Exhibit B
APL08-00006 & APL08-00009

ATTACHMENT SEPA 46
ZON06-00025

RECEIVED
AUG 28
AM PM
PLANNING DEPARTMENT
BY

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July 5, 2005

Mr. Anthony Sabegh
436 10th Avenue
Kirkland, Washington 98033

Subject: Proposed Mixed-Use Development, NE 68th Street
Traffic Impact Analysis

Dear Mr. Sabegh:

Thank you for working with Transportation Solutions, Inc. for analysis of the transportation impacts of your proposed development on Kirkland's NE 68th Street.

This letter summarizes our analysis and conclusions. In brief, the project is estimated to generate no more than 56 vehicular trips during the afternoon peak hour, and delays at local intersections will increase by no more than 2.8 seconds. A transportation concurrency certificate has already been issued for the project, and the project will have no significant adverse environmental impacts.

PROPOSED PROJECT

Construction of two commercial buildings is proposed on a vacant parcel, located on NE 68th Street, east of 108th Avenue NE (immediately east of an existing 7-Eleven convenience store). One building near the south edge of the property would be approximately 5,500 square feet. Anticipated uses would be either single-tenant medical-office building, general retail use (five to six tenants), or restaurant use. A second building near the north edge of the property would be approximately 3,200 square feet. The ground floor is anticipated to serve automobile service such as a mechanic use. The upper floor is anticipated to be office or restaurant use. The total square footage of the two buildings is expected to be 8,700 square feet. The site is currently undeveloped, with no associated automotive trip generation. Figure 1 illustrates the site frontage, along the north side of NE 68th Street.

Figure 1. Proposed Development Site.

TRIP GENERATION

Increased traffic generation attributable to the expansion was estimated using the Institute of Transportation Engineers' *Trip Generation*, 7th Edition. Alternative trip generation estimates were developed for different possible uses of the proposed buildings, as summarized in Table 1. The most conservative trip generation estimates is based on the south building and the top of the north building operating as restaurants. This results in 56 afternoon peak hour trips (excluding pass-by trips); 48 morning peak hour trips; and 719 total weekday trips.

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Table 1. Trip Generation Estimates, Afternoon Peak Hour.

Time Period	Square Feet	ITE LUC	Trip Rate	Total Trips	Pass-By %	Primary Trips		
						Total	In	Out
SOUTH BUILDING OPTIONS								
Option: Medical-Dental Office	5,500	720	3.86	21.2	0%	21	6	15
Option: Specialty Retail	5,500	814	2.71	14.9	30%	10	5	6
Option: Quality Restaurant	5,500	931	7.49	41.2	15%	35	23	12
NORTH BUILDING OPTIONS								
Ground Floor, Quick Lube Vehicle Shop	(2 bays)	941	5.19	10.4	0%	10	5	5
Option: Upper Floor, Office	1600	710	1.49	2.4	0%	2	1	2
Option: Upper Floor, Restaurant	1600	931	7.49	12.0	15%	10	7	3
MOST CONSERVATIVE OPTIONS								
South Building: Quality Restaurant	5,500	931	7.49	41.2	15%	35	23	12
North Building Ground Floor: Quick Lube	(2 bays)	941	5.19	10.4	0%	10	5	5
North Building Upper Floor: Restaurant	1600	931	7.49	12.0	15%	10	7	3
Total	8,700		7.31	64	13%	*56*	*35*	*20*

Notes:
-- Trip estimates for all land uses except medical-dental office are based on ITE trip rates. Proposed medical-dental office square footage is less than the range of observed ITE data, and use of equations would not be appropriate.
-- Land use code for ground floor of north building was similar to both "Automobile Care Center" and "Quick Lubrication Vehicle Shop." Greater peak hour rates result from using "Quick Lubrication Vehicle Shop," so that use was assumed to ensure a conservative result.
-- For all tables, entering and exiting trips can differ from total by one trip due to rounding.

Table 2. Trip Generation Estimates, Morning Peak Hour.

Time Period	Square Feet	ITE LUC	Trip Rate	Total Trips	Pass-By %	Primary Trips		
						Total	In	Out
SOUTH BUILDING OPTIONS								
Option: Medical-Dental Office	5,500	720	2.48	13.6	0%	14	11	3
Option: Specialty Retail	5,500	814	6.84	37.6	0%	38	18	20
Option: Quality Restaurant	5,500	931	0.81	4.5	0%	4	4	2
NORTH BUILDING OPTIONS								
Ground Floor, Quick Lube Vehicle Shop	(2 bays)	941	4.0	8.0	0%	8	4	4
Option: Upper Floor, Office	1600	710	1.55	2.5	0%	2	2	0
Option: Upper Floor, Restaurant	1600	931	0.81	1.3	0%	1	1	1
MOST CONSERVATIVE OPTIONS								
South Building: Specialty Retail	5,500	814	6.84	37.6	0%	38	18	20
North Building Ground Floor: Quick Lube	(2 bays)	941	4.0	8.0	0%	8	4	4
North Building Upper Floor: Office	1600	710	1.55	2.5	0%	2	2	0
Total	8,700		5.53	48	0%	*48*	*24*	*24*

Note: Trip estimate for retail based on peak hour of generator. No data available for peak hour of adjacent street traffic. Therefore, this is a conservative estimate.

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Table 3. Site Trip Generation Estimates, Weekday Daily.

Time Period	Square Feet	ITE LUC	Trip Rate	Total Trips	Pass-By %	Primary Trips		
						Total	In	Out
SOUTH BUILDING OPTIONS								
Option: Medical-Dental Office	5,500	720	36.13	198.7	0%	199	99	99
Option: Specialty Retail	5,500	814	49.63	273.0	0%	273	136	136
Option: Quality Restaurant	5,500	931	89.95	494.7	0%	495	247	247
NORTH BUILDING OPTIONS								
Ground Floor, Quick Lube Vehicle Shop	1600	941	40.0	80.0	0%	80	40	40
Option: Upper Floor, Office	1600	710	11.01	17.6	0%	18	9	9
Option: Upper Floor, Restaurant	1600	931	89.95	143.9	0%	144	72	72
MOST CONSERVATIVE OPTIONS								
South Building: Quality Restaurant	5,500	931	89.95	494.7	0%	495	247	247
North Building Ground Floor: Quick Lube	1600	941	40.0	80.0	0%	80	40	40
North Building Upper Floor: Restaurant	1600	931	89.95	143.9	0%	144	72	72
Total	8,700		82.60	718.6	0%	719	359	359

Notes:
-- Retail trip generation estimated using equation. Use of rate may be appropriate but results in a lower estimate.

TRAFFIC DISTRIBUTION

Traffic distribution patterns were analyzed by City of Kirkland Public Works staff, using the City's transportation demand model. This model forecasts origins/destinations of trips to/from the site based on other land uses within Kirkland and in the larger region. Site trips are then routed to/from these origins/destinations based on the most desirable route choice.

Resultant traffic patterns for these site trips are shown in Attachment A. Note that this distribution reflects the assumption that the site driveway would be limited to right-in/right-out movements only, as discussed later. If left turns from the site driveway are permitted, site traffic volumes through the intersection of NE 68th Street and 108th Avenue NE would be lower. Therefore, using the City's distribution results in greater intersection delay impacts, and is conservative.

STUDY INTERSECTIONS

Site traffic distribution was segregated into those trips approaching and departing the site. These separate distributions were then applied to site daily trips to estimate daily trips by movement. Proportional share calculations were prepared based on the City's methodology and are included in Attachment B. This analysis included all City key intersections impacted by more than 31 daily trips. Those impacted by

fewer trips cannot possibly have a proportionate share greater than 1.00 percent. Results are also summarized in Table 4.

Table 4. Intersection Proportionate Shares

Intersection	Proportionate Share
NE 68th Street / 108th Avenue NE	1.97 %
NE 72nd Place / I-405 Southbound Ramps	1.25 %
116th Ave NE / NE 70th Street	0.74 %
116th Ave NE / I-5 Northbound Ramps	0.53 %
Central Way / 6th Street	0.34 %

INTERSECTION PERFORMANCE

Level of service (LOS) is a measure of the ability of a given intersection to serve traffic using the street network. The Transportation Research Board developed the LOS methodology used in making this evaluation, and it is summarized in the 2000 *Highway Capacity Manual* (*HCM*). Intersection level of service calculations were performed using the Synchro computer program, Version 6, which was developed by Trafficware to be consistent with the 2000 *HCM*.

Level of service analysis is required at those intersections with greater than 1.00 percent proportionate share: NE 68th Street / 108th Avenue NE and NE 72nd Place / I-405 Southbound Ramps. Levels of service and turning movements were also studied at the site driveway.

Afternoon peak hour traffic volumes with the proposed project (provided by City of Kirkland staff) project trips, and volumes without the proposed project, are summarized in Table 5.

Intersection performance was analyzed using the Synchro computer program, Version 6, Build 612. As shown in Table 6, the project is not expected to change year 2006 levels of service. Average vehicular delays for each intersection as a whole would increase by 0.6 to 2.8 seconds. Detailed level of service output is included in Attachment C.

Table 5. Key Intersection Afternoon Peak Hour Traffic Volumes.

Turning Movement	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR
Intersection 104, NE 68th Street and 108th Avenue NE												
Without Project	139	459	290	185	236	131	230	448	117	238	378	261
Project Trips	0	0	7	5	0	0	0	16	0	1	14	5
With Project	139	459	297	190	236	131	230	464	117	239	392	266
Intersection 411, NE 72nd Street and I-405 Southbound Ramps												
Without Project	0	882	72	246	727	2	0	0	0	227	0	330
Project Trips	0	3	8	0	10	0	0	0	0	8	0	0
With Project	0	885	80	246	737	2	0	0	0	235	0	330

Table 6. Levels of Service and Delay

Approach	Without Project	With Project	Change
Intersection 104, NE 68th Street and 108th Avenue NE			
Northbound	F (90.1)	F (89.7)	-0.4
Southbound	F (81.2)	F (85.1)	+3.9
Eastbound	E (65.0)	E (65.4)	+0.4
Westbound	E (80.0)	F (88.0)	+8.0
Overall	F (80.1)	F (82.9)	+2.8
V/C Ratio	1.17	1.17	0
Intersection 411, NE 72nd Street and I-405 Southbound Ramps			
Northbound	D (42.3)	D (42.9)	+0.6
Southbound	C (25.8)	C (25.8)	0
Westbound	D (46.2)	D (47.2)	+1.0
Overall	D (37.8)	D (38.4)	+0.6
V/C Ratio	0.98	0.98	0
Site Driveway Intersection with NE 68th Street			
If Left Turns Prohibited			
Southbound	(Non-existent)	C (17.7)	
Eastbound		0.0	
Westbound		0.0	
Overall		0.2	
If Left Turns Permitted			
Southbound	(Non-existent)	E (35.5)	
Eastbound Left		B (10.2)	
Eastbound Thru		0.0	
Westbound		0.0	
Overall		0.5	

The project's impacts to increased delays are not significant. Moreover, the City has established thresholds for SEPA mitigation at intersections. Intersections operating at level of service "F" may be required to mitigate impacts of proportionate share impacts of 5 percent or more. Intersections operating at level of service "D" have no mitigation requirement. Results suggest no SEPA mitigation is warranted.

It should be noted that afternoon peak hour delays will typically be less than those shown in Table 6. Separate peak hour factors (to convert the hourly volumes to a more conservative 15-minute analysis period) were applied to each of the four approaches, as provided in City data. It is highly unlikely that all four approaches would peak during the same 15-minute period. Note also that the peak hour factor reported for Interstate 405 off-ramp traffic (0.58) is incredibly low, reflecting a highly unusual bunching of traffic during a 15-minute period or some other count anomaly that does not regularly occur. Therefore, this represents a conservative analysis.

LEFT-TURN ACCESS

Proposal and Concerns

The applicant proposes a single site driveway with full access (i.e., including left turns to and from the site). It would be located approximately 140 feet from the westbound stop bar at the signalized intersection west of the site. City staff have identified possible concerns regarding left-turn operations due to the proximity of the adjacent signalized intersection. It is possible that queues entering the site could develop because could impede left turns into site. This potential currently exists due to the location of a King County Metro transit stop directly across the street from the proposed driveway (westbound on NE 68th Street). Metro's routes 245, 251, and 254 pass this station approximately 70 times per weekday. Stops to pick up or release passengers can impede westbound traffic, as shown in Figure 2.

It is also possible that vehicles queued for a westbound left-turn or through movement could obstruct the vision of motorists attempting to exit the site and turn left. This potential exists at virtually every driveway within a short distance on the approach leg to a signalized intersection. Three examples exist on each other leg of the NE 68th Street / 108th Avenue NE signalized intersection. Full-access driveways to 108th Avenue NE / Sixth Street S exist within 150 feet north of, and 50 to 100 feet south of, the southbound and northbound stop bars, respectively. A full access commercial driveway to the shopping center in the southwest quadrant exists within 150 feet west of the eastbound stop bar. Left turns exiting these three driveways are permitted, although both are routinely blocked by peak hour queues. No safety concerns related to these movements are apparent at either existing site.

Figure 2. Metro Transit Stop Causes Westbound Queuing.

Left turns entering these other three site driveways are also permitted, despite the fact that motorists could instead make an appropriate turn at the signalized intersection and enter each of these three sites via NE 68th Street (i.e., the burden of turn restrictions on entering traffic would be relatively low).

Impacts of Turn Restrictions

Should left turns be restricted, some trips to/from the site would be eliminated, as some motorists would instead travel to a more convenient site. The extent of this behavior would depend primarily on the nature of the land use. Trips that do access the site despite difficulty turning would conduct additional travel and/or U turns elsewhere. Trips destined to the site from the west would most likely either:

- Conduct U turns along NE 68th Street / NE 72nd Place at private driveways, or conduct three-point turns, including backing to the public street;

- Conduct U turns at the I-405 southbound ramps intersection (a T intersection) or at the NE 70th Street / 116th Avenue NE intersection.
- Enter such private driveways, turn around on private property, and then return to NE 68th Street via a right turn; or
- Turn right to a private driveway or public street, then turn around in a private driveway.

Trips leaving the site and destined east would turn right to NE 68th Street and would most likely:

- Conduct a U turn at the 108th Avenue NE signalized intersection;
- Turn around within the Lakeview Elementary school site, in the Houghton Plaza center, or within another private development; or
- Travel north on Sixth Street S or south on 108th Avenue NE and use local streets to reach the destination.

The additional travel from the site to a turnaround location, the turnaround maneuver, and travel back to the site would introduce other safety concerns, operational delays, and private property impacts, that may be greater detriment than allowing left turns to and from the site driveway. U turns along NE 68th Street / NE 72nd Place, in particular, would be difficult given the limited sight distance caused by horizontal and vertical curvature.

In summary, allowing left turn access at the site is not expected to cause significant safety or operational problems. To balance safety concerns at the site with safety concerns at other locations and access needs for site employees and customers, we suggest allowing full access at the site driveway and carefully monitoring site traffic volumes, vehicle queues, and turning conflicts. In the event safety concerns remain, driveway modifications may be appropriate, such as time-of-day or complete prohibition of left turns entering and/or exiting the site.

TRANSPORTATION CONCURRENCY

The City has reviewed trip generation estimates and developed the trip distribution pattern for this project. This project passed the City's Transportation Concurrency Test on June 9, 2005. This confirms the project is consistent with concurrency requirements and there is sufficient additional transportation capacity to serve the project.

EXPECTED MITIGATION

Transportation impacts of the expected additional traffic are negligible. Therefore, no transportation improvements are recommended. However, the Applicant is

responsible to pay a transportation road impact fee based on the gross floor area of the proposed expansion. The fee was estimated based on assumed building uses as:

Restaurant:	$5.56 per square foot × 7,100 square feet = $39,476.
Auto service:	$964.00 per service bay × 2 bays = $1,928.
Total:	$41,404.

The fee can vary dramatically if proposed uses change from those assumed in this analysis. Any revision to this fee amount will be determined prior to building permit issuance based on exact square footage and proposed uses.

The City of Kirkland uses road impact fee monies to partially fund transportation improvements throughout the City. Therefore, this money will be used to help mitigate the project's transportation impacts.

SUMMARY

The proposed development is estimated to increase afternoon peak hour traffic volumes by no more than 56 new vehicular trips. (Impacts are less if the development plan changes to another less-intensive alternative summarized in Table 1.) Weekday daily traffic volumes are estimated to increase by no more than 719 trips. The project's transportation impacts are expected to be negligible, with vehicular delays increasing by approximately 2.8 seconds at the intersection of NE 68th Street and 108th Avenue NE during the afternoon peak hour; and by 0.6 seconds per vehicle at the intersection of NE 72nd Street and the I-405 southbound ramps. Delay increases will be significantly less than the daily variation in delays due to volume fluctuations and weather conditions, and will not be perceptible to most users.

Full access (including left turns) is proposed at the site driveway. City staff will evaluate the potential conflicts and determine allowable driveway configuration. This report recommends allowing left turns to and from the site, monitoring turning conflicts, and possibly implementing time-of-day or complete left-turn restrictions if appropriate.

Payment of a road impact fee is required, in accordance with KMC 27.04. Based on the land uses assumed herein, the corresponding fee would be $41,404. The actual amount will vary if the proposed uses or building square footage changes.

No other transportation mitigation is warranted.

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Transportation Solutions, Inc.

If you have any questions concerning the findings in this report, please contact me at your convenience.

Very truly yours,

BRUCE R. NEWMAN, P.E., PTOE
Transportation Engineer

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Attachment A

City Trip Distribution Model

1) Project ID:	NE 68th Street Mixed-Use	4) Transportation Concurrency Status: PASS	6) Transportation Concurrency Certificate Date:
2) Project Description:	Construct two buildings to include 7,100 sf high-turnover sitdown restaurant and 1,600 sf autocare facility	5) Transportation Concurrency Test Date: 9-Jun-05	7) Certificate of Occupancy Date
3) Build-out Year:	2006		

SUMMARY OF TRAFFIC IMPACTS

8) Daily Trips	719	PM Peak Trips:	56	Impacted Subares(s):	E, SW	TAZ:	261

Signalized Intersection PM Peak Traffic Impact

		Project PM Peak Turning Volumes															
		Eastbound			Westbound			Northbound			Southbound						
Code	Intersection	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	PM Peak Trips	Daily Trips	Sum of Critical Vol*	Vol. Capacity Ratio*
102	Lake Wash/Lakeview Dr				1					2				3		1145	0.83
103	State St/NE 68th St		2			1								3		829	0.60
104	108th Ave NE/NE 68th St		16		1	14	5			7	5			48		1510	1.10
105	Central Way/6th St	1					1	1	1			1		5		1128	0.82
406	NE 70th St/132nd Ave NE		1					1					1	3		1430	1.04
407	NE 70th St/116th Ave NE	2		1		3		5					1	12		1651	1.20
410	116th Ave NE/I-405 Ramp	5											1	6		1328	0.93
411	NE 72nd Pl/I-405 SB Ramp				8				3	8		10		29		1461	1.03
	Driveway/NE 68th Street		29				36						20	85		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A
	#N/A													0		#N/A	#N/A

Transportation Concurency Test

	LOS Standards		*LOS with Project Impacts*			
Subares No	A= Max. Intersection LOS	B=Average 2009 V/C	a=No. exceeding 1.4	b=Average V/C	a <= A?	b<= B?
Southwest (1xx)	1.4	1.01	0	0.79	yes	yes
Northwest (2xx)	1.4	1.20	0	0.92	yes	yes
Northeast (3xx)	1.4	1.04	0	0.81	yes	yes
East(4xx)	1.4	1.10	0	0.98	yes	yes

TEST RESULTS

Result: **PASS**

* Based on Critical Movement, Planning Method TRC #212.
1. Number of intersection exceeding Average V/C LOS Standard (2012)
1. Sixth Year Target Average V/C ratio, see step 6, part 1 of the guidelines

Exhibit B
APL08-00006 & APL08-00009

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Attachment B

Daily Trip Generation Estimates and Proportionate Share Calculations

NE 68TH STREET RETAIL
TRIP DISTRIBUTION SUMMARY

TRIP GENERATION VOLUMES BY TIME PERIOD

PM Peak Entering	20
PM Peak Exiting	35
Daily Entering	359
Daily Exiting	359

AFTERNOON PEAK HOUR VOLUMES PER CONCURRENCY RESULT

ID	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	ALL
102	lake wash / Lakeview			2							1			3
103	state / 68th								2			1		3
104	108th / 68th			7	5				16		1	14	5	48
105	Central / 6th	1	1			1		1					1	5
406	70th / 132nd	1					1		1					3
407	70th / 116th	5					1	2		1		3		12
410	116th / 405						1	5						6
411	72nd / 405		3	8		10					8			29
	Driveway / 68th						20		29				36	85
														194

AFTERNOON PEAK HOUR VOLUMES -- ENTERING ONLY

ID	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	ALL
102	lake wash / Lakeview			2										2
103	state / 68th								2					2
104	108th / 68th			7	5				3					15
105	Central / 6th					1								1
406	70th / 132nd	1					1							2
407	70th / 116th	5					1					3		9
410	116th / 405							5						5
411	72nd / 405					10					8			18
	Driveway / 68th								16				36	52
														106

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NE 68TH STREET RETAIL
TRIP DISTRIBUTION SUMMARY

AFTERNOON PEAK HOUR VOLUMES -- EXITING ONLY

ID	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	ALL
102	lake wash / Lakeview										1			1
103	state / 68th											1		1
104	108th / 68th								13		1	14	5	33
105	Central / 6th	1	1					1					1	4
406	70th / 132nd								1					1
407	70th / 116th							2		1				3
410	116th / 405						1							1
411	72nd / 405		3	8										11
	Driveway / 68th						20		13					33
														88

DAILY VOLUME (SCALING UP THE PM RESULTS) -- ENTERING ONLY

ID	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	ALL
102	lake wash / Lakeview	0	0	21	0	0	0	0	0	0	0	0	0	21
103	state / 68th	0	0	0	0	0	0	0	21	0	0	0	0	21
104	108th / 68th	0	0	72	51	0	0	0	31	0	0	0	0	154
105	Central / 6th	0	0	0	0	10	0	0	0	0	0	0	0	10
406	70th / 132nd	10	0	0	0	0	10	0	0	0	0	0	0	21
407	70th / 116th	51	0	0	0	0	10	0	0	0	0	31	0	92
410	116th / 405	0	0	0	0	0	0	51	0	0	0	0	0	51
411	72nd / 405	0	0	0	0	103	0	0	0	0	82	0	0	185
	Driveway / 68th	0	0	0	0	0	0	0	164	0	0	0	369	533

DAILY VOLUME (SCALING UP THE PM RESULTS) -- EXITING ONLY

ID	Name	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	ALL
102	Lake Wash / Lakeview	0	0	0	0	0	0	0	0	0	10	0	0	10
103	state / 68th	0	0	0	0	0	0	0	0	0	0	10	0	10
104	108th / 68th	0	0	0	0	0	0	0	133	0	10	144	51	338
105	Central / 6th	10	10	0	0	0	0	10	0	0	0	0	10	41
406	70th / 132nd	0	0	0	0	0	0	0	10	0	0	0	0	10
407	70th / 116th	0	0	0	0	0	0	21	0	10	0	0	0	31
410	116th / 405	0	0	0	0	0	10	0	0	0	0	0	0	10
411	72nd / 405	0	31	82	0	0	0	0	0	0	0	0	0	113
	Driveway / 68th	0	0	0	0	0	205	0	133	0	0	0	0	338

Exhibit B
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Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	NE 68th Street Retail		
Major Street[1]	108th Ave NE	# of Lanes*=	1
Minor Street[1]	NE 68th St	# of Lanes*=	1

DATE:
June 9, 2005

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes* *		
(Total of both approaches divided by two)	Major Street Volume V_1 =	184.5	164	205	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	61.5	72	51	*Minor*

**Do not leave cell empty for zero volume*

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	2.21%
$P_2=V_2/(5{,}000 \times f_2)$ =	1.23%
$P_3=V_1/(15{,}000 \times f_3)$ =	1.48%
$P_4=V_2/(2{,}500 \times f_4)$ =	2.46%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	1.72%
$S_2=(P_3+P_4)/2$=	1.97%

Intersection Proportional Share = Maximum of S1 and S2 = 1.97%

Significant Intersection? yes

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Bruce Newman
Company: Transportation Solutions, Inc.

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	NE 68th Street Retail		
Major Street[1]	Central Way	# of Lanes*=	2
Minor Street[1]	6th	# of Lanes*=	1

DATE:
June 9, 2005

Daily Project Traffic Entering the Intersection		Daily Volumes	*Entering Leg Volumes* *		
(Total of both approaches divided by two)	Major Street Volume V_1 =	10	10	10	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	15.5	21	10	*Minor*

**Do not leave cell empty for zero volume*

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
1	***1***	***1***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.10%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.31%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.07%
$P_4=V_2/(2{,}500 \times f_4)$ =	0.62%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.21%
$S_2=(P_3+P_4)/2$=	0.34%

Intersection Proportional Share = Maximum of S1 and S2 = 0.34%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Bruce Newman
Company: Transportation Solutions, Inc.

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	NE 68th Street Retail		
Major Street[1]	116th Ave NE	# of Lanes*=	1
Minor Street[1]	NE 70th Street	# of Lanes*=	1

DATE:
June 9, 2005

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes* *		
(Total of both approaches divided by two)	Major Street Volume V_1 =	30.5	51	10	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	31	31	31	*Minor*

**Do not leave cell empty for zero volume*

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.37%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.62%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.24%
$P_4=V_2/(2{,}500 \times f_4)$ =	1.24%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.49%
$S_2=(P_3+P_4)/2$=	0.74%

Intersection Proportional Share = Maximum of S1 and S2 = 0.74%

Significant Intersection? **no**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By:	Bruce Newman
Company:	Transportation Solutions, Inc.

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	NE 68th Street Retail		
Major Street[1]	116th Ave NE	# of Lanes*=	1
Minor Street[1]	I-405 NB Ramps	# of Lanes*=	1

DATE:
June 9, 2005

Daily Project Traffic Entering the Intersection		Daily Volumes	*Entering Leg Volumes* *		
(Total of both approaches divided by two)	Major Street Volume V_1 =	5	0	10	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	25.5	51	0	*Minor*

**Do not leave cell empty for zero volume*

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	0.06%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.51%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.04%
$P_4=V_2/(2{,}500 \times f_4)$ =	1.02%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	0.29%
$S_2=(P_3+P_4)/2$=	0.53%

Intersection Proportional Share = Maximum of S1 and S2 = 0.53%

Significant Intersection? no

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Bruce Newman
Company: Transportation Solutions, Inc.

Proportional Share Impact Worksheet

Input appropriate information in green cells

[1] See "*Intersection Description*" worksheet for descriptions

1. May Change without notice, call Thang Nguyen 425-587-3869 with questions

			Through Lanes[1]
Project Name:	NE 68th Street Retail		
Major Street[1]	NE 72nd Place	# of Lanes*=	1
Minor Street[1]	I-405 SB Ramps	# of Lanes*=	1

DATE:
June 9, 2005

Daily Project Traffic Entering the Intersection

		Daily Volumes	*Entering Leg Volumes* *		
(Total of both approaches divided by two)	Major Street Volume V_1 =	108	113	103	*Major*
(Total of both approaches divided by two)	Minor Street Volume V_2 =	41	82	0	*Minor*

**Do not leave cell empty for zero volume*

Determine Geometric Factors

Number of Lanes		Geometric Factors			
Major Street	Minor Street	f_1	f_2	f_3	f_4
2	2	1.000	1.330	1.000	1.330
2	1	1.000	1.000	1.000	1.000
1	2	0.833	1.330	0.833	1.330
1	1	0.833	1.000	0.833	1.000

f_1	f_2	f_3	f_4
0.833	***1***	***0.833***	***1***

Calculate Base Percentages

$P_1=V_1/(10{,}000 \times f_1)$ =	1.30%
$P_2=V_2/(5{,}000 \times f_2)$ =	0.82%
$P_3=V_1/(15{,}000 \times f_3)$ =	0.86%
$P_4=V_2/(2{,}500 \times f_4)$ =	1.64%

Calculate Proportional Share

$S_1=(P_1+P_2)/2$=	1.06%
$S_2=(P_3+P_4)/2$=	1.25%

Intersection Proportional Share = Maximum of S1 and S2 = 1.25%

Significant Intersection? **yes**

1. Number of through lanes. Do not count exclusive turn lanes. Use the smaller number of lanes if the number of lanes is unequal on two legs. For Example, if one minor leg has two lanes and one minor leg has one lane, the number of lanes on the minor leg is one.

Computed By: Bruce Newman
Company: Transportation Solutions, Inc.

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Attachment C

Level of Service Calculations

Lanes, Volumes, Timings
3: I-405 SB Ramps & NE 72nd Place 6/24/2005

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		1%			-2%
Storage Length (ft)	0	100		100	200	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Satd. Flow (prot)	1770	1583	1853	1575	1787	1881
Flt Permitted	0.950				0.091	
Satd. Flow (perm)	1770	1583	1853	1575	171	1881
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		214		38		
Link Speed (mph)	30		30			30
Link Distance (ft)	881		968			1141
Travel Time (s)	20.0		22.0			25.9
Volume (vph)	227	330	882	72	246	727
Peak Hour Factor	0.58	0.58	0.95	0.95	0.93	0.93
Lane Group Flow (vph)	391	569	928	76	265	782
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	22.0
Total Split (s)	25.0	25.0	44.0	44.0	11.0	55.0
Total Split (%)	31.3%	31.3%	55.0%	55.0%	13.8%	68.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	22.0	22.0	41.0	41.0	52.0	52.0
Actuated g/C Ratio	0.28	0.28	0.51	0.51	0.65	0.65
v/c Ratio	0.80	0.96	0.98	0.09	0.97	0.64
Control Delay	41.6	49.4	45.3	6.2	68.4	11.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.6	49.4	45.3	6.2	68.4	11.4
LOS	D	D	D	A	E	B
Approach Delay	46.2		42.3			25.8
Approach LOS	D		D			C
Queue Length 50th (ft)	181	187	427	9	81	204
Queue Length 95th (ft)	159	127	#701	29	#231	314
Internal Link Dist (ft)	801		888			1061
Turn Bay Length (ft)		100		100	200	
Base Capacity (vph)	487	590	950	826	273	1223
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0

Lanes, Volumes, Timings
3: I-405 SB Ramps & NE 72nd Place 6/24/2005

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.80	0.96	0.98	0.09	0.97	0.64

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 37.8 Intersection LOS: D
Intersection Capacity Utilization 82.6% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: I-405 SB Ramps & NE 72nd Place

Lanes, Volumes, Timings
24: NE 68th Street & 108th Ave NE 6/24/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			0%	
Storage Length (ft)	0		75	0		0	0		125	75		0
Storage Lanes	1		1	1		0	1		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1761	1853	1575	1778	1758	0	1770	1863	1583	1770	1762	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1761	1853	1575	1778	1758	0	1770	1863	1583	1770	1762	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			56		39				190		28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1250			808			518			836	
Travel Time (s)		28.4			18.4			11.8			19.0	
Volume (vph)	230	448	117	238	378	261	139	459	290	185	236	131
Peak Hour Factor	0.97	0.97	0.97	0.90	0.90	0.90	0.75	0.75	0.75	0.84	0.84	0.84
Lane Group Flow (vph)	237	462	121	264	710	0	185	612	387	220	437	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			
Detector Phases	7	4	4	3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0		10.0	22.0	22.0	10.0	22.0	
Total Split (s)	15.0	36.0	36.0	19.0	40.0	0.0	14.0	31.0	31.0	14.0	31.0	0.0
Total Split (%)	15.0%	36.0%	36.0%	19.0%	40.0%	0.0%	14.0%	31.0%	31.0%	14.0%	31.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	Min		None	None	None	None	None	
Act Effct Green (s)	12.0	33.0	33.0	16.0	37.0		11.0	28.0	28.0	11.0	28.0	
Actuated g/C Ratio	0.12	0.33	0.33	0.16	0.37		0.11	0.28	0.28	0.11	0.28	
v/c Ratio	1.12	0.76	0.22	0.93	1.05		0.95	1.17	0.67	1.13	0.85	
Control Delay	140.8	39.2	14.7	81.0	79.6		98.4	130.5	22.2	145.2	49.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	140.8	39.2	14.7	81.0	79.6		98.4	130.5	22.2	145.2	49.0	
LOS	F	D	B	F	E		F	F	C	F	D	
Approach Delay		65.0			80.0			90.1			81.2	
Approach LOS		E			E			F			F	
Queue Length 50th (ft)	~175	261	29	168	~481		119	~469	109	~164	248	
Queue Length 95th (ft)	#326	383	71	#320	#707		#189	#509	145	#280	#365	
Internal Link Dist (ft)		1170			728			438			756	
Turn Bay Length (ft)			75						125	75		
Base Capacity (vph)	211	611	557	284	675		195	522	580	195	514	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	

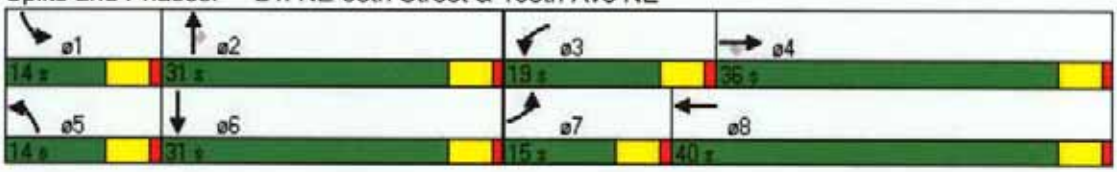
Lanes, Volumes, Timings
24: NE 68th Street & 108th Ave NE 6/24/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.12	0.76	0.22	0.93	1.05		0.95	1.17	0.67	1.13	0.85	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Natural Cycle: 90
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 80.1 Intersection LOS: F
Intersection Capacity Utilization 96.3% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: NE 68th Street & 108th Ave NE



Lanes, Volumes, Timings
3: I-405 SB Ramps & NE 72nd Place 6/24/2005

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	0%		1%			-2%
Storage Length (ft)	0	100		100	200	
Storage Lanes	1	1		1	1	
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15	9		9	15	
Satd. Flow (prot)	1770	1583	1853	1575	1787	1881
Flt Permitted	0.950				0.091	
Satd. Flow (perm)	1770	1583	1853	1575	171	1881
Right Turn on Red		Yes		Yes		
Satd. Flow (RTOR)		213		42		
Link Speed (mph)	30		30			30
Link Distance (ft)	881		968			1141
Travel Time (s)	20.0		22.0			25.9
Volume (vph)	235	330	885	80	246	737
Peak Hour Factor	0.58	0.58	0.95	0.95	0.93	0.93
Lane Group Flow (vph)	405	569	932	84	265	792
Turn Type		Perm		Perm	pm+pt	
Protected Phases	8		2		1	6
Permitted Phases		8		2	6	
Detector Phases	8	8	2	2	1	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	10.0	22.0
Total Split (s)	25.0	25.0	44.0	44.0	11.0	55.0
Total Split (%)	31.3%	31.3%	55.0%	55.0%	13.8%	68.8%
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag			Lag	Lag	Lead	
Lead-Lag Optimize?			Yes	Yes	Yes	
Recall Mode	None	None	None	None	None	None
Act Effct Green (s)	22.0	22.0	41.0	41.0	52.0	52.0
Actuated g/C Ratio	0.28	0.28	0.51	0.51	0.65	0.65
v/c Ratio	0.83	0.96	0.98	0.10	0.97	0.65
Control Delay	44.1	49.5	46.2	6.2	68.4	11.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.1	49.5	46.2	6.2	68.4	11.6
LOS	D	D	D	A	E	B
Approach Delay	47.2		42.9			25.8
Approach LOS	D		D			C
Queue Length 50th (ft)	190	187	430	10	81	209
Queue Length 95th (ft)	166	128	#705	31	#231	322
Internal Link Dist (ft)	801		888			1061
Turn Bay Length (ft)		100		100	200	
Base Capacity (vph)	487	590	950	828	273	1223
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0

Lanes, Volumes, Timings
3: I-405 SB Ramps & NE 72nd Place 6/24/2005

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.96	0.98	0.10	0.97	0.65

Intersection Summary

Area Type: Other
Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 80
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.98
Intersection Signal Delay: 38.4 Intersection LOS: D
Intersection Capacity Utilization 83.2% ICU Level of Service E
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: I-405 SB Ramps & NE 72nd Place

Lanes, Volumes, Timings
24: NE 68th Street & 108th Ave NE 6/24/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Grade (%)		1%			-1%			0%			0%	
Storage Length (ft)	0		75	0		0	0		125	75		0
Storage Lanes	1		1	1		0	1		1	1		0
Total Lost Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Leading Detector (ft)	50	50	50	50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0	0	0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Satd. Flow (prot)	1761	1853	1575	1778	1758	0	1770	1863	1583	1770	1762	0
Flt Permitted	0.950			0.950			0.950			0.950		
Satd. Flow (perm)	1761	1853	1575	1778	1758	0	1770	1863	1583	1770	1762	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			54		39				194		28	
Link Speed (mph)		30			30			30			30	
Link Distance (ft)		1250			808			518			836	
Travel Time (s)		28.4			18.4			11.8			19.0	
Volume (vph)	230	464	117	239	392	266	139	459	297	190	236	131
Peak Hour Factor	0.97	0.97	0.97	0.90	0.90	0.90	0.75	0.75	0.75	0.84	0.84	0.84
Lane Group Flow (vph)	237	478	121	266	732	0	185	612	396	226	437	0
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4						2			
Detector Phases	7	4	4	3	8		5	2	2	1	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
Minimum Split (s)	10.0	22.0	22.0	10.0	22.0		10.0	22.0	22.0	10.0	22.0	
Total Split (s)	15.0	36.0	36.0	19.0	40.0	0.0	14.0	31.0	31.0	14.0	31.0	0.0
Total Split (%)	15.0%	36.0%	36.0%	19.0%	40.0%	0.0%	14.0%	31.0%	31.0%	14.0%	31.0%	0.0%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lead/Lag	Lead	Lag	Lag	Lead	Lag		Lead	Lag	Lag	Lead	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	Min		None	None	None	None	None	
Act Effct Green (s)	12.0	33.0	33.0	16.0	37.0		11.0	28.0	28.0	11.0	28.0	
Actuated g/C Ratio	0.12	0.33	0.33	0.16	0.37		0.11	0.28	0.28	0.11	0.28	
v/c Ratio	1.12	0.78	0.22	0.94	1.08		0.95	1.17	0.68	1.16	0.85	
Control Delay	140.8	40.8	15.0	82.4	90.0		98.4	130.5	22.6	155.0	49.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	140.8	40.8	15.0	82.4	90.0		98.4	130.5	22.6	155.0	49.0	
LOS	F	D	B	F	F		F	F	C	F	D	
Approach Delay		65.4			88.0			89.7			85.1	
Approach LOS		E			F			F			F	
Queue Length 50th (ft)	~175	273	30	170	~511		119	~469	113	~172	248	
Queue Length 95th (ft)	#326	#426	72	#323	#738		#189	#509	148	#289	#365	
Internal Link Dist (ft)		1170			728			438			756	
Turn Bay Length (ft)			75						125	75		
Base Capacity (vph)	211	611	556	284	675		195	522	583	195	514	
Starvation Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Spillback Cap Reductn	0	0	0	0	0		0	0	0	0	0	

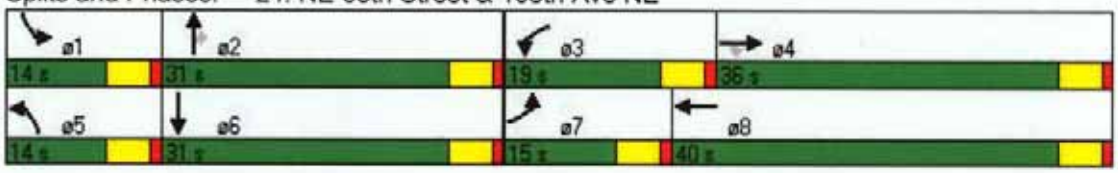
Lanes, Volumes, Timings
24: NE 68th Street & 108th Ave NE 6/24/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Storage Cap Reductn	0	0	0	0	0		0	0	0	0	0	
Reduced v/c Ratio	1.12	0.78	0.22	0.94	1.08		0.95	1.17	0.68	1.16	0.85	

Intersection Summary

Area Type: Other
Cycle Length: 100
Actuated Cycle Length: 100
Natural Cycle: 100
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.17
Intersection Signal Delay: 82.9 Intersection LOS: F
Intersection Capacity Utilization 97.6% ICU Level of Service F
Analysis Period (min) 15
~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 24: NE 68th Street & 108th Ave NE



Lanes, Volumes, Timings
6: NE 68th Street & Site Driveway 7/5/2005

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		0%	-1%		0%	
Turning Speed (mph)	15			9	15	9
Satd. Flow (prot)	1770	1863	1866	0	1718	0
Flt Permitted	0.950				0.968	
Satd. Flow (perm)	1770	1863	1866	0	1718	0
Link Speed (mph)		30	30		20	
Link Distance (ft)		340	468		373	
Travel Time (s)		7.7	10.6		12.7	
Volume (vph)	15	951	877	20	13	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.85	0.85
Lane Group Flow (vph)	16	1034	975	0	23	0
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.1%		ICU Level of Service B	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
6: NE 68th Street & Site Driveway

7/5/2005

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	-1%		0%	
Volume (veh/h)	15	951	877	20	13	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.85	0.85
Hourly flow rate (vph)	16	1034	953	22	15	8
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh)					0	
Upstream signal (ft)		340				
pX, platoon unblocked					0.77	
vC, conflicting volume	975				2030	964
vC1, stage 1 conf vol					964	
vC2, stage 2 conf vol					1066	
vCu, unblocked vol	975				2343	964
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				86	97
cM capacity (veh/h)	707				109	310

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	16	1034	975	24
Volume Left	16	0	0	15
Volume Right	0	0	22	8
cSH	707	1700	1700	141
Volume to Capacity	0.02	0.61	0.57	0.17
Queue Length 95th (ft)	2	0	0	14
Control Delay (s)	10.2	0.0	0.0	35.5
Lane LOS	B			E
Approach Delay (s)	0.2		0.0	35.5
Approach LOS				E

Intersection Summary			
Average Delay	0.5		
Intersection Capacity Utilization	60.1%	ICU Level of Service	B
Analysis Period (min)	15		

Lanes, Volumes, Timings
6: NE 68th Street & Site Driveway 7/5/2005

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)		0%	-1%		0%	
Turning Speed (mph)	15			9	15	9
Satd. Flow (prot)	0	1863	1863	0	0	1611
Flt Permitted						
Satd. Flow (perm)	0	1863	1863	0	0	1611
Link Speed (mph)		30	30		20	
Link Distance (ft)		340	468		373	
Travel Time (s)		7.7	10.6		12.7	
Volume (vph)	0	951	877	36	0	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.85	0.85
Lane Group Flow (vph)	0	1034	992	0	0	24
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 58.3%		ICU Level of Service B	
Analysis Period (min) 15			

HCM Unsignalized Intersection Capacity Analysis
6: NE 68th Street & Site Driveway

7/5/2005

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	-1%		0%	
Volume (veh/h)	0	951	877	36	0	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.85	0.85
Hourly flow rate (vph)	0	1034	953	39	0	24
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					TWLTL	
Median storage veh)					0	
Upstream signal (ft)		340				
pX, platoon unblocked					0.77	
vC, conflicting volume	992				2007	973
vC1, stage 1 conf vol					973	
vC2, stage 2 conf vol					1034	
vCu, unblocked vol	992				2312	973
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)					5.4	
tF (s)	2.2				3.5	3.3
p0 queue free %	100				100	92
cM capacity (veh/h)	697				114	306

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	1034	992	24
Volume Left	0	0	0
Volume Right	0	39	24
cSH	1700	1700	306
Volume to Capacity	0.61	0.58	0.08
Queue Length 95th (ft)	0	0	6
Control Delay (s)	0.0	0.0	17.7
Lane LOS			C
Approach Delay (s)	0.0	0.0	17.7
Approach LOS			C

Intersection Summary			
Average Delay		0.2	
Intersection Capacity Utilization		58.3%	ICU Level of Service B
Analysis Period (min)		15	