way95thQ:	xxxx xxxx	xxxxx		xxxx xxxx	xxxxx		xxxx xxxx	51.5		xxxx	xxxx	18.2
Control Del:	xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx xxxx	1216		xxxxx	xxxx	114.5
LOS by Move:	* *	*		* *	*		* *	F		*	*	F
Movement:	LT - LTR	- RT		LT - LTR	- RT		LT - LTR	- RT		LT - LTR	- RT	
Shared Cap.:	xxxx xxxx	xxxxx		xxxx xxxx	xxxxx		xxxx xxxx	xxxxx		0	xxxx	xxxxx
SharedQueue:	xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx	xxxx	xxxxx
Shrd ConDel:	xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx xxxx	xxxxx		xxxxx	xxxx	xxxxx
Shared LOS:	* *	*		* *	*		* *	*		*	*	*
ApproachDel:	xxxxxx			xxxxxx			1216.1			114.5		
ApproachLOS:	*			*			F			F		

Note: Queue reported is the number of cars per lane.

HCM Signalized Intersection Capacity Analysis — B7-Revised Mitigated AM Peak

122: SE 30th & Bel Way — 4/1/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	230	0	0	150	0	2500	540	0	1000	490
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0		3.0	5.0		4.0	
Lane Util. Factor			0.88			1.00		0.95	1.00		0.91	
Frt			0.85			0.86		1.00	0.85		0.95	
Flt Protected			1.00			1.00		1.00	1.00		1.00	
Satd. Flow (prot)			2787			1611		3539	1583		4834	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	
Satd. Flow (perm)			2787			1611		3539	1583		4834	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	242	0	0	158	0	2632	568	0	1053	516
RTOR Reduction (vph)	0	0	225	0	0	0	0	0	39	0	32	0
Lane Group Flow (vph)	0	0	17	0	0	158	0	2632	529	0	1537	0
Turn Type			custom			Free			custom			
Protected Phases			8					Free			2	
Permitted Phases						Free			6			
Actuated Green, G (s)			7.3			120.0		120.0	102.7		102.7	
Effective Green, g (s)			8.3			120.0		120.0	102.7		103.7	
Actuated g/C Ratio			0.07			1.00		1.00	0.86		0.86	
Clearance Time (s)			5.0						5.0		5.0	
Vehicle Extension (s)			2.0						2.0		2.0	
Lane Grp Cap (vph)			193			1611		3539	1355		4177	
v/s Ratio Prot			0.01					0.74			0.32	
v/s Ratio Perm						0.10			0.33			
v/c Ratio			0.09			0.10		0.74	0.39		0.37	
Uniform Delay, d1			52.3			0.0		0.0	1.9		1.6	
Progression Factor			1.00			1.00		1.00	1.00		1.00	
Incremental Delay, d2			0.1			0.1		1.5	0.8		0.3	
Delay (s)			52.4			0.1		1.5	2.7		1.9	
Level of Service			D			A		A	A		A	
Approach Delay (s)		52.4			0.1			1.7			1.9	
Approach LOS		D			A			A			A	

Intersection Summary			
HCM Average Control Delay	4.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	0.0
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	80	20	20	2650	1500	20
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frt	0.97		1.00	1.00	1.00	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1743		1770	3539	3532	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1743		1770	3539	3532	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	84	21	21	2789	1579	21
RTOR Reduction (vph)	8	0	0	0	0	0
Lane Group Flow (vph)	97	0	21	2789	1600	0
Turn Type			Prot			
Protected Phases			1	6	2	
Permitted Phases	8					
Actuated Green, G (s)	11.1		3.0	98.9	90.9	
Effective Green, g (s)	13.1		5.0	100.9	92.9	
Actuated g/C Ratio	0.11		0.04	0.84	0.77	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	
Lane Grp Cap (vph)	190		74	2976	2734	
v/s Ratio Prot			0.01	c0.79	0.45	
v/s Ratio Perm	c0.06					
v/c Ratio	0.51		0.28	0.94	0.59	
Uniform Delay, d1	50.4		55.8	7.2	5.6	
Progression Factor	1.00		1.00	1.00	0.52	
Incremental Delay, d2	1.0		0.8	7.2	0.8	
Delay (s)	51.4		56.5	14.4	3.7	
Level of Service	D		E	B	A	
Approach Delay (s)	51.4			14.7	3.7	
Approach LOS	D			B	A	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	6.0
Intersection Capacity Utilization	85.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	170	1000	1650	900	500	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.98	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1770	3539	3539	1583	3383	
Flt Permitted	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1770	3539	3539	1583	3383	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	179	1053	1737	947	526	105
RTOR Reduction (vph)	0	0	0	266	15	0
Lane Group Flow (vph)	179	1053	1737	681	616	0
Turn Type	Prot			Perm		
Protected Phases	1	6	2		8	
Permitted Phases				2		
Actuated Green, G (s)	13.5	85.2	66.7	66.7	24.8	
Effective Green, g (s)	15.5	87.2	68.7	68.7	26.8	
Actuated g/C Ratio	0.13	0.73	0.57	0.57	0.22	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	229	2572	2026	906	756	
v/s Ratio Prot	c0.10	0.30	c0.49		c0.18	
v/s Ratio Perm				0.43		
v/c Ratio	0.78	0.41	0.86	0.75	0.82	
Uniform Delay, d1	50.6	6.4	21.5	19.3	44.2	
Progression Factor	1.00	1.00	1.19	1.63	1.00	
Incremental Delay, d2	14.7	0.5	2.0	2.3	6.4	
Delay (s)	65.3	6.9	27.6	33.6	50.7	
Level of Service	E	A	C	C	D	
Approach Delay (s)		15.4	29.7		50.7	
Approach LOS		B	C		D	

Intersection Summary			
HCM Average Control Delay	28.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
122: SE 30th & Bel Way

B7-Revised Mitigated PM Peak
4/1/2011

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	0	540	0	0	510	0	1200	230	0	2650	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)			4.0			4.0		3.0	5.0		4.0	
Lane Util. Factor			0.88			1.00		0.95	1.00		0.91	
Frt			0.85			0.86		1.00	0.85		0.99	
Flt Protected			1.00			1.00		1.00	1.00		1.00	
Satd. Flow (prot)			2787			1611		3539	1583		5037	
Flt Permitted			1.00			1.00		1.00	1.00		1.00	
Satd. Flow (perm)			2787			1611		3539	1583		5037	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	0	568	0	0	537	0	1263	242	0	2789	189
RTOR Reduction (vph)	0	0	5	0	0	0	0	0	70	0	6	0
Lane Group Flow (vph)	0	0	563	0	0	537	0	1263	172	0	2972	0
Turn Type			custom			Free			custom			
Protected Phases			8					Free			2	
Permitted Phases						Free			6			
Actuated Green, G (s)			27.5			120.0		120.0	82.5		82.5	
Effective Green, g (s)			28.5			120.0		120.0	82.5		83.5	
Actuated g/C Ratio			0.24			1.00		1.00	0.69		0.70	
Clearance Time (s)			5.0						5.0		5.0	
Vehicle Extension (s)			2.0						2.0		2.0	
Lane Grp Cap (vph)			662			1611		3539	1088		3505	
v/s Ratio Prot			c0.20					0.36			c0.59	
v/s Ratio Perm						0.33			0.11			
v/c Ratio			0.85			0.33		0.36	0.16		0.85	
Uniform Delay, d1			43.7			0.0		0.0	6.6		13.5	
Progression Factor			1.00			1.00		1.00	1.00		1.00	
Incremental Delay, d2			9.9			0.6		0.3	0.3		2.8	
Delay (s)			53.6			0.6		0.3	6.9		16.3	
Level of Service			D			A		A	A		B	
Approach Delay (s)		53.6			0.6			1.3			16.3	
Approach LOS		D			A			A			B	

Intersection Summary			
HCM Average Control Delay	14.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.8%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
108: 112th (Old P& R) & Bel Way

B7-Revised PM Peak
4/1/2011

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	34	10	50	1700	2750	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0		3.0	3.0	3.0	
Lane Util. Factor	1.00		1.00	0.95	0.95	
Frt	0.97		1.00	1.00	1.00	
Flt Protected	0.96		0.95	1.00	1.00	
Satd. Flow (prot)	1737		1770	3539	3537	
Flt Permitted	0.96		0.95	1.00	1.00	
Satd. Flow (perm)	1737		1770	3539	3537	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	36	11	53	1789	2895	11
RTOR Reduction (vph)	10	0	0	0	0	0
Lane Group Flow (vph)	37	0	53	1789	2906	0
Turn Type			Prot			
Protected Phases			1	6	2	
Permitted Phases	8					
Actuated Green, G (s)	6.5		7.1	103.5	91.4	
Effective Green, g (s)	8.5		9.1	105.5	93.4	
Actuated g/C Ratio	0.07		0.08	0.88	0.78	
Clearance Time (s)	5.0		5.0	5.0	5.0	
Vehicle Extension (s)	2.0		2.0	2.0	2.0	
Lane Grp Cap (vph)	123		134	3111	2753	
v/s Ratio Prot			0.03	c0.51	c0.82	
v/s Ratio Perm	c0.02					
v/c Ratio	0.30		0.40	0.58	1.06	
Uniform Delay, d1	52.9		52.8	1.8	13.3	
Progression Factor	1.00		1.00	1.00	1.10	
Incremental Delay, d2	0.5		0.7	0.8	29.8	
Delay (s)	53.4		53.5	2.6	44.4	
Level of Service	D		D	A	D	
Approach Delay (s)	53.4			4.0	44.4	
Approach LOS	D			A	D	

Intersection Summary			
HCM Average Control Delay	29.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	88.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	70	1700	1500	350	1050	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	0.95	0.95	1.00	0.97	
Frt	1.00	1.00	1.00	0.85	0.99	
Flt Protected	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (prot)	1770	3539	3539	1583	3425	
Flt Permitted	0.95	1.00	1.00	1.00	0.95	
Satd. Flow (perm)	1770	3539	3539	1583	3425	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	74	1789	1579	368	1105	53
RTOR Reduction (vph)	0	0	0	116	3	0
Lane Group Flow (vph)	74	1789	1579	252	1155	0
Turn Type	Prot			Perm		
Protected Phases	1	6	2		8	
Permitted Phases				2		
Actuated Green, G (s)	6.4	70.0	58.6	58.6	40.0	
Effective Green, g (s)	8.4	72.0	60.6	60.6	42.0	
Actuated g/C Ratio	0.07	0.60	0.51	0.51	0.35	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	124	2123	1787	799	1199	
v/s Ratio Prot	0.04	c0.51	c0.45		c0.34	
v/s Ratio Perm				0.16		
v/c Ratio	0.60	0.84	0.88	0.31	0.96	
Uniform Delay, d1	54.2	19.4	26.5	17.5	38.3	
Progression Factor	1.00	1.00	0.97	1.09	1.00	
Incremental Delay, d2	5.1	4.3	5.9	0.9	17.7	
Delay (s)	59.2	23.7	31.7	20.0	56.0	
Level of Service	E	C	C	B	E	
Approach Delay (s)		25.1	29.5		56.0	
Approach LOS		C	C		E	

Intersection Summary			
HCM Average Control Delay	34.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	89.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Internal Ramp Intersection - B7R AM Peak Unsignalized

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #1 AM

Cycle (sec):	100	Critical Vol./Cap.(X):	0.753
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	16.1
Optimal Cycle:	0	Level Of Service:	C

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 0 1 0			0 1 0 0 0		
Volume Module:												
Base Vol:	130	0	130	0	0	0	0	20	130	440	100	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	130	0	130	0	0	0	0	20	130	440	100	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	130	0	130	0	0	0	0	20	130	440	100	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	130	0	130	0	0	0	0	20	130	440	100	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	130	0	130	0	0	0	0	20	130	440	100	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.13	0.87	0.81	0.19	0.00
Final Sat.:	518	0	625	0	0	0	0	96	621	585	133	0
Capacity Analysis Module:												
Vol/Sat:	0.25	xxxx	0.21	xxxx	xxxx	xxxx	xxxx	0.21	0.21	0.75	0.75	xxxx
Crit Moves:	****							****		****		
Delay/Veh:	11.3	0.0	9.4	0.0	0.0	0.0	0.0	8.9	8.9	20.9	20.9	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	11.3	0.0	9.4	0.0	0.0	0.0	0.0	8.9	8.9	20.9	20.9	0.0
LOS by Move:	B	*	A	*	*	*	*	A	A	C	C	*
ApproachDel:	10.4			xxxxxx				8.9			20.9	
Delay Adj:	1.00			xxxxx				1.00			1.00	
ApprAdjDel:	10.4			xxxxxx				8.9			20.9	
LOS by Appr:	B			*				A			C	
AllWayAvgQ:	0.3	0.0	0.2	0.0	0.0	0.0	0.2	0.2	0.2	2.6	2.6	2.6

Note: Queue reported is the number of cars per lane.

Internal Ramp Intersection - B7R PM Peak Unsignalized

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #2 PM

Cycle (sec):	100	Critical Vol./Cap.(X):	0.661
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	13.4
Optimal Cycle:	0	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1 0 0 0 1			0 0 0 0 0			0 0 0 1 0			0 1 0 0 0		
Volume Module:												
Base Vol:	130	0	130	0	0	0	0	360	130	130	100	0
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	130	0	130	0	0	0	0	360	130	130	100	0
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	130	0	130	0	0	0	0	360	130	130	100	0
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	130	0	130	0	0	0	0	360	130	130	100	0
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	130	0	130	0	0	0	0	360	130	130	100	0
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.73	0.27	0.57	0.43	0.00
Final Sat.:	516	0	621	0	0	0	0	545	197	369	284	0
Capacity Analysis Module:												
Vol/Sat:	0.25	xxxx	0.21	xxxx	xxxx	xxxx	xxxx	0.66	0.66	0.35	0.35	xxxx
Crit Moves:	****							****			****	
Delay/Veh:	11.4	0.0	9.4	0.0	0.0	0.0	0.0	16.1	16.1	11.0	11.0	0.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	11.4	0.0	9.4	0.0	0.0	0.0	0.0	16.1	16.1	11.0	11.0	0.0
LOS by Move:	B	*	A	*	*	*	*	C	C	B	B	*
ApproachDel:	10.4			xxxxxx			16.1			11.0		
Delay Adj:	1.00			xxxxx			1.00			1.00		
ApprAdjDel:	10.4			xxxxxx			16.1			11.0		
LOS by Appr:	B			*			C			B		
AllWayAvgQ:	0.3	0.0	0.2	0.0	0.0	0.0	1.7	1.7	1.7	0.5	0.5	0.5

Note: Queue reported is the number of cars per lane.

Internal Garage Intersection - B7R AM Peak Unsignalized

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #1 AM

Cycle (sec):	100	Critical Vol./Cap.(X):	0.664
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	13.6
Optimal Cycle:	0	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	0 1	0	0 1	0 0	0	0 0	0 0	0	1 0	0 0	1
Volume Module:												
Base Vol:	0	80	20	440	50	0	0	0	0	100	0	130
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	80	20	440	50	0	0	0	0	100	0	130
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	80	20	440	50	0	0	0	0	100	0	130
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	80	20	440	50	0	0	0	0	100	0	130
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	80	20	440	50	0	0	0	0	100	0	130
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.80	0.20	0.90	0.10	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	552	138	663	75	0	0	0	0	537	0	653
Capacity Analysis Module:												
Vol/Sat:	xxxx	0.15	0.15	0.66	0.66	xxxx	xxxx	xxxx	xxxx	0.19	xxxx	0.20
Crit Moves:		****			****							****
Delay/Veh:	0.0	8.8	8.8	16.5	16.5	0.0	0.0	0.0	0.0	10.4	0.0	9.0
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	8.8	8.8	16.5	16.5	0.0	0.0	0.0	0.0	10.4	0.0	9.0
LOS by Move:	*	A	A	C	C	*	*	*	*	B	*	A
ApproachDel:		8.8			16.5			xxxxxx			9.6	
Delay Adj:		1.00			1.00			xxxxx			1.00	
ApprAdjDel:		8.8			16.5			xxxxxx			9.6	
LOS by Appr:		A			C			*			A	
AllWayAvgQ:	0.2	0.2	0.2	1.8	1.8	1.8	0.0	0.0	0.0	0.2	0.0	0.2

Note: Queue reported is the number of cars per lane.

Internal Garage Intersection - B7R PM Peak Unsignalized

Level Of Service Computation Report
2000 HCM 4-Way Stop Method (Base Volume Alternative)

Intersection #2 PM

Cycle (sec):	100	Critical Vol./Cap.(X):	0.609
Loss Time (sec):	0 (Y+R=4.0 sec)	Average Delay (sec/veh):	12.3
Optimal Cycle:	0	Level Of Service:	B

Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L -	T -	R	L -	T -	R	L -	T -	R	L -	T -	R
Control:	Stop Sign			Stop Sign			Stop Sign			Stop Sign		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	0 0	0 1	0	0 1	0 0	0	0 0	0 0	0	1 0	0 0	1
Volume Module: PM												
Base Vol:	0	410	50	130	50	0	0	0	0	100	0	130
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	0	410	50	130	50	0	0	0	0	100	0	130
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	0	410	50	130	50	0	0	0	0	100	0	130
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	0	410	50	130	50	0	0	0	0	100	0	130
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
FinalVolume:	0	410	50	130	50	0	0	0	0	100	0	130
Saturation Flow Module:												
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	0.00	0.89	0.11	0.72	0.28	0.00	0.00	0.00	0.00	1.00	0.00	1.00
Final Sat.:	0	673	82	482	185	0	0	0	0	530	0	642
Capacity Analysis Module:												
Vol/Sat:	xxxx	0.61	0.61	0.27	0.27	xxxx	xxxx	xxxx	xxxx	0.19	xxxx	0.20
Crit Moves:			****	****								****
Delay/Veh:	0.0	14.4	14.4	10.0	10.0	0.0	0.0	0.0	0.0	10.5	0.0	9.1
Delay Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
AdjDel/Veh:	0.0	14.4	14.4	10.0	10.0	0.0	0.0	0.0	0.0	10.5	0.0	9.1
LOS by Move:	*	B	B	B	B	*	*	*	*	B	*	A
ApproachDel:		14.4			10.0			xxxxxx			9.7	
Delay Adj:		1.00			1.00			xxxxx			1.00	
ApprAdjDel:		14.4			10.0			xxxxxx			9.7	
LOS by Appr:		B			B			*			A	
AllWayAvgQ:	1.4	1.4	1.4	0.3	0.3	0.3	0.0	0.0	0.0	0.2	0.0	0.2

Note: Queue reported is the number of cars per lane.

1: External Performance by approach

Approach	EB	All
Delay / Veh (s)	0.8	0.8
Travel Dist (mi)	7.2	7.2
Travel Time (hr)	0.3	0.3
Vehicles Entered	50	50
Vehicles Exited	50	50
Hourly Exit Rate	50	50
Input Volume	50	50
% of Volume	101	101
Denied Entry Before	0	0
Denied Entry After	0	0

6: External Performance by approach

Approach	WB	All
Delay / Veh (s)	2.8	2.8
Travel Dist (mi)	28.7	28.7
Travel Time (hr)	1.3	1.3
Vehicles Entered	102	102
Vehicles Exited	102	102
Hourly Exit Rate	102	102
Input Volume	110	110
% of Volume	93	93
Denied Entry Before	0	0
Denied Entry After	0	0

11: External Performance by approach

Approach	NB	All
Delay / Veh (s)	1.7	1.7
Travel Dist (mi)	141.1	141.1
Travel Time (hr)	5.4	5.4
Vehicles Entered	1328	1328
Vehicles Exited	1326	1326
Hourly Exit Rate	1326	1326
Input Volume	1365	1365
% of Volume	97	97
Denied Entry Before	0	0
Denied Entry After	0	0

12: SE 10th & Bel Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Delay / Veh (s)	37.5	36.2	30.7	22.0	12.3	68.7	22.8	17.2	24.6	8.8	8.8	16.6
Travel Dist (mi)	6.8	1.9	2.1	0.1	0.2	14.2	422.0	3.2	0.5	149.3	1.1	601.5
Travel Time (hr)	1.4	0.4	0.4	0.0	0.0	1.3	21.9	0.2	0.1	9.3	0.1	35.1
Vehicles Entered	109	31	33	4	5	42	1208	9	6	1652	12	3111
Vehicles Exited	109	31	33	4	5	42	1213	9	6	1651	12	3115
Hourly Exit Rate	109	31	33	4	5	42	1213	9	6	1651	12	3115
Input Volume	105	35	30	5	5	40	1255	10	5	1630	15	3134
% of Volume	104	89	111	80	100	106	97	88	120	101	79	99
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

13: Bel Way & 108th Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	54.7	52.1	52.8	85.8	14.5	12.6	60.4	58.9	36.1	271.6	257.0	153.5
Travel Dist (mi)	4.5	162.5	8.5	6.2	90.6	9.9	9.2	8.9	9.2	44.6	26.9	2.4
Travel Time (hr)	0.9	28.6	1.6	2.1	7.5	0.9	1.4	1.3	1.0	16.0	9.2	0.6
Vehicles Entered	45	1606	83	78	1096	117	60	58	60	190	112	11
Vehicles Exited	46	1587	82	80	1091	117	61	59	63	187	113	12
Hourly Exit Rate	46	1587	82	80	1091	117	61	59	63	187	113	12
Input Volume	45	1606	75	95	1150	120	60	55	60	195	115	10
% of Volume	103	99	109	84	95	98	102	107	105	96	98	117
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	1	0

13: Bel Way & 108th Performance by movement

Movement	All
Delay / Veh (s)	58.6
Travel Dist (mi)	383.4
Travel Time (hr)	71.1
Vehicles Entered	3516
Vehicles Exited	3498
Hourly Exit Rate	3498
Input Volume	3586
% of Volume	98
Denied Entry Before	0
Denied Entry After	1

14: Bel Way & 112th Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Delay / Veh (s)	151.2	16.3	38.8	25.0	219.1	252.0	73.5
Travel Dist (mi)	5.3	151.1	388.9	91.3	215.6	9.9	861.9
Travel Time (hr)	2.8	12.6	23.4	4.6	68.1	3.7	115.1
Vehicles Entered	61	1770	1265	302	1026	49	4473
Vehicles Exited	62	1768	1256	303	986	48	4423
Hourly Exit Rate	62	1768	1256	303	986	48	4423
Input Volume	70	1785	1328	300	1100	50	4634
% of Volume	88	99	95	101	90	96	95
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	30	2	32

24: External Performance by approach

Approach	NB	All
Delay / Veh (s)	1.3	1.3
Travel Dist (mi)	58.1	58.1
Travel Time (hr)	2.6	2.6
Vehicles Entered	222	222
Vehicles Exited	223	223
Hourly Exit Rate	223	223
Input Volume	220	220
% of Volume	101	101
Denied Entry Before	0	0
Denied Entry After	0	0

62: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	1.9	27.8	18.3
Travel Dist (mi)	186.0	340.6	526.6
Travel Time (hr)	5.7	29.2	34.9
Vehicles Entered	1540	2665	4205
Vehicles Exited	1540	2660	4200
Hourly Exit Rate	1540	2660	4200
Input Volume	1599	2850	4449
% of Volume	96	93	94
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

85: 112th & Performance by movement

Movement	EBL	EBR	WBL	WBR	NBT	NBR	SBL	SBT	SBR	All
Delay / Veh (s)	24.5	16.2	23.0	4.3	0.9	0.7	3.5	2.7	2.4	4.1
Travel Dist (mi)	0.6	0.3	15.4	7.9	45.0	6.6	2.3	83.4	1.3	162.9
Travel Time (hr)	0.1	0.0	1.5	0.4	1.4	0.2	0.1	3.1	0.1	6.9
Vehicles Entered	10	5	129	66	323	42	27	968	15	1585
Vehicles Exited	10	4	125	66	324	42	27	964	15	1577
Hourly Exit Rate	10	4	125	66	324	42	27	964	15	1577
Input Volume	10	5	130	65	331	40	30	955	15	1581
% of Volume	98	80	96	102	98	106	91	101	98	100
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0

89: SE 8th & 112th Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	41.1	3.9	25.6	19.2	19.3	6.6	14.2
Travel Dist (mi)	19.7	57.7	27.7	21.3	63.1	84.8	274.3
Travel Time (hr)	2.4	2.6	2.6	1.9	5.8	4.1	19.4
Vehicles Entered	150	444	250	195	639	858	2536
Vehicles Exited	152	444	249	194	644	859	2542
Hourly Exit Rate	152	444	249	194	644	859	2542
Input Volume	150	440	250	200	650	850	2540
% of Volume	102	101	100	97	99	101	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

108: 112th (no P&R) & Bel Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	70.5	76.7	58.8	120.9	126.3	21.9	122.3	6.9	8.0	42.1	28.4	26.9
Travel Dist (mi)	4.4	1.3	3.4	22.4	1.6	19.7	5.6	171.0	2.6	2.0	305.7	2.1
Travel Time (hr)	1.0	0.3	0.6	6.6	0.5	1.7	1.7	7.0	0.1	0.3	28.4	0.2
Vehicles Entered	39	12	30	170	12	148	45	1386	21	17	2625	18
Vehicles Exited	39	11	30	169	13	147	45	1384	21	17	2622	18
Hourly Exit Rate	39	11	30	169	13	147	45	1384	21	17	2622	18
Input Volume	40	10	30	170	10	150	50	1437	20	20	2810	20
% of Volume	98	107	101	99	127	98	90	96	106	86	93	89
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

108: 112th (no P&R) & Bel Way Performance by movement

Movement	All
Delay / Veh (s)	26.9
Travel Dist (mi)	542.0
Travel Time (hr)	48.4
Vehicles Entered	4523
Vehicles Exited	4516
Hourly Exit Rate	4516
Input Volume	4767
% of Volume	95
Denied Entry Before	0
Denied Entry After	0

109: External Performance by approach

Approach	SB	All
Delay / Veh (s)	1.5	1.5
Travel Dist (mi)	48.4	48.4
Travel Time (hr)	2.2	2.2
Vehicles Entered	275	275
Vehicles Exited	274	274
Hourly Exit Rate	274	274
Input Volume	285	285
% of Volume	96	96
Denied Entry Before	0	0
Denied Entry After	0	0

122: SE 30th St & Bel Way Performance by movement

Movement	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Delay / Veh (s)	17.8	0.8	511.2	97.7	88.8	28.4	2.9	2.6	43.6
Travel Dist (mi)	26.8	1.3	16.9	221.3	1.5	0.7	188.1	0.6	457.1
Travel Time (hr)	1.6	0.1	14.4	41.2	0.3	0.1	6.9	0.0	64.6
Vehicles Entered	103	9	105	1306	9	10	2772	11	4325
Vehicles Exited	103	9	92	1298	9	10	2770	11	4302
Hourly Exit Rate	103	9	92	1298	9	10	2770	11	4302
Input Volume	100	10	100	1350	10	10	2955	10	4546
% of Volume	103	88	92	96	90	98	94	107	95
Denied Entry Before	0	0	0	0	0	0	1	0	1
Denied Entry After	0	0	3	47	0	0	1	0	51

135: SE 16th & Bel Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	134.4	117.6	113.8	176.6	115.1	83.4	37.8	3.9	4.0	45.6	41.0	50.5
Travel Dist (mi)	0.9	1.1	1.1	0.3	0.4	0.7	4.7	73.8	0.7	3.5	606.8	3.6
Travel Time (hr)	0.6	0.6	0.6	0.5	0.4	0.5	0.9	3.7	0.0	0.2	40.0	0.3
Vehicles Entered	14	18	18	9	12	21	70	1147	12	10	1723	10
Vehicles Exited	14	17	17	9	12	21	71	1151	12	10	1706	10
Hourly Exit Rate	14	17	17	9	12	21	71	1151	12	10	1706	10
Input Volume	15	15	15	10	10	20	75	1200	10	10	1700	10
% of Volume	92	111	111	88	117	104	94	96	117	98	100	98
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	1	0

135: SE 16th & Bel Way Performance by movement

Movement	All
Delay / Veh (s)	29.1
Travel Dist (mi)	697.8
Travel Time (hr)	48.3
Vehicles Entered	3064
Vehicles Exited	3050
Hourly Exit Rate	3050
Input Volume	3092
% of Volume	99
Denied Entry Before	0
Denied Entry After	1

153: External Performance by approach

Approach	EB	All
Delay / Veh (s)	1.0	1.0
Travel Dist (mi)	121.3	121.3
Travel Time (hr)	4.6	4.6
Vehicles Entered	838	838
Vehicles Exited	835	835
Hourly Exit Rate	835	835
Input Volume	850	850
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

217: External Performance by approach

Approach	SB	All
Delay / Veh (s)	0.4	0.4
Travel Dist (mi)	7.7	7.7
Travel Time (hr)	0.3	0.3
Vehicles Entered	55	55
Vehicles Exited	55	55
Hourly Exit Rate	55	55
Input Volume	55	55
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

257: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	0.5	6.5	4.6
Travel Dist (mi)	92.4	384.3	476.8
Travel Time (hr)	2.5	15.0	17.5
Vehicles Entered	1307	2771	4078
Vehicles Exited	1308	2769	4077
Hourly Exit Rate	1308	2769	4077
Input Volume	1360	2950	4311
% of Volume	96	94	95
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

298: External Performance by approach

Approach	NB	All
Delay / Veh (s)	1.2	1.2
Travel Dist (mi)	76.1	76.1
Travel Time (hr)	3.0	3.0
Vehicles Entered	693	693
Vehicles Exited	694	694
Hourly Exit Rate	694	694
Input Volume	690	690
% of Volume	101	101
Denied Entry Before	0	0
Denied Entry After	0	0

1083: External Performance by approach

Approach	WB	All
Delay / Veh (s)	0.9	0.9
Travel Dist (mi)	9.5	9.5
Travel Time (hr)	0.4	0.4
Vehicles Entered	76	76
Vehicles Exited	75	75
Hourly Exit Rate	75	75
Input Volume	80	80
% of Volume	93	93
Denied Entry Before	0	0
Denied Entry After	0	0

1221: External Performance by approach

Approach	SB	All
Delay / Veh (s)	5.5	5.5
Travel Dist (mi)	502.1	502.1
Travel Time (hr)	17.1	17.1
Vehicles Entered	2806	2806
Vehicles Exited	2805	2805
Hourly Exit Rate	2805	2805
Input Volume	2980	2980
% of Volume	94	94
Denied Entry Before	0	0
Denied Entry After	0	0

1227: External Performance by approach

Approach	EB	All
Delay / Veh (s)	1.3	1.3
Travel Dist (mi)	2.9	2.9
Travel Time (hr)	0.1	0.1
Vehicles Entered	19	19
Vehicles Exited	18	18
Hourly Exit Rate	18	18
Input Volume	20	20
% of Volume	89	89
Denied Entry Before	0	0
Denied Entry After	0	0

1271: External Performance by approach

Approach	SE	All
Delay / Veh (s)	0.2	0.2
Travel Dist (mi)	8.9	8.9
Travel Time (hr)	0.4	0.4
Vehicles Entered	69	69
Vehicles Exited	69	69
Hourly Exit Rate	69	69
Input Volume	70	70
% of Volume	99	99
Denied Entry Before	0	0
Denied Entry After	0	0

1272: External Performance by approach

Approach	NW	All
Delay / Veh (s)	0.1	0.1
Travel Dist (mi)	0.9	0.9
Travel Time (hr)	0.1	0.1
Vehicles Entered	15	15
Vehicles Exited	15	15
Hourly Exit Rate	15	15
Input Volume	15	15
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

1351: External Performance by approach

Approach	EB	All
Delay / Veh (s)	1.2	1.2
Travel Dist (mi)	1.9	1.9
Travel Time (hr)	0.1	0.1
Vehicles Entered	38	38
Vehicles Exited	38	38
Hourly Exit Rate	38	38
Input Volume	36	36
% of Volume	106	106
Denied Entry Before	0	0
Denied Entry After	0	0

1353: External Performance by approach

Approach	WB	All
Delay / Veh (s)	0.8	0.8
Travel Dist (mi)	7.2	7.2
Travel Time (hr)	0.4	0.4
Vehicles Entered	94	94
Vehicles Exited	93	93
Hourly Exit Rate	93	93
Input Volume	96	96
% of Volume	97	97
Denied Entry Before	0	0
Denied Entry After	0	0

9121: External Performance by approach

Approach	EB	All
Delay / Veh (s)	1.0	1.0
Travel Dist (mi)	2.3	2.3
Travel Time (hr)	0.1	0.1
Vehicles Entered	46	46
Vehicles Exited	46	46
Hourly Exit Rate	46	46
Input Volume	50	50
% of Volume	92	92
Denied Entry Before	0	0
Denied Entry After	0	0

9122: Bend Performance by approach

Approach	WB	NE	All
Delay / Veh (s)	0.7	2.2	1.8
Travel Dist (mi)	3.6	57.4	61.0
Travel Time (hr)	0.2	2.4	2.6
Vehicles Entered	54	172	226
Vehicles Exited	54	174	228
Hourly Exit Rate	54	174	228
Input Volume	55	170	224
% of Volume	98	103	102
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9123: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	0.6	0.4	0.6
Travel Dist (mi)	20.5	18.0	38.5
Travel Time (hr)	0.9	0.7	1.6
Vehicles Entered	172	54	226
Vehicles Exited	172	54	226
Hourly Exit Rate	172	54	226
Input Volume	170	55	224
% of Volume	101	98	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9124: Bend Performance by approach

Approach	SB	NW	All
Delay / Veh (s)	0.2	0.4	0.3
Travel Dist (mi)	6.6	13.4	19.9
Travel Time (hr)	0.3	0.6	0.8
Vehicles Entered	54	172	226
Vehicles Exited	55	172	227
Hourly Exit Rate	55	172	227
Input Volume	55	170	224
% of Volume	100	101	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9125: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	0.8	0.1	0.6
Travel Dist (mi)	40.5	4.3	44.8
Travel Time (hr)	1.7	0.2	1.8
Vehicles Entered	172	55	227
Vehicles Exited	172	55	227
Hourly Exit Rate	172	55	227
Input Volume	170	55	224
% of Volume	101	100	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9126: Bend Performance by approach

Approach	SB	NE	All
Delay / Veh (s)	0.5	0.1	0.2
Travel Dist (mi)	13.1	9.8	22.9
Travel Time (hr)	0.5	0.4	0.9
Vehicles Entered	55	172	227
Vehicles Exited	55	172	227
Hourly Exit Rate	55	172	227
Input Volume	55	170	224
% of Volume	100	101	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9127: Bend Performance by approach

Approach	NB	SW	All
Delay / Veh (s)	0.4	0.1	0.3
Travel Dist (mi)	22.7	3.1	25.8
Travel Time (hr)	0.9	0.1	1.1
Vehicles Entered	171	55	226
Vehicles Exited	172	55	227
Hourly Exit Rate	172	55	227
Input Volume	170	55	224
% of Volume	101	100	101
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9132: Bend Performance by approach

Approach	SB	NW	All
Delay / Veh (s)	20.7	2.2	13.3
Travel Dist (mi)	122.5	120.7	243.3
Travel Time (hr)	14.1	4.8	18.9
Vehicles Entered	1732	1164	2896
Vehicles Exited	1733	1170	2903
Hourly Exit Rate	1733	1170	2903
Input Volume	1725	1220	2946
% of Volume	100	96	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9141: Bend Performance by approach

Approach	NB	SW	All
Delay / Veh (s)	1.9	29.5	22.4
Travel Dist (mi)	82.0	171.1	253.1
Travel Time (hr)	3.2	13.8	17.0
Vehicles Entered	364	1090	1454
Vehicles Exited	365	1045	1410
Hourly Exit Rate	365	1045	1410
Input Volume	370	1085	1456
% of Volume	99	96	97
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9142: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	1.1	47.1	30.4
Travel Dist (mi)	198.3	845.8	1044.1
Travel Time (hr)	5.5	57.6	63.1
Vehicles Entered	1540	2723	4263
Vehicles Exited	1538	2665	4203
Hourly Exit Rate	1538	2665	4203
Input Volume	1599	2850	4449
% of Volume	96	94	94
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9892: Bend Performance by approach

Approach	SB	NE	All
Delay / Veh (s)	1.6	0.4	1.3
Travel Dist (mi)	136.0	29.6	165.6
Travel Time (hr)	4.5	1.0	5.5
Vehicles Entered	1011	325	1336
Vehicles Exited	1010	324	1334
Hourly Exit Rate	1010	324	1334
Input Volume	1000	330	1330
% of Volume	101	98	100
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Delay / Veh (s)	188.7
Travel Dist (mi)	7927.8
Travel Time (hr)	613.1
Vehicles Entered	7225
Vehicles Exited	7010
Hourly Exit Rate	7010
Input Volume	55139
% of Volume	13
Denied Entry Before	1
Denied Entry After	85

Arterial Level of Service: NB Bel Way

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
SE 30th St	122	97.7	113.8	0.2	16
	257	0.5	6.9	0.1	37
	108	6.9	18.1	0.1	28
	62	2.0	13.1	0.1	33
	9142	1.1	12.8	0.1	36
112th	14	38.8	66.9	0.3	17
108th	13	14.2	24.2	0.1	13
	9132	2.2	14.7	0.1	25
SE 16th	135	3.9	11.6	0.1	22
SE 10th	12	22.9	65.1	0.4	20
Total		190.1	347.2	1.6	21

Arterial Level of Service: SB Bel Way

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
SE 10th	12	8.8	20.3	0.1	18
SE 16th	135	41.1	83.9	0.4	15
	9132	20.6	29.2	0.1	9
108th	13	52.1	64.4	0.1	6
112th	14	12.0	20.5	0.1	15
	9142	49.8	78.1	0.3	14
	62	27.8	39.4	0.1	12
112th (no P&R)	108	28.4	39.0	0.1	11
	257	6.9	19.5	0.1	25
SE 30th St	122	2.9	9.0	0.1	29
Total		250.3	403.4	1.5	13

Arterial Level of Service: NB 112th

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	9141	2.1	32.1	0.2	25
	85	0.9	15.3	0.2	37
	9892	0.4	9.9	0.1	32
SE 8th	89	25.6	37.6	0.1	13
Total		28.9	94.9	0.6	23

Arterial Level of Service: SB 112th

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
SE 8th	89	6.6	17.3	0.1	24
	9892	1.7	15.7	0.1	30
	85	2.7	11.6	0.1	28
	9141	29.6	46.2	0.2	12
Bel Way	14	219.1	243.6	0.2	4
Total		259.7	334.5	0.7	9

Intersection: 12: SE 10th & Bel Way

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LR	LT	TR	LT	TR
Maximum Queue (ft)	214	26	518	535	377	380
Average Queue (ft)	101	5	249	266	162	184
95th Queue (ft)	182	20	458	481	305	322
Link Distance (ft)	264	182	1802	1802	470	470
Upstream Blk Time (%)	0				0	0
Queuing Penalty (veh)	0				0	0
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 13: Bel Way & 108th

Movement	EB	EB	EB	B9132	B9132	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	T	T	L	T	TR	LT	R	LTR
Maximum Queue (ft)	324	514	531	376	358	124	272	298	198	95	1046
Average Queue (ft)	40	478	489	245	248	52	85	92	82	41	691
95th Queue (ft)	183	598	589	459	442	118	210	211	158	83	1348
Link Distance (ft)		425	425	286	286		322	322	795		1260
Upstream Blk Time (%)		29	34	21	22		1	0			9
Queuing Penalty (veh)		253	289	180	193		4	1			0
Storage Bay Dist (ft)	300					100				275	
Storage Blk Time (%)	0	34				8	8				
Queuing Penalty (veh)	0	15				45	8				

Intersection: 14: Bel Way & 112th

Movement	EB	EB	EB	WB	WB	WB	SB	SB	B9141	B9141
Directions Served	L	T	T	T	T	R	L	LR	T	T
Maximum Queue (ft)	140	355	363	852	909	225	1183	1191	682	688
Average Queue (ft)	83	233	238	420	459	75	895	914	153	159
95th Queue (ft)	149	387	382	702	753	248	1340	1338	573	586
Link Distance (ft)		322	322	1598	1598		1092	1092	758	758
Upstream Blk Time (%)		4	4				22	24	3	4
Queuing Penalty (veh)		34	35				118	128	18	20
Storage Bay Dist (ft)	120					200				
Storage Blk Time (%)	17	21			27	0				
Queuing Penalty (veh)	148	15			82	0				

Intersection: 85: 112th &

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LR	L	R	T	TR	L	T	TR
Maximum Queue (ft)	45	152	61	12	40	35	177	205
Average Queue (ft)	14	58	31	0	4	7	15	25
95th Queue (ft)	41	135	54	5	20	27	103	122
Link Distance (ft)	289	632	632	758	758		419	419
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)						100		
Storage Blk Time (%)							2	
Queuing Penalty (veh)							1	

Intersection: 89: SE 8th & 112th

Movement	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	R	T	TR	L	L	T
Maximum Queue (ft)	202	87	95	162	226	210	223	387
Average Queue (ft)	93	35	45	76	118	114	128	122
95th Queue (ft)	165	69	76	133	191	188	204	260
Link Distance (ft)		684	684	621	621		520	520
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					350		
Storage Blk Time (%)	0							
Queuing Penalty (veh)	0							

Intersection: 108: 112th (no P&R) & Bel Way

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB	B62	B62
Directions Served	LT	R	LT	R	L	T	TR	L	T	TR	T	T
Maximum Queue (ft)	127	81	399	148	122	242	279	72	639	642	712	708
Average Queue (ft)	48	26	221	53	48	104	130	16	581	595	539	562
95th Queue (ft)	100	64	393	114	106	209	254	63	757	731	966	947
Link Distance (ft)	588	588	686	686		635	635		562	562	623	623
Upstream Blk Time (%)									17	18	15	15
Queuing Penalty (veh)									246	251	211	210
Storage Bay Dist (ft)					200			200				
Storage Blk Time (%)						0			20			
Queuing Penalty (veh)						0			4			

Intersection: 108: 112th (no P&R) & Bel Way

Movement	B9142	B9142
Directions Served	T	T
Maximum Queue (ft)	1609	1612
Average Queue (ft)	921	934
95th Queue (ft)	2009	2015
Link Distance (ft)	1598	1598
Upstream Blk Time (%)	3	2
Queuing Penalty (veh)	38	33
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 122: SE 30th St & Bel Way

Movement	EB	NB	NB	NB	SB	SB
Directions Served	TR	L	T	TR	L	T
Maximum Queue (ft)	174	225	771	774	33	12
Average Queue (ft)	42	183	429	379	7	0
95th Queue (ft)	146	279	1060	986	26	5
Link Distance (ft)	1420		886	886		305
Upstream Blk Time (%)			21	5		
Queuing Penalty (veh)			0	0		
Storage Bay Dist (ft)		200			75	
Storage Blk Time (%)		58	0			
Queuing Penalty (veh)		389	0			

Intersection: 135: SE 16th & Bel Way

Movement	EB	WB	NB	NB	NB	B9132	B9132	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	T	T	L	T	TR
Maximum Queue (ft)	163	173	121	336	326	87	70	60	1126	1121
Average Queue (ft)	56	47	43	61	72	2	2	5	471	497
95th Queue (ft)	151	129	100	202	219	31	28	26	1074	1095
Link Distance (ft)	324	181		286	286	425	425		1802	1802
Upstream Blk Time (%)		3		0	1					
Queuing Penalty (veh)		0		3	4					
Storage Bay Dist (ft)			100					75		
Storage Blk Time (%)			2	2				0	27	
Queuing Penalty (veh)			10	2				0	3	

Network Summary

Network wide Queuing Penalty: 2994

6: External Performance by approach

Approach	WB	All
Delay / Veh (s)	3.5	3.5
Travel Dist (mi)	16.7	16.7
Travel Time (hr)	1.0	1.0
Vehicles Entered	190	190
Vehicles Exited	189	189
Hourly Exit Rate	189	189
Input Volume	180	180
% of Volume	105	105
Denied Entry Before	0	0
Denied Entry After	0	0

11: External Performance by approach

Approach	NB	All
Delay / Veh (s)	1.6	1.6
Travel Dist (mi)	141.8	141.8
Travel Time (hr)	5.4	5.4
Vehicles Entered	1334	1334
Vehicles Exited	1333	1333
Hourly Exit Rate	1333	1333
Input Volume	1365	1365
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

12: SE 10th & Bel Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Delay / Veh (s)	37.1	37.3	30.9	33.9	12.3	63.9	20.5	15.3	22.4	8.2	8.8	15.5
Travel Dist (mi)	7.1	1.9	1.9	0.2	0.2	14.6	424.6	3.3	0.4	145.8	1.4	601.3
Travel Time (hr)	1.5	0.4	0.4	0.0	0.0	1.3	21.3	0.2	0.0	8.8	0.1	34.0
Vehicles Entered	114	31	30	4	6	42	1229	9	4	1612	16	3097
Vehicles Exited	113	31	31	4	6	42	1215	10	4	1612	16	3084
Hourly Exit Rate	113	31	31	4	6	42	1215	10	4	1612	16	3084
Input Volume	105	35	30	5	5	40	1255	10	5	1630	15	3134
% of Volume	108	89	104	80	120	106	97	98	80	99	105	98
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

13: Bel Way & 108th Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	47.3	37.2	38.2	96.2	7.4	6.3	62.8	61.7	40.2	217.3	200.5	165.4
Travel Dist (mi)	3.9	162.0	7.3	7.0	105.6	9.8	8.3	8.7	9.5	44.0	26.5	2.3
Travel Time (hr)	0.7	21.9	1.1	2.7	6.2	0.7	1.3	1.3	1.1	13.0	7.2	0.6
Vehicles Entered	39	1594	71	89	1289	116	54	57	62	188	114	11
Vehicles Exited	40	1584	71	89	1288	117	55	58	64	180	106	10
Hourly Exit Rate	40	1584	71	89	1288	117	55	58	64	180	106	10
Input Volume	45	1606	75	95	1336	120	60	55	60	195	115	10
% of Volume	89	99	94	94	96	98	92	105	107	92	92	98
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	2	0	0

13: Bel Way & 108th Performance by movement

Movement	All
Delay / Veh (s)	42.5
Travel Dist (mi)	395.0
Travel Time (hr)	57.8
Vehicles Entered	3684
Vehicles Exited	3662
Hourly Exit Rate	3662
Input Volume	3771
% of Volume	97
Denied Entry Before	0
Denied Entry After	2

14: Bel Way & 112th Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Delay / Veh (s)	140.1	20.8	72.8	66.8	89.2	88.3	57.9
Travel Dist (mi)	5.8	148.0	444.4	101.7	231.0	9.3	940.1
Travel Time (hr)	2.8	14.6	40.7	9.2	33.6	1.4	102.3
Vehicles Entered	67	1757	1469	342	1055	46	4736
Vehicles Exited	66	1749	1448	344	1062	46	4715
Hourly Exit Rate	66	1749	1448	344	1062	46	4715
Input Volume	70	1785	1500	350	1050	50	4806
% of Volume	94	98	97	98	101	92	98
Denied Entry Before	0	0	2	1	0	0	3
Denied Entry After	0	0	11	4	1	0	16

24: External Performance by approach

Approach	NB	All
Delay / Veh (s)	1.3	1.3
Travel Dist (mi)	55.8	55.8
Travel Time (hr)	2.5	2.5
Vehicles Entered	214	214
Vehicles Exited	214	214
Hourly Exit Rate	214	214
Input Volume	220	220
% of Volume	97	97
Denied Entry Before	0	0
Denied Entry After	0	0

62: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	1.4	18.6	11.9
Travel Dist (mi)	195.9	344.3	540.2
Travel Time (hr)	5.6	22.6	28.2
Vehicles Entered	1697	2700	4397
Vehicles Exited	1699	2686	4385
Hourly Exit Rate	1699	2686	4385
Input Volume	1730	2750	4480
% of Volume	98	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

85: 112th & Performance by movement

Movement	EBL	EBR	WBL	WBR	NBT	NBR	SBL	SBT	SBR	All
Delay / Veh (s)	17.6	8.7	14.2	4.1	0.9	0.8	2.6	0.9	0.4	2.3
Travel Dist (mi)	0.4	0.4	16.3	8.0	49.4	6.2	2.5	81.5	1.3	166.0
Travel Time (hr)	0.1	0.0	1.2	0.4	1.5	0.2	0.1	2.6	0.1	6.3
Vehicles Entered	8	8	136	67	373	40	28	945	15	1620
Vehicles Exited	8	8	136	67	372	40	28	945	15	1619
Hourly Exit Rate	8	8	136	67	372	40	28	945	15	1619
Input Volume	10	5	130	65	380	40	30	955	15	1630
% of Volume	78	160	104	103	98	101	94	99	98	99
Denied Entry Before	0	0	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0	0	0

89: SE 8th & 112th Performance by movement

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Delay / Veh (s)	41.3	3.8	25.6	21.2	19.6	6.3	14.4
Travel Dist (mi)	20.1	57.0	27.9	21.0	61.5	82.5	270.1
Travel Time (hr)	2.4	2.6	2.6	1.9	5.7	3.9	19.2
Vehicles Entered	155	440	251	193	623	834	2496
Vehicles Exited	153	439	249	190	624	836	2491
Hourly Exit Rate	153	439	249	190	624	836	2491
Input Volume	150	440	250	200	650	850	2540
% of Volume	102	100	100	95	96	98	98
Denied Entry Before	0	0	0	0	0	1	1
Denied Entry After	0	0	0	0	0	0	0

108: 112th (no P&R) & Bel Way Performance by movement

Movement	EBL	EBR	NBL	NBT	SBT	SBR	All
Delay / Veh (s)	48.9	37.6	50.1	2.6	34.6	25.4	22.9
Travel Dist (mi)	3.5	3.5	6.9	228.3	312.8	1.4	556.4
Travel Time (hr)	0.6	0.5	0.9	7.0	34.1	0.1	43.2
Vehicles Entered	32	31	51	1711	2730	12	4567
Vehicles Exited	31	31	51	1710	2732	12	4567
Hourly Exit Rate	31	31	51	1710	2732	12	4567
Input Volume	30	30	50	1746	2805	10	4670
% of Volume	104	104	102	98	97	117	98
Denied Entry Before	0	0	0	0	1	0	1
Denied Entry After	0	0	0	0	15	0	15

109: External Performance by approach

Approach	SB	All
Delay / Veh (s)	1.5	1.5
Travel Dist (mi)	47.0	47.0
Travel Time (hr)	2.2	2.2
Vehicles Entered	267	267
Vehicles Exited	267	267
Hourly Exit Rate	267	267
Input Volume	285	285
% of Volume	94	94
Denied Entry Before	0	0
Denied Entry After	0	0

122: SE 30th St & Bel Way Performance by movement

Movement	EBR	WBR	NBT	NBR	SBT	SBR	All
Delay / Veh (s)	8.5	4.1	4.9	7.5	11.8	6.9	8.8
Travel Dist (mi)	38.1	70.6	200.3	38.8	177.8	11.1	536.7
Travel Time (hr)	3.0	3.7	6.8	1.7	12.9	0.8	28.9
Vehicles Entered	543	505	1178	235	2576	190	5227
Vehicles Exited	543	506	1175	234	2583	190	5231
Hourly Exit Rate	543	506	1175	234	2583	190	5231
Input Volume	530	510	1200	230	2650	180	5300
% of Volume	102	99	98	102	97	106	99
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

135: SE 16th & Bel Way Performance by movement

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Delay / Veh (s)	61.0	59.4	37.8	44.2	64.2	16.3	25.9	4.8	5.1	20.2	14.8	16.6
Travel Dist (mi)	1.0	1.0	0.9	0.3	0.3	0.9	5.0	80.0	0.7	3.1	593.0	4.2
Travel Time (hr)	0.3	0.3	0.2	0.1	0.2	0.2	0.7	4.4	0.0	0.2	26.9	0.2
Vehicles Entered	16	15	15	9	8	24	73	1242	11	9	1680	12
Vehicles Exited	15	15	15	9	8	24	74	1250	11	10	1679	12
Hourly Exit Rate	15	15	15	9	8	24	74	1250	11	10	1679	12
Input Volume	15	15	15	10	10	20	75	1284	10	10	1700	10
% of Volume	98	98	98	88	78	119	98	97	107	98	99	117
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

135: SE 16th & Bel Way Performance by movement

Movement	All
Delay / Veh (s)	11.8
Travel Dist (mi)	690.3
Travel Time (hr)	33.6
Vehicles Entered	3114
Vehicles Exited	3122
Hourly Exit Rate	3122
Input Volume	3177
% of Volume	98
Denied Entry Before	0
Denied Entry After	0

153: External Performance by approach

Approach	EB	All
Delay / Veh (s)	1.0	1.0
Travel Dist (mi)	118.3	118.3
Travel Time (hr)	4.5	4.5
Vehicles Entered	814	814
Vehicles Exited	816	816
Hourly Exit Rate	816	816
Input Volume	850	850
% of Volume	96	96
Denied Entry Before	0	0
Denied Entry After	0	0

217: External Performance by approach

Approach	SB	All
Delay / Veh (s)	0.5	0.5
Travel Dist (mi)	8.2	8.2
Travel Time (hr)	0.3	0.3
Vehicles Entered	58	58
Vehicles Exited	58	58
Hourly Exit Rate	58	58
Input Volume	55	55
% of Volume	105	105
Denied Entry Before	0	0
Denied Entry After	0	0

257: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	2.4	9.6	6.8
Travel Dist (mi)	119.0	378.9	498.0
Travel Time (hr)	5.0	16.8	21.9
Vehicles Entered	1681	2716	4397
Vehicles Exited	1681	2713	4394
Hourly Exit Rate	1681	2713	4394
Input Volume	1710	2780	4490
% of Volume	98	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

298: External Performance by approach

Approach	NB	All
Delay / Veh (s)	1.1	1.1
Travel Dist (mi)	75.5	75.5
Travel Time (hr)	2.9	2.9
Vehicles Entered	688	688
Vehicles Exited	688	688
Hourly Exit Rate	688	688
Input Volume	690	690
% of Volume	100	100
Denied Entry Before	0	0
Denied Entry After	0	0

1083: External Performance by approach

Approach	WB	All
Delay / Veh (s)	0.8	0.8
Travel Dist (mi)	7.7	7.7
Travel Time (hr)	0.4	0.4
Vehicles Entered	63	63
Vehicles Exited	63	63
Hourly Exit Rate	63	63
Input Volume	60	60
% of Volume	105	105
Denied Entry Before	0	0
Denied Entry After	0	0

1221: External Performance by approach

Approach	SB	All
Delay / Veh (s)	8.0	8.0
Travel Dist (mi)	555.9	555.9
Travel Time (hr)	21.5	21.5
Vehicles Entered	3126	3126
Vehicles Exited	3110	3110
Hourly Exit Rate	3110	3110
Input Volume	3180	3180
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

1227: External Performance by approach

Approach	EB	All
Delay / Veh (s)	0.9	0.9
Travel Dist (mi)	36.5	36.5
Travel Time (hr)	1.8	1.8
Vehicles Entered	234	234
Vehicles Exited	233	233
Hourly Exit Rate	233	233
Input Volume	230	230
% of Volume	101	101
Denied Entry Before	0	0
Denied Entry After	0	0

1271: External Performance by approach

Approach	SE	All
Delay / Veh (s)	0.3	0.3
Travel Dist (mi)	8.7	8.7
Travel Time (hr)	0.4	0.4
Vehicles Entered	68	68
Vehicles Exited	68	68
Hourly Exit Rate	68	68
Input Volume	70	70
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

1272: External Performance by approach

Approach	NW	All
Delay / Veh (s)	0.1	0.1
Travel Dist (mi)	0.9	0.9
Travel Time (hr)	0.0	0.0
Vehicles Entered	15	15
Vehicles Exited	15	15
Hourly Exit Rate	15	15
Input Volume	15	15
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

1351: External Performance by approach

Approach	EB	All
Delay / Veh (s)	0.9	0.9
Travel Dist (mi)	1.8	1.8
Travel Time (hr)	0.1	0.1
Vehicles Entered	36	36
Vehicles Exited	36	36
Hourly Exit Rate	36	36
Input Volume	36	36
% of Volume	101	101
Denied Entry Before	0	0
Denied Entry After	0	0

1353: External Performance by approach

Approach	WB	All
Delay / Veh (s)	0.7	0.7
Travel Dist (mi)	7.2	7.2
Travel Time (hr)	0.4	0.4
Vehicles Entered	94	94
Vehicles Exited	94	94
Hourly Exit Rate	94	94
Input Volume	96	96
% of Volume	98	98
Denied Entry Before	0	0
Denied Entry After	0	0

9121: External Performance by approach

Approach	EB	All
Delay / Veh (s)	1.0	1.0
Travel Dist (mi)	2.2	2.2
Travel Time (hr)	0.1	0.1
Vehicles Entered	44	44
Vehicles Exited	44	44
Hourly Exit Rate	44	44
Input Volume	50	50
% of Volume	88	88
Denied Entry Before	0	0
Denied Entry After	0	0

9122: Bend Performance by approach

Approach	WB	NE	All
Delay / Veh (s)	0.7	2.2	1.9
Travel Dist (mi)	3.8	57.7	61.5
Travel Time (hr)	0.2	2.4	2.7
Vehicles Entered	58	174	232
Vehicles Exited	58	175	233
Hourly Exit Rate	58	175	233
Input Volume	55	170	224
% of Volume	105	103	104
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9123: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	0.6	0.5	0.6
Travel Dist (mi)	20.7	19.2	39.9
Travel Time (hr)	0.9	0.8	1.7
Vehicles Entered	174	58	232
Vehicles Exited	174	58	232
Hourly Exit Rate	174	58	232
Input Volume	170	55	224
% of Volume	103	105	103
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9124: Bend Performance by approach

Approach	SB	NW	All
Delay / Veh (s)	0.3	0.4	0.3
Travel Dist (mi)	6.9	13.5	20.4
Travel Time (hr)	0.3	0.6	0.9
Vehicles Entered	58	174	232
Vehicles Exited	57	174	231
Hourly Exit Rate	57	174	231
Input Volume	55	170	224
% of Volume	104	103	103
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9125: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	0.8	0.2	0.7
Travel Dist (mi)	41.1	4.5	45.5
Travel Time (hr)	1.7	0.2	1.9
Vehicles Entered	175	57	232
Vehicles Exited	174	58	232
Hourly Exit Rate	174	58	232
Input Volume	170	55	224
% of Volume	103	105	103
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9126: Bend Performance by approach

Approach	SB	NE	All
Delay / Veh (s)	0.8	0.1	0.3
Travel Dist (mi)	13.7	10.0	23.7
Travel Time (hr)	0.6	0.4	1.0
Vehicles Entered	58	175	233
Vehicles Exited	58	175	233
Hourly Exit Rate	58	175	233
Input Volume	55	170	224
% of Volume	105	103	104
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9127: Bend Performance by approach

Approach	NB	SW	All
Delay / Veh (s)	0.4	0.2	0.3
Travel Dist (mi)	23.1	3.3	26.4
Travel Time (hr)	1.0	0.1	1.1
Vehicles Entered	174	58	232
Vehicles Exited	175	58	233
Hourly Exit Rate	175	58	233
Input Volume	170	55	224
% of Volume	103	105	104
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9132: Bend Performance by approach

Approach	SB	NW	All
Delay / Veh (s)	8.3	2.4	5.7
Travel Dist (mi)	120.5	136.7	257.3
Travel Time (hr)	8.0	5.5	13.6
Vehicles Entered	1703	1316	3019
Vehicles Exited	1704	1326	3030
Hourly Exit Rate	1704	1326	3030
Input Volume	1725	1370	3095
% of Volume	99	97	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9141: Bend Performance by approach

Approach	NB	SW	All
Delay / Veh (s)	2.1	1.1	1.4
Travel Dist (mi)	92.7	173.0	265.8
Travel Time (hr)	3.6	5.5	9.1
Vehicles Entered	411	1082	1493
Vehicles Exited	413	1083	1496
Hourly Exit Rate	413	1083	1496
Input Volume	420	1085	1505
% of Volume	98	100	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9142: Bend Performance by approach

Approach	NB	SB	All
Delay / Veh (s)	1.1	18.0	11.5
Travel Dist (mi)	218.7	852.4	1071.1
Travel Time (hr)	6.0	36.2	42.3
Vehicles Entered	1699	2725	4424
Vehicles Exited	1700	2700	4400
Hourly Exit Rate	1700	2700	4400
Input Volume	1730	2750	4480
% of Volume	98	98	98
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

9892: Bend Performance by approach

Approach	SB	NE	All
Delay / Veh (s)	1.4	0.4	1.2
Travel Dist (mi)	133.0	29.6	162.6
Travel Time (hr)	4.4	1.0	5.4
Vehicles Entered	989	325	1314
Vehicles Exited	988	325	1313
Hourly Exit Rate	988	325	1313
Input Volume	1000	330	1330
% of Volume	99	98	99
Denied Entry Before	0	0	0
Denied Entry After	0	0	0

Total Network Performance

Delay / Veh (s)	115.5
Travel Dist (mi)	8252.3
Travel Time (hr)	498.3
Vehicles Entered	7750
Vehicles Exited	7657
Hourly Exit Rate	7657
Input Volume	57137
% of Volume	13
Denied Entry Before	5
Denied Entry After	33

Arterial Level of Service: NB Bel Way

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
SE 30th St	122	4.9	20.9	0.2	31
	257	2.7	9.1	0.1	28
112th (no P&R)	108	2.6	14.7	0.1	34
	62	1.4	11.8	0.1	36
	9142	1.1	12.8	0.1	36
112th	14	72.8	100.5	0.3	13
108th	13	6.7	16.6	0.1	19
	9132	2.4	14.9	0.1	25
SE 16th	135	4.8	12.6	0.1	20
SE 10th	12	20.8	62.8	0.4	21
Total		120.1	276.8	1.6	21

Arterial Level of Service: SB Bel Way

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
SE 10th	12	8.2	19.7	0.1	18
SE 16th	135	14.9	57.6	0.4	22
	9132	8.4	16.9	0.1	15
108th	13	37.2	49.6	0.1	7
112th	14	18.4	26.9	0.1	12
	9142	18.9	47.1	0.3	24
	62	18.6	30.2	0.1	15
112th (no P&R)	108	34.6	45.0	0.1	12
	257	9.6	22.3	0.1	22
SE 30th St	122	11.8	18.0	0.1	14
Total		180.5	333.4	1.5	17

Arterial Level of Service: NB 112th

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
	9141	2.3	32.4	0.2	25
	85	0.9	14.6	0.2	39
	9892	0.4	9.9	0.1	32
SE 8th	89	25.6	37.7	0.1	13
Total		29.1	94.6	0.6	23

Arterial Level of Service: SB 112th

Cross Street	Node	Delay (s/veh)	Travel time (s)	Dist (mi)	Arterial Speed
SE 8th	89	6.3	17.0	0.1	24
	9892	1.6	15.6	0.1	31
	85	0.9	9.8	0.1	33
	9141	1.1	17.7	0.2	32
Bel Way	14	89.2	114.2	0.2	7
Total		99.0	174.3	0.7	15

Intersection: 12: SE 10th & Bel Way

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LR	LT	TR	LT	TR
Maximum Queue (ft)	210	31	534	528	334	365
Average Queue (ft)	97	6	234	241	150	179
95th Queue (ft)	180	23	462	463	273	301
Link Distance (ft)	264	182	1802	1802	470	470
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 13: Bel Way & 108th

Movement	EB	EB	EB	B9132	B9132	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	T	T	L	T	TR	LT	R	LTR
Maximum Queue (ft)	167	523	523	359	331	124	251	252	221	146	918
Average Queue (ft)	19	430	450	139	154	66	37	30	82	44	571
95th Queue (ft)	99	624	629	353	364	135	176	149	179	100	1079
Link Distance (ft)		425	425	286	286		322	322	795		1260
Upstream Blk Time (%)		15	18	4	4		1	0			2
Queuing Penalty (veh)		129	158	33	37		7	2			0
Storage Bay Dist (ft)	300					100				275	
Storage Blk Time (%)		20				13	0		1		
Queuing Penalty (veh)		9				86	0		1		

Intersection: 14: Bel Way & 112th

Movement	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	L	T	T	T	T	R	L	LR
Maximum Queue (ft)	144	359	351	1236	1286	225	856	873
Average Queue (ft)	86	291	292	749	802	102	595	615
95th Queue (ft)	149	402	389	1179	1239	286	937	953
Link Distance (ft)		322	322	1598	1598		1092	1092
Upstream Blk Time (%)		7	7				0	0
Queuing Penalty (veh)		64	67				1	2
Storage Bay Dist (ft)	120					200		
Storage Blk Time (%)	16	32			35	0		
Queuing Penalty (veh)	139	22			124	1		

Intersection: 85: 112th &

Movement	EB	WB	WB	NB	NB	SB	SB	SB
Directions Served	LR	L	R	T	TR	L	T	TR
Maximum Queue (ft)	35	132	51	18	34	44	18	59
Average Queue (ft)	14	55	30	0	3	6	1	8
95th Queue (ft)	39	111	53	6	19	28	12	36
Link Distance (ft)	289	632	632	758	758		419	419
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)						100		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 89: SE 8th & 112th

Movement	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	R	T	TR	L	L	T
Maximum Queue (ft)	179	80	97	162	223	238	245	348
Average Queue (ft)	95	33	43	79	127	115	134	128
95th Queue (ft)	157	62	76	145	191	191	209	270
Link Distance (ft)		684	684	621	621		520	520
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	250					350		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 108: 112th (no P&R) & Bel Way

Movement	EB	NB	NB	NB	B257	SB	SB	B62	B62	B9142	B9142
Directions Served	LR	L	T	T	T	T	TR	T	T	T	T
Maximum Queue (ft)	112	111	93	125	391	653	648	696	694	769	824
Average Queue (ft)	49	42	30	51	33	494	543	295	338	201	224
95th Queue (ft)	92	88	76	107	214	822	815	783	813	954	989
Link Distance (ft)	588		675	675	303	562	562	623	623	1598	1598
Upstream Blk Time (%)					1	9	13	4	5	0	0
Queuing Penalty (veh)					4	130	177	54	72	4	3
Storage Bay Dist (ft)		200									
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 122: SE 30th St & Bel Way

Movement	EB	EB	WB	NB	NB	SB	SB	SB	SB	B257	B257
Directions Served	R	R	R	T	TR	T	T	T	R	T	T
Maximum Queue (ft)	229	234	190	238	299	375	322	326	79	292	212
Average Queue (ft)	73	118	61	27	69	204	178	169	18	17	16
95th Queue (ft)	206	230	135	141	202	356	306	296	71	137	120
Link Distance (ft)	422	422	747	896	896	303	303	303		675	675
Upstream Blk Time (%)						2	0	0			
Queuing Penalty (veh)						14	3	4			
Storage Bay Dist (ft)									60		
Storage Blk Time (%)								22	0		
Queuing Penalty (veh)								40	1		

Intersection: 135: SE 16th & Bel Way

Movement	EB	WB	NB	NB	NB	B9132	B9132	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	T	T	L	T	TR
Maximum Queue (ft)	98	72	120	314	307	28	26	34	519	529
Average Queue (ft)	32	24	38	90	113	1	2	4	195	227
95th Queue (ft)	76	58	86	242	273	15	17	21	458	496
Link Distance (ft)	324	181		286	286	425	425		1802	1802
Upstream Blk Time (%)				1	1					
Queuing Penalty (veh)				3	4					
Storage Bay Dist (ft)			100					75		
Storage Blk Time (%)			1	3					11	
Queuing Penalty (veh)			3	2					1	

Network Summary

Network wide Queuing Penalty: 1404