

# **MALL OF AMERICA, PHASE II TRAFFIC STUDY**

**PREPARED FOR:**

**MALL OF AMERICA**

**PREPARED BY:**

**SRF CONSULTING GROUP, INC.**

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**Approvals:**

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**Date** \_\_\_\_\_

Marie Cote, P.E., Principal  
SRF Consulting Group, Inc.

\_\_\_\_\_

**Date** \_\_\_\_\_

Charlie Honchell, P.E., Director of Public Works  
City of Bloomington, MN

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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**

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

\* Trains at this intersection also include impacts to 30th Avenue

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

Figure 1

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**

<b>Intersection</b>	<b>NB/EB</b>	<b>SB/WB</b>
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.

Figure 2

Figure 3

Figure 4

Figure 5

- 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:

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