

**To:** Kirk Roberts, PE  
City of Bloomington

**From:** Joshua Maus, PE, PTOE  
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**Date:** August 4, 2015

**Subject:** Norman Pointe Development Traffic Study

## Introduction

As requested, SRF has completed a traffic study for the proposed Norman Pointe residential development in the City of Bloomington (see Figure 1: Project Location). The proposed development is located in the northeast quadrant of the American Boulevard/Normandale Lake Boulevard intersection. This traffic study is supplementary to the ongoing *Normandale Lake District Traffic Study Update*. The main objectives of this study are to evaluate the traffic impacts to the adjacent roadway network and recommend any necessary improvements to accommodate the proposed development. The following information provides the assumptions, analysis, and study recommendations offered for consideration.

## Existing Conditions

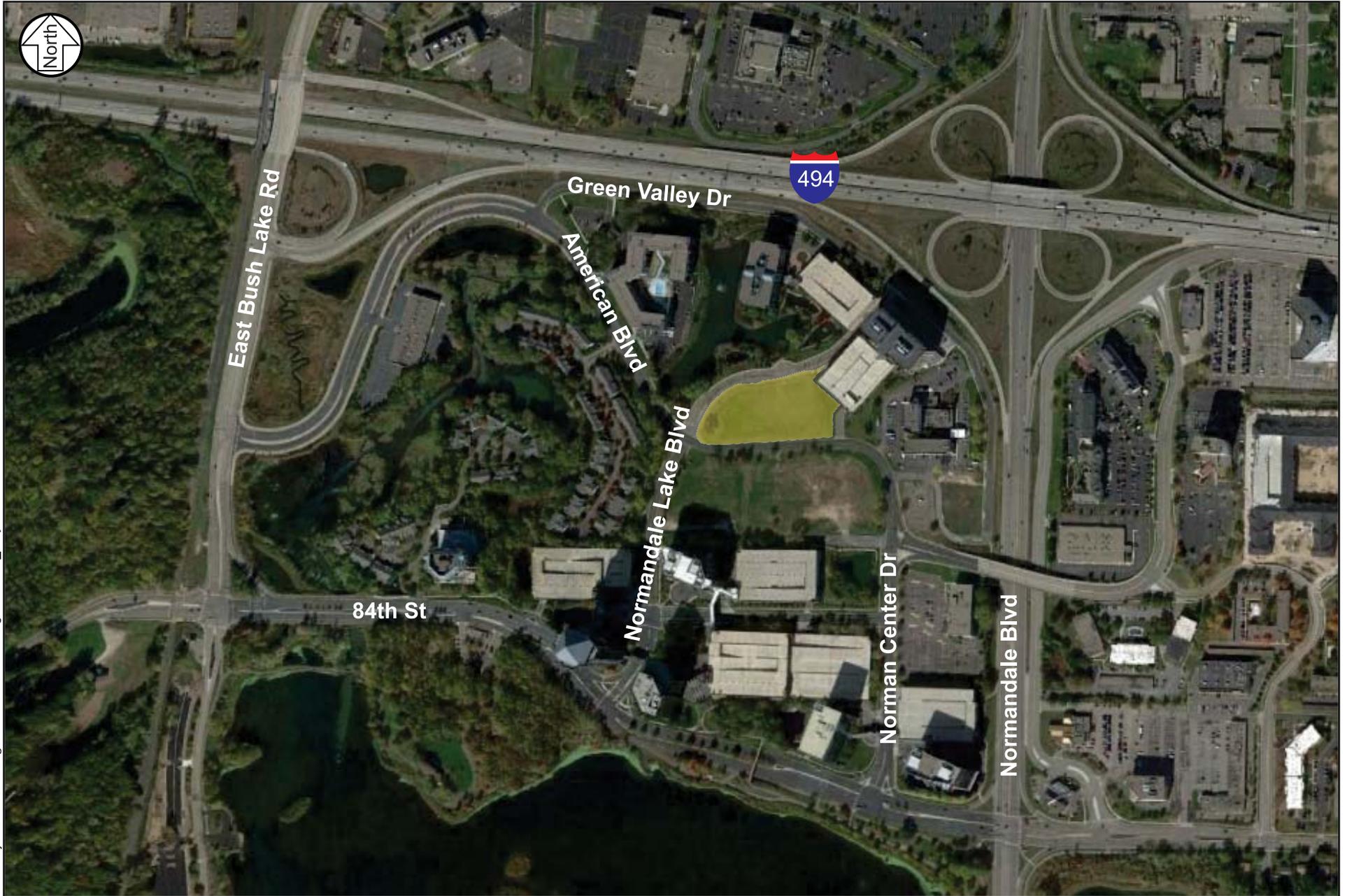
The existing conditions were reviewed to establish a baseline to compare and determine any future impacts associated with the proposed development. The evaluation of existing conditions includes peak hour intersection counts, field observations, and an intersection capacity analysis.

## Data Collection

As part of the ongoing *Normandale Lake District Traffic Study Update*, intersection turning movement counts were collected by SRF during the weekday a.m. and p.m. peak periods in August 2013 and May 2015 at the following locations:

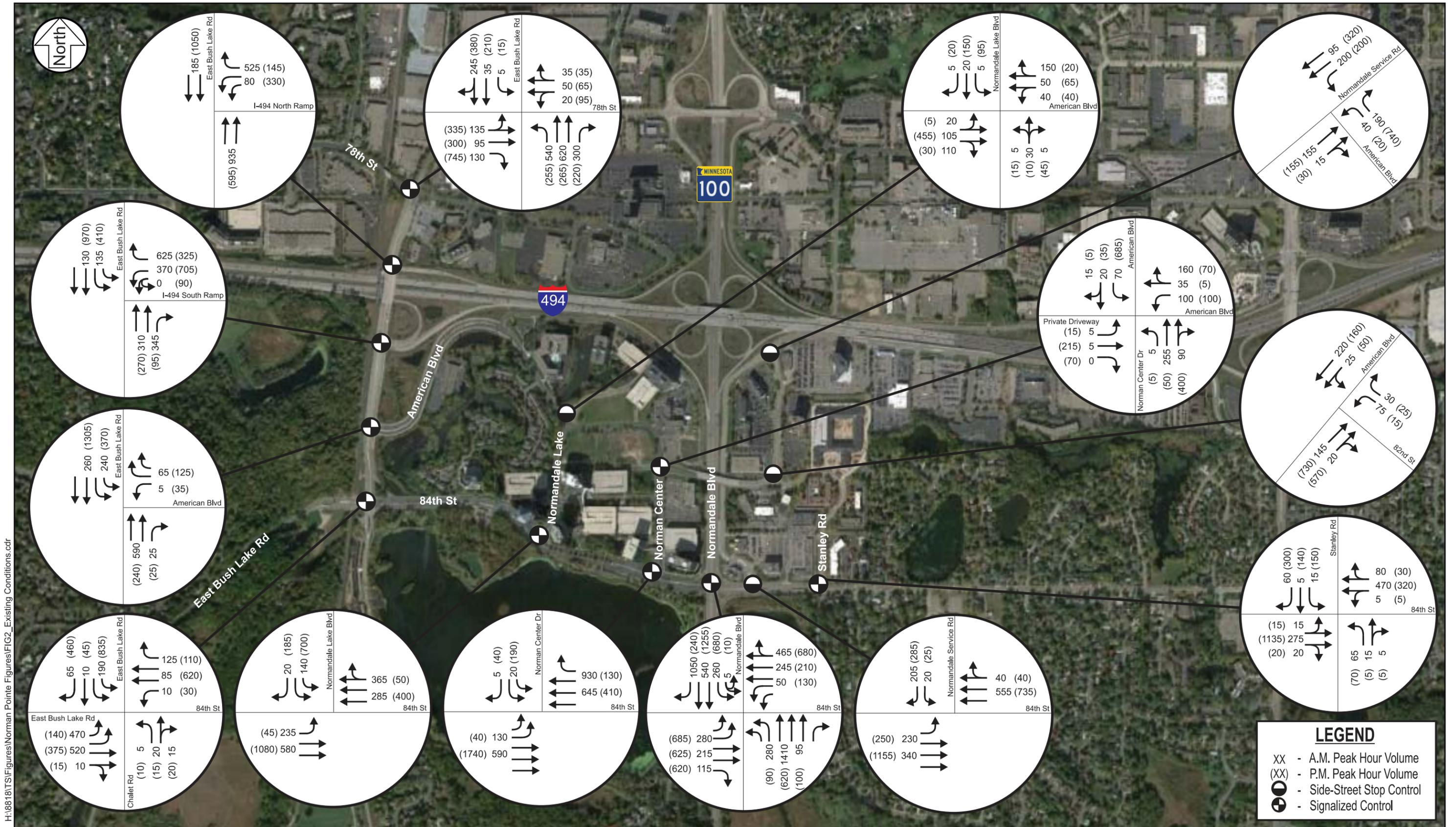
- East Bush Lake Road/78th Street
- East Bush Lake Road/Westbound I-494 Ramp
- East Bush Lake Road/Eastbound I-494 Ramps
- East Bush Lake Road/American Boulevard
- East Bush Lake Road/84th Street
- 84th Street/Normandale Lake Boulevard
- 84th Street/Norman Center Drive
- 84th Street/Normandale Boulevard
- 84th Street/Normandale Service Road
- 84th Street/Stanley Road
- American Boulevard/Normandale Lake Boulevard
- American Boulevard/Norman Center Drive
- American Boulevard/82nd Street
- American Boulevard/Normandale Service Road

Two site visits were conducted during the a.m. and p.m. peak periods to observe traffic patterns and identify current operational issues. These site visits were also used to identify roadway characteristics (i.e. roadway geometry, traffic controls, and posted speed limits) within the study area. Existing geometrics, traffic control, and peak hour traffic volumes are shown in Figure 2.



### Project Location

Norman Pointe Development Traffic Study  
City of Bloomington



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### Intersection Capacity Analysis

An existing intersection capacity analysis was completed to establish a baseline condition to which future traffic operations could be compared. The study intersections were analyzed using a combination of Synchro/SimTraffic software (V8.0) and the *Highway Capacity Manual* (HCM).

Capacity analysis results identify a Level of Service (LOS) which indicates how well an intersection is operating. Intersections are ranked from LOS A through LOS F. The LOS results are based on average delay per vehicle, which correspond to the delay threshold values shown in Table 1. LOS A indicates the best traffic operation, while LOS F indicates an intersection where demand exceeds capacity. Overall intersection LOS A through LOS D is generally considered acceptable in the Twin Cities Metropolitan Area.

**Table 1: Level of Service Criteria for Signalized and Unsignalized Intersections**

LOS Designation	Signalized Intersection Average Delay/Vehicle (seconds)	Unsignalized Intersection Average Delay/Vehicle (seconds)
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

For side-street stop controlled intersections, special emphasis is given to providing an estimate for the level of service of the side-street approach. Traffic operations at an unsignalized intersection with side-street stop control can be described in two ways. First, consideration is given to the overall intersection level of service. This takes into account the total number of vehicles entering the intersection and the capability of the intersection to support these volumes. Second, it is important to consider the delay on the minor approach. Since the mainline does not have to stop, the majority of delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay (i.e. poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during peak hour conditions.

Results of the existing capacity analysis shown in Table 2 indicate that all study intersections currently operate at an acceptable overall LOS D or better during the a.m. and p.m. peak hours, with the existing traffic control, geometric layout, and signal timing.

**Table 2: Existing Conditions Peak Hour Capacity Analysis**

Intersection	A.M. Peak		P.M. Peak	
	LOS	Delay (sec.)	LOS	Delay (sec.)
East Bush Lake Road/78th Street	C	25	C	25
East Bush Lake Road/Westbound I-494 Ramp	B	19	B	14
East Bush Lake Road/Eastbound I-494 Ramps	B	13	C	20
East Bush Lake Road/American Boulevard	B	13	B	16
East Bush Lake Road/84th Street	B	14	C	32
84th Street/Normandale Lake Boulevard	B	10	B	14
84th Street/Norman Center Drive	A	7	A	9
84th Street/Normandale Boulevard	C	33	D	43
84th Street/Normandale Service Road <sup>(1)</sup>	C/E	45	A/D	32
84th Street/Stanley Road	A	7	B	12
American Boulevard/Normandale Lake Boulevard <sup>(1)</sup>	A/A	8	A/B	13
American Boulevard/Norman Center Drive	A	7	B	15
American Boulevard/82nd Street <sup>(1)</sup>	A/A	6	A/A	7
American Boulevard/Normandale Service Road <sup>(1)</sup>	A/A	4	A/A	7

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS.

Although all of the intersections operated at acceptable overall levels of service during the a.m. and p.m. peak hours, the following operational issues were observed during field observations as well as in the simulation model:

- East Bush Lake Road/78th Street
  - During the a.m. peak hour northbound left-turn queues extend approximately 530 feet, which is beyond the available turn lane storage. These queues cause inefficient traffic operations for northbound through and westbound right-turn movements at the East Bush Lake Road/Westbound I-494 Ramp intersection.
  - During the p.m. peak hour eastbound queues extend approximately 360 feet, blocking access to the eastbound right-turn lane. Based on one day of field observations, these queues extended more than 700 feet and cycle failure was observed. The intersection currently operates with eastbound/westbound split phasing.
- East Bush Lake Road/Eastbound I-494 Ramps
  - During the p.m. peak hour when eastbound I-494 is experiencing heavy congestion, motorists were observed to exit at East Bush Lake Road and either make a westbound U-turn to return to I-494 or make a westbound left-turn to either a southbound left-turn at American Boulevard or 84th Street depending on the motorist’s final destination. While this “cut-through” travel pattern occurs on a regular basis, the magnitude of motorists making these movements is dependent on the level of congestion of eastbound I-494.

- East Bush Lake Road/84th Street
  - During the p.m. peak hour southbound left-turn queues extend approximately 540 feet, which is beyond the available storage.
- 84th Street/Normandale Boulevard
  - During the a.m. peak hour, poor lane utilization was observed on the westbound through and northbound left-turn movements due to the high percentage of vehicles destined to make a westbound right-turn at the 84th Street/Norman Center Drive intersection.
  - During the p.m. peak hour, eastbound queues along 84th Street extend through the Norman Center Drive intersection and some days will extend past the Normandale Lake Boulevard intersection. However, on those days the queues are generally “rolling” rather than stopped.
- 84th Street/Normandale Service Road
  - During the a.m. peak hour, the westbound approach of the 84th Street/Normandale Boulevard intersection queues through the Normandale Service Road intersection approximately 10 percent of the peak hour, resulting in poor operations for the Normandale Service Road southbound approach.
  - During the a.m. and p.m. peak hour eastbound left-turn queues extend beyond available storage (approximately 150 and 170 feet), respectively. These stopped vehicles would extend into the eastbound through lanes which would increase the potential for rear-end crashes along 84th Street.
- American Boulevard/Normandale Lake Boulevard
  - There is an existing sight distance issue for southbound approach vehicles at the location of the stop signs. The location of the Norman Pointe monument signs and landscaping make it difficult for motorists to see vehicles traveling along American Boulevard. However, when vehicles pull forward past the stop signs, which motorists were observed to do, the sight distance does meet the minimum AASHTO sight distance requirements.
- American Boulevard/Norman Center Drive
  - During the p.m. peak hour southbound left-turn queues extend approximately 350 feet, blocking access to two driveways along American Boulevard.

### **I-494/East Bush Lake Road Westbound On-Ramp**

The I-494/East Bush Lake Road Westbound On-Ramp concept shown in Figure 3 is expected to be constructed by year 2018. This proposed ramp will result in more direct access for regional trips destined for westbound I-494 from Bloomington’s Normandale Lakes District and southern Edina. This is an assumed regional improvement under year 2018 conditions and travel pattern shifts for motorists rerouting to use the I-494/East Bush Lake Road Westbound On-Ramp were based on the *I-494/East Bush Lake Road Preliminary Design Project*.



In addition to providing access to westbound I-494, the project plans to extend the southbound left-turn lanes and provide a signal overlap phase for the northbound right-turn movement. With the signal overlap phase, it is assumed that no westbound U-turn movement would be permitted since it would be in direct conflict with the northbound right-turn movement. Motorists currently making westbound U-turns were assumed to stay on I-494 and no longer would be using the East Bush Lake Road as a cut-through route.

## **Year 2018 No Build Traffic Forecasts**

Traffic forecasts were developed for year 2018 (one-year after the opening) conditions for both with and without the construction of the proposed Norman Pointe residential development (i.e. year 2018 no build and build conditions, respectively). This section describes the methodology/assumptions used to develop year 2018 no build traffic forecasts. Year 2018 build forecasts will be discussed in the upcoming sections of this document.

### **Background Traffic**

To develop year 2018 background growth to the study area, growth rates were applied to the existing non-Normandale Lake District traffic volume set. These growth rates were based on historical traffic volume trends, information provided from the Year 2030 Metro Council Travel Demand Model with updated 2040 SE data, and the *I-494/East Bush Lake Road Preliminary Design Project* forecast memo. It should be noted that much of the growth expected in the area is directly due to the expected/proposed land use changes in the Normandale Lake District and not necessarily related to growth outside of the study area. A growth rate of one-quarter percent per year was applied to all movements entering the study area, except for the northbound and southbound through movements at the Normandale Boulevard/84<sup>th</sup> Street intersection, where a three-quarter percent per year growth rate.

### **Development Currently Under Construction**

In addition to the general background increases, year 2018 no build conditions include trips that will be generated by the Hampton Inn and Luxembourg Apartments, which are currently under construction and expected to open in the next six months. The Hampton Inn is located in the northeast quadrant of the American Boulevard/Norman Center Drive intersection and the Luxembourg Apartments are generally located north of 82nd Street/Stanley Road and east of American Boulevard. Trip generation estimates for the a.m. and p.m. peak hour and on a daily basis were calculated for the hotel and apartment land uses based on the *ITE Trip Generation Manual, 9th Edition*. A 15 percent modal/multi-use reduction was applied to the developments. This value was calculated using current traffic counts and trip generation estimate for the existing development. Results of the trip generation estimate shown in Table 3 indicate that the apartment and hotel land uses will generate a total of approximately 167 a.m. peak hour, 200 p.m. peak hour, and 2,288 daily trips.

**Table 3: Trip Generation Estimates – Developments Currently Under Construction**

Land Use Type (ITE Code)	Size	A.M. Peak Hour Trips		P.M. Peak Hour Trips		Daily Trips
		In	Out	In	Out	
Hotel (310)	100 rooms	31	22	31	29	817
Apartment (210)	282 DU	29	115	114	61	1,875
<b>Subtotal</b>		<b>60</b>	<b>137</b>	<b>145</b>	<b>91</b>	<b>2,692</b>
<b>Modal/Multi-Use Reduction (15%)</b>		<b>(9)</b>	<b>(21)</b>	<b>(22)</b>	<b>(14)</b>	<b>(404)</b>
<b>Total</b>		<b>51</b>	<b>116</b>	<b>123</b>	<b>77</b>	<b>2,288</b>

**I-494/East Bush Lake Road Westbound On-Ramp**

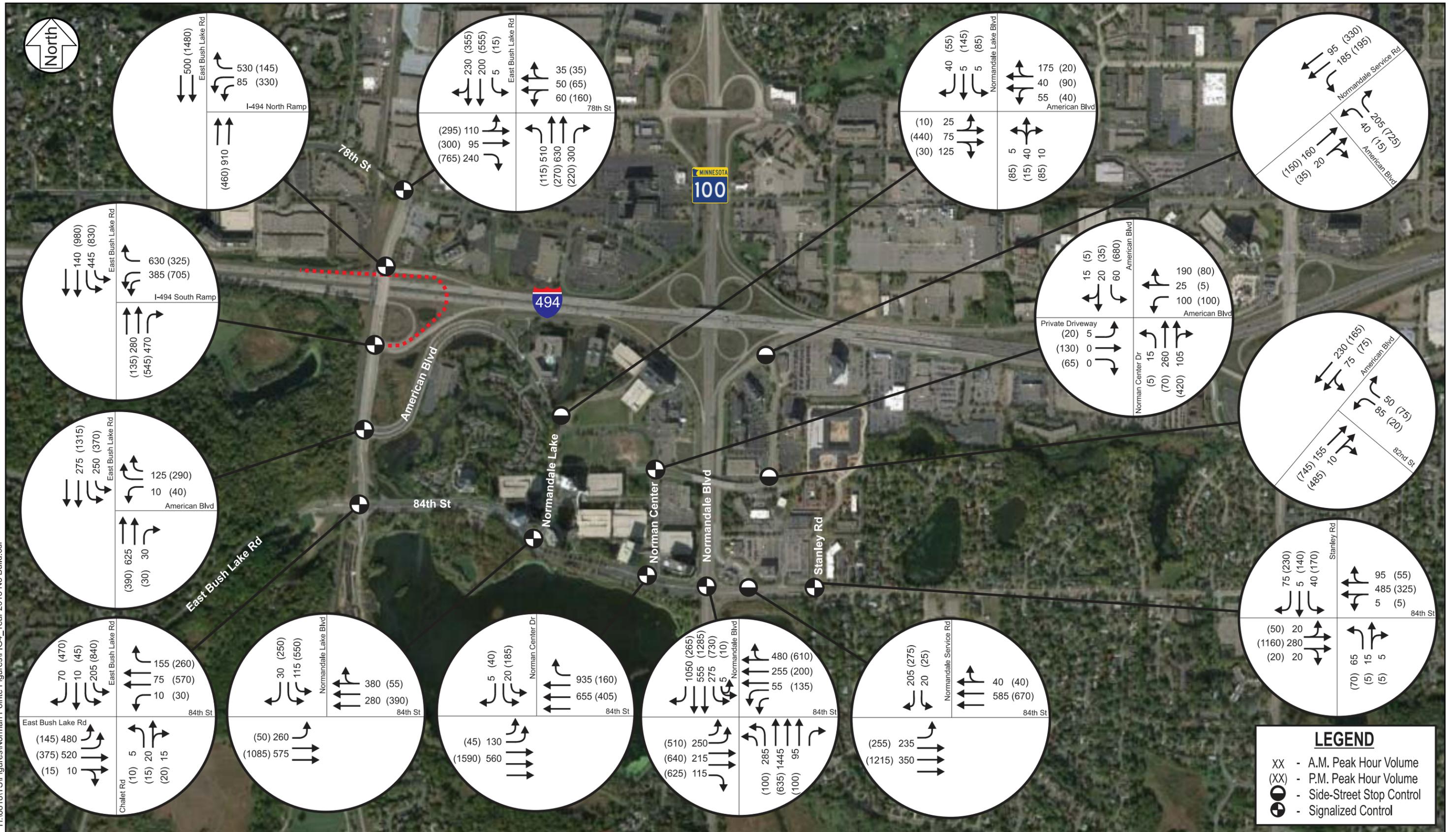
As previously mentioned, year 2018 no build conditions assume that the I-494 East Bush Lake Road Westbound On-Ramp is complete and open to traffic. It should be noted that trips generated in the Normandale Lake District Area were individually rerouted based on the development access location, directional distribution, and ITE trip generation to account for the travel pattern shifts to the new on-ramp. However, the travel pattern and traffic volume magnitude shift for non-Normandale Lake District Area trips were based on the information provided in the *I-494/East Bush Lake Road Preliminary Design Project* forecast memo and are consistent with assumptions from the ongoing *Normandale Lake District Traffic Study Update*.

Approximately 325 a.m. peak hour and 465 p.m. peak hour non-Normandale Lake District trips are expected to reroute to the I-494 East Bush Lake Road Westbound On-Ramp under year 2018 conditions. The majority of this shift is from trips destined to/from the west, north, and east of the East Bush Lake Road/78th Street intersection. A portion of vehicles that are currently using East Bush Lake Road to access US Highway 169 to the south are also expected to reroute to the I-494 East Bush Lake Road Westbound On-Ramp.

Approximately 105 a.m. peak hour and 400 p.m. peak hour Normandale Lake District trips (including existing land uses and the two developments that are currently under construction) are expected to reroute to the I-494 East Bush Lake Road Westbound On-Ramp under year 2018 conditions. These trips will divert away from making an eastbound left-turn or westbound right-turn at the 84th Street/Normandale Boulevard intersection and northbound left-turn at East Bush Lake Road/78th Street.

Year 2018 no build traffic forecasts, which take into account background growth, trips generated by the Hampton Inn and Luxemburg Apartments (currently under construction), and travel pattern shifts due to the new I-494 East Bush Lake Road Westbound On-Ramp, are shown in Figure 4.

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## Year 2018 No Build Conditions

### Intersection Capacity Analysis

To determine if the existing roadway network can accommodate year 2018 no build traffic forecasts, a detailed traffic capacity analysis was completed. The year 2018 no build conditions were reviewed to establish a baseline to compare and determine any future impacts associated with the proposed development. Study intersections were analyzed using Synchro/SimTraffic and HCM. Results of the year 2018 no build operations analysis shown in Table 4 indicates that the study intersections are expected to operate at an acceptable overall LOS D or better during the a.m. and p.m. peak hours, with the existing traffic control, geometric layout, and signal timing, except the East Bush Lake Road/78th Street intersection which is expected to operate at LOS E during the p.m. peak hour.

**Table 4: Year 2018 No Build Conditions Peak Hour Capacity Analysis**

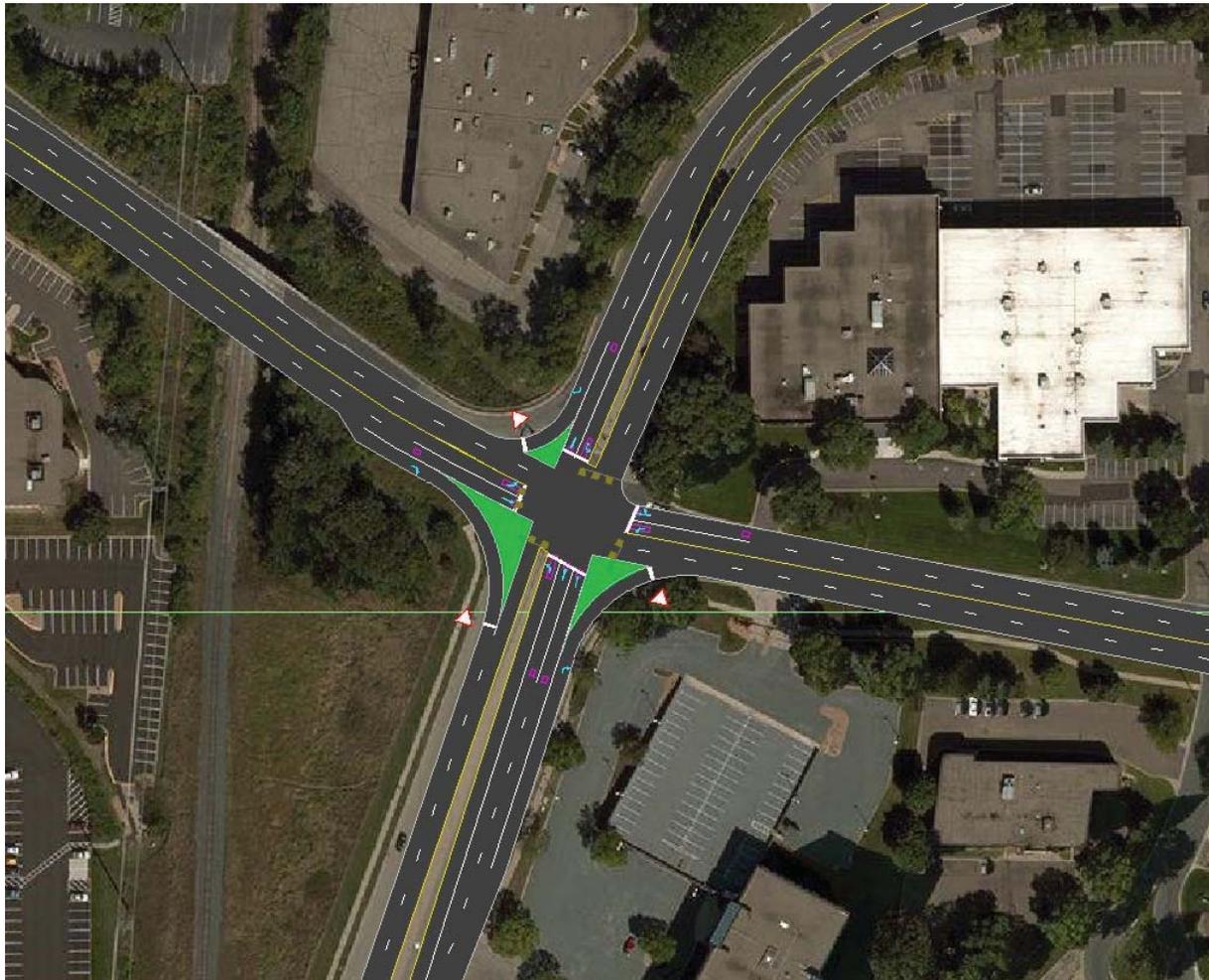
Intersection	A.M. Peak		P.M. Peak	
	LOS	Delay (sec.)	LOS	Delay (sec.)
East Bush Lake Road/78th Street	C	25	E	59
East Bush Lake Road/Westbound I-494 Ramp	B	17	C	25
East Bush Lake Road/Eastbound I-494 Ramps	B	15	D	41
East Bush Lake Road/American Boulevard	B	14	B	17
East Bush Lake Road/84th Street	B	14	C	30
84th Street/Normandale Lake Boulevard	B	10	B	14
84th Street/Norman Center Drive	A	7	A	8
84th Street/Normandale Boulevard	C	30	D	37
84th Street/Normandale Service Road <sup>(1)</sup>	B/D	34	A/C	19
84th Street/Stanley Road	A	7	B	12
American Boulevard/Normandale Lake Boulevard <sup>(1)</sup>	A/A	8	A/B	12
American Boulevard/Norman Center Drive	A	6	B	13
American Boulevard/82nd Street <sup>(1)</sup>	A/A	7	A/A	9
American Boulevard/Normandale Service Road <sup>(1)</sup>	A/A	3	A/A	6

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS.

To provide acceptable operations at the East Bush Lake Road/78th Street intersection, the modifications listed below are recommended (see Figure 5). It should be noted that at this intersection there is limited right-of-way to expand the roadway width due to existing building location and grade changes. Therefore, the existing roadway width was maintained.

- Restripe the eastbound approach to provide a left-turn, single through, and right-turn lane.
- Restripe the westbound approach to provide a left-turn and shared through/right-turn lane.
- Restripe the southbound approach to provide a southbound left-turn, single through, and trap the right-turn lane.
- Remove the split phasing along the eastbound and westbound approaches and provide protected/permitted left-turn phasing.

**Figure 5: Recommended Geometric Modifications to the East Bush Lake Road/78th Street Intersection**



To improve traffic operations along East Bush Lake Road during the p.m. peak hour under year 2018 conditions, signal timing cycles and splits should be optimized at the study intersections from 78th Street to 84th Street. Current cycle lengths along East Bush Lake Road during the p.m. peak hour are 90 seconds, a 150 second cycle length was assumed for analysis purposes.

With the modifications identified above to the p.m. peak hour, results of the year 2018 no build operations analysis shown in Table 5 indicates that the study intersections are expected to operate at an acceptable overall LOS D or better. In addition to the modifications listed above, the City should monitor the 84th Street/Normandale Service Road intersection and consider installing “No Left Turn” signs during the a.m. and p.m. peak periods. As mentioned under existing conditions, eastbound left-turn queues extend beyond the available storage, causing safety and operational issues for mainline traffic on 84th Street

**Table 5: Year 2018 No Build Conditions Peak Hour Capacity Analysis – Recommended Improvements**

Intersection	P.M. Peak	
	LOS	Delay (sec.)
East Bush Lake Road/78th Street	C	25
East Bush Lake Road/Westbound I-494 Ramp	C	23
East Bush Lake Road/Eastbound I-494 Ramps	C	27
East Bush Lake Road/American Boulevard	B	17
East Bush Lake Road/84th Street	C	25
84th Street/Normandale Lake Boulevard	B	14
84th Street/Norman Center Drive	A	7
84th Street/Normandale Boulevard	D	37
84th Street/Normandale Service Road <sup>(1)</sup>	A/C	23
84th Street/Stanley Road	B	13
American Boulevard/Normandale Lake Boulevard <sup>(1)</sup>	A/B	14
American Boulevard/Norman Center Drive	B	14
American Boulevard/82nd Street <sup>(1)</sup>	A/A	7
American Boulevard/Normandale Service Road <sup>(1)</sup>	A/A	6

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS.

## Proposed Development

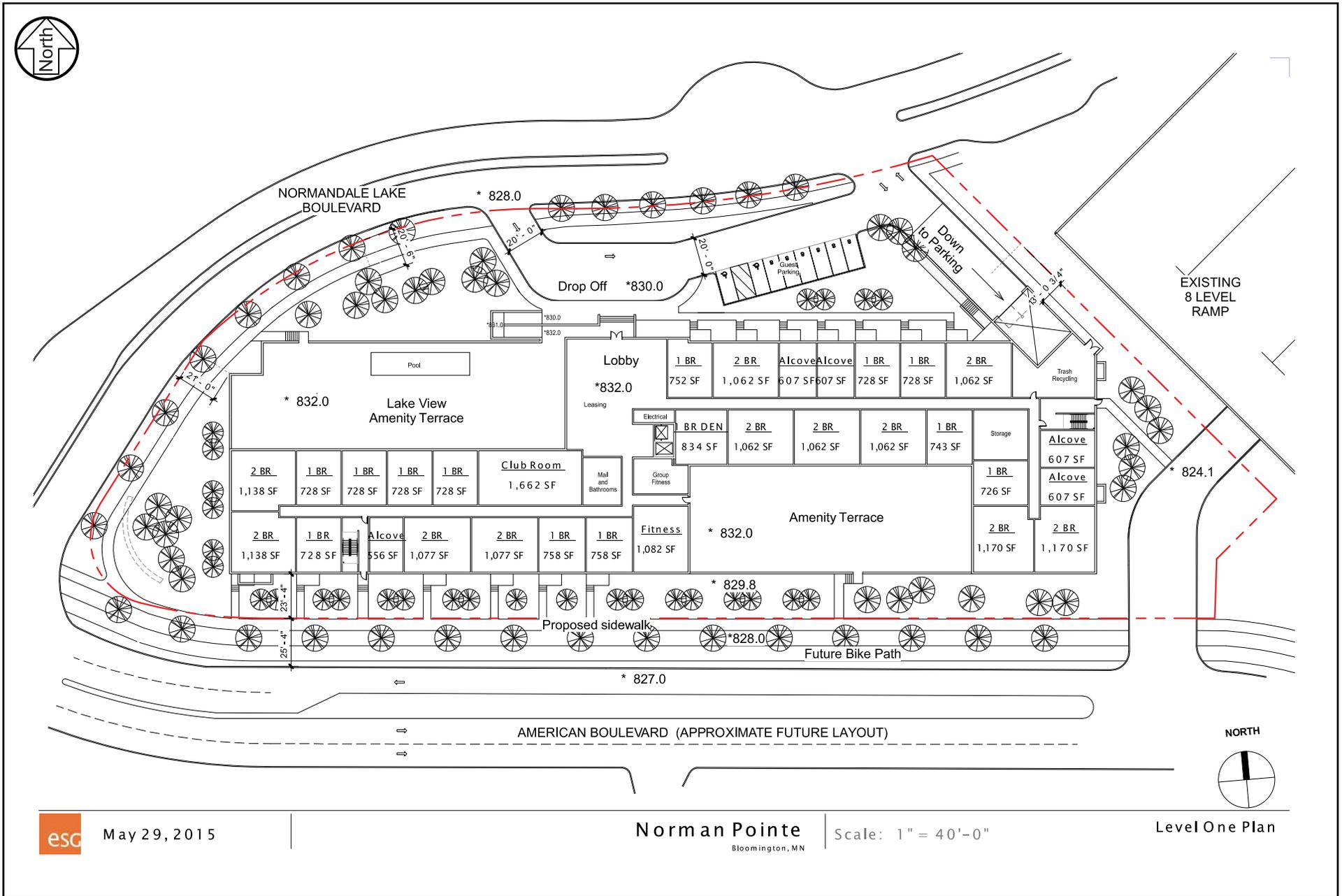
The proposed Norman Pointe residential development is located in the northeast quadrant of American Boulevard/Normandale Lake Boulevard intersection and is expected to open in year 2017. This site is currently vacant. The proposed development consists of 177-unit apartment complex (see Figure 6). Access to the proposed development is proposed at two locations along Normandale Lake Boulevard. The westernmost driveway is right-in only and leads to a drop-off area and guest parking. The easternmost driveway is a full access and leads down to the underground parking facility.

To account for traffic impacts associated with the proposed development, trip generation estimates for the a.m. and p.m. peak hours and on a daily basis were developed using the *ITE Trip Generation Manual, 9th Edition*. A modal/multi-use trip reduction of 15 percent was applied to the proposed development trips, which is consistent with existing trips in the Normandale Lake District. Results of the trip generation estimates shown in Table 6 indicate that the proposed residential development will generate 76 a.m. peak hour, 92 p.m. peak hour, and 1,000 daily trips.

**Table 6: Trip Generation Estimates – Proposed Development**

Land Use Type (ITE Code)	Size	A.M. Peak Hour Trips		P.M. Peak Hour Trips		Daily Trips
		In	Out	In	Out	
Apartment (210)	177 DU	18	72	71	38	1,177
Modal/Multi-Use Reduction (15%)		(3)	(11)	(11)	(6)	(177)
Total		15	61	60	32	1,000

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**Site Plan**  
 Norman Pointe Development Traffic Study  
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**Figure 6**

The arriving/departing vehicles of the proposed development were distributed throughout the study area based on the directional distribution shown in Figure 7. The directional distribution was developed based on the regional travel demand model, existing area travel patterns, and is consistent with previous studies conducted in the Normandale Lake District. Norman Pointe site generated trips are shown in Figure 8. Resultant year 2018 build traffic forecasts, which take into account background growth, trips generated by the Hampton Inn and Luxemburg Apartments (currently under construction), travel pattern shifts due to the new I-494 East Bush Lake Road Westbound On-Ramp, and the proposed Norman Pointe residential development are shown in Figure 9.

## Year 2018 Build Conditions

### Intersection Capacity Analysis

To determine if the 2018 no build roadway network can accommodate year 2018 build traffic forecasts a detailed traffic capacity analysis was completed. It should be noted that the intersection modifications to East Bush Lake Road/78th Street and the signal timing adjustments to East Bush Lake Road at the study intersections from 78th Street to 84th Street identified under year 2018 no build conditions, were assumed under year 2018 build conditions. Study intersections were analyzed using Synchro/SimTraffic and HCM. Results of the year 2018 build operations analysis shown in Table 7 indicate that the study intersections are expected to operate at an acceptable overall LOS D or better during the a.m. and p.m. peak hours, with the recommended no build roadway network.

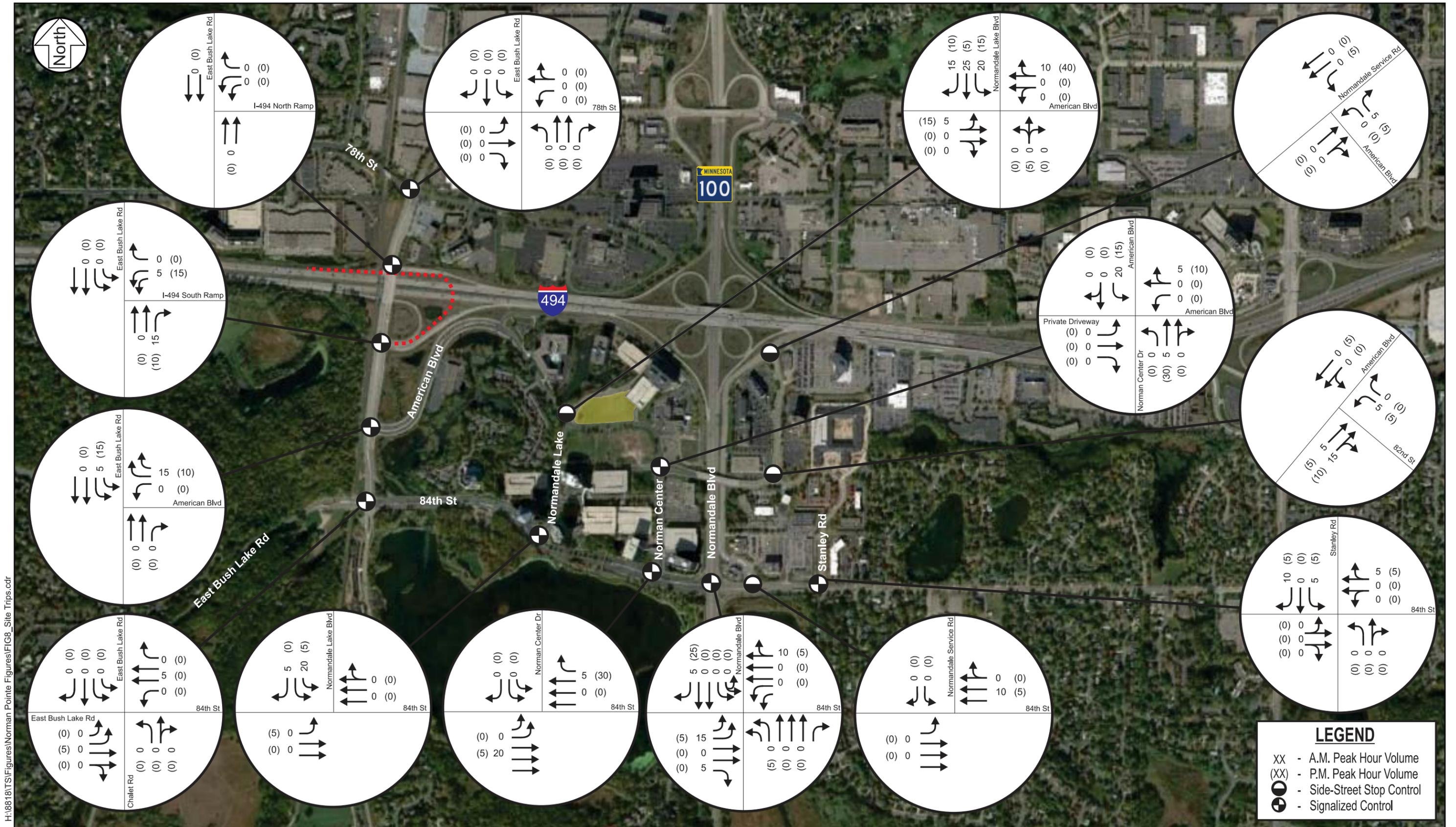
**Table 7: Year 2018 Build Conditions Peak Hour Capacity Analysis**

Intersection	A.M. Peak		P.M. Peak	
	LOS	Delay (sec.)	LOS	Delay (sec.)
East Bush Lake Road/78th Street	B	15	C	26
East Bush Lake Road/Westbound I-494 Ramp	B	18	C	22
East Bush Lake Road/Eastbound I-494 Ramps	B	16	C	28
East Bush Lake Road/American Boulevard	B	14	B	17
East Bush Lake Road/84th Street	B	14	C	25
84th Street/Normandale Lake Boulevard	B	10	B	13
84th Street/Norman Center Drive	A	7	A	7
84th Street/Normandale Boulevard	C	31	D	37
84th Street/Normandale Service Road <sup>(1)</sup>	C/E	45	A/C	19
84th Street/Stanley Road	A	7	B	12
American Boulevard/Normandale Lake Boulevard <sup>(1)</sup>	A/A	8	A/C	15
American Boulevard/Norman Center Drive	A	6	B	15
American Boulevard/82nd Street <sup>(1)</sup>	A/A	7	A/A	8
American Boulevard/Normandale Service Road <sup>(1)</sup>	A/A	3	A/A	6

(1) Indicates an unsignalized intersection with side-street stop control, where the overall LOS is shown followed by the worst approach LOS.



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**Norman Pointe Site Trips**  
 Norman Pointe Development Traffic Study  
 City of Bloomington

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**Figure 8**



Based on the analysis results, the proposed development has a minimal effect on traffic operations in the study area. It should be noted that the American Boulevard/Normandale Lake Boulevard intersection is expected to operate acceptably under year 2018 build conditions. A cursory of the peak hour traffic volumes indicates that this intersection will not meet signal warrants under year 2018 build conditions. No traffic control or geometric improvements are needed.

As mentioned under the year 2018 no build conditions, the City should also consider installing “No Left Turn” signs during the a.m. and p.m. peak periods at the 84th Street/Normandale Service Road intersection.

## Site Plan Review

A review of the proposed development site plan (dated May 29, 2015) was completed to identify any issues and recommend potential improvements. The following summarizes the findings of the site plan review:

- Consider constructing angle parking for the guest parking spaces located in the drop-off area to reduce confusion and likelihood of motorists driving the wrong way on the one-way drive aisle (guest parking shown as 90-degree parking on the proposed site plan).
- Install “No Left-Turn” and “Do Not Enter” signs to discourage vehicles exiting the underground parking facility to enter the wrong way in the drop-off area.
- As previously mentioned, the existing monument signs and landscaping located north of American Boulevard on the east and west side of Normandale Lake Boulevard create sight distance issues for motorists making southbound movements at the stop sign locations. However, when motorists pull forward past the stop signs the sight distance does appear to meet AASHTO minimums. To improve current conditions consider the following: extend the median further south closer to American Boulevard, relocate the stop signs closer to American Boulevard, add stop bars to the north approach and/or relocate/remove the monument signs.

## Conclusions and Recommendations

Based on the analysis the following conclusions and recommendations are offered for your consideration:

- Results of the existing capacity analysis indicate that all study intersections currently operate at an acceptable overall LOS D or better during the a.m. and p.m. peak hours, with the existing traffic control, geometric layout, and signal timing.
  - While overall the study intersection operate at acceptable levels of service, existing traffic issues were observed to occur at multiple locations.
- Results of the year 2018 no build conditions indicate that geometric modifications will be needed at the East Bush Lake Road/78th Street intersection and signal timing modifications will be needed at the study intersections along East Bush Lake Road. These improvements are required to accommodate the travel pattern shifts due to the new I-494 East Bush Lake Road Westbound On-Ramp.

- Results of the year 2018 build operations analysis indicate that the study intersections are expected to operate at an acceptable overall LOS D or better during the a.m. and p.m. peak hours, with the recommended no build roadway network.
- The following site plan improvements should be considered:
  - Consider constructing angle parking for the guest parking spaces located in the drop-off area to reduce confusion and likelihood of motorists driving the wrong way on the one-way drive aisle (guest parking shown as 90-degree parking on the proposed site plan).
  - Install “No Left-Turn” and “Do Not Enter” signs to discourage vehicles exiting the underground parking facility to enter the wrong way in the drop-off area.
  - The existing monument signs and landscaping located north of American Boulevard on the east and west side of Normandale Lake Boulevard create sight distance issues for motorists making southbound movements at the stop sign locations. However, when motorists pull forward past the stop signs the sight distance does appear to meet AASHTO minimums. To improve current conditions consider the following: extend the median further south closer to American Boulevard, relocate the stop signs closer to American Boulevard, add stop bars to the north approach and/or relocate/remove the monument signs.