

TRANSPORTATION IMPACT ANALYSIS

for the

MAPLE LEAF COMMONS PROJECT

8511-15TH Avenue NE

DPD #3008142

Prepared by:

heffron

transportation, inc.

6544 NE 61st Street, Seattle, WA 98115
ph: (206) 523-3939 ♦ fax: (206) 523-4949

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1. INTRODUCTION

This report presents the transportation analyses prepared for the Maple Leaf Commons residential project at 8511-15th Avenue NE in Seattle's Maple Leaf neighborhood. It documents the existing conditions in the site vicinity, presents estimates of project-related traffic, and evaluates the anticipated impacts to the surrounding transportation system including transit, parking, safety, and pedestrian facilities.

1.1. Project Description

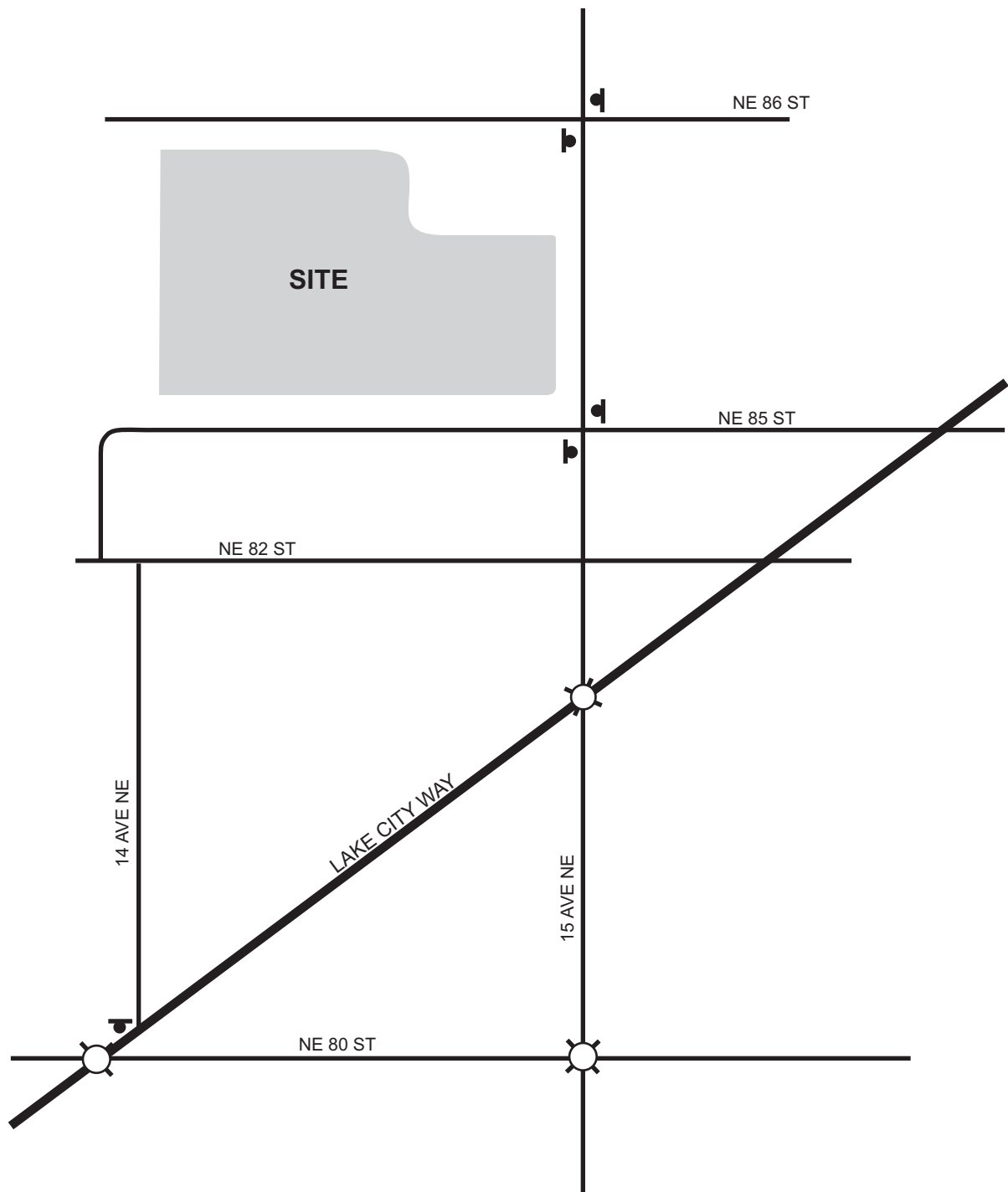
The site is located west of 15th Avenue NE within the Maple Leaf neighborhood in North Seattle. It is bounded by NE 86th Street to the north, NE 85th Street to the south, and the Maple Leaf Reservoir to the west. This location is currently the Camp Fire USA Headquarter site; however, operations at this site have been significantly reduced over the past few years. The proposed project would demolish the existing building and construct 39 single-family, cottage-style homes. The project would have 48 on-site parking spaces—41 in a common parking garage and seven (7) in private garages attached to individual units. The main access to the large parking garage would be from a driveway located on NE 85th Street. Of these seven homes with private garages, two would be accessed from NE 86th Street and five would be accessed from NE 85th Street. The project vicinity is shown on Figure 1 and the site plan is shown on Figure 2.

The proposed project is currently scheduled to be complete in 2009. Therefore, all transportation analyses were performed for this year.

2. SUMMARY

The proposed project would generate about 290 net new vehicle trips per day, 17 vehicle trips during the AM peak hour, and 27 vehicle trips during the PM peak hour. No mitigation would be warranted at any of the study area intersections. However, to improve site lines from NE 86th Street and NE 85th Street where they intersect 15th Avenue NE, it is recommended that some on-street parking on the west side of 15th Avenue NE be eliminated approaching each intersection. Three total parking spaces would be affected.

The proposed project would not adversely impact the pedestrian, transit or on-street parking in the site vicinity. The proposed project would supply 48 parking spaces on the site (39 spaces are required by the City for this land use). Using conservative estimates, this development's peak parking demand could be about 57 vehicles, nine more than could be accommodated on-site. A parking study conducted for the area within 400 feet of walking distance from the site determined that there is ample on-street parking available to accommodate the additional demand during the neighborhood's peak parking period. The Maple Leaf Commons project proposes to provide parking for a car-sharing program (e.g., Flexcar). With the close proximity to several major transit routes along with the availability of a shared car, residents may be able to live with fewer or no car. Thus, the car-sharing program could reduce the project's overall parking demand and reduce overflow parking.

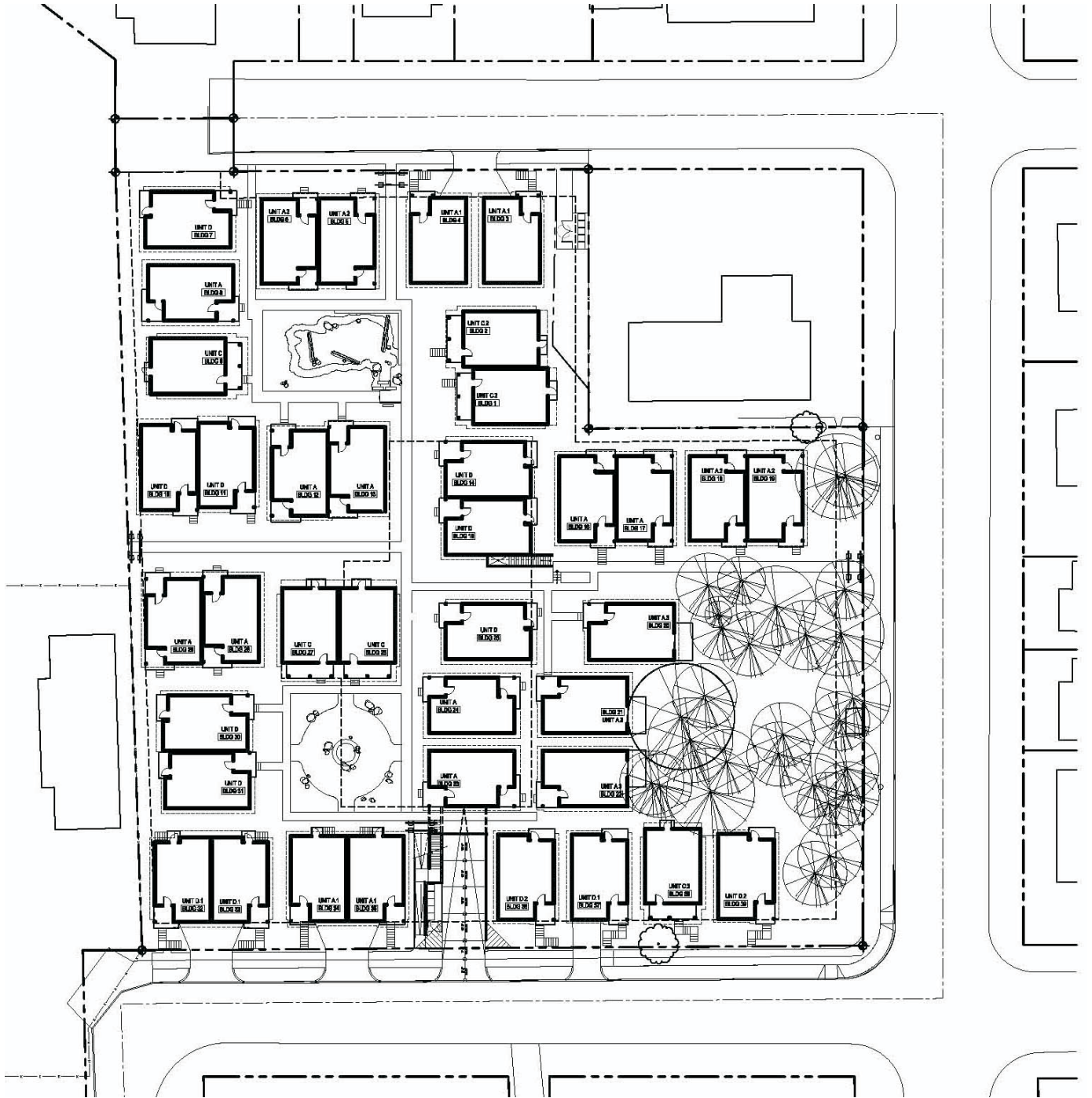


-  Stop Sign
-  Traffic Signal

MAPLE LEAF COMMONS

Figure 1
Vicinity Map





MAPLE LEAF COMMONS

Figure 2
Site Plan



About 30% of the peak hour traffic was assumed to travel west from the site using 14th Avenue NE. This corresponds to six (6) net new AM peak hour trips and one (1) net new PM peak hour trip. These low volumes would not likely be noticeable to the nearby neighborhood.

The proposed project would have about 30 construction workers on the site for the duration of construction, estimated to be about 14 months. Peak truck activity would occur during the early clearing and excavation phase, when up to 42 truck loads of material per day could be removed from the site. To reduce potential impacts during construction, the contractor will route all truck traffic to 15th Avenue NE and NE 85th Street. In addition, the contractor will contract with a local church or other entity to provide off-site parking for its construction workers.

3. BACKGROUND CONDITIONS

This section of the report presents the existing and future conditions without the proposed project. The impacts of the proposed project were evaluated against these base conditions. Year 2009 was selected as the future horizon year for the analyses, as this is when the project is expected to be complete and occupied. This section describes the roadway network, traffic volumes, traffic operations (in terms of levels of service), traffic safety, transit facilities, pedestrian/bicycle (non-motorized) facilities, and parking.

3.1. Roadway Network

The main access to the proposed Maple Leaf Commons residential development would be from a driveway on NE 85th Street. Individual driveways would be provided for two homes on NE 86th Street and five homes on NE 85th Street. The speed limits are not posted for roadways within the site vicinity; therefore, the City-wide speed limit of 30 mph for arterial streets and 25 mph for non-arterial streets would apply. Curbs, gutters, and sidewalks are provided along all the streets in the site vicinity. A description of these roadways near the site is follows.

15th Avenue NE is a north-south Minor arterial. This roadway connects between NE Pacific Street near the University of Washington campus and Ballinger Way in Shoreline. Near the proposed site this roadway has two travel lanes (one in each direction), and parking is allowed intermittently on both sides of the street. This street is also classified as a Major Transit Street.

NE 86th Street is an east-west local residential access street. West of 15th Avenue NE, this roadway extends along the proposed site frontage and ends at the Maple Leaf Reservoir border. East of 15th Avenue NE, this roadway connects to Lake City Way. The street has about 25 feet of pavement width and parking is allowed on both sides of the street. When cars are parked on both sides, the effective driving width is reduced to one lane so drivers must wait to pass one another on this street.

NE 85th Street is an east-west local residential access street. West of 15th Avenue NE, this roadway travels along the proposed site frontage, then bends south to continue as 14th Avenue NE. East of 15th Avenue NE, this roadway connects to Lake City Way. There is one traffic circle in the section between 15th Avenue NE and Lake City Way to calm traffic. Adjacent to the site, parking is allowed only on the south side of the street; east of 15th Avenue NE, parking is allowed on both sides of the street.

NE 14th Avenue NE is a north-south local residential access street. It begins as NE 85th Street on the north and intersects with NE 82nd Street, and then with Lake City Way. On-street parking and sidewalks are provided along the east side of the street near the project site.

The City of Seattle has no plans to make any major transportation improvements in the study area. Therefore, existing roadway conditions were assumed for all future-year analyses.

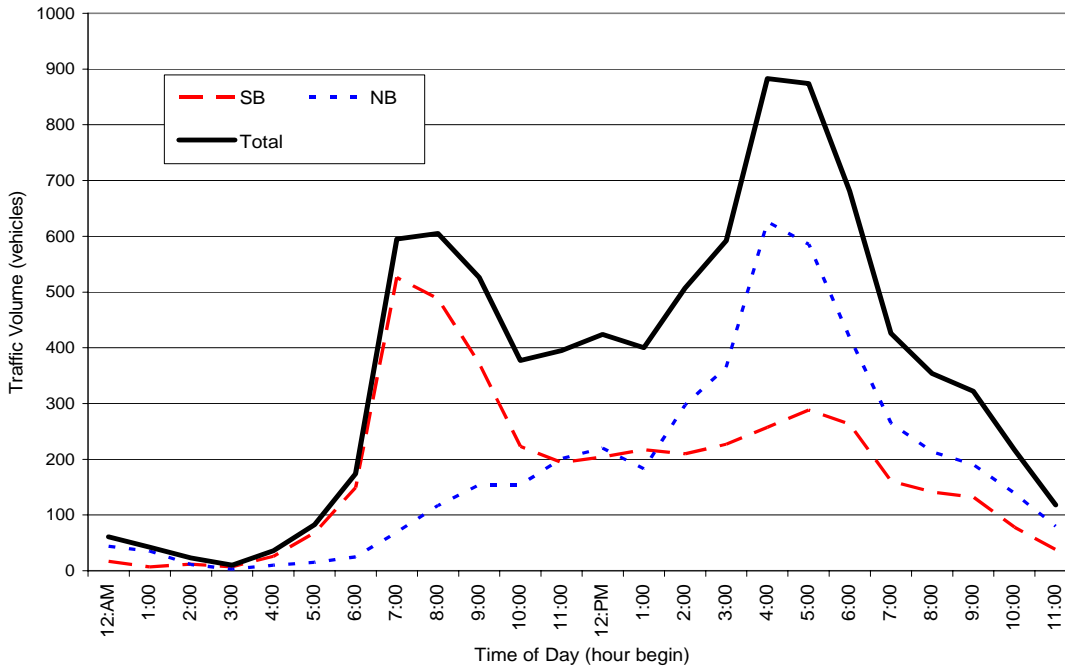
3.2. Traffic Volumes

This study evaluates traffic operations for five off-site study intersections. These intersections were selected in consultation with John Shaw of Department of Planning and Development (DPD), and include:

- Lake City Way/15th Avenue NE
- Lake City Way/NE 80th Street
- NE 80th Street/15th Avenue NE
- NE 86th Street/15th Avenue NE
- NE 85th Street/15th Avenue NE

AM and PM peak period turning movement counts were performed for this project at the NE 86th Street/15th Avenue NE and NE 85th Street/15th Avenue NE intersections. In addition, 24-hour count and vehicular speed data were collected on 15th Avenue NE in front of the proposed site, between NE 86th Street and NE 85th Street. These data were commissioned in May 2007. On 15th Avenue NE, about 600 vehicles pass the site during the AM peak hour, 885 during the PM peak hour and 8,725 daily. The street experiences sharp peaks in traffic during the morning and afternoon commute periods and shown on Figure 3.

Figure 3. Existing Traffic Volumes on NE 15th Avenue Adjacent to the Site

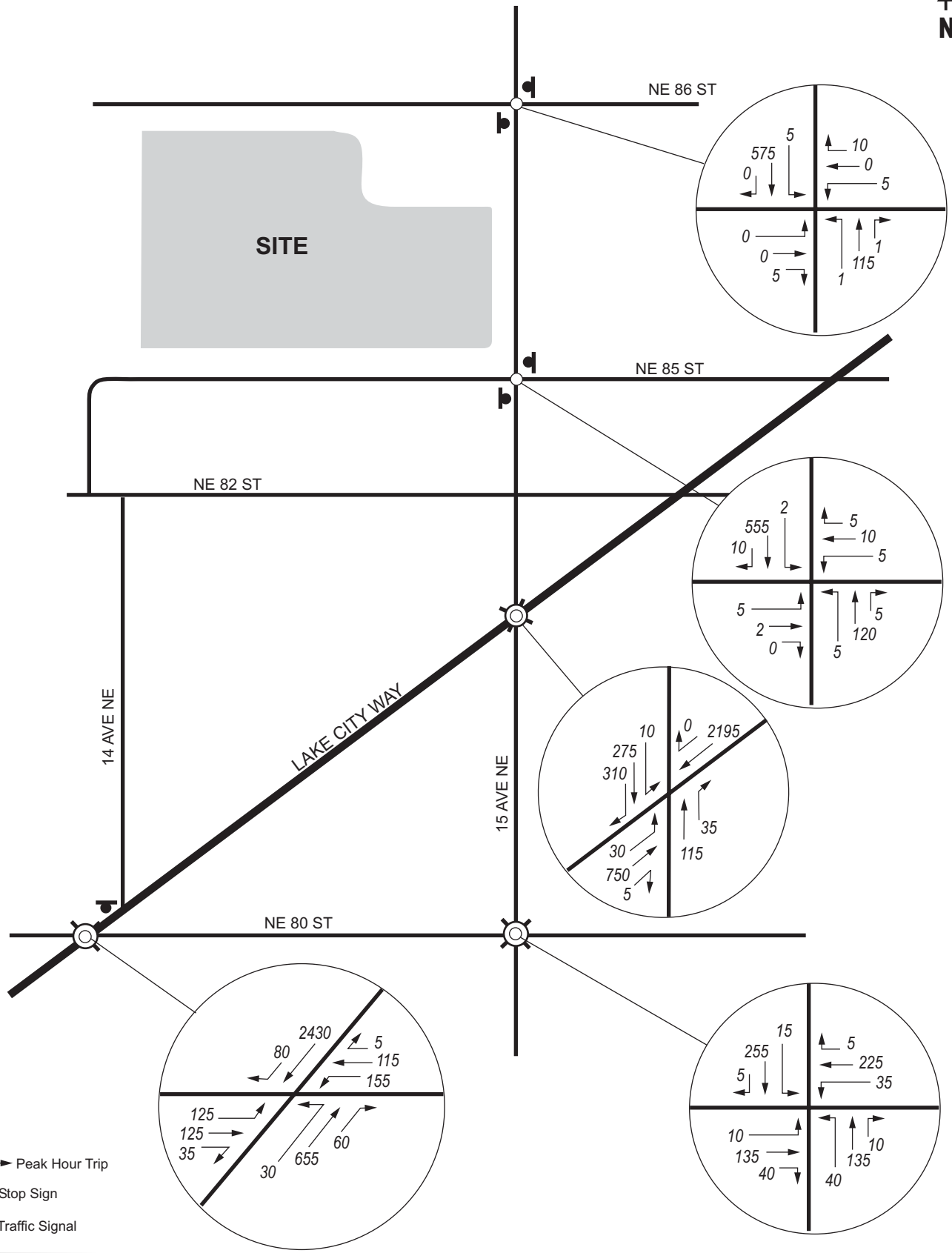


Source: Traffic Count Consultants, Inc. May 2007.

Speed measurements were performed on this street to assess sight distance needs and evaluate traffic operations at unsignalized intersections. The average speed was determined to be 31.2 mph northbound and 32.5 southbound. The 85th-percentile speed, which is used by traffic engineers to assess compliance with the speed limit, is 34.9 mph northbound and 37.4 mph southbound. These are higher than the speed limit of 30 mph on 15th Avenue NE.

Traffic volume data for the triangle of intersections at Lake City Way/NE 80th Street/15th Avenue NE were obtained from a 2005 traffic study of these intersections commissioned by Seattle Department of Transportation (SDOT). The 2005 traffic volumes were increased by 0.5% per year to reflect 2007 volumes. The existing AM and PM peak hour traffic volumes at the study intersections are shown on Figure 4 and Figure 5, respectively.

The proposed project is scheduled to be complete and occupied in 2009. This analysis assumes a future-year-2009 build-out, which provides the baseline against which the impacts will be measured. Review of City of Seattle traffic count data show that, over the past seven years, traffic volumes in the site vicinity range from declining every year to increasing by about 0.5% a year. Near the site on 15th Avenue NE, traffic volumes have declined by more than 12% in the past seven years. To be conservative and to account for any pipeline projects in the area that could increase traffic volumes, an average annual growth rate of 0.5% per year was applied to the traffic counts conducted in April 2007 and year 2005 traffic counts at the Lake City Way intersections to estimate future 2009 traffic volumes. The future 2009 without project traffic volumes for the AM and PM peak hours are shown on Figure 6 and Figure 7, respectively.

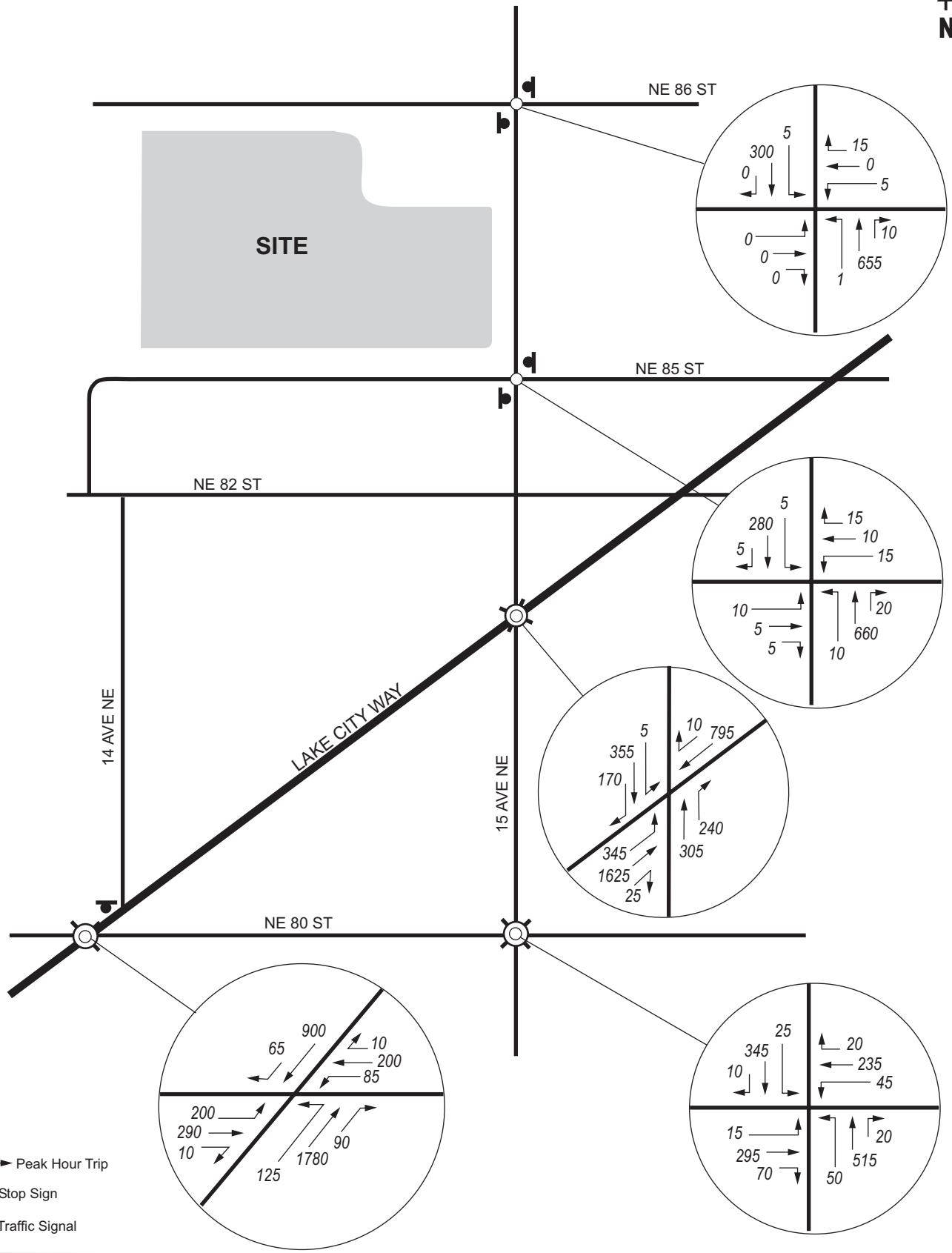


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Figure 4

Existing (2007) Traffic Volumes
AM Peak Hour



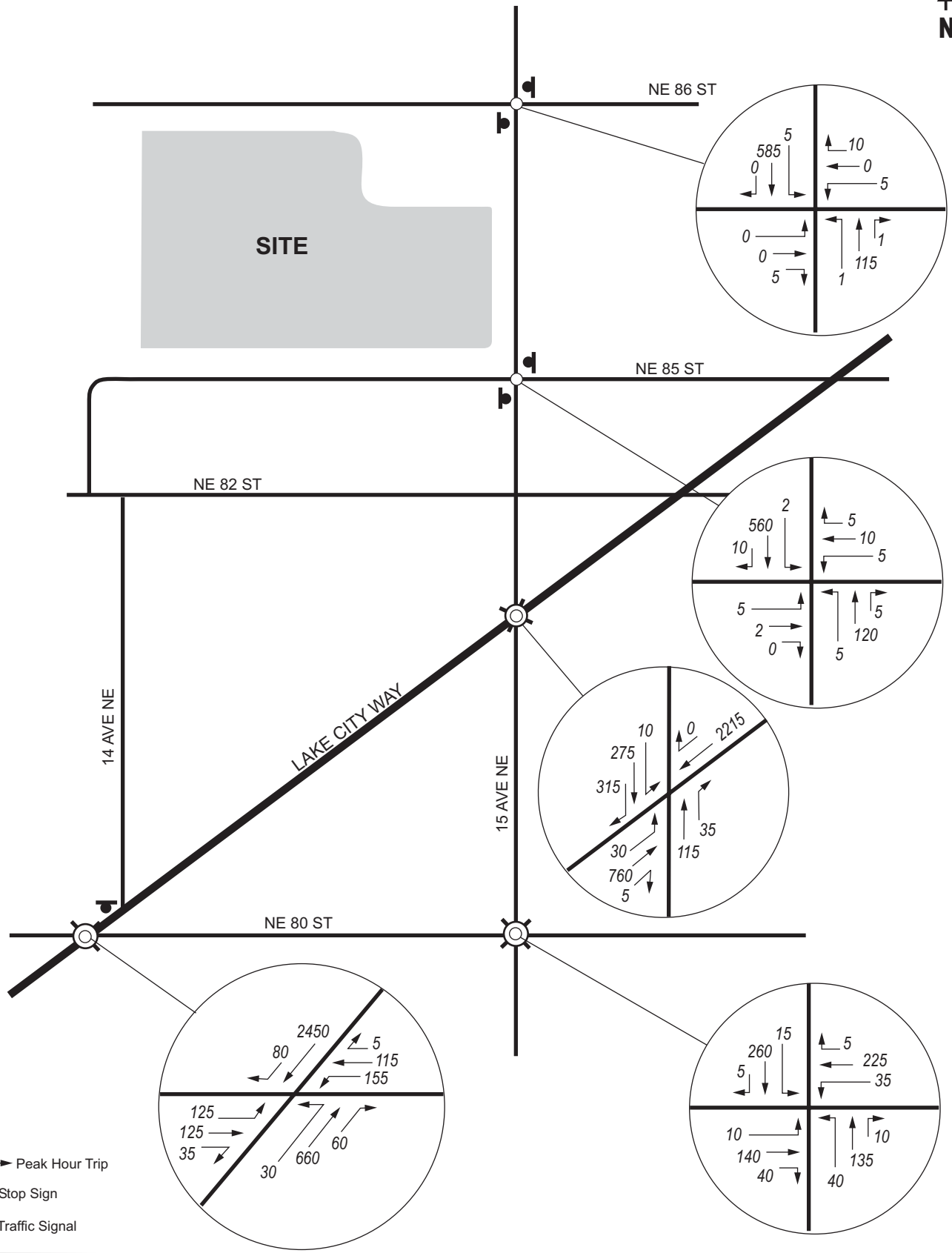


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Figure 5

Existing (2007) Traffic Volumes
PM Peak Hour



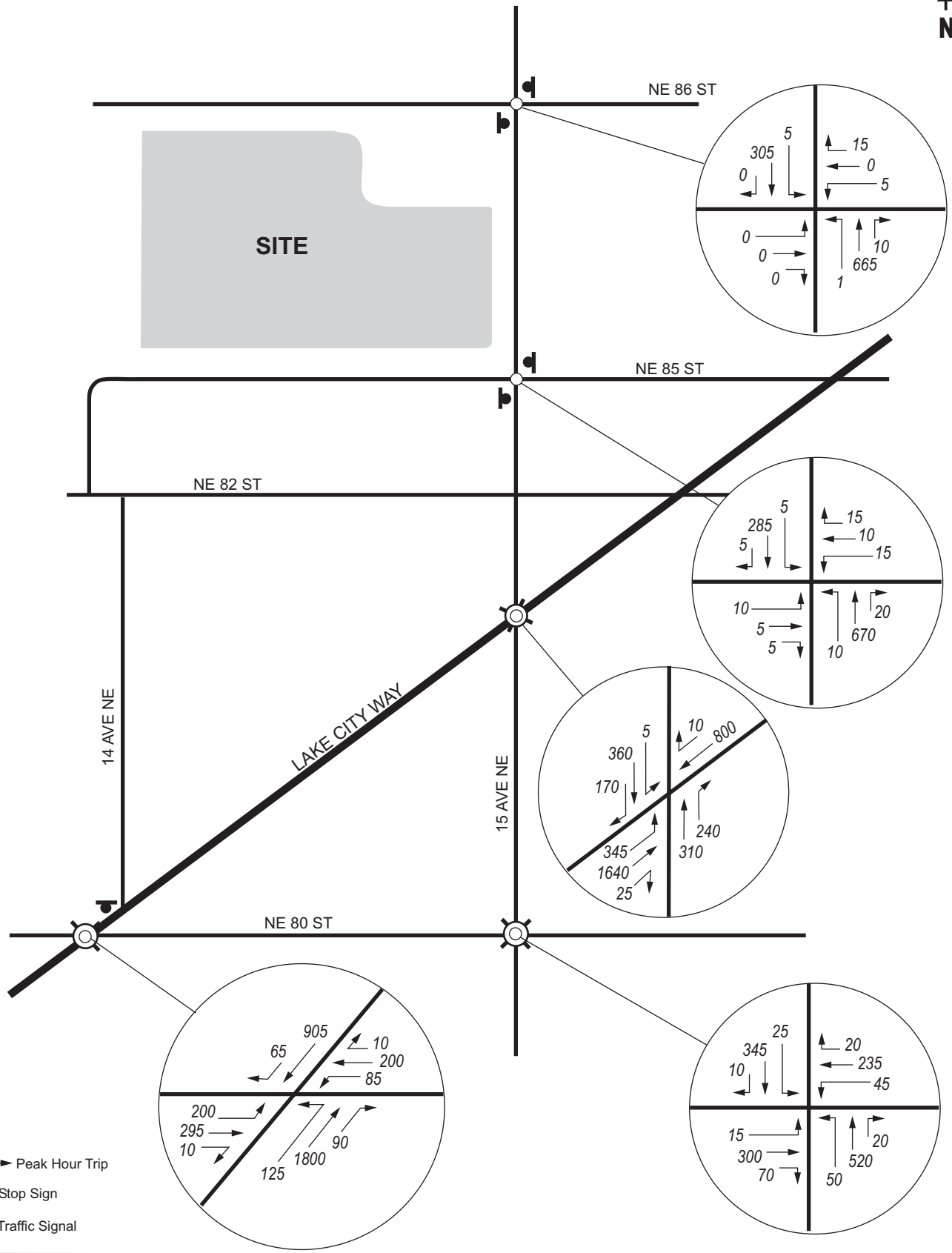


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Figure 6

Future (2009) Without-Project
 Traffic Volumes - AM Peak Hour





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Figure 7

Future (2009) Without-Project
 Traffic Volumes - PM Peak Hour



3.3. Level of Service

Traffic operations analysis was performed for five intersections. Traffic operations are evaluated using level of service (LOS). Six letter designations, “A” through “F,” are used to define level of service. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays. The ITE definitions are provided in the Appendix. LOS D is acceptable to the City of Seattle.

Levels of service for the study area intersections were determined using procedures in the *Highway Capacity Manual 2000* (HCM 2000, Transportation Research Board, 2000). All level of service calculations were performed using the Synchro 6.0 software. Future-year-2009 conditions assume that lane geometry would not change at any of the off-site intersections. Table 1 summarizes existing (2007) and year-2009 levels of service without the proposed project for both the AM and PM peak hour conditions.

Table 1. Intersection Level of Service Summary – Background Conditions

	Existing (2007)		2009 Without-Project	
	LOS ¹	Delay ²	LOS ¹	Delay ²
AM PEAK HOUR				
Signalized Intersections				
Lake City Way/15 th Avenue NE	E	55.0	E	60.3
Lake City Way/NE 80 th Street	F	91.3	F	94.1
NE 80 th Street/15 th Avenue NE	C	30.6	C	30.6
Unsignalized Intersections ³				
NE 86 th Street/15 th Avenue NE				
Eastbound Approach	B	12.5	B	12.6
Westbound Approach	B	12.0	B	12.0
NE 85 th Street/15 th Avenue NE				
Eastbound Approach	C	18.7	C	18.8
Westbound Approach	C	16.9	C	17.0
PM PEAK HOUR				
Signalized Intersections				
Lake City Way/15 th Avenue NE	F	128.3	F	132.8
Lake City Way/NE 80 th Street	F	115.3	F	121.4
NE 80 th Street/15 th Avenue NE	C	25.1	C	25.1
Unsignalized Intersections ³				
NE 86 th Street/15 th Avenue NE				
Eastbound Approach	A	0.0	A	0.0
Westbound Approach	C	19.1	C	19.6
NE 85 th Street/15 th Avenue NE				
Eastbound Approach	D	29.8	D	30.9
Westbound Approach	D	29.2	D	30.3

Source: Heffron Transportation, December 2007. All levels of service reflect the Synchro software and methodology.

1. Level of service.
2. Average seconds of delay per vehicle.
3. Average seconds of delay per vehicle on the worst movement, generally a turn movement from the minor street.

The intersection analysis shows that the unsignalized intersections near the site currently operate at LOS D or better during both the AM and PM Peak hours. The triangle of intersections at Lake City Way/15th Avenue NE/NE 80th Street, however, operate at LOS F during both peak hours. This is consistent with SDOT’s analysis of these intersections, which found there are no changes that can be made within the existing right-of-way to improve the operations at these intersections.

3.4. Traffic Safety

Collision data for the study area intersections were obtained from SDOT. These data were examined to determine if any traffic safety conditions exist, that could be impacted by the proposed project. Unsignalized intersections with five or more collisions per year and signalized intersections with 10 or more collisions per year are considered high collision locations by the City of Seattle. The City of Seattle intersection data, which reflect the 3-year period between January 1, 2004 and December 31, 2006, are summarized in Table 2. None of the study area intersections meets the threshold of a high collision location. In addition, there have been no reported collisions on 14th Avenue NE between NE 85th Street and Lake City Way within the past three years.

Table 2. Collision Summary – Maple Leaf Commons Study Area

Intersection	Head-On	Rear-End	Side-Swipe	Right Turn	Left Turn	Right Angle	Ped/Bike	Total for 3 Years	Average/Year
NE 86 th Street/15 th Avenue NE	0	0	0	0	0	3	0	3	1.0
NE 85 th Street/15 th Avenue NE	0	0	0	0	0	1	0	1	0.3
Lake City Way/15 th Avenue NE	0	1	3	0	4	1	1	10	3.3
NE 80 th Street/Lake City Way	0	2	2	0	9	8	0	21	7.0
NE 80 th Street/15 th Avenue NE	0	0	0	2	3	8	0	13	4.3

Source: City of Seattle Department of Transportation, October 2007.

3.5. Parking

On-street parking is available along most the streets within the site vicinity. A parking utilization study was conducted for this site in accordance with the City of Seattle Client Assistance Memorandum (CAM) #117. This study included all parking areas within a 400-foot walking distance from the proposed Maple Leaf Commons project site. Both an on-street parking supply and an on-street parking demand survey was completed for this area.

On-Street Parking Supply

The on-street supply within the study area was separated into block faces. For example, the south side of NE 86th Street between 15th Avenue NE and 16th Avenue NE is one block face. Each block face was then analyzed to determine the number of available on-street parking spaces. Restrictions were included: no on-street parking was assumed within 30 feet of a signalized or marked intersection, 20 feet of an uncontrolled intersection, 15 feet on either side of a fire hydrant, or five feet on either side of a driveway or alley.

The parking supply survey results indicate there are 145 on-street parking spaces within a 400-foot walking distance of the proposed project site. Only one area has restricted parking: on the west side of 15th Avenue NE south of NE 86th Street. Parking is restricted to two hours between 7:00 A.M. and 6:00 P.M. except for Sundays and holidays at this location.

On-Street Parking Demand

Parking demand for the 400-foot study area was collected during both a weekday and a weekend day (Wednesday May 2, 2007 and Saturday May 5, 2007). Two periods were evaluated – 2:00 to 3:00 P.M. (mid-afternoon) and 7:00 to 8:00 P.M. (night). The mid-afternoon period is typically when parking demand in a residential neighborhood is lowest, although it would capture any commuters who parked in the neighborhood to ride the bus elsewhere. The nighttime period is typically when peak parking demand occurs in residential neighborhood after residents have returned home for the evening. The highest demand out of the four times surveyed was the Saturday night between 7:00 and 8:00 P.M. A second parking demand count was completed during this time on Saturday May 19, 2007. The results of the parking demand survey are summarized in Table 3. A full summary and map are provided in Appendix B.

Table 3. Total On-Street Parking Demand Survey Results – May 2007

Time Period Surveyed	Parking Supply	Total Number of Vehicles Parked	% Utilization
Mid-Afternoon, 2:00 to 3:00 P.M.			
Wednesday, May 2, 2007	145	60	41%
Saturday, May 5, 2007	145	60	41%
Average	145	60	41%
Weekday, 7:00 to 8:00 P.M.			
Wednesday, May 2, 2007	145	69	47%
Saturday, May 5, 2007	145	73	50%
Saturday, May 19, 2007	145	62	42%
Average	145	68	47%

The results of the on-street parking demand survey show that during the afternoon about 41% of the existing parking spaces are utilized and about 47% of them are used in the later evening hours.

3.6. Transit

King County Metro provides transit service to the study area. Routes 73 and 77 have a stop with a shelter on 15th Avenue NE along the site frontage. Both of these routes provide service between Jackson Park, Maple Leaf, the University District and Downtown Seattle; Route 77 extends the service to the North City area. Routes 72, 79, and 373 have bus stops about a quarter of a mile from the site at the intersection of NE 80th Street/15th Avenue NE. Route 72 and 79 provide service between Lake City, Maple Leaf, the University District, and Downtown Seattle. Route 79 service the Ravenna neighborhood. Route 373 provides service between Meridian Park, Jackson Park, Maple Leaf, Ravenna and the University of Washington campus. Routes 72 and 73 provide all-day service and the remaining routes provide service during commuter peak times. All routes operate with approximately 30-minute headways.

3.7. Non-Motorized Transportation Facilities

The proposed site is located within a residential community where sidewalks are provided on both sides of each street in the area, except for 14th Avenue NE south of the project site where a sidewalk is only provided on the east side of the street.

4. PROJECT IMPACTS

This section of the report describes the conditions that would exist with all of the cottages occupied. First, the net increase in automobile trips, (difference in trips between the existing land use and the proposed project), was determined. Then, these trips were added to the 2009-without-project traffic volumes. Finally, level of service analysis was performed to determine the proposed project's impact on traffic operations in the study area. The following sections describe the methodology used to determine the proposed project's impacts.

4.1. Roadway Network

The proposed project would demolish the existing Camp Fire Headquarters building, and construct approximately 39 new cottage-style homes. About 15 of these homes would be detached and the remaining 24 would be attached in a duplex design. On-site parking would be provided, with 41 spaces in a below-grade parking garage and seven (7) spaces within private garages. The vehicle access to the parking garage would be on NE 85th Street, along with three other driveways to private homes. One driveway to two private homes would be located on NE 86th Street. No changes to the roadway network would occur with the proposed project development.

4.2. Trip Generation

Trip generation for the proposed development was determined using rates in *Trip Generation* (Institute of Transportation Engineers [ITE], 7th Edition, 2003). This manual summarizes the results of numerous traffic studies throughout the country for a variety of land-use types; however, no information for cottage-style homes is provided. Trip generation for the Maple Leaf Commons residential development was calculated using "Single-Family Detached Housing," (Land Use Code 210), which provides conservative results, because the size of an average single-family home is larger than the proposed cottages, which typically relates to larger families with more trips. Although the *Census 2000* data provided by the Puget Sound Regional Council (PSRC) for the proposed site's neighborhood show that about 20 percent of the trips are made by other modes of transportation (walking/biking at 2% and transit at 18%), the number of trips generated by the site was not reduced to account for these other modes of travel. This results in a conservatively high estimate for vehicle trips generated by the site. The proposed trip generation is summarized in Table 4.

The Camp Fire Headquarters building is currently on the proposed site. This 20,860 square foot (sf) building currently has about 25 employees working on site on a daily basis for Camp Fire. In prior years, there were about 45 employees at this location. In addition, other tenants were using this building, including Youth Suicide Prevention and the Seattle Genealogical Society. Both of these groups had functions quarterly that exceeded the site's parking capacity, and required the use of on-street parking in the site vicinity.

To be conservative, the trip generation associated with the existing building was calculated using the current employee count within the building. ITE information for the “General Office” (Land Use Code 710) was used to calculate the trip generation. The existing trip estimate is shown in Table 4.

As shown, the proposed project would increase the site-generated trips by 17 during the AM peak hour and 27 during the PM peak hour. If the mode split reduction were applied, the net increase in project trips would be 12 during the AM peak hour and 20 during the PM peak hour.

In addition to the project trips shown in Table 4, there would be traffic from residents moving in and moving out of the homes. Traffic associated with these occurrences would be very infrequent as in any residential neighborhood. Thus, move-in/move-out vehicle trips are not included as part of the analysis, which represents estimated day-to-day weekday traffic.

Table 4. Trip Generation Summary

Land Use	Daily Trips	AM Peak Hour Trips			PM Peak Hour Trips		
		In	Out	Total	In	Out	Total
Single-Family Detached/Attached ¹	370	7	22	29	25	14	39
Existing Camp Fire Headquarters ²	-80	-11	-1	-12	-2	-10	-12
Net Increase in Vehicle Traffic	290	-4	19	17	23	4	27

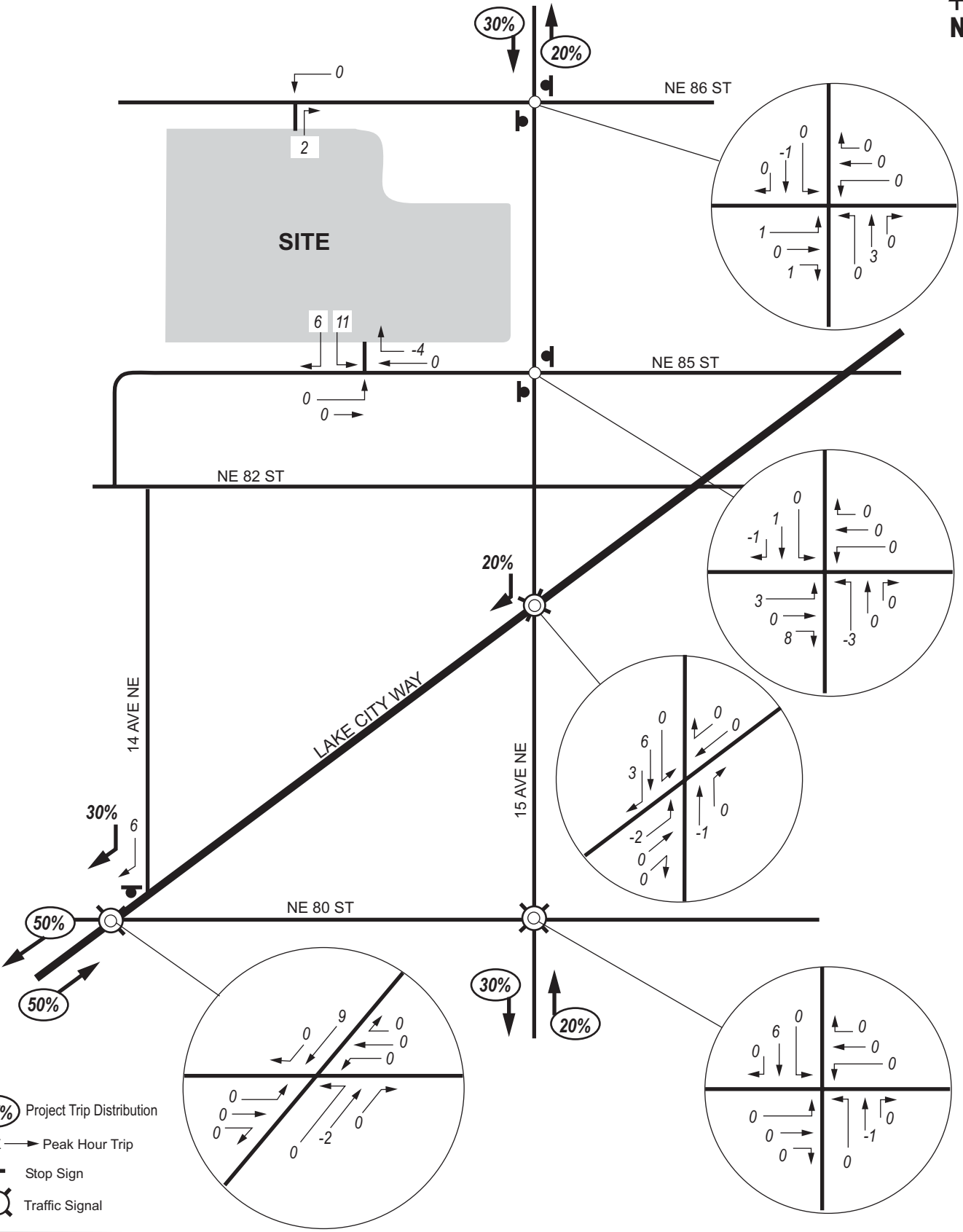
Source: Heffron Transportation, Inc. October 2007.

- ¹ Average trip rates from Institute of Transportation Engineers (ITE) Trip Generation, 7th Edition, “Single-Family Detached Housing,” Land Use Code 210.
- ² Average trip rates from Institute of Transportation Engineers (ITE) Trip Generation, 7th Edition, “General Office,” Land Use Code 710.

4.3. Trip Distribution and Assignment

Project trip distribution patterns were estimated using the local travel patterns in the area and the site’s location compared to major points of interest in the community, such as retail facilities, offices, parks, schools, and major arterials. These patterns were derived using the recent vehicle traffic counts taken in the area. The AM peak and the PM peak are slightly different. However, in general about 20% of the project traffic would travel north of the site, about 50% to the west of the site (with 30% of that using 14th Avenue NE to access Lake City Way), and 30% south of the site. About six (6) net new trips would use 14th Avenue NE during the AM peak hour and about one (1) trip during the PM peak hour.

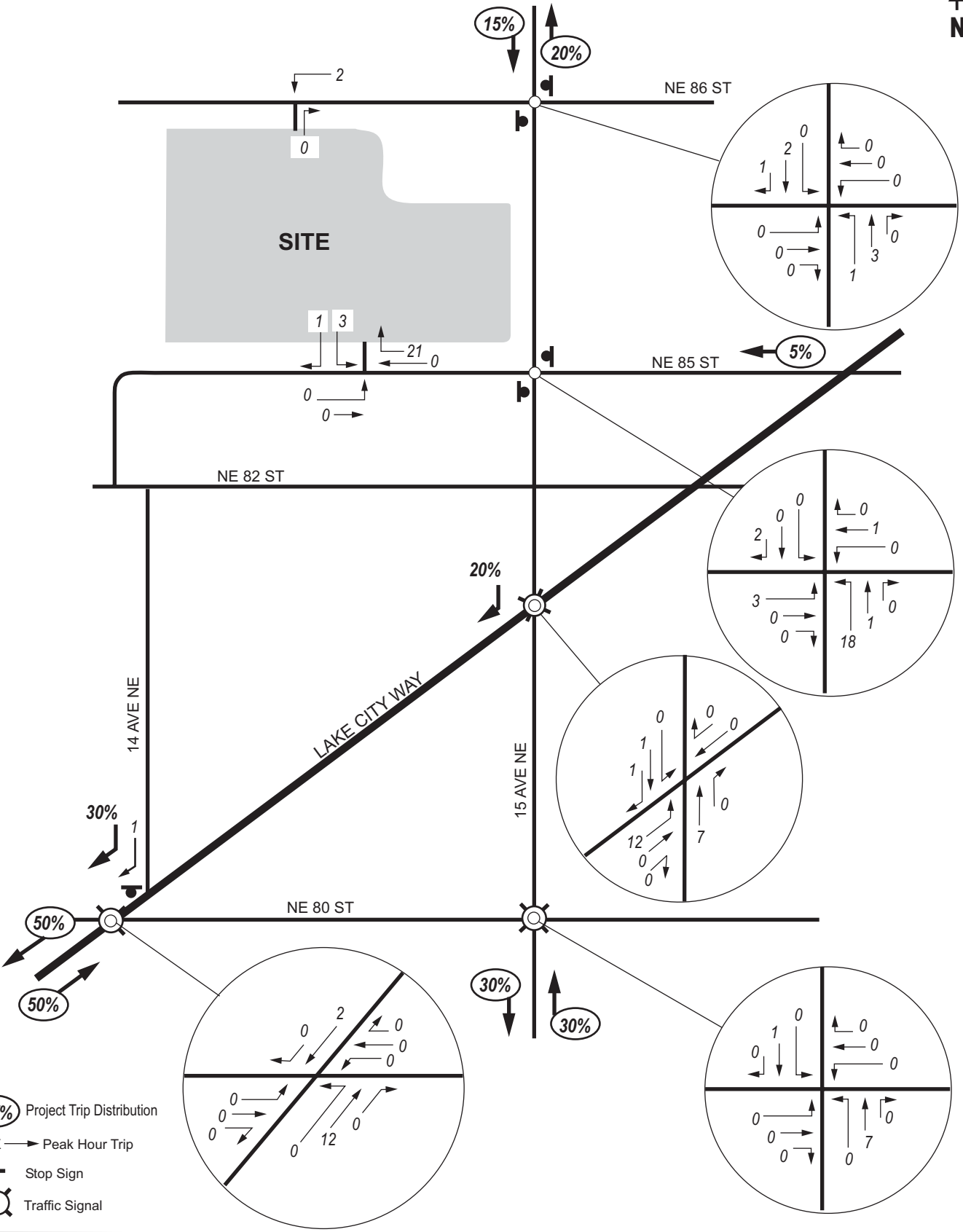
The main entrance to the proposed site would be located on NE 85th Street, along with three other driveways serving five homes. Two homes would be accessed with one driveway on NE 86th Street. The estimated net new site-generated traffic was assigned to the roadway network according to the trip distribution pattern described. The AM and PM peak trip distribution and assignments are shown on Figure 8 and Figure 9, respectively. These trips were then added to the 2009-without-project traffic forecasts to estimate the year 2009-with-project traffic volumes, which are shown on Figure 10 and Figure 11.



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Figure 8
Project Trip Distribution
and Net New AM Peak Hour Trips



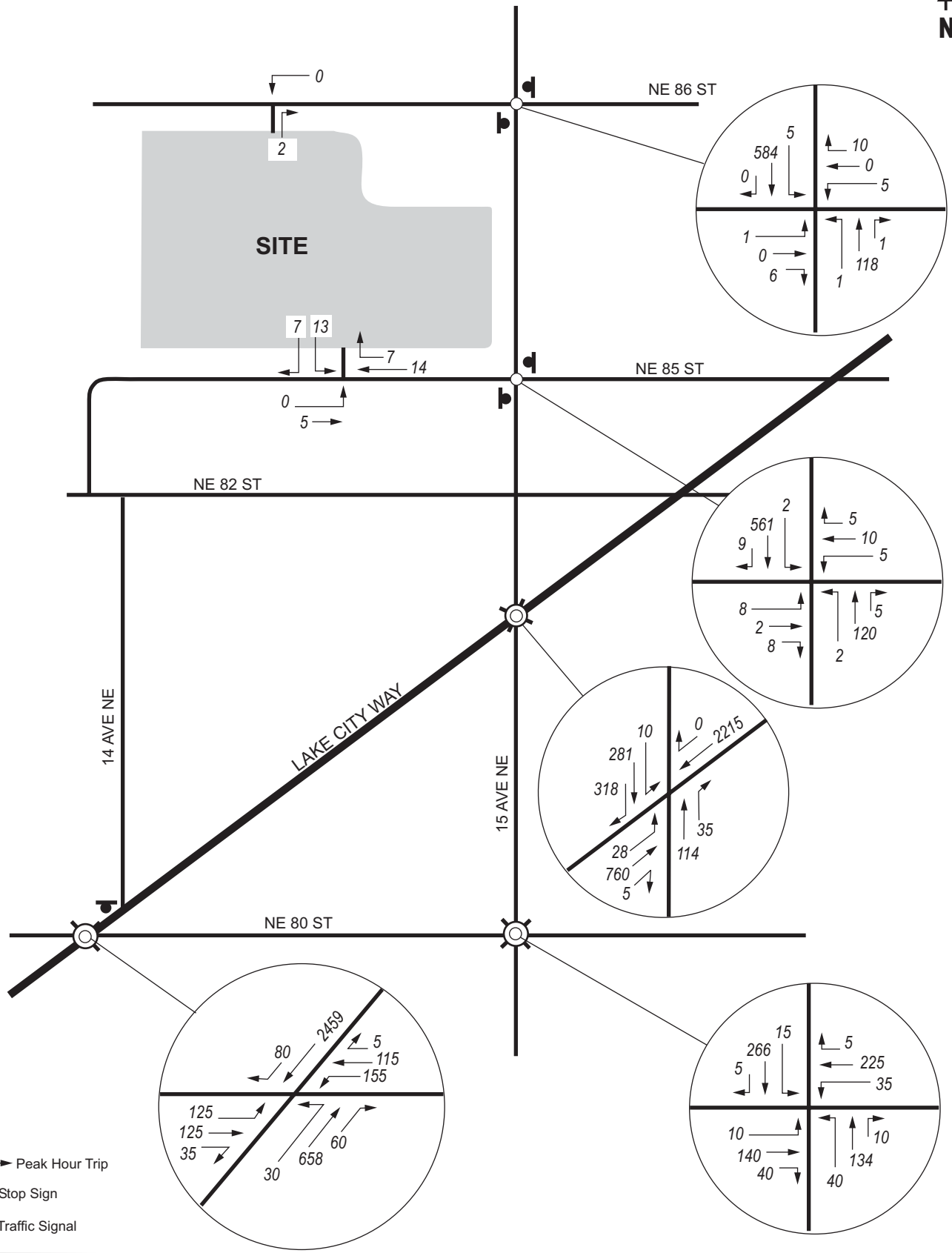


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Figure 9

Project Trip Distribution and Net New PM Peak Hour Trips





XX → Peak Hour Trip

Stop Sign

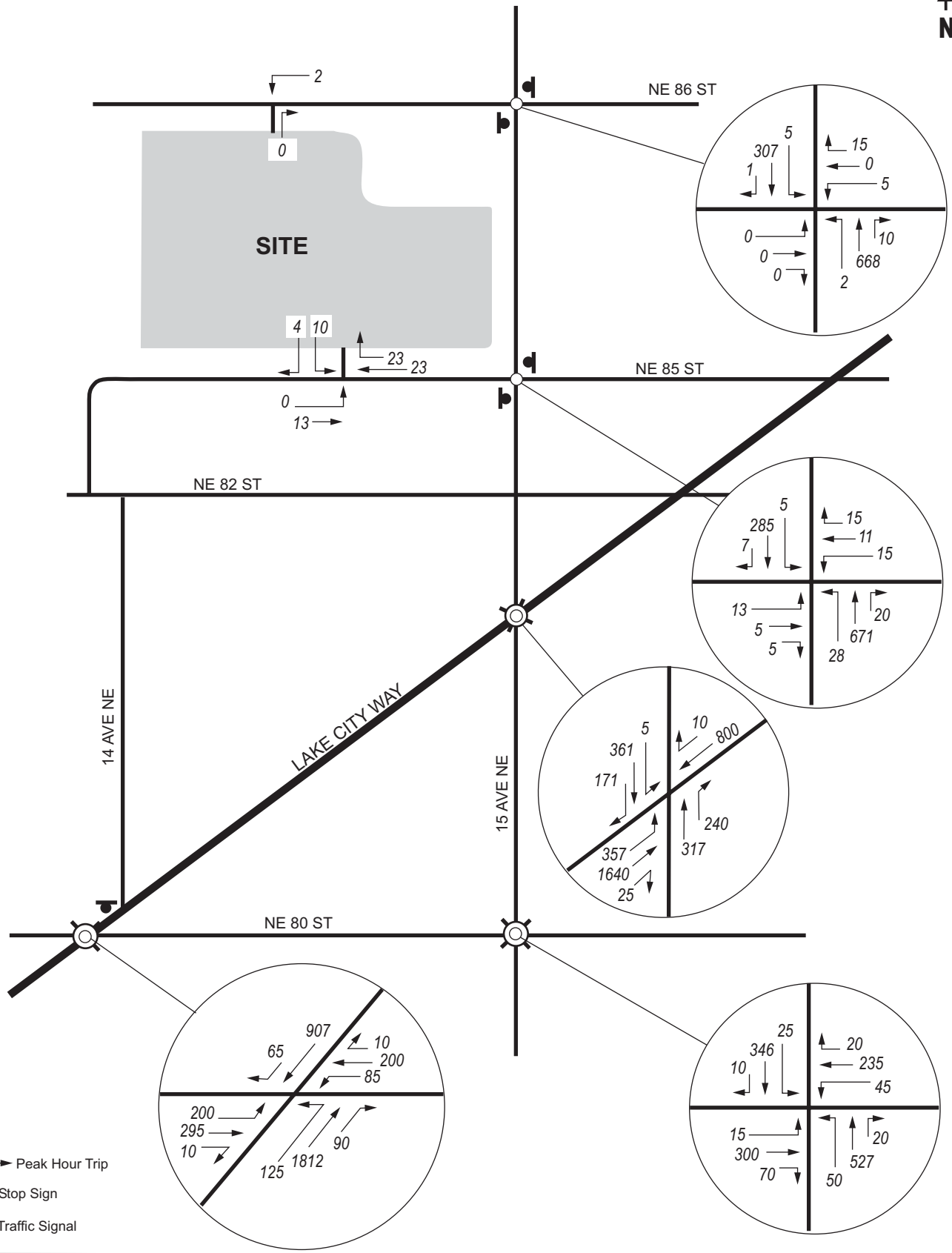
Traffic Signal

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Figure 10

Future (2009) With-Project
Traffic Volumes - AM Peak Hour





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Figure 11

Future (2009) With-Project
Traffic Volumes - PM Peak Hour



4.4. Level of Service

Levels of service for the off-site study area intersections were calculated using the 2009-with-project traffic volumes and the methodology described earlier in this report. Table 5 shows the results of the analysis; levels of service for the 2009-without-project conditions are shown for comparison.

Table 5. Intersection Level of Service Summary – Future 2009 Conditions

	2009 Without-Project		2009 With-Project	
	LOS ¹	Delay ²	LOS ¹	Delay ²
AM PEAK HOUR				
Signalized Intersections				
Lake City Way/15 th Avenue NE	E	60.3	E	62.8
Lake City Way/NE 80 th Street	F	94.1	F	95.1
NE 80 th Street/15 th Avenue NE	C	30.6	C	30.6
Unsignalized Intersections ³				
NE 86 th Street/15 th Avenue NE				
Eastbound Approach	B	12.6	B	13.4
Westbound Approach	B	12.0	B	12.1
NE 85 th Street/15 th Avenue NE				
Eastbound Approach	C	18.8	C	16.9
Westbound Approach	C	17.0	C	17.0
PM PEAK HOUR				
Signalized Intersections				
Lake City Way/15 th Avenue NE	F	132.8	F	136.0
Lake City Way/NE 80 th Street	F	121.4	F	124.3
NE 80 th Street/15 th Avenue NE	C	25.1	C	25.1
Unsignalized Intersections ³				
NE 86 th Street/15 th Avenue NE				
Eastbound Approach	A	0.0	A	0.0
Westbound Approach	C	19.6	C	19.7
NE 85 th Street/15 th Avenue NE				
Eastbound Approach	D	30.9	E	37.8
Westbound Approach	D	30.3	D	33.7

Source: Heffron Transportation, December 2007. All levels of service reflect the Synchro software and methodology.

1. Level of service.
2. Average seconds of delay per vehicle.
3. Average seconds of delay per vehicle on the worst movement, generally a turn movement from the minor street.

The level of service analysis shows the proposed project would add very little, or no, delay to the study area intersections during the AM peak hour. During the PM peak hour the eastbound approach at the NE 85th Street/15th Avenue NE, intersection is shown to degrade from LOS D to LOS E; however, only three project trips are estimated to use this approach. The eastbound left-turn would increase from eight (8) vehicles to 11. With such a low vehicle volume at this location, no mitigation is necessary with one vehicle making a left turn at this location about every five minutes.

The triangle of the three signalized study intersections at Lake City Way/NE 80th Street/15th Avenue NE operates together; however, they do not meet the City's LOS D standard. These intersections have

been analyzed and improved by the City as much as possible without physically altering the geometry of these intersections. Table 5 shows the addition of the proposed project would increase the delay at two of these intersections during the PM peak hour. However, the proposed project trips would represent less than 0.5% of the traffic using this cluster of intersections, and thus increasing the total intersection delay by about three seconds. Since the impact is so small, no mitigation is recommended at these intersections.

It is estimated about 30% of the traffic leaving the site could use 14th Avenue NE to connect with Lake City Way during peak/congested times. On the return trip to the site, 15th Avenue NE would be used instead, since accessing 14th Avenue NE from the west on Lake City Way is not a viable option and the traffic signal at Lake City Way/15th Avenue NE provides a more convenient route. During other times of the day, using 15th Avenue NE to connect to Lake City Way would be the most convenient option. However, even if all of the traffic leaving the site desiring to travel west during the AM peak hour used 14th Avenue NE, this would represent one additional vehicle every six (6) minutes traveling on this roadway. During other times of the day, very little traffic would use this roadway.

4.5. Traffic Safety

The accident data indicated no high accident locations or unusual safety issues in the site vicinity. Therefore, it is unlikely that the proposed project would affect the safety at off-site locations. However, based on field observations, it is recommended that the parking along the west side of 15th Avenue NE between NE 86th Street and NE 85th Street be eliminated to improve the sight distances at the corresponding intersections. There are two parking spaces located north of N 85th Street between the intersection and a Metro transit stop. It is recommended that those spaces be eliminated and the transit stop extended to retain the sight lines to the north during most times of the day except when a bus is stopped there. It is also recommended that parking be prohibited within 30 feet of N 86th Street (north of the intersection) to improve the site triangle at this location. This would affect one legal parking space in this location. Therefore, the proposed parking prohibitions would affect three on-street parking spaces.

4.6. Parking Demand and Supply

Typically, the parking demand can be estimated using rates in the Institute of Transportation Engineers (ITE) *Parking Generation* (3rd Edition, 2004). However, the cottage style housing is not the typical single-family residential development and is not included in the *Parking Generation* manual. This land use requires one stall per unit based on Seattle Municipal Code (SMC) 23.43.012. Some of these units will be attached; therefore, the most similar land use in *Parking Generation* is "Residential/Condo Townhouse (Land Use Code 230)." The average peak parking demand rate for a townhouse is 1.46 spaces per unit. Using this rate the average peak parking demand would be 57 parking spaces. The Maple Leaf Commons development is proposing to accommodate 48 garaged parking spaces within the development. Therefore, the potential overflow could be nine (9) vehicles.

The on-street parking utilization survey (see Section 3.4 of this report) determined that there are 145 parking spaces within 400 feet of the proposed site. About 50% percent of these spaces are filled during the peak parking demand periods. Therefore, the potential overflow parking need of nine (9) parking spaces would be accommodated by streets in the site vicinity without adversely affecting the parking available for others.

The proposed project would eliminate some on-street parking. It is recommended that three parking spaces be eliminated on NE 15th Avenue to improve sight lines at the intersections: two spaces north

of NE 85th Street and one space north of NE 86th Street. Even with the elimination of these on-street parking spaces, there will still be ample parking available in the neighborhood.

To reduce the potential parking overflow, the Maple Leaf Commons project proposes to provide parking for a car-sharing program (e.g., Flexcar). With the close proximity to several major transit routes along with the availability of a shared car, residents may be able to live with fewer or no car. Thus, the car-sharing program could reduce the project's overall parking demand and reduce overflow parking.

4.7. Transit

The proposed project could generate transit trips during the day, since the site is directly served by King County Metro. An increase in ridership would be considered positive, since less vehicle traffic would be using the local roadway system.

4.8. Non-Motorized Facilities

The proposed project would construct new sidewalks along the site frontages for NE 86th Street, 15th Avenue NE, and NE 85th Street.

4.9. Site Access

The proposed project would have a main driveway located on NE 85th Street to access the below-grade parking garage. There would also be three other driveways on this roadway serving five residential units. One driveway on NE 86th Street would serve two residential units. All of the driveways would operate at LOS A during all times of the day, including the AM and PM peak hours.

4.10. Construction Traffic

The project contractor estimates that 30 workers would be on site for the duration of project construction, estimated to be about 14 months. Peak trucking activity would coincide with the initial clearing and excavation for the underground garage. It is estimated that a total of 8,500 cubic yards of material would be hauled from the site. Assuming each dump truck and trailer can accommodate 22 yards, and assuming a "fluff" factor of about 10% as material is excavated into the truck, it is expected that the site would generate about 420 truck loads of material. This phase of construction would take about 10 days, which equates to a total of about 42 truck loads per day or about 5 truck loads for each hour of an 8-hour workday. Smaller numbers of truck trips would be generated during later project phases, including concrete pours when up to 10 trucks per day could be generated by the site.

The contractor will direct all trucks to use 15th Avenue NE and NE 85th Street to access the site. In addition, the contractor will contract with a local church or business to provide parking for construction workers.

5. MITIGATION

The proposed project would not require mitigation at any intersection or roadway in the study area. It would reduce the eastbound approach to the NE 85th Street/15th Avenue NE intersection from LOS D to LOS E during the PM peak hour; however, the left-turn movement would only be increased from eight (8) to 11. This low volume would not warrant any physical improvements at this location.

It is recommended that three parking spaces be eliminated on NE 15th Avenue to improve sight lines at the intersections: two spaces north of NE 85th Street and one space north of NE 86th Street.

To reduce the potential for parking overflow, the project would provide parking for a car-sharing program (e.g., Flexcar).

To reduce potential impacts during construction, the contractor will route all truck traffic to 15th Avenue NE and NE 85th Street. In addition, the contractor will contract with a local church or other entity to provide off-site parking for its construction workers.

APPENDIX A

Level of Service Definitions

Levels of service (LOS) are qualitative descriptions of traffic operating conditions. These levels of service are designated with letters ranging from LOS A, which is indicative of good operating conditions with little or no delay, to LOS F, which is indicative of stop-and-go conditions with frequent and lengthy delays. Levels of service for this analysis were developed using procedures presented in the *Highway Capacity Manual* (Transportation Research Board, 2000).

Level of service for signalized intersections is defined in terms of delay. Delay can be a cause of driver discomfort, frustration, inefficient fuel consumption, and lost travel time. Specifically, level-of-service criteria are stated in terms of the average delay per vehicle in seconds. Delay is a complex measure and is dependent on a number of variables including: the quality of progression, cycle length, green ratio, and a volume-to-capacity ratio for the lane group or approach in question. Table A-1 shows the level of service criteria for signalized intersections from the *Highway Capacity Manual*.

Table A-1. Level of Service for Signalized Intersections

Level of Service	Average Delay Per Vehicle	General Description
A	Less than 10.0 Seconds	Free flow
B	10.1 to 20.0 seconds	Stable flow (slight delays)
C	20.1 to 35.0 seconds	Stable flow (acceptable delays)
D	35.1 to 55.0 seconds	Approaching unstable flow (tolerable delay—occasionally wait through more than one signal cycle before proceeding.
E	55.1 to 80.0 seconds	Unstable flow (approaching intolerable delay)
F	Greater than 80.0 seconds	Forced flow (jammed)

Source: Transportation Research Board, *Highway Capacity Manual*, 2000.

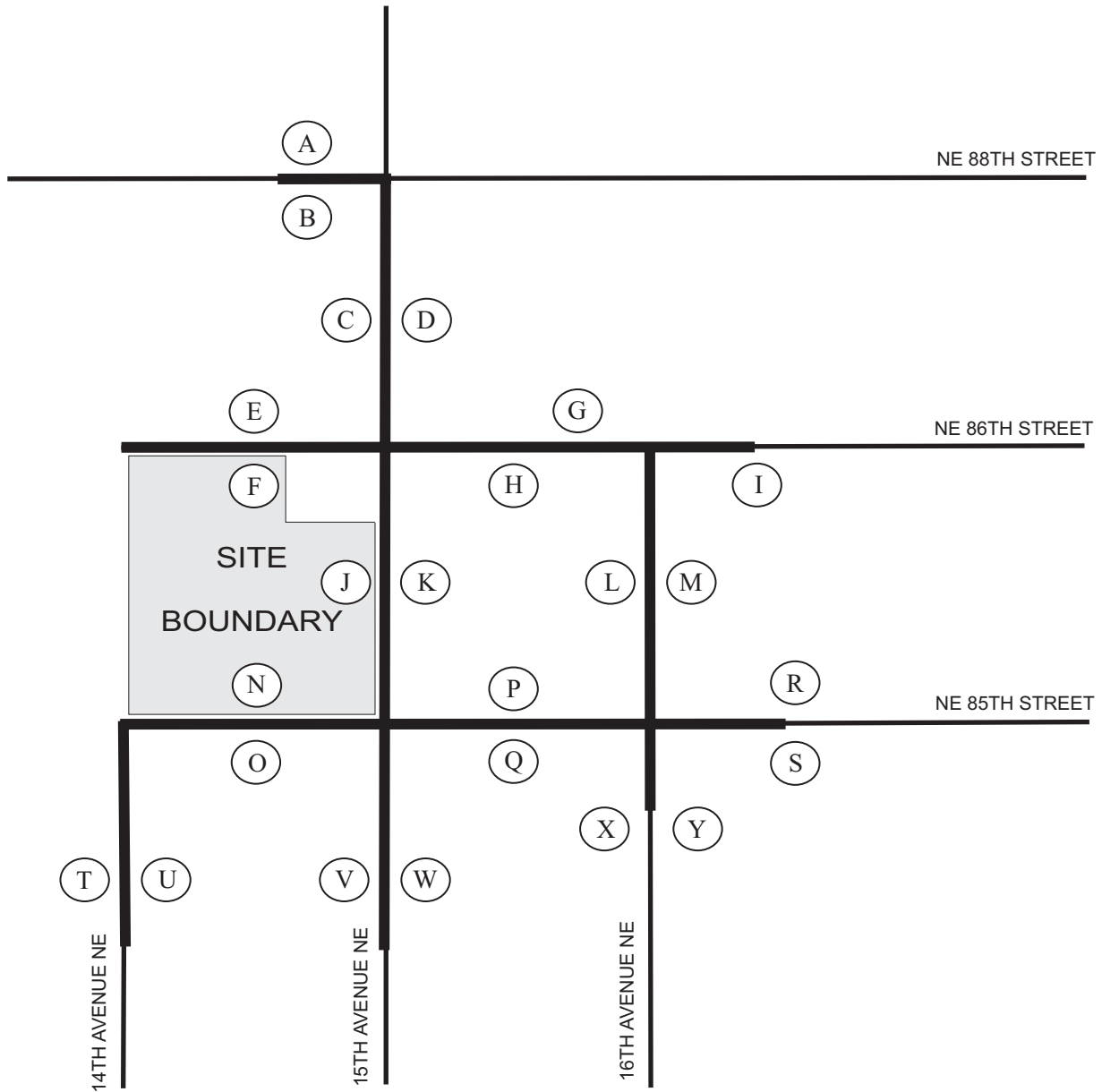
For unsignalized intersections, level of service is based on the average delay per vehicle for each turning movement. The level of service for a two-way, stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. Delay is related to the availability of gaps in the main street's traffic flow, and the ability of a driver to enter or pass through those gaps. Table A-2 shows the level of service criteria for unsignalized intersections from the *Highway Capacity Manual*.

Table A-2. Level of Service Criteria for Unsignalized Intersections

Level of Service	Average Delay (seconds per vehicle)
A	Less than 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

Source: Transportation Research Board, *Highway Capacity Manual*, 2000.

APPENDIX B
Parking Utilization Survey Results



Legend

ⓧ Block Face ID

— Study Area

MAPLE LEAF
Campfire Cottages

Appendix B-1
BLOCK FACE IDENTIFICATION

heffron
transportation, inc.

Appendix B-3

Maple Leaf Campfire Cottages

On-Street Parking Utilization Study

Segment	Street Name	Street Segment	Side of Street	Parking Supply		Parking Demand					Parking Utilization			
				Unrestricted Parking Spaces	2 Hour Parking 7 am to 6 pm Except Sun and Hol	2:00 PM - 3:00 PM		7:00 PM - 8:00 PM			2:00 PM - 3:00 PM		7:00 PM - 8:00 PM	
						Wednesday 05/02/07	Saturday 05/05/07	Wednesday 05/02/07	Saturday 05/05/07	Saturday 5/19/07 7:00 PM -8:00 PM	Average Utilization	Percent Utilization Based on Average	Average Utilization	Percent Utilization Based on Average
A	NE 88th Street	West boundary and 15th Ave NE	N	2	0	1	2	1	1	1	2	100%	1	50%
B	NE 88th Street	West boundary and 15th Ave NE	S	1	0	0	1	0	1	1	1	100%	1	100%
C	15th Avenue NE	NE 88th St and NE 86th St	W	8	0	5	2	4	3	6	4	50%	4	50%
D	15th Avenue NE	NE 88th St and NE 86th St	E	6	0	2	3	1	5	3	3	50%	3	50%
E	NE 86th Street	West Boundary and 15th Ave NE	N	3	0	5	6	5	6	6	6	200%	6	200%
F	NE 86th Street	West Boundary and 15th Ave NE	S	5	0	4	4	5	4	4	4	80%	5	100%
G	NE 86th Street	15th Ave NE and east boundary	N	9	0	3	4	4	5	6	4	44%	5	56%
H	NE 86th Street	15th Ave NE and 16th Ave NE	S	5	0	1	3	3	3	4	2	40%	3	60%
I	NE 86th Street	16th Ave NE and east boundary	S	2	0	2	1	2	2	2	2	100%	2	100%
J	15th Avenue NE	NE 86th St and NE 85th St	W	4	4	4	0	2	0	0	2	25%	1	13%
K	15th Avenue NE	NE 86th St and NE 85th St	E	7	0	3	1	3	3	1	2	29%	3	43%
L	16th Avenue NE	NE 86th St and NE 85th St	W	8	0	3	4	3	2	3	4	50%	3	38%
M	16th Avenue NE	NE 86th St and NE 85th St	E	11	0	3	2	3	4	2	3	27%	4	36%
N	NE 85th Street	West Boundary and 15th Ave NE	N	0	0	0	0	0	0	0	0	0%	0	0%
O	NE 85th Street	West Boundary and 15th Ave NE	S	9	0	4	5	8	10	3	5	56%	9	100%
P	NE 85th Street	15th Ave NE and 16th Ave NE	N	5	0	3	2	4	3	0	3	60%	4	80%
Q	NE 85th Street	15th Ave NE and 16th Ave NE	S	6	0	4	5	5	6	2	5	83%	6	100%
R	NE 85th Street	16th Ave NE and east boundary	N	1	0	0	0	0	0	0	0	0%	0	0%
S	NE 85th Street	16th Ave NE and east boundary	S	3	0	0	3	1	0	0	2	67%	1	33%
T	14th Avenue NE	NE 85th St and south boundary	W	20	0	0	1	1	1	3	1	5%	1	5%
U	14th Avenue NE	NE 85th St and south boundary	E	16	0	7	5	8	5	7	6	38%	7	44%
V	15th Avenue NE	NE 85th St and south boundary	W	0	0	0	0	0	0	0	0	0%	0	0%
W	15th Avenue NE	NE 85th St and south boundary	E	6	0	3	5	4	6	5	4	67%	5	83%
X	16th Avenue NE	NE 85th St and south boundary	W	4	0	3	1	2	3	3	2	50%	3	75%
Y	16th Avenue NE	NE 85th St and south boundary	E	0	0	0	0	0	0	0	0	0%	0	0%
TOTAL				141	4	60	60	69	73	62	60	41%	71	49%