

Village at Totem Lake

Updated Transportation Impact Study

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Prepared for:

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FINDINGS/CONCLUSIONS

This traffic impact analysis (TIA) has been prepared for the proposed Village at Totem Lake development as a requirement to the SEPA Addendum issued for the Totem Lake Mall redevelopment project. This TIA is an update to the *Totem Lake Mall Redevelopment Traffic Impact Analysis* dated December 2005.

Project Proposal. The proposed Village at Totem Lake development includes 342,700 square feet (sf) shopping center use, a 50,000 sf grocery store, 1,050 apartments, and an 800 seat multiplex theatre. Vehicular access to the proposed development would be provided by three driveways on Totem Lake Blvd, five driveways on 120th Ave NE, and three driveways on Totem Lake Way. One driveway on Totem Lake Boulevard and one driveway on 120th Ave NE are proposed to be signalized with the project, and all unsignalized driveways are proposed to allow full access. The anticipated year of occupancy for the project is 2017.

Trip Generation. The proposed Village at Totem Lake development is estimated to generate 577 net new trips during the weekday AM peak hour (150 entering, 427 exiting), and 268 net new trips during the weekday PM peak hour (246 entering, 22 exiting). The current land use proposal for the Village at Totem Lake is estimated to generate 313 fewer trips (14 percent less) during the PM peak hour when compared to the PM peak hour trip generation estimate documented in the 2005 TIA, which is the trip generation that SEPA is based on.

Future Year LOS. An AM and PM peak hour LOS analysis was conducted at four study intersections for year 2017 conditions. The results of the LOS analysis showed that the signalized study intersections are estimated to operate at LOS D or better during the AM and PM peak hours in 2017 with the proposed project, except for the intersection of NE 128th St/120th Ave NE which is anticipated to operate at LOS E in 2017 during the PM peak hour with the project. Additionally, all controlled movements at the unsignalized study intersection of Totem Lake Way/120th Ave NE would operate at LOS C or better under 2017 AM and PM peak hour conditions with the proposed project.

Site Access Analysis. The two signalized site driveways are anticipated to operate at LOS A during both the AM and PM peak hour in 2017 with the proposed Village at Totem Lake project. All controlled movements at the unsignalized site driveways are expected to operate at LOS D or better during the AM and PM peak hour in 2017 with the project, with the exception of the westbound (exiting) left-thru movement at the Upper Mall Loop Road driveway on 120th Ave NE which is anticipated to operate at LOS E.

Mitigation

Concurrency. Based on correspondence with the City of Kirkland, the proposed project obtained concurrency with the 2005 Totem Lake Mall Redevelopment proposal and the concurrency is vested.

SEPA Improvements. The following improvements are proposed to be completed as part of the Village at Totem Lake project:

- Redesign 120th Ave NE along the project frontage to include on-street parking and other traffic calming measures
- Install traffic signal at Totem Lake Boulevard/Central Driveway
- Install traffic signal at 120th Ave NE/Central Driveway

In addition, it is recommended that the City consider optimizing the peak hour signal timing at the intersection of NE 128th Street/120th Ave NE to improve the operations of the intersection with the redistribution of background traffic from 120th Ave NE.

INTRODUCTION

This updated traffic impact analysis has been prepared for the proposed Village at Totem Lake development in the city of Kirkland (see **Figure 1**).

Background

A Traffic Impact Analysis (TIA) for the Totem Lake Mall Redevelopment was prepared in December 2005, and a SEPA Mitigated Determination of Nonsignificance for the Totem Lake Mall Conceptual Master Plan (CMP) was issued on January 20, 2006. The SEPA determination was based on the redevelopment project consisting of approximately 562,300 sf retail, 144,000 sf office, 216 residential units, and a 3,000 seat multiplex theatre. CenterCal Properties purchased the Totem Lake Mall property in 2015 and requested an update to the 2006 SEPA determination based on a modified CMP and a SEPA Addendum was issued for the project on February 26, 2015. This updated traffic impact study for the proposed project (now being referred to as the Village at Totem Lake) was prepared as a requirement to the SEPA Addendum.

Project Approach

Based on the SEPA Addendum and additional correspondence with the City of Kirkland Staff, the following items are addressed in this updated traffic impact analysis:

- Project description
- Existing Conditions
- Collision History
- Project Trip Generation
- Project Trip Distribution and Assignment
- Traffic volume forecasts and assumptions for year 2017 conditions with the proposed development and including the redistribution of background traffic on 120th Ave NE
- LOS analysis at four study intersections:
 1. NE 128th Street / Totem Lake Blvd
 2. Totem Lake Blvd / 120th Ave NE / I-405 NB Ramps
 3. NE 128th Street / 120th Ave NE
 4. Totem Lake Way / 120th Ave NE
- LOS analysis at site access driveways
- Mitigation

Project Description

The existing Totem Lake Mall site consists of two areas; the area between Totem Lake Blvd and 120th Ave NE is referred to as the "Lower Mall" and the area located east of 120th Ave NE is referred to as the "Upper Mall." The proposed Village at Totem Lake development includes 342,700 square

feet (sf) shopping center use, a 50,000 sf grocery store, 1,050 apartments, and an 800 seat multiplex theatre. Vehicular access to the proposed development would be provided by three driveways on Totem Lake Blvd, five driveways on 120th Ave NE, and three driveways on Totem Lake Way. One driveway on Totem Lake Boulevard and one driveway on 120th Ave NE are proposed to be signalized with the project, and all unsignalized driveways are proposed to allow full access. The anticipated year of occupancy for the project is 2017. A preliminary site plan is provided in **Figure 2**.



Figure 1: Project Site Vicinity

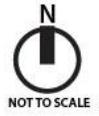


Figure 2: Preliminary Site Plan

EXISTING CONDITIONS

Existing Traffic Volumes

Year 2015 existing AM and PM peak hour traffic volumes at the four study intersections were based on counts conducted by All Traffic Data on Tuesday, September 15, 2015. The AM peak hour represents the highest one-hour time period between 7:00 and 9:00 AM at each study intersection, while the PM peak hour represents the highest one-hour time period between 4:00 and 6:00 PM. **Figure 3** illustrates the 2015 existing AM and PM peak hour traffic volumes at the study intersections.

Existing Mall Trip Generation

To determine the number of trips generated by the existing Totem Lake Mall, AM and PM peak period traffic counts were conducted by All Traffic Data at the existing driveways to the site on Tuesday, September 15, 2015. **Table 1** provides a summary of the AM and PM peak hour trip generation of the existing Totem Lake Mall. The detailed driveway count summaries are included in **Appendix A**. It should be noted that the existing Totem Lake Mall was not at full occupancy at the time of the counts.

Table 1
Totem Lake Mall Existing (2015) Trip Generation

Time Period	Gross Trips Generated ¹		
	In	Out	Total
AM Peak Hour (8:00-9:00 a.m.)	224	151	375
PM Peak Hour (4:15-5:15 p.m.)	673	731	1,404

1) Based on counts conducted at the existing Totem Lake Mall driveways on Tuesday, 9/15/15.

As shown in **Table 1**, the existing Totem Lake Mall generates a total of 375 trips (224 in, 151 out) during the AM peak hour and a total of 1,404 trips (673 in, 731 out) during the PM peak hour.

Level of Service

A level of service (LOS) analysis was conducted at the following four study intersections for 2015 existing AM and PM peak hour conditions:

1. NE 128th Street / Totem Lake Blvd
2. Totem Lake Blvd / 120th Ave NE / I-405 NB Ramps
3. NE 128th Street / 120th Ave NE
4. Totem Lake Way / 120th Ave NE

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

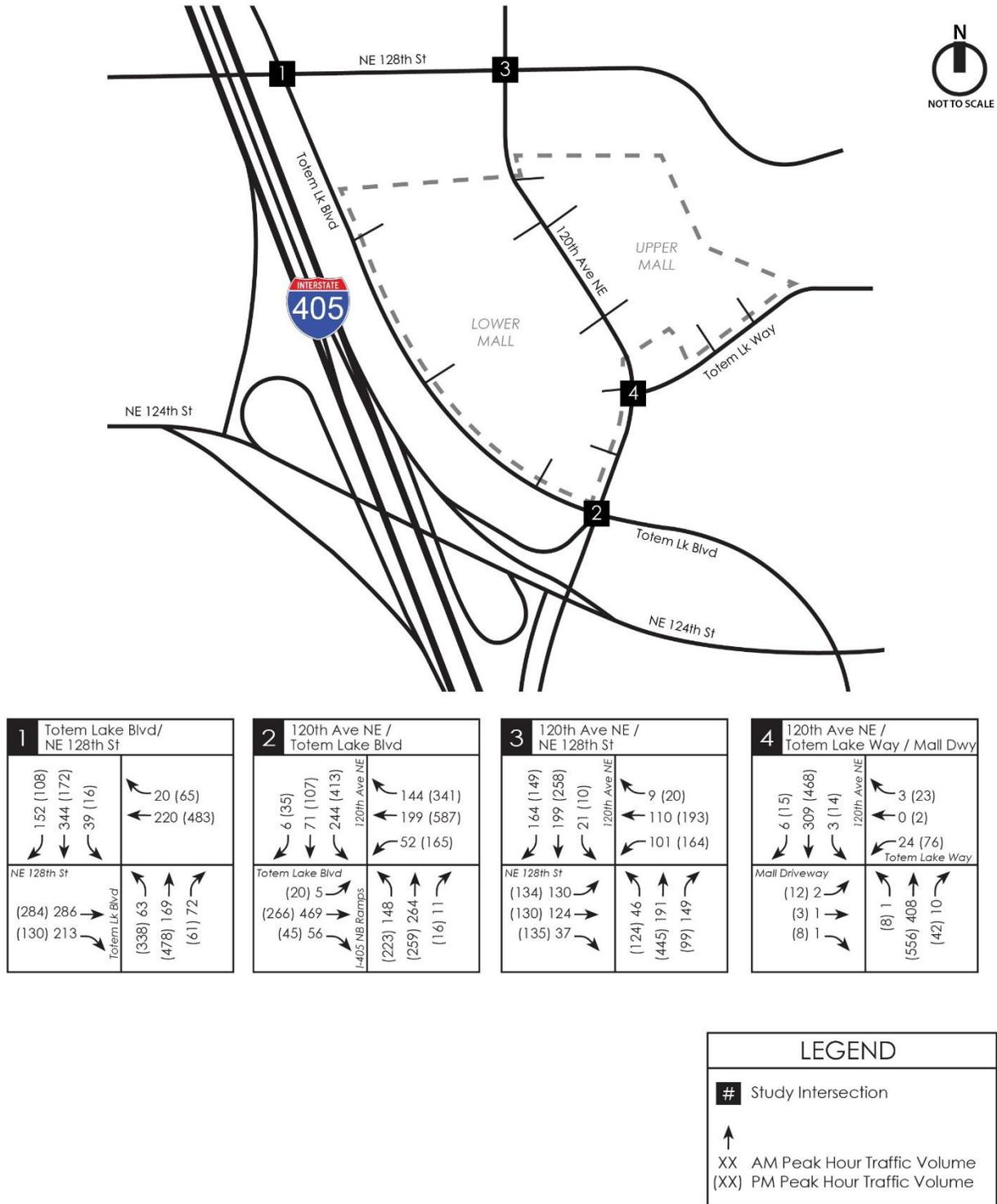


Figure 3: Year 2015 Existing Peak Hour Traffic Volumes

The LOS reported for signalized intersections represents the average control delay (sec/veh) and can be reported for the overall intersection, for each approach, and for each lane group (additional v/c ratio criteria apply to lane group LOS only).

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

Table 2 outlines the current HCM 2010 LOS criteria for signalized and stop-controlled intersections based on these methodologies.

Table 2
LOS Criteria for Signalized and Stop-Controlled Intersections¹

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

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

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

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

Level of service calculations for intersections were based on methodology and procedures outlined in the 2010 update of the *Highway Capacity Manual*, Transportation Research Board (HCM 2010) using *Synchro 8.0* traffic analysis software. Existing signal timing used in the analysis was provided by the City of Kirkland and WSDOT.

The 2015 existing AM and PM peak hour LOS analysis results for the study intersections are summarized in **Table 3**. The 2015 existing LOS worksheets are included in **Appendix B**.

Table 3
2015 Existing Peak Hour Level of Service Summary

Study Intersection	AM Peak Hour		PM Peak Hour	
	LOS ¹	Delay (sec)	LOS ¹	Delay (sec)
<u>Signalized:</u>				
1) NE 128 th St / Totem Lake Blvd	B	12.1	C	29.2
2) Totem Lake Blvd / 120 th Ave NE / I-405 NB Ramps	B	17.8	C	24.7
3) NE 128 th St / 120 th Ave NE	D	35.3	D	40.9
<u>Two-Way Stop Controlled:</u>				
4) Totem Lake Way / 120 th Ave NE				
Eastbound Left/Thru/Right	C	15.0	D	26.5
Westbound Left/Thru/Right	C	17.0	F	59.2
Northbound Left	A	8.0	A	8.5
Southbound Left	A	8.3	A	9.0

- 1) LOS = Level of Service, reported by movement for unsignalized intersections.
2) LOS for intersection 3 was reported based on HCM 2000 methodology using the Synchro 8 software program.

As shown in **Table 3**, the signalized study intersections operate at LOS D or better under 2015 existing conditions during both the AM and PM peak hours. Additionally, all controlled movements at the unsignalized study intersection of Totem Lake Way/120th Ave NE operate at LOS D or better under 2015 AM and PM peak hour conditions, with the exception of the westbound shared left/thru/right movement which currently operates at LOS F during the PM peak hour.

Collision History

Collision data at the study intersections were summarized for the three-year period from 2012 to 2014. Collision data was provided by the City of Kirkland. The collision data is included in **Appendix C**. Summaries of the total by year, annual average, and collisions per million entering vehicles (MEV) are provided in **Table 4**.

Table 4
Collision Data Summary, January 1, 2012 to December 31, 2014

Study Intersections	2012 Collisions	2013 Collisions	2014 Collisions	Average Annual Collisions	Average Collisions / MEV ¹
1) NE 128 th St / Totem Lake Blvd	9	12	10	10.33	0.60
2) 120 th Ave NE / Totem Lake Blvd	6	9	7	7.33	0.62
3) NE 128 th St / 120 th Ave NE	4	5	9	6.00	0.32
4) Totem Lake Way / 120 th Ave NE	0	2	1	1.00	0.08

- 1) MEV = Million Entering Vehicles. Rates reported are the average of the most recent 3-year period.
Collision data provided by the City of Kirkland.

FUTURE WITHOUT-PROJECT CONDITIONS

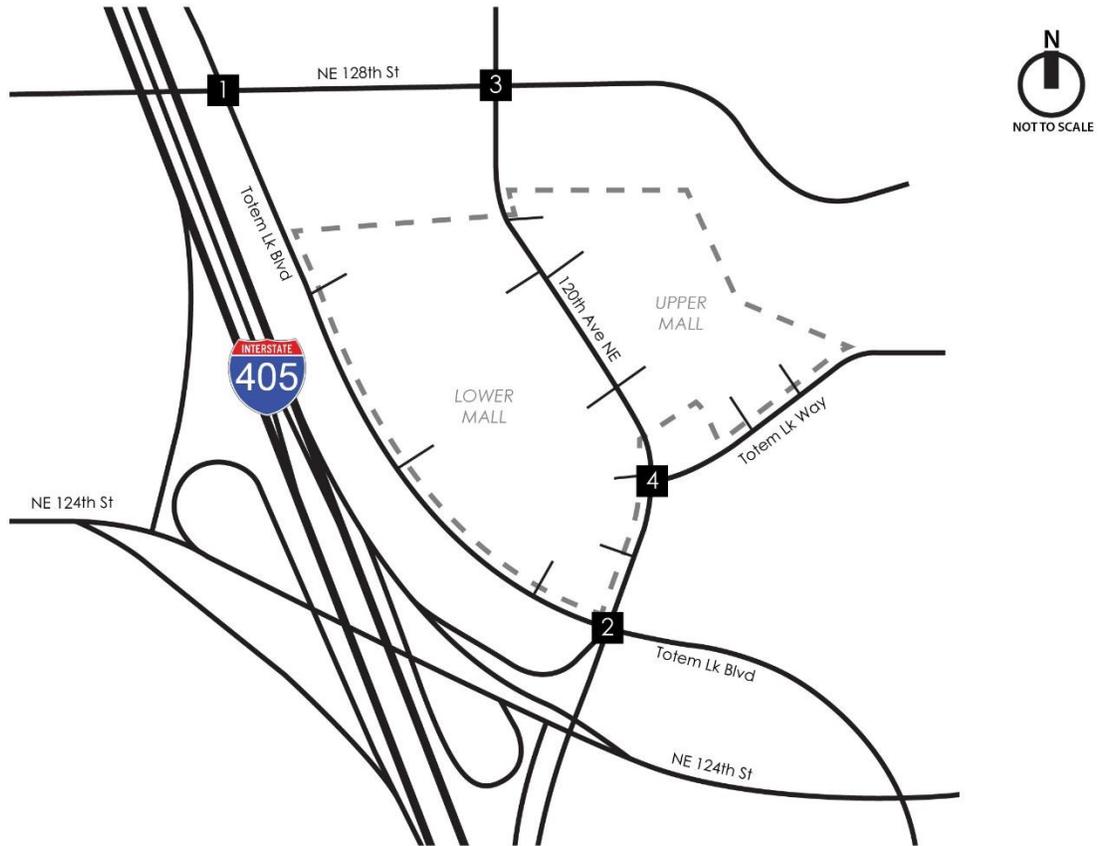
Future Traffic Volumes With 120th Ave NE Redistribution

In conjunction with the Village at Totem Lake project, 120th Ave NE is proposed to be altered along the project frontage to include on-street parking, multiple pedestrian crossings between the lower and upper mall, a traffic signal, and multiple project access driveways. The proposed “traffic calming” measures on 120th Ave NE would result in increased travel times on 120th Ave NE. As a result, a portion of the vehicular through traffic that currently uses 120th Ave NE would likely shift to use Totem Lake Boulevard or other City streets.

In order to estimate the redistribution of background traffic associated with the planned traffic calming on 120th Ave NE, the existing Totem Lake Mall trips at the study intersections were subtracted from the 2015 existing peak hour traffic volumes (see **Figure 3**) at the study intersections to estimate 2015 existing peak hour traffic volumes without the Totem Lake Mall. This existing Mall trip generation includes trips associated with the Chase bank in the upper mall that is not a part of the Totem Lake Mall redevelopment area but shares access with the Mall under existing conditions. The estimated peak hour trips associated with the Chase bank were assumed to remain and were assigned to a new separate access driveway on Totem Lake Way and the shared garage access driveway on 120th Ave NE. The estimated 2015 AM and PM peak hour traffic volumes without the Totem Lake Mall are illustrated in **Figure 4**.

Future year 2017 Baseline AM and PM peak hour traffic volumes were estimated by applying a 2 percent annual growth rate to the 2015 existing volumes without Totem Lake Mall (see **Figure 4**) and including pipeline project trips provided by the City of Kirkland. The 2017 Baseline AM and PM peak hour traffic volumes at the study intersections are illustrated in **Figure 5**. It should be noted that the 2017 Baseline peak hour traffic volumes represent a scenario with the existing Totem Lake Mall vacated.

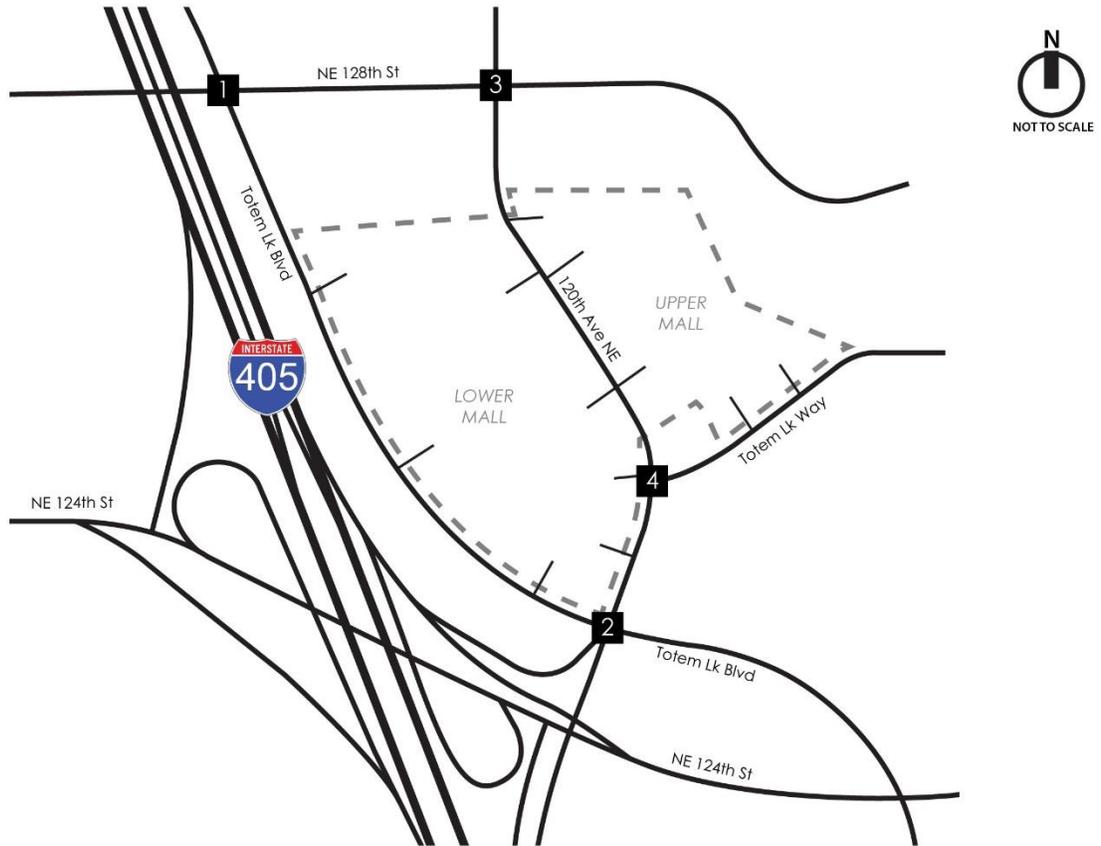
The 2017 Baseline AM and PM peak hour traffic volumes (**Figure 5**) were used to estimate the redistribution of background traffic from 120th Ave NE as a result of the planned traffic calming on 120th Ave NE as a part of the Village at Totem Lake development project. It was estimated that 50 percent of the northbound AM and PM peak hour background volume on 120th Ave NE would shift to northbound Totem Lake Boulevard. It was also estimated that 10 percent of the southbound AM and PM peak hour background volume on 120th Ave NE would shift off of 120th Ave NE, with 5 percent shifting to southbound Totem Lake Boulevard and the remaining 5 percent shifting to other roadways that were not included in this analysis. There is less southbound traffic that is expected to shift from 120th Ave NE to Totem Lake Boulevard because of the westbound left-turn restriction at the intersection of NE 128th Street/Totem Lake Boulevard (study intersection #1). The AM and PM peak hour traffic volume redistribution with the 120th Ave NE traffic calming is included in **Appendix D**. The year 2017 Baseline Adjusted AM and PM peak hour volumes with the redistribution of traffic from 120th Ave NE are illustrated in **Figure 6**.



1 Totem Lake Blvd / NE 128th St	2 120th Ave NE / Totem Lake Blvd	3 120th Ave NE / NE 128th St	4 120th Ave NE / Totem Lake Way / Mall Dwy																																
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LEGEND	
#	Study Intersection
↑	XX AM Peak Hour Traffic Volume
(XX)	PM Peak Hour Traffic Volume

Figure 4: Year 2015 Existing Peak Hour Traffic Volumes Without Totem Lake Mall

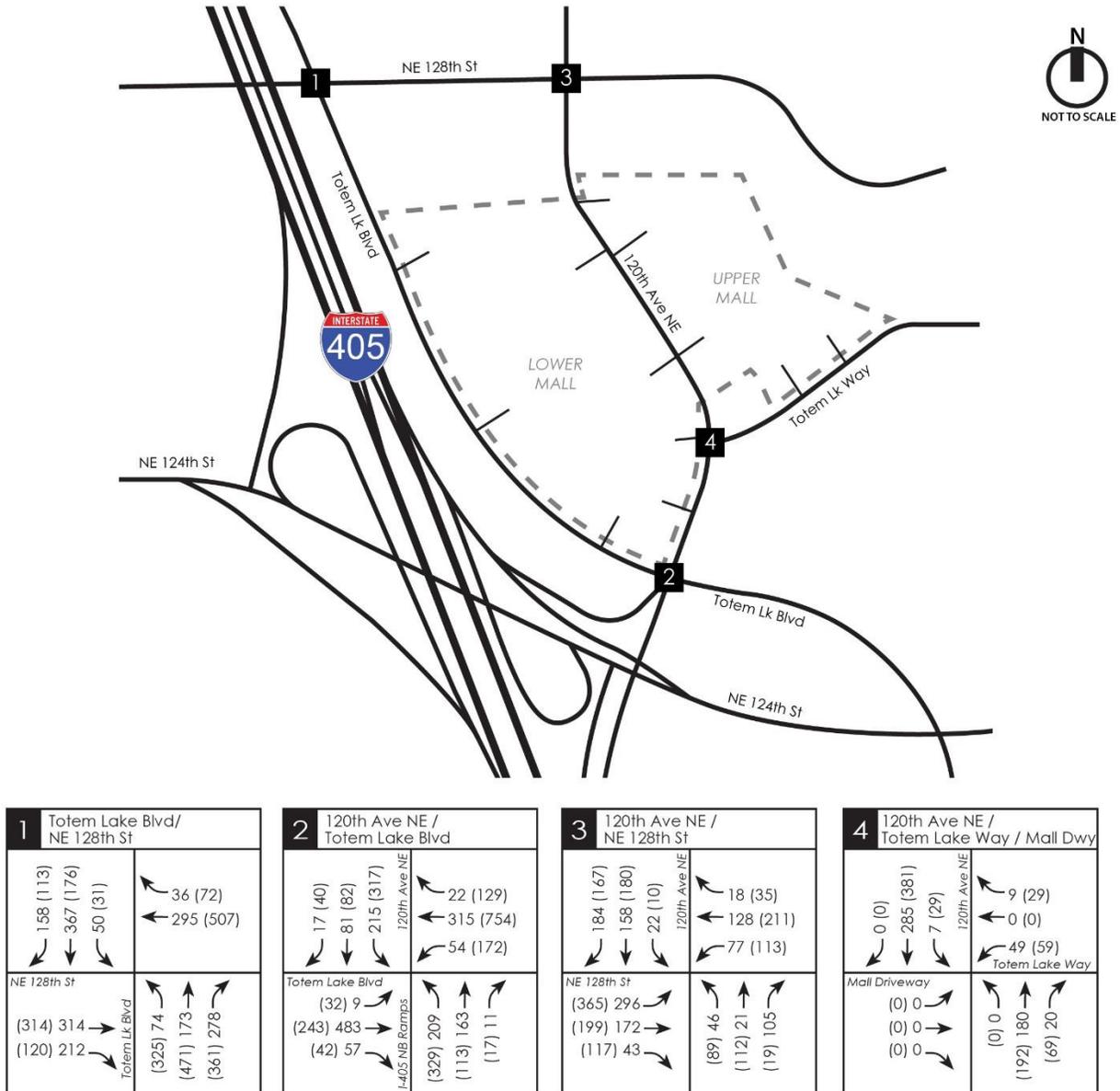


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(37) 54	(17) 11																																		
NE 128th St	120th Ave NE																																		
(146) 140	(89) 46																																		
(144) 133	(331) 177																																		
(117) 43	(74) 144																																		
Mall Driveway	120th Ave NE																																		
(0) 0	(0) 0																																		
(0) 0	(466) 375																																		
(0) 0	(69) 20																																		

Note: The 2017 baseline traffic volumes assume that the existing Totem Lake Mall is vacant.

LEGEND	
#	Study Intersection
↑	
XX	AM Peak Hour Traffic Volume
(XX)	PM Peak Hour Traffic Volume

Figure 5: Year 2017 Baseline Peak Hour Traffic Volumes



Note: The 2017 baseline traffic volumes assume that the existing Totem Lake Mall is vacant.

LEGEND	
#	Study Intersection
↑	AM Peak Hour Traffic Volume
(XX)	PM Peak Hour Traffic Volume

Figure 6: Year 2017 Baseline Peak Hour Traffic Volumes Adjusted for 120th Ave NE Redistribution

FUTURE WITH PROJECT CONDITIONS

Project Trip Generation

The net new trips associated with the Village at Totem Lake development were determined by estimating the total trips from the proposed project and then subtracting out the trips generated by the existing Totem Lake Mall.

Existing Use:

To determine the number of trips generated by the existing Mall, peak period traffic counts were conducted at the existing driveways on Tuesday, September 15, 2015. Pass-by trips associated with the existing Mall were estimated based on methodology documented in the ITE *Trip Generation Handbook*, 3rd Edition, and subtracted from the total driveway counts to result in the net trip generation for the existing Mall. The existing Totem Lake Mall generates 375 net trips (224 in, 151 out) during the AM peak hour and 927 net trips (445 in, 482 out) during the PM peak hour. The detailed trip generation calculations for the existing Totem Lake Mall are included in **Appendix A**.

Proposed Use:

The proposed Village at Totem Lake development includes 342,700 square feet (sf) shopping center use, a 50,000 sf grocery store, 1,050 apartments, and an 800 seat multiplex theatre.

The trip generation estimates for the proposed uses were based on methodology documented in the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition for Land Use Code (LUC) 820 (Shopping Center), LUC 850 (Grocery), LUC 220 (Apartments), and LUC 444 (Movie Theatre with Matinee).

Internal trips and pass-by trips were estimated based on the methodology documented in the ITE *Trip Generation Handbook*, 3rd Edition. The resulting net (without trip credit for existing uses) weekday daily, AM and PM peak hour trip generation for the proposed Village at Totem Lake project is summarized in **Table 5**. The detailed trip generation calculations are included in **Attachment E**.

Table 5
Project Net Trip Generation Summary

Time Period	Proposed Net Trips Generated		
	In	Out	Total
Weekday Daily	8,838	8,837	16,675
AM Peak Hour	374	578	952
PM Peak Hour	691	504	1,195

As shown in **Table 5**, the proposed Village at Totem Lake development is estimated to generate a total of 16,675 net weekday daily trips with 952 net trips occurring during the weekday AM peak hour (374 entering, 578 exiting), and 1,195 net trips occurring during the weekday PM peak hour (691 entering, 504 exiting).

Comparison to Previous 2005 TIA

In the 2005 TIA for the Totem Lake Mall Redevelopment, the trip generation estimates were summarized in terms of “External Trips” which are the total driveway trips (net new trips plus pass-by trips). **Table 6** includes a summary of the trip generation estimate for the Totem Lake Mall site documented in the 2005 TIA and the trip generation estimate for the current land use proposal in terms of “External Trips.” The detailed trip generation comparison is included in **Appendix F**.

Table 6
Trip Generation Comparison to 2005 TIA

Land Use	Weekday Daily Trips	Weekday AM Peak Hour Trips			Weekday PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
2005 TIA ¹							
Total Trips	27,667	518	290	808	1,142	1,408	2,550
<i>Internal Trips</i>	<i>(4,002)</i>	<i>(7)</i>	<i>(7)</i>	<i>(14)</i>	<i>(156)</i>	<i>(157)</i>	<i>(313)</i>
Net External Trips	23,665	511	283	794	986	1,251	2,237
CURRENT PROPOSAL							
Total Trips	27,146	418	608	1,026	1,312	1,172	2,484
<i>Internal Trips</i>	<i>(2,984)</i>	<i>(6)</i>	<i>(6)</i>	<i>(12)</i>	<i>(280)</i>	<i>(280)</i>	<i>(560)</i>
Net External Trips	24,162	412	602	1,014	1,032	892	1,924

1) Totem Lake Mall Redevelopment Traffic Impact Analysis, December 23, 2005.

As shown in **Table 6**, the current land use proposal for the Village at Totem Lake is estimated to generate 313 fewer trips (14 percent less) during the PM peak hour when compared to the PM peak hour trip generation estimate documented in the 2005 TIA, which is the trip generation that SEPA is based on.

Future Driveway Configuration

With the proposed Village at Totem Lake project, the three existing driveways to the lower mall on Totem Lake Boulevard would remain in their current location and the existing middle driveway would be signalized to connect to the new “Central Driveway” through the site. The driveways on Totem Lake Boulevard would provide access to the lower mall surface parking.

The driveways on 120th Ave NE are proposed to be relocated and reconfigured with the proposed project. A total of 6 driveways are proposed on 120th Ave NE (see **Figure 2** for location of proposed driveways described below):

#8: 120th Ave NE/Upper Mall Loop Road/Lower Mall Service Driveway – provides unsignalized access to upper mall loop road/parking garage for residential and retail uses and also provides access to lower mall for service/loading

#9: 120th Ave NE/Lower Mall Garage Driveway – provides unsignalized access to lower mall parking garage for residential and retail uses

#10: 120th Ave NE/Lower Mall Central Driveway – provides signalized access to the lower mall surface parking

#11: 120th Ave NE/Upper Mall Garage Driveway/Lower Mall Service Driveway – provides unsignalized access to upper mall parking garage for retail uses and also provides service/loading access to the lower mall

#12: 120th Ave NE/Lower Mall South Driveway – provides unsignalized access to the lower mall surface parking

Additionally, three unsignalized driveways are proposed on Totem Lake Way (see **Figure 2**):

#13: Totem Lake Way/West Driveway – provides unsignalized access to the upper mall garage for retail use only

#14: Totem Lake Way/East Driveway – provides unsignalized access to the upper mall garage for residential use only

#15: Totem Lake Way/Loop Road – provides unsignalized access to the upper mall loop road for residential use only

All driveways to the lower and upper mall on Totem Lake Boulevard, 120th Ave NE, and Totem Lake Way are proposed to provide full access.

Project Trip Distribution and Assignment

The City of Kirkland provided a PM peak hour project trip distribution for the Village at Totem Lake site on October 8, 2015 using the Bellevue-Kirkland-Redmond (BKR) traffic model. The overall trip distribution was used to estimate the project trip distribution for the two specific mall areas (upper mall and lower mall). The estimated project trip distribution for the lower mall area is illustrated in **Figure 7** and the project trip distribution for the upper mall area is illustrated in **Figure 8**.

The assignment of new project trips at the site driveways was based on the proposed land use anticipated to use each individual driveway and the proposed driveway access locations.

The assignment of pass-by project trips for the proposed project was determined based on the background traffic volumes on Totem Lake Boulevard and 120th Ave NE (after accounting for the shift in traffic from 120th Ave NE as a result of traffic calming on 120th Ave NE (see **Figure 6**)).

The AM and PM peak hour project trip assignment (new trips and pass-by trips) at the study intersections and site driveways for the proposed Village at Totem Lake development are illustrated in **Figure 9** and **Figure 10**, respectively. **Appendix G** includes figures that illustrate the net new inbound trip assignment, the net new outbound trip assignment, and the pass-by trip assignment separately for both the AM and PM peak hours.

Future With-Project Traffic Volumes

To estimate future year 2017 peak hour traffic volumes with the proposed project, the project trip assignment (shown in **Figures 9 and 10**) was added to the 2017 Baseline Adjusted traffic volumes (shown in **Figure 6**) to result in the 2017 With Project peak hour traffic volumes. The 2017 With Project AM and PM peak hour traffic volumes at the study intersections are shown in **Figure 11**. The 2017 With-Project AM and PM peak hour traffic volumes at the site driveways are shown in **Figure 12**.



Figure 7: Lower Mall General Project Trip Distribution

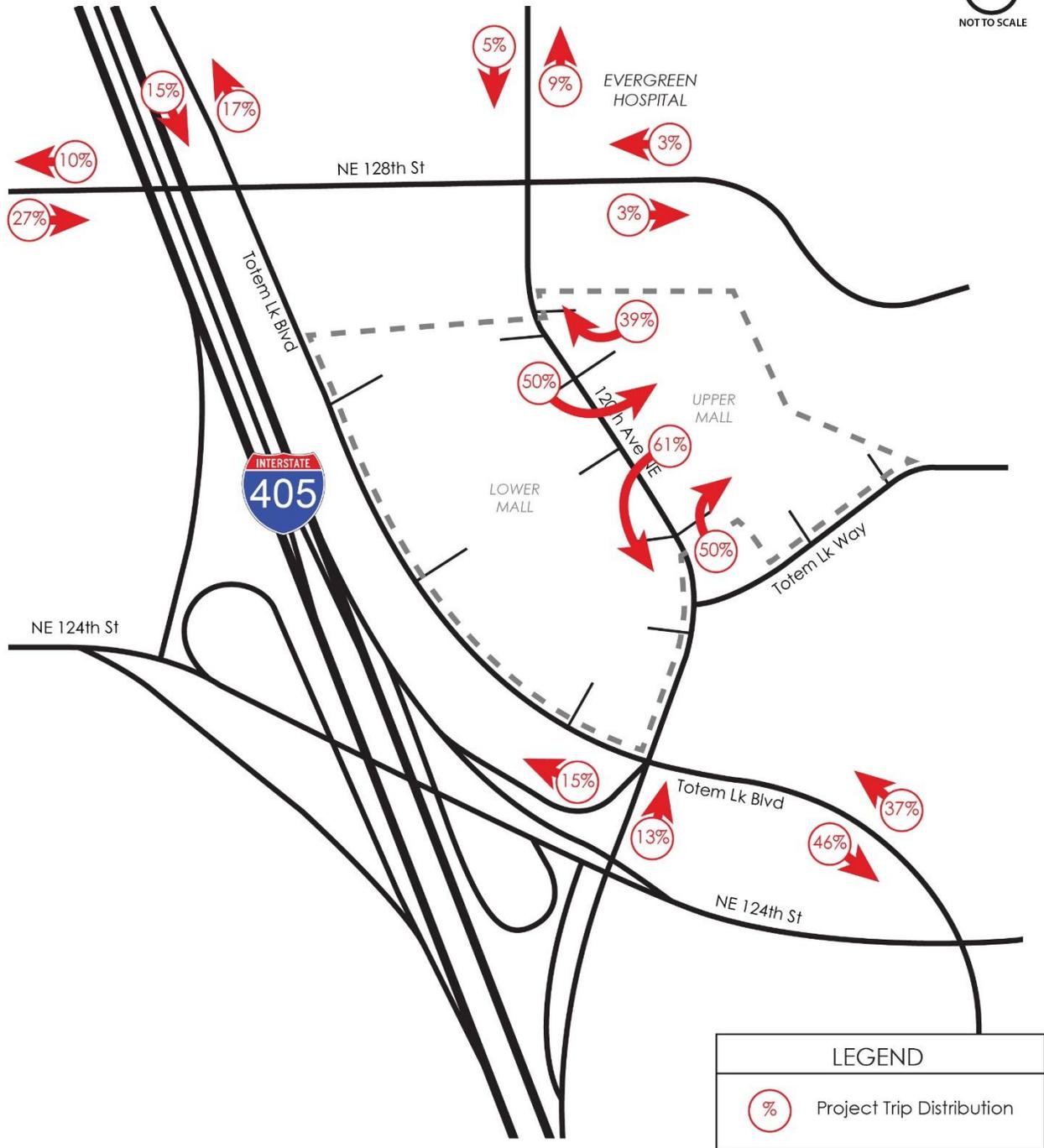


Figure 8: Upper Mall General Project Trip Distribution

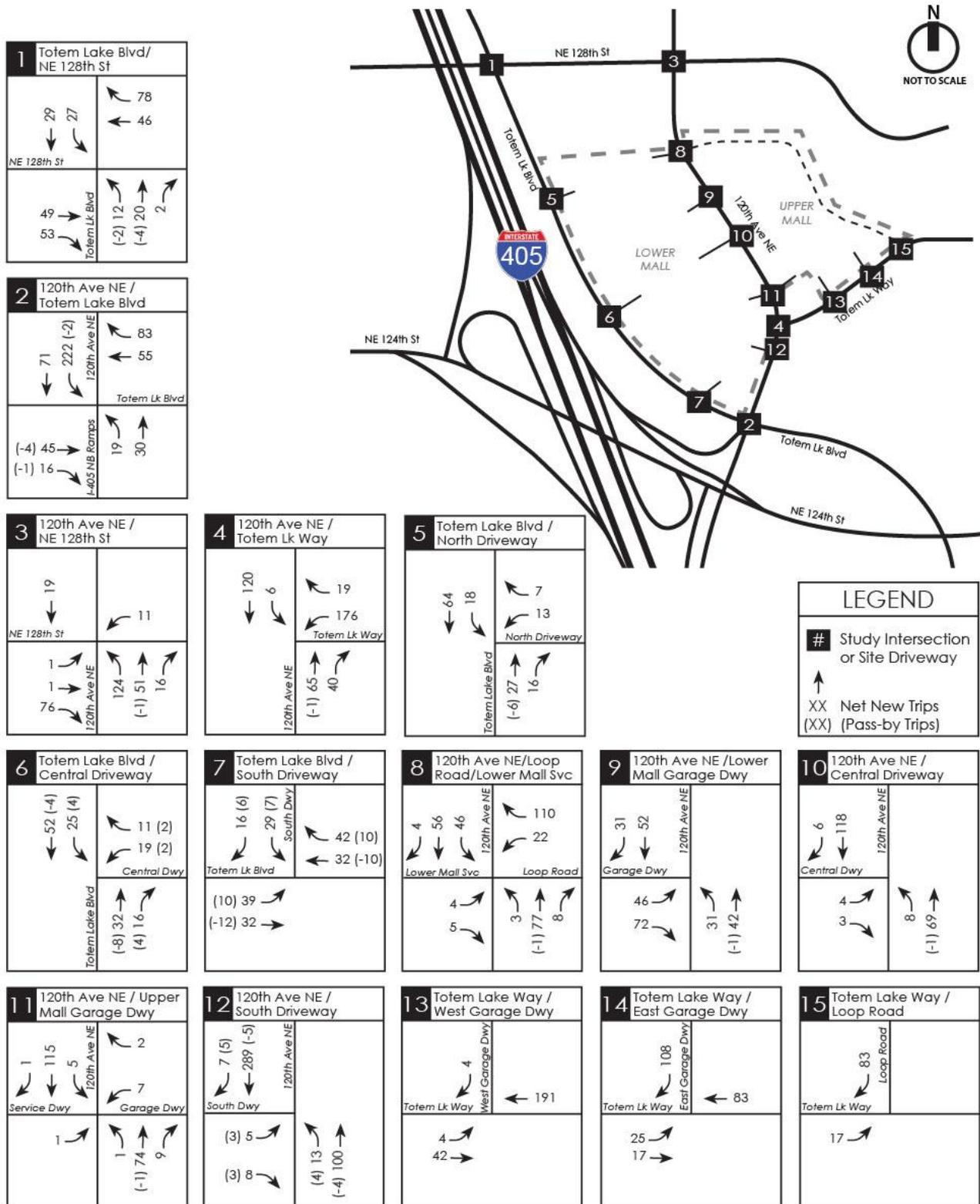


Figure 9: AM Peak Hour Project Trip Assignment

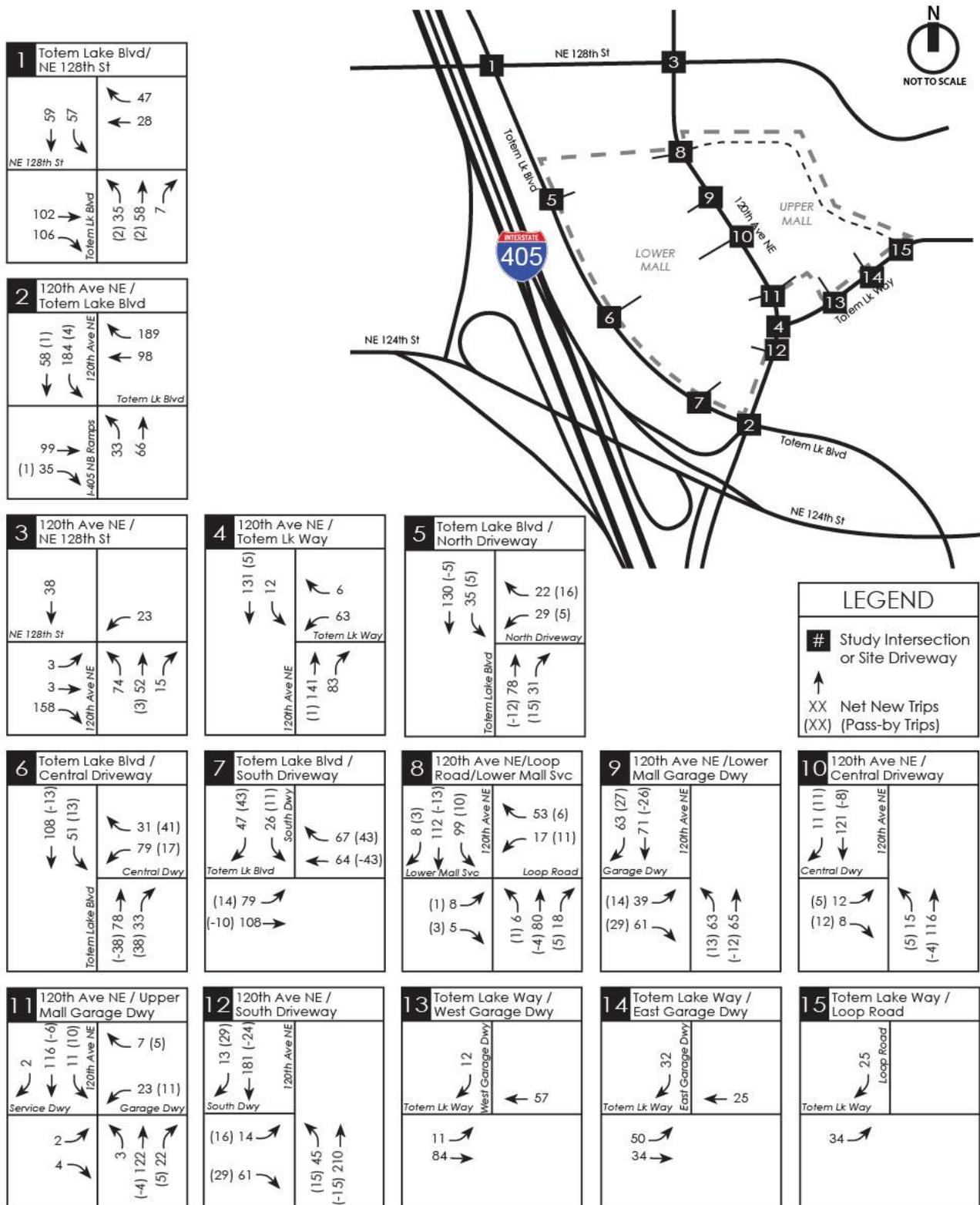


Figure 10: PM Peak Hour Project Trip Assignment

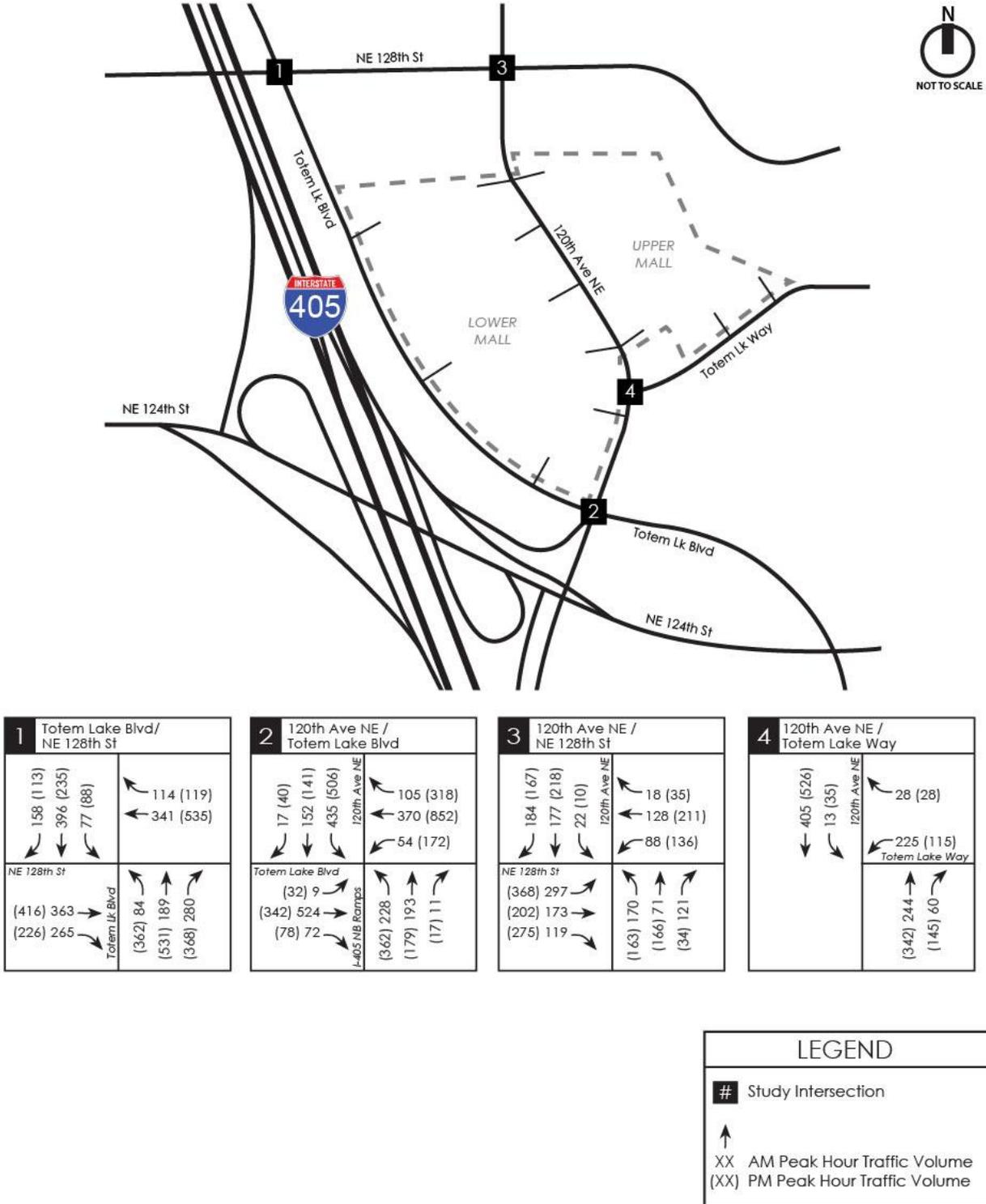


Figure 11: Year 2017 With-Project Peak Hour Traffic Volumes at Study Intersections

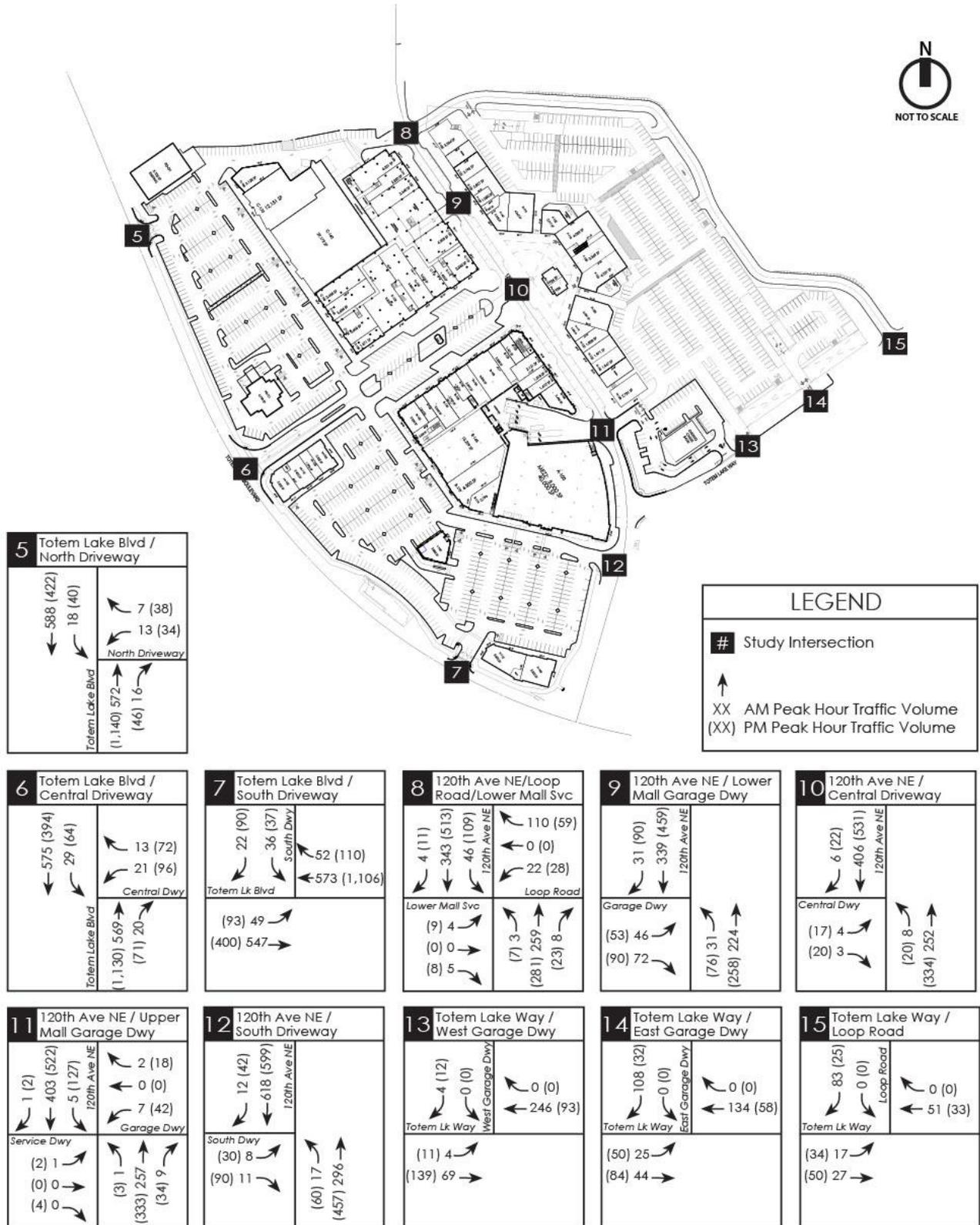


Figure 12: Year 2017 With-Project Peak Hour Traffic Volumes at Site Driveways

Level of Service

A Level of service (LOS) analysis was conducted at the four study intersections for future year 2017 With Project conditions.

The roadway network assumed in the year 2017 LOS analysis was based on existing intersection geometry at the signalized study intersections (#1-3). Signal timing at the signalized study intersections were assumed to be the same as existing conditions. At study intersection #4 (Totem Lake Way/120th Ave NE), the intersection was assumed to be a three-leg intersection with a southbound left-turn lane and remain as two-way stop controlled for the 2017 LOS analysis.

The 2017 weekday AM and PM peak hour LOS results with the project at the study intersections are summarized in **Table 7**. The LOS worksheets are included in **Appendix B**.

Table 7
Year 2017 With Project Peak Hour Level of Service Summary at Study Intersections

Study Intersection	AM PEAK HOUR		PM PEAK HOUR	
	LOS ¹	Delay (sec)	LOS ¹	Delay (sec)
<u>Signalized:</u>				
1) NE 128 th St / Totem Lake Blvd	B	13.8	D	38.2
2) Totem Lake Blvd / 120 th Ave / I-405 NB	C	20.8	D	40.7
3) NE 128 th St / 120 th Ave NE ²	D	49.5	E	73.2
<u>Two-Way Stop Controlled:</u>				
4) Totem Lake Way / 120 th Ave NE				
Westbound Left	C	21.5	C	22.7
Westbound Right	B	10.5	B	12.8
Southbound Left	A	8.1	A	8.9

1) LOS = Level of Service, reported by movement for unsignalized intersections.

2) LOS for intersection 3 was reported based on HCM 2000 methodology using the Synchro 8 software program.

As shown in **Table 7**, the signalized study intersections are estimated to operate at LOS D or better during the AM and PM peak hours in 2017 with the proposed project, except for the intersection of NE 128th Street/120th Ave NE which is anticipated to operate at LOS E in 2017 during the PM peak hour with the project. The intersection of NE 128th Street/120th Ave NE is anticipated to operate at LOS E during the PM peak hour in 2017 primarily as a result of the redistribution of background traffic from 120th Ave NE that results in a higher demand for eastbound left-turns at the intersection. Additionally, all controlled movements at the unsignalized study intersection of Totem Lake Way/120th Ave NE would operate at LOS C or better under 2017 AM and PM peak hour conditions with the proposed project.

Table 8 provides a summary of the current With-Project PM peak hour level of service results compared to the PM peak hour With-Project level of service as documented in the 2005 TIA for the Totem Lake Mall Redevelopment. There was no AM peak hour level of service reported in the 2005 TIA so a With-Project level of service comparison cannot be made for the AM peak hour.

Table 8
PM Peak Hour Level of Service Comparison to 2005 TIA

Study Intersection	PM PEAK HOUR			
	2011 With Project (from 2005 TIA)		2017 With Project (current proposal) ²	
	LOS ¹	Delay (sec)	LOS ¹	Delay (sec)
<u>Signalized:</u>				
1) NE 128 th St / Totem Lake Blvd	D	43.3	D	38.2
2) Totem Lake Blvd / 120 th Ave / I-405 NB	E	66.6	D	37.1
3) NE 128 th St / 120 th Ave NE	C	29.3	E	73.2
4) Totem Lake Way / 120 th Ave NE ³	C	25.8	--	--
<u>Two-Way Stop Controlled:</u>				
4) Totem Lake Way / 120 th Ave NE	--	--		
Westbound Left/Right	--	--	C	23.2
Southbound Left/Thru	--	--	A	8.9

- 1) LOS = Level of Service, reported by movement for unsignalized intersections.
- 2) LOS for intersection 3 was reported based on HCM 2000 methodology using the Synchro 8 software program.
- 3) 2005 TIA assumed intersection to be signalized.

As shown in **Table 8**, the signalized study intersection of Totem Lake Blvd/120th Ave NE (#2) is anticipated to operate at a better LOS (LOS D vs. LOS E) during the PM peak hour in 2017 with the project than was estimated in the 2005 TIA. The signalized study intersection of NE 128th St/120th Ave NE (#3) is anticipated to operate at a worse LOS (LOS E vs. LOS C) during the PM peak hour than was estimated in the 2005 TIA. The intersection of NE 128th Street/120th Ave NE is anticipated to operate at LOS E during the PM peak hour in 2017 primarily as a result of the redistribution of background traffic from 120th Ave NE that results in a higher demand for eastbound left-turns at the intersection.

Site Access Analysis

A level of service (LOS) analysis was conducted at the proposed project site access driveways for future year 2017 With-Project conditions. The 2017 With-Project AM and PM peak hour volumes at the site driveways used in the LOS analyses are as shown on **Figure 12**.

Table 9 summarizes the results of the LOS analysis for 2017 With Project conditions at the site driveways. The LOS worksheets are included in **Appendix B**.

**Table 9
Year 2017 With Project Peak Hour Level of Service Summary at Site Driveways**

Driveway Location	AM PEAK HOUR		PM PEAK HOUR	
	LOS ¹	Delay (sec)	LOS ¹	Delay (sec)
<u>Signalized:</u>				
6) Totem Lake Blvd / Central Driveway	A	4.7	A	9.7
10) 120 th Ave NE / Central Driveway ²	A	3.8	A	3.9
<u>Two-Way Stop Controlled:</u>				
5) Totem Lake Blvd / North Driveway				
Southbound left (entering)	A	9.0	B	12.7
Westbound left (exiting)	C	15.6	D	31.0
Westbound right (exiting)	B	10.6	C	16.0
7) Totem Lake Blvd / South Driveway				
Southbound left (exiting)	C	17.3	D	34.6
Southbound right (exiting)	B	11.0	C	18.7
Eastbound left (entering)	A	9.3	B	14.1
8) 120 th Ave NE / Upper Mall Loop Road/Lower Mall Svc				
Northbound left/thru/right (entering)	A	8.1	A	8.8
Southbound left (entering)	A	8.0	A	8.4
Eastbound left/thru/right (exiting)	B	14.9	D	25.0
Westbound left/thru (exiting)	C	18.5	E	37.1
Westbound right (exiting)	B	11.0	B	11.2
9) 120 th Ave NE / Lower Mall Garage Driveway				
Northbound left/thru (entering)	A	8.4	A	9.4
Eastbound left-right (exiting)	C	15.0	D	27.9
11) 120 th Ave NE / Upper Mall Garage Driveway				
Northbound left/thru/right (entering)	A	8.3	A	8.9
Southbound left/thru/right (entering)	A	7.9	A	8.5
Eastbound left/thru/right (exiting)	C	16.4	C	18.7
Westbound left/thru/right (exiting)	C	15.2	D	30.4
12) 120 th Ave NE / Lower Mall South Driveway				
Northbound left (entering)	A	9.2	A	9.5
Eastbound left/right (exiting)	B	14.4	C	19.9
13) Totem Lake Way / West Garage Driveway				
Southbound left-right (exiting)	A	9.9	A	9.3
Eastbound left/thru (entering)	A	7.8	A	7.5
14) Totem Lake Way / East Garage Driveway				
Southbound left-right (exiting)	A	9.8	A	9.2
Eastbound left/thru (entering)	A	7.6	A	7.5
15) Totem Lake Way / Loop Road				
Southbound left-right (exiting)	A	9.1	A	9.0
Eastbound left/thru (entering)	A	7.4	A	7.4

1) LOS = Level of Service, reported by movement for unsignalized intersections.

2) LOS for driveway # 11 was reported based on HCM 2000 methodology using the Synchro 8 software program

As shown in **Table 9**, the results of the AM peak hour LOS analysis show that the signalized site driveways and all controlled movements at the unsignalized site driveways are expected to operate

at LOS C or better in 2017 during the AM peak hour with the proposed Village at Totem Lake project.

As also shown in **Table 9**, the results of the PM peak hour LOS analysis show that the signalized site driveways and all controlled movements at the unsignalized site driveways are anticipated to operate at LOS D or better during the PM peak hour in 2017 with the proposed Village at Totem Lake project, with the exception of the westbound left/thru at 120th Ave NE/Upper Mall Loop Road (#8) which is anticipated to operate at LOS E. Vehicles exiting the site onto 120th Ave NE from the unsignalized Upper Mall Loop Road driveway (#8) may shift to exit at 120th Ave NE/Totem Lake Way (intersection #4).

MITIGATION

Concurrency

Based on correspondence with the City of Kirkland, the proposed project obtained concurrency with the 2005 Totem Lake Mall Redevelopment proposal and the concurrency is vested.

SEPA Improvements

Per the SEPA Addendum issued for the project on February 26, 2015, "*the need for, extent, and/or design of some potential improvements, such as intersection improvements, will depend on decisions regarding access to the site which will be made subsequently by the applicant, Public Works Department, and the Design Review Board.*"

The following improvements are proposed to be completed as part of the Village at Totem Lake project:

- Redesign 120th Ave NE along the project frontage to include on-street parking and other traffic calming measures
- Install traffic signal at Totem Lake Boulevard/Central Driveway
- Install traffic signal at 120th Ave NE/Central Driveway

In addition, it is recommended that the City consider optimizing the peak hour signal timing at the intersection of NE 128th Street/120th Ave NE to improve the operations of the intersection with the redistribution of background traffic from 120th Ave NE.

Appendix A

Existing Totem Lake Mall Trip Generation

**Totem Lake Mall
Existing Trip Generation Study**

Tuesday, September 15, 2015

AM PEAK HOUR

Peak Hour	Total Trips		
	IN	OUT	TOTAL
8:00-9:00 am	224	151	375

PM PEAK HOUR

Peak Hour	Total Trips		
	IN	OUT	TOTAL
4:15-5:15 pm	673	731	1,404

Totem Lake Mall Existing Trip Generation
AM PEAK PERIOD

Day: Tuesday, September 15, 2015

Interval Begin	LOWER MALL												UPPER MALL												Total Trips			Hourly Totals	
	#4 120th Ave NE/Dwy aligned with Totem Lk		#5 North Dwy/ Totem Lake Blvd		#6 Middle Dwy/ Totem Lake Blvd		#7 South Dwy/Totem Lake Blvd		#10 west 120th Ave NE/Middle Dwy		#11 west 120th Ave NE/South Dwy		#9 120th Ave NE/ TJ's North Dwy		#10 east 120th Ave NE/Middle Dwy		#11 east 120th Ave NE/South Dwy		#12 120th Ave NE/Dwy aligned with B of A Dwy		#13 Totem Lake Way/West Dwy		#14 Totem Lake Way/East Dwy		In	Out	Total		
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	Total		
7:00 AM	2	3	2	2	4	5	8	6	0	1	1	0	0	0	1	2	1	0	0	2	0	0	0	0	0	19	21	40	
7:15 AM	2	2	3	1	7	7	5	6	3	1	0	0	0	1	2	1	5	2	0	4	0	0	0	0	27	25	52		
7:30 AM	1	0	3	2	7	5	5	4	6	1	0	0	1	0	1	6	4	2	0	4	1	1	0	0	29	25	54		
7:45 AM	2	0	12	2	4	3	9	7	7	2	1	0	6	1	3	1	3	1	1	3	1	0	0	0	49	20	69		
8:00 AM	1	1	11	5	8	8	13	5	4	2	1	0	3	3	7	7	6	3	1	1	1	0	0	0	56	35	91		
8:15 AM	3	1	5	0	5	5	2	3	2	0	0	1	9	3	11	10	6	3	1	3	1	0	2	1	47	30	77		
8:30 AM	0	2	6	4	3	2	13	8	6	3	0	0	10	4	9	9	8	6	0	1	3	1	0	1	58	41	99		
8:45 AM	3	0	7	3	7	3	7	8	2	2	3	2	6	5	9	8	14	5	1	3	2	5	2	1	63	45	108		
Peak Hour	7	4	29	12	23	18	35	24	14	7	4	3	28	15	36	34	34	17	3	8	7	6	4	3	224	151	375		
	11		41		41		59		21		7		43		70		51		11		13		7		375				

Totem Lake Mall Existing Trip Generation

PM PEAK PERIOD

Day: Tuesday, September 15, 2015

Interval Begin	LOWER MALL												UPPER MALL												Total Trips		
	#4 120th Ave NE/Dwy aligned with Totem Lk Way		#5 North Dwy/ Totem Lake Blvd		#6 Middle Dwy/ Totem Lake Blvd		#7 South Dwy/Totem Lake Blvd		#10 west 120th Ave NE/Middle Dwy		#11 west 120th Ave NE/South Dwy		#9 120th Ave NE/ TJ's North Dwy		#10 east 120th Ave NE/Middle Dwy (TJ's Main Dwy)		#11 east 120th Ave NE/South Dwy		#12 120th Ave NE/Bank Dwy		#13 Totem Lake Way/West Dwy		#14 Totem Lake Way/East Dwy				
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	Total
4:00 PM	7	4	13	20	24	16	13	7	3	3	6	5	17	11	39	35	33	28	3	0	11	21	0	3	169	153	322
4:15 PM	3	9	21	26	25	19	14	11	7	5	3	3	24	20	41	43	43	24	4	3	6	18	2	0	193	181	374
4:30 PM	8	4	14	24	21	13	23	7	0	9	3	4	20	19	41	41	34	34	1	0	6	16	1	1	172	172	344
4:45 PM	5	5	18	25	16	21	12	2	8	8	0	6	13	32	40	38	36	28	3	3	9	15	2	1	162	184	346
5:00 PM	9	5	8	21	19	22	15	23	8	4	3	3	15	20	40	43	22	31	1	3	4	19	2	0	146	194	340
5:15 PM	6	10	25	26	18	13	23	18	6	5	5	1	17	12	39	29	23	30	4	3	4	9	1	0	171	156	327
5:30 PM	4	4	18	21	15	19	16	13	5	6	5	3	13	21	29	41	33	13	2	1	8	11	0	0	148	153	301
5:45 PM	5	4	17	34	12	25	18	11	7	8	4	0	16	13	38	39	19	29	4	3	5	13	0	1	145	180	325
Peak Hour	25	23	61	96	81	75	64	43	23	26	9	16	72	91	162	165	135	117	9	9	25	68	7	2	673	731	1,404
	48		157		156		107		49		25		163		327		252		18		93		9		1,404		

Appendix B

Level of Service (LOS) Calculations at Study Intersections and Site Access
Driveways

2015 Existing

Lanes, Volumes, Timings

1: TOTEM LAKE BLVD & NE 128TH ST

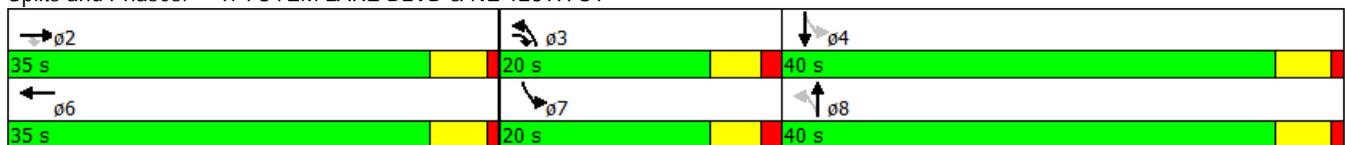
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑		↑	↑↑		↑	↑↑	
Volume (vph)	0	286	213	0	220	20	63	169	72	39	344	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		189			1017			515			1382	
Travel Time (s)		3.7			19.8			10.0			26.9	
Confl. Peds. (#/hr)			4			36			11	11		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	6%	6%	6%	6%	6%	3%	3%	3%	1%	1%	1%
Parking (#/hr)				0								
Shared Lane Traffic (%)												
Turn Type		NA	pm+ov		NA		pm+pt	NA		pm+pt		NA
Protected Phases		2	3		6		3	8		7		4
Permitted Phases			2				8			4		
Detector Phase		2	3		6		3	8		7		4
Switch Phase												
Minimum Initial (s)		7.0	3.0		7.0		3.0	5.0		3.0		5.0
Minimum Split (s)		33.0	8.1		12.0		8.1	35.0		8.1		37.0
Total Split (s)		35.0	20.0		35.0		20.0	40.0		20.0		40.0
Total Split (%)		36.8%	21.1%		36.8%		21.1%	42.1%		21.1%		42.1%
Yellow Time (s)		4.0	3.6		4.0		3.6	4.0		3.6		4.0
All-Red Time (s)		1.0	1.5		1.0		1.5	1.0		1.5		1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	-1.0		-1.0		-1.0
Total Lost Time (s)		5.0	5.1		5.0		5.1	4.0		4.1		4.0
Lead/Lag			Lead				Lead	Lag		Lead		Lag
Lead-Lag Optimize?												
Recall Mode		None	None		None		None	Min		None		None

Intersection Summary

Area Type: Other
 Cycle Length: 95
 Actuated Cycle Length: 49.2
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated

Splits and Phases: 1: TOTEM LAKE BLVD & NE 128TH ST



HCM 2010 Signalized Intersection Summary

1: TOTEM LAKE BLVD & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑		↗	↑↑		↗	↑↑	
Volume (veh/h)	0	286	213	0	220	20	63	169	72	39	344	152
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1792	1792	0	1792	1900	1845	1845	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	301	224	0	232	21	66	178	76	41	362	160
Adj No. of Lanes	0	2	1	0	2	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	6	6	0	6	6	3	3	3	1	1	1
Cap, veh/h	0	1189	591	0	1100	99	369	797	327	543	763	331
Arrive On Green	0.00	0.35	0.35	0.00	0.35	0.37	0.04	0.33	0.33	0.05	0.32	0.29
Sat Flow, veh/h	0	3495	1518	0	3242	283	1757	2419	991	1792	2418	1051
Grp Volume(v), veh/h	0	301	224	0	124	129	66	127	127	41	266	256
Grp Sat Flow(s),veh/h/ln	0	1703	1518	0	1703	1733	1757	1752	1658	1792	1787	1682
Q Serve(g_s), s	0.0	3.0	5.0	0.0	2.4	2.5	1.2	2.5	2.7	0.7	5.7	5.9
Cycle Q Clear(g_c), s	0.0	3.0	5.0	0.0	2.4	2.5	1.2	2.5	2.7	0.7	5.7	5.9
Prop In Lane	0.00		1.00	0.00		0.16	1.00		0.60	1.00		0.62
Lane Grp Cap(c), veh/h	0	1189	591	0	594	605	369	577	546	543	564	530
V/C Ratio(X)	0.00	0.25	0.38	0.00	0.21	0.21	0.18	0.22	0.23	0.08	0.47	0.48
Avail Cap(c_a), veh/h	0	2139	1015	0	1069	1088	846	1321	1249	1055	1347	1267
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	11.1	10.4	0.0	10.9	10.9	11.4	11.6	11.6	10.0	13.1	13.5
Incr Delay (d2), s/veh	0.0	0.2	0.6	0.0	0.2	0.2	0.2	0.2	0.2	0.0	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.4	2.2	0.0	1.2	1.2	0.6	1.2	1.2	0.3	2.9	2.8
LnGrp Delay(d),s/veh	0.0	11.3	11.0	0.0	11.2	11.1	11.6	11.8	11.8	10.0	13.8	14.2
LnGrp LOS		B	B		B	B	B	B	B	B	B	B
Approach Vol, veh/h		525			253			320			563	
Approach Delay, s/veh		11.2			11.1			11.8			13.7	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		21.7	7.0	19.1		21.7	6.4	19.7				
Change Period (Y+Rc), s		5.0	5.1	5.0		5.0	5.1	5.0				
Max Green Setting (Gmax), s		30.0	14.9	35.0		30.0	14.9	35.0				
Max Q Clear Time (g_c+I1), s		7.0	3.2	7.9		4.5	2.7	4.7				
Green Ext Time (p_c), s		6.1	0.1	3.2		6.3	0.0	3.3				
Intersection Summary												
HCM 2010 Ctrl Delay			12.1									
HCM 2010 LOS			B									

Lanes, Volumes, Timings

2: I-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LAKE BLVD

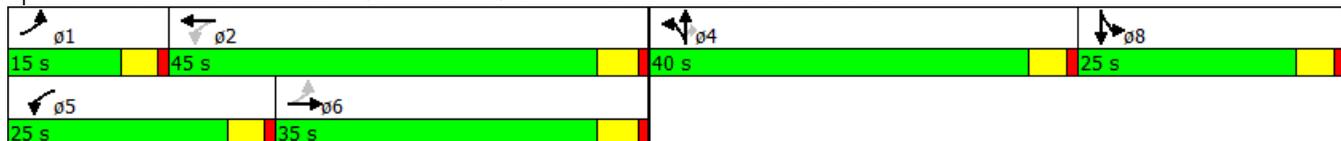
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	469	56	52	199	144	148	264	11	244	71	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	185		0	150		0	150		150	215		0
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		330			927			370			349	
Travel Time (s)		6.4			18.1			10.1			9.5	
Confl. Peds. (#/hr)	5					5			2			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)							0%					
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2					4			
Detector Phase	1	6		5	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	4.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	8.5	11.0		9.5	31.0		32.6	32.6	32.6	10.6	10.6	
Total Split (s)	15.0	35.0		25.0	45.0		40.0	40.0	40.0	25.0	25.0	
Total Split (%)	12.0%	28.0%		20.0%	36.0%		32.0%	32.0%	32.0%	20.0%	20.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6	3.6	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	Min		None	Min		None	None	None	None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 71.4
 Natural Cycle: 85
 Control Type: Actuated-Uncoordinated

Splits and Phases: 2: I-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LAKE BLVD



HCM 2010 Signalized Intersection Summary
 2: I-405 NB ON/OFF RAMP/120TH AVE NE & TOTEM LAKE BLVD

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	469	56	52	199	144	148	264	11	244	71	6
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1827	1827	1900	1845	1845	1845	1845	1845	1900
Adj Flow Rate, veh/h	5	494	59	55	209	152	156	278	12	257	75	6
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	3	3	3	3	3	3
Cap, veh/h	407	839	100	369	608	421	410	431	365	513	254	20
Arrive On Green	0.02	0.26	0.26	0.07	0.31	0.31	0.23	0.23	0.23	0.15	0.15	0.15
Sat Flow, veh/h	1774	3183	379	1740	1957	1354	1757	1845	1564	3408	1686	135
Grp Volume(v), veh/h	5	274	279	55	184	177	156	278	12	257	0	81
Grp Sat Flow(s),veh/h/ln	1774	1770	1792	1740	1736	1575	1757	1845	1564	1704	0	1821
Q Serve(g_s), s	0.1	7.1	7.1	1.1	4.3	4.6	3.9	7.1	0.3	3.6	0.0	2.1
Cycle Q Clear(g_c), s	0.1	7.1	7.1	1.1	4.3	4.6	3.9	7.1	0.3	3.6	0.0	2.1
Prop In Lane	1.00		0.21	1.00		0.86	1.00		1.00	1.00		0.07
Lane Grp Cap(c), veh/h	407	467	473	369	540	490	410	431	365	513	0	274
V/C Ratio(X)	0.01	0.59	0.59	0.15	0.34	0.36	0.38	0.65	0.03	0.50	0.00	0.30
Avail Cap(c_a), veh/h	753	1047	1060	958	1358	1232	1220	1281	1086	1392	0	744
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.4	16.8	16.8	12.0	13.9	14.0	16.9	18.1	15.5	20.4	0.0	19.8
Incr Delay (d2), s/veh	0.0	1.2	1.2	0.2	0.4	0.4	0.6	1.6	0.0	0.8	0.0	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	3.6	3.6	0.5	2.1	2.0	2.0	3.8	0.1	1.8	0.0	1.1
LnGrp Delay(d),s/veh	13.4	18.0	18.0	12.1	14.3	14.5	17.5	19.8	15.6	21.2	0.0	20.4
LnGrp LOS	B	B	B	B	B	B	B	B	B	C		C
Approach Vol, veh/h		558			416			446			338	
Approach Delay, s/veh		18.0			14.1			18.8			21.0	
Approach LOS		B			B			B			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.8	20.3		15.8	7.3	17.8		11.5				
Change Period (Y+Rc), s	4.5	5.0		4.6	4.5	5.0		4.6				
Max Green Setting (Gmax), s	10.5	40.0		35.4	20.5	30.0		20.4				
Max Q Clear Time (g_c+I1), s	2.1	6.6		9.1	3.1	9.1		5.6				
Green Ext Time (p_c), s	0.0	4.0		1.9	0.1	3.7		1.3				
Intersection Summary												
HCM 2010 Ctrl Delay			17.8									
HCM 2010 LOS			B									
Notes												
User approved pedestrian interval to be less than phase max green.												
User approved volume balancing among the lanes for turning movement.												

Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

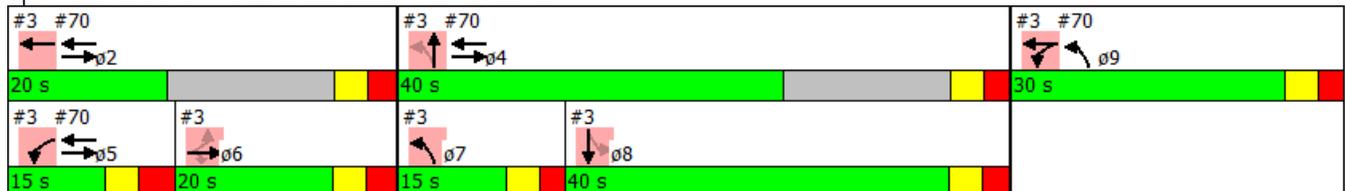
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	130	124	37	101	110	9	46	191	149	21	199	164
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175		0	100		0	150		0	170		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1017			103			361			591	
Travel Time (s)		19.8			2.0			9.8			16.1	
Confl. Peds. (#/hr)	20		8			20	6		11	11		6
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Heavy Vehicles (%)	6%	6%	6%	11%	11%	11%	4%	4%	4%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4			8	
Permitted Phases	6		6				4			8		
Detector Phase	6	6	6	5 9	2 9		7	4		8	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0				6.0	6.0		6.0	6.0	
Minimum Split (s)	22.8	22.8	22.8				11.3	22.4		22.6	22.6	
Total Split (s)	20.0	20.0	20.0				15.0	40.0		40.0	40.0	
Total Split (%)	16.7%	16.7%	16.7%				12.5%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	
All-Red Time (s)	2.8	2.8	2.8				2.3	2.4		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Lead/Lag	Lag	Lag	Lag				Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None				None	None		None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 97.9
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: 120TH AVE NE & NE 128TH ST



Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

3/7/2016

Lane Group	ø2	ø5	ø9
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	2	5	9
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	6.0	6.0	12.0
Minimum Split (s)	22.7	12.3	21.4
Total Split (s)	20.0	15.0	30.0
Total Split (%)	17%	13%	25%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	2.7	3.3	2.4
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	
Lead-Lag Optimize?			
Recall Mode	None	None	None
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

3: 120TH AVE NE & NE 128TH ST

3/7/2016

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	130	124	37	101	110	9	46	191	149	21	199	164	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	5.8	5.8	5.8	6.3	5.7		5.3	5.4		5.6	5.6		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00		
Frbp, ped/bikes	1.00	1.00	0.96	1.00	0.99		1.00	0.98		1.00	0.99		
Flpb, ped/bikes	0.95	1.00	1.00	1.00	1.00		1.00	1.00		0.98	1.00		
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.93		1.00	0.93		
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00		
Satd. Flow (prot)	1620	1792	1458	1626	1681		1736	1668		1736	1719		
Flt Permitted	0.67	1.00	1.00	0.95	1.00		0.20	1.00		0.54	1.00		
Satd. Flow (perm)	1151	1792	1458	1626	1681		370	1668		993	1719		
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	
Adj. Flow (vph)	140	133	40	109	118	10	49	205	160	23	214	176	
RTOR Reduction (vph)	0	0	34	0	3	0	0	0	0	0	26	0	
Lane Group Flow (vph)	140	133	6	109	125	0	49	365	0	23	364	0	
Confl. Peds. (#/hr)	20		8				20	6		11	11	6	
Heavy Vehicles (%)	6%	6%	6%	11%	11%	11%	4%	4%	4%	2%	2%	2%	
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA		
Protected Phases		6		5 9	2 9		7	4				8	
Permitted Phases	6		6				4			8			
Actuated Green, G (s)	15.2	15.2	15.2	28.7	50.3		37.4	37.4		26.4	26.4		
Effective Green, g (s)	15.2	15.2	15.2	23.3	44.9		37.4	37.4		26.4	26.4		
Actuated g/C Ratio	0.15	0.15	0.15	0.24	0.45		0.38	0.38		0.27	0.27		
Clearance Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6		
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0		4.0	4.0		
Lane Grp Cap (vph)	177	275	224	383	763		216	631		265	459		
v/s Ratio Prot		0.07		c0.07	0.07		0.01	c0.22			c0.21		
v/s Ratio Perm	c0.12		0.00				0.07			0.02			
v/c Ratio	0.79	0.48	0.03	0.28	0.16		0.23	0.58		0.09	0.79		
Uniform Delay, d1	40.3	38.2	35.5	30.9	15.9		21.7	24.4		27.2	33.7		
Progression Factor	1.00	1.00	1.00	1.08	0.91		1.00	1.00		1.00	1.00		
Incremental Delay, d2	19.7	0.5	0.0	0.1	0.0		0.2	1.5		0.2	9.7		
Delay (s)	60.0	38.7	35.5	33.5	14.5		21.9	26.0		27.4	43.3		
Level of Service	E	D	D	C	B		C	C		C	D		
Approach Delay (s)		47.8			23.2			25.5			42.4		
Approach LOS		D			C			C			D		
Intersection Summary													
HCM 2000 Control Delay			35.3									HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio			0.63										
Actuated Cycle Length (s)			98.8									Sum of lost time (s)	28.4
Intersection Capacity Utilization			61.9%									ICU Level of Service	B
Analysis Period (min)			15										
c Critical Lane Group													

Lanes, Volumes, Timings

4: 120TH AVE NE & South Mall Dwy/TOTEM LAKE WAY

3/7/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	1	24	0	3	1	408	10	3	309	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		167			267			155			244	
Travel Time (s)		4.6			7.3			4.2			6.7	
Confl. Peds. (#/hr)				3		3			3	3		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	3%	3%	4%	4%	4%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection

Int Delay, s/veh 0.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	1	1	24	0	3	1	408	10	3	309	6
Conflicting Peds, #/hr	0	0	0	3	0	3	0	0	3	3	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	0	0	0	0	0	3	3	3	4	4	4
Mvmt Flow	2	1	1	26	0	3	1	434	11	3	329	6

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	784	788	335	783	785	445	335	0	0	448	0	0
Stage 1	338	338	-	444	444	-	-	-	-	-	-	-
Stage 2	446	450	-	339	341	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.1	6.5	6.2	4.13	-	-	4.14	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3	2.227	-	-	2.236	-	-
Pot Cap-1 Maneuver	313	326	712	314	327	617	1219	-	-	1102	-	-
Stage 1	681	644	-	597	579	-	-	-	-	-	-	-
Stage 2	595	575	-	680	642	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	310	324	710	310	325	614	1216	-	-	1099	-	-
Mov Cap-2 Maneuver	310	324	-	310	325	-	-	-	-	-	-	-
Stage 1	680	642	-	595	577	-	-	-	-	-	-	-
Stage 2	590	573	-	674	640	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	15	17	0	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1216	-	-	365	328	1099	-	-
HCM Lane V/C Ratio	0.001	-	-	0.012	0.088	0.003	-	-
HCM Control Delay (s)	8	-	-	15	17	8.3	-	-
HCM Lane LOS	A	-	-	C	C	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0	0.3	0	-	-

Lanes, Volumes, Timings
 1: TOTEM LAKE BLVD & NE 128TH ST

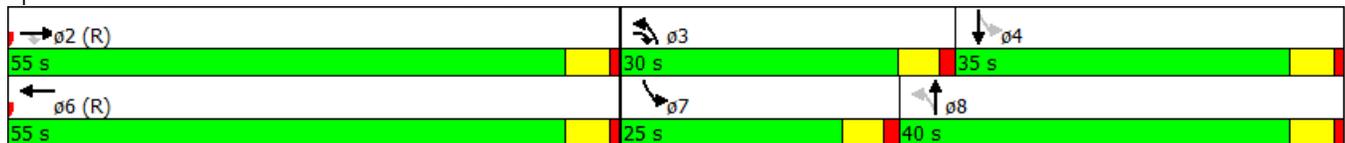
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑		↑	↑↑		↑	↑↑	
Volume (vph)	0	284	130	0	483	65	338	478	61	16	172	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		189			1017			515			1382	
Travel Time (s)		3.7			19.8			10.0			26.9	
Confl. Peds. (#/hr)			8			65			18	18		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	1%	1%	1%	1%	1%	1%
Shared Lane Traffic (%)												
Turn Type		NA	pm+ov		NA		pm+pt	NA		pm+pt		NA
Protected Phases		2	3		6		3	8		7		4
Permitted Phases			2				8			4		
Detector Phase		2	3		6		3	8		7		4
Switch Phase												
Minimum Initial (s)		7.0	3.0		7.0		3.0	5.0		3.0		5.0
Minimum Split (s)		33.0	8.1		37.0		8.1	35.0		8.1		10.0
Total Split (s)		55.0	30.0		55.0		30.0	40.0		25.0		35.0
Total Split (%)		45.8%	25.0%		45.8%		25.0%	33.3%		20.8%		29.2%
Yellow Time (s)		4.0	3.6		4.0		3.6	4.0		3.6		4.0
All-Red Time (s)		1.0	1.5		1.0		1.5	1.0		1.5		1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	-1.0		-1.0		-1.0
Total Lost Time (s)		5.0	5.1		5.0		5.1	4.0		4.1		4.0
Lead/Lag			Lead				Lead	Lag		Lead		Lag
Lead-Lag Optimize?												
Recall Mode		C-Min	None		C-Min		None	None		None		None

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated

Splits and Phases: 1: TOTEM LAKE BLVD & NE 128TH ST



HCM 2010 Signalized Intersection Summary

1: TOTEM LAKE BLVD & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑		↑	↑↑		↑	↑↑	
Volume (veh/h)	0	284	130	0	483	65	338	478	61	16	172	108
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	0.98		0.98	0.98		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1845	1845	0	1827	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	302	138	0	514	69	360	509	65	17	183	115
Adj No. of Lanes	0	2	1	0	2	0	1	2	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	3	3	0	4	4	1	1	1	1	1	1
Cap, veh/h	0	1982	1178	0	1732	232	432	975	124	201	274	161
Arrive On Green	0.00	0.57	0.57	0.00	0.57	0.57	0.19	0.31	0.31	0.02	0.13	0.12
Sat Flow, veh/h	0	3597	1561	0	3155	409	1792	3183	405	1792	2126	1252
Grp Volume(v), veh/h	0	302	138	0	290	293	360	285	289	17	152	146
Grp Sat Flow(s),veh/h/ln	0	1752	1561	0	1736	1738	1792	1787	1801	1792	1787	1591
Q Serve(g_s), s	0.0	4.9	2.9	0.0	10.5	10.5	20.4	15.8	15.9	1.0	9.7	10.6
Cycle Q Clear(g_c), s	0.0	4.9	2.9	0.0	10.5	10.5	20.4	15.8	15.9	1.0	9.7	10.6
Prop In Lane	0.00		1.00	0.00		0.24	1.00		0.22	1.00		0.79
Lane Grp Cap(c), veh/h	0	1982	1178	0	981	983	432	547	552	201	230	205
V/C Ratio(X)	0.00	0.15	0.12	0.00	0.30	0.30	0.83	0.52	0.52	0.08	0.66	0.71
Avail Cap(c_a), veh/h	0	1982	1178	0	981	983	466	547	552	479	462	411
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	0.00	1.00	1.00	0.00	0.94	0.94	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	0.0	12.4	4.0	0.0	13.6	13.6	35.1	34.4	34.4	44.0	49.8	50.5
Incr Delay (d2), s/veh	0.0	0.2	0.2	0.0	0.7	0.7	11.2	0.9	0.9	0.1	2.8	3.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.4	1.3	0.0	5.2	5.2	11.3	7.9	8.1	0.5	5.0	4.9
LnGrp Delay(d),s/veh	0.0	12.6	4.2	0.0	14.3	14.3	46.3	35.2	35.3	44.1	52.5	54.5
LnGrp LOS		B	A		B	B	D	D	D	D	D	D
Approach Vol, veh/h		440			583			934			315	
Approach Delay, s/veh		9.9			14.3			39.5			53.0	
Approach LOS		A			B			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		72.9	27.7	19.5		72.9	6.4	40.8				
Change Period (Y+Rc), s		5.0	5.1	5.0		5.0	5.1	5.0				
Max Green Setting (Gmax), s		50.0	24.9	30.0		50.0	19.9	35.0				
Max Q Clear Time (g_c+I1), s		6.9	22.4	12.6		12.5	3.0	17.9				
Green Ext Time (p_c), s		10.7	0.2	1.9		10.4	0.0	3.3				
Intersection Summary												
HCM 2010 Ctrl Delay			29.2									
HCM 2010 LOS			C									

Lanes, Volumes, Timings

2: I-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LAKE BLVD

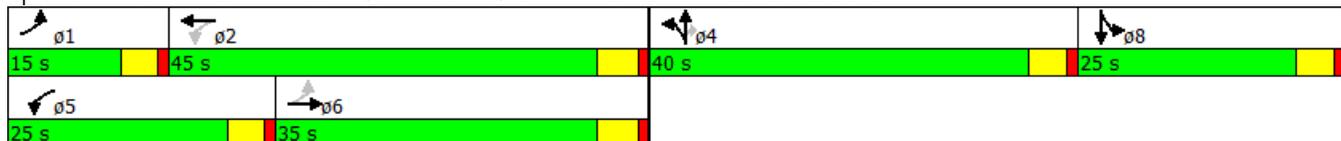
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	266	45	165	587	341	223	259	16	413	107	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	185		0	150		0	150		150	215		0
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		330			927			361			349	
Travel Time (s)		6.4			18.1			9.8			9.5	
Confl. Peds. (#/hr)	12					12			5			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)							0%					
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2					4			
Detector Phase	1	6		5	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	9.5	11.0		9.5	33.0		32.6	32.6	32.6	10.6	10.6	
Total Split (s)	15.0	35.0		25.0	45.0		40.0	40.0	40.0	25.0	25.0	
Total Split (%)	12.0%	28.0%		20.0%	36.0%		32.0%	32.0%	32.0%	20.0%	20.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6	3.6	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	Min		None	Min		None	None	None	None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 88.1
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated

Splits and Phases: 2: I-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LAKE BLVD



HCM 2010 Signalized Intersection Summary
 2: I-405 NB ON/OFF RAMP/120TH AVE NE & TOTEM LAKE BLVD

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	20	266	45	165	587	341	223	259	16	413	107	35
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	0.99		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1900	1881	1881	1881	1863	1863	1900
Adj Flow Rate, veh/h	21	280	47	174	618	359	235	273	17	435	113	37
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	2	2	2
Cap, veh/h	229	905	150	526	799	464	381	400	338	636	249	81
Arrive On Green	0.04	0.30	0.30	0.11	0.37	0.37	0.21	0.21	0.21	0.18	0.18	0.18
Sat Flow, veh/h	1774	3030	502	1792	2165	1257	1792	1881	1588	3442	1345	440
Grp Volume(v), veh/h	21	162	165	174	510	467	235	273	17	435	0	150
Grp Sat Flow(s),veh/h/ln	1774	1770	1762	1792	1787	1635	1792	1881	1588	1721	0	1785
Q Serve(g_s), s	0.6	5.3	5.4	4.6	18.9	18.9	8.9	10.0	0.6	8.8	0.0	5.6
Cycle Q Clear(g_c), s	0.6	5.3	5.4	4.6	18.9	18.9	8.9	10.0	0.6	8.8	0.0	5.6
Prop In Lane	1.00		0.28	1.00		0.77	1.00		1.00	1.00		0.25
Lane Grp Cap(c), veh/h	229	528	526	526	660	604	381	400	338	636	0	330
V/C Ratio(X)	0.09	0.31	0.31	0.33	0.77	0.77	0.62	0.68	0.05	0.68	0.00	0.45
Avail Cap(c_a), veh/h	436	733	730	848	979	895	871	914	772	984	0	510
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.0	20.3	20.3	13.8	20.9	20.9	26.7	27.1	23.5	28.5	0.0	27.2
Incr Delay (d2), s/veh	0.2	0.3	0.3	0.4	2.3	2.5	1.6	2.1	0.1	1.3	0.0	1.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	2.6	2.7	2.3	9.6	8.8	4.5	5.4	0.3	4.3	0.0	2.8
LnGrp Delay(d),s/veh	18.2	20.6	20.7	14.1	23.1	23.3	28.3	29.2	23.5	29.8	0.0	28.1
LnGrp LOS	B	C	C	B	C	C	C	C	C	C		C
Approach Vol, veh/h		348			1151			525				585
Approach Delay, s/veh		20.5			21.9			28.6				29.4
Approach LOS		C			C			C				C
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.3	31.6		19.5	11.6	26.4		17.4				
Change Period (Y+Rc), s	4.5	5.0		4.6	4.5	5.0		4.6				
Max Green Setting (Gmax), s	10.5	40.0		35.4	20.5	30.0		20.4				
Max Q Clear Time (g_c+I1), s	2.6	20.9		12.0	6.6	7.4		10.8				
Green Ext Time (p_c), s	0.0	5.8		2.2	0.5	6.1		2.0				
Intersection Summary												
HCM 2010 Ctrl Delay			24.7									
HCM 2010 LOS			C									
Notes												
User approved volume balancing among the lanes for turning movement.												

Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

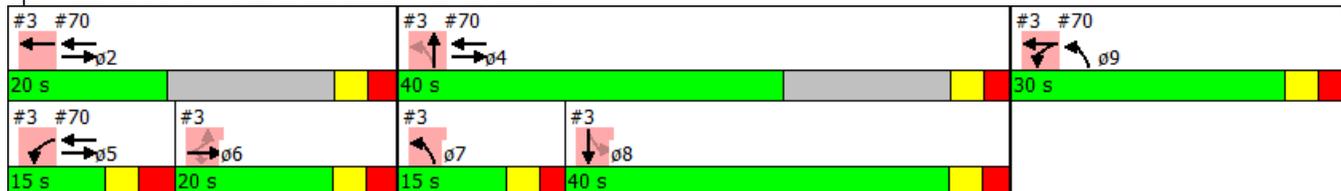
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	130	135	164	193	20	124	445	99	10	258	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175		0	100		0	150		0	170		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1017			103			361			591	
Travel Time (s)		19.8			2.0			9.8			16.1	
Confl. Peds. (#/hr)	14		12			14	6		9	9		6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4			8	
Permitted Phases	6		6				4			8		
Detector Phase	6	6	6	5 9	2 9		7	4		8	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0				6.0	6.0		6.0	6.0	
Minimum Split (s)	22.8	22.8	22.8				11.3	22.4		22.6	22.6	
Total Split (s)	20.0	20.0	20.0				15.0	40.0		40.0	40.0	
Total Split (%)	16.7%	16.7%	16.7%				12.5%	33.3%		33.3%	33.3%	
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	
All-Red Time (s)	2.8	2.8	2.8				2.3	2.4		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Lead/Lag	Lag	Lag	Lag				Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None				None	None		None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 107.9
 Natural Cycle: 95
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: 120TH AVE NE & NE 128TH ST



Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

3/7/2016

Lane Group	ø2	ø5	ø9
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	2	5	9
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	6.0	6.0	12.0
Minimum Split (s)	22.7	12.3	21.4
Total Split (s)	20.0	15.0	30.0
Total Split (%)	17%	13%	25%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	2.7	3.3	2.4
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	
Lead-Lag Optimize?			
Recall Mode	None	None	None
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

3: 120TH AVE NE & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	134	130	135	164	193	20	124	445	99	10	258	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	6.3	5.7		5.3	5.4		5.6	5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1679	1827	1464	1719	1773		1770	1796		1753	1745	
Flt Permitted	0.62	1.00	1.00	0.95	1.00		0.16	1.00		0.30	1.00	
Satd. Flow (perm)	1097	1827	1464	1719	1773		306	1796		558	1745	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	138	134	139	169	199	21	128	459	102	10	266	154
RTOR Reduction (vph)	0	0	120	0	3	0	0	0	0	0	18	0
Lane Group Flow (vph)	138	134	19	169	217	0	128	561	0	10	402	0
Confl. Peds. (#/hr)	14		12				14	6		9	9	6
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4				8
Permitted Phases	6		6				4			8		
Actuated Green, G (s)	15.0	15.0	15.0	31.8	53.2		43.3	43.3		29.1	29.1	
Effective Green, g (s)	15.0	15.0	15.0	26.4	47.8		43.3	43.3		29.1	29.1	
Actuated g/C Ratio	0.14	0.14	0.14	0.25	0.44		0.40	0.40		0.27	0.27	
Clearance Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	152	254	204	421	787		241	722		150	471	
v/s Ratio Prot		0.07		c0.10	0.12		0.04	c0.31			c0.23	
v/s Ratio Perm	c0.13		0.01				0.17			0.02		
v/c Ratio	0.91	0.53	0.09	0.40	0.28		0.53	0.78		0.07	0.85	
Uniform Delay, d1	45.6	43.0	40.4	34.0	18.9		23.7	28.0		29.2	37.2	
Progression Factor	1.00	1.00	1.00	1.13	0.91		1.00	1.00		1.00	1.00	
Incremental Delay, d2	45.6	0.9	0.1	0.2	0.1		1.1	5.6		0.3	14.5	
Delay (s)	91.2	43.9	40.5	38.8	17.2		24.8	33.5		29.4	51.8	
Level of Service	F	D	D	D	B		C	C		C	D	
Approach Delay (s)		58.6			26.6			31.9			51.2	
Approach LOS		E			C			C			D	
Intersection Summary												
HCM 2000 Control Delay			40.9				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			107.6				Sum of lost time (s)			28.4		
Intersection Capacity Utilization			73.3%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings

4: 120TH AVE NE & South Mall Dwy/TOTEM LAKE WAY

3/7/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	3	8	76	2	23	8	556	42	14	468	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	100		0	100		0
Storage Lanes	0		0	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		167			267			155			244	
Travel Time (s)		4.6			7.3			4.2			6.7	
Confl. Peds. (#/hr)	5			2		7			2	7		5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	2%	2%	2%	1%	1%	1%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection

Int Delay, s/veh 5.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	12	3	8	76	2	23	8	556	42	14	468	15
Conflicting Peds, #/hr	5	0	0	2	0	7	0	0	2	7	0	5
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	1	1	1	2	2	2	1	1	1
Mvmt Flow	13	3	9	84	2	26	9	618	47	16	520	17

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1244	1253	535	1237	1239	655	542	0	0	671	0	0
Stage 1	564	564	-	666	666	-	-	-	-	-	-	-
Stage 2	680	689	-	571	573	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.11	6.51	6.21	4.12	-	-	4.11	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.11	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.11	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.509	4.009	3.309	2.218	-	-	2.209	-	-
Pot Cap-1 Maneuver	152	174	549	153	176	468	1027	-	-	924	-	-
Stage 1	514	512	-	450	459	-	-	-	-	-	-	-
Stage 2	444	450	-	508	505	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	138	168	546	144	170	463	1025	-	-	919	-	-
Mov Cap-2 Maneuver	138	168	-	144	170	-	-	-	-	-	-	-
Stage 1	507	501	-	443	452	-	-	-	-	-	-	-
Stage 2	411	443	-	487	494	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	26.5	59.2	0.1	0.3
HCM LOS	D	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1025	-	-	193	171	919	-	-
HCM Lane V/C Ratio	0.009	-	-	0.132	0.656	0.017	-	-
HCM Control Delay (s)	8.5	-	-	26.5	59.2	9	-	-
HCM Lane LOS	A	-	-	D	F	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.4	3.8	0.1	-	-

2017 With Project

Lanes, Volumes, Timings
 1: TOTEM LK BLVD & NE 128TH ST

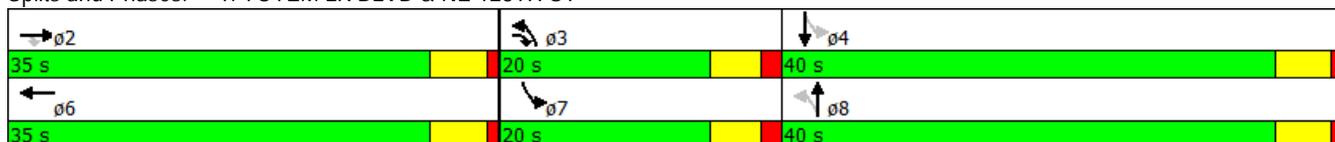
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑		↑	↑↑		↑	↑↑	
Volume (vph)	0	363	265	0	341	114	84	189	280	77	396	158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		190			1017			623			1382	
Travel Time (s)		3.7			19.8			12.1			26.9	
Confl. Peds. (#/hr)			4			36			11	11		
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	6%	6%	6%	6%	6%	6%	3%	3%	3%	1%	1%	1%
Parking (#/hr)		0										
Shared Lane Traffic (%)												
Turn Type		NA	pm+ov		NA		pm+pt	NA		pm+pt		NA
Protected Phases		2	3		6		3	8		7		4
Permitted Phases			2				8			4		
Detector Phase		2	3		6		3	8		7		4
Switch Phase												
Minimum Initial (s)		7.0	3.0		7.0		3.0	5.0		3.0		5.0
Minimum Split (s)		33.0	8.1		12.0		8.1	35.0		8.1		37.0
Total Split (s)		35.0	20.0		35.0		20.0	40.0		20.0		40.0
Total Split (%)		36.8%	21.1%		36.8%		21.1%	42.1%		21.1%		42.1%
Yellow Time (s)		4.0	3.6		4.0		3.6	4.0		3.6		4.0
All-Red Time (s)		1.0	1.5		1.0		1.5	1.0		1.5		1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	-1.0		-1.0		-1.0
Total Lost Time (s)		5.0	5.1		5.0		5.1	4.0		4.1		4.0
Lead/Lag			Lead				Lead	Lag		Lead		Lag
Lead-Lag Optimize?												
Recall Mode		None	None		None		None	Min		None		None

Intersection Summary

Area Type: Other
 Cycle Length: 95
 Actuated Cycle Length: 53.5
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated

Splits and Phases: 1: TOTEM LK BLVD & NE 128TH ST



HCM 2010 Signalized Intersection Summary

1: TOTEM LK BLVD & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑		↑	↑↑		↑	↑↑	
Volume (veh/h)	0	363	265	0	341	114	84	189	280	77	396	158
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		0.99	1.00		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1792	1792	0	1792	1900	1845	1845	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	382	114	0	359	120	88	199	295	81	417	166
Adj No. of Lanes	0	2	1	0	2	0	1	2	0	1	2	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	0	6	6	0	6	6	3	3	3	1	1	1
Cap, veh/h	0	1173	603	0	861	283	378	602	534	425	846	333
Arrive On Green	0.00	0.34	0.34	0.00	0.34	0.36	0.05	0.34	0.34	0.07	0.34	0.32
Sat Flow, veh/h	0	3495	1518	0	2589	821	1757	1752	1553	1792	2499	984
Grp Volume(v), veh/h	0	382	114	0	243	236	88	199	295	81	297	286
Grp Sat Flow(s),veh/h/ln	0	1703	1518	0	1703	1618	1757	1752	1553	1792	1787	1696
Q Serve(g_s), s	0.0	4.4	2.6	0.0	5.8	5.9	1.8	4.5	8.2	1.5	7.0	7.2
Cycle Q Clear(g_c), s	0.0	4.4	2.6	0.0	5.8	5.9	1.8	4.5	8.2	1.5	7.0	7.2
Prop In Lane	0.00		1.00	0.00		0.51	1.00		1.00	1.00		0.58
Lane Grp Cap(c), veh/h	0	1173	603	0	586	557	378	602	534	425	605	574
V/C Ratio(X)	0.00	0.33	0.19	0.00	0.41	0.42	0.23	0.33	0.55	0.19	0.49	0.50
Avail Cap(c_a), veh/h	0	1916	935	0	958	910	776	1183	1049	841	1207	1145
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	12.9	10.5	0.0	13.4	13.2	11.6	13.0	14.2	10.5	14.0	14.3
Incr Delay (d2), s/veh	0.0	0.2	0.2	0.0	0.7	0.7	0.2	0.3	0.9	0.2	0.6	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.1	1.1	0.0	2.8	2.7	0.9	2.2	3.6	0.7	3.6	3.5
LnGrp Delay(d),s/veh	0.0	13.1	10.7	0.0	14.0	13.9	11.8	13.3	15.1	10.7	14.6	15.0
LnGrp LOS		B	B		B	B	B	B	B	B	B	B
Approach Vol, veh/h		496			479			582			664	
Approach Delay, s/veh		12.6			14.0			14.0			14.3	
Approach LOS		B			B			B			B	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		23.4	7.9	22.0		23.4	7.6	22.3				
Change Period (Y+Rc), s		5.0	5.1	5.0		5.0	5.1	5.0				
Max Green Setting (Gmax), s		30.0	14.9	35.0		30.0	14.9	35.0				
Max Q Clear Time (g_c+I1), s		6.4	3.8	9.2		7.9	3.5	10.2				
Green Ext Time (p_c), s		8.5	0.1	4.9		8.3	0.1	4.8				
Intersection Summary												
HCM 2010 Ctrl Delay			13.8									
HCM 2010 LOS			B									

Lanes, Volumes, Timings

2: 1-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LK BLVD

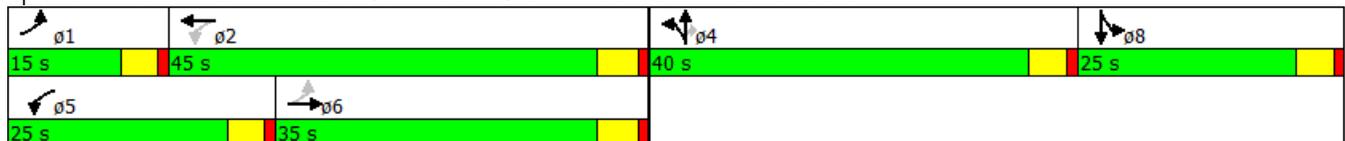
3/21/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	524	72	54	370	105	228	193	11	435	152	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	150		0	150		150	215		0
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		239			927			303			408	
Travel Time (s)		4.7			18.1			8.3			11.1	
Confl. Peds. (#/hr)	5					5			2			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	3%	3%	3%	3%	3%	3%
Shared Lane Traffic (%)							0%					
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split	NA	
Protected Phases	1	6		5	2		4	4		8	8	
Permitted Phases	6			2					4			
Detector Phase	1	6		5	2		4	4	4	8	8	
Switch Phase												
Minimum Initial (s)	4.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0	6.0	
Minimum Split (s)	8.5	11.0		9.5	31.0		32.6	32.6	32.6	10.6	10.6	
Total Split (s)	15.0	35.0		25.0	45.0		40.0	40.0	40.0	25.0	25.0	
Total Split (%)	12.0%	28.0%		20.0%	36.0%		32.0%	32.0%	32.0%	20.0%	20.0%	
Yellow Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6	3.6	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	-1.0	-1.0	-1.0	
Total Lost Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6	3.6	
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	Min		None	Min		None	None	None	None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 81.8
 Natural Cycle: 85
 Control Type: Actuated-Uncoordinated

Splits and Phases: 2: 1-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LK BLVD



HCM 2010 Signalized Intersection Summary

2: 1-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LK BLVD

3/21/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	9	524	72	54	370	105	228	193	11	435	152	17
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1827	1827	1900	1845	1845	1845	1845	1845	1900
Adj Flow Rate, veh/h	9	552	76	57	389	111	222	229	0	458	160	18
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	4	4	4	3	3	3	3	3	3
Cap, veh/h	345	872	120	332	857	242	353	371	315	718	343	39
Arrive On Green	0.03	0.28	0.28	0.07	0.32	0.32	0.20	0.20	0.00	0.21	0.21	0.21
Sat Flow, veh/h	1774	3123	429	1740	2670	753	1757	1845	1568	3408	1629	183
Grp Volume(v), veh/h	9	312	316	57	251	249	222	229	0	458	0	178
Grp Sat Flow(s),veh/h/ln	1774	1770	1783	1740	1736	1687	1757	1845	1568	1704	0	1812
Q Serve(g_s), s	0.2	9.4	9.4	1.3	7.0	7.1	7.0	6.9	0.0	7.4	0.0	5.2
Cycle Q Clear(g_c), s	0.2	9.4	9.4	1.3	7.0	7.1	7.0	6.9	0.0	7.4	0.0	5.2
Prop In Lane	1.00		0.24	1.00		0.45	1.00		1.00	1.00		0.10
Lane Grp Cap(c), veh/h	345	494	498	332	557	541	353	371	315	718	0	382
V/C Ratio(X)	0.03	0.63	0.63	0.17	0.45	0.46	0.63	0.62	0.00	0.64	0.00	0.47
Avail Cap(c_a), veh/h	635	903	909	830	1171	1138	1052	1105	939	1200	0	638
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.9	19.2	19.2	13.7	16.4	16.4	22.2	22.2	0.0	21.9	0.0	21.0
Incr Delay (d2), s/veh	0.0	1.3	1.3	0.2	0.6	0.6	1.8	1.7	0.0	0.9	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	4.8	4.8	0.6	3.4	3.4	3.6	3.7	0.0	3.6	0.0	2.7
LnGrp Delay(d),s/veh	15.0	20.5	20.5	13.9	17.0	17.0	24.1	23.8	0.0	22.8	0.0	21.9
LnGrp LOS	B	C	C	B	B	B	C	C		C		C
Approach Vol, veh/h		637			557			451			636	
Approach Delay, s/veh		20.4			16.7			23.9			22.6	
Approach LOS		C			B			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.1	23.5		15.8	7.6	21.0		16.4				
Change Period (Y+Rc), s	4.5	5.0		4.6	4.5	5.0		4.6				
Max Green Setting (Gmax), s	10.5	40.0		35.4	20.5	30.0		20.4				
Max Q Clear Time (g_c+I1), s	2.2	9.1		9.0	3.3	11.4		9.4				
Green Ext Time (p_c), s	0.0	5.0		1.9	0.1	4.5		2.4				
Intersection Summary												
HCM 2010 Ctrl Delay			20.8									
HCM 2010 LOS			C									
Notes												
User approved volume balancing among the lanes for turning movement.												

Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

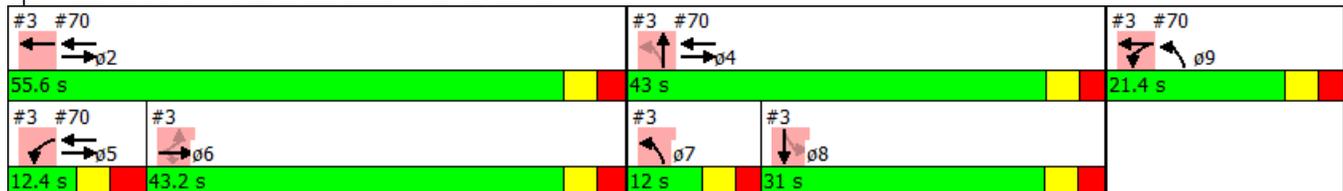
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	297	173	119	88	128	18	170	71	121	22	177	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175		0	100		0	150		0	170		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1017			134			408			591	
Travel Time (s)		19.8			2.6			11.1			16.1	
Confl. Peds. (#/hr)	20		8			20	6		11	11		6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4			8	
Permitted Phases	6		6				4			8		
Detector Phase	6	6	6	5 9	2 9		7	4		8	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0				6.0	6.0		6.0	6.0	
Minimum Split (s)	22.8	22.8	22.8				11.3	22.4		22.6	22.6	
Total Split (s)	43.2	43.2	43.2				12.0	43.0		31.0	31.0	
Total Split (%)	36.0%	36.0%	36.0%				10.0%	35.8%		25.8%	25.8%	
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	
All-Red Time (s)	2.8	2.8	2.8				2.3	2.4		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Lead/Lag	Lag	Lag	Lag				Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None				None	None		None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 110.7
 Natural Cycle: 105
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: 120TH AVE NE & NE 128TH ST



Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

3/7/2016

Lane Group	ø2	ø5	ø9
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	2	5	9
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	6.0	6.0	12.0
Minimum Split (s)	22.7	12.3	21.4
Total Split (s)	55.6	12.4	21.4
Total Split (%)	46%	10%	18%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	2.7	3.3	2.4
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	
Lead-Lag Optimize?			
Recall Mode	None	None	None
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

3: 120TH AVE NE & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	297	173	119	88	128	18	170	71	121	22	177	184
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	6.3	5.7		5.3	5.4		5.6	5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.95	1.00	0.99		1.00	0.96		1.00	0.99	
Flpb, ped/bikes	0.95	1.00	1.00	1.00	1.00		1.00	1.00		0.97	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.91		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1643	1827	1482	1719	1756		1770	1627		1721	1699	
Flt Permitted	0.66	1.00	1.00	0.95	1.00		0.15	1.00		0.63	1.00	
Satd. Flow (perm)	1143	1827	1482	1719	1756		276	1627		1147	1699	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	306	178	123	91	132	19	175	73	125	23	182	190
RTOR Reduction (vph)	0	0	87	0	5	0	0	0	0	0	31	0
Lane Group Flow (vph)	306	178	36	91	146	0	175	198	0	23	341	0
Confl. Peds. (#/hr)	20		8				20	6		11	11	6
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4				8
Permitted Phases	6		6				4			8		
Actuated Green, G (s)	33.1	33.1	33.1	23.8	63.3		37.5	37.5		25.2	25.2	
Effective Green, g (s)	33.1	33.1	33.1	18.4	57.9		37.5	37.5		25.2	25.2	
Actuated g/C Ratio	0.30	0.30	0.30	0.16	0.52		0.34	0.34		0.23	0.23	
Clearance Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	338	540	438	282	908		183	545		258	382	
v/s Ratio Prot		0.10		c0.05	0.08		c0.06	0.12			0.20	
v/s Ratio Perm	c0.27		0.02				c0.26			0.02		
v/c Ratio	0.91	0.33	0.08	0.32	0.16		0.96	0.36		0.09	0.89	
Uniform Delay, d1	37.9	30.7	28.4	41.3	14.2		33.2	28.2		34.3	42.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	26.0	0.1	0.0	0.2	0.0		53.0	0.6		0.2	22.6	
Delay (s)	63.8	30.9	28.5	41.5	14.2		86.2	28.7		34.5	64.6	
Level of Service	E	C	C	D	B		F	C		C	E	
Approach Delay (s)		47.0			24.5			55.7			62.9	
Approach LOS		D			C			E			E	
Intersection Summary												
HCM 2000 Control Delay			49.5				HCM 2000 Level of Service				D	
HCM 2000 Volume to Capacity ratio			0.83									
Actuated Cycle Length (s)			111.9				Sum of lost time (s)			28.4		
Intersection Capacity Utilization			76.5%				ICU Level of Service			D		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
 4: 120TH AVE NE & TOTEM LAKE WAY

3/16/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	225	28	244	60	13	405
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		0	100	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	25		25			25
Link Distance (ft)	130		96			219
Travel Time (s)	3.5		2.6			6.0
Confl. Peds. (#/hr)	20	20		20	20	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 4: 120TH AVE NE & TOTEM LAKE WAY

3/16/2016

Intersection

Int Delay, s/veh 5.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	225	28	244	60	13	405
Conflicting Peds, #/hr	20	20	0	20	20	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	3	3
Mvmt Flow	245	30	265	65	14	440

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	786	338	0
Stage 1	318	-	-
Stage 2	468	-	-
Critical Hdwy	6.42	6.22	4.13
Critical Hdwy Stg 1	5.42	-	-
Critical Hdwy Stg 2	5.42	-	-
Follow-up Hdwy	3.518	3.318	2.227
Pot Cap-1 Maneuver	361	704	1203
Stage 1	738	-	-
Stage 2	630	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	345	681	1183
Mov Cap-2 Maneuver	458	-	-
Stage 1	726	-	-
Stage 2	612	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.3	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	458	681	1183	-
HCM Lane V/C Ratio	-	-	0.534	0.045	0.012	-
HCM Control Delay (s)	-	-	21.5	10.5	8.1	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	3.1	0.1	0	-

Lanes, Volumes, Timings
 5: TOTEM LK BLVD & Mall North Dwy

3/7/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	13	7	572	16	18	588
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50	0		0	100	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	35		35			35
Link Distance (ft)	271		518			623
Travel Time (s)	5.3		10.1			12.1
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
5: TOTEM LK BLVD & Mall North Dwy

3/7/2016

Intersection

Int Delay, s/veh 0.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	13	7	572	16	18	588
Conflicting Peds, #/hr	10	10	0	10	10	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	100	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	5	5	2	2
Mvmt Flow	14	8	622	17	20	639

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	999	340	0 0 649 0
Stage 1	640	-	- - - -
Stage 2	359	-	- - - -
Critical Hdwy	6.84	6.94	- - 4.14 -
Critical Hdwy Stg 1	5.84	-	- - - -
Critical Hdwy Stg 2	5.84	-	- - - -
Follow-up Hdwy	3.52	3.32	- - 2.22 -
Pot Cap-1 Maneuver	240	656	- - 933 -
Stage 1	487	-	- - - -
Stage 2	677	-	- - - -
Platoon blocked, %			- - - -
Mov Cap-1 Maneuver	231	645	- - 925 -
Mov Cap-2 Maneuver	355	-	- - - -
Stage 1	483	-	- - - -
Stage 2	657	-	- - - -

Approach	WB	NB	SB
HCM Control Delay, s	13.9	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	355	645	925	-
HCM Lane V/C Ratio	-	-	0.04	0.012	0.021	-
HCM Control Delay (s)	-	-	15.6	10.6	9	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	0.1	0	0.1	-

Lanes, Volumes, Timings
 6: TOTEM LK BLVD & Mall Central Dr

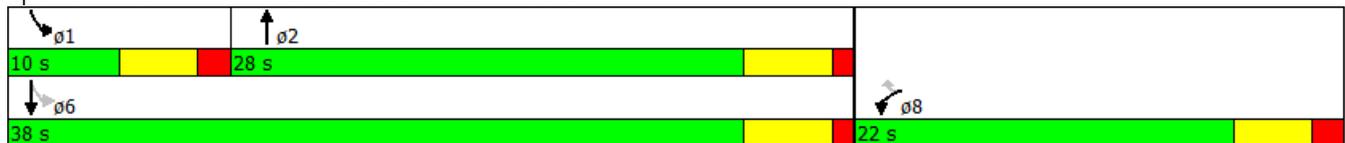
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	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↕		↘	↕
Volume (vph)	21	13	569	20	29	575
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100	0		0	200	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		35			35
Link Distance (ft)	398		642			518
Travel Time (s)	7.8		12.5			10.1
Confl. Peds. (#/hr)	10	10		10	10	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	21.0	21.0	21.0		9.0	21.0
Total Split (s)	22.0	22.0	28.0		10.0	38.0
Total Split (%)	36.7%	36.7%	46.7%		16.7%	63.3%
Yellow Time (s)	3.5	3.5	4.0		3.5	4.0
All-Red Time (s)	1.5	1.5	1.0		1.5	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min		None	Min

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 34.7
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated

Splits and Phases: 6: TOTEM LK BLVD & Mall Central Dr



HCM 2010 Signalized Intersection Summary
6: TOTEM LK BLVD & Mall Central Dr

3/7/2016

								
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Volume (veh/h)	21	13	569	20	29	575		
Number	3	18	2	12	1	6		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00		0.99	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1810	1900	1863	1863		
Adj Flow Rate, veh/h	23	14	618	22	32	625		
Adj No. of Lanes	1	1	2	0	1	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	5	5	2	2		
Cap, veh/h	63	56	1501	53	540	2258		
Arrive On Green	0.04	0.04	0.44	0.44	0.03	0.64		
Sat Flow, veh/h	1774	1583	3476	120	1774	3632		
Grp Volume(v), veh/h	23	14	314	326	32	625		
Grp Sat Flow(s),veh/h/ln	1774	1583	1719	1787	1774	1770		
Q Serve(g_s), s	0.4	0.3	3.8	3.8	0.3	2.4		
Cycle Q Clear(g_c), s	0.4	0.3	3.8	3.8	0.3	2.4		
Prop In Lane	1.00	1.00		0.07	1.00			
Lane Grp Cap(c), veh/h	63	56	762	792	540	2258		
V/C Ratio(X)	0.37	0.25	0.41	0.41	0.06	0.28		
Avail Cap(c_a), veh/h	986	880	1292	1343	775	3817		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	14.4	14.4	5.8	5.8	3.9	2.4		
Incr Delay (d2), s/veh	3.6	2.3	0.4	0.3	0.0	0.1		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.2	0.2	1.8	1.9	0.1	1.1		
LnGrp Delay(d),s/veh	18.0	16.7	6.2	6.1	3.9	2.5		
LnGrp LOS	B	B	A	A	A	A		
Approach Vol, veh/h	37		640			657		
Approach Delay, s/veh	17.5		6.1			2.6		
Approach LOS	B		A			A		
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	6.0	18.6				24.5		6.1
Change Period (Y+Rc), s	5.0	5.0				5.0		5.0
Max Green Setting (Gmax), s	5.0	23.0				33.0		17.0
Max Q Clear Time (g_c+I1), s	2.3	5.8				4.4		2.4
Green Ext Time (p_c), s	0.0	7.5				9.4		0.0
Intersection Summary								
HCM 2010 Ctrl Delay			4.7					
HCM 2010 LOS			A					

Lanes, Volumes, Timings
 7: TOTEM LK BLVD & Mall South Dwy

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	49	547	573	52	36	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Link Speed (mph)		35	35		35	
Link Distance (ft)		642	239		134	
Travel Time (s)		12.5	4.7		2.6	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	5%	5%	2%	2%
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection

Int Delay, s/veh 1

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	49	547	573	52	36	22
Conflicting Peds, #/hr	10	0	0	10	10	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	5	5	2	2
Mvmt Flow	53	595	623	57	39	24

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	689	0	360
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.14	-	6.94
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.22	-	3.32
Pot Cap-1 Maneuver	901	-	637
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	893	-	626
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.8	0	14.9
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	893	-	-	-	331	626
HCM Lane V/C Ratio	0.06	-	-	-	0.118	0.038
HCM Control Delay (s)	9.3	-	-	-	17.3	11
HCM Lane LOS	A	-	-	-	C	B
HCM 95th %tile Q(veh)	0.2	-	-	-	0.4	0.1

Lanes, Volumes, Timings

8: 120TH AVE NE & Lower Mall Svc/Upper Mall Loop Road

3/16/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	0	5	22	0	110	3	259	8	46	343	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	50		0	100		0
Storage Lanes	0		0	0		1	0		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		174			174			177			408	
Travel Time (s)		4.7			4.7			4.8			11.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	4	0	5	22	0	110	3	259	8	46	343	4
Conflicting Peds, #/hr	10	0	10	10	0	10	10	0	10	10	0	10
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	0	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	3	3	3
Mvmt Flow	4	0	5	24	0	120	3	282	9	50	373	4

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	787	792	395	790	789	306	387	0	0	300	0	0
Stage 1	485	485	-	302	302	-	-	-	-	-	-	-
Stage 2	302	307	-	488	487	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.14	-	-	4.13	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.236	-	-	2.227	-	-
Pot Cap-1 Maneuver	309	322	654	308	323	734	1161	-	-	1255	-	-
Stage 1	563	552	-	707	664	-	-	-	-	-	-	-
Stage 2	707	661	-	561	550	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	245	303	643	290	304	722	1151	-	-	1245	-	-
Mov Cap-2 Maneuver	245	303	-	290	304	-	-	-	-	-	-	-
Stage 1	557	525	-	699	656	-	-	-	-	-	-	-
Stage 2	583	654	-	529	524	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	14.9	12.3	0.1	0.9
HCM LOS	B	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1151	-	-	373	290	722	1245	-	-
HCM Lane V/C Ratio	0.003	-	-	0.026	0.082	0.166	0.04	-	-
HCM Control Delay (s)	8.1	0	-	14.9	18.5	11	8	-	-
HCM Lane LOS	A	A	-	B	C	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.1	0.3	0.6	0.1	-	-

Lanes, Volumes, Timings
 9: 120TH AVE NE & Lower Mall Garage

3/7/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	46	72	31	224	339	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			25	25	
Link Distance (ft)	187			195	177	
Travel Time (s)	5.1			5.3	4.8	
Confl. Peds. (#/hr)	20	20	20			20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Parking (#/hr)				10	10	
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 9: 120TH AVE NE & Lower Mall Garage

3/7/2016

Intersection

Int Delay, s/veh 2.7

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	46	72	31	224	339	31
Conflicting Peds, #/hr	20	20	20	0	0	20
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	3	3
Mvmt Flow	50	78	34	243	368	34

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	716	425	422 0
Stage 1	405	-	- -
Stage 2	311	-	- -
Critical Hdwy	6.42	6.22	4.14 -
Critical Hdwy Stg 1	5.42	-	- -
Critical Hdwy Stg 2	5.42	-	- -
Follow-up Hdwy	3.518	3.318	2.236 -
Pot Cap-1 Maneuver	397	629	1127 -
Stage 1	673	-	- -
Stage 2	743	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	370	608	1108 -
Mov Cap-2 Maneuver	370	-	- -
Stage 1	662	-	- -
Stage 2	705	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	15	1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1108	-	486	-	-
HCM Lane V/C Ratio	0.03	-	0.264	-	-
HCM Control Delay (s)	8.4	0	15	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.1	-	-

Lanes, Volumes, Timings
 10: 120TH AVE NE & Lower Mall Central Dr

3/7/2016

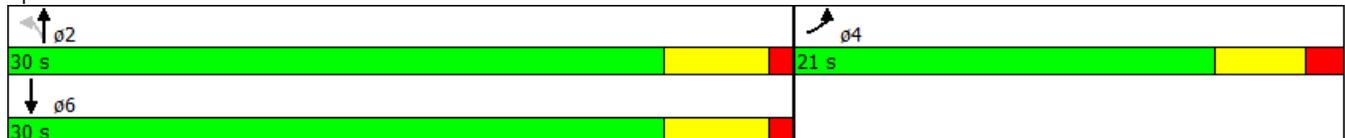


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	Y			Y	Y	
Volume (vph)	4	3	8	252	406	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes				Yes
Link Speed (mph)	25			25	25	
Link Distance (ft)	247			223	195	
Travel Time (s)	6.7			6.1	5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Parking (#/hr)				10	10	
Shared Lane Traffic (%)						
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	21.0		20.0	20.0	20.0	
Total Split (s)	21.0		30.0	30.0	30.0	
Total Split (%)	41.2%		58.8%	58.8%	58.8%	
Yellow Time (s)	3.5		4.0	4.0	4.0	
All-Red Time (s)	1.5		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	5.0			5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 51
 Actuated Cycle Length: 21.7
 Natural Cycle: 45
 Control Type: Actuated-Uncoordinated

Splits and Phases: 10: 120TH AVE NE & Lower Mall Central Dr



HCM 2010 Signalized Intersection Summary
 10: 120TH AVE NE & Lower Mall Central Dr

3/7/2016

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Volume (veh/h)	4	3	8	252	406	6		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1900	1827	1845	1900		
Adj Flow Rate, veh/h	4	3	9	274	441	7		
Adj No. of Lanes	0	0	0	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	0	0	4	4	3	3		
Cap, veh/h	7	6	179	959	969	15		
Arrive On Green	0.01	0.01	0.53	0.53	0.53	0.53		
Sat Flow, veh/h	854	640	17	1793	1811	29		
Grp Volume(v), veh/h	8	0	283	0	0	448		
Grp Sat Flow(s),veh/h/ln	1707	0	1810	0	0	1840		
Q Serve(g_s), s	0.1	0.0	0.0	0.0	0.0	3.3		
Cycle Q Clear(g_c), s	0.1	0.0	1.9	0.0	0.0	3.3		
Prop In Lane	0.50	0.37	0.03			0.02		
Lane Grp Cap(c), veh/h	15	0	1138	0	0	984		
V/C Ratio(X)	0.54	0.00	0.25	0.00	0.00	0.46		
Avail Cap(c_a), veh/h	1247	0	2212	0	0	2099		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	1.00		
Uniform Delay (d), s/veh	10.8	0.0	2.8	0.0	0.0	3.1		
Incr Delay (d2), s/veh	32.2	0.0	0.2	0.0	0.0	0.5		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.9	0.0	0.0	1.7		
LnGrp Delay(d),s/veh	43.0	0.0	3.0	0.0	0.0	3.6		
LnGrp LOS	D		A			A		
Approach Vol, veh/h	8			283	448			
Approach Delay, s/veh	43.0			3.0	3.6			
Approach LOS	D			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		16.7		5.2		16.7		
Change Period (Y+Rc), s		5.0		5.0		5.0		
Max Green Setting (Gmax), s		25.0		16.0		25.0		
Max Q Clear Time (g_c+I1), s		3.9		2.1		5.3		
Green Ext Time (p_c), s		6.8		0.0		6.6		
Intersection Summary								
HCM 2010 Ctrl Delay			3.8					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Lanes, Volumes, Timings

11: 120TH AVE NE & Lower Mall South Svc/Upper Mall Garage

3/7/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	0	7	0	2	1	257	9	5	403	1
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		134			123			219			223	
Travel Time (s)		3.7			3.4			6.0			6.1	
Confl. Peds. (#/hr)	10		10	10		10	10		10	10		10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	4%	4%	4%	3%	3%	3%
Parking (#/hr)								10			10	
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	1	0	0	7	0	2	1	257	9	5	403	1
Conflicting Peds, #/hr	10	0	10	10	0	10	10	0	10	10	0	10
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	4	4	4	3	3	3
Mvmt Flow	1	0	0	8	0	2	1	279	10	5	438	1

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	757	760	459	755	756	304	449	0	0	299	0	0
Stage 1	459	459	-	296	296	-	-	-	-	-	-	-
Stage 2	298	301	-	459	460	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.14	-	-	4.13	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.236	-	-	2.227	-	-
Pot Cap-1 Maneuver	324	336	602	325	337	736	1101	-	-	1256	-	-
Stage 1	582	566	-	712	668	-	-	-	-	-	-	-
Stage 2	711	665	-	582	566	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	316	328	592	318	329	724	1092	-	-	1246	-	-
Mov Cap-2 Maneuver	316	328	-	318	329	-	-	-	-	-	-	-
Stage 1	577	558	-	705	662	-	-	-	-	-	-	-
Stage 2	702	659	-	574	558	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	16.4	15.2	0	0.1
HCM LOS	C	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1092	-	-	316	363	1246	-	-
HCM Lane V/C Ratio	0.001	-	-	0.003	0.027	0.004	-	-
HCM Control Delay (s)	8.3	0	-	16.4	15.2	7.9	0	-
HCM Lane LOS	A	A	-	C	C	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0	0.1	0	-	-

Lanes, Volumes, Timings
 12: 120TH AVE NE & Lower mall South Dwy

3/7/2016

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	8	11	17	296	618	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	50			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			25	25	
Link Distance (ft)	121			408	96	
Travel Time (s)	3.3			11.1	2.6	
Confl. Peds. (#/hr)	10	10	10			10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	2%	2%	4%	4%	3%	3%
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	8	11	17	296	618	12
Conflicting Peds, #/hr	10	10	10	0	0	10
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	4	4	3	3
Mvmt Flow	9	12	18	322	672	13

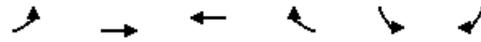
Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1047	698	695 0
Stage 1	688	-	- -
Stage 2	359	-	- -
Critical Hdwy	6.42	6.22	4.14 -
Critical Hdwy Stg 1	5.42	-	- -
Critical Hdwy Stg 2	5.42	-	- -
Follow-up Hdwy	3.518	3.318	2.236 -
Pot Cap-1 Maneuver	253	440	891 -
Stage 1	499	-	- -
Stage 2	707	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	244	433	884 -
Mov Cap-2 Maneuver	369	-	- -
Stage 1	495	-	- -
Stage 2	687	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	14.4	0.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	884	-	404	-	-
HCM Lane V/C Ratio	0.021	-	0.051	-	-
HCM Control Delay (s)	9.2	-	14.4	-	-
HCM Lane LOS	A	-	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.2	-	-

Lanes, Volumes, Timings
 13: TOTEM LAKE WAY & West Garage Dwy

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	4	69	246	0	0	4
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		25	
Link Distance (ft)		130	136		111	
Travel Time (s)		3.5	3.7		3.0	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 13: TOTEM LAKE WAY & West Garage Dwy

3/7/2016

Intersection

Int Delay, s/veh 0.2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	4	69	246	0	0	4
Conflicting Peds, #/hr	10	0	0	10	10	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	75	267	0	0	4

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	277	0	361
Stage 1	-	-	277
Stage 2	-	-	84
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1286	-	638
Stage 1	-	-	770
Stage 2	-	-	939
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1275	-	626
Mov Cap-2 Maneuver	-	-	626
Stage 1	-	-	764
Stage 2	-	-	928

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	9.9
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1275	-	-	-	740
HCM Lane V/C Ratio	0.003	-	-	-	0.006
HCM Control Delay (s)	7.8	0	-	-	9.9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lanes, Volumes, Timings
 14: TOTEM LAKE WAY & Res Garage Dwy

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	25	44	134	0	0	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		25	
Link Distance (ft)		136	253		108	
Travel Time (s)		3.7	6.9		2.9	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 14: TOTEM LAKE WAY & Res Garage Dwy

3/7/2016

Intersection

Int Delay, s/veh 4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	25	44	134	0	0	108
Conflicting Peds, #/hr	10	0	0	10	10	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	27	48	146	0	0	117

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	156	0	166
Stage 1	-	-	156
Stage 2	-	-	102
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1424	-	878
Stage 1	-	-	872
Stage 2	-	-	922
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1412	-	863
Mov Cap-2 Maneuver	-	-	704
Stage 1	-	-	865
Stage 2	-	-	896

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	9.8
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1412	-	-	-	863
HCM Lane V/C Ratio	0.019	-	-	-	0.136
HCM Control Delay (s)	7.6	0	-	-	9.8
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Lanes, Volumes, Timings
 15: TOTEM LAKE WAY & Loop Road

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	17	27	51	0	0	83
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		25	
Link Distance (ft)		253	182		106	
Travel Time (s)		6.9	5.0		2.9	
Confl. Peds. (#/hr)	10			10	10	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 15: TOTEM LAKE WAY & Loop Road

3/7/2016

Intersection

Int Delay, s/veh 5

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	17	27	51	0	0	83
Conflicting Peds, #/hr	10	0	0	10	10	10
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	18	29	55	0	0	90

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	65	0	75
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1537	-	986
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1524	-	970
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	2.9	0	9.1
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1524	-	-	-	970
HCM Lane V/C Ratio	0.012	-	-	-	0.093
HCM Control Delay (s)	7.4	0	-	-	9.1
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0.3

Lanes, Volumes, Timings
 1: TOTEM LK BLVD & NE 128TH ST

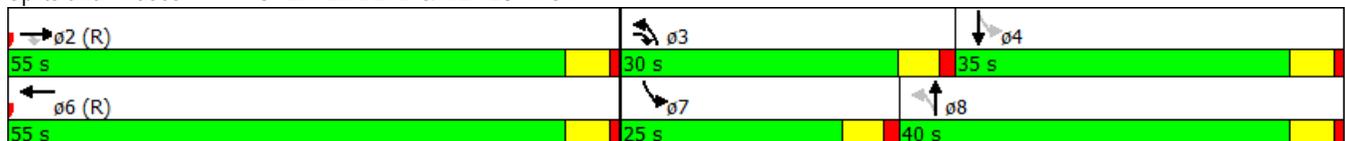
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↑		↑↑		↑	↑↑		↑	↑↑	
Volume (vph)	0	416	226	0	535	119	361	531	368	88	235	113
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		0	200		0
Storage Lanes	0		1	0		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			35			35	
Link Distance (ft)		190			1017			623			1382	
Travel Time (s)		3.7			19.8			12.1			26.9	
Confl. Peds. (#/hr)			8			65			18	18		
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Heavy Vehicles (%)	3%	3%	3%	4%	4%	4%	1%	1%	1%	1%	1%	1%
Parking (#/hr)		0										
Shared Lane Traffic (%)												
Turn Type		NA	pm+ov		NA		pm+pt	NA		pm+pt		NA
Protected Phases		2	3		6		3	8		7		4
Permitted Phases			2				8			4		
Detector Phase		2	3		6		3	8		7		4
Switch Phase												
Minimum Initial (s)		7.0	3.0		7.0		3.0	5.0		3.0		5.0
Minimum Split (s)		33.0	8.1		37.0		8.1	35.0		8.1		10.0
Total Split (s)		55.0	30.0		55.0		30.0	40.0		25.0		35.0
Total Split (%)		45.8%	25.0%		45.8%		25.0%	33.3%		20.8%		29.2%
Yellow Time (s)		4.0	3.6		4.0		3.6	4.0		3.6		4.0
All-Red Time (s)		1.0	1.5		1.0		1.5	1.0		1.5		1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	-1.0		-1.0		-1.0
Total Lost Time (s)		5.0	5.1		5.0		5.1	4.0		4.1		4.0
Lead/Lag			Lead				Lead	Lag		Lead		Lag
Lead-Lag Optimize?												
Recall Mode		C-Min	None		C-Min		None	None		None		None

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 120
 Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBT, Start of Green
 Natural Cycle: 85
 Control Type: Actuated-Coordinated

Splits and Phases: 1: TOTEM LK BLVD & NE 128TH ST



HCM 2010 Signalized Intersection Summary
 1: TOTEM LK BLVD & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑	↗		↑↑		↗	↑↑		↗	↑↑	
Volume (veh/h)	0	416	226	0	535	119	361	531	368	88	235	113
Number	5	2	12	1	6	16	3	8	18	7	4	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.96	0.99		0.98	1.00		0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1845	1845	0	1827	1900	1881	1881	1900	1881	1881	1900
Adj Flow Rate, veh/h	0	443	240	0	569	127	384	565	391	94	250	120
Adj No. of Lanes	0	2	1	0	2	0	1	2	0	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	0	3	3	0	4	4	1	1	1	1	1	1
Cap, veh/h	0	1832	1115	0	1465	326	459	606	419	195	396	183
Arrive On Green	0.00	0.52	0.52	0.00	0.52	0.53	0.19	0.30	0.30	0.07	0.17	0.16
Sat Flow, veh/h	0	3597	1561	0	2893	623	1792	2006	1388	1792	2347	1085
Grp Volume(v), veh/h	0	443	240	0	352	344	384	503	453	94	188	182
Grp Sat Flow(s),veh/h/ln	0	1752	1561	0	1736	1689	1792	1787	1607	1792	1787	1645
Q Serve(g_s), s	0.0	8.3	6.2	0.0	14.6	14.6	20.7	32.8	32.9	5.1	11.7	12.4
Cycle Q Clear(g_c), s	0.0	8.3	6.2	0.0	14.6	14.6	20.7	32.8	32.9	5.1	11.7	12.4
Prop In Lane	0.00		1.00	0.00		0.37	1.00		0.86	1.00		0.66
Lane Grp Cap(c), veh/h	0	1832	1115	0	907	883	459	540	485	195	302	278
V/C Ratio(X)	0.00	0.24	0.22	0.00	0.39	0.39	0.84	0.93	0.93	0.48	0.62	0.66
Avail Cap(c_a), veh/h	0	1832	1115	0	907	883	489	540	485	389	462	425
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.00	0.79	0.79	1.00	1.00	1.00	0.86	0.86	0.86
Uniform Delay (d), s/veh	0.0	15.6	5.8	0.0	17.1	17.0	31.9	40.7	40.7	38.5	46.3	46.9
Incr Delay (d2), s/veh	0.0	0.3	0.4	0.0	1.0	1.0	11.1	23.4	25.2	1.2	1.8	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	4.1	2.8	0.0	7.2	7.0	11.6	19.7	18.0	2.6	6.0	5.8
LnGrp Delay(d),s/veh	0.0	16.0	6.3	0.0	18.1	18.1	43.0	64.1	65.9	39.7	48.2	49.2
LnGrp LOS		B	A		B	B	D	E	E	D	D	D
Approach Vol, veh/h		683			696			1340			464	
Approach Delay, s/veh		12.5			18.1			58.6			46.8	
Approach LOS		B			B			E			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		67.7	28.0	24.2		67.7	12.0	40.2				
Change Period (Y+Rc), s		5.0	5.1	5.0		5.0	5.1	5.0				
Max Green Setting (Gmax), s		50.0	24.9	30.0		50.0	19.9	35.0				
Max Q Clear Time (g_c+I1), s		10.3	22.7	14.4		16.6	7.1	34.9				
Green Ext Time (p_c), s		15.5	0.2	4.8		14.5	0.2	0.1				
Intersection Summary												
HCM 2010 Ctrl Delay			38.2									
HCM 2010 LOS			D									

Lanes, Volumes, Timings

2: 1-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LK BLVD

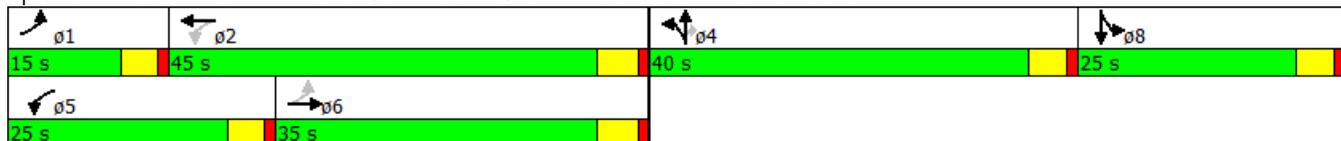
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	342	78	172	852	318	362	179	17	506	141	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	185		0	150		0	150		150	215		0
Storage Lanes	1		0	1		0	1		1	2		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			Yes			Yes
Link Speed (mph)		35			35			25				25
Link Distance (ft)		239			927			369				408
Travel Time (s)		4.7			18.1			10.1				11.1
Confl. Peds. (#/hr)	12					12			5			
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Heavy Vehicles (%)	2%	2%	2%	1%	1%	1%	1%	1%	1%	2%	2%	2%
Shared Lane Traffic (%)							0%					
Turn Type	pm+pt	NA		pm+pt	NA		Split	NA	Perm	Split		NA
Protected Phases	1	6		5	2		4	4		8		8
Permitted Phases	6			2					4			
Detector Phase	1	6		5	2		4	4	4	8		8
Switch Phase												
Minimum Initial (s)	5.0	6.0		5.0	6.0		6.0	6.0	6.0	6.0		6.0
Minimum Split (s)	9.5	11.0		9.5	33.0		32.6	32.6	32.6	10.6		10.6
Total Split (s)	15.0	35.0		25.0	45.0		40.0	40.0	40.0	25.0		25.0
Total Split (%)	12.0%	28.0%		20.0%	36.0%		32.0%	32.0%	32.0%	20.0%		20.0%
Yellow Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6		3.6
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0		1.0
Lost Time Adjust (s)	-1.0	-1.0		-1.0	-1.0		-1.0	-1.0	-1.0	-1.0		-1.0
Total Lost Time (s)	3.5	4.0		3.5	4.0		3.6	3.6	3.6	3.6		3.6
Lead/Lag	Lead	Lag		Lead	Lag							
Lead-Lag Optimize?												
Recall Mode	None	Min		None	Min		None	None	None	None		None

Intersection Summary

Area Type: Other
 Cycle Length: 125
 Actuated Cycle Length: 110.4
 Natural Cycle: 100
 Control Type: Actuated-Uncoordinated

Splits and Phases: 2: 1-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LK BLVD



HCM 2010 Signalized Intersection Summary
 2: 1-405 NB ON/OFF RAMPS/120TH AVE NE & TOTEM LK BLVD

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	32	342	78	172	852	318	362	179	17	506	141	40
Number	1	6	16	5	2	12	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	0.99		0.98	1.00		0.99	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1881	1881	1900	1881	1881	1881	1863	1863	1900
Adj Flow Rate, veh/h	34	360	82	181	897	335	284	323	18	533	148	42
Adj No. of Lanes	1	2	0	1	2	0	1	1	1	2	1	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	2	2	2	1	1	1	1	1	1	2	2	2
Cap, veh/h	173	965	217	475	998	371	399	419	354	663	269	76
Arrive On Green	0.04	0.34	0.34	0.10	0.39	0.39	0.22	0.22	0.22	0.19	0.19	0.19
Sat Flow, veh/h	1774	2861	644	1792	2540	944	1792	1881	1588	3442	1397	396
Grp Volume(v), veh/h	34	221	221	181	630	602	284	323	18	533	0	190
Grp Sat Flow(s),veh/h/ln	1774	1770	1735	1792	1787	1697	1792	1881	1588	1721	0	1793
Q Serve(g_s), s	1.2	9.2	9.5	6.0	32.3	32.6	14.3	15.8	0.9	14.5	0.0	9.4
Cycle Q Clear(g_c), s	1.2	9.2	9.5	6.0	32.3	32.6	14.3	15.8	0.9	14.5	0.0	9.4
Prop In Lane	1.00		0.37	1.00		0.56	1.00		1.00	1.00		0.22
Lane Grp Cap(c), veh/h	173	597	585	475	702	667	399	419	354	663	0	345
V/C Ratio(X)	0.20	0.37	0.38	0.38	0.90	0.90	0.71	0.77	0.05	0.80	0.00	0.55
Avail Cap(c_a), veh/h	309	597	585	695	749	712	667	700	591	753	0	392
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	23.4	24.5	24.6	17.0	27.8	27.9	35.1	35.6	29.9	37.7	0.0	35.6
Incr Delay (d2), s/veh	0.5	0.4	0.4	0.5	13.0	14.3	2.4	3.0	0.1	5.7	0.0	1.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.6	4.6	4.6	3.0	18.5	17.9	7.4	8.5	0.4	7.4	0.0	4.8
LnGrp Delay(d),s/veh	23.9	24.9	25.0	17.5	40.8	42.2	37.4	38.7	29.9	43.4	0.0	37.0
LnGrp LOS	C	C	C	B	D	D	D	D	C	D		D
Approach Vol, veh/h		476			1413			625			723	
Approach Delay, s/veh		24.9			38.4			37.9			41.7	
Approach LOS		C			D			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.5	42.4		25.4	13.0	37.0		22.4				
Change Period (Y+Rc), s	4.5	5.0		4.6	4.5	5.0		4.6				
Max Green Setting (Gmax), s	10.5	40.0		35.4	20.5	30.0		20.4				
Max Q Clear Time (g_c+I1), s	3.2	34.6		17.8	8.0	11.5		16.5				
Green Ext Time (p_c), s	0.0	2.8		2.5	0.5	7.7		1.4				
Intersection Summary												
HCM 2010 Ctrl Delay				37.1								
HCM 2010 LOS				D								
Notes												
User approved volume balancing among the lanes for turning movement.												

Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

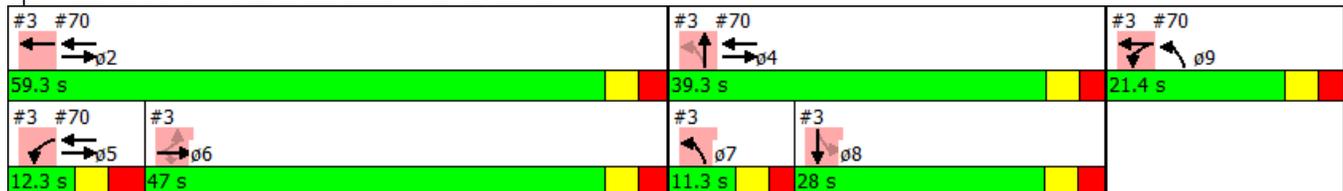
3/7/2016

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	368	202	275	136	211	35	163	166	34	10	218	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	175		0	100		0	150		0	170		0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (ft)	25			25			25			25		
Right Turn on Red			Yes			Yes			No			Yes
Link Speed (mph)		35			35			25			25	
Link Distance (ft)		1017			134			408			591	
Travel Time (s)		19.8			2.6			11.1			16.1	
Confl. Peds. (#/hr)	14		12			14	6		9	9		6
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Shared Lane Traffic (%)												
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4			8	
Permitted Phases	6		6				4			8		
Detector Phase	6	6	6	5 9	2 9		7	4		8	8	
Switch Phase												
Minimum Initial (s)	6.0	6.0	6.0				6.0	6.0		6.0	6.0	
Minimum Split (s)	22.8	22.8	22.8				11.3	22.4		22.6	22.6	
Total Split (s)	47.0	47.0	47.0				11.3	39.3		28.0	28.0	
Total Split (%)	39.2%	39.2%	39.2%				9.4%	32.8%		23.3%	23.3%	
Yellow Time (s)	3.0	3.0	3.0				3.0	3.0		3.0	3.0	
All-Red Time (s)	2.8	2.8	2.8				2.3	2.4		2.6	2.6	
Lost Time Adjust (s)	0.0	0.0	0.0				0.0	0.0		0.0	0.0	
Total Lost Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Lead/Lag	Lag	Lag	Lag				Lead			Lag	Lag	
Lead-Lag Optimize?												
Recall Mode	None	None	None				None	None		None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 118.9
 Natural Cycle: 145
 Control Type: Actuated-Uncoordinated

Splits and Phases: 3: 120TH AVE NE & NE 128TH ST



Lanes, Volumes, Timings
 3: 120TH AVE NE & NE 128TH ST

3/7/2016

Lane Group	ø2	ø5	ø9
Lane Configurations			
Volume (vph)			
Ideal Flow (vphpl)			
Storage Length (ft)			
Storage Lanes			
Taper Length (ft)			
Right Turn on Red			
Link Speed (mph)			
Link Distance (ft)			
Travel Time (s)			
Confl. Peds. (#/hr)			
Peak Hour Factor			
Heavy Vehicles (%)			
Shared Lane Traffic (%)			
Turn Type			
Protected Phases	2	5	9
Permitted Phases			
Detector Phase			
Switch Phase			
Minimum Initial (s)	6.0	6.0	12.0
Minimum Split (s)	22.7	12.3	21.4
Total Split (s)	59.3	12.3	21.4
Total Split (%)	49%	10%	18%
Yellow Time (s)	3.0	3.0	3.0
All-Red Time (s)	2.7	3.3	2.4
Lost Time Adjust (s)			
Total Lost Time (s)			
Lead/Lag		Lead	
Lead-Lag Optimize?			
Recall Mode	None	None	None
Intersection Summary			

HCM Signalized Intersection Capacity Analysis

3: 120TH AVE NE & NE 128TH ST

3/7/2016

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	368	202	275	136	211	35	163	166	34	10	218	167
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.8	5.8	5.8	6.3	5.7		5.3	5.4		5.6	5.6	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frbp, ped/bikes	1.00	1.00	0.94	1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	0.97	1.00	1.00	1.00	1.00		1.00	1.00		0.98	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1676	1827	1458	1719	1754		1770	1800		1728	1723	
Flt Permitted	0.60	1.00	1.00	0.95	1.00		0.14	1.00		0.63	1.00	
Satd. Flow (perm)	1062	1827	1458	1719	1754		267	1800		1143	1723	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	379	208	284	140	218	36	168	171	35	10	225	172
RTOR Reduction (vph)	0	0	186	0	6	0	0	0	0	0	23	0
Lane Group Flow (vph)	379	208	98	140	248	0	168	206	0	10	374	0
Confl. Peds. (#/hr)	14		12				14	6		9	9	6
Heavy Vehicles (%)	4%	4%	4%	5%	5%	5%	2%	2%	2%	2%	2%	2%
Turn Type	Perm	NA	Perm	Prot	NA		pm+pt	NA		Perm	NA	
Protected Phases		6		5 9	2 9		7	4				8
Permitted Phases	6		6				4			8		
Actuated Green, G (s)	41.2	41.2	41.2	26.3	73.9		33.9	33.9		22.4	22.4	
Effective Green, g (s)	41.2	41.2	41.2	20.9	68.5		33.9	33.9		22.4	22.4	
Actuated g/C Ratio	0.35	0.35	0.35	0.18	0.58		0.29	0.29		0.19	0.19	
Clearance Time (s)	5.8	5.8	5.8				5.3	5.4		5.6	5.6	
Vehicle Extension (s)	2.0	2.0	2.0				2.0	4.0		4.0	4.0	
Lane Grp Cap (vph)	367	633	505	302	1010		151	513		215	324	
v/s Ratio Prot		0.11		c0.08	0.14		c0.06	0.11			0.22	
v/s Ratio Perm	c0.36		0.07				c0.26			0.01		
v/c Ratio	1.03	0.33	0.19	0.46	0.25		1.11	0.40		0.05	1.16	
Uniform Delay, d1	38.9	28.7	27.2	44.0	12.4		40.3	34.3		39.5	48.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	55.7	0.1	0.1	0.4	0.0		106.6	0.7		0.1	99.0	
Delay (s)	94.5	28.8	27.3	44.4	12.5		147.0	35.0		39.6	147.2	
Level of Service	F	C	C	D	B		F	D		D	F	
Approach Delay (s)		56.9			23.8			85.3			144.6	
Approach LOS		E			C			F			F	
Intersection Summary												
HCM 2000 Control Delay			73.2				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			118.9				Sum of lost time (s)			28.4		
Intersection Capacity Utilization			83.7%				ICU Level of Service			E		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
 4: 120TH AVE NE & TOTEM LAKE WAY

3/16/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	115	28	342	145	35	526
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	50		0	100	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	25		25			25
Link Distance (ft)	140		96			219
Travel Time (s)	3.8		2.6			6.0
Confl. Peds. (#/hr)	50	50		50	50	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection

Int Delay, s/veh 2.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	115	28	342	145	35	526
Conflicting Peds, #/hr	50	50	0	50	50	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	50	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	125	30	372	158	38	572

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1149	551	0 0 579 0
Stage 1	501	-	- - - -
Stage 2	648	-	- - - -
Critical Hdwy	6.42	6.22	- - 4.12 -
Critical Hdwy Stg 1	5.42	-	- - - -
Critical Hdwy Stg 2	5.42	-	- - - -
Follow-up Hdwy	3.518	3.318	- - 2.218 -
Pot Cap-1 Maneuver	219	534	- - 995 -
Stage 1	609	-	- - - -
Stage 2	521	-	- - - -
Platoon blocked, %			- - -
Mov Cap-1 Maneuver	193	490	- - 954 -
Mov Cap-2 Maneuver	327	-	- - - -
Stage 1	584	-	- - - -
Stage 2	479	-	- - - -

Approach	WB	NB	SB
HCM Control Delay, s	20.8	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	327	490	954	-
HCM Lane V/C Ratio	-	-	0.382	0.062	0.04	-
HCM Control Delay (s)	-	-	22.7	12.8	8.9	-
HCM Lane LOS	-	-	C	B	A	-
HCM 95th %tile Q(veh)	-	-	1.7	0.2	0.1	-

Lanes, Volumes, Timings
 5: TOTEM LK BLVD & Mall North Dwy

3/7/2016

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	34	38	1140	46	40	422
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	50	0		0	100	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Link Speed (mph)	35		35			35
Link Distance (ft)	271		518			623
Travel Time (s)	5.3		10.1			12.1
Confl. Peds. (#/hr)	25	25		25	25	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop		Free			Free

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
5: TOTEM LK BLVD & Mall North Dwy

3/7/2016

Intersection

Int Delay, s/veh 1.3

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Vol, veh/h	34	38	1140	46	40	422
Conflicting Peds, #/hr	25	25	0	25	25	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	100	-
Veh in Median Storage, #	1	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	41	1239	50	43	459

Major/Minor	Minor1	Major1	Major2
Conflicting Flow All	1605	695	0
Stage 1	1289	-	-
Stage 2	316	-	-
Critical Hdwy	6.84	6.94	4.14
Critical Hdwy Stg 1	5.84	-	-
Critical Hdwy Stg 2	5.84	-	-
Follow-up Hdwy	3.52	3.32	2.22
Pot Cap-1 Maneuver	96	385	522
Stage 1	222	-	-
Stage 2	712	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	84	369	511
Mov Cap-2 Maneuver	175	-	-
Stage 1	217	-	-
Stage 2	639	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23.1	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	175	369	511	-
HCM Lane V/C Ratio	-	-	0.211	0.112	0.085	-
HCM Control Delay (s)	-	-	31	16	12.7	-
HCM Lane LOS	-	-	D	C	B	-
HCM 95th %tile Q(veh)	-	-	0.8	0.4	0.3	-

Lanes, Volumes, Timings
 6: TOTEM LK BLVD & Mall Central Dr

3/7/2016

	↙	↖	↑	↗	↘	↓
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↙	↖	↕		↘	↕
Volume (vph)	96	72	1130	71	64	394
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100	0		0	200	
Storage Lanes	1	1		0	1	
Taper Length (ft)	25				25	
Right Turn on Red		Yes		Yes		
Link Speed (mph)	35		35			35
Link Distance (ft)	398		642			518
Travel Time (s)	7.8		12.5			10.1
Confl. Peds. (#/hr)	25	25		25	25	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Turn Type	Prot	Perm	NA		pm+pt	NA
Protected Phases	8		2		1	6
Permitted Phases		8			6	
Detector Phase	8	8	2		1	6
Switch Phase						
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	21.0	21.0	21.0		9.0	21.0
Total Split (s)	21.0	21.0	30.0		9.0	39.0
Total Split (%)	35.0%	35.0%	50.0%		15.0%	65.0%
Yellow Time (s)	3.5	3.5	4.0		3.5	4.0
All-Red Time (s)	1.5	1.5	1.0		1.5	1.0
Lost Time Adjust (s)	0.0	0.0	0.0		0.0	0.0
Total Lost Time (s)	5.0	5.0	5.0		5.0	5.0
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?						
Recall Mode	None	None	Min		None	Min

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 48.6
 Natural Cycle: 60
 Control Type: Actuated-Uncoordinated

Splits and Phases: 6: TOTEM LK BLVD & Mall Central Dr



HCM 2010 Signalized Intersection Summary

6: TOTEM LK BLVD & Mall Central Dr

3/7/2016

								
Movement	WBL	WBR	NBT	NBR	SBL	SBT		
Lane Configurations								
Volume (veh/h)	96	72	1130	71	64	394		
Number	3	18	2	12	1	6		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00		0.98	1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1900	1863	1863		
Adj Flow Rate, veh/h	104	78	1228	77	70	428		
Adj No. of Lanes	1	1	2	0	1	2		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	175	156	1699	106	351	2375		
Arrive On Green	0.10	0.10	0.50	0.50	0.05	0.67		
Sat Flow, veh/h	1774	1583	3470	211	1774	3632		
Grp Volume(v), veh/h	104	78	643	662	70	428		
Grp Sat Flow(s),veh/h/ln	1774	1583	1770	1819	1774	1770		
Q Serve(g_s), s	2.4	2.0	12.3	12.3	0.7	2.0		
Cycle Q Clear(g_c), s	2.4	2.0	12.3	12.3	0.7	2.0		
Prop In Lane	1.00	1.00		0.12	1.00			
Lane Grp Cap(c), veh/h	175	156	890	915	351	2375		
V/C Ratio(X)	0.60	0.50	0.72	0.72	0.20	0.18		
Avail Cap(c_a), veh/h	655	584	1020	1049	421	2775		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	18.7	18.5	8.4	8.4	6.4	2.7		
Incr Delay (d2), s/veh	3.2	2.5	2.2	2.1	0.3	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	1.3	1.0	6.4	6.6	0.4	1.0		
LnGrp Delay(d),s/veh	21.9	21.0	10.6	10.6	6.7	2.7		
LnGrp LOS	C	C	B	B	A	A		
Approach Vol, veh/h	182		1305			498		
Approach Delay, s/veh	21.5		10.6			3.3		
Approach LOS	C		B			A		
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2				6		8
Phs Duration (G+Y+Rc), s	7.3	26.8				34.1		9.3
Change Period (Y+Rc), s	5.0	5.0				5.0		5.0
Max Green Setting (Gmax), s	4.0	25.0				34.0		16.0
Max Q Clear Time (g_c+I1), s	2.7	14.3				4.0		4.4
Green Ext Time (p_c), s	0.0	7.5				14.8		0.4
Intersection Summary								
HCM 2010 Ctrl Delay			9.7					
HCM 2010 LOS			A					

Lanes, Volumes, Timings
 7: TOTEM LK BLVD & Mall South Dwy

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	93	400	1106	110	37	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	100			0	0	0
Storage Lanes	1			0	1	1
Taper Length (ft)	25				25	
Link Speed (mph)		35	35		35	
Link Distance (ft)		642	239		134	
Travel Time (s)		12.5	4.7		2.6	
Confl. Peds. (#/hr)	25			25	25	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	93	400	1106	110	37	90
Conflicting Peds, #/hr	25	0	0	25	25	25
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	0
Veh in Median Storage, #	-	0	0	-	1	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	435	1202	120	40	98

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	1347	0	1707
Stage 1	-	-	1287
Stage 2	-	-	420
Critical Hdwy	4.14	-	6.84
Critical Hdwy Stg 1	-	-	5.84
Critical Hdwy Stg 2	-	-	5.84
Follow-up Hdwy	2.22	-	3.52
Pot Cap-1 Maneuver	507	-	82
Stage 1	-	-	223
Stage 2	-	-	631
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	496	-	63
Mov Cap-2 Maneuver	-	-	161
Stage 1	-	-	218
Stage 2	-	-	492

Approach	EB	WB	SB
HCM Control Delay, s	2.7	0	23.3
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	496	-	-	-	161	360
HCM Lane V/C Ratio	0.204	-	-	-	0.25	0.272
HCM Control Delay (s)	14.1	-	-	-	34.6	18.7
HCM Lane LOS	B	-	-	-	D	C
HCM 95th %tile Q(veh)	0.8	-	-	-	0.9	1.1

Lanes, Volumes, Timings

8: 120TH AVE NE & Lower Mall Service/Upper Mall Loop Road

3/16/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	8	28	0	59	7	281	23	109	513	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	50		0	100		0
Storage Lanes	0		0	0		1	0		0	1		0
Taper Length (ft)	25			25			25			25		
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		174			174			177			408	
Travel Time (s)		4.7			4.7			4.8			11.1	
Confl. Peds. (#/hr)	25		25	25		25	25		25	25		25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection

Int Delay, s/veh 2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	9	0	8	28	0	59	7	281	23	109	513	11
Conflicting Peds, #/hr	25	0	25	25	0	25	25	0	25	25	0	25
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	0	-	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	10	0	9	30	0	64	8	305	25	118	558	12

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1184	1197	614	1188	1190	368	595	0	0	355	0	0
Stage 1	826	826	-	358	358	-	-	-	-	-	-	-
Stage 2	358	371	-	830	832	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	166	186	492	165	188	677	981	-	-	1204	-	-
Stage 1	366	387	-	660	628	-	-	-	-	-	-	-
Stage 2	660	620	-	364	384	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	131	159	472	142	161	649	961	-	-	1179	-	-
Mov Cap-2 Maneuver	131	159	-	142	161	-	-	-	-	-	-	-
Stage 1	355	341	-	640	609	-	-	-	-	-	-	-
Stage 2	577	601	-	315	338	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	25	19.5	0.2	1.4
HCM LOS	D	C		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	961	-	-	198	142	649	1179	-	-
HCM Lane V/C Ratio	0.008	-	-	0.093	0.214	0.099	0.1	-	-
HCM Control Delay (s)	8.8	0	-	25	37.1	11.2	8.4	-	-
HCM Lane LOS	A	A	-	D	E	B	A	-	-
HCM 95th %tile Q(veh)	0	-	-	0.3	0.8	0.3	0.3	-	-

Lanes, Volumes, Timings
 9: 120TH AVE NE & Lower Mall Garage

3/7/2016



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	53	90	76	258	459	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	100			0
Storage Lanes	1	0	0			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			25	25	
Link Distance (ft)	187			195	177	
Travel Time (s)	5.1			5.3	4.8	
Confl. Peds. (#/hr)	50	50	50			50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)				10	10	
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

HCM 2010 TWSC
 9: 120TH AVE NE & Lower Mall Garage

3/7/2016

Intersection

Int Delay, s/veh 4.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	53	90	76	258	459	90
Conflicting Peds, #/hr	50	50	50	0	0	50
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	58	98	83	280	499	98

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1044	648	647 0
Stage 1	598	-	- -
Stage 2	446	-	- -
Critical Hdwy	6.42	6.22	4.12 -
Critical Hdwy Stg 1	5.42	-	- -
Critical Hdwy Stg 2	5.42	-	- -
Follow-up Hdwy	3.518	3.318	2.218 -
Pot Cap-1 Maneuver	254	470	939 -
Stage 1	549	-	- -
Stage 2	645	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	208	432	900 -
Mov Cap-2 Maneuver	208	-	- -
Stage 1	526	-	- -
Stage 2	551	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	27.9	2.1	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	900	-	309	-	-
HCM Lane V/C Ratio	0.092	-	0.503	-	-
HCM Control Delay (s)	9.4	0	27.9	-	-
HCM Lane LOS	A	A	D	-	-
HCM 95th %tile Q(veh)	0.3	-	2.7	-	-

Lanes, Volumes, Timings
 10: 120TH AVE NE & Lower Mall Central Dr

3/7/2016

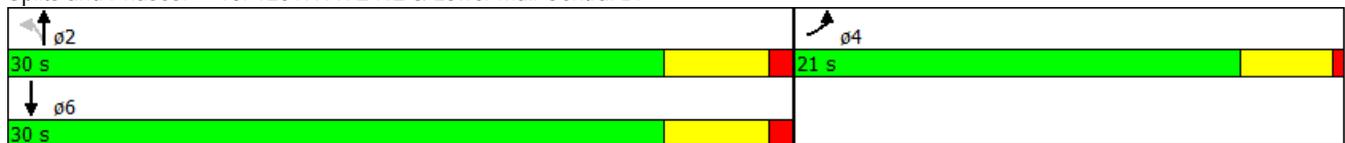


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	17	20	20	334	531	22
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Right Turn on Red		Yes				Yes
Link Speed (mph)	25			25	25	
Link Distance (ft)	247			223	195	
Travel Time (s)	6.7			6.1	5.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)				10	10	
Shared Lane Traffic (%)						
Turn Type	Prot		Perm	NA	NA	
Protected Phases	4			2	6	
Permitted Phases			2			
Detector Phase	4		2	2	6	
Switch Phase						
Minimum Initial (s)	4.0		4.0	4.0	4.0	
Minimum Split (s)	21.0		20.0	20.0	20.0	
Total Split (s)	21.0		30.0	30.0	30.0	
Total Split (%)	41.2%		58.8%	58.8%	58.8%	
Yellow Time (s)	3.5		4.0	4.0	4.0	
All-Red Time (s)	0.5		1.0	1.0	1.0	
Lost Time Adjust (s)	0.0			0.0	0.0	
Total Lost Time (s)	4.0			5.0	5.0	
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None		None	None	None	

Intersection Summary

Area Type: Other
 Cycle Length: 51
 Actuated Cycle Length: 28.5
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated

Splits and Phases: 10: 120TH AVE NE & Lower Mall Central Dr



HCM 2010 Signalized Intersection Summary
 10: 120TH AVE NE & Lower Mall Central Dr

3/7/2016

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Volume (veh/h)	17	20	20	334	531	22		
Number	7	14	5	2	6	16		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1900	1900	1863	1863	1900		
Adj Flow Rate, veh/h	18	22	22	363	577	24		
Adj No. of Lanes	0	0	0	1	1	0		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	0	0	2	2	2	2		
Cap, veh/h	29	35	170	1087	1084	45		
Arrive On Green	0.04	0.04	0.61	0.61	0.61	0.61		
Sat Flow, veh/h	732	895	36	1780	1776	74		
Grp Volume(v), veh/h	41	0	385	0	0	601		
Grp Sat Flow(s),veh/h/ln	1668	0	1816	0	0	1850		
Q Serve(g_s), s	0.6	0.0	0.0	0.0	0.0	4.8		
Cycle Q Clear(g_c), s	0.6	0.0	2.6	0.0	0.0	4.8		
Prop In Lane	0.44	0.54	0.06			0.04		
Lane Grp Cap(c), veh/h	66	0	1257	0	0	1129		
V/C Ratio(X)	0.62	0.00	0.31	0.00	0.00	0.53		
Avail Cap(c_a), veh/h	1104	0	1886	0	0	1800		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.00	1.00		
Uniform Delay (d), s/veh	12.2	0.0	2.5	0.0	0.0	2.9		
Incr Delay (d2), s/veh	11.0	0.0	0.2	0.0	0.0	0.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	0.5	0.0	1.4	0.0	0.0	2.5		
LnGrp Delay(d),s/veh	23.2	0.0	2.7	0.0	0.0	3.4		
LnGrp LOS	C		A			A		
Approach Vol, veh/h	41			385	601			
Approach Delay, s/veh	23.2			2.7	3.4			
Approach LOS	C			A	A			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4		6		
Phs Duration (G+Y+Rc), s		20.7		5.0		20.7		
Change Period (Y+Rc), s		5.0		4.0		5.0		
Max Green Setting (Gmax), s		25.0		17.0		25.0		
Max Q Clear Time (g_c+I1), s		4.6		2.6		6.8		
Green Ext Time (p_c), s		9.5		0.1		8.9		
Intersection Summary								
HCM 2010 Ctrl Delay			3.9					
HCM 2010 LOS			A					
Notes								
User approved volume balancing among the lanes for turning movement.								

Lanes, Volumes, Timings

11: 120TH AVE NE & Lower Mall South Svc/Upper Mall Garage

3/7/2016

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	0	4	42	0	18	2	333	34	27	522	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25			25			25			25	
Link Distance (ft)		134			123			219			223	
Travel Time (s)		3.7			3.4			6.0			6.1	
Confl. Peds. (#/hr)	50		50	50		50	50		50	50		50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Parking (#/hr)								10			10	
Shared Lane Traffic (%)												
Sign Control		Stop			Stop			Free			Free	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											

Intersection

Int Delay, s/veh 2.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Vol, veh/h	2	0	4	42	0	18	2	333	34	27	522	2
Conflicting Peds, #/hr	50	0	50	50	0	50	50	0	50	50	0	50
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None									
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	2	0	4	46	0	20	2	362	37	29	567	2

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1122	1130	668	1114	1113	480	620	0	0	449	0	0
Stage 1	677	677	-	435	435	-	-	-	-	-	-	-
Stage 2	445	453	-	679	678	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	183	204	458	185	208	586	960	-	-	1111	-	-
Stage 1	443	452	-	600	580	-	-	-	-	-	-	-
Stage 2	592	570	-	441	452	-	-	-	-	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	157	179	421	163	183	538	920	-	-	1065	-	-
Mov Cap-2 Maneuver	157	179	-	163	183	-	-	-	-	-	-	-
Stage 1	423	416	-	573	554	-	-	-	-	-	-	-
Stage 2	545	545	-	402	416	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	18.7	30.4	0	0.4
HCM LOS	C	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	920	-	-	270	206	1065	-	-
HCM Lane V/C Ratio	0.002	-	-	0.024	0.317	0.028	-	-
HCM Control Delay (s)	8.9	0	-	18.7	30.4	8.5	0	-
HCM Lane LOS	A	A	-	C	D	A	A	-
HCM 95th %tile Q(veh)	0	-	-	0.1	1.3	0.1	-	-

Lanes, Volumes, Timings
 12: 120TH AVE NE & Lower mall South Dwy

3/7/2016

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	30	90	60	457	599	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	50			0
Storage Lanes	1	0	1			0
Taper Length (ft)	25		25			
Link Speed (mph)	25			25	25	
Link Distance (ft)	121			408	96	
Travel Time (s)	3.3			11.1	2.6	
Confl. Peds. (#/hr)	25	25	25			25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control	Stop			Free	Free	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

Intersection

Int Delay, s/veh 2.3

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Vol, veh/h	30	90	60	457	599	42
Conflicting Peds, #/hr	25	25	25	0	0	25
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	50	-	-	-
Veh in Median Storage, #	1	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	33	98	65	497	651	46

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	1326	724	722 0
Stage 1	699	-	- -
Stage 2	627	-	- -
Critical Hdwy	6.42	6.22	4.12 -
Critical Hdwy Stg 1	5.42	-	- -
Critical Hdwy Stg 2	5.42	-	- -
Follow-up Hdwy	3.518	3.318	2.218 -
Pot Cap-1 Maneuver	172	426	880 -
Stage 1	493	-	- -
Stage 2	532	-	- -
Platoon blocked, %			- -
Mov Cap-1 Maneuver	152	408	862 -
Mov Cap-2 Maneuver	290	-	- -
Stage 1	483	-	- -
Stage 2	482	-	- -

Approach	EB	NB	SB
HCM Control Delay, s	19.9	1.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	862	-	370	-	-
HCM Lane V/C Ratio	0.076	-	0.353	-	-
HCM Control Delay (s)	9.5	-	19.9	-	-
HCM Lane LOS	A	-	C	-	-
HCM 95th %tile Q(veh)	0.2	-	1.6	-	-

Lanes, Volumes, Timings
 13: TOTEM LAKE WAY & West Garage Dwy

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	11	139	93	0	0	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		25	
Link Distance (ft)		140	127		120	
Travel Time (s)		3.8	3.5		3.3	
Confl. Peds. (#/hr)	25			25	25	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 13: TOTEM LAKE WAY & West Garage Dwy

3/7/2016

Intersection

Int Delay, s/veh 0.8

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	11	139	93	0	0	12
Conflicting Peds, #/hr	25	0	0	25	25	25
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	151	101	0	0	13

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	126	0	151
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1460	-	895
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1430	-	858
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	9.3
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1430	-	-	-	858
HCM Lane V/C Ratio	0.008	-	-	-	0.015
HCM Control Delay (s)	7.5	0	-	-	9.3
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0	-	-	-	0

Lanes, Volumes, Timings
 14: TOTEM LAKE WAY & Res Garage Dwy

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	50	84	58	0	0	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		25	
Link Distance (ft)		127	253		108	
Travel Time (s)		3.5	6.9		2.9	
Confl. Peds. (#/hr)	25			25	25	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 14: TOTEM LAKE WAY & Res Garage Dwy

3/7/2016

Intersection

Int Delay, s/veh 3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	50	84	58	0	0	32
Conflicting Peds, #/hr	25	0	0	25	25	25
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	91	63	0	0	35

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	88	0	113
Stage 1	-	-	88
Stage 2	-	-	200
Critical Hdwy	4.12	-	6.22
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.318
Pot Cap-1 Maneuver	1508	-	940
Stage 1	-	-	935
Stage 2	-	-	834
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1477	-	901
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	916
Stage 2	-	-	785

Approach	EB	WB	SB
HCM Control Delay, s	2.8	0	9.2
HCM LOS			A

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1477	-	-	-	901
HCM Lane V/C Ratio	0.037	-	-	-	0.039
HCM Control Delay (s)	7.5	0	-	-	9.2
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Lanes, Volumes, Timings
 15: TOTEM LAKE WAY & Loop Road

3/7/2016



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	34	50	33	0	0	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Link Speed (mph)		25	25		25	
Link Distance (ft)		253	182		106	
Travel Time (s)		6.9	5.0		2.9	
Confl. Peds. (#/hr)	25			25	25	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Shared Lane Traffic (%)						
Sign Control		Free	Free		Stop	

Intersection Summary

Area Type: Other
 Control Type: Unsignalized

HCM 2010 TWSC
 15: TOTEM LAKE WAY & Loop Road

3/7/2016

Intersection

Int Delay, s/veh 3.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Vol, veh/h	34	50	33	0	0	25
Conflicting Peds, #/hr	25	0	0	25	25	25
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	37	54	36	0	0	27

Major/Minor	Major1	Major2	Minor2
Conflicting Flow All	61	0	189
Stage 1	-	-	61
Stage 2	-	-	128
Critical Hdwy	4.12	-	6.42
Critical Hdwy Stg 1	-	-	5.42
Critical Hdwy Stg 2	-	-	5.42
Follow-up Hdwy	2.218	-	3.518
Pot Cap-1 Maneuver	1542	-	800
Stage 1	-	-	962
Stage 2	-	-	898
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1510	-	748
Mov Cap-2 Maneuver	-	-	748
Stage 1	-	-	942
Stage 2	-	-	857

Approach	EB	WB	SB
HCM Control Delay, s	3	0	9
HCM LOS			A

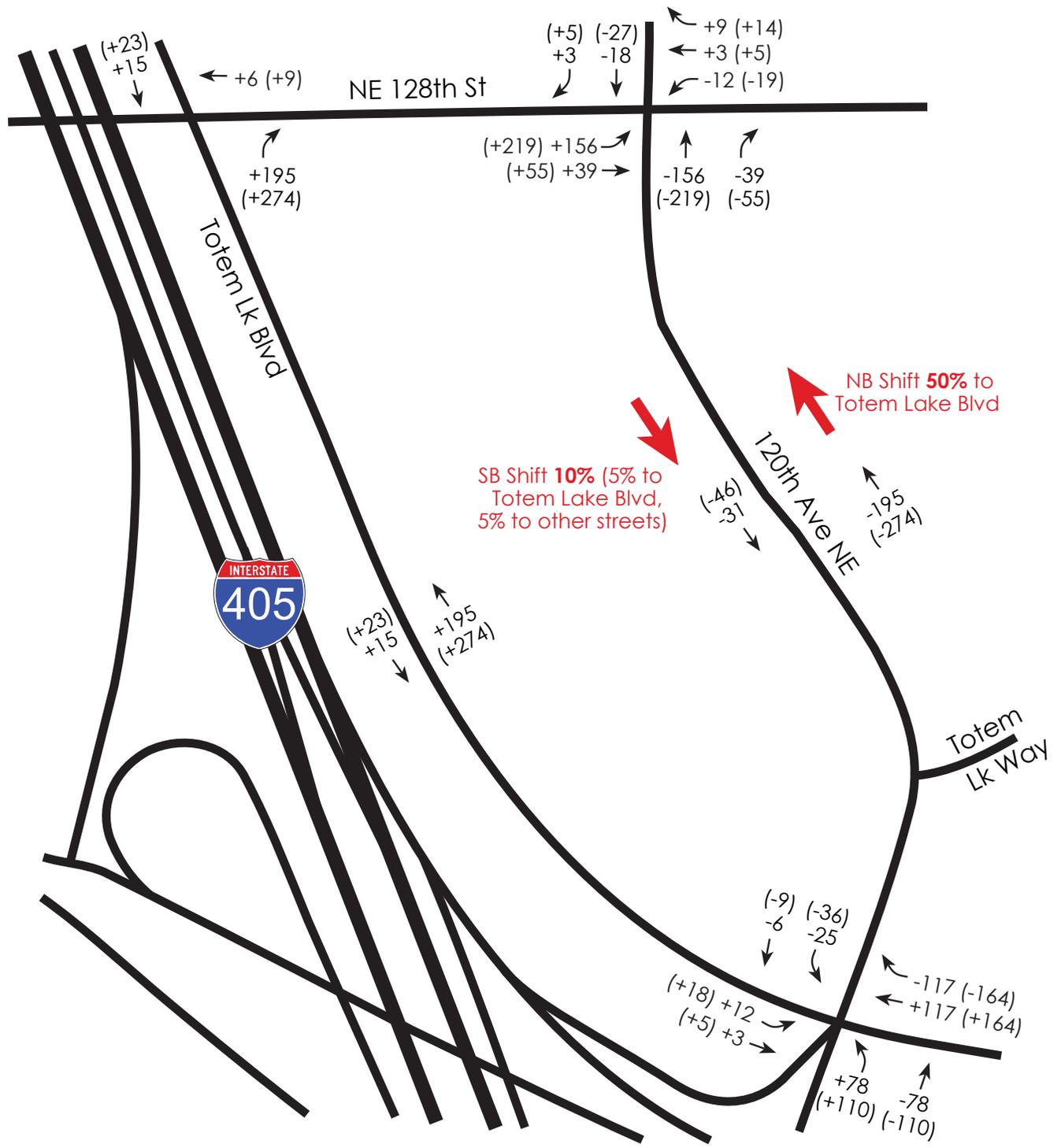
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1510	-	-	-	933
HCM Lane V/C Ratio	0.024	-	-	-	0.029
HCM Control Delay (s)	7.4	0	-	-	9
HCM Lane LOS	A	A	-	-	A
HCM 95th %tile Q(veh)	0.1	-	-	-	0.1

Appendix C

Collision History

Appendix D

120th Ave NE Redistribution



LEGEND	
↑	XX AM Peak Hour Traffic Volume
↓	(XX) PM Peak Hour Traffic Volume

Background Redistribution for 120th Ave NE Traffic Calming

Appendix E

Detailed Trip Generation Calculations

Village at Totem Lake Weekday Daily Trip Generation

Land Use	Area	Units ¹	LUC ²	Trip Rate	Directional Distribution		Vehicle Trip Generation		
					In	Out	In	Out	Total
MOVIE THEATRE⁵	800	seats	444	0.53	50%	50%	212	212	424
<i>Internal Trips</i> ³							-15	-16	-31
Movie Theatre Subtotal (less internal) =							197	196	393
APARTMENTS	1,050	DU	220	equation	50%	50%	3,243	3,244	6,487
<i>Internal Trips</i> ³							-778	-714	-1,492
Apartment Subtotal (less internal) =							2,465	2,530	4,995
SHOPPING CENTER	342,700	GLA	820	equation	50%	50%	7,562	7,561	15,123
<i>Internal Trips</i> ³							-522	-569	-1,091
<i>Passby Trips</i> ⁴	34%						-2,385	-2,386	-4,771
Shopping Center Subtotal (less internal and passby) =							4,655	4,606	9,261
GROCERY STORE	50,000	GFA	850	102.24	50%	50%	2,556	2,556	5,112
<i>Internal Trips</i> ³							-177	-193	-370
<i>Passby Trips</i> ⁴	36%						-853	-854	-1,707
Grocery Subtotal (less internal and passby) =							1,526	1,509	3,035
Gross Weekday Daily Trips Generated =							13,573	13,573	27,146
<i>Less Total Internal Trips =</i>							-1,492	-1,492	-2,984
Net Weekday Daily External Trips =							12,081	12,081	24,162
<i>Less Total Passby Trips =</i>							-3,238	-3,240	-6,478
Net New Weekday Daily Trips Generated =							8,843	8,841	17,684
2005 TIA for Mall Redevelopment (NET EXTERNAL TRIPS) =							11,832	11,833	23,665
Trip Difference from 2005 TIA (NET EXTERNAL TRIPS) =							249	248	497
Percent Difference from 2005 TIA =									2%

Notes:

¹ GFA is Gross Floor Area, GLA is Gross Leasable Area, DU is Dwelling Unit.

² Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, 2012 Land Use Codes.

³ Internal trip reductions based on methodology documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014 (used average of AM and PM percentages for Daily).

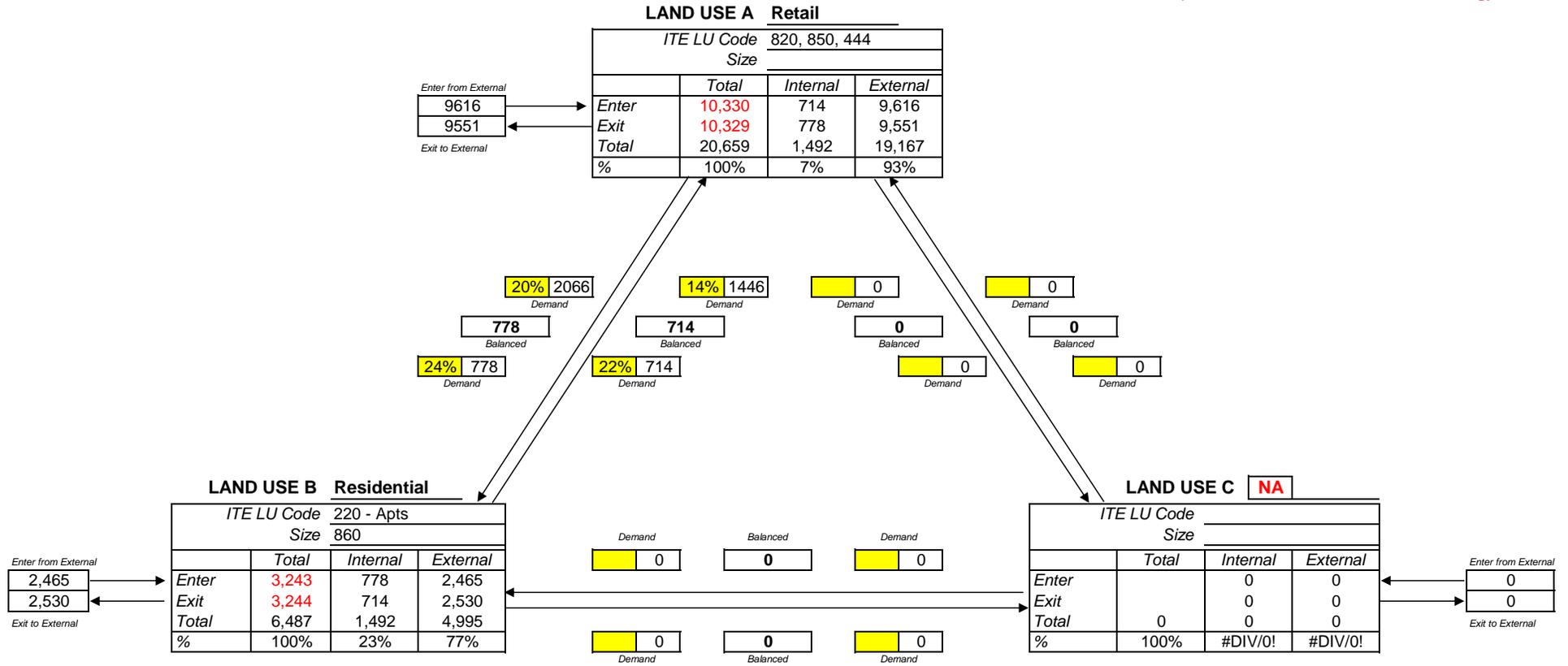
⁴ Passby percent for weekday daily assumed to be the same as PM peak hour passby.

⁵ The weekday daily rate for the movie theatre was calculated based on the ratio of Friday daily to Friday PM peak of adjacent street rates per movie screen (348.33/45.91) multiplied by the weekday PM peak of adjacent street rate per seat (0.07).

Analyst TENW
 Date 2/3/2016

Multi-Use Development Trip Generation and Internal Capture Summary - Daily

Project Name Village at Totem Lake
 Time Period Daily
 Assumed Average of AM and PM internal capture rates from NCHRP 8-51 Methodology



Village at Totem Lake AM Peak Hour Trip Generation

Land Use	Area	Units ¹	LUC ²	Trip Rate	Directional Distribution		Vehicle Trip Generation		
					In	Out	In	Out	Total
MOVIE THEATRE⁶	800	seats	444	0.01	50%	50%	4	4	8
<i>Internal Trips³</i>							0	0	0
Movie Theatre Subtotal (less internal) =							4	4	8
APARTMENTS	1,050	DU	220	equation	20%	80%	104	414	518
<i>Internal Trips³</i>							-2	-4	-6
Apartment Subtotal (less internal) =							102	410	512
SHOPPING CENTER	342,700	GLA	820	equation	62%	38%	205	125	330
<i>Internal Trips³</i>							-3	-1	-4
<i>Passby Trips⁴</i>	0%						0	0	0
Shopping Center Subtotal (less internal and passby) =							202	124	326
GROCERY STORE	50,000	GFA	850	3.40	62%	38%	105	65	170
<i>Internal Trips³</i>							-1	-1	-2
<i>Passby Trips⁵</i>	36%						-37	-23	-60
Grocery Subtotal (less internal and passby) =							67	41	108
Gross AM Peak Hour Trips Generated =							418	608	1,026
<i>Less Total Internal Trips =</i>							-6	-6	-12
Net AM Peak Hour External Trips =							412	602	1,014
<i>Less Total Passby Trips =</i>							-37	-23	-60
Net New AM Peak Hour Trips Generated =							375	579	954
2005 TIA for Mall Redevelopment (NET EXTERNAL TRIPS) =							511	283	794
Trip Difference from 2005 TIA (NET EXTERNAL TRIPS) =							(99)	319	220
Percent Difference from 2005 TIA =									28%

Notes:

¹ GFA is Gross Floor Area, GLA is Gross Leasable Area, DU is Dwelling Unit.

² Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, 2012 Land Use Codes.

³ Internal trip reductions based on methodology documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014.

⁴ Passby percent for AM Peak Hour assumed to be 0%, to be conservative.

⁵ Passby percent for AM Peak Hour assumed to equal to PM peak pass-by percentage (36%).

⁶ The AM peak trip rate for the movie theatre was calculated based on the ratio of the Weekday AM peak of adjacent street rate per seat (0.01) to the Weekday PM peak of adjacent street rate per seat (0.07) for LUC 443 (Movie Theatre without Matinee) multiplied by the Weekday PM peak of adjacent street rate per seat for LUC 444 (0.07).

NCHRP 8-51 Internal Trip Capture Estimation Tool

Project Name:	Village @ Totem Lake	Organization:	TENW
Project Location:		Performed By:	
Scenario Description:	Option 2 (Without Hotel)	Date:	9/29/2015
Analysis Year:	2017 With-Project	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	325,000	gsf	500	310	190
Restaurant				0		
Cinema/Entertainment	444	800	seats	8	4	4
Residential	220	860	DU's	515	104	411
Hotel				0		
All Other Land Uses ²				0		
Total				1023	418	605

Table 2-A: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	2	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	4	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary

	Total	Entering	Exiting
All Person-Trips	1,023	418	605
Internal Capture Percentage	1%	1%	1%
External Vehicle-Trips ³	1,011	412	599
External Transit-Trips ⁴	0	0	0
External Non-Motorized Trips ⁴	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	1%	1%
Restaurant	N/A	N/A
Cinema/Entertainment	0%	0%
Residential	2%	1%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A

⁴Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Village at Totem Lake PM Peak Hour Trip Generation

Land Use	Area	Units ¹	LUC ²	Trip Rate	Directional Distribution		Vehicle Trip Generation		
					In	Out	In	Out	Total
MOVIE THEATRE	800	seats	444	0.07	55%	45%	31	25	56
<i>Internal Trips</i> ³							-8	-7	-15
Movie Theatre Subtotal (less internal) =							23	18	41
APARTMENTS	1,050	DU	220	equation	65%	35%	387	208	595
<i>Internal Trips</i> ³							-180	-87	-267
Apartment Subtotal (less internal) =							207	121	328
SHOPPING CENTER	342,700	GLA	820	equation	48%	52%	656	711	1,367
<i>Internal Trips</i> ³							-68	-141	-209
<i>Passby Trips</i> ⁴	34%						-189	-205	-394
Shopping Center Subtotal (less internal and passby) =							399	365	764
GROCERY STORE	50,000	GFA	850	equation	51%	49%	238	228	466
<i>Internal Trips</i> ³							-24	-45	-69
<i>Passby Trips</i> ⁴	36%						-73	-70	-143
Grocery Subtotal (less internal and passby) =							141	113	254
Gross PM Peak Hour Trips Generated =							1,312	1,172	2,484
<i>Less Total Internal Trips =</i>							-280	-280	-560
Net PM Peak Hour External Trips =							1,032	892	1,924
<i>Less Total Passby Trips =</i>							-262	-275	-537
Net New PM Peak Hour Trips Generated =							770	617	1,387
2005 TIA for Mall Redevelopment (NET EXTERNAL TRIPS) =							986	1,251	2,237
Trip Difference from 2005 TIA (NET EXTERNAL TRIPS) =							46	(359)	(313)
Percent Difference from 2005 TIA =									-14%

Notes:

¹ GFA is Gross Floor Area, GLA is Gross Leasable Area, DU is Dwelling Unit.

² Institute of Transportation Engineers, Trip Generation Manual, 9th Edition, 2012 Land Use Codes.

³ Internal trip reductions based on methodology documented in the ITE Trip Generation Handbook, 3rd Edition, August 2014.

⁴ Passby percent based on studies documented in the ITE Trip Generation Handbook, 3rd Edition, 2014.

NCHRP 8-51 Internal Trip Capture Estimation Tool

Project Name:	Village at Totem Lake	Organization:	TENW
Project Location:		Performed By:	TENW
Scenario Description:		Date:	2/3/2016
Analysis Year:	2017 With-Project	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)

Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office				0		
Retail	820	325,000	gsf	1833	894	939
Restaurant				0		
Cinema/Entertainment	444	800	seats	56	31	25
Residential	220	860	DU's	595	387	208
Hotel				0		
All Other Land Uses ²				0		
Total				2484	1312	1172

Table 2-P: Mode Split and Vehicle Occupancy Estimates

Land Use	Entering Trips			Exiting Trips		
	Veh. Occ.	% Transit	% Non-Motorized	Veh. Occ.	% Transit	% Non-Motorized
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						
All Other Land Uses ²						

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	8	178	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	5	0		2	0
Residential	0	87	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary

	Total	Entering	Exiting
All Person-Trips	2,484	1,312	1,172
Internal Capture Percentage	23%	21%	24%
External Vehicle-Trips ³	1,924	1,032	892
External Transit-Trips ⁴	0	0	0
External Non-Motorized Trips ⁴	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use

Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	10%	20%
Restaurant	N/A	N/A
Cinema/Entertainment	26%	28%
Residential	47%	42%
Hotel	N/A	N/A

¹ Land Use Codes (LUCs) from *Trip Generation Informational Report*, published by the Institute of Transportation Engineers.

² Total estimate for all other land uses at mixed-use development site-not subject to internal trip capture computations in this estimator

³ Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P

⁴ Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Appendix F

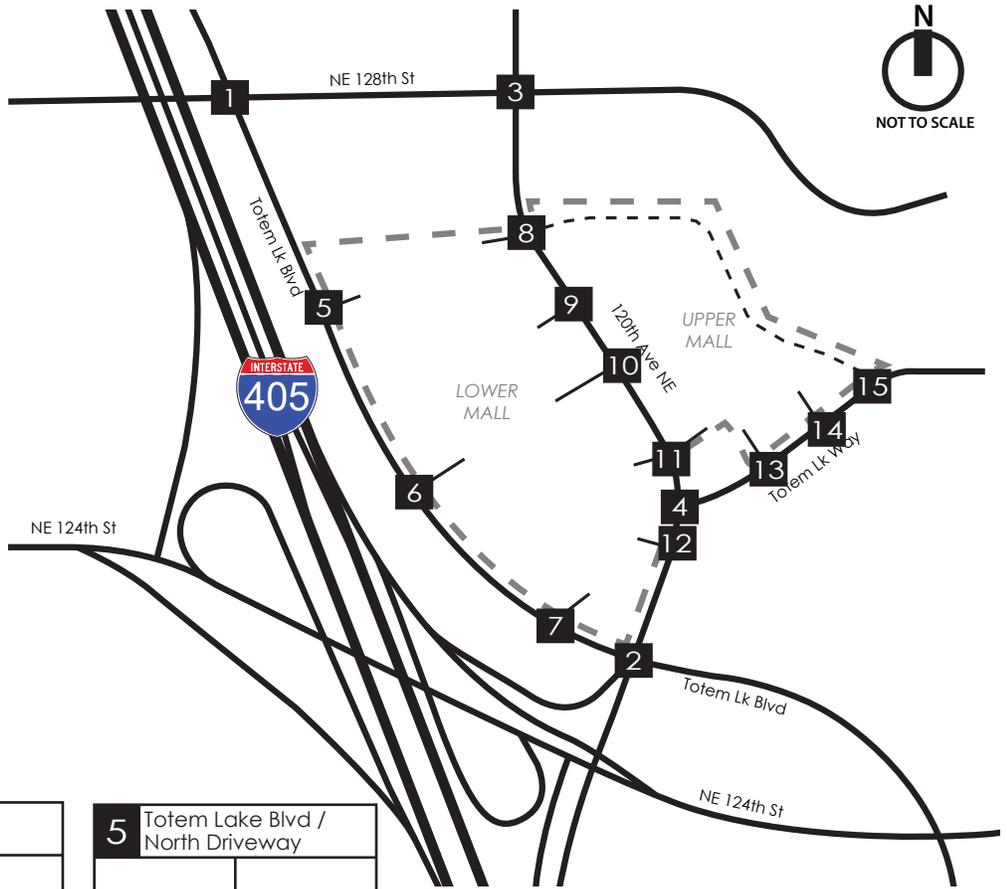
Detailed Trip Generation Comparison

Village at Totem Lake - Trip Generation Comparison

Land Use	ITE LUC	Size	Weekday Daily Trips	weekaay AM Peak Hour Trips	weekaay PM Peak Hour Trips
2005 Proposed Mall Redevelopment Trip Generation (Source: 2005 Traffic Study by TSI)					
Shopping Center	820	562,299 SF	20,863	441	1,957
Office	710	144,000 SF	1,766	251	240
Condominiums	230	216 DU	1,235	96	113
Theatre	445	3,000 seats	<u>3,803</u>	<u>20</u>	<u>240</u>
		Total Trips	27,667	808	2,550
		<i>Internal Trips</i>	<u>-4,002</u>	<u>-14</u>	<u>-313</u>
		Net External Trips	23,665	794	2,237
Current Land Use Plan Trip Generation (TENW, February 2016)					
Shopping Center	820	342,700 SF	15,123	330	1,367
Grocery	850	50,000 SF	5,112	170	466
Apartments	220	1,050 DU	6,487	518	595
Theatre	444	800 seats	<u>424</u>	<u>8</u>	<u>56</u>
		Total Trips	27,146	1,026	2,484
		<i>Internal Trips</i>	<u>-2,984</u>	<u>-12</u>	<u>-560</u>
		Net External Trips	24,162	1,014	1,924
External Trip Difference from 2005 Traffic Study			497	220	-313
Percent Difference from 2005 Traffic Study			2%	28%	-14%

Appendix G

Net New and Pass-By Trip Assignment Figures



1 Totem Lake Blvd / NE 128th St				
<table border="1"> <tr> <td>NE 128th St</td> <td> <p>29 ↓</p> <p>27 ↘</p> </td> </tr> <tr> <td>Totem Lk Blvd</td> <td> <p>49 →</p> <p>53 ↘</p> </td> </tr> </table>	NE 128th St	<p>29 ↓</p> <p>27 ↘</p>	Totem Lk Blvd	<p>49 →</p> <p>53 ↘</p>
NE 128th St	<p>29 ↓</p> <p>27 ↘</p>			
Totem Lk Blvd	<p>49 →</p> <p>53 ↘</p>			

2 120th Ave NE / Totem Lake Blvd				
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>83 ↘</p> <p>55 ←</p> </td> </tr> <tr> <td>I-405 NB Ramps</td> <td> <p>19 ↘</p> <p>30 ↗</p> </td> </tr> </table>	120th Ave NE	<p>83 ↘</p> <p>55 ←</p>	I-405 NB Ramps	<p>19 ↘</p> <p>30 ↗</p>
120th Ave NE	<p>83 ↘</p> <p>55 ←</p>			
I-405 NB Ramps	<p>19 ↘</p> <p>30 ↗</p>			

3 120th Ave NE / NE 128th St				
<table border="1"> <tr> <td>NE 128th St</td> <td> <p>19 ↓</p> </td> </tr> <tr> <td>120th Ave NE</td> <td> <p>11 ↘</p> </td> </tr> </table>	NE 128th St	<p>19 ↓</p>	120th Ave NE	<p>11 ↘</p>
NE 128th St	<p>19 ↓</p>			
120th Ave NE	<p>11 ↘</p>			

4 120th Ave NE / Totem Lk Way				
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>7 ↓</p> <p>6 ↘</p> </td> </tr> <tr> <td>Totem Lk Way</td> <td> <p>60 ↗</p> <p>40 ↗</p> </td> </tr> </table>	120th Ave NE	<p>7 ↓</p> <p>6 ↘</p>	Totem Lk Way	<p>60 ↗</p> <p>40 ↗</p>
120th Ave NE	<p>7 ↓</p> <p>6 ↘</p>			
Totem Lk Way	<p>60 ↗</p> <p>40 ↗</p>			

5 Totem Lake Blvd / North Driveway				
<table border="1"> <tr> <td>Totem Lake Blvd</td> <td> <p>64 ↓</p> <p>18 ↘</p> </td> </tr> <tr> <td>North Driveway</td> <td> <p>16 ↗</p> </td> </tr> </table>	Totem Lake Blvd	<p>64 ↓</p> <p>18 ↘</p>	North Driveway	<p>16 ↗</p>
Totem Lake Blvd	<p>64 ↓</p> <p>18 ↘</p>			
North Driveway	<p>16 ↗</p>			

LEGEND
Study Intersection or Site Driveway
↑ XX Net New Trips = 375 in

6 Totem Lake Blvd / Central Driveway				
<table border="1"> <tr> <td>Totem Lake Blvd</td> <td> <p>39 ↘</p> <p>25 ↘</p> </td> </tr> <tr> <td>Central Dwy</td> <td> <p>16 ↗</p> <p>16 ↗</p> </td> </tr> </table>	Totem Lake Blvd	<p>39 ↘</p> <p>25 ↘</p>	Central Dwy	<p>16 ↗</p> <p>16 ↗</p>
Totem Lake Blvd	<p>39 ↘</p> <p>25 ↘</p>			
Central Dwy	<p>16 ↗</p> <p>16 ↗</p>			

7 Totem Lake Blvd / South Driveway				
<table border="1"> <tr> <td>Totem Lk Blvd</td> <td> <p>42 ↗</p> <p>32 ←</p> </td> </tr> <tr> <td>South Dwy</td> <td> <p>39 ↗</p> </td> </tr> </table>	Totem Lk Blvd	<p>42 ↗</p> <p>32 ←</p>	South Dwy	<p>39 ↗</p>
Totem Lk Blvd	<p>42 ↗</p> <p>32 ←</p>			
South Dwy	<p>39 ↗</p>			

8 120th Ave NE / Loop Road / Lower Mall Svc						
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>4 ↘</p> <p>56 ↘</p> <p>46 ↘</p> </td> </tr> <tr> <td>Lower Mall Svc</td> <td> <p>3 ↗</p> </td> </tr> <tr> <td>Loop Road</td> <td> <p>8 ↗</p> </td> </tr> </table>	120th Ave NE	<p>4 ↘</p> <p>56 ↘</p> <p>46 ↘</p>	Lower Mall Svc	<p>3 ↗</p>	Loop Road	<p>8 ↗</p>
120th Ave NE	<p>4 ↘</p> <p>56 ↘</p> <p>46 ↘</p>					
Lower Mall Svc	<p>3 ↗</p>					
Loop Road	<p>8 ↗</p>					

9 120th Ave NE / Lower Mall Garage Dwy				
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>31 ↘</p> <p>25 ↘</p> </td> </tr> <tr> <td>Lower Mall Garage Dwy</td> <td> <p>31 ↗</p> <p>11 ↗</p> </td> </tr> </table>	120th Ave NE	<p>31 ↘</p> <p>25 ↘</p>	Lower Mall Garage Dwy	<p>31 ↗</p> <p>11 ↗</p>
120th Ave NE	<p>31 ↘</p> <p>25 ↘</p>			
Lower Mall Garage Dwy	<p>31 ↗</p> <p>11 ↗</p>			

10 120th Ave NE / Central Driveway				
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>6 ↘</p> <p>19 ↘</p> </td> </tr> <tr> <td>Central Dwy</td> <td> <p>8 ↗</p> <p>42 ↗</p> </td> </tr> </table>	120th Ave NE	<p>6 ↘</p> <p>19 ↘</p>	Central Dwy	<p>8 ↗</p> <p>42 ↗</p>
120th Ave NE	<p>6 ↘</p> <p>19 ↘</p>			
Central Dwy	<p>8 ↗</p> <p>42 ↗</p>			

11 120th Ave NE / Upper Mall Garage Dwy						
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>1 ↘</p> <p>13 ↘</p> <p>5 ↘</p> </td> </tr> <tr> <td>Service Dwy</td> <td> <p>1 ↗</p> <p>50 ↗</p> <p>9 ↗</p> </td> </tr> <tr> <td>Garage Dwy</td> <td> <p>1 ↗</p> <p>50 ↗</p> <p>9 ↗</p> </td> </tr> </table>	120th Ave NE	<p>1 ↘</p> <p>13 ↘</p> <p>5 ↘</p>	Service Dwy	<p>1 ↗</p> <p>50 ↗</p> <p>9 ↗</p>	Garage Dwy	<p>1 ↗</p> <p>50 ↗</p> <p>9 ↗</p>
120th Ave NE	<p>1 ↘</p> <p>13 ↘</p> <p>5 ↘</p>					
Service Dwy	<p>1 ↗</p> <p>50 ↗</p> <p>9 ↗</p>					
Garage Dwy	<p>1 ↗</p> <p>50 ↗</p> <p>9 ↗</p>					

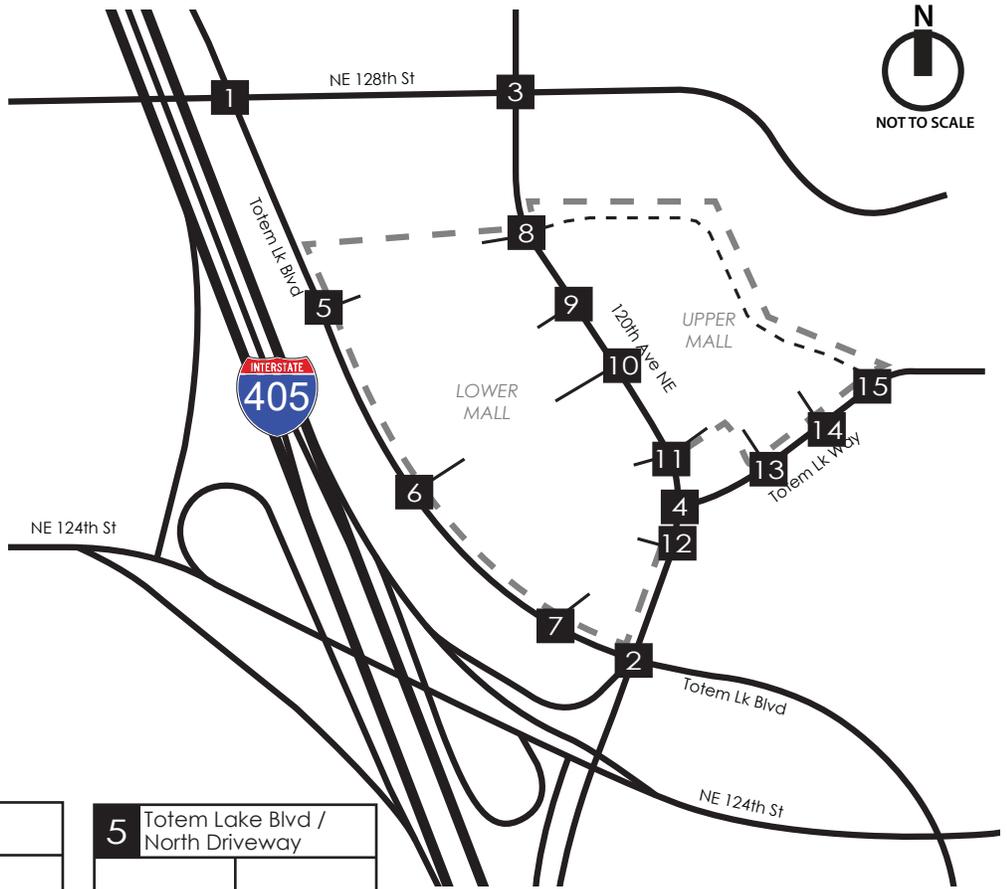
12 120th Ave NE / South Driveway				
<table border="1"> <tr> <td>120th Ave NE</td> <td> <p>7 ↘</p> </td> </tr> <tr> <td>South Dwy</td> <td> <p>13 ↗</p> <p>100 ↗</p> </td> </tr> </table>	120th Ave NE	<p>7 ↘</p>	South Dwy	<p>13 ↗</p> <p>100 ↗</p>
120th Ave NE	<p>7 ↘</p>			
South Dwy	<p>13 ↗</p> <p>100 ↗</p>			

13 Totem Lake Way / West Garage Dwy				
<table border="1"> <tr> <td>Totem Lk Way</td> <td> <p>4 ↗</p> <p>42 ↗</p> </td> </tr> <tr> <td>West Garage Dwy</td> <td> <p>4 ↗</p> <p>42 ↗</p> </td> </tr> </table>	Totem Lk Way	<p>4 ↗</p> <p>42 ↗</p>	West Garage Dwy	<p>4 ↗</p> <p>42 ↗</p>
Totem Lk Way	<p>4 ↗</p> <p>42 ↗</p>			
West Garage Dwy	<p>4 ↗</p> <p>42 ↗</p>			

14 Totem Lake Way / East Garage Dwy				
<table border="1"> <tr> <td>Totem Lk Way</td> <td> <p>25 ↗</p> <p>17 ↗</p> </td> </tr> <tr> <td>East Garage Dwy</td> <td> <p>25 ↗</p> <p>17 ↗</p> </td> </tr> </table>	Totem Lk Way	<p>25 ↗</p> <p>17 ↗</p>	East Garage Dwy	<p>25 ↗</p> <p>17 ↗</p>
Totem Lk Way	<p>25 ↗</p> <p>17 ↗</p>			
East Garage Dwy	<p>25 ↗</p> <p>17 ↗</p>			

15 Totem Lake Way / Loop Road				
<table border="1"> <tr> <td>Totem Lk Way</td> <td> <p>17 ↗</p> </td> </tr> <tr> <td>Loop Road</td> <td> <p>17 ↗</p> </td> </tr> </table>	Totem Lk Way	<p>17 ↗</p>	Loop Road	<p>17 ↗</p>
Totem Lk Way	<p>17 ↗</p>			
Loop Road	<p>17 ↗</p>			

AM Peak Hour Net New Project Trip Assignment (Inbound Trips Only)



1 Totem Lake Blvd / NE 128th St	
NE 128th St	<p>↶ 78</p> <p>↷ 46</p>
Totem Lk Blvd	<p>↶ 12</p> <p>↷ 20</p> <p>↸ 2</p>

2 120th Ave NE / Totem Lake Blvd	
120th Ave NE	<p>↶ 71</p> <p>↷ 222</p>
Totem Lk Blvd	<p>↶ 45</p> <p>↷ 16</p> <p>I-405 NB Ramps</p>

3 120th Ave NE / NE 128th St	
NE 128th St	
120th Ave NE	<p>↶ 1</p> <p>↷ 1</p> <p>↶ 124</p> <p>↷ 51</p> <p>↸ 16</p>

4 120th Ave NE / Totem Lk Way	
120th Ave NE	<p>↶ 109</p> <p>↷ 19</p> <p>↸ 176</p>
Totem Lk Way	<p>↶ 5</p>

5 Totem Lake Blvd / North Driveway	
Totem Lake Blvd	<p>↶ 7</p> <p>↷ 13</p>
North Driveway	<p>↶ 27</p>

LEGEND	
#	Study Intersection or Site Driveway
↑	Net New Trips = 579 out

6 Totem Lake Blvd / Central Driveway	
Totem Lake Blvd	<p>↶ 13</p> <p>↷ 11</p> <p>↸ 19</p>
Central Dwy	<p>↶ 16</p>

7 Totem Lake Blvd / South Driveway	
Totem Lk Blvd	<p>↶ 16</p> <p>↷ 29</p>
South Dwy	<p>↶ 32</p>

8 120th Ave NE / Loop Road / Lower Mall Svc	
120th Ave NE	<p>↶ 110</p> <p>↷ 22</p>
Lower Mall Svc	<p>↶ 4</p> <p>↷ 5</p>
Loop Road	<p>↶ 77</p>

9 120th Ave NE / Lower Mall Garage Dwy	
120th Ave NE	<p>↶ 27</p>
Garage Dwy	<p>↶ 46</p> <p>↷ 72</p>
Central Dwy	<p>↶ 31</p>

10 120th Ave NE / Central Driveway	
120th Ave NE	<p>↶ 99</p>
Central Dwy	<p>↶ 4</p> <p>↷ 3</p>
Loop Road	<p>↶ 27</p>

11 120th Ave NE / Upper Mall Garage Dwy	
120th Ave NE	<p>↶ 102</p> <p>↷ 2</p> <p>↸ 7</p>
Service Dwy	<p>↶ 1</p> <p>↷ 0</p>
Garage Dwy	<p>↶ 24</p>

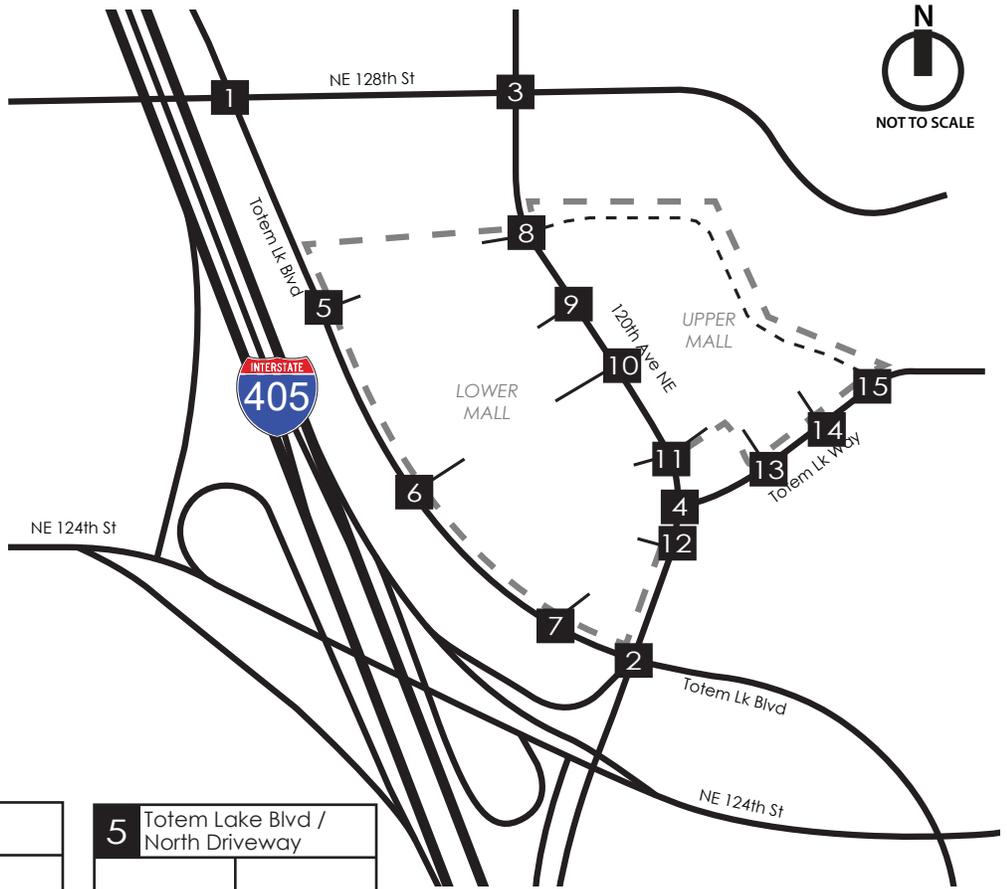
12 120th Ave NE / South Driveway	
120th Ave NE	<p>↶ 285</p>
South Dwy	<p>↶ 5</p> <p>↷ 8</p>

13 Totem Lake Way / West Garage Dwy	
Totem Lk Way	<p>↶ 4</p> <p>↷ 191</p>
West Garage Dwy	

14 Totem Lake Way / East Garage Dwy	
Totem Lk Way	<p>↶ 108</p> <p>↷ 83</p>
East Garage Dwy	

15 Totem Lake Way / Loop Road	
Totem Lk Way	<p>↶ 83</p>
Loop Road	

AM Peak Hour Net New Project Trip Assignment (Outbound Trips Only)



1 Totem Lake Blvd / NE 128th St	
NE 128th St	Totem Lk Blvd
	-2 → -4 →

2 120th Ave NE / Totem Lake Blvd	
120th Ave NE	Totem Lk Blvd
-2 ↙	
-4 →	
-1 ↙	

3 120th Ave NE / NE 128th St	
NE 128th St	120th Ave NE
	-1 ↑

4 120th Ave NE / Totem Lk Way	
120th Ave NE	Totem Lk Way
	-1 ↑

5 Totem Lake Blvd / North Driveway	
Totem Lake Blvd	North Driveway
	-6 ↑

6 Totem Lake Blvd / Central Driveway	
Totem Lake Blvd	Central Dwy
-4 ← 4 →	2 ↻ 2 ↻
	-8 ↑ 4 ↻

7 Totem Lake Blvd / South Driveway	
Totem Lk Blvd	South Dwy
6 ↻ 7 ↻	10 ↻ -10 ←
	10 ↻ -12 →

8 120th Ave NE / Loop Road / Lower Mall Svc	
120th Ave NE	Loop Road
	-1 ↑

9 120th Ave NE / Lower Mall Garage Dwy	
120th Ave NE	Garage Dwy
	-1 ↑

10 120th Ave NE / Central Driveway	
120th Ave NE	Central Dwy
	-1 ↑

11 120th Ave NE / Upper Mall Garage Dwy	
120th Ave NE	Garage Dwy
	-1 ↑

12 120th Ave NE / South Driveway	
120th Ave NE	South Dwy
5 ↻ -5 ↻	3 ↻ 3 ↻
	4 ↻ -4 ↻

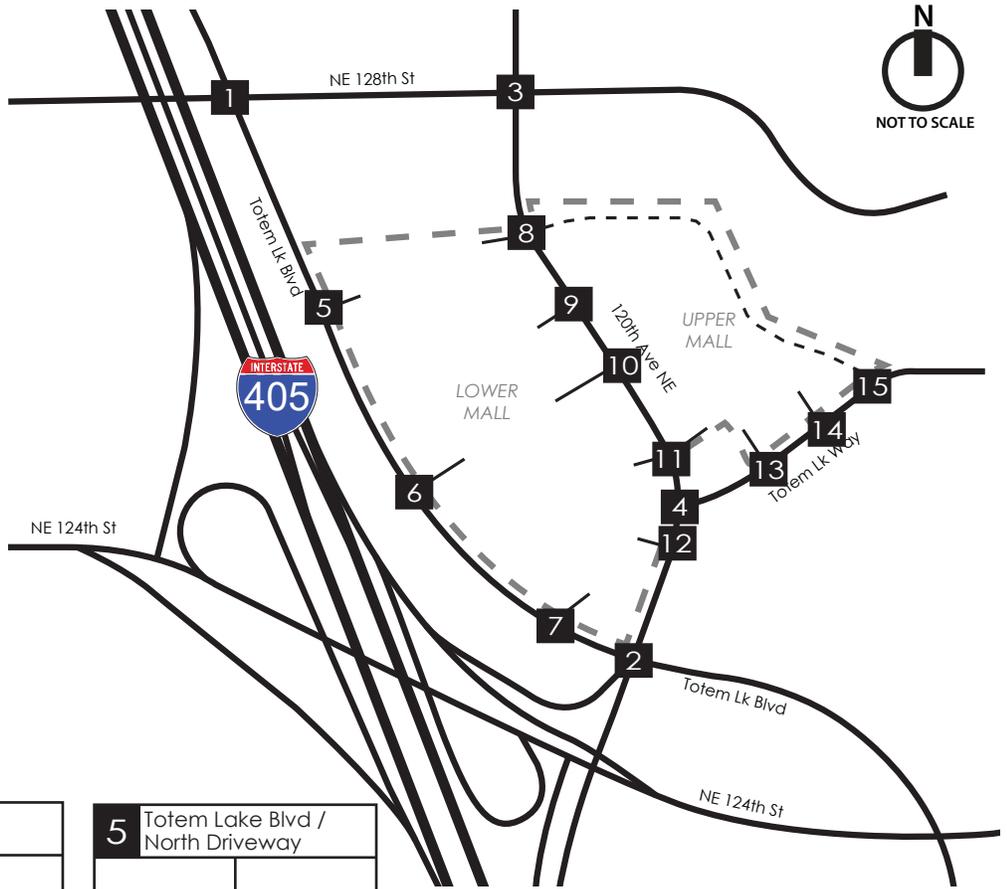
13 Totem Lake Way / West Garage Dwy	
Totem Lk Way	West Garage Dwy

14 Totem Lake Way / East Garage Dwy	
Totem Lk Way	East Garage Dwy

15 Totem Lake Way / Loop Road	
Totem Lk Way	Loop Road

LEGEND	
#	Study Intersection or Site Driveway
↑	Pass-by Trips (37 in / 23 out)

AM Peak Hour Pass-By Project Trip Assignment



1 Totem Lake Blvd / NE 128th St	
59 57	
NE 128th St	
102 106	Totem Lk Blvd

2 120th Ave NE / Totem Lake Blvd	
120th Ave NE	189 98
	Totem Lk Blvd
I-405 NB Ramps	33 66

3 120th Ave NE / NE 128th St	
38	23
NE 128th St	
158	120th Ave NE

4 120th Ave NE / Totem Lk Way	
13 12	
	Totem Lk Way
120th Ave NE	127 83

5 Totem Lake Blvd / North Driveway	
130 35	
	North Driveway
Totem Lake Blvd	31

LEGEND	
#	Study Intersection or Site Driveway
↑	Net New Trips = 770 in

6 Totem Lake Blvd / Central Driveway	
79 51	
	Central Dwy
Totem Lake Blvd	31 33

7 Totem Lake Blvd / South Driveway	
South Dwy	67 64
Totem Lk Blvd	
79	

8 120th Ave NE / Loop Road / Lower Mall Svc	
8 112 99	
Lower Mall Svc	Loop Road
120th Ave NE	6 18

9 120th Ave NE / Lower Mall Garage Dwy	
63 49	
Garage Dwy	120th Ave NE
	63 24

10 120th Ave NE / Central Driveway	
11 38	
Central Dwy	120th Ave NE
	15 87

11 120th Ave NE / Upper Mall Garage Dwy	
2 25 11	
Service Dwy	Garage Dwy
	3 102 22

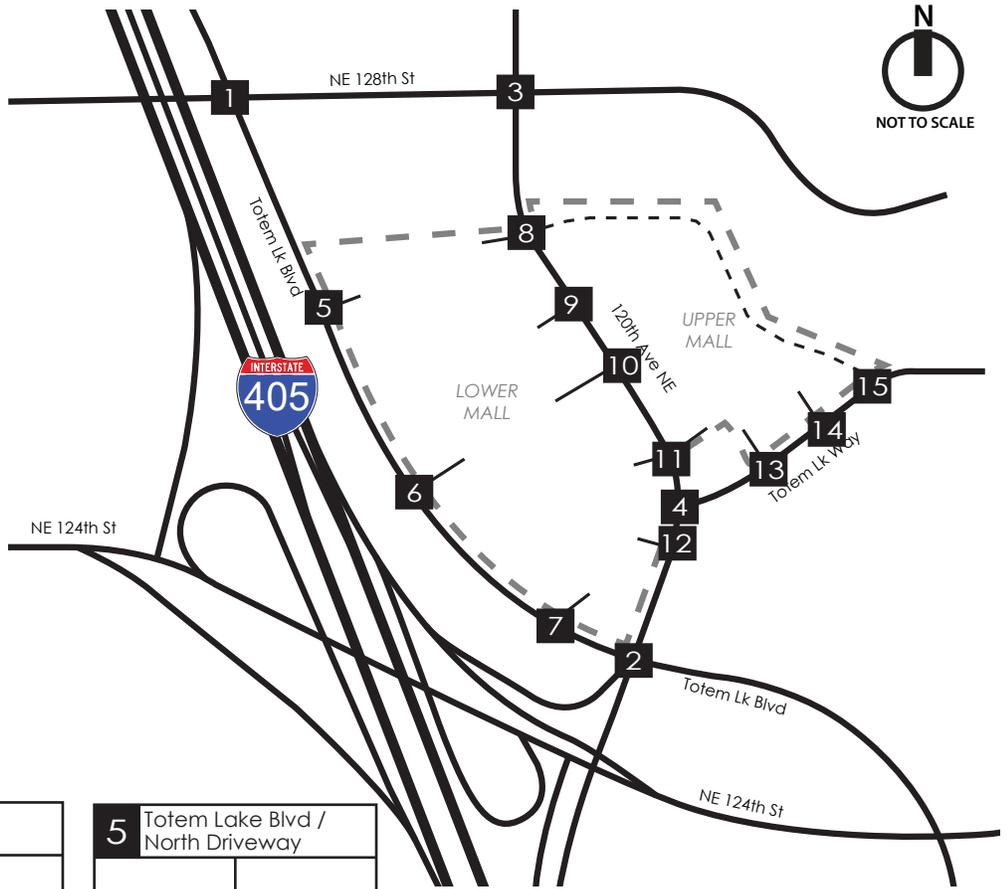
12 120th Ave NE / South Driveway	
13	
South Dwy	120th Ave NE
	45 210

13 Totem Lake Way / West Garage Dwy	
	West Garage Dwy
Totem Lk Way	
	11 84

14 Totem Lake Way / East Garage Dwy	
	East Garage Dwy
Totem Lk Way	
	50 34

15 Totem Lake Way / Loop Road	
	Loop Road
Totem Lk Way	
	34

PM Peak Hour Net New Project Trip Assignment (Inbound Trips Only)



1 Totem Lake Blvd / NE 128th St	
NE 128th St	<p>↶ 47</p> <p>↷ 28</p>
Totem Lk Blvd	<p>↶ 35</p> <p>↷ 58</p> <p>↶ 7</p>

2 120th Ave NE / Totem Lake Blvd	
120th Ave NE	<p>↶ 58</p> <p>↷ 184</p>
Totem Lk Blvd	<p>↶ 99</p> <p>↷ 35</p> <p>I-405 NB Ramps</p>

3 120th Ave NE / NE 128th St	
NE 128th St	
120th Ave NE	<p>↶ 3</p> <p>↷ 3</p> <p>↶ 74</p> <p>↷ 52</p> <p>↶ 15</p>

4 120th Ave NE / Totem Lk Way	
120th Ave NE	<p>↶ 118</p> <p>↷ 6</p> <p>↷ 63</p>
Totem Lk Way	<p>↶ 14</p>

5 Totem Lake Blvd / North Driveway	
Totem Lake Blvd	<p>↶ 22</p> <p>↷ 29</p>
North Driveway	<p>↶ 78</p>

LEGEND	
#	Study Intersection or Site Driveway
↑	Net New Trips = 617 out

6 Totem Lake Blvd / Central Driveway	
Totem Lake Blvd	<p>↶ 29</p> <p>↶ 31</p> <p>↷ 79</p>
Central Dwy	<p>↶ 47</p>

7 Totem Lake Blvd / South Driveway	
Totem Lk Blvd	<p>↶ 47</p> <p>↷ 26</p> <p>South Dwy</p>
South Driveway	<p>↶ 108</p>

8 120th Ave NE / Loop Road / Lower Mall Svc	
120th Ave NE	<p>↶ 53</p> <p>↷ 17</p>
Lower Mall Svc	<p>↶ 8</p> <p>↷ 5</p>
Loop Road	<p>↶ 80</p>

9 120th Ave NE / Lower Mall Garage Dwy	
120th Ave NE	<p>↶ 22</p>
Lower Mall Garage Dwy	<p>↶ 39</p> <p>↷ 61</p>
Garage Dwy	<p>↶ 41</p>

10 120th Ave NE / Central Driveway	
120th Ave NE	<p>↶ 83</p>
Central Dwy	<p>↶ 12</p> <p>↷ 8</p>
Central Driveway	<p>↶ 29</p>

11 120th Ave NE / Upper Mall Garage Dwy	
120th Ave NE	<p>↶ 91</p> <p>↶ 7</p> <p>↷ 23</p>
Service Dwy	<p>↶ 2</p> <p>↷ 4</p>
Upper Mall Garage Dwy	<p>↶ 20</p>

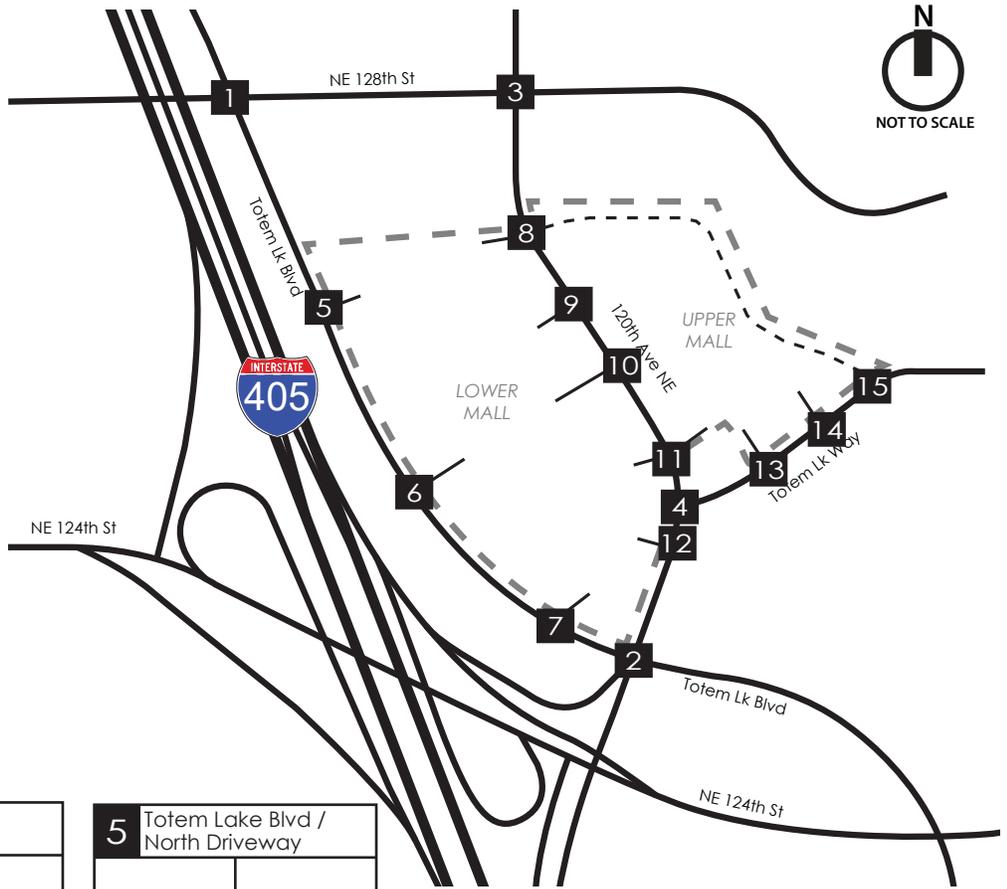
12 120th Ave NE / South Driveway	
120th Ave NE	<p>↶ 181</p>
South Dwy	<p>↶ 14</p> <p>↷ 61</p>

13 Totem Lake Way / West Garage Dwy	
Totem Lk Way	<p>↶ 12</p> <p>↶ 57</p>
West Garage Dwy	

14 Totem Lake Way / East Garage Dwy	
Totem Lk Way	<p>↶ 32</p> <p>↶ 25</p>
East Garage Dwy	

15 Totem Lake Way / Loop Road	
Totem Lk Way	<p>↶ 25</p>
Loop Road	

PM Peak Hour Net New Project Trip Assignment (Outbound Trips Only)



1	Totem Lake Blvd / NE 128th St
NE 128th St	Totem Lk Blvd
	2 → 2 →

2	120th Ave NE / Totem Lake Blvd
120th Ave NE	Totem Lk Blvd
1 ← 4 →	
1 ↓	I-405 NB Ramps

3	120th Ave NE / NE 128th St
NE 128th St	120th Ave NE
	3 ↑

4	120th Ave NE / Totem Lk Way
120th Ave NE	Totem Lk Way
5 ↓	1 ↑

5	Totem Lake Blvd / North Driveway
Totem Lake Blvd	North Driveway
-5 ↓ 5 ↓	16 ↗ 5 ↘
	-12 ↑ 15 ↑

LEGEND	
#	Study Intersection or Site Driveway
↑	Pass-by Trips (262 in / 275 out)

6	Totem Lake Blvd / Central Driveway
Totem Lake Blvd	Central Dwy
-13 ↓ 13 ↘	41 ↗ 17 ↘
	38 ↑ 38 ↗

7	Totem Lake Blvd / South Driveway
Totem Lk Blvd	South Dwy
43 ↗ 11 ↘	43 ↗ -43 ↘
	14 ↗ -10 ↘

8	120th Ave NE / Loop Road / Lower Mall Svc
120th Ave NE	Loop Road
3 ↗ -13 ↘ 10 ↘	6 ↗ 11 ↘
	1 ↗ 3 ↘
	1 ↗ -4 ↘ 5 ↘

9	120th Ave NE / Lower Mall Garage Dwy
120th Ave NE	Garage Dwy
27 ↗ -26 ↘	
	14 ↗ 29 ↘
	13 ↗ -12 ↘

10	120th Ave NE / Central Driveway
120th Ave NE	Central Dwy
11 ↗ -8 ↘	
	5 ↗ 12 ↘
	5 ↗ -4 ↘

11	120th Ave NE / Upper Mall Garage Dwy
120th Ave NE	Garage Dwy
-6 ↓ 10 ↘	5 ↗ 11 ↘
	-4 ↗ 5 ↘

12	120th Ave NE / South Driveway
120th Ave NE	South Dwy
29 ↗ -24 ↘	
	16 ↗ 29 ↘
	15 ↗ -15 ↘

13	Totem Lake Way / West Garage Dwy
Totem Lk Way	West Garage Dwy

14	Totem Lake Way / East Garage Dwy
Totem Lk Way	East Garage Dwy

15	Totem Lake Way / Loop Road
Totem Lk Way	Loop Road

PM Peak Hour Pass-By Project Trip Assignment