MALL OF AMERICA, PHASE II
TRAFFIC STUDY

PREPARED FOR:

MALL OF AMERICA

PREPARED BY:

SRF CONSULTING GROUP, INC.

SEPTEMBER 06, 2006

SRF NO. 0055391

Approvals:

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I. INTRODUCTION

This report contains the traffic study results for the proposed second phase of development for the Mall of America. The proposed project is located in the northeast quadrant of TH 77 and Lindau Lane in the City of Bloomington (see Figure 1: Project Location). The purpose of this study is to determine the traffic impacts on the adjacent roadway system and necessary improvements to accommodate the traffic increase related to the proposed Mall expansion and other adjacent developments in the area, including activities associated with the Minneapolis/St. Paul International Airport and Bloomington Central Station. This study includes an operations analysis for a Saturday peak hour and a Thursday p.m. peak hour for the following scenarios:

- Existing conditions
- Year 2012 no build and build conditions
- Year 2030 build conditions

Existing, future no build and build conditions take into account light rail transit (LRT) operations.

II. EXISTING CONDITIONS

This section of the report documents existing conditions in and around the project area. This section documents existing LRT operations and traffic operations.

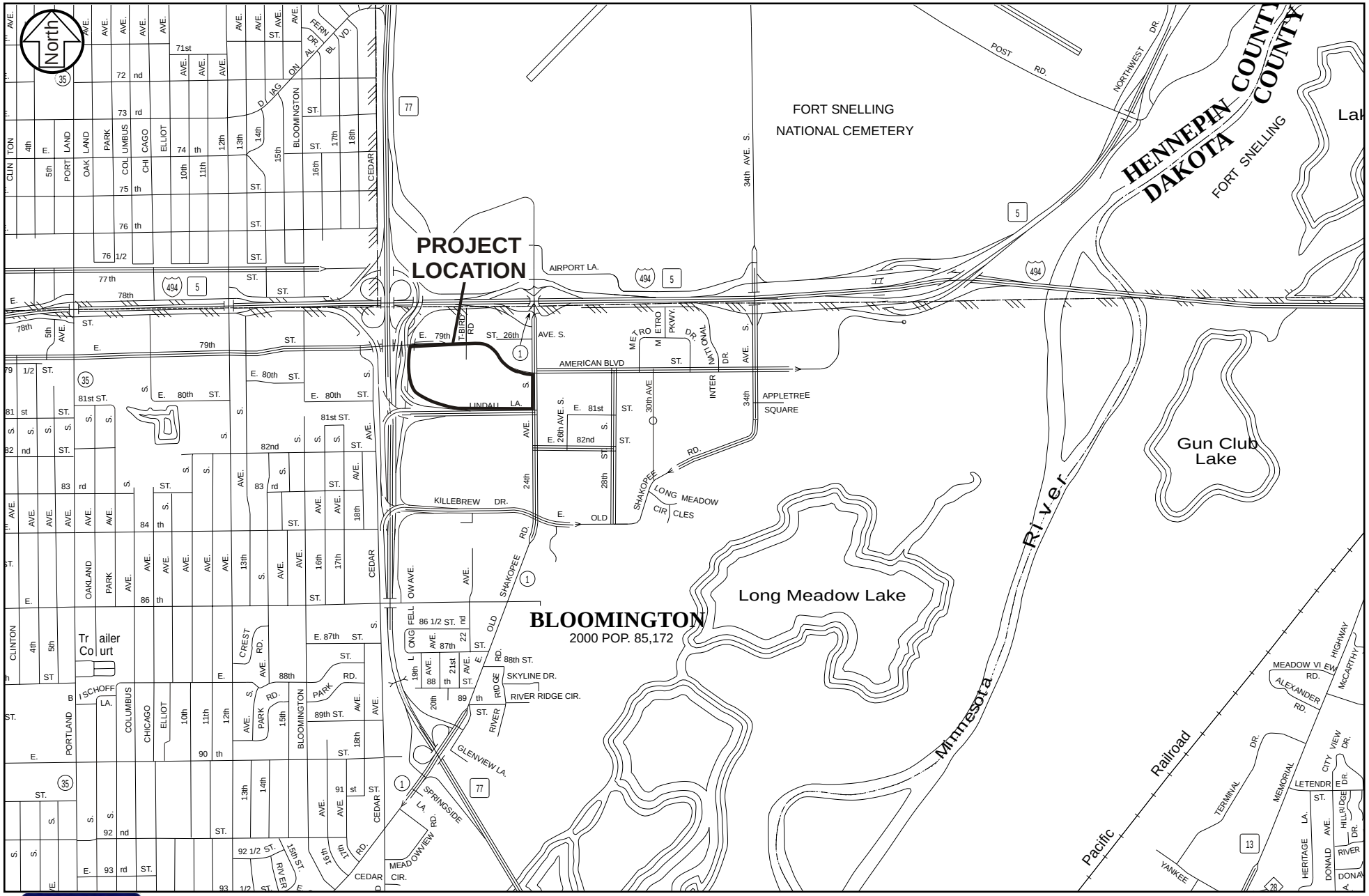
A. LRT Operations

Light rail transit has been in use within the study area since December of 2004 and its operation is expected to continue into the future. Because the LRT line directly impacts seven intersections within the study area, delay to motor vehicles as a result of its operation was calculated to include in the traffic operations analysis. In order to determine impacts to the seven intersections, train counts and delays to motorists were identified for both the a.m. and p.m. peak hours. Table 1 shows the number of trains during the a.m. and p.m. peak hours at selected intersections.

Table 1
Existing Number of LRT Trains – A.M. and P.M. Peak Hours

Intersection	A.M. Peak Hour (7:30 – 8:30)	P.M. Peak Hour (4:30 – 5:30)
24th Avenue/Killebrew Drive	14	NA
28th Avenue/82nd Street*	16	17
34th Avenue/American Boulevard**	17	16
34th Avenue/Appletree Drive	16	NA
Total	**63**	**33**

* Trains at this intersection also include impacts to 30th Avenue
**Trains at this intersection also include impacts to I-494 and 34th Avenue



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PROJECT LOCATION

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Mall of America/City of Bloomington

Figure 1

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There were a total of 96 trains during the a.m. and p.m. peak hours, or an average of 16 trains per hour, per location. These numbers are similar to Metro Transit's LRT schedule and are similar to the assumptions used in the *Bloomington Central Station Traffic Study* (2004).

In addition to identifying the number of trains during the peak hours, the time needed for each train crossing was measured. This time is not the preemption time, but the actual time that the traffic signal allocates to the train crossing (restricting conflicting traffic phases). This time was then incorporated into the traffic operations model to replicate real life traffic operations. Table 2 shows measurements of train crossing times at the seven intersections.

Table 2
Time Needed to Accommodate Train Crossing

Intersection	NB/EB	SB/WB
I-494 N. Ramp/34th Avenue	70 seconds for back-to-back	40 seconds
I-494 S. Ramp/34th Avenue		
34th Avenue/American Boulevard	65 seconds for back-to-back 40 seconds	40 seconds 30 seconds 30 seconds
34th Avenue/Appletree Drive	60 seconds	
30th Avenue Signal	70 seconds 65 seconds	70 seconds 155 seconds for back-to-back
28th Avenue/82nd Street	65 seconds	65 seconds
24th Avenue/Killebrew Drive	65 seconds 110 seconds for back-to-back	65 seconds

B. Traffic Operations

The existing operations analysis is based on peak hour turning movement counts taken within the study area and delay due to LRT. Peak hour turning movement counts for a Saturday and a typical weekday (Thursday) were collected by SRF in April and May of 2005 at the following key intersections:

- Lindau Lane/TH 77 Ramps/IKEA Way
- Lindau Lane/24th Avenue
- Killebrew Drive/22nd Avenue
- 24th Avenue/I-494 Interchange
- American Boulevard/IKEA Driveway
- American Boulevard/24th Avenue
- American Boulevard/34th Avenue
- 34th Avenue/I-494 South Ramps
- Old Shakopee Road/86th Street
- Lindau Lane/22nd Avenue
- Killebrew Drive/TH 77 Ramps/20th Avenue
- Killebrew Drive/24th Avenue
- 24th Avenue/82nd Street
- American Boulevard/Thunderbird Road
- American Boulevard/28th Avenue
- 34th Avenue/I-494 North Ramps
- 28th Avenue/82nd Street
- Old Shakopee Road/TH 77 East Ramp

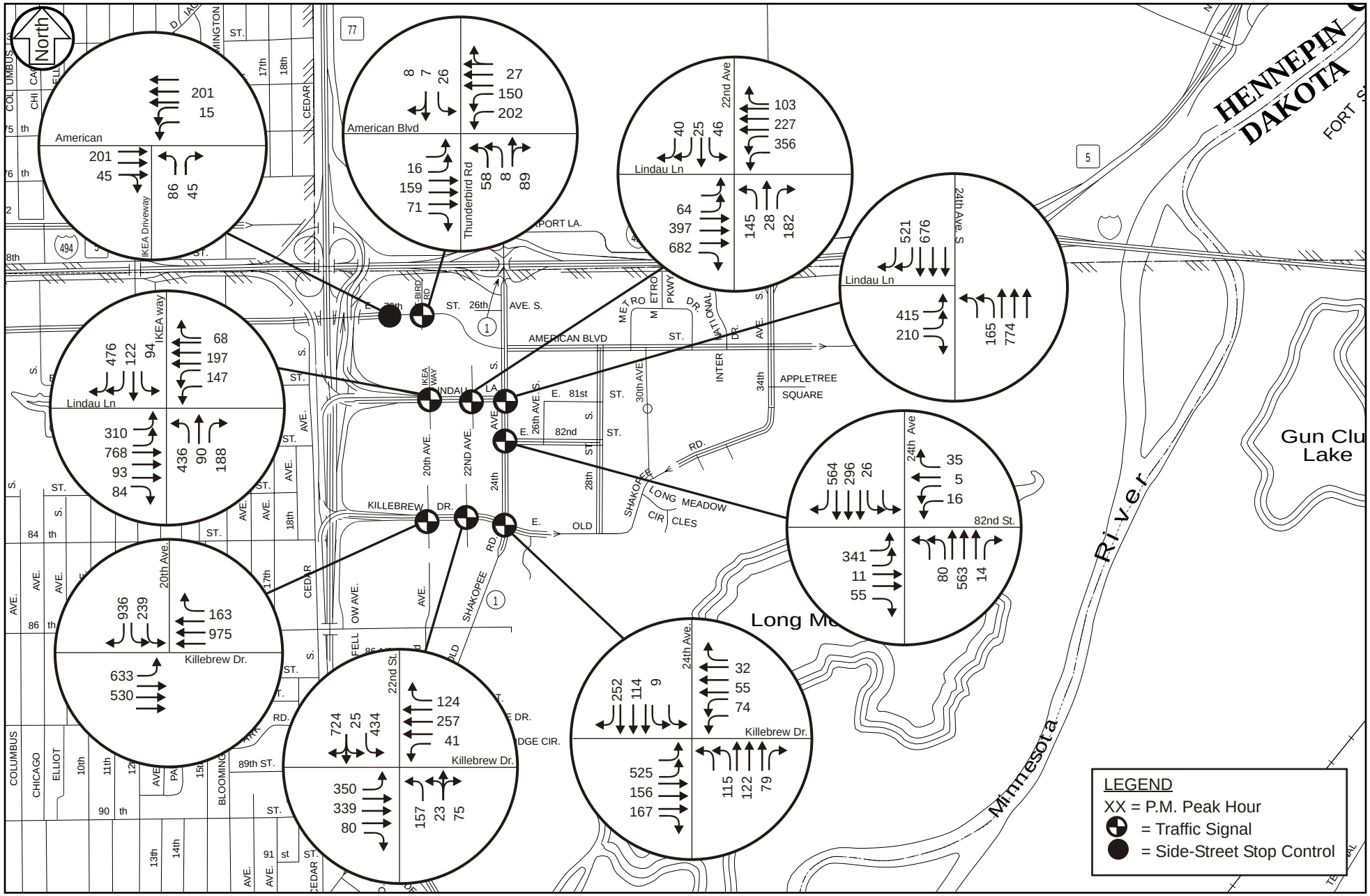
It is important to note that the operations analysis for the proposed Mall of America Phase II was completed for the typical Saturday peak hour (3:00 to 4:00 p.m.) and typical Thursday p.m. peak hour (4:30 to 5:30 p.m.). An operations analysis for the typical weekday a.m. peak hour will be completed for the Airport South AUAR update, under a separate study at a later date.

All of the intersections are signalized with the exception of American Boulevard/IKEA Driveway. This intersection is side-street stop controlled. Existing geometrics, traffic controls and peak hour traffic volumes for the key intersections are shown in Figures 2 through 5.

Traffic Assumptions

In addition to the turning movement counts, traffic data, operations analyses and assumptions from the *Mall of America Phase II Traffic Study* (2003), the *Mall of America DEIS* (2000), the *Airport South AUAR* (2002) and the *Bloomington Central Station Traffic Study* (2004) were also reviewed. Based on the previous studies, the following assumptions for existing conditions were made:

- Based on the following data, an adjustment factor of 1.3 was applied to the existing Thursday turning movements counts into and out of the Mall of America and IKEA:
    - The *Mall of America Phase II Traffic Study* (2003) included an operations analysis for the weekday p.m. peak hour for a typical peak month in August. A factor of 1.3 was applied to adjust counts from May to August.
    - August 2003 TH 77 ramp volumes at Killebrew Drive and Lindau Lane were 15 percent higher than April 2003 volumes.
    - Total Mall traffic into and out of the site was 3,620 cars during the weekday peak hour in May 2005.
- Based on the following data, no adjustment factor was applied to the existing Saturday turning movement counts:
    - The *Mall of America DEIS* (2000) and *Airport South AUAR* (2002) did not include a Saturday operations analysis.
    - The *Mall of America Phase II Traffic Study* (2003) included an operations analysis for Saturday peak conditions.
    - Additional Mall visitor data from the Phase II study indicated a Saturday/Thursday ratio of 1.8 – May 2005 counts calculate a ratio of 2.1.
    - Data collection for May 14, 2005 was on the fishing opener weekend with rainy weather conditions.
    - Total traffic into and out of the Mall (May 2005) was 7,445 vehicles during the peak hour (3:00 to 4:00 p.m.) – significantly higher than a typical weekday peak period (previous data).
    - Volumes collected for the Lindau Lane origin-destination study on May 21, 2005 were approximately 20 percent lower than those collected on May 14, 2005.
    - TH 77 ramp volumes at Killebrew Drive and Lindau Lane for April 2005 were the same or higher than those from August 2004.



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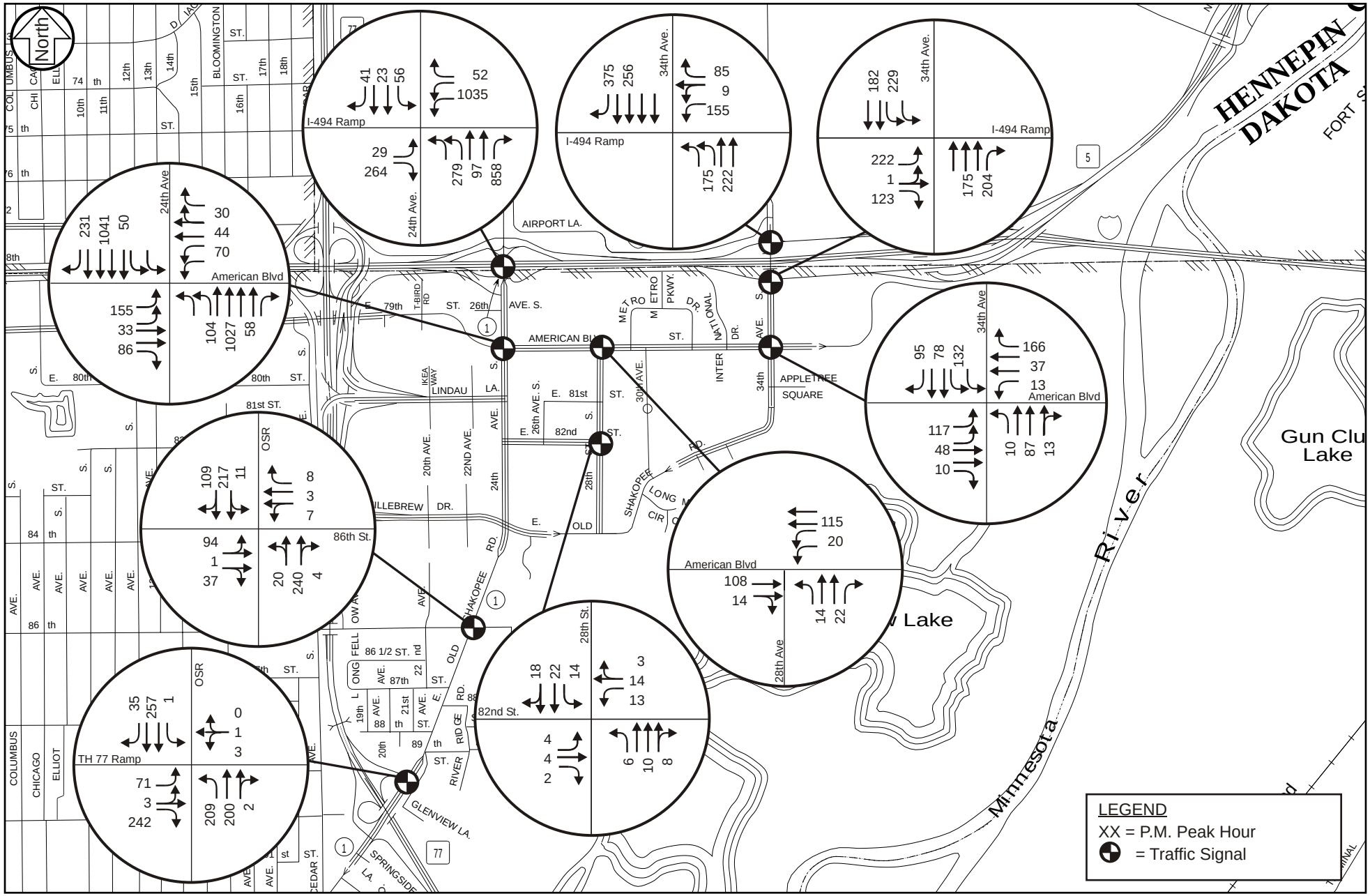
YEAR 2005 SATURDAY PEAK HOUR TRAFFIC VOLUMES (3 PM to 4 PM)

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

Figure 2



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YEAR 2005 SATURDAY PEAK HOUR TRAFFIC VOLUMES (3 PM to 4 PM)

MALL OF AMERICA PHASE II TRAFFIC STUDY
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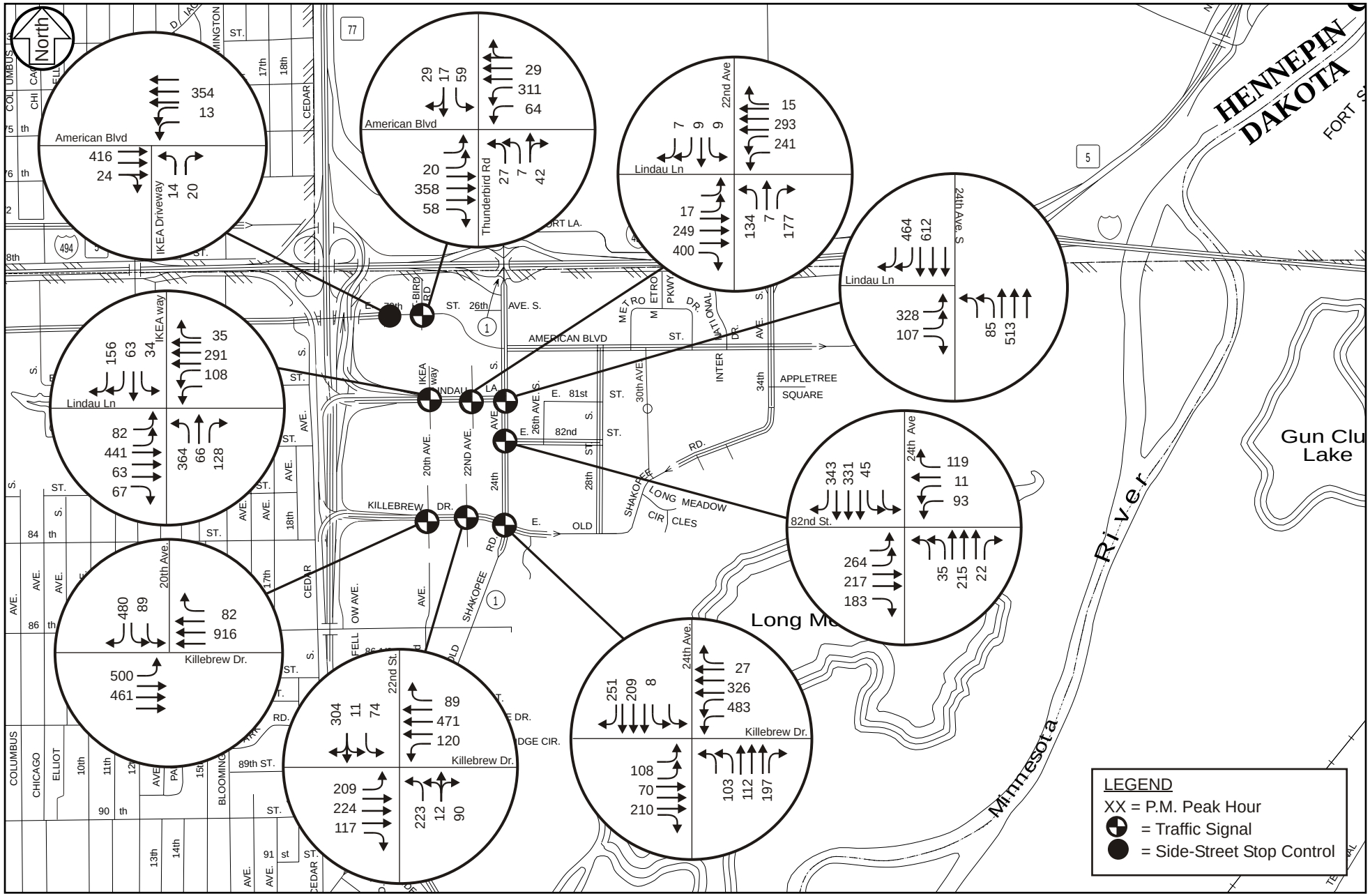
Figure 3



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YEAR 2005 WEEKDAY PEAK HOUR TRAFFIC VOLUMES (4:30 PM to 5:30 PM)

Figure 4

MALL OF AMERICA PHASE II TRAFFIC STUDY
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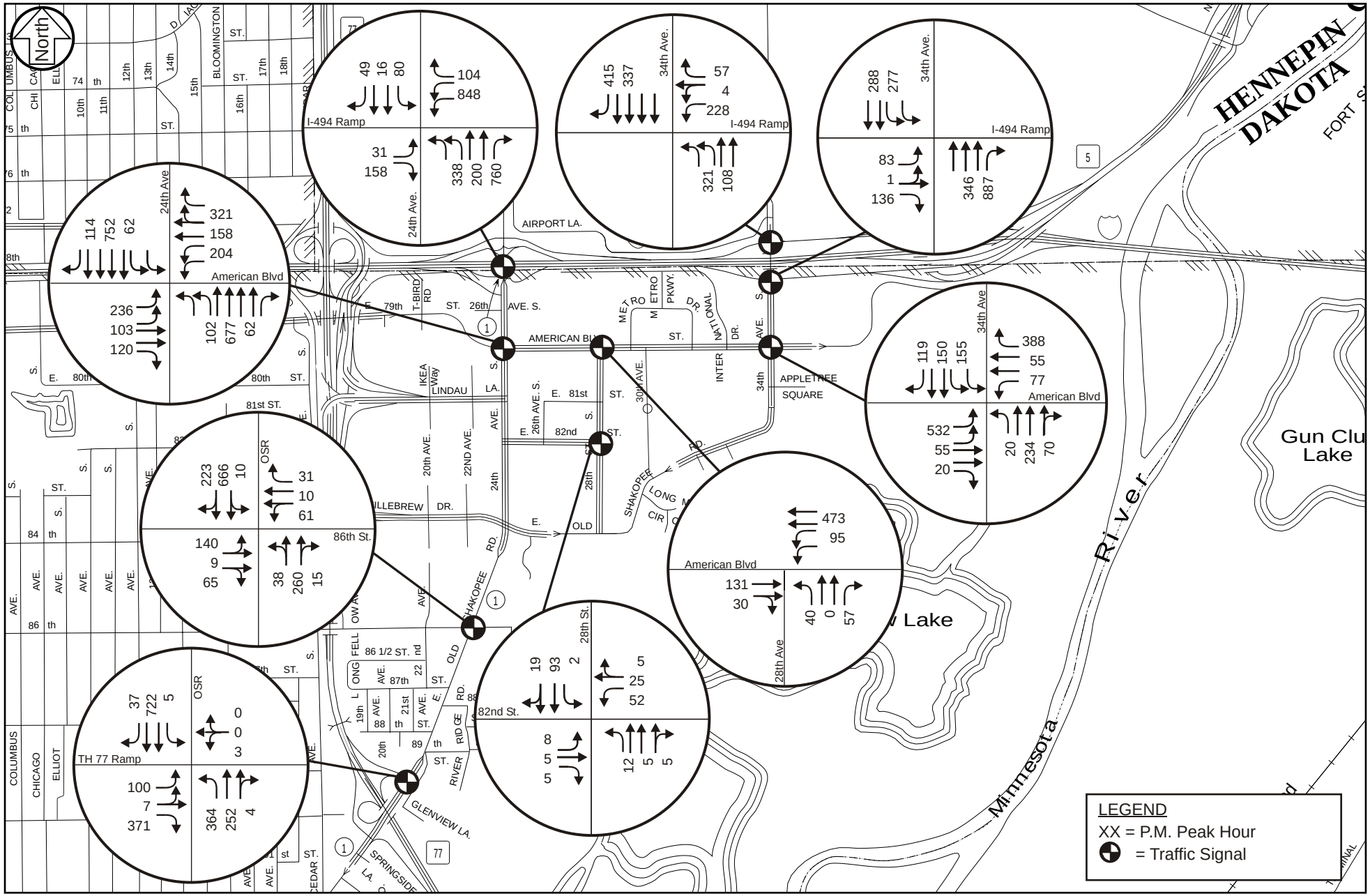

YEAR 2005 WEEKDAY PEAK HOUR TRAFFIC VOLUMES (4:30 PM to 5:30 PM)

Figure 5

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

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- Based on information from the previous LRT Operations section, the intersections of 34th Avenue and I-494 North ramp, I-494 South ramp and American Boulevard, a single train will be modeled requiring 45 seconds of signal time. Back-to-back trains require 90 seconds of signal time. As part of the model, ramp intersections were modeled as an all-red phase. American Boulevard was modeled as a northbound/southbound green phase.
- Based on information from the previous LRT Operations section, the remaining intersections impacted by LRT, a single train will be modeled requiring 70 seconds of signal time, with back-to-back trains requiring 140 seconds of signal time. The intersections of 34th Avenue/Appletree Drive, 28th Avenue/82nd Street, and 30th Avenue were modeled as an all-red phase. At 24th Avenue and Killebrew Drive, the LRT phase restricts southbound movement and northbound through movement.

Traffic Operations Analysis

Saturday and Thursday operations analyses were conducted for the mid August p.m. peak hour (3:00 to 4:00 p.m. and 4:30 to 5:30 p.m.) at each of the intersections to determine how traffic currently operates within the project area. Unsignalized and signalized intersections were analyzed using the Synchro/SimTraffic software. The SimTraffic software was used to review lane utilization, weaving and queues between closely spaced intersections and determine level of service results.

The operations analyses identify a Level of Service (LOS) which indicates the quality of traffic flow through an intersection. Intersections are given a ranking from LOS A through LOS F. LOS A indicates the best traffic operation, with vehicles experiencing minimal delays. LOS F indicates an intersection where demand exceeds capacity, or a breakdown of traffic flow. LOS A through D are generally considered acceptable by drivers. LOS E indicates that an intersection is operating at, or very near its capacity, and that vehicles experience substantial delays.

For the unsignalized intersection at American Boulevard/IKEA Driveway, special emphasis was to providing an estimate for the LOS of the side-street (driveway) approach. Traffic operations at an unsignalized intersection with side-street stop control are calculated two ways. First, consideration is given to the overall intersection level of service. This takes into account the total entering volume into the intersection and the capability of the intersection to support these volumes. Second, it is also important to consider the level of service on the side-street approach. Since the mainline does not have to stop at an unsignalized intersection that has side-street stop control, the majority of intersection delay is attributed to the side-street approaches. It is typical of intersections with higher mainline traffic volumes to experience high levels of delay (poor levels of service) on the side-street approaches, but an acceptable overall intersection level of service during the peak hour periods.

Results of the operations analyses are shown in Table 3. Most of the key intersections, with the exception of Lindau Lane/TH 77 Ramps/IKEA Way and Killebrew Drive/22nd Avenue, are presently operating at acceptable levels of service.

Table 3
Existing Peak Hour Capacity Analysis
Level of Service Results

Intersection	Level of Service	
	Saturday Peak	**Thursday P.M. Peak**
Lindau Lane/TH 77 Ramps/IKEA Way	**E** (C)	D
Lindau Lane/22nd Avenue	C	B
Lindau Lane/24th Avenue	B	B
Killebrew Drive/TH 77 Ramps/20th Avenue	C	B
Killebrew Drive/22nd Avenue	**E** (C)	B
Killebrew Drive/24th Avenue	D	D
24th Avenue/I-494 Single-Point Interchange	D	C
24th Avenue/82nd Street	B	B
American Boulevard/IKEA Driveway *	A/A	A/A
American Boulevard/Thunderbird Road	B	A
American Boulevard/24th Avenue	C	C
American Boulevard/28th Avenue	A	A
American Boulevard/34th Avenue	D	D
34th Avenue/I-494 North Ramps	D	D
34th Avenue/I-494 South Ramps	D	C
28th Avenue/82nd Street	D	C
Old Shakopee Road/86th Street	A	B
Old Shakopee Road/TH 77 East Ramp	B	B

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
Note: Parentheses indicate LOS with assumed improvements listed below.

Queuing at all freeway ramp terminal intersections was reviewed and addressed for the existing conditions. Based on site observations and the traffic analysis, queuing problems exist during the Saturday p.m. peak hour at the intersection of Lindau Lane/TH 77 Ramps/IKEA Way. Traffic at times will spill back to the southbound TH 77 CD roadway. The improvement listed below eliminates this queuing problem.

In order for the intersections of Lindau Lane/TH 77 Ramps/IKEA Way and Killebrew Drive/22nd Avenue to operate at acceptable levels of service, the following improvements are recommended:

<u>Lindau Lane/TH 77 Ramps/IKEA Way</u>

- Eliminate access from northbound TH 77 to eastbound Lindau Lane
- Remove concrete median on the west approach to allow southbound TH 77 traffic to make an eastbound right-turn movement on Lindau Lane to the existing MOA near Nordstrom's

Killebrew Drive/22nd Avenue

- Construct an additional eastbound left-turn lane to provide dual left-turn lanes

III. YEAR 2012 NO BUILD CONDITIONS

Future traffic operations analyses were conducted for the year 2012 no build conditions. The land use, street network assumptions, and operations results are discussed in this section of the report.

A. Assumed Land Use

The year 2012 no build condition assumes that there will be no development associated with Mall of America Phase II. It does, however, assume that adjacent growth and development identified as part of the *Bloomington Central Station Traffic Study*, the *Airport South AUAR*, and the Minneapolis/St. Paul International Airport expansion has occurred (see Figure 6: Adjacent Development Locations). For specific details on the amount of development occurring on adjacent land, please refer to Appendix A (Table A-1).

B. Assumed Roadway Improvements for Existing Conditions

Based on the existing conditions analysis, the following improvements are assumed in the year 2012 no build analysis:

Lindau Lane/TH 77 Ramps/IKEA Way

- Eliminate access from northbound TH 77 to eastbound Lindau Lane
- Remove concrete median on the west approach to allow southbound TH 77 traffic to make an eastbound right-turn movement on Lindau Lane to the existing MOA near Nordstrom's

Killebrew Drive/22nd Avenue

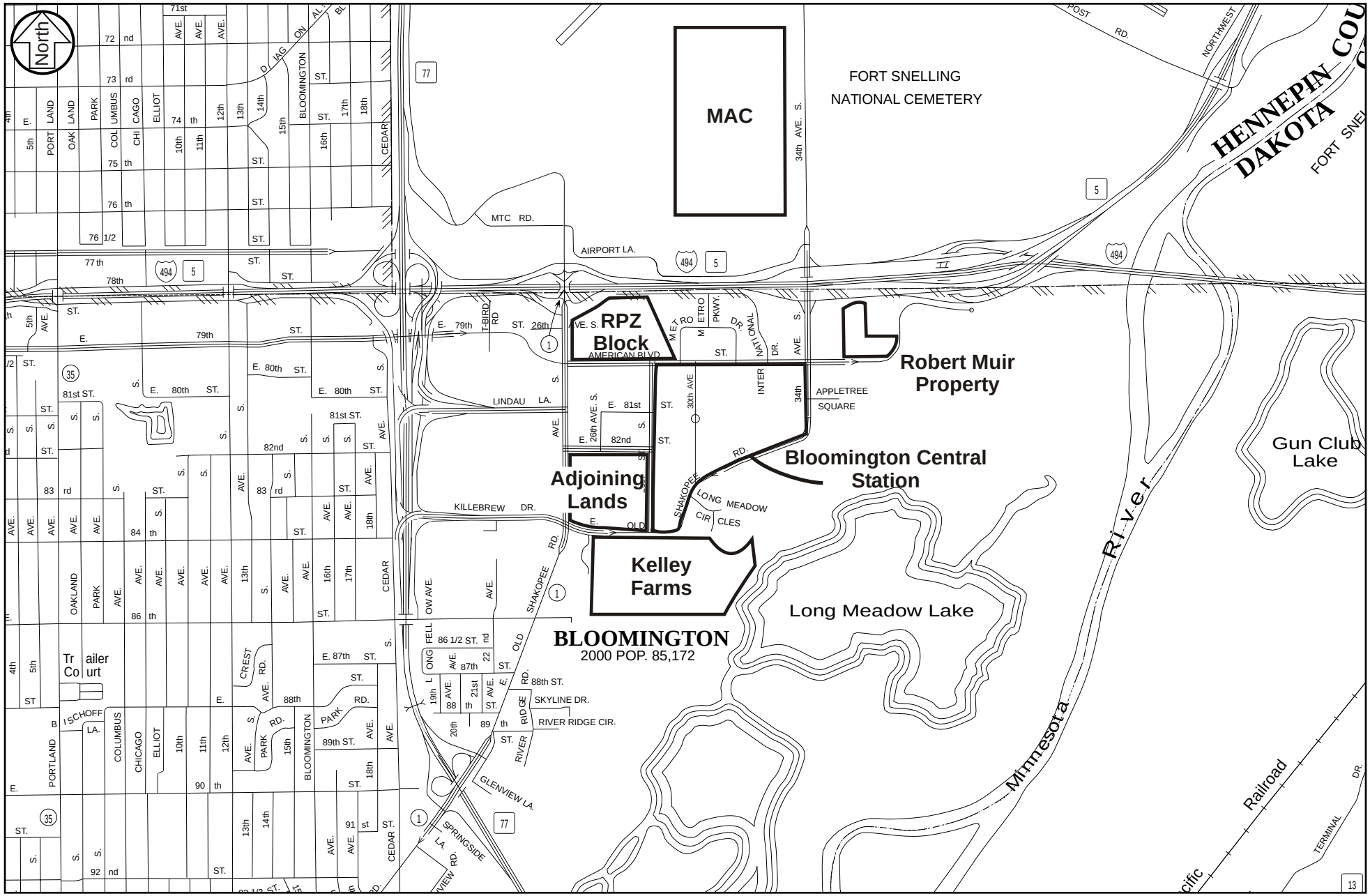
- Construct an additional eastbound left-turn lane to provide dual left-turn lanes

C. Assumed Roadway Improvements listed in the Bloomington Central Station Traffic Study

As a result of the *Bloomington Central Station Traffic Study*, the following improvements are assumed in the year 2012 no build analysis:

American Boulevard

- American Boulevard will operate as a westbound one-way roadway between West Road and 34th Avenue with three through lanes



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ADJACENT DEVELOPMENT LOCATIONS

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Figure 6

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American Boulevard/28th Avenue

- Construct an eastbound right-turn lane (250 feet)
- Restripe the northbound inside through lane to a left-turn lane
- Extend the northbound left-turn lane to 200 feet
- Replace north-south split phasing with protected left-turn phasing

American Boulevard/West Road (30th Avenue)

- Installation of a traffic signal
- Convert the eastbound through lanes into dual right-turn lanes
- The east approach will include dual left-turn lanes and two through lanes. The inside through lane will end and become the outside left-turn lane at this intersection.
- The south approach will include dual left-turn lanes

American Boulevard/Metro Drive East

- Construct a westbound left-turn lane (200 feet)

American Boulevard/International Drive/East Road (33rd Avenue)

- Convert to a right-in/right-out/eastbound left-in access

Old Shakopee Road/East Road (33rd Avenue)

- Installation of a traffic signal
- The north approach will include a left-turn lane, a shared left-turn/through lane and a right-turn lane.
- Construct a westbound right-turn lane (300 feet)

Old Shakopee Road/West Road (30th Avenue)

- Installation of a traffic signal
- Construct an eastbound left-turn lane (350 feet)
- The north approach will include dual left-turn lanes and a right-turn lane. This approach was modeled with what is shown on the proposed site plan, an inside left-turn lane of approximately 100 feet and a second full-length left-turn lane.

Old Shakopee Road/28th Avenue

- Restripe the southbound left-turn lane to a through lane
- Construct a southbound left-turn lane (250 feet)
- Construct an eastbound left-turn lane (300 feet)
- Construct an eastbound right-turn lane (300 feet)
- Construct an additional westbound left-turn lane (300 feet)

D. Assumed Roadway Improvements listed in the Airport South CIP

The following improvements listed in the City's Airport South CIP are assumed in the year 2012 no build analysis:

Killebrew Avenue at 20th Avenue

- Construct an additional eastbound left-turn lane to provide dual left-turn lanes

Old Shakopee Road, 24th Avenue to 30th Avenue

- Reconstruct with two through lanes in each direction, and a median with left- and right-turn lanes

Old Shakopee Road, 86th Street to Cedar Avenue

- Reconstruct with two through lanes in each direction, and a median with left- and right-turn lanes

American Boulevard

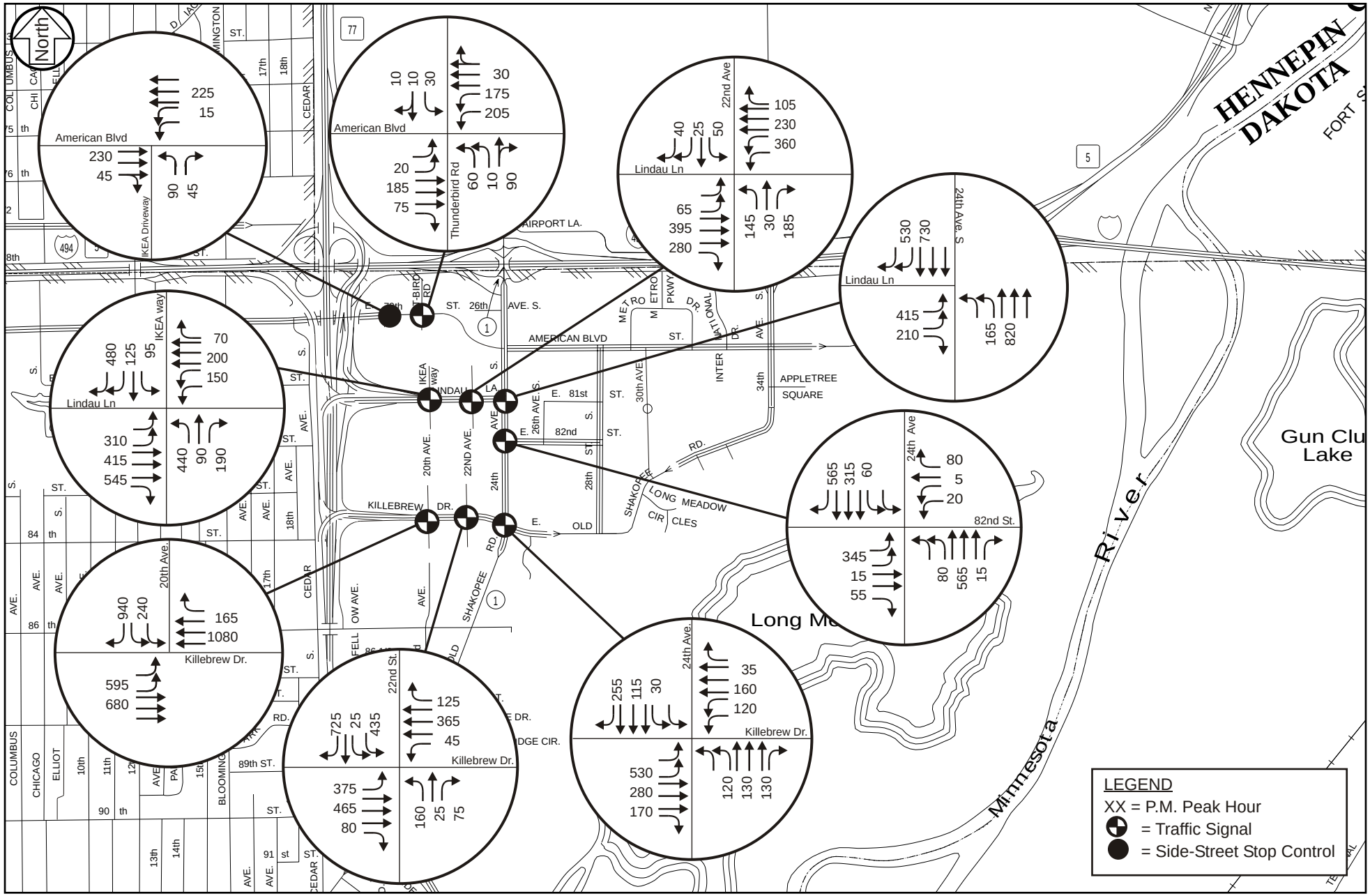
- Reconstruct with an additional westbound through lane (three through lanes) from 28th Avenue to 34th Avenue, and a median with left-turn lanes

American Boulevard at 24th Avenue

- Construct an additional westbound right-turn lane to provide dual westbound right-turn lanes

E. Year 2012 No Build Traffic Operations Analysis – Saturday

To determine how well the existing and assumed roadway improvements listed above will accommodate year 2012 no build traffic forecasts (see Figures 7 and 8), an operations analysis was conducted for Saturday peak conditions (3:00 – 4:00 p.m.). A background growth rate of one percent per year was assumed for all traffic that passes through the study area. Results of the analysis shown in Table 4 indicate that all intersections operate at acceptable levels of service during the Saturday peak hour.



YEAR 2012 NO BUILD SATURDAY PEAK HOUR TRAFFIC VOLUMES (3 PM to 4 PM)

Figure 7

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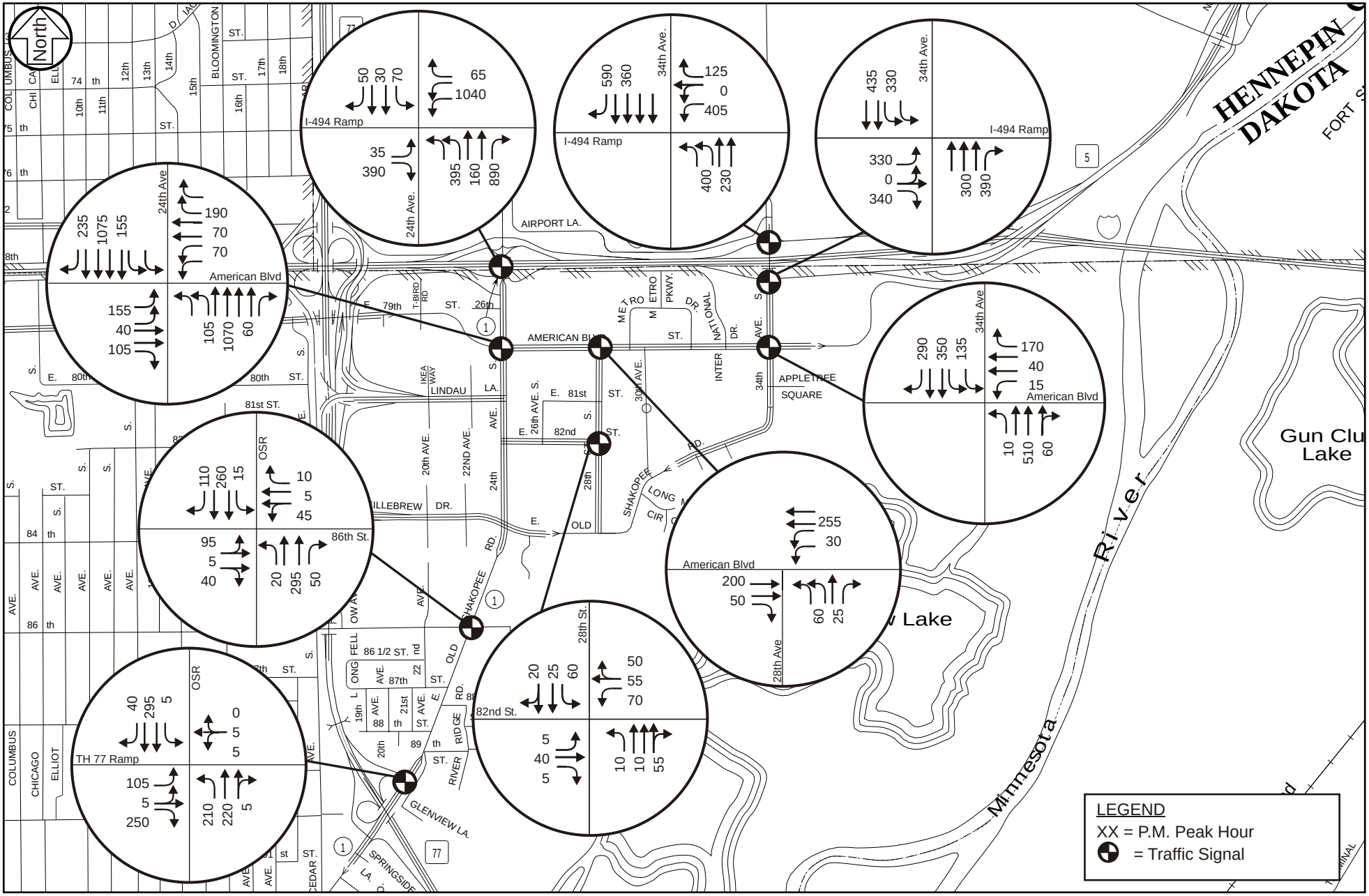

YEAR 2012 NO BUILD SATURDAY PEAK HOUR TRAFFIC VOLUMES

Figure 8

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Table 4
Year 2012 No Build Peak Hour Capacity Analysis - Saturday
Level of Service Results

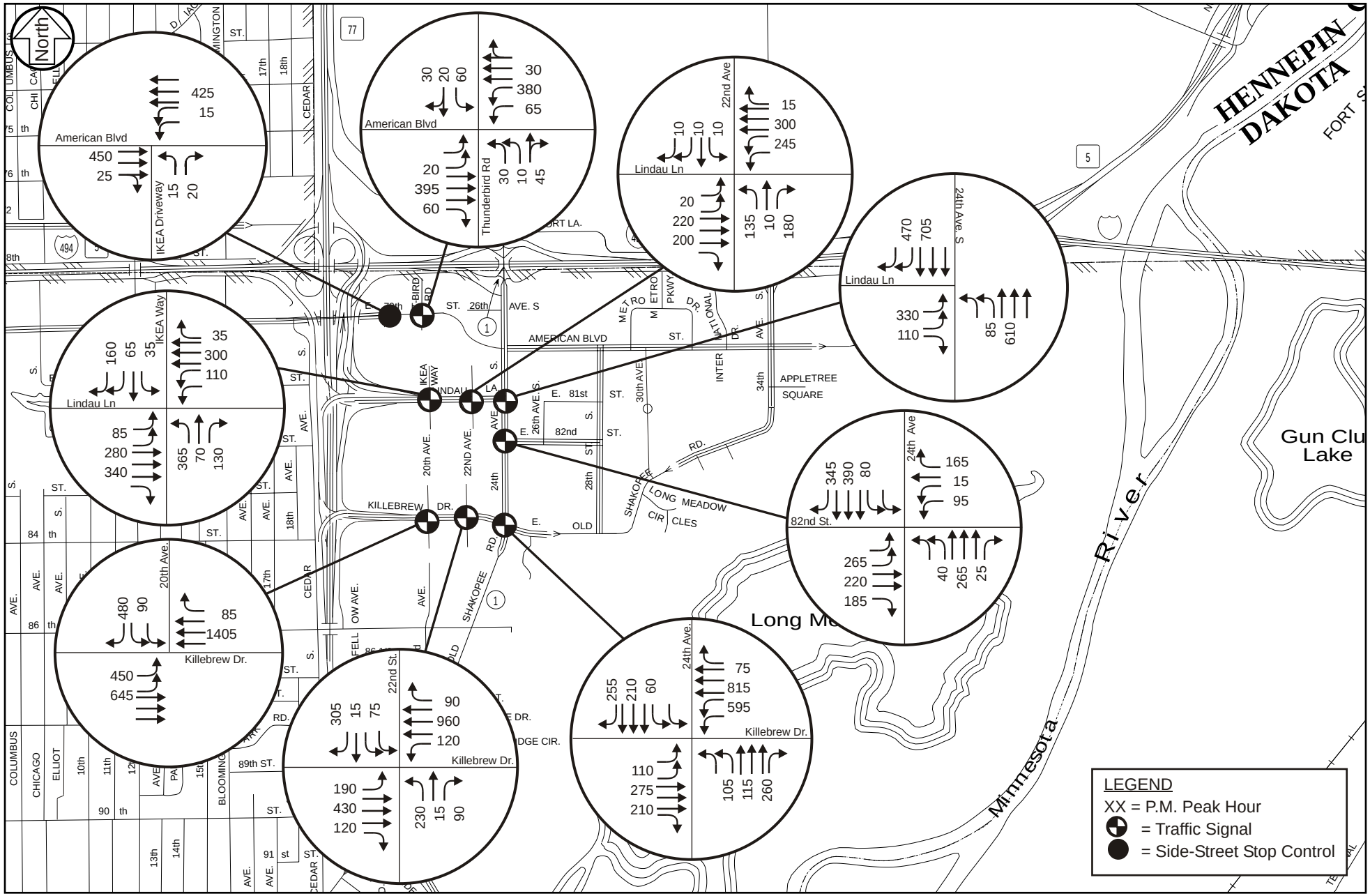
Intersection	Level of Service
	Saturday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	C
Lindau Lane/22nd Avenue	C
Lindau Lane/24th Avenue	B
Killebrew Drive/TH 77 Ramps/20th Avenue	C
Killebrew Drive/22nd Avenue	C
Killebrew Drive/24th Avenue	D
24th Avenue/I-494 Single-Point Interchange	D
24th Avenue/82nd Street	B
American Boulevard/IKEA Driveway *	A/B
American Boulevard/Thunderbird Road	B
American Boulevard/24th Avenue	C
American Boulevard/28th Avenue	A
American Boulevard/34th Avenue	B
34th Avenue/I-494 North Ramps	D
34th Avenue/I-494 South Ramps	D
28th Avenue/82nd Street	D
Old Shakopee Road/86th Street	A
Old Shakopee Road/TH 77 East Ramp	B

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.

Queuing at all freeway ramp terminal intersections was reviewed for year 2012 no build conditions. Based on the traffic analysis, queuing problems will not develop during the Saturday p.m. peak hour.

F. Year 2012 No Build Traffic Operations Analysis – Thursday

To determine how well the existing and assumed roadway improvements listed above will accommodate year 2012 no build traffic forecasts (see Figures 9 and 10), an operations analysis was conducted for Thursday peak conditions (4:30 – 5:30 p.m). A background growth rate of one percent per year was assumed for all traffic that passes through the study area. Results of the analysis shown in Table 5 indicate that the intersection of 34th Avenue/I-494 North Ramps will operate at unacceptable levels of service during the Thursday peak hour.



YEAR 2012 NO BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

Figure 9

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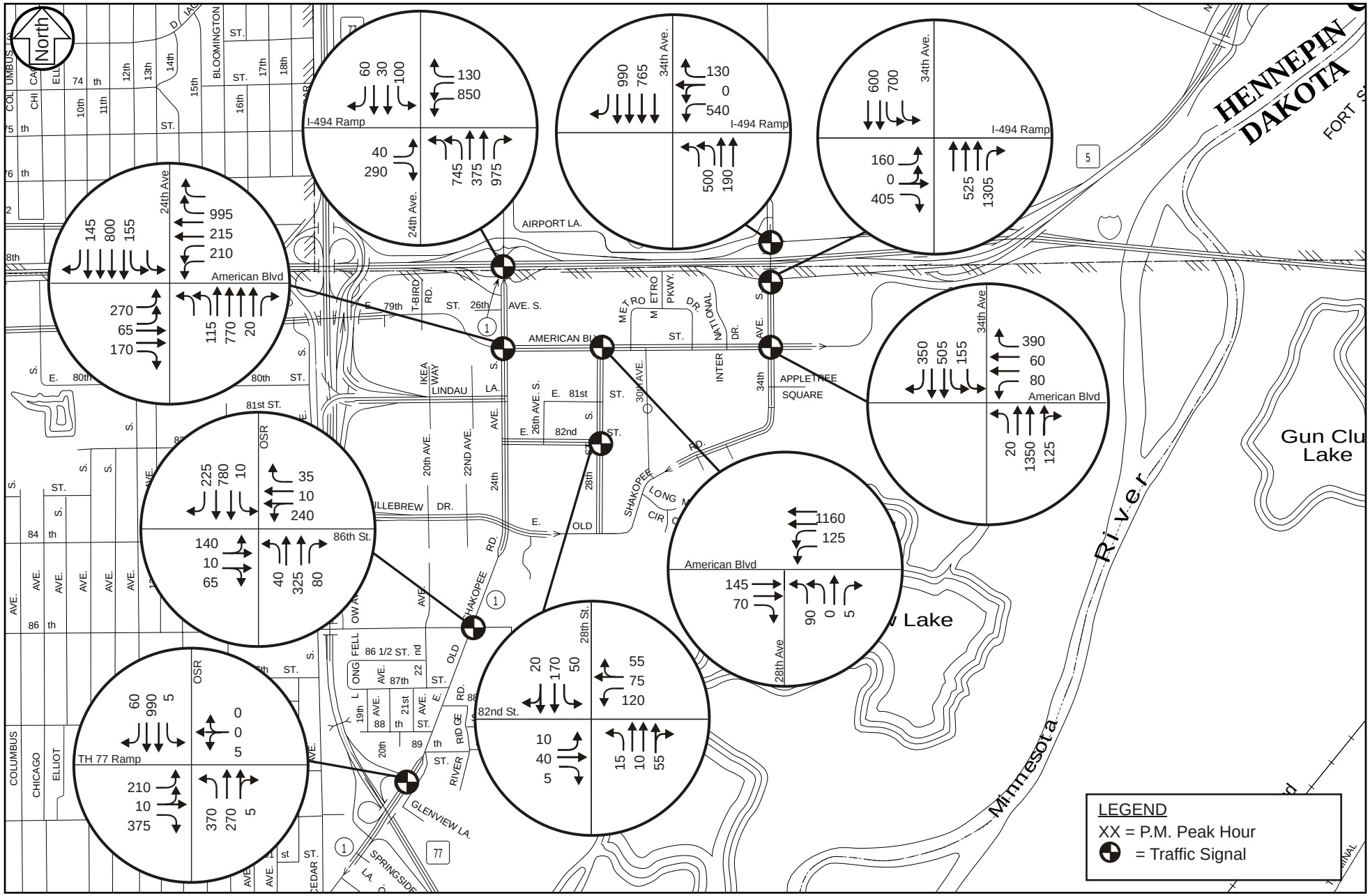

YEAR 2012 NO BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES

Figure 10

MALL OF AMERICA PHASE II TRAFFIC STUDY
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Table 5
Year 2012 No Build Peak Hour Capacity Analysis - Thursday
Level of Service Results

Intersection	Level of Service
	Thursday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	C
Lindau Lane/22nd Avenue	C
Lindau Lane/24th Avenue	B
Killebrew Drive/TH 77 Ramps/20th Avenue	B
Killebrew Drive/22nd Avenue	B
Killebrew Drive/24th Avenue	D
24th Avenue/I-494 Single-Point Interchange	D
24th Avenue/82nd Street	B
American Boulevard/IKEA Driveway *	A/B
American Boulevard/Thunderbird Road	B
American Boulevard/24th Avenue	D
American Boulevard/28th Avenue	A
American Boulevard/34th Avenue	C (B)
34th Avenue/I-494 North Ramps	**F** [(1)] (D)
34th Avenue/I-494 South Ramps	**F** [(1)] (D)
28th Avenue/82nd Street	D
Old Shakopee Road/86th Street	B
Old Shakopee Road/TH 77 East Ramp	D

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
[(1)] Average vehicle delay of 80 seconds
Note: Parentheses indicate LOS with assumed improvements listed below.

As displayed in Table 5, operational problems are expected at the 34th Avenue/I-494 ramp intersections during the Thursday p.m. peak hour. Unacceptable vehicle delays and significant queues will develop with the existing interchange design, intersection geometrics and signal phasing/timing by year 2012. Currently, LRT operations have a significant impact on the operations of the 34th Avenue I-494 interchange, largely due to the delay created by the "all red" traffic phase with each LRT crossing. To address these operational problems during the Thursday p.m. peak hour, the "all red" traffic phase with each LRT train crossing needs to be converted to a northbound/southbound "green" phase. This modification to the LRT operations for year 2012 no build conditions will improve operations and eliminate any potential queuing problems at the freeway ramp intersections during the Thursday p.m. peak hour. As indicated by year 2030 operational problems discussed further in the report, this modification is only an interim solution until funding for major interchange improvements is identified.

IV. YEAR 2012 BUILD CONDITIONS

Future traffic operations analyses were conducted for the year 2012 build conditions. The land use, street network assumptions, and operations results are discussed in this section of the report.

A. Assumed Land Use and Trip Generation Estimates

The proposed Mall of America Phase II development consists of 1,907,691 square feet of retail/mixed use, 1250 hotel rooms, 300 residential condos, and 615,000 square feet of office (see Figure 11: Proposed Site Plan dated September 5, 2006). It is assumed that the proposed Phase II development will be completed by year 2011. Land use assumptions and trip generation for the adjacent developments (2012) and Phase II are displayed in the Appendix (Tables A-1 and A-2). Approximately 69 percent of the new development trips generated for the Saturday peak hour are associated with the proposed MOA Phase II development and 31 percent are associated with other adjacent land use developments. For the Thursday peak hour, 48 percent of the new development trips are associated with the proposed MOA Phase II development and 52 percent of the new development trips are associated with other adjacent land use developments.

The following assumptions related to trip generation estimates were used in the analysis:

- Based on data provided by Bass Pro Shops representatives, the daily traffic estimated for a 300,000 square foot store is 10,000 and 20,000 vehicles per day on a weekday and Saturday, respectively. These daily trips are similar to data for a Cabela's store of similar size. Using the peak hour factors for a Cabela's store, trip generation estimates were developed for the weekday and Saturday peak hour conditions.
- Trip generation estimates for the retail use were developed using the existing MOA traffic counts and the plotted ITE retail center curve. Based on the plotted ITE curve for trips versus size, the trip generation rate decreases as the retail square footage increases, due to multi-use trips. Therefore, the multi-use reduction factors (36 and 47 percent for weekday and Saturday peak hour conditions, respectively) calculated through this exercise was applied to the Bass Pro Shops trip generation estimates.
- For the 6,000-seat performing arts center, trip generation estimates were not developed for a Saturday matinee. It is assumed that restrictions will be placed upon the performing arts center to eliminate matinee events from being scheduled during times that would impact Saturday peak conditions.

  In addition, trip generation estimates were not developed for the weekday peak hour condition, since it is assumed that an event at the performing arts center would not generate trips entering/leaving the site during the 4:30 to 5:30 p.m. peak hour. A review of the Ordway Performing Arts Center schedule indicates a majority (only one show per month started at 2:00 p.m.) of the shows, concerts, operas started at 7:30 or 8:00 p.m. Therefore, it also assumed that an event at the performing arts center would have a 7:30 or 8:00 p.m. start time and would not generate trips entering the site during the weekday evening peak hour. If a visitor to the performing arts center chooses to arrive more than two hours prior to the performance, this trip would be considered a multi-use trip and would be accounted for in the retail use trip generation estimates.

B. Trip Distribution

The directional trip distribution for the site-generated trips is consistent with the *Airport South AUAR* and *Bloomington Central Station Traffic Study*. Figure 12 displays the regional directional distribution percentages for the site. A different trip distribution was used for the MAC expansion, consistent with the *2015 Terminal Expansion Project Minneapolis-Saint Paul International Airport Traffic Report*. Approximately 10 percent of the airport expansion generated trips would travel on the northern segment of 34th Avenue (not in the study area), the remaining 90 percent would use the 34th Avenue interchange to access I-494.

C. Assumed Roadway Improvements

All roadway improvements included in the year 2012 no build analysis are assumed in the year 2012 build analysis. A significant improvement listed in the *Bloomington Central Station Traffic Study* is the modification of American Boulevard to a westbound one-way roadway between West Road and 34th Avenue. If this improvement is not constructed by year 2012, the intersection along 24th Avenue will operate with less delay and the intersection operations in the immediate Bloomington Central Station area will worsen.

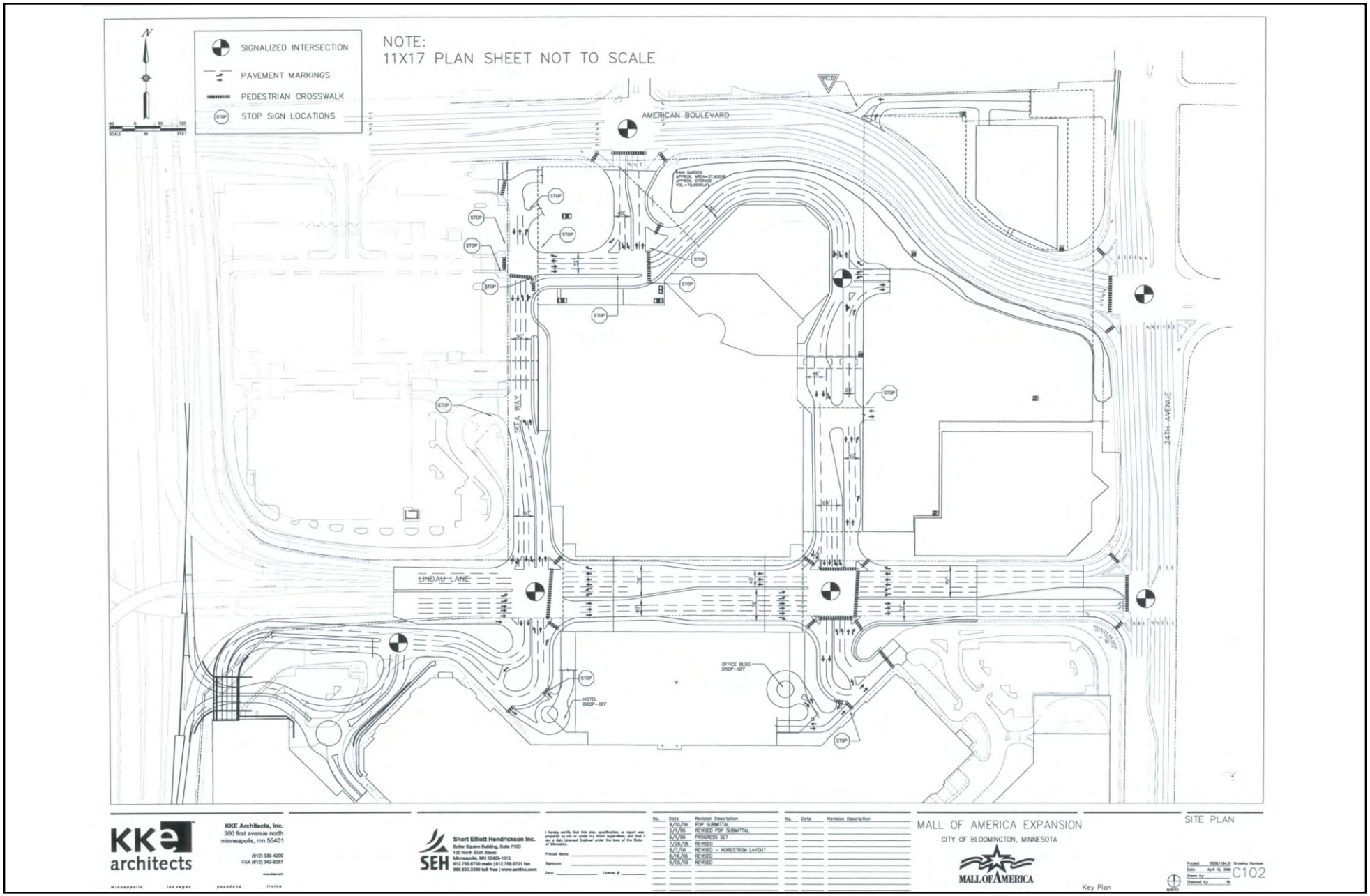
The intersection geometrics shown in the proposed site plan are assumed in the year 2012 build analysis. In addition, to the recommended signal phasing/timing modifications identified at the 34th Avenue/I494 North Ramps and South Ramps, the following improvements with optimized signal timing at all intersections were assumed:

<u>TH 77/I-494 CD Roadway</u>

- Construct a new ramp from the TH 77/I-494 CD roadway to Thunderbird Road (see Figure 13)

D. Year 2012 Build Traffic Operations Analysis – Saturday

To determine how well the existing and assumed roadway improvements will accommodate year 2012 build traffic forecasts (see Figures 14 and 15), an operations analysis was conducted for Saturday peak conditions (3:00 – 4:00 pm). Results of the analysis shown in Table 6 indicate that the intersections of Lindau Lane/TH 77 Ramps/IKEA Way, 24th Avenue/I-494 Single-Point Interchange, and American Boulevard/24th Avenue will operate at unacceptable levels of service during the Saturday peak hour.



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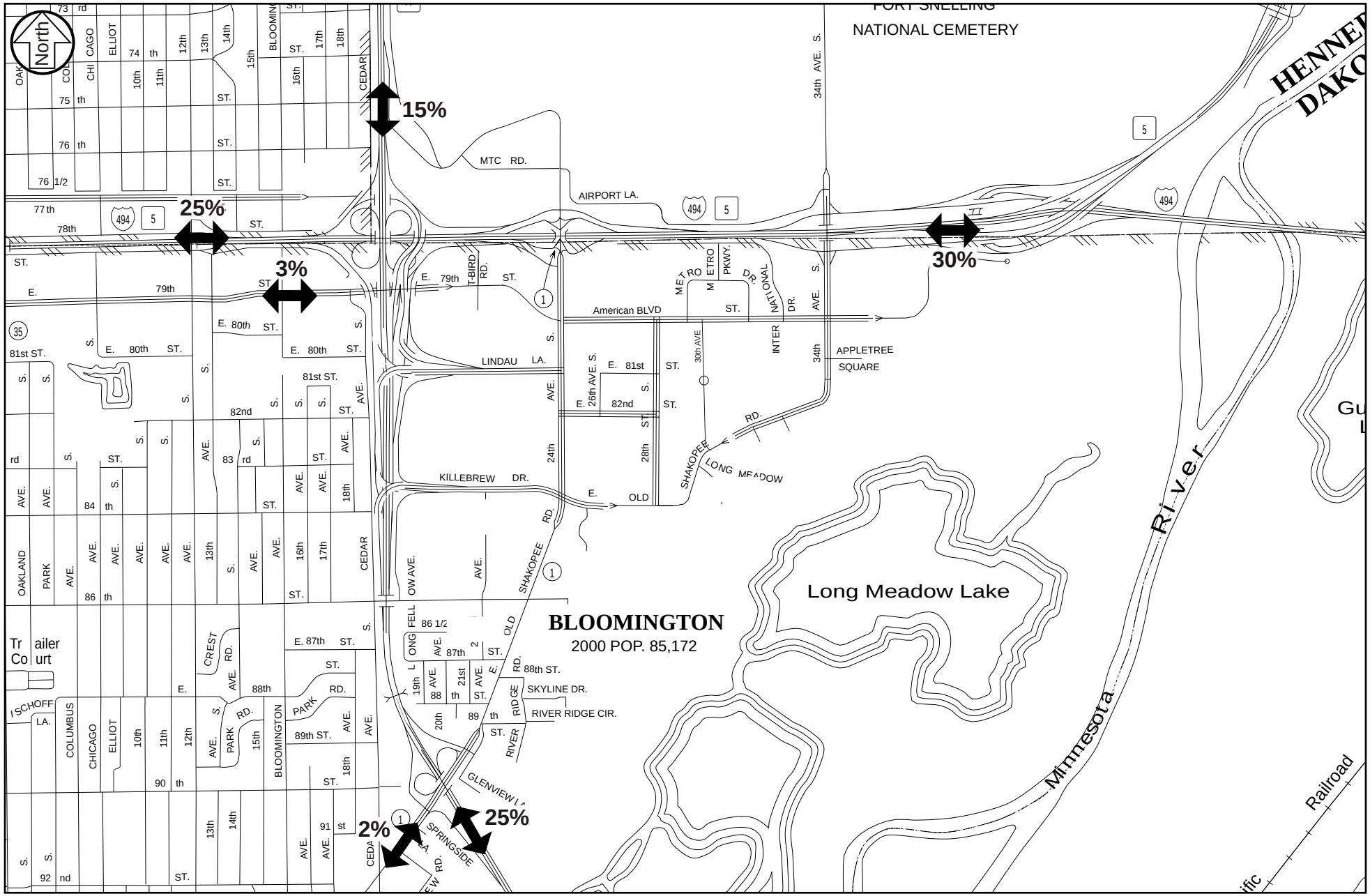
SITE PLAN

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

Figure 11



DIRECTIONAL DISTRIBUTION

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

Figure 12

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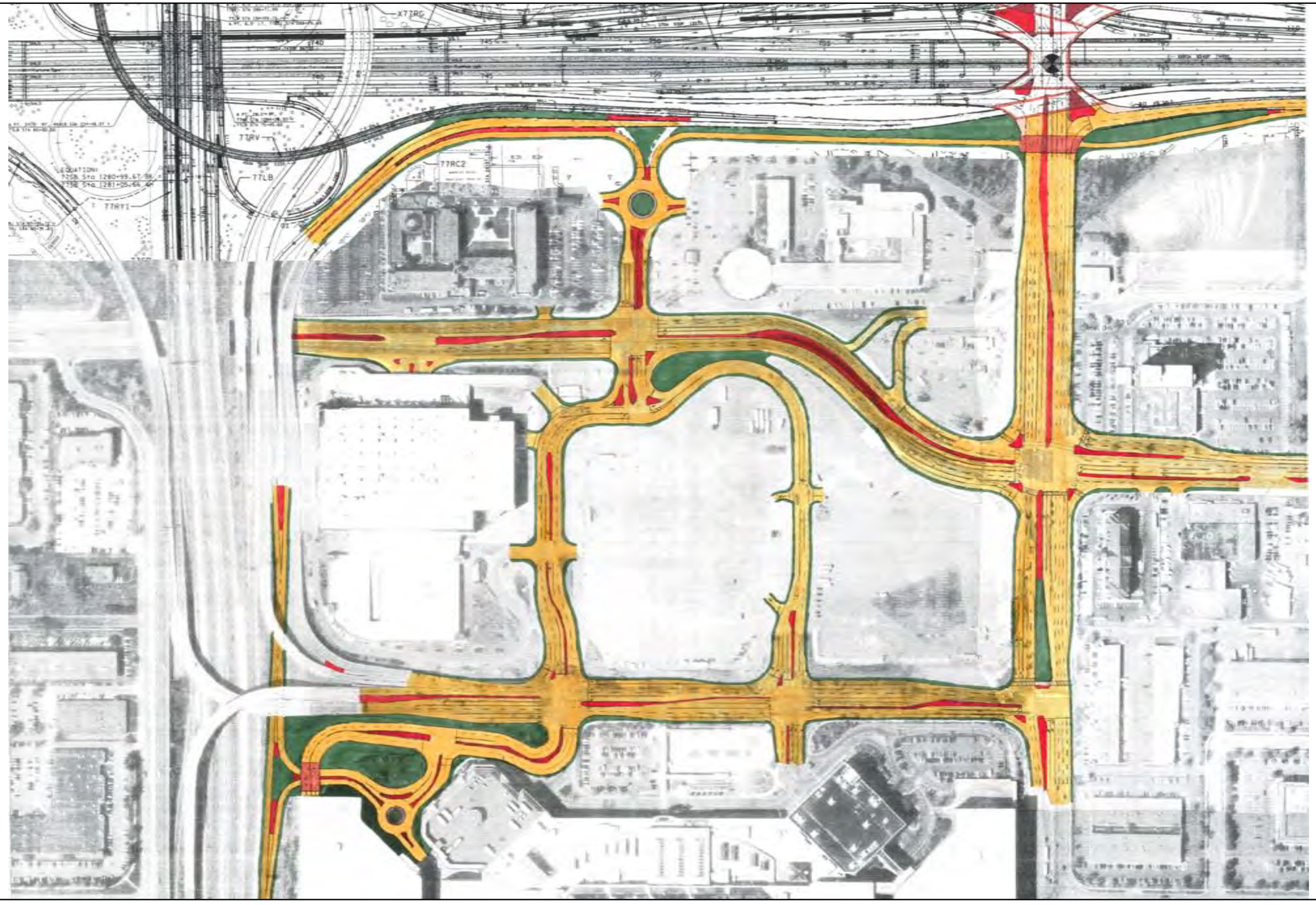

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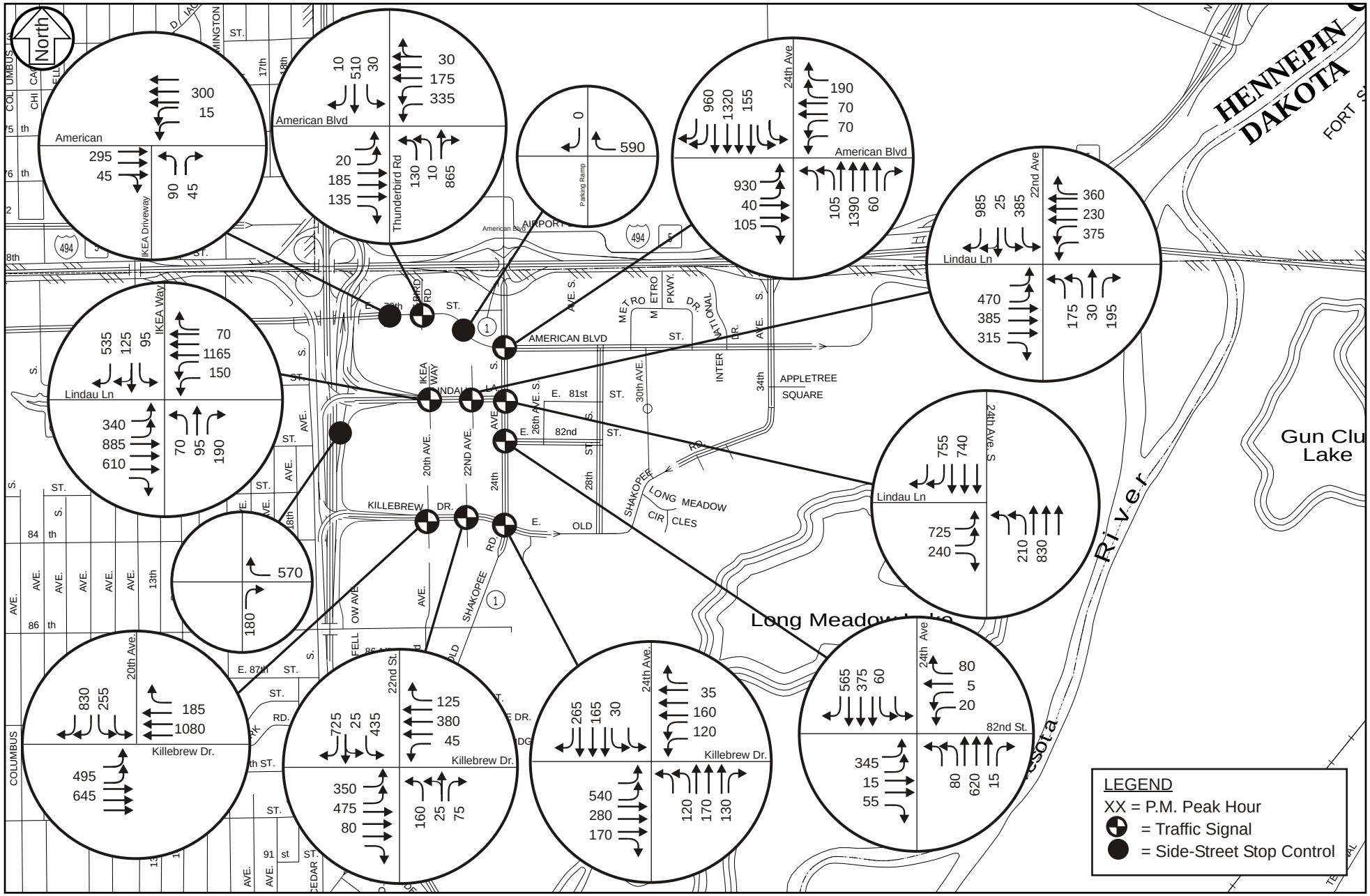
PROPOSED ROADWAY CONCEPT

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

Figure 13



YEAR 2012 BUILD SATURDAY PEAK HOUR TRAFFIC VOLUMES (3:00 PM to 4:00 PM)

Figure 14

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

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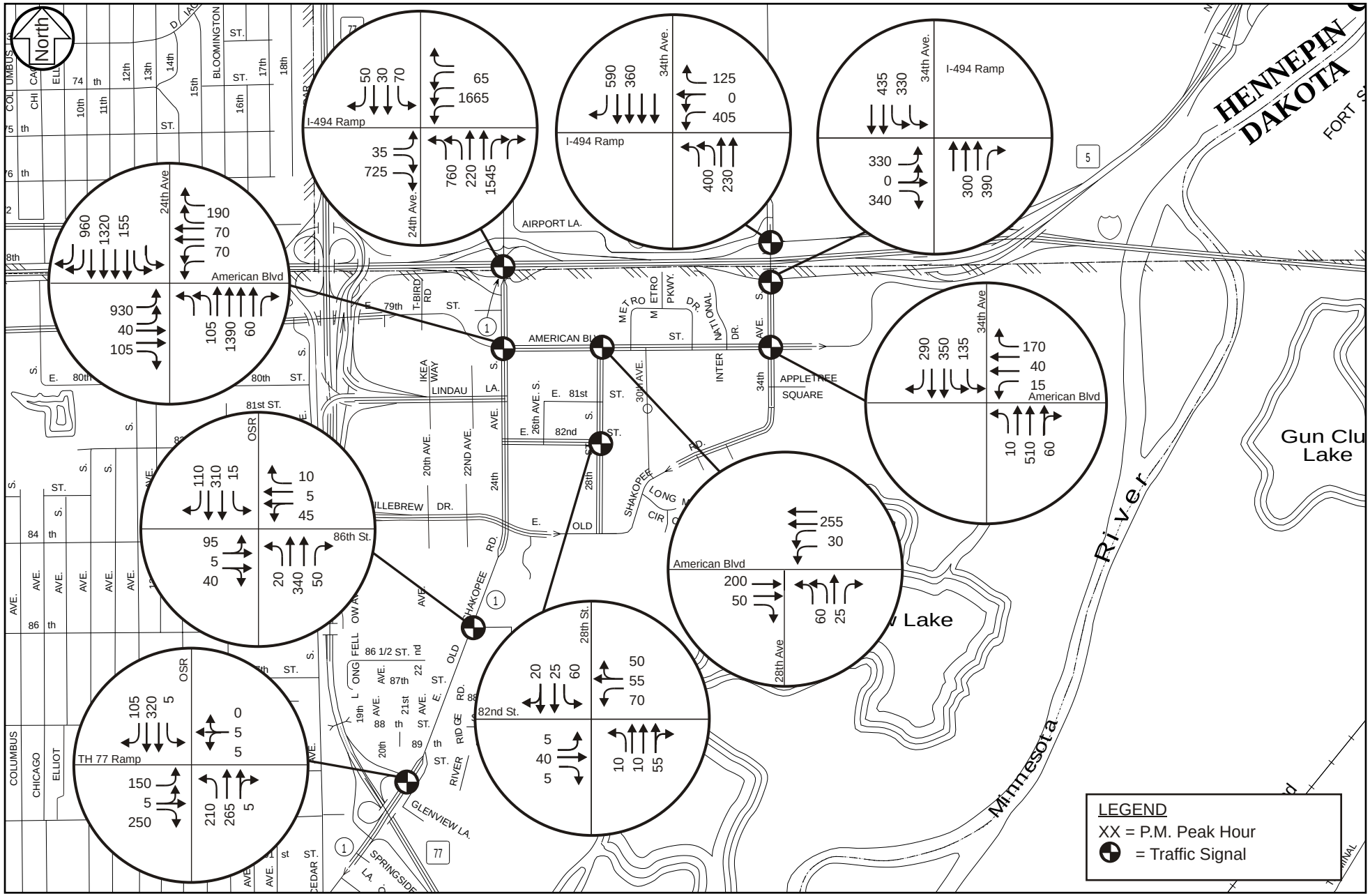

YEAR 2012 BUILD SATURDAY PEAK HOUR TRAFFIC VOLUMES (3:00 PM to 4:00 PM)

Figure 15

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

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Table 6
Year 2012 Build Peak Hour Capacity Analysis - Saturday
Level of Service Results

Intersection	Level of Service
	Saturday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	**F** (D)
Lindau Lane/22nd Avenue	D
Lindau Lane/24th Avenue	D
Killebrew Drive/TH 77 Ramps/20th Avenue	C
Killebrew Drive/22nd Avenue	D
Killebrew Drive/24th Avenue	D
24th Avenue/I-494 Single-Point Interchange	**F** (D)
24th Avenue/82nd Street	B
American Boulevard/IKEA Driveway *	D/E (A/B)
American Boulevard/Thunderbird Road	**F** (B)
American Boulevard/24th Avenue	**F** (D)
American Boulevard/28th Avenue	A
American Boulevard/34th Avenue	B
34th Avenue/I-494 North Ramps	D
34th Avenue/I-494 South Ramps	D
28th Avenue/82nd Street	D
Old Shakopee Road/86th Street	B
Old Shakopee Road/TH 77 East Ramp	B

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
Note: Parentheses indicate LOS with assumed improvements listed below.

Queuing at all freeway ramp terminal intersections was reviewed and addressed for year 2012 build Saturday p.m. peak hour conditions. Based on the traffic analysis, queuing problems will develop (spillback to the freeway) at the intersections of Lindau Lane/TH 77 Ramps/IKEA Way and 24th Avenue/I-494 Single Point Interchange. With the improvements listed below, these queuing problems are eliminated.

In order for all intersections to operate at acceptable levels of service during year 2012 build (Saturday) conditions, the following improvements shown in Figure 13 are needed:

TH 77 CD Roadway

- Construct a new access to/from the TH 77 CD roadway to/from the existing MOA parking ramp (see Figure 13).

American Boulevard/24th Avenue

- Construct an additional southbound right-turn lane. Extend both turn lanes to the I-494 single-point interchange (see Figure 13).

24th Avenue/I-494 Single-Point Interchange

- Construct an additional westbound left-turn lane (triple lefts) (see Figure 13).

Killebrew Drive/20th Avenue

- Eliminate the "free" southbound right-turn lane
- Construct dual right-turn lanes with overlap signal timing

The westbound triple left-turn lane improvement recommended for year 2012 build conditions is necessary for the heavy westbound to southbound movement during the Saturday peak hour. It is possible that some motorists may choose the alternate route using the 34th Avenue interchange and American Boulevard to the current Mall of America and proposed Phase II. In addition, wayfinding improvements may be proposed under a separate upcoming study. Therefore, a sensitivity analysis was completed to determine how many vehicles would need to use the alternate route to eliminate the westbound triple left-turn lane improvement. Based on the sensitivity analysis results, approximately 300 vehicles would need to divert to the 34th Avenue interchange. These additional vehicles would not create any new operational problems at the 34th Avenue interchange in its current configuration or with its proposed improvements during the Saturday peak hour.

Additional Operations Analysis

An additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. The previous analysis assumes a three percent distribution to the west on American Boulevard. It was discussed that this value could be increased through the implementation of ITS measures. These motorists would still have a destination/origin on I-494 west, but they would access the freeway using American Boulevard to the Portland Avenue interchange.

Based on existing traffic counts collected at the IKEA driveway and driveway across from Thunderbird Road, it was determined that more than 10 percent of the MOA and IKEA visitors currently leaving the future MOA 2 site travel west on American Boulevard. Therefore, a 10 percent distribution to the west on American Boulevard was assumed reasonable and used to determine operational impacts to area intersections for year 2012 build conditions. The rerouting of traffic does not include the proposed office and hotel uses that span across Lindau Lane or proposed uses constructed on the current MOA site. With a 10 percent distribution to the west, approximately 300 new trips during the Saturday peak hour would use American Boulevard to the west.

Based on the analysis, all improvements recommended in the previous section are still needed even with the new assumed distribution to the west on American Boulevard. It is important to note that based on the analysis, it is not necessary to direct more traffic to use American Boulevard to the west to achieve acceptable intersection operations. However, any increase above the three percent distribution will provide benefits to the operations at American Boulevard/24th Avenue during Saturday peak hour conditions.

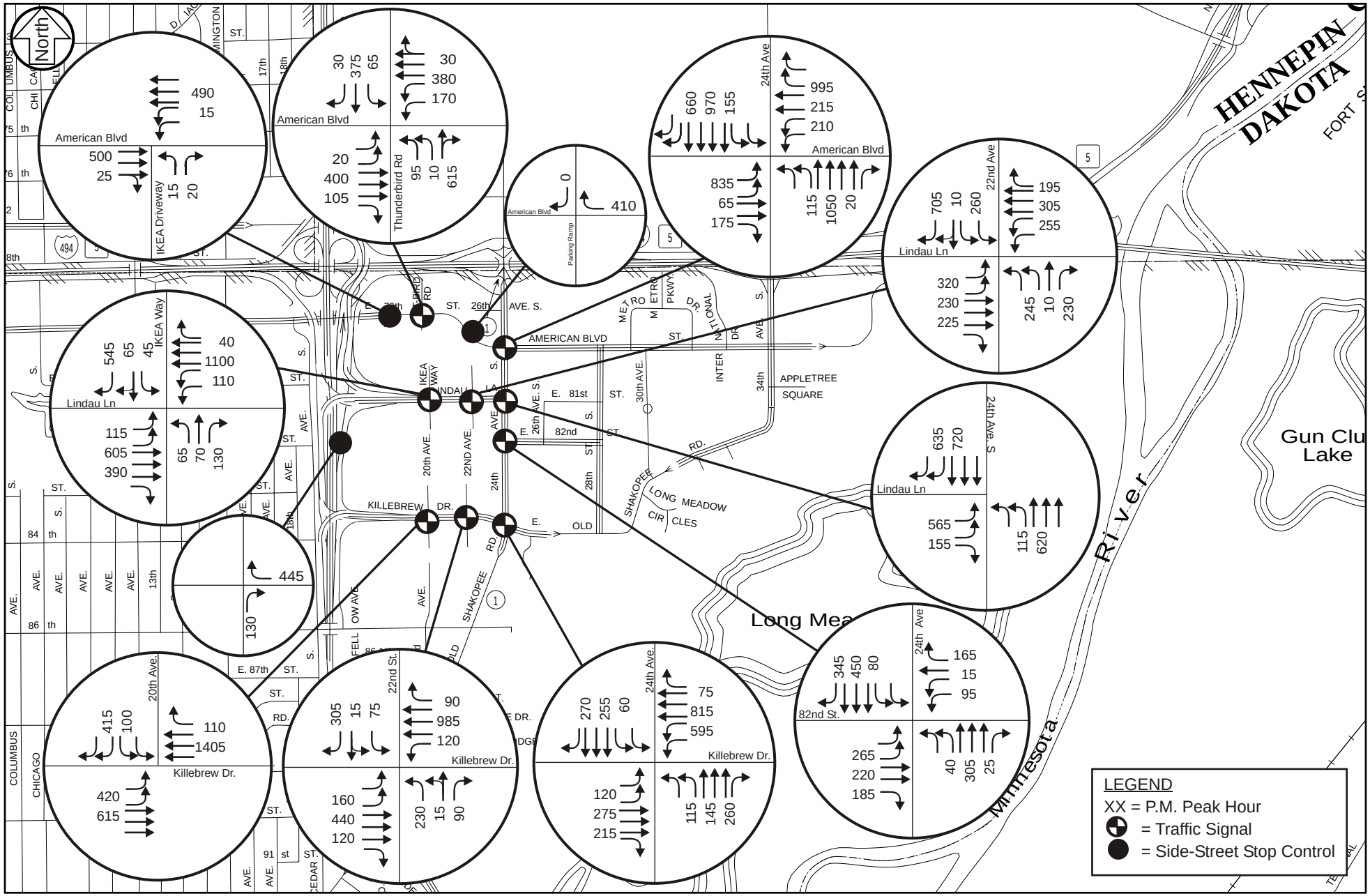
E. Year 2012 Build Traffic Operations Analysis – Thursday

To determine how well the existing and assumed roadway improvements listed above will accommodate year 2012 build traffic forecasts (see Figures 16 and 17), an operations analysis was conducted for Thursday peak conditions. This analysis assumes the additional improvements identified in the previous Saturday peak hour analysis. Although the 2012 build volumes for the Thursday peak hour does not require the westbound triple left-turn improvement at the 24th Avenue/I-494 Single-Point Interchange, it was assumed in the model since it is required for Saturday conditions. Results of the analysis shown in Table 7 indicate that the intersections of American Boulevard/IKEA Driveway, American Boulevard/Thunderbird Road and American Boulevard/24th Avenue will operate at unacceptable levels of service during the Thursday peak hour.

Table 7
Year 2012 Build Peak Hour Capacity Analysis - Thursday
Level of Service Results

Intersection	Level of Service
	Thursday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	C
Lindau Lane/22nd Avenue	C
Lindau Lane/24th Avenue	B
Killebrew Drive/TH 77 Ramps/20th Avenue	C
Killebrew Drive/22nd Avenue	C
Killebrew Drive/24th Avenue	D
24th Avenue/I-494 Single-Point Interchange	D
24th Avenue/82nd Street	B
American Boulevard/IKEA Driveway *	**E/F** [(1)] (A/B)
American Boulevard/Thunderbird Road	**F** [(1)] (C)
American Boulevard/24th Avenue	**F** [(2)] (D)
American Boulevard/28th Avenue	A
American Boulevard/34th Avenue	C
34th Avenue/I-494 North Ramps	D
34th Avenue/I-494 South Ramps	D
28th Avenue/82nd Street	D
Old Shakopee Road/86th Street	B
Old Shakopee Road/TH 77 East Ramp	B

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
(1) Poor intersection operations caused from vehicle queues from American Boulevard/24th Avenue
(2) Average vehicle delay of 100 seconds
Levels of service shown in parentheses assume the improvements listed below.



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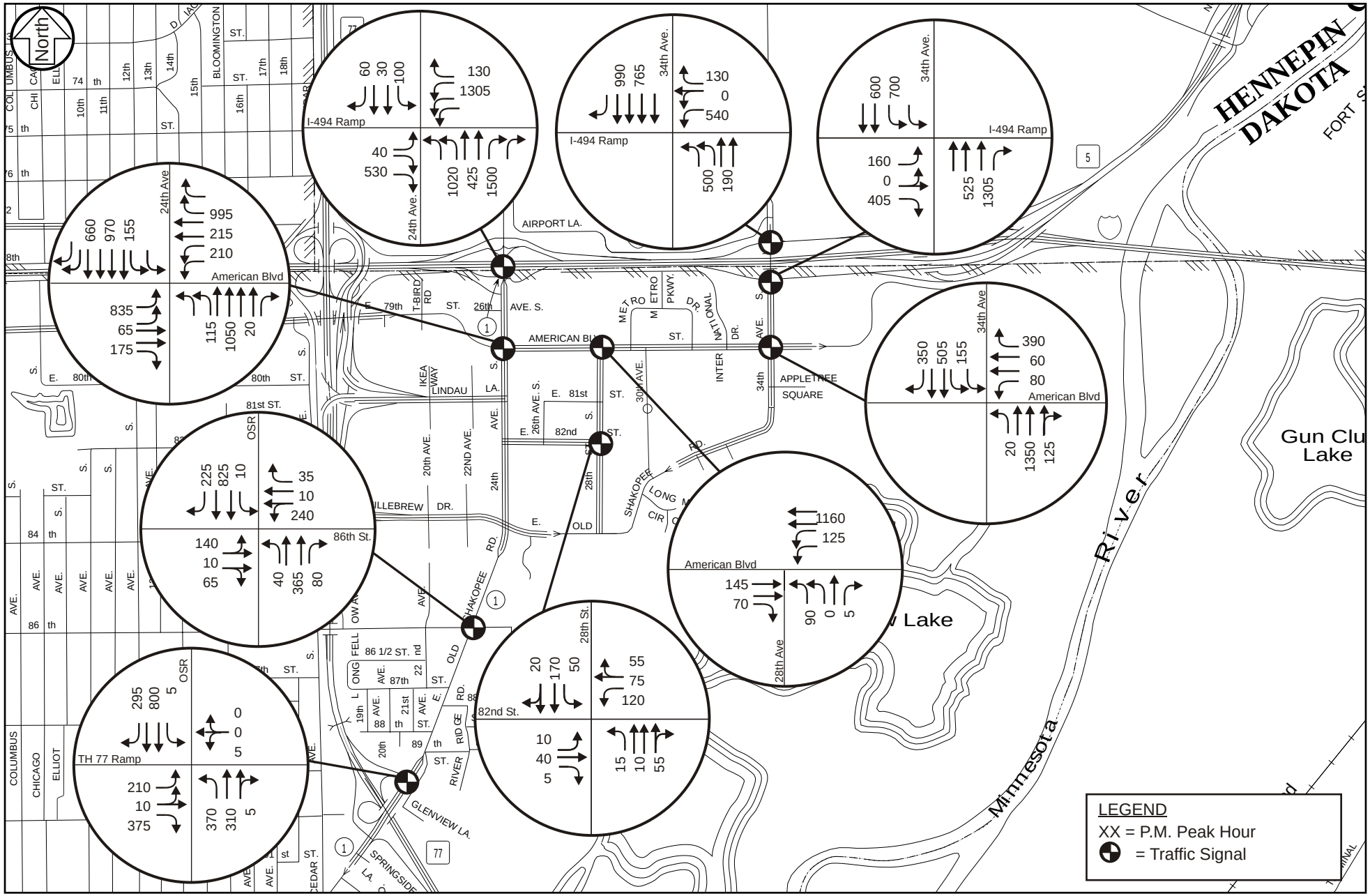
YEAR 2012 BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES (4:30 P.M. TO 5:30 P.M.)

Figure 16

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington



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YEAR 2012 BUILD WEEKDAY PEAK HOUR TRAFFIC VOLUMES (4:30 P.M. TO 5:30 P.M.)

Figure 17

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

In order for all of the key intersections to operate at acceptable levels of service during the year 2012 build Thursday conditions, the following improvements will be needed:

American Boulevard/24th Avenue

- Extend the southbound left most left-turn lane to 500 feet
- Extend the eastbound left-turn lanes to 500 feet
- Extend the westbound left-turn lanes to 500 feet
- Construct an additional westbound right-turn lane to provide three westbound right-turn lanes
- The westbound approach should have four approach lanes that begin at 28th Avenue, two of these lanes would be trap right-turn lanes at the intersection

Additional Operations Analysis

Similar to year 2012 Saturday build conditions, an additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 250 new trips during the Thursday p.m. peak hour would use American Boulevard to the west.

With the increase of traffic using American Boulevard to the west, the intersection delay at American Boulevard/24th Avenue will be reduced by approximately 35 seconds/vehicle. However, the following improvements will still be needed to achieve acceptable operations at the intersection of American Boulevard/24th Avenue during the Thursday p.m. peak hour:

American Boulevard at 24th Avenue

- Extend the southbound left most left-turn lane to 500 feet
- Extend the eastbound left-turn lanes to 500 feet

V. 2030 BUILD CONDITIONS

Future traffic operations analyses were conducted for the year 2030 build conditions. The land use, street network assumptions, and operations results are discussed in this section of the report.

A. Assumed Land Use

Land use assumptions and trip generation for Phase II and adjacent developments are also included in the Appendix (Tables A-2 and A-3). Year 2030 build conditions includes additional adjacent developments and background growth beyond year 2012 to year 2030. Approximately 47 percent of the new development trips generated for the Saturday peak hour are associated with the MOA Phase II development and 53 percent are associated with other adjacent land use developments. For the Thursday peak hour, 25 percent of the new development trips are associated with the MOA Phase II development and 75 percent of the new development trips are associated with other adjacent land use developments.

B. Assumed Roadway Improvements

All roadway improvements included in the year 2012 no build and build analyses are assumed in the year 2030 build analysis. In addition, the following additional improvements with optimized signal timing were assumed:

American Boulevard/34th Avenue (listed in the Bloomington Central Station Traffic Study)

- Eliminate the southbound free right-turn lane
- Construct southbound dual right-turn lanes that extend from the I-494 South Ramps

24th Avenue/82nd Street

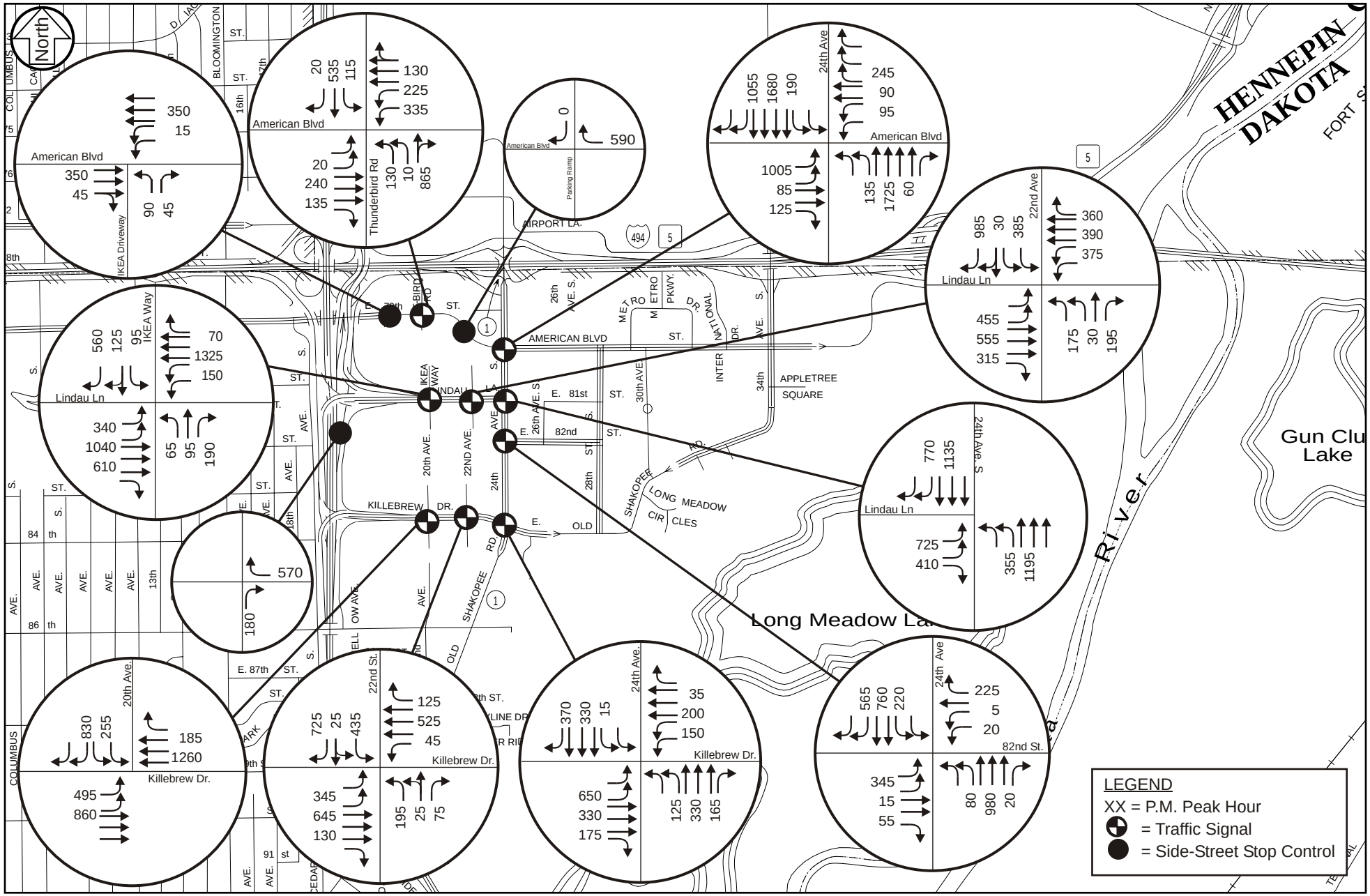
- On the north approach, convert the rightmost through lane into a trap right-turn lane. This improvement will create better lane utilization upstream at the single-point interchange.

Old Shakopee Road

- Reconstruction of Old Shakopee Road between Cedar Avenue and Killebrew Avenue

C. Year 2030 Build Traffic Operations Analysis – Saturday

To determine how well the existing and assumed roadway improvements will accommodate year 2030 build traffic forecasts (see attached Figures 18 and 19), an operations analysis was conducted for Saturday peak conditions. Results of the analysis shown in Table 8 indicate that all of the key intersections are expected to operate at acceptable levels of service for year 2030 build Saturday conditions, with the exception of the 24th Avenue/I-494 Single-Point Interchange. The 24th Avenue/I-494 Single-Point Interchange is expected to operate near the LOS D/E threshold with an average vehicle delay of 60 seconds.



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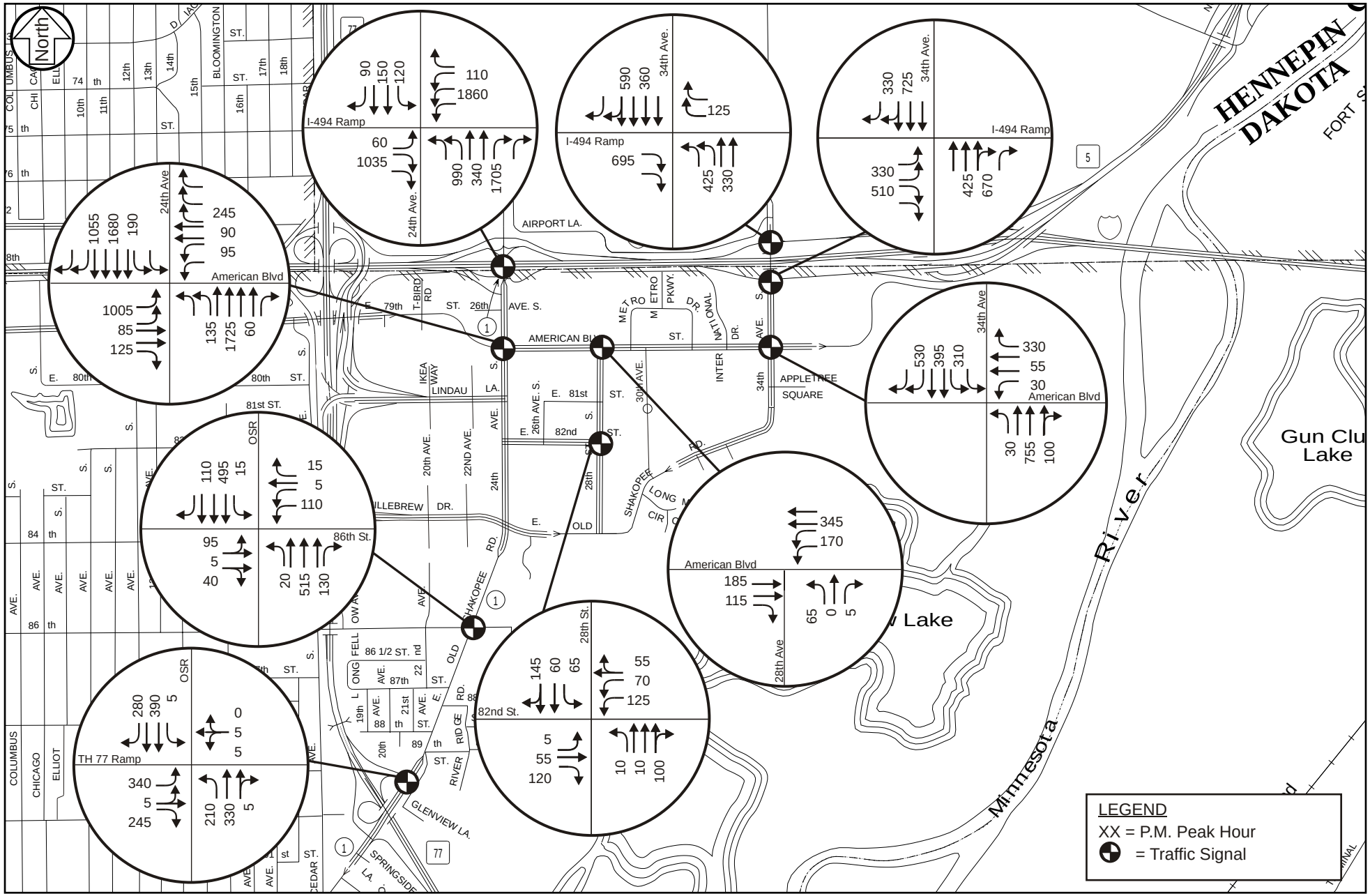
YEAR 2030 SATURDAY PEAK HOUR TRAFFIC VOLUMES (3:00 P.M. TO 4:00 P.M.)

Figure 18

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington



YEAR 2030 SATURDAY PEAK HOUR TRAFFIC VOLUMES (3:00 P.M. TO 4:00 P.M.)

Figure 19

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

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Table 8
Year 2030 Build Peak Hour Capacity Analysis – Saturday
Level of Service Results

Intersection	Level of Service
	Saturday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	C
Lindau Lane/22nd Avenue	D
Lindau Lane/24th Avenue	C
Killebrew Drive/TH 77 Ramps/20th Avenue	C
Killebrew Drive/22nd Avenue	D
Killebrew Drive/24th Avenue	D
24th Avenue/I-494 Single-Point Interchange	**E** [(1)]
24th Avenue/82nd Street	C
American Boulevard/IKEA Driveway *	A/B
American Boulevard/Thunderbird Road	C
American Boulevard/24th Avenue	D
American Boulevard/28th Avenue	B
American Boulevard/34th Avenue	C
34th Avenue/I-494 North Ramps	D
34th Avenue/I-494 South Ramps	C
28th Avenue/82nd Street	D
Old Shakopee Road/86th Street	B
Old Shakopee Road/TH 77 East Ramp	B

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
(1) Average delay of 60 seconds

The following improvements are not needed from a level of service perspective, but are recommended to improve overall operations and reduce queues:

Killebrew Avenue at 22nd Avenue

- Add overlap signal phasing for the southbound right-turn movement

Killebrew Avenue at 24th Avenue

- Extend the eastbound left-turn lanes to 400 feet

Additional Operations Analysis

Similar to year 2012 build conditions, an additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 300 new trips during the Saturday peak hour would use American Boulevard to the west.

With the increase of traffic using American Boulevard to the west, the 24th Avenue/I-494 Single-Point Interchange is expected to improve to LOS D during the Saturday peak hour. In addition to routing traffic to the west on American Boulevard, traffic traveling to the mall from the east on I-494 could be directed to 34th Avenue. This could also provide relief to the single-point interchange.

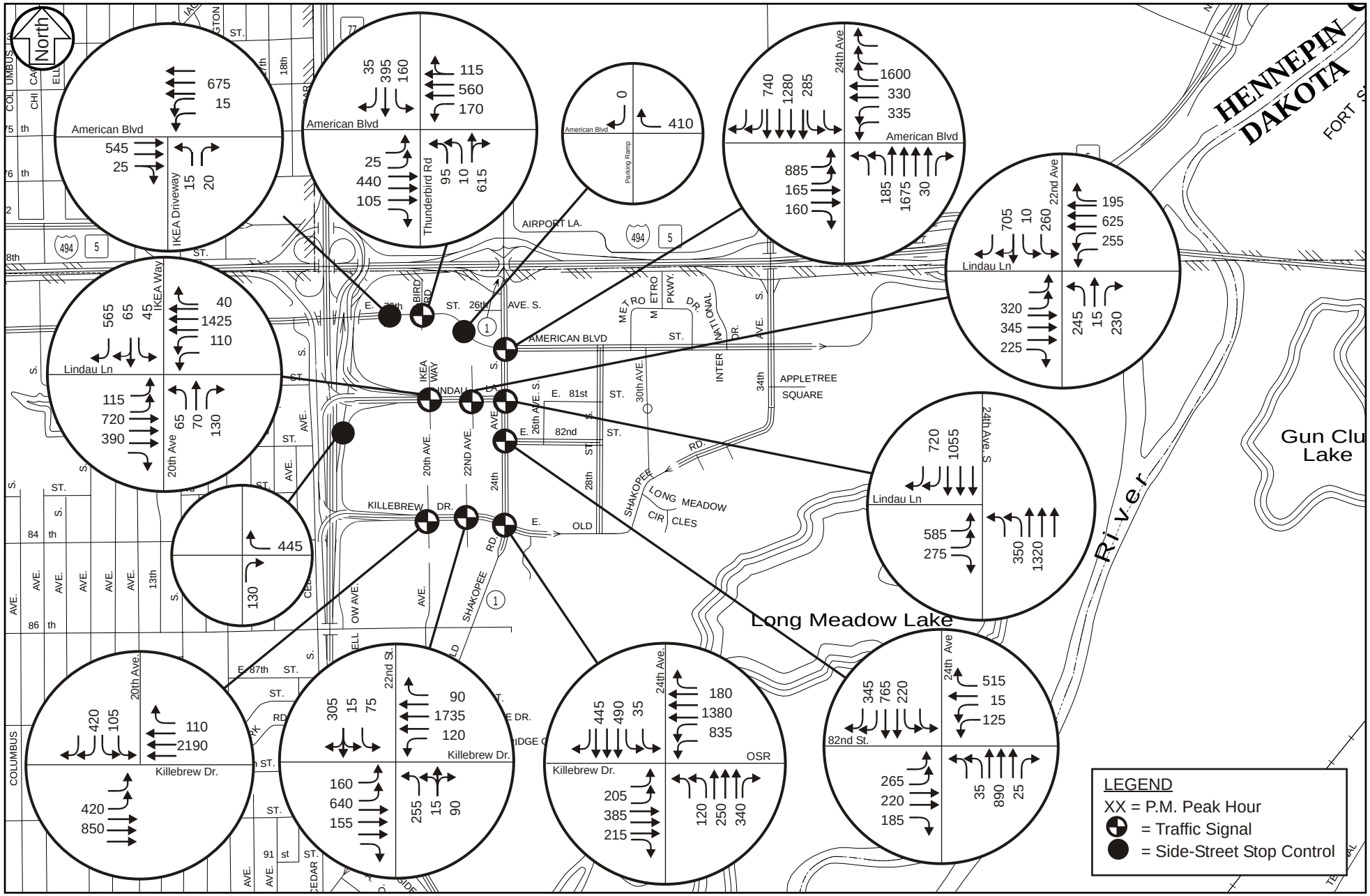
D. Year 2030 Build Traffic Operations Analysis – Thursday

To determine how well the existing and assumed roadway improvements will accommodate year 2030 build traffic forecasts (see attached Figures 20 and 21), an operations analysis was conducted for Thursday peak conditions. Results of the analysis shown in Table 9 indicate that nine intersections will operate at unacceptable levels of service during the Thursday peak hour.

Table 9
Year 2030 Build Peak Hour Capacity Analysis – Thursday
Level of Service Results

Intersection	Level of Service Thursday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	C
Lindau Lane/22nd Avenue	D
Lindau Lane/24th Avenue	**E** [(1)]
Killebrew Drive/TH 77 Ramps/20th Avenue	D
Killebrew Drive/22nd Avenue	C
Killebrew Drive/24th Avenue	**E** (D)
24th Avenue/I-494 Single-Point Interchange	**E** [(2)]
24th Avenue/82nd Street	D
American Boulevard/IKEA Driveway *	A/C
American Boulevard/Thunderbird Road	**F** [(1)]
American Boulevard/24th Avenue	**F** [(3)]
American Boulevard/28th Avenue	C
American Boulevard/34th Avenue	**F** (D)
34th Avenue/I-494 North Ramps	**F** (D)
34th Avenue/I-494 South Ramps	**F** (C)
28th Avenue/82nd Street	**F** (D)
Old Shakopee Road/86th Street	C
Old Shakopee Road/TH 77 East Ramp	D

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
(1) Poor intersection operations caused from vehicle queues from American Boulevard/24th Avenue
(2) Average vehicle delay of 60 seconds
(3) Average vehicle delay of 260 seconds
Note: Parentheses indicate LOS with assumed improvements listed below.



YEAR 2030 WEEKDAY PEAK HOUR TRAFFIC VOLUMES (4:30 P.M. TO 5:30 P.M.)

Figure 20

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

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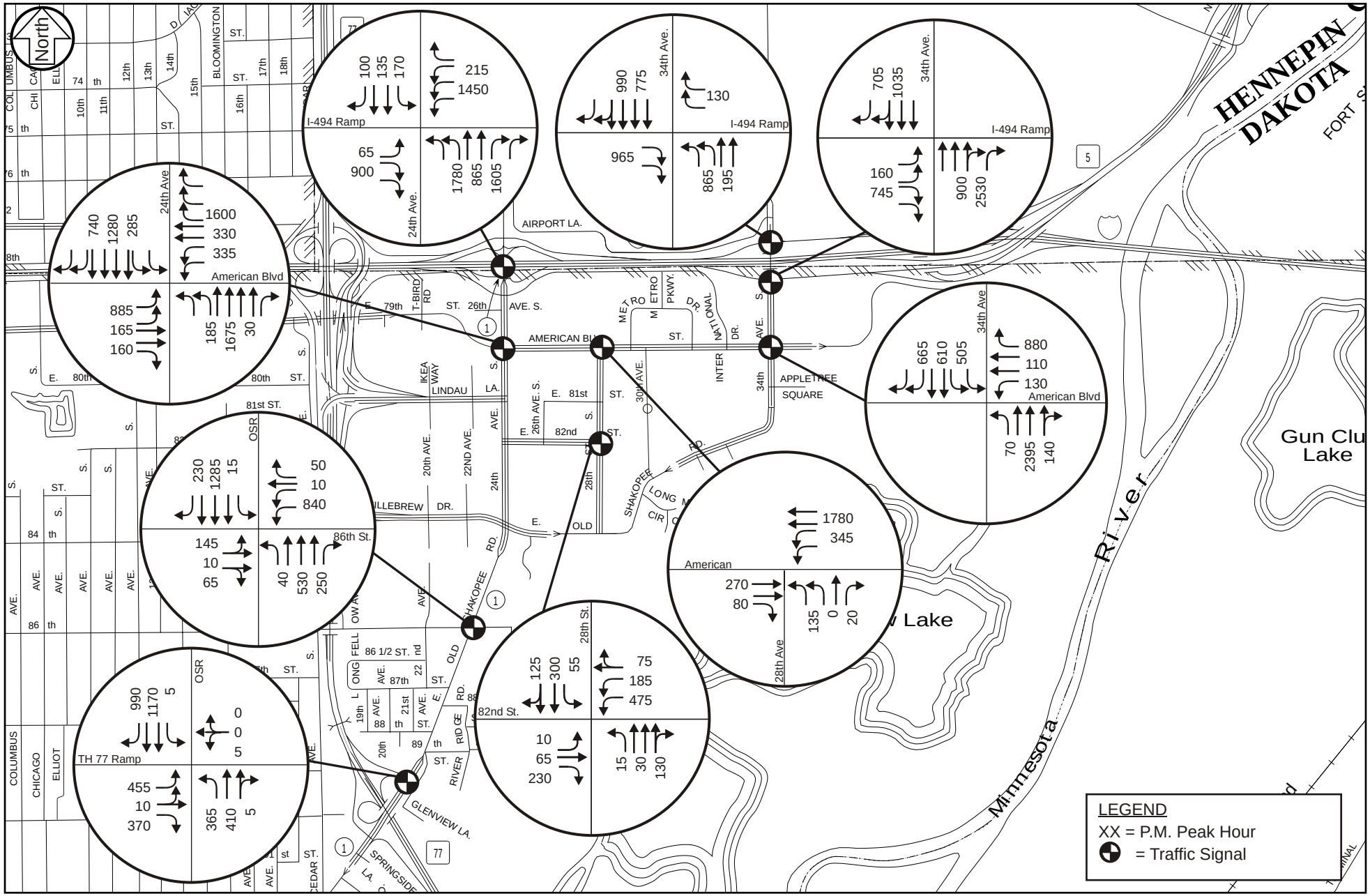

YEAR 2030 WEEKDAY PEAK HOUR TRAFFIC VOLUMES (4:30 PM to 5:30 PM)

Figure 21

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

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As shown in Table 9, four key intersections are expected to operate at unacceptable levels of service with the following recommended improvements. The combination of peak hour trips from redevelopment sites to the east and south with the proposed MOA 2 peak hour trips traveling through the 24th Avenue intersections exceed the capacity of their at-grade design.

Killebrew Avenue at 24th Avenue

- Extend the westbound left-turn lanes to 500 feet
- Extend the third westbound through lane back to the intersection of Old Shakopee Road/28th Avenue

28th Avenue/82nd Street

- Construct an additional westbound left-turn lane

American Boulevard/34th Avenue

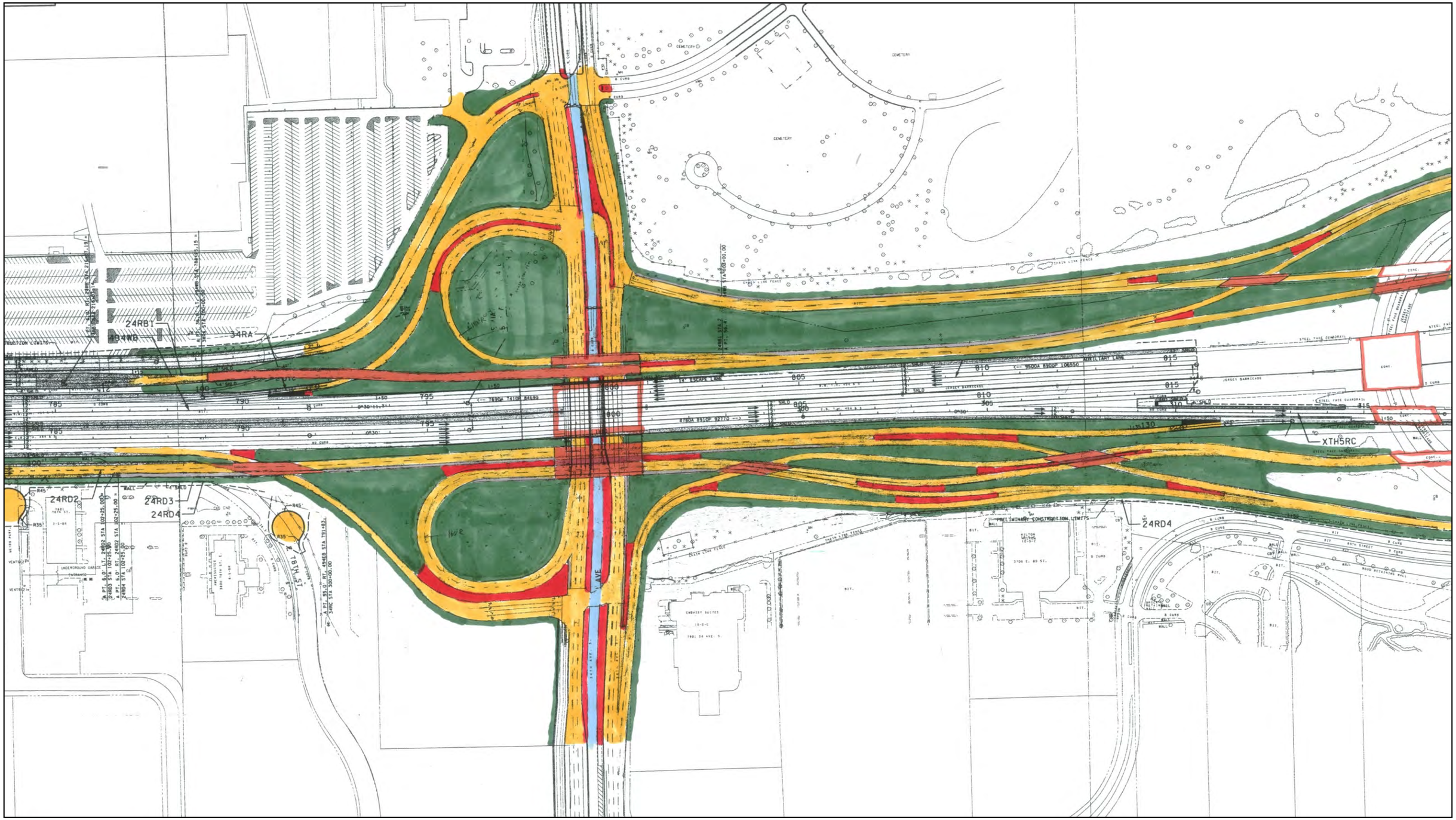
- Eliminate the westbound free right-turn lane
- Construct westbound dual right-turn lanes

34th Avenue/I-494 North Ramps and South Ramps (Figure 22)

- Reconstruct the interchange to include loops in the northwest and southwest quadrants. These improvements will eliminate two major traffic conflicts with LRT operations, the westbound to southbound movement, and the southbound to eastbound movement. Improvements at the 34th Avenue/I-494 Ramps are a result of increased traffic volumes due to background growth, adjacent developments, and LRT operations.

Additional Operations Analysis

Similar to year 2030 Saturday build conditions, an additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 250 new trips during the Thursday p.m. peak hour would use American Boulevard to the west. Based on the results in Table 10, three key intersections are expected to operate at unacceptable levels of service for year 2030 build Thursday p.m. peak hour conditions with the increased traffic using American Boulevard to the west.



PROPOSED ROADWAY CONCEPT, I-494/34TH AVENUE

MALL OF AMERICA PHASE II TRAFFIC STUDY
Mall of America/City of Bloomington

Figure 22

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Table 10
2030 Build Peak Hour Capacity Analysis – 10% Distribution to American West
Level of Service Results

Intersection	Level of Service
	Thursday Peak
Lindau Lane/TH 77 Ramps/IKEA Way	C
Lindau Lane/22nd Avenue	C
Lindau Lane/24th Avenue	**E** [(1)]
Killebrew Drive/TH 77 Ramps/20th Avenue	D
Killebrew Drive/22nd Avenue	C
Killebrew Drive/24th Avenue	D
24th Avenue/I-494 Single-Point Interchange	D
24th Avenue/82nd Street	D
American Boulevard/IKEA Driveway *	A/C
American Boulevard/Thunderbird Road	**F** [(1)]
American Boulevard/24th Avenue	**F** [(2)]
American Boulevard/28th Avenue	C
American Boulevard/34th Avenue	D
34th Avenue/I-494 North Ramps	D
34th Avenue/I-494 South Ramps	C
28th Avenue/82nd Street	D
Old Shakopee Road/86th Street	C
Old Shakopee Road/TH 77 East Ramp	D

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
(1) Poor intersection operations caused from vehicle queues from American Boulevard/24th Avenue
(2) Average vehicle delay of 220 seconds

As previously stated, the combination of peak hour trips from redevelopment sites to the east and south with the proposed MOA 2 peak hour trips traveling through the 24th Avenue intersections exceed the capacity of their at-grade design during year 2030 build Thursday conditions. In order to improve operations to acceptable operations, the following comments are provided:

- Further review of the feasibility of a grade-separated intersection at American Boulevard/24th Avenue should be considered.

- Mn/DOT has recently selected a consultant for the Travel Demand Forecasting and Concept Development project for the I-494/TH 77 corridors. Results of this study will provide forecast traffic volumes for the area from a regional perspective to compare with the local traffic model and future volumes developed for the MOA Phase II Traffic Study and supplemental analyses. This will allow us to determine whether adjustments could be made. In addition, a new connection from Thunderbird Road or areas east of 24th Avenue to the CD roadway will be considered as part of this study.

- Based on the percent breakdown of traffic using the intersection of American Boulevard/24th Avenue during year 2030 build Thursday conditions, further review of the total amount of future development for the entire study area should be considered.

VI. OTHER ISSUES

A. Site Plan Review

As part of this study, SRF staff worked closely with the site design engineer to review and modify on-site intersection and roadway geometrics to provide the necessary lane configurations, turn lane lengths and intersection spacing to provide adequate on-site operations during peak hour conditions.

To determine how well the on-site intersections will accommodate year 2030 build traffic forecasts, an operations analysis was conducted for Saturday peak hour conditions. Results of the analysis shown in Table 11 indicate that all key intersections on-site are expected to operate at acceptable levels of service for year 2030 build Saturday conditions.

Table 11
Year 2030 Build Peak Hour Capacity Analysis - Saturday
Internal Intersection Level of Service Results

Intersection	Level of Service
	Saturday Peak
Northbound TH 77 CD Ramps/East Ramp Roundabout *	A [(1)]
East Ramp Roadway/Nordstrom's Access	A
IKEA Way/IKEA Driveway *	A/B
IKEA Way/North Ring Road *	B/B
Thunderbird Road/North Ring Road *	A/D
22nd Avenue/Main Parking Access	C
22nd Avenue/Large Vehicle Access *	A/A

* Indicates an unsignalized intersection. The overall LOS is shown followed by the worst approach LOS.
[(1)] Level of Service results are similar with both Synchro/SimTraffic and RODEL traffic models.

In addition to the intersection operations analysis, on-site plan review comments are summarized below:

- Queuing at all adjacent intersections along American Boulevard and Lindau Lane was reviewed and addressed for future peak conditions. Intersection geometrics and lane configurations will accommodate future traffic forecasts. Heavy vehicle queues are not expected to develop from the adjacent intersections, backing on-site to block internal intersections.

Based on the traffic simulation of year 2030 build conditions (Saturday), the southbound average queues on IKEA Way and 22nd Avenue at Lindau Lane are not expected to extend back into the first internal intersections to the north. In addition, the southbound 95th percentile queues on IKEA Way are not expected to extend back to the first internal intersection. However, the southbound 95th percentile queues on 22nd Avenue are expected to extend back to the first internal intersection during peak Saturday conditions.

Based on the traffic simulation of year 2030 build conditions (Saturday), the northbound average and 95th percentile queues at American Boulevard are not expected to spill back into the T-intersection to the south. However, the westbound right-turning vehicles may queue back onto the north ring road to the east. This queue will not impact the entering traffic at the T-intersection south of American Boulevard

- Queuing at all internal intersections was reviewed and addressed for future peak conditions. Intersection geometrics and lane configurations will accommodate future traffic forecasts. Heavy vehicle queues are not expected to develop from the internal intersections, backing into the adjacent American Boulevard and Lindau Lane intersections.

B. Impacts to IKEA Store

With the proposed site plan dated September 5, 2006, operational impacts to the IKEA Store are minimal. The current layout locates the main parking ramp adjacent to 24th Avenue. As previously stated, access to the main parking ramp is provided along American Boulevard west of 24th Avenue and along the main internal roadway north of the Lindau Lane/22nd Avenue intersection. Therefore, the majority of the travel patterns for new trips will occur on the east side of the proposed MOA 2 site. This will allow the necessary capacity for IKEA Way to operate at acceptable levels of operation during Saturday peak conditions for IKEA customers.

As previously stated, the southbound average and 95th percentile queues along IKEA Way are not expected to block the first internal intersection to the north. According to the proposed site plan, a smaller parking structure will be provided at the north end of IKEA Way. However, this parking area will mainly serve the office use at the north end of the site. Peak conditions for the office use are during the weekday evening period, which does not conflict with IKEA's Saturday peak condition.

Currently, IKEA has a separate full-access along American Boulevard, west of the American Boulevard/Thunderbird Road signalized access to MOA 2. As development of the MOA 2 site occurs, other options to attract IKEA customers to use this access during Saturday peak conditions should be considered.

VII. CONCLUSIONS AND RECOMMENDATIONS

The proposed Mall of America Phase II development consists of 1,907,691 square feet of retail/mixed use, 1250 hotel rooms, 300 residential condos, and 615,000 square feet of office assumed to be completed by year 2011.

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

A. Existing Conditions

- Existing turning movement counts, geometrics, traffic controls, and LRT operations were all collected in April and May of 2005. The Thursday p.m. peak hour turning movement counts that were collected were factored by 1.3 to replicate typical traffic volumes experienced during August. The Saturday peak hour turning movement counts were not factored because historical data indicated that the Saturday counted has similar traffic volumes compared to a typical Saturday peak that would occur in August.

- Results of the existing traffic operations analysis indicate that the intersections of Lindau Lane/TH 77 Ramps/IKEA Way and Killebrew Drive/22nd Avenue are currently operating at unacceptable levels of service during the Saturday peak hour. To improve operations at these intersections, the following improvements are recommended:

  Lindau Lane/TH 77 Ramps/IKEA Way

  - Eliminate access from northbound TH 77 to eastbound Lindau Lane
  - Remove concrete median on the west approach to allow southbound TH 77 traffic to make an eastbound right-turn movement on Lindau Lane to the existing MOA near Nordstrom's

  Killebrew Drive/22nd Avenue

  - Construct an additional eastbound left-turn lane to provide dual left-turn lanes

B. Year 2012 No Build Conditions

- The 2012 no build Saturday peak hour analysis assumes the recommended improvements from the existing analysis, assumed roadway improvements listed in the *Bloomington Central Station Traffic Study*, and assumed roadway improvements listed in the Airport South CIP. Results of the analysis indicate that all key intersections will operate at acceptable levels of service during the Saturday peak hour.

- The 2012 no build Thursday p.m. peak hour analysis assumes the recommended improvements from the existing analysis, assumed roadway improvements listed in the *Bloomington Central Station Traffic Study*, and assumed roadway improvements listed in the Airport South CIP. Results of the analysis indicate that all key intersections will operate at acceptable levels of service during the Thursday p.m. peak hour except the 34th Avenue/I-494 North and South ramp intersections. In order for these intersections to operate at acceptable levels of service, the following additional improvement is recommended:

  34th Avenue/I-494 North Ramps and South Ramps

  - Replace the existing "all-red" traffic phase with each LRT train crossing to a northbound/southbound "green" phase.

C. Year 2012 Build Conditions

- Based on the 2012 build Saturday analysis, the following additional improvements are needed for all intersections to operate at acceptable levels of service:

  TH 77/I-494 CD Roadway

  - Construct a new ramp from the TH 77/I-494 CD roadway to Thunderbird Road (see Figure 13)

  TH 77 CD Roadway

  - Construct a new access to/from the TH 77 CD roadway to/from the existing MOA parking ramp (see Figure 13).

  American Boulevard/24th Avenue

  - Construct an additional southbound right-turn lane. Extend both turn lanes to the I-494 single-point interchange (see Figure 13)

  24th Avenue/I-494 Single-Point Interchange

  - Construct an additional westbound left-turn lane (triple lefts) (see Figure 13).

  Killebrew Drive/20th Avenue

  - Eliminate the "free" southbound right-turn lane
  - Construct dual right-turn lanes with overlap signal timing

- The westbound triple left-turn lane improvement recommended for year 2012 build conditions is necessary for the heavy westbound to southbound movement during the Saturday peak hour. It is possible that some motorists may choose the alternate route using the 34th Avenue interchange and American Boulevard to the current Mall of America and proposed Phase II. In addition, wayfinding improvements may be proposed under a separate upcoming study. Therefore, a sensitivity analysis was completed to determine how many vehicles would need to use the alternate route to eliminate the westbound triple left-turn lane improvement. Based on the sensitivity analysis results, approximately 300 vehicles would need to divert to the 34th Avenue interchange. These additional vehicles would not create any new operational problems at the 34th Avenue interchange in its current configuration or with its proposed improvements during the Saturday peak hour.

- An additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 300 new trips during the Saturday peak hour would use American Boulevard to the west. Based on the analysis, all improvements recommended in the previous section are still needed even with the new assumed distribution to the west on American Boulevard. It is important to note that based on the analysis, it is not necessary to direct more traffic to use American Boulevard to the west to achieve acceptable intersection operations. However, any increase above the three percent distribution will provide benefits to the operations at American Boulevard/24th Avenue during Saturday peak hour conditions.

- Based on the 2012 build Thursday analysis, the following additional improvements are needed for all intersections to operate at acceptable levels of service:

  <u>American Boulevard/24th Avenue</u>

  - Extend the southbound left most left-turn lane to 500 feet
  - Extend the eastbound left-turn lanes to 500 feet
  - Extend the westbound left-turn lanes to 500 feet
  - Construct an additional westbound right-turn lane to provide three westbound right-turn lanes
  - The westbound approach should have four approach lanes that begin at 28th Avenue, two of these lanes would be trap right-turn lanes at the intersection

- An additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 250 new trips during the Thursday p.m. peak hour would use American Boulevard to the west. Based on the analysis, the following improvements will still be needed to achieve acceptable operations at the intersection of American Boulevard/24th Avenue during the Thursday p.m. peak hour:

  <u>American Boulevard/24th Avenue</u>

  - Extend the southbound left most left-turn lane to 500 feet
  - Extend the eastbound left-turn lanes to 500 feet

D. Year 2030 Build Conditions

- The 2030 build Saturday peak hour analysis assumed all of the improvements from the 2012 build analyses. In addition, the following additional improvements were assumed:

  American Boulevard/34th Avenue (listed in the Bloomington Central Station Traffic Study)

  - Eliminate the southbound free right-turn lane
  - Construct southbound dual right-turn lanes that extend from the I-494 South Ramps

  24th Avenue/82nd Street

  - On the north approach, convert the right/through lane into a trap right-turn lane. This improvement will create better lane utilization upstream at the single-point interchange.

  Old Shakopee Road

  - Reconstruction of Old Shakopee Road between Cedar Avenue and Killebrew Avenue

- Based on the 2030 build Saturday analysis, all of the key intersections are expected to operate at acceptable levels of service**,** with the exception of the 24th Avenue/I-494 Single-Point Interchange (near the LOS D/E threshold). The following additional improvements are not needed from a level of service perspective, but are recommended to improve overall operations and reduce queues:

  Killebrew Avenue at 22nd Avenue

  - Add overlap signal phasing for the southbound right-turn movement

  Killebrew Avenue at 24th Avenue

  - Extend the eastbound left-turn lanes to 400 feet

- An additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 300 new trips during the Saturday peak hour would use American Boulevard to the west. With the increase of traffic using American Boulevard to the west, the 24th Avenue/I-494 Single-Point Interchange is expected to improve to LOS D during the Saturday peak hour. In addition to routing traffic to the west on American Boulevard, traffic traveling to the mall from the east on I-494 could be directed to 34th Avenue. This could also provide relief to the single-point interchange.

- The 2030 build Thursday p.m. peak hour analysis assumed all of the improvements from the 2030 build Saturday peak hour analysis. Based on the 2030 build Thursday analysis, four key intersections are expected to operate at unacceptable levels of service with the following recommended improvements:

Killebrew Avenue at 24th Avenue

- Extend the westbound left-turn lanes to 500 feet
- Extend the third westbound through lane back to the intersection of Old Shakopee Road/28th Avenue

28th Avenue/82nd Street

- Construct an additional westbound left-turn lane

American Boulevard/34th Avenue

- Eliminate the westbound free right-turn lane
- Construct westbound dual right-turn lanes

34th Avenue/I-494 North Ramps and South Ramps (Figure 22)

- Reconstruct the interchange to include loops in the northwest and southwest quadrants. These improvements will eliminate two major traffic conflicts with LRT operations, the westbound to southbound movement, and the southbound to eastbound movement. Improvements at the 34th Avenue/I-494 Ramps are a result of increased traffic volumes due to background growth, adjacent developments, and LRT operations.

- An additional analysis was conducted to determine how the key intersections would operate if a larger percentage of traffic would use American Boulevard to the west. With a 10 percent distribution to the west, approximately 250 new trips during the Thursday p.m. peak hour would use American Boulevard to the west. With the increase of traffic using American Boulevard to the west, three key intersections are expected to operate at unacceptable levels of service for year 2030 build Thursday p.m. peak hour conditions.

- The combination of peak hour trips from redevelopment sites to the east and south with the proposed MOA 2 peak hour trips traveling through the 24th Avenue intersections exceed the capacity of their at-grade design during year 2030 build Thursday conditions. In order to improve operations to acceptable operations, the following comments are provided:

  - Further review of the feasibility of a grade-separated intersection at American Boulevard/24th Avenue should be considered.

  - Mn/DOT has recently selected a consultant for the Travel Demand Forecasting and Concept Development project for the I-494/TH 77 corridors. Results of this study will provide forecast traffic volumes for the area from a regional perspective to compare with the local traffic model and future volumes developed for the MOA Phase II Traffic Study and supplemental analyses. This will allow us to determine whether adjustments could be made. In addition, a new connection from Thunderbird Road or areas east of 24th Avenue to the CD roadway will be considered as part of this study.

- Based on the percent breakdown of traffic using the intersection of American Boulevard/24th Avenue during year 2030 build Thursday conditions, further review of the total amount of future development for the entire study area should be considered.

E. Site Plan Review

- As part of this study, SRF staff worked closely with the site design engineer to review and modify on-site intersection and roadway geometrics to provide the necessary lane configurations, turn lane lengths and intersection spacing to provide adequate on-site operations during peak hour conditions. Results of the analysis indicate that all key intersections on-site are expected to operate at acceptable levels of service for year 2030 build Saturday conditions.

- Queuing at all adjacent intersections along American Boulevard and Lindau Lane was reviewed and addressed for future peak conditions. Intersection geometrics and lane configurations will accommodate future traffic forecasts. Heavy vehicle queues are not expected to develop from the adjacent intersections, backing on-site to block internal intersections.

- Queuing at all internal intersections was reviewed and addressed for future peak conditions. Intersection geometrics and lane configurations will accommodate future traffic forecasts. Heavy vehicle queues are not expected to develop from the internal intersections, backing into the adjacent American Boulevard and Lindau Lane intersections.

F. Impacts to IKEA Store

- With the proposed site plan dated September 5, 2006, operational impacts to the IKEA Store are minimal. The current layout locates the main parking ramp adjacent to 24th Avenue. As previously stated, access to the main parking ramp is provided along American Boulevard west of 24th Avenue and along the main internal roadway north of the Lindau Lane/22nd Avenue intersection. Therefore, the majority of the travel patterns for new trips will occur on the east side of the proposed MOA 2 site. This will allow the necessary capacity for IKEA Way to operate at acceptable levels of operation during Saturday peak conditions for IKEA customers.

- As previously stated, the southbound average and 95th percentile queues along IKEA Way are not expected to block the first internal intersection to the north. According to the proposed site plan, a smaller parking structure will be provided at the north end of IKEA Way. However, this parking area will mainly serve the office use at the north end of the site. Peak conditions for the office use are during the weekday evening period, which does not conflict with IKEA's Saturday peak condition.

- Currently, IKEA has a separate full-access along American Boulevard, west of the American Boulevard/Thunderbird Road signalized access to MOA 2. As development of the MOA 2 site occurs, other options to attract IKEA customers to use this access during Saturday peak conditions should be considered.

APPENDIX A

Detailed Trip Generation

Table A-1
Mall of America Phase II Traffic Study
Adjacent Land Use Trip Generation

Adjacent Land Use Developed by Year 2012					Weekday					Saturday		
			Land Use		Daily	A.M. Peak		P.M. Peak		Daily	P.M. Peak	
TAZ	Location	Land Use	Type	Size	Trips	In	Out	In	Out	Trips	In	Out
471 C	SE Quad of Old Shakopee/24th Ave	Office	710	150.434 ksf	1,827	229	31	42	205	96	7	6
471 D	South of Old Shakopee just West of Ceridian	Office	710	388.65 ksf	3,794	489	67	87	427	206	18	16
472 A	RPZ	Office	710	79.2 ksf	1,115	137	19	28	139	64	4	3
472 D	Bloomington Central Station [1]	Health Partners Expansion	710	145 ksf	1,687	211	29	39	190	312	25	22
	Bloomington Central Station [1]	2 residential towers	220	275 units	1,756	27	107	105	57	1,669	82	54
	Bloomington Central Station [1]	11 residential towers	220	828 units	5,286	80	321	317	171	5,026	245	164
		Retail - assume 1 restaurant	932	8.3 ksf	528	25	23	28	18	1,314	52	31
		Retail - assume mix	814	9 ksf	399	6	4	11	14	378	10	13
		Retail - assume mix	814	8.8 ksf	390	6	4	10	13	370	9	12
	Bloomington Central Station [1]	14-story office tower	710	544.55 ksf	4,674	608	83	111	543	1,125	75	64
		Flex retail	814	27.7 ksf	1,228	18	11	33	42	1,165	31	40
	Bloomington Central Station [1]	Hotel	310	200 rooms	1,552	65	41	59	53	1,556	77	60
		Restaurants	932	5 ksf	318	15	14	17	11	792	33	18
		Retail	814	1 ksf	44	1	0	1	2	42	1	2
	Bloomington Central Station [1]	9-story office bldg	710	245.1 ksf	2,528	321	44	57	279	516	42	35
	Bloomington Central Station [1]	Transit-oriented retail	814	150 ksf	6,648	97	60	179	228	6,306	170	216
	MAC Terminal Expansion [2]	Airport	--	6000 stalls	12,500	--	--	145	1,000	9,000	145	315
		Total			**46,274**	**2,335**	**858**	**1,270**	**3,392**	**29,937**	**1,027**	**1,071**

[1] Retail land uses assume a 50% multi-use reduction. Office, residential, and hotel land uses assume a 5% LRT reduction.

[2] Trip Generation based on data from "2015 Terminal Expansion Project Minneapolis-St Paul International Airport" (July 2005).

Existing Land Use Replaced by Year 2012					Weekday					Saturday		
			Land Use		Daily	A.M. Peak		P.M. Peak		Daily	P.M. Peak	
TAZ	Location	Land Use	Type	Size	Trips	In	Out	In	Out	Trips	In	Out
471 C	SE Quad of Old Shakopee/24th Ave	Apartments	220	92 units	703	10	39	44	24	466	31	26
471 D	South of Old Shakopee just West of Ceridian	Single Family Housing	210	23 units	269	6	19	18	11	264	17	14
472 D	Bloomington Central Station	Office (Dynamics)	710	259.122 ksf	2,777	354	48	63	306	146	12	11
		Total			**3,749**	**370**	**106**	**125**	**341**	**877**	**60**	**51**

		GRAND TOTAL			**42,525**	**1,965**	**751**	**1,145**	**3,051**	**29,060**	**966**	**1,020**

Table A-2
Mall of America Phase II Traffic Study
Land Use Trip Generation, Year 2012

TAZ	Location	Land Use	Land Use Type	Size	Weekday Daily Trips	Weekday A.M. Peak In	Weekday A.M. Peak Out	Weekday P.M. Peak In	Weekday P.M. Peak Out	Saturday Daily Trips	Saturday P.M. Peak In	Saturday P.M. Peak Out
473 B	MOA Phase II (Met Center Site)	Retail/Mixed Use [1]	820	1457.691 ksf	15,597	273	66	866	975	21,134	1,138	1,283
		Bass Pro Shops [2]	820	300 ksf	6,400	111	26	301	339	10,600	598	674
		Performing Arts Center [3]	--	6000 seats	2,560	0	0	0	0	4,240	0	0
		Hotel [4]	310	1325 units	5,413	226	145	207	184	5,426	267	210
		Office [5]	710	615 ksf	6,094	755	103	140	685	1,312	123	104
		Residential Condos [5]	230	300 units	1,582	20	99	95	46	1,531	68	59
		Total			**37,646**	**1,385**	**439**	**1,609**	**2,229**	**44,243**	**2,194**	**2,330**

[1] Trip generation rates were based on existing MOA traffic counts.

[2] Trip generation rates were based on Bass Pro Shops trip generation information. A 47 percent multi-use reduction was assumed for Saturday trips and a 36 percent multi-use reduction was assumed for weekday trips.

[3] The performing arts center is assumed to have a restricted schedule, only generating trips during off-peak hours.

[3] A 50 percent multi-use reduction was assumed for hotel land use.

[4] A 10 percent multi-use reduction was assumed for office and residential land use.

Table A-3
Mall of America Phase II Traffic Study
Adjacent Land Use Trip Generation

Adjacent Land Use Developed by Year 2030					Weekday					Saturday		
			Land Use		Daily	A.M. Peak		P.M. Peak		Daily	P.M. Peak	
TAZ	Location	Land Use	Type	Size	Trips	In	Out	In	Out	Trips	In	Out
471 B	SE Quad of Old Shakopee/86th St	Light Industrial	110	147.541 ksf	1,000	75	10	6	42	288	10	11
471 C	SE Quad of Old Shakopee/24th Ave	Office	710	150.434 ksf	1,827	229	31	42	205	96	7	6
		Office	710	935.669 ksf	7,463	987	135	192	935	458	44	38
471 D	South of Old Shakopee just West of Ceridian	Office	710	388.65 ksf	3,794	489	67	87	427	206	18	16
471 E	SE Quad of American Blvd/34th Ave	Condos	230	74 units	497	7	34	31	15	696	35	29
		Condos	230	115 units	723	10	48	45	22	844	41	35
471 F	NE Quad of American Blvd/34th Ave	Apartments	220	115 units	842	12	48	53	28	647	33	33
		Apartments	220	364 units	2,338	36	146	142	76	2,601	84	84
		Office	710	419.3 ksf	4,023	520	71	93	455	220	20	17
472 A	RPZ	Office	710	79.2 ksf	1,115	137	19	28	139	64	4	3
472 B	East of RPZ just North of American Blvd	Office	710	503.884 ksf	4,634	602	82	109	534	259	24	20
472 C	NW Quad of American Blvd/34th Ave	Office	710	410.844 ksf	3,960	511	70	92	447	216	20	17
		Retail [1]	814	20 ksf	443	13	8	24	30	420	21	27
		Apartments	220	375 units	2,404	37	150	146	78	2,688	86	86
472 D	Bloomington Central Station [1]	Health Partners Expansion	710	145 ksf	1,687	211	29	39	190	312	25	22
	Bloomington Central Station [1]	2 residential towers	220	275 units	1,756	27	107	105	57	1,669	82	54
	Bloomington Central Station [1]	11 residential towers	220	828 units	5,286	80	321	317	171	5,026	245	164
		Retail - assume 1 restaurant	932	8.3 ksf	528	25	23	28	18	1,314	52	31
		Retail - assume mix	814	9 ksf	399	6	4	11	14	378	10	13
		Retail - assume mix	814	8.8 ksf	390	6	4	10	13	370	9	12
	Bloomington Central Station [1]	14-story office tower	710	544.55 ksf	4,674	608	83	111	543	1,125	75	64
		Flex retail	814	27.7 ksf	1,228	18	11	33	42	1,165	31	40
	Bloomington Central Station [1]	Hotel	310	200 rooms	1,552	65	41	59	53	1,556	77	60
		Restaurants	932	5 ksf	318	15	14	17	11	792	33	18
		Retail	814	1 ksf	44	1	0	1	2	42	1	2
	Bloomington Central Station [1]	Office (4 bldgs)	710	546.3 ksf	4,685	610	83	112	545	1,128	75	64
		Flex Retail	814	4.7 ksf	208	3	2	6	7	198	6	7
	Bloomington Central Station [1]	Office	710	489.4 ksf	4,305	559	76	101	494	1,012	72	62
		Flex Retail	814	10.6 ksf	470	7	4	13	16	446	12	15
	Bloomington Central Station [1]	9-story office bldg	710	245.1 ksf	2,528	321	44	57	279	516	42	35
	Bloomington Central Station [1]	Transit-oriented retail	814	150 ksf	6,648	97	60	179	228	6,306	170	216
		LRT Park-and-Ride [2]	093	1048 spaces	2,630	317	39	82	400	658	49	56
472 F	Adjoining Lands [3]	Office	710	546.941 ksf	4,689	611	83	112	545	265	25	21
		Retail	820	273.471 ksf	12,407	166	106	555	601	16,544	822	765

Table A-3
Mall of America Phase II Traffic Study
Adjacent Land Use Trip Generation

Adjacent Land Use Developed by Year 2030					Weekday					Saturday		
			Land Use		Daily	A.M. Peak		P.M. Peak		Daily	P.M. Peak	
TAZ	Location	Land Use	Type	Size	Trips	In	Out	In	Out	Trips	In	Out
472 G	Area just north of Adjoining Lands	Office	710	842.061 ksf	6,882	908	124	174	848	415	40	34
473 A	Area just north of MOA Phase II	Hotel	310	550 rooms	4,549	206	132	172	153	4,996	215	169
		Hotel	310	550 rooms	4,549	206	132	172	153	4,996	215	169
473 C	Area just south of MOA	Hotel	310	430 rooms	3,475	152	97	134	119	3,842	169	132
	MAC Terminal Expansion [4]	Airport	--	6000 stalls	12,500	--	--	145	1,000	9,000	145	315
		Total			**123,451**	**8,890**	**2,537**	**3,834**	**9,937**	**73,774**	**3,144**	**2,963**

[1] Retail land uses assume a 50% multi-use reduction. Office, residential, and hotel land uses assume a 5% LRT reduction.

[2] Peak hour trip generation rates are based on existing park-and-ride traffic counts. 1048 additional parking stalls are assumed, a total of 1575.

[3] Retail and Office land uses assume a 5% multi-use reduction.

[4] Trip Generation based on data from "2015 Terminal Expansion Project Minneapolis-St Paul International Airport" (July 2005).

Existing Land Use Replaced by Year 2030					Weekday					Saturday		
			Land Use		Daily	A.M. Peak		P.M. Peak		Daily	P.M. Peak	
TAZ	Location	Land Use	Type	Size	Trips	In	Out	In	Out	Trips	In	Out
471 C	SE Quad of Old Shakopee/24th Ave	Apartments	220	92 units	703	10	39	44	24	466	31	26
471 D	South of Old Shakopee just West of Ceridian	Single Family Housing	210	23 units	269	6	19	18	11	264	17	14
472 B	East of RPZ just North of American Blvd [3]	Office	710	465.85 ksf	4,362					241	22	19
						708	99	102	509			
472 C	NW Quad of American Blvd/34th Ave [3]	Airport Park n Go	??	1336 spaces	668					668	25	25
472 D	Bloomington Central Station [3]	Industrial (Dynamics)	110	259.122 ksf	1,834	151	9	14	138	383	17	19
472 G	Area just north of Adjoining Lands	Office	710	511.111 ksf	4,685	609	83	111	541	262	24	21
473 A	Area just north of MOA Phase II	Hotel	310	478 rooms	3,905	173	111	149	133	4,304	187	147
		Hotel	310	263 rooms	1,981	83	53	82	73	2,236	104	82
473 C	Area just south of MOA	Hotel	310	207 rooms	1,479	61	39	65	57	1,697	82	65
		Total			**19,887**	**1,802**	**452**	**586**	**1,485**	**10,522**	**510**	**418**

[3] Weekday a.m. and p.m. peak hour trip generation rates are based on existing traffic counts and observations.

	GRAND TOTAL			**103,565**	**7,088**	**2,085**	**3,248**	**8,452**	**63,252**	**2,634**	**2,545**