



# **DRAFT FINAL VISITOR & PARKING STUDY**

**APRIL 10, 2006  
REVISED MAY 2, 2006**

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# TABLE OF CONTENTS

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<b>1.0 INTRODUCTION .....</b>	<b>1-1</b>
<b>2.0 VISITOR ANALYSIS .....</b>	<b>2-1</b>
2.1 Visitor Analysis .....	2-1
2.1.1 Methodology.....	2-2
2.1.2 Mode of Travel .....	2-2
2.1.3 Duration.....	2-4
2.1.4 Forecasts of Visitors.....	2-4
2.1.5 Employees .....	2-4
2.1.6 Visitor Analysis Summary.....	2-5
<b>3.0 PARKING ANALYSIS .....</b>	<b>3-1</b>
3.1 Study of Existing Parking .....	3-1
3.1.1 Objectives .....	3-1
3.1.2 Parking Data Collection – Existing MOA.....	3-1
3.1.3 Description of Available Parking .....	3-1
3.1.4 Methodology.....	3-2
3.1.5 Results .....	3-2
3.2 Traffic Count Data Collection .....	3-8
3.2.1 System Description .....	3-8
3.2.2 Value of the System .....	3-11
3.2.3 Summary of Data .....	3-13
3.3 Forecasting Future Parking Demand.....	3-14
3.3.1 Methodology - Use of Visitor Data, Parking Analysis & Traffic Counts.....	3-14
3.3.2 Impact of Visitor Projections .....	3-14
3.3.3 Impact of Visitor Duration .....	3-14
3.3.4 Other Factors .....	3-16
3.3.5 Peak Parking Demand.....	3-19
<b>4.0 CONCLUSIONS &amp; RECOMMENDATIONS .....</b>	<b>4-1</b>
4.1 Objectives.....	4-1
4.2 Validation of Forecasts.....	4-1
4.2.1 ITE Calculations .....	4-1
4.2.2 ULI Shared Parking Validation.....	4-4
4.2.3 Comparison of Methods .....	4-6
4.3 Management of Peak Parking.....	4-7
4.3.1 Definition of Peak Parking .....	4-7
4.3.2 Parking Management Plan .....	4-10
4.3.3 Management Strategies .....	4-10
4.4 Conclusions .....	4-12

## **1.0 INTRODUCTION**

Since 1992, The Mall of America (MOA) has been a thriving retail/entertainment complex which draws millions of visitors to the area to experience one of the major tourist attractions in the upper Midwest. The existing Phase I of the Mall of America annually draws between 35,000,000 and 40,000,000 visitors who come to enjoy the shopping, restaurants and the entertainment offered by the mall. The success of MOA can be attributed to many factors including:

- Variety of shops and entertainment
- Year around comfortable environment
- Reliable transportation systems
- Adequate and easily accessible parking
- Partnering with City of Bloomington

Prior to construction of Phase I of the MOA, and with the understanding that the MOA was unique in its characteristics, a visitor analysis was completed to estimate the traffic and parking generations for the Mall. The results of that analysis proved to effectively estimate the traffic and parking demands that did occur for Phase 1, thereby validating the visitor analysis process. A similar visitor analysis process has now been used for the Phase II analysis.

Since the inception of the planning for the Mall of America, it has been anticipated that a second phase of the MOA would be built. Original plans identified the property east of the mall as the site for Phase II. When plans for an expanded runway system for the Minneapolis-St. Paul Airport included a new north-south runway which would limit the expansion of the mall as a result of a restrictive Runway Protection Zone, the MOA, Metropolitan Airports Commission (MAC) and the City of Bloomington agreed on a plan which would shift the expansion plans to the vacant Met Center site, north of Phase I. Since this decision was approved, plans have been evolving which now include an additional 5.6 million square feet of retail, entertainment, hotels and offices which are connected to Phase I by a four level concourse which will allow visitors to move easily between the entire Mall of America complex.

Table 1.0.1 outlines the components of Phase I and Phase II of the Mall.

**Table 1.0.1  
Phase I & Phase II Description**

<b>Description</b>	<b>Current MOA</b>	<b>MOA Phase II</b>	<b>Total Project Phases I &amp; II</b>
Gross Area	4,220,500	5,595,603	9,816,103
IKEA		330,329	330,329
Balance of Phase II Development		5,265,274	
Hotel, Office & Residential Area	0	2,140,400	2,140,400
Gross Retail & Showcase Area	4,220,500	3,455,203	7,675,703
Common Area	1,645,995	1,080,619	2,726,614
Utilization Percent (Gross to Leasable)	61.00%	68.72%	64.48%
Gross Leasable Area	2,574,505	2,374,584	4,949,089

## Section I – INTRODUCTION

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The first development as part of Phase II was the opening of an IKEA store on the west end of the Phase II development. The 330,000 square foot store, with 1407 parking spaces will be integrated with the rest of Phase II by means of an enclosed skyway and common road system. Much like Macy's and Nordstrom's were anchor tenants for Phase I, IKEA is one of the premier anchor tenants of the Phase II development which will draw additional visitors to the Mall of America. An initial Visitors Study prepared in 2000 estimated for a 5.6 million square foot Phase II addition to the existing 4.2 million square foot Phase I, would generate approximately 56 million annual visitors to the total Mall of America development. The basis for a significant amount of the information in the initial study was derived from information gathered by the annual Intercept Study. The Mall of America had conducted this study every year since the Mall of America opened. It identified as part of the questions asked, where the visitors arrived from, how they arrived, how many were in their party and how long they stayed. The updated Visitor Analysis conducted by Westwood, which is incorporated in this study, estimates a revised 53 million visitors to the Mall of America after completion of the entire complex in 2010.

To accommodate this increase in visitors, and help assure the entire Mall of America development is as successful as Phase I, the Mall of America and the City of Bloomington are working together to update the transportation system plans to accommodate the increase in traffic. Likewise, both the Mall of America and the City of Bloomington recognize the need to provide adequate parking with the Phase II development that is as easily accessible and adequate as the Phase I parking. The Visitor and Parking Study conducted by Westwood recognize that visitors, traffic and parking are all integrally linked together. The original Visitor Analysis was the basis for the traffic study prepared for the City of Bloomington as part of the Airport South EIS and AUAR. To utilize the updated Visitor Analysis to plan for the parking needs of the total Mall of America development, Westwood analyzed the information collected from the Visitor Intercept Studies completed since the 2000 study. This information is essential since there is no information available for a facility of approximately 9.8 million square feet to compare traffic and parking from. The information derived from the Intercept Study provides the best available information to use for determining the number of parking spaces necessary.

To supplement the information gathered with the Visitor Analysis, Westwood utilized information from the ITE 3<sup>rd</sup> Edition Parking Study and the latest published ULI Shared Parking Study. Westwood also utilized information obtained from an on-site parking count on December 10, 2005 to confirm actual on-site parking during the peak Christmas shopping season as well as a second count on January 28, 2006, which is a more typical average Saturday shopping day. The Mall of America has also installed a new vehicle counting system which was activated on December 10<sup>th</sup>, which provides valuable information on a 15 minute basis of vehicles entering and leaving the mall. The system utilizes the data to determine the total number of vehicles parked at the mall at any point in time.

All of this information has been collected, analyzed and validated to estimate the number of parking spaces recommended as part of the Visitor and Parking Analysis. The study first goes through the data collection and methodology utilized for the Visitor Analysis. Correlations are made in the Visitor Analysis of the number of visitors and the estimated peak hour trip generations determined from the Westwood Visitor Analysis to the generally accepted ITE methodology of estimating peak hour trips. This validation is important for utilizing the Visitor Analysis to estimate the number of parking spaces. The linkage between visitors, trips and parking is essential in preparing this study. From our review of the two methods of estimating peak hour trip generation, it appears that the Visitor Analysis projections and the ITE projections are reasonably close, making it logical to further use the Visitor Analysis for the parking analysis.

## **Section I – INTRODUCTION**

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All of the information collected has been organized into three sections:

- Section Two – Westwood Visitor Analysis
- Section Three – Westwood Parking Analysis
- Section Four – Conclusions & Recommendations

## **2.0 VISITOR ANALYSIS**

### **2.1 *Visitor Analysis***

The visitor analysis provided essential data for forecasting Phase II parking demands. In particular the forecasts of increased number of visitors and visitor duration provided by the visitor analysis were integral to the parking demand analysis.

In 2000, the Mall of America prepared a Visitor Analysis which was used to prepare the original traffic analysis for the Airport South EIS. As Phase II plans have evolved, the Mall of America and the City of Bloomington have conducted a series of traffic studies to analyze the traffic circulation and roadway network implications for the Mall after completion of the Phase II expansion. Those studies utilized traffic forecasts that were primarily based on ITE trip generation methodologies and processes. The focus of those traffic forecasts was on the roadway network “design day” and “design hour” of a P.M. Peak Hour in August. This hour is clearly not the peak traffic hour of the year, but it is the hour chosen for roadway network design purposes.

As an independent check of the traffic forecasts utilized in the City roadway network traffic studies, a visitor analysis was conducted to forecast traffic volumes through alternative methods and procedures. The data developed for the Visitor Analysis can be applied to both the roadway network traffic forecast and to the peak parking analysis. This section of the report summarizes information from the visitor analysis process that relates to parking demand and also summarizes the major data points and trends found in the Visitor Analysis.

Like the traffic forecasts which did not project for the highest peak trip day, the parking study also does not project for the highest day use.

The Visitor Analysis documents traffic projections related to the entire MOA area after completion of the Phase II expansion. This expansion, on the parcel to the north of the current Mall referred to as the “Met Center” site, is expected to add an additional 5.6 million gross square feet of mixed use space to the overall MOA project. (For the purposes of this analysis, the already completed IKEA store is considered to be part of Phase II; all references to new square footage or new trips for Phase II include IKEA as “new development” within Phase II.)

For this analysis, Westwood used a composite approach, known as the “Visitor Analysis” in estimating traffic to the expanded Mall. Using a combination of data from the Institute of Transportation Engineers (ITE), visitor projections and current MOA data, estimates for various portions of the overall project (both Phases I & II) were developed and then added together. The visitor analysis process produced an estimate of vehicle trip generation for the P.M. Peak Hour of the roadway system on the roadway design day: The findings of the traffic generation study were used to confirm the validity of the traffic forecasts developed, by other methods, in the City traffic studies.

Several of the key data points and factors developed in the Visitor Analysis serve to not only inform the traffic forecast but also are directly applicable to development of peak December Saturday parking forecasts. This section focuses on those factors from the Visitor Analysis which are germane to the parking forecast.

### 2.1.1 Methodology

The scale and diversity of venues found in both the current MOA and the planned Phase II expansion do not lend themselves to estimation using only one method. Current estimating methods found in the ITE manuals provide no information applicable to the overall Mall project, nor do they offer projects of similar scale to some of the major components of MOA. For example, while ITE does provide data for retail malls, even the largest project data represents a mall less than half the size of the MOA.

In developing traffic impact estimates, the team used a variety of information sources and estimating methods, each applicable to a distinct phase of the project. By combining various methods, each based on the best data available for that component of MOA, the overall traffic estimates represent a compilation of “bests” which should accurately reflect anticipated conditions at the MOA project as a whole. This technique was used very successfully to estimate Phase I traffic generation and parking requirements.

The retail, entertainment and dining portions of the Phase II MOA could not be estimated using ITE methods and data. The mall retail and dining portions are of such a scale and size that the nearest ITE data is from projects less than half the size of MOA. The entertainment portions are similarly difficult to estimate, as we know of no other comparable facility combining such a variety of mixed use venues within a “mall” of approximately 9.8 million square feet.

To address the limitations of ITE on this portion of the project, a visitor-based approach was used, similar to the methods used to estimate the original MOA and the approach often used to estimate trips at large theme parks, entertainment venues and mixed use projects. In looking at visitors, we developed an approach which accounts not only for total visitors, but also duration of stay, method of arrival, and whether or not the visitor is local to the MOA (lives within 150 miles of the MOA) or is a non-resident.

### 2.1.2 Mode of Travel

Information analyzed in the MOA Intercept Study showed that visitors arrive at the Mall using a number of modes of travel. The primary mode is by auto. The results of the Mall Intercept Study indicate that 74% of mall visitors arrive by auto. According to the same study, approximately 11% of Mall visitors arrive by LRT, 7% by bus and 8% by other modes of travel (e.g., hotel shuttle, tour bus, airport shuttle and taxi). The Intercept Study has been conducted over time and the results show a trend of increasing transit usage, especially with the implementation of LRT.

**Table 2.1.1.1  
Mode of Travel**

Description		Analysis Results
Shoppers	Resident	68%
	Non-Resident	32%
Vehicle Occupancy	Resident	2.1
	Non-Resident	3.6
Visitors per Car		2.3

NOTE: Residents live within a 150-mile radius of the MOA; Non-Residents live outside the 150-mile radius

Mode of Travel	Percent of Visitors
LRT	11%
Transit	7%
Other (e.g., Hotel Shuttle, Tour Bus, Airport Shuttle, Taxi)	8%
Auto	74%

In addition to the Mall Intercept Study, other data sources are available to estimate the transit ridership component of Mall visitors. The chart below summarizes LRT ridership as a percentage of Mall visitors using a number of data sources. Examining the data below indicates that (from these sources) it would appear that the LRT ridership represents about 3% of the Mall visitors, if the number of visitors actually entering the Mall equates to the projected number of visitors identified in the study. It must be noted that the calculation of 135,000 visitors is based on the Intercept Study, with a margin of error of  $\pm 4\%$ . Based on this statistical margin of error, it is likely the LRT ridership would be 7% - 15% of the total visitors at the time the study was conducted. There may also be a variation in the monthly factors from ITE relating to the Mall of America. These possible variations should be considered in determining the range of actual LRT ridership.

**Table 2.1.1.2  
Derivation of Mall Visitor LRT Ridership**

Source	Description	Category	Passengers / Visitors
City of Bloomington	LRT Ridership (Entire Route)	Weekday	25,600
		Weekend	20,000
Metro Transit	Passengers Using MOA LRT Station	December Weekday	3,600 Boardings
			3,600 Alightings
			7,200 Total
MOA Intercept, Visitor & Parking Analyses	MOA Visitors (All Modes of Travel)	December Weekday	135,000

## Section 2.0 – VISITOR ANALYSIS

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Using the above values, it can be seen that 7,200 of the 25,600 daily LRT riders embark or disembark at the MOA station. This equates to 28% of the LRT trips having a beginning or end at the Mall.

Considering the 3,600 LRT riders who disembark at the Mall on a typical December weekday, this equates to 2.7% of the estimated typical weekday Mall visitor count of 135,000.

The various data sources record a range of LRT usage of about 3% to 11%. As will be seen in future sections of this report, the future projections of parking spaces is based on factors which extend certain current data points (such as LRT ridership percentage) into the future on a constant basis. For those points, the important factor in determining future parking is that the data item stays constant. For that reason, although there is variation in the current record of LRT ridership, that variation will bear no impact on the parking projections based on the assumption that the actual ridership percentage stays constant to what it is today.

### 2.1.3 Duration

The duration of the average visit has been decreasing over the years since the time of the Mall opening, from 3.80 hours per visitor in 2000 to 2.36 hours per visitor in 2005. The visitor duration is expected to increase to 3.41 hours after the Phase II expansion. The increase in visitor duration was calculated as a function of the number of forecasted visitors and the gross leasable area for the Phase I and Phase II scenarios. The calculation assumed that the number of visitor hours per unit of GLA stays constant between the two scenarios.

Further discussion of visitor duration is contained in Section 3.3.3 and of calculation assumptions in Section 4.1.1 of this report.

### 2.1.4 Forecasts of Visitors

The table below summarizes the annual visitor count data projected for the total build out.

**Table 2.1.3.1  
Visitor Component**

Visitor Type	Avg. Annual Visitors	Mode of Travel	Vehicle Occupancy
Resident Auto	27,030,000	75%	2.1
Resident Non-Auto	9,010,000	25%	20
Non-Resident Auto	12,550,400	74%	3.6
Non-Resident Non-Auto	4,409,600	26%	20
<b>Total</b>	<b>53,000,000</b>		

### 2.1.5 Employees

Retail and entertainment venue employees were estimated using data from the existing MOA facility. Employees of the office and hotel portions of the project are already included in the estimates generated using ITE data and were not included in this section.

## Section 2.0 – VISITOR ANALYSIS

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For employees, only total payroll information is available, so an estimate of the average daily employees on-site was developed assuming two shifts per day, and three shifts covering the 14 shifts of a week. As a result, we estimate that 2/3 (67%) are expected to be at the MOA on an average day. On a typical day, there is a small overlap in time when two shifts would be parked at the Mall. While this method does not account for those employees who work part time and would then potentially understate trips, it also does not account for sizable numbers of late night and early morning employees who enter and leave the site outside of the P.M. peak. Taken together, the 2/3 factor is a good estimate of the total employees on-site on an average weekday. Total employees and total employees on-site per day are shown in Table 2.1.4.1.

**Table 2.1.4.1**  
**Phase I & II Employee Component**

<b>Employee Group</b>	<b>Total Number</b>	<b>Mode of Travel</b>	<b>Vehicle Occupancy</b>
Arrive by Auto	12,125	75%	1.1
Arrive by Transit	4,042	25%	20
<b>Total Employees</b>	<b>16,167</b>		
<b>Total Employees On-Site per Day</b>	<b>10,778</b>		

For employees, data from the MOA indicates that approximately 25% of employees currently take mass transit to work. For employees using transit, we used a vehicle occupancy of 20 people per bus or light rail car and two trip ends (one arriving, one leaving) per person.

For employees using personal autos (75% of the staff), we used ITE data on current vehicle occupancy for workers (currently a little more than 1.1 persons per vehicle). Since employees using a personal auto are much more likely to take a trip during breaks for lunch, errands, etc., we also estimated an average of 2.2 trip ends (10% more than one arriving and one leaving) per person to be conservative.

### **2.1.6 Visitor Analysis Summary**

The analysis summarized above describes the methods and data used to estimate the annual and peak visitor traffic to the Mall. The results of this work yield hourly traffic flow estimates to be used for roadway system analysis purposes. The same factors and derivations developed for traffic flow estimates are also of prime importance in the estimating of annual and peak parking demands for the expanded Mall. The following sections describe how these factors are combined with other data collection efforts to produce the Mall parking demand estimates.

#### ***Trends***

The Visitor Analysis has been carried out over multiple years at the Mall and can therefore serve to illustrate trends in the visitor characteristics and behaviors. Table 2.1.5.1 notes key findings on traveler characteristics from the Mall visitor intercept studies that were conducted in 2000 and in 2005. In 2000, the traffic studies conducted used the findings and data current at that time. Presently, with new data available, the visitor projections are able to be made with data that describes the most current characteristics at the Mall.

**Table 2.1.5.1  
Comparison of Key Visitor Factors**

<b>Category</b>	<b>2000 Analysis</b>	<b>2005 Analysis</b>
Resident Shoppers	45%	68%
Non-Resident Shoppers	55%	32%
Vehicle Occupancy Residents	2.4	2.1
Vehicle Occupancy Nonresidents	3.5	3.6
Residents Arriving by Auto	95%	75%
Resident Arriving by Non-Auto	5%	25%
Non-Residents Arriving by Auto	85%	74%
Non-Resident Arriving by Non-Auto	15%	26%
Visitors per Car	2.90	2.30
Employee by Auto	95%	75%
Employee by Non-Auto	5%	25%
Shopper Duration Existing Mall	3.80	2.36
Shopper Duration Expanded Mall	5.50	3.41
Number of Employees	19,544	16,167
Existing Number of Visitors	41,400,000	38,000,000
Projected Number of Visitors	56,400,000	53,000,000

## 3.0 PARKING ANALYSIS

### 3.1 Study of Existing Parking

#### 3.1.1 Objectives

The objectives of the parking data collection were to determine usage of the existing parking facilities and to provide data that can be used to determine parking requirements for the planned Mall expansion.

The parking demand data measured on a peak shopping Saturday in December can be compared against available parking capacity to determine adequacy of the current parking facility. Analysis of this data can also be used to determine the duration and level of peak demand times.

A comparison of the December and January parking data collections help determine the level of parking demand variation between the peak holiday shopping season and a more typical peak demand period.

#### 3.1.2 Parking Data Collection – Existing MOA

Parking requirements are based on peak parking demands. Research has identified Saturdays as the peak parking day for large mixed-use developments. The peak parking demand month is December. For purposes of the study, it was decided to collect parking data on a Saturday in December and a Saturday late in January. The data collected on a Saturday in December represents one of the busiest shopping days of the year. The data collected on a Saturday in late January represents a more average day with regard to the number of visitors.

Parking data for the current MOA was collected during periods of peak parking demand. Data was collected on Saturday, December 10, 2005, and Saturday, January 28, 2006, between noon and 5:00 P.M.

#### 3.1.3 Description of Available Parking

The existing on-site parking for the Mall of America is located on two seven-level ramps east and west of the Mall, surface level parking north and south of the Mall, and employee parking located under the east parking ramp near the transit center. The parking capacities for these facilities are described on Table 3.1.3.1.

**Table 3.1.3.1  
Existing On-Site Parking Capacities**

<b>Description</b>	<b>Capacity</b>
East Ramp	5,515
West Ramp	5,690
Surface Parking	569
<b>Subtotal</b>	<b>11,774</b>
MOA Employee Permit Parking *	513
<b>Total</b>	<b>12,287</b>

\* Parking near Transit Center for Mall employees only, not for Mall tenants

Overflow parking is available in two parking lots, one east of the Mall and the other north of the Mall in the old Met Center area. The majority of off-site parking is in the surface lot north of the Mall.

### 3.1.4 Methodology

Methodology for conducting the existing ramp usage included:

- Analyzing parking ramp plans to determine the number of parking spaces.
- Developing maps and data collection routes for each parking ramp level.
- Developing forms to record data for each parking ramp and data collection time period. The forms were designed to record either parkers or empty spaces and to record the data in small increments. They were designed to maximize accuracy, quality control and efficiency of the data collection efforts.
- Planning data collection periods to surround the peak Saturday parking demand period and to fit within budget constraints.

The same data collection team was used for both the December and January data collections.

#### ***Processing the Collected Parking Data***

The collected data was reviewed for completeness and proper coding. The data was entered into custom spreadsheets for analysis purposes and verified for correctness. Each data point included the data collection date, time interval, ramp identifier, ramp level, “empty” or “full” classification for parking spaces, row location and count of either empty or occupied spaces.

The spreadsheets were designed to tabulate data by ramp level and time.

### 3.1.5 Results

The peak parking demand for Saturday, December 10th, was counted during the 75 minute data collection intervals starting at 1:15 and 2:30 P.M. The measured peak parking demand at these times filled 95% of the available on-site parking spaces. Based on data provided by Mall of America Security, an estimated additional 500 parkers used the overflow parking facility during the peak demand time.

Peak parking demand for visitors and employees on Saturday, December 10th, was determined to be 11,129 (total of on-site visitors and employees). The capacity of the on-site visitor parking is 11,774 spaces, so the peak parking demand equaled 95% of the available on-site spaces. The addition of 500 off-site parkers results in a peak parking demand of 11,629, or 99% of the available on-site parking.

Peak parking for the Saturday in January was counted during samples starting at 2:30 and 3:45 P.M. The measured parking demand filled the on-site available parking to the 85% level. Due to the lower parking demand in January, no data was analyzed for the overflow parking. It can be assumed that the number of off-site parkers was less than the 500 counted in December. Applying the ratio of on-site parking between the two days to the 500 overflow parkers measured in December results in an estimated total of 450 off-site parkers.

## **Section 3.0 – PARKING ANALYSIS**

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On-site peak parking for visitors and employees for Saturday, January 28th, was determined to be 10,023. The on-site peak demand of parkers for the Saturday in January equaled 85% of the available on-site spaces.

The on-site peak parking demand measured in January was 1,106 parkers or 10% fewer than the peak parking demand measured in December. The differences in peak parking demands between the December and January data provide an indication of the level of expected variation between the holiday shopping demand in December and other periods of the year.

It should be noted that the study of existing parking demand did not consider the permit parking area near the Transit Center for Mall of America employees. This parking area includes 513 spaces. This area is available to Mall of America employees only and not to retail employees of the shopping center.

Tables 3.1.5.1 and 3.1.5.2 summarize the measured parking demands. These tables break parking values down by location, including ramp and level, and by data collection time interval. The tables also include the percentage of parking spaces occupied by location and time. Figures 3.1.5.1 and 3.1.5.2 provide graphical representations of the data. These graphs are useful in comparing parking demands by time.

**Section 3.0 – PARKING ANALYSIS**

**Table 3.1.5.1  
Summary of Current Parking Demand Data  
Saturday, December 10, 2005**

**Number of Parking Spaces Occupied  
by Start Time**

Ramp	Level	Ramp Capacity	Data Collection Start Time			
			12:00 PM	1:15 PM	2:30 PM	3:45 PM
East	1	806	790	796	797	795
	2	674	674	671	658	671
	3	675	673	670	648	673
	4	701	688	690	658	690
	5	814	785	755	731	756
	6	902	603	899	813	854
	7	943	43	721	724	636
<b>East Total</b>		<b>5,515</b>	<b>4,256</b>	<b>5,202</b>	<b>5,029</b>	<b>5,075</b>
West	1	815	805	807	806	799
	2	746	692	712	737	669
	3	661	661	657	658	618
	4	691	680	676	684	678
	5	832	805	812	801	628
	6	934	763	925	933	923
	7	1,011	424	775	909	561
<b>West Total</b>		<b>5,690</b>	<b>4,830</b>	<b>5,364</b>	<b>5,528</b>	<b>4,876</b>
<b>Surface Parking <sup>(1)</sup></b>		<b>569</b>	<b>560</b>	<b>563</b>	<b>563</b>	<b>560</b>
<b>Grand Total <sup>(2)</sup></b>		<b>11,774</b>	<b>9,646</b>	<b>11,129</b>	<b>11,120</b>	<b>10,511</b>

**Percentage of Parking Spaces Occupied  
by Start Time**

Ramp	Level	Data Collection Start Time			
		12:00 PM	1:15 PM	2:30 PM	3:45 PM
East	1	98%	99%	99%	99%
	2	100%	100%	98%	100%
	3	100%	99%	96%	100%
	4	98%	98%	94%	98%
	5	96%	93%	90%	93%
	6	67%	100%	90%	95%
	7	5%	76%	77%	67%
<b>East Overall</b>		<b>77%</b>	<b>94%</b>	<b>91%</b>	<b>92%</b>
West	1	99%	99%	99%	98%
	2	93%	95%	99%	90%
	3	100%	99%	100%	93%
	4	98%	98%	99%	98%
	5	97%	98%	96%	75%
	6	82%	99%	100%	99%
	7	42%	77%	90%	55%
<b>West Overall</b>		<b>85%</b>	<b>94%</b>	<b>97%</b>	<b>86%</b>
<b>Surface Parking <sup>(1)</sup></b>		<b>98%</b>	<b>99%</b>	<b>99%</b>	<b>98%</b>
<b>Total</b>		<b>82%</b>	<b>95%</b>	<b>94%</b>	<b>89%</b>

<sup>(1)</sup> The percentage occupancy for Surface Parking is calculated using the average of the East and West Ramp Level 1 percentages

<sup>(2)</sup> Does not include 513 employee parking spaces accessible by permit

**Section 3.0 – PARKING ANALYSIS**

**Table 3.1.5.2  
Summary of Current Parking Demand Data  
Saturday, January 28, 2006**

**Number of Parking Spaces Occupied  
by Start Time**

Ramp	Level	Ramp Capacity	Data Collection Start Time			
			12:00 PM	1:15 PM	2:30 PM	3:45 PM
East	1	806	777	791	800	792
	2	674	652	672	671	663
	3	675	635	667	670	650
	4	701	639	678	681	683
	5	814	508	791	740	742
	6	902	86	674	896	869
	7	943	0	18	522	544
<b>East Total</b>		<b>5,515</b>	<b>3,297</b>	<b>4,291</b>	<b>4,980</b>	<b>4,943</b>
West	1	815	795	801	810	783
	2	746	572	658	667	609
	3	661	658	658	651	640
	4	691	645	673	666	664
	5	832	380	792	760	557
	6	934	185	364	901	906
	7	1,011	0	0	23	73
<b>West Total</b>		<b>5,690</b>	<b>3,235</b>	<b>3,946</b>	<b>4,478</b>	<b>4,232</b>
<b>Surface Parking <sup>(1)</sup></b>		<b>569</b>	<b>552</b>	<b>559</b>	<b>565</b>	<b>553</b>
<b>Grand Total <sup>(2)</sup></b>		<b>11,774</b>	<b>7,084</b>	<b>8,796</b>	<b>10,023</b>	<b>9,728</b>

**Percentage of Parking Spaces Occupied  
by Start Time**

Ramp	Level	Data Collection Start Time			
		12:00 PM	1:15 PM	2:30 PM	3:45 PM
East	1	96%	98%	99%	98%
	2	97%	100%	100%	98%
	3	94%	99%	99%	96%
	4	91%	97%	97%	97%
	5	62%	97%	91%	91%
	6	10%	75%	99%	96%
	7	0%	2%	55%	58%
<b>East Overall</b>		<b>60%</b>	<b>78%</b>	<b>90%</b>	<b>90%</b>
West	1	98%	98%	99%	96%
	2	77%	88%	89%	82%
	3	100%	100%	98%	97%
	4	93%	97%	96%	96%
	5	46%	95%	91%	67%
	6	20%	39%	96%	97%
	7	0%	0%	2%	7%
<b>West Overall</b>		<b>57%</b>	<b>69%</b>	<b>79%</b>	<b>74%</b>
<b>Surface Parking <sup>(1)</sup></b>		<b>97%</b>	<b>98%</b>	<b>99%</b>	<b>97%</b>
<b>Total</b>		<b>60%</b>	<b>75%</b>	<b>85%</b>	<b>83%</b>

<sup>(1)</sup> The percentage occupancy for Surface Parking is calculated using the average of the East and West Ramp Level 1 percentages

<sup>(2)</sup> Does not include 513 employee parking spaces accessible by permit

Figure 3.1.5.1  
 Peak Parking Demand - Saturday in December  
 Saturday, December 10, 2005

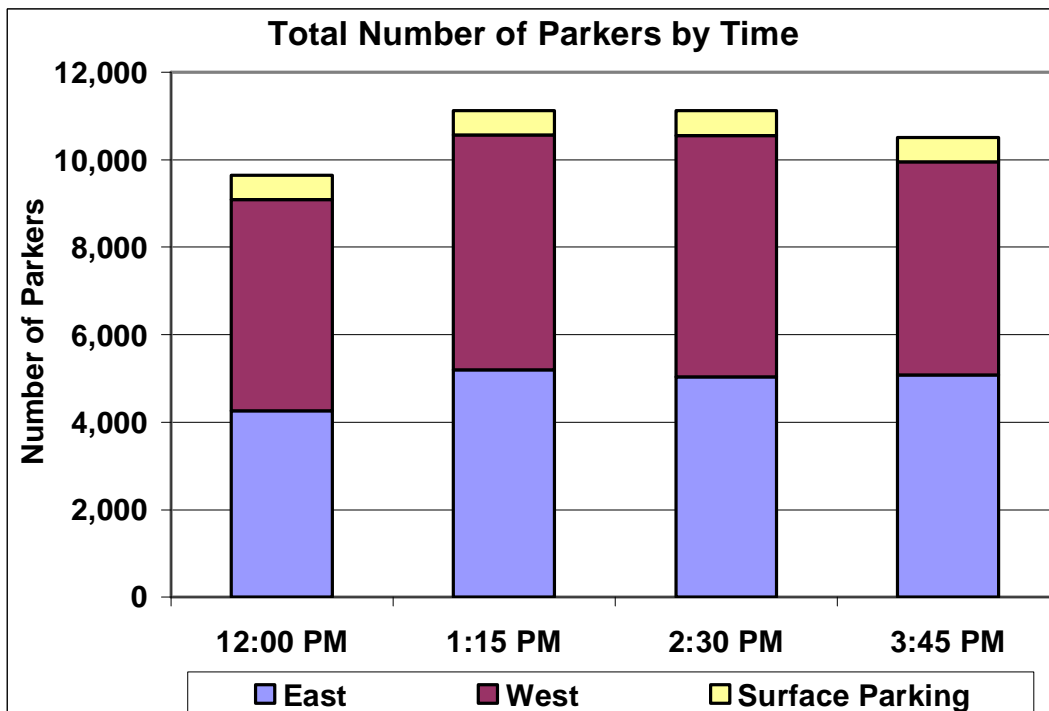
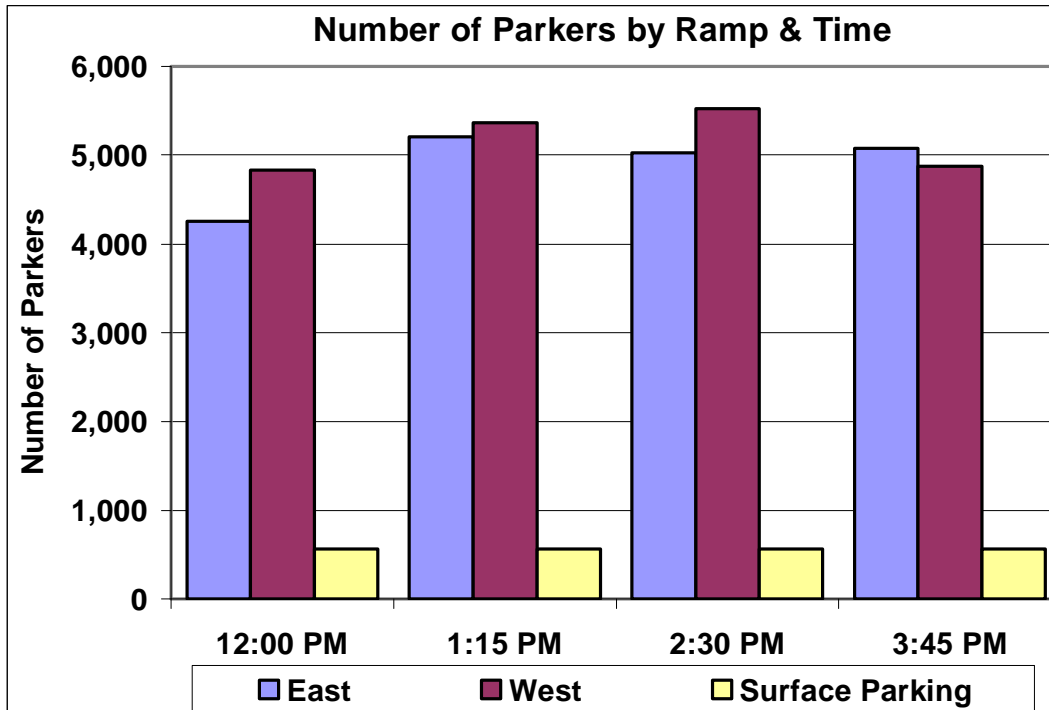
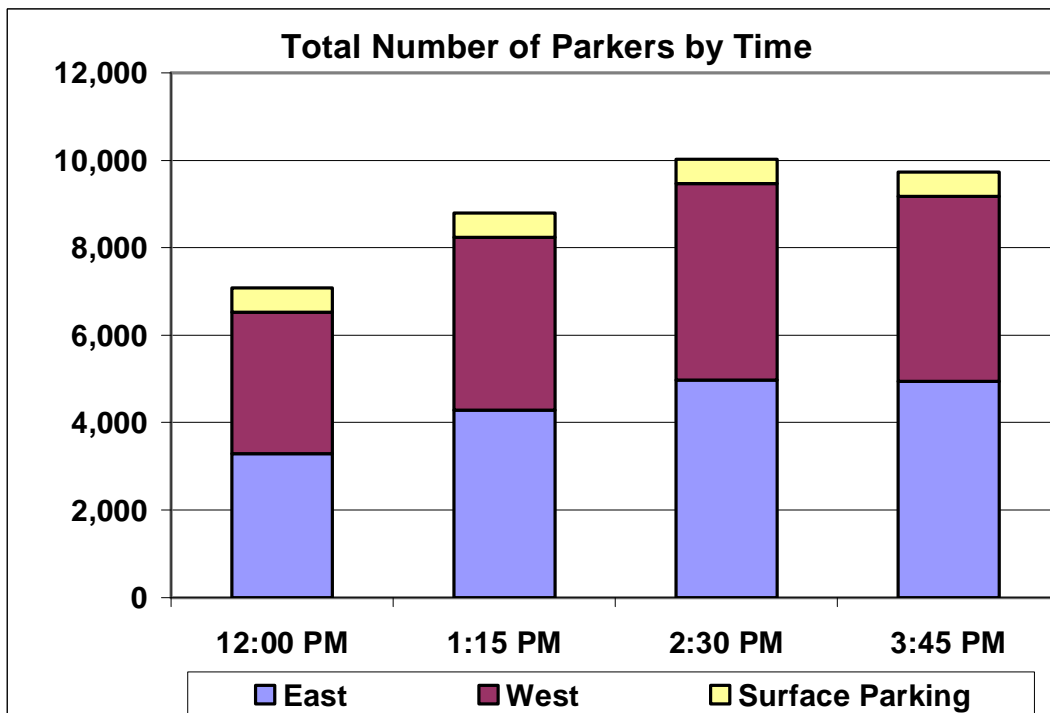
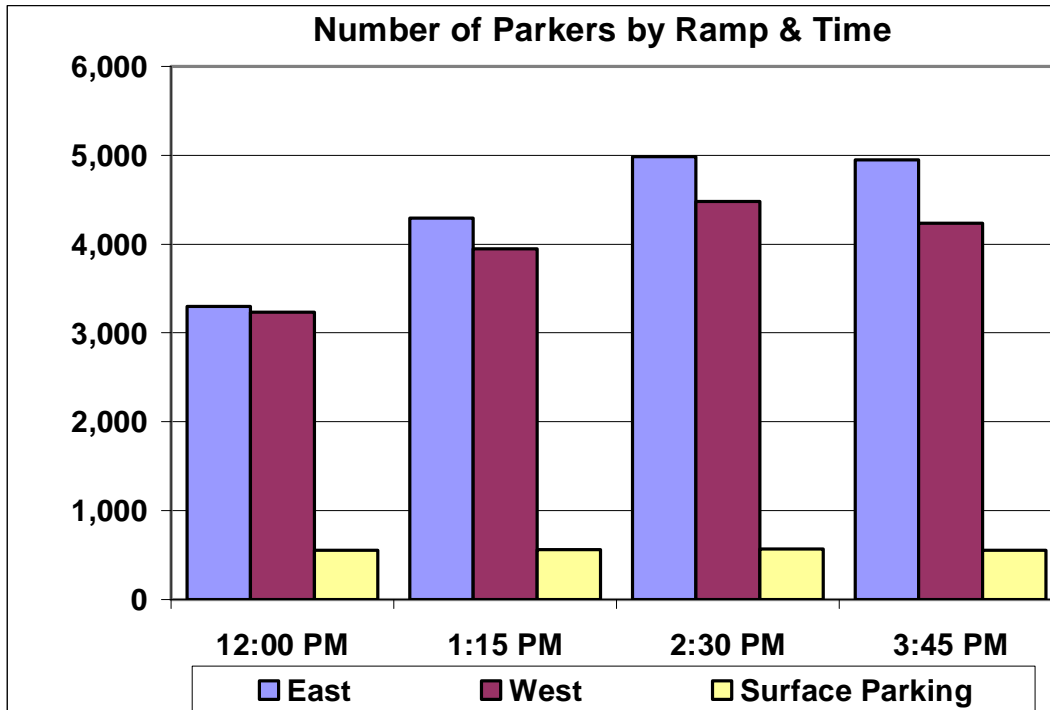


Figure 3.1.5.2  
 Peak Parking Demand - Saturday in January  
 Saturday, January 28, 2006



### **3.2 Traffic Count Data Collection**

The Mall of America installed a Data Collection Management System (DCMS) in December 2005 that continuously monitors the traffic demands of vehicles entering and exiting the shopping center area. The DCMS uses a video vehicle detection system to collect and record counts at each entrance and exit. This system was a significant source of data for this project and will prove to be an important tool to help manage peak parking traffic demands. A description of this system is included in the project report to inform the reader about this important resource.

#### **3.2.1 System Description**

The DCMS uses the Autoscope video vehicle detection system manufactured by Econolite. The Autoscope units are located at each entrance and configured to collect and record traffic data by lane and direction of travel. The counts are recorded on a 15-minute basis and categorized by location and direction. The collected data is archived on a computer system and retained for future analysis. The availability of archived data is useful for planning effective management of traffic operations and parking demand. The data can be retrieved by approved users with password access via a web browser.

The system provides two views on-screen: live traffic video images showing actual camera views for all locations and a count summary by Mall entrance and camera location, which is displayed on an aerial view of the Mall. Examples of these two images are shown in Figures 3.2.1.1 and 3.2.1.2.

The DCMS system includes three custom reports. Each of the three reports can be output in a variety of formats, including Excel, CSV, PDF, XML and TIFF. The output formats make it easy to post-process data.

The three reports are:

- **Volume by Entrance** – This report is produced for a user-specified range of dates. The initial summary lists inbound, outbound and on-site volumes for each gate (named for nearby store or street) and for the entire Mall. The operator can drill down by gate or “Total Mall” options for a listing of hourly inbound, outbound and total of on-site vehicle volumes. It would be possible to use the system to retrieve the number of vehicles on-site for any hour of any day included in the archived data.
- **Lot Details** – This report includes the same information as the Volume by Entrance report. However, the Lot Details report presents the data for all gates and for the entire site on a single row for each time increment. The values presented include: time, volume in and volume out by gate, an on-site calculation by gate, and the same data for the entire MOA. It would be possible to use this report to retrieve the number of vehicles on-site for any day and hour for which data is available.
- **Monthly Volume** – The monthly volume report summarizes the total inbound and outbound volumes by day. The data is arranged in columns by day-of-week, and weekly totals are calculated.

Figure 3.2.1.1  
Data Collection Management System  
Live Traffic Video Images



Live Traffic Video images  
Image updates are approximately every minute.



[1] **Bloomington**  
3/7/2006 9:32:31 AM



[2] **Macys**  
3/7/2006 9:31:57 AM



[3] **Nordstroms**  
3/7/2006 9:32:16 AM



[4] **Nordstroms**  
3/7/2006 9:32:03 AM



[5] **Sears**  
3/7/2006 9:32:23 AM



[6] **24th Ave North**  
3/7/2006 9:32:51 AM



[7] **24th Ave North**  
3/7/2006 9:32:42 AM

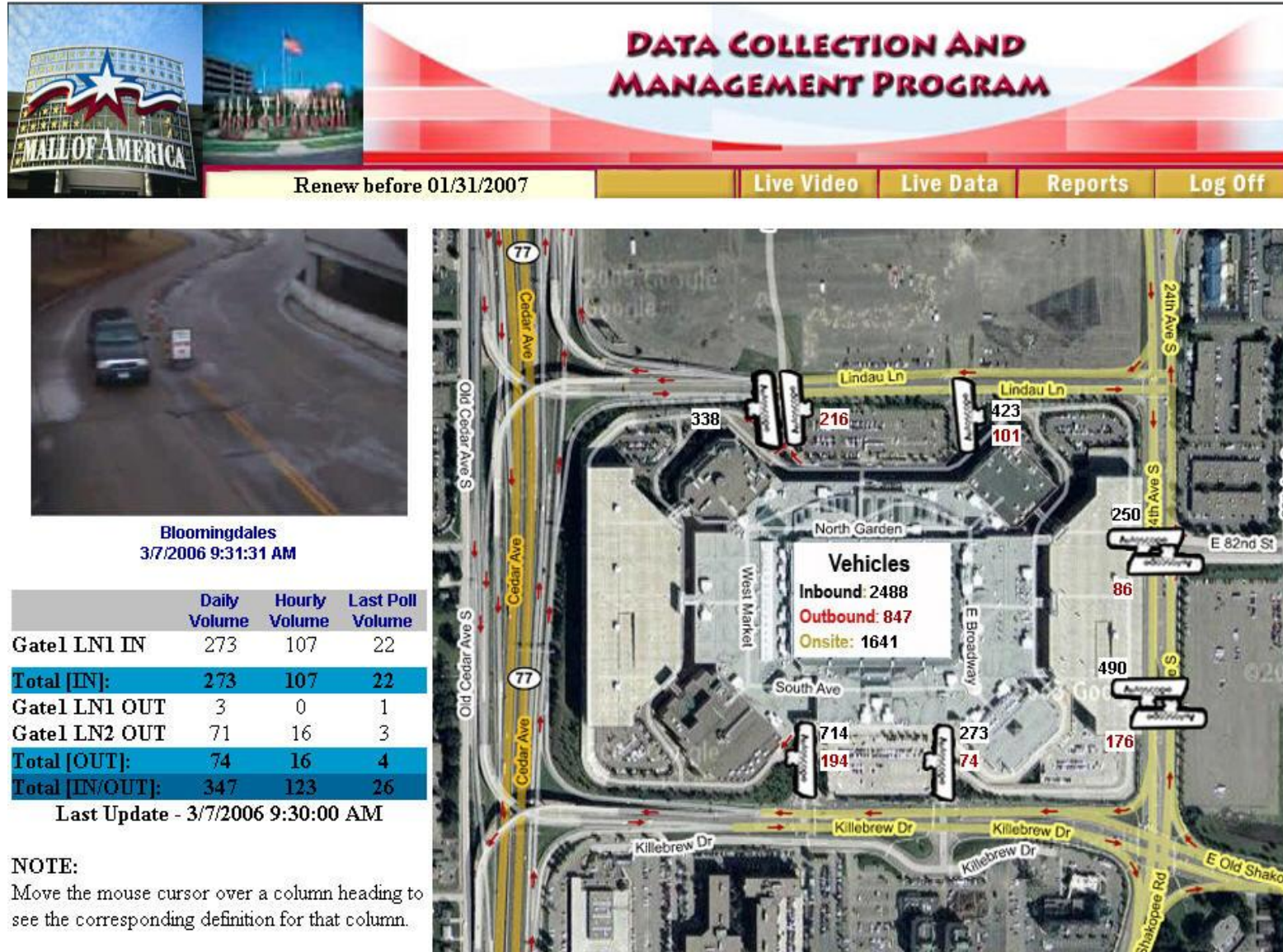


[8] **24th Ave South**  
3/7/2006 9:32:11 AM



[9] **24th Ave South**  
3/7/2006 9:32:38 AM

Figure 3.2.1.2  
Data Collection Management System  
Count Summary by Site & Entrance



### 3.2.2 Value of the System

One important feature of the DCMS system is the calculation and display of current on-site vehicles. The number of on-site vehicles relates directly to the number of parked vehicles. The values presented by the system can be used to determine whether special traffic and parking management plans should be deployed. For example, if the parking levels are approaching capacity, dynamic message signs can be configured to instruct drivers to optimum parking locations. The information can also be used to determine when on-street officers should direct traffic.

The system also displays the cumulative inbound and outbound vehicles for the day. By reviewing the current values and typical historical values, traffic and parking demand managers can predict whether a problematic situation may develop and react accordingly.

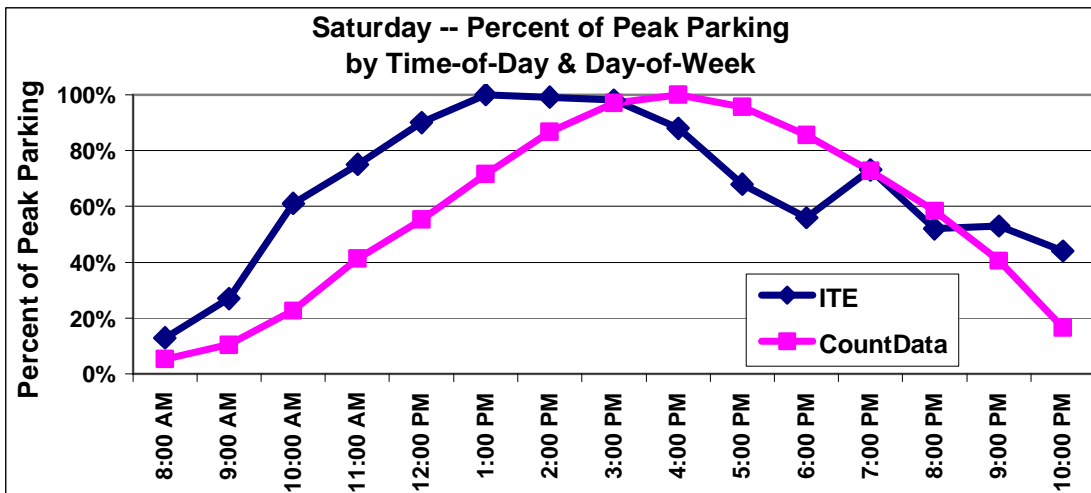
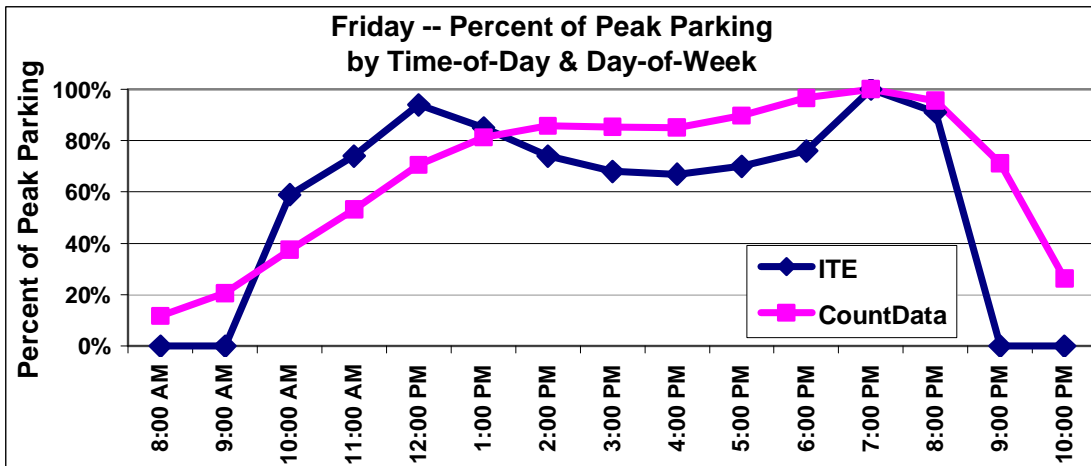
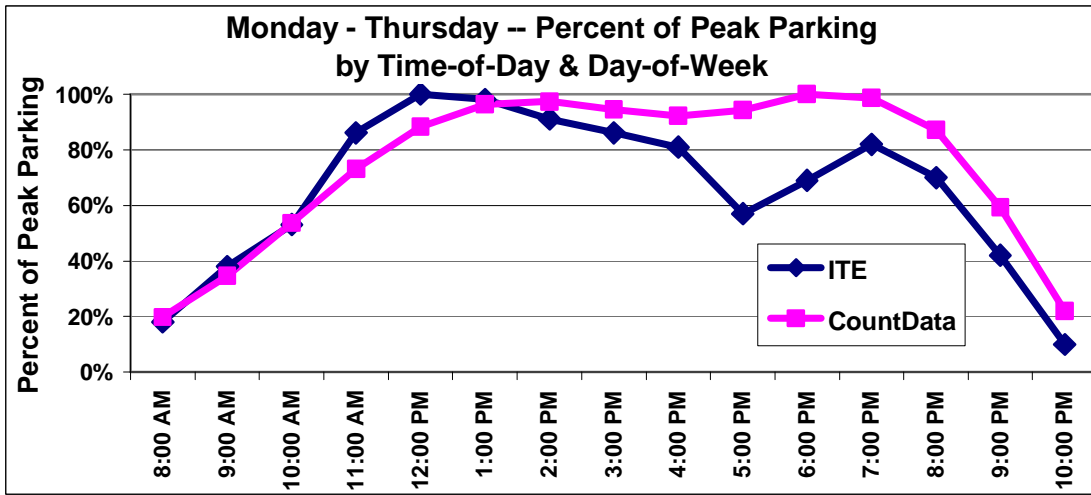
Historical data can be used to predict future situations. The values recorded can be used to determine the impact of special events at the Mall. The system not only helps evaluate traffic conditions over time, but also allows real-time data to be shared with others for a variety of analysis purposes.

Standard industry references such as the ITE Parking Generation report provide typical factors (i.e., day-of-week, month-of-year, etc.) for parking use patterns. These factors have been developed based on data assembled from many shopping centers and mixed used developments. However, none of the shopping centers included in these samples are equivalent to the Mall of America. The availability of data from the DCMS system provides the opportunity to calculate an equivalent set of factors with values matching the characteristics of the Mall of America. These calculated factors are useful in forecasting future parking demands. Using the ITE shopping center factors as a guide for how to look at the DCMS data, the following factors and other useful information were calculated as they pertain to the Mall:

- Day-of-Week Factors – The ITE Parking Generation report for shopping centers / mixed use includes separate factor categories for Monday – Thursday, Friday, Saturday and Sunday. There are also separate factors for December and Non-December conditions. It is suggested that this set of factors be developed from data generated by the DCMS system.
- Hour-of-Day Factors – In this case, ITE presents a set of hourly factors related to a percentage of Peak Parking Demand. The data is presented on a Monday – Thursday, Friday, Saturday and Sunday basis. These important factors can be determined for the Mall of America by analyzing data collected by the DCMS system.
- Month-of-Year Factors – These factors can also be calculated. These factors can be developed after the DCMS system is on-line for one year.

Figure 3.2.2.1 compares a sample of peak parking factors derived from collected data to factors contained in the ITE Parking Generation report. The general pattern for parking throughout the day is similar. However, the DCMS data tends to show the peak parking level reached an hour or two later than indicated by the ITE data.

Figure 3.2.2.1  
Autoscope Website Data  
February 1 – February 16, 2006



Note: Outbound counts were factored up to equal inbound counts

**3.2.3 Summary of Data**

The following tables summarize a set of day-of-week and time-of-day factors developed by analyzing data generated by the DCMS. A “Peak Day of Week” or “Peak Hour of Day” description indicates the highest value for the data type.

*Table 3.2.3.1 shows parkers by day-of-week. The “Peak Day of Week” designation for Saturday indicates this was the day of the week with the maximum level of parking. The 69% value for Sunday means that parking on that day was 69% of Saturday’s.*

**Table 3.2.3.1  
Peak Parking by Day-of-Week  
Derived from the Data Collection Management System Information  
Data Period February 1 to February 15th, 2006**

<b>Time</b>	<b>Sunday</b>	<b>Monday-Thursday</b>	<b>Friday</b>	<b>Saturday</b>
Percentage	69%	34%	48%	Peak Day of Week

*Table 3.2.3.2 shows parkers by time-of-day. The “Peak Hour of Day” designation for 3:00 P.M. Sunday indicates that this was the peak hour. The 3.7% value for 8:00 A.M. on Sunday means that parking at that time was 3.7% of the peak hour for that day.*

**Table 3.2.3.2  
Percent of Daily Peak Parking (by Hour)  
Derived from the Data Collection Management System Information  
Data Period February 1 to February 15th, 2006**

<b>Time</b>	<b>Sunday</b>	<b>Monday-Thursday</b>	<b>Friday</b>	<b>Saturday</b>
8:00 AM	3.7%	19.9%	11.7%	5.4%
9:00 AM	7.0%	34.7%	20.6%	10.5%
10:00 AM	13.1%	53.6%	37.5%	22.8%
11:00 AM	34.7%	73.0%	53.3%	41.3%
12:00 PM	57.1%	88.2%	70.5%	55.3%
1:00 PM	78.4%	96.3%	81.3%	71.6%
2:00 PM	91.7%	97.3%	85.8%	86.7%
3:00 PM	Peak Hour of Day	94.5%	85.3%	96.9%
4:00 PM	96.3%	92.3%	85.1%	Peak Hour of Day
5:00 PM	82.5%	94.2%	89.8%	95.6%
6:00 PM	63.7%	Peak Hour of Day	96.7%	85.5%
7:00 PM	43.8%	98.6%	Peak Hour of Day	72.7%
8:00 PM	17.5%	87.1%	95.6%	58.4%
9:00 PM	10.6%	59.3%	71.1%	40.6%
10:00 PM	6.0%	22.0%	26.4%	16.5%

### **3.3 Forecasting Future Parking Demand**

This study forecasts future parking demands based on information contained in the Visitor Analysis, the parking data collection, and data available from the parking count.

The Visitor Analysis forecasts an increase in annual visitors to the Mall of America from the current level of 38,000,000 to 53,000,000 after the Phase II expansion. Another key forecast of the Visitor Analysis was the increase in visitor duration from 2.36 hours to 3.41 hours. Both of these increases will impact the number of daily parkers and the number of peak period parkers.

The Parking Analysis measured the peak parking demand for one of the busiest shopping days of the year, a Saturday in December.

The data available from the Data Collection Management system can be used to analyze and develop factors for parking data.

#### **3.3.1 Methodology - Use of Visitor Data, Parking Analysis & Traffic Counts**

The methodology is based on the physical count of vehicles in December which indicated that the existing parking for the Mall of America is adequate. One factor that has improved the adequacy of the existing parking is the addition of LRT service. The LRT ridership percentage for visitors to the Mall of America ranges from about 3% to 11%, depending on the source of data. Regardless of the actual percentage, it is acknowledged that a higher percentage of visitors use a non-auto mode of transportation than in the past. Logically, this has lowered peak parking demand for current conditions. One key assumption included in the methodology is that the modal split of transportation stays constant after the Phase II of the Mall expansion. Given the trend of increasing transit ridership to the Mall, this seems very reasonable.

It is acknowledged that the adequacy of the current parking capacity is based on an effective parking management program. The current management program includes directing traffic within the parking ramps and using law enforcement officers to direct on-street traffic during peak demand periods. It will be important to maintain these operations.

The current arrangement of parking decks with speed ramps is important in the efficient entry, parking and exiting of visitors. Signs are activated to inform visitors when parking levels fill. It will be important that new parking facilities are designed with similar ease of access and information elements.

#### **3.3.2 Impact of Visitor Projections**

The Visitor Analysis forecasts an increase in annual visitors to the Mall from the current level of 38,000,000 to 53,000,000 after the Phase II expansion. The ratio of the increase in visitors is  $53,000,000 / 38,000,000$  or a 39.5% increase. The 39.5% increase is one of the multiplier ratios applied to the current parking capacity to forecast future parking needs.

#### **3.3.3 Impact of Visitor Duration**

An analysis was performed to determine the impact of the forecasted increase in visitor duration on peak parking demand between the Phase I and Phase II Mall scenarios. It was recognized that an increase in visitor duration will result in increased peak parking demand.

## Section 3.0 – PARKING ANALYSIS

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The Visitor Analysis used the MOA Intercept Study conducted by the Mall of America to determine the current average visitor duration of 2.36 hours for the July 2005 time period. This likely would change for the holiday time period. The study also determined that the average visitor duration is expected to increase to 3.41 hours after the Phase II expansion (see Sections 2.1.3 and 4.4.1). Since the number of visitors increases in a ratio which is less than the increase in size, visitors are estimated to stay longer at the expanded Mall to maintain the same amount of time shopping at current stores. In other words, a visitor to the Mall will spend the same amount of time at a store like Sears, but will visit more stores in the expanded Mall and therefore be at the Mall for a longer total time. The increase in visitor duration was calculated as a function of the number of forecasted visitors and the gross leasable areas for the Phase I and Phase II scenarios. The calculation assumed that the number of visitor hours per unit of GLA stays constant between the two scenarios.

Figure 4.1.1.1 in Section 4.1, Validation of Forecasts, provides more information on the determination of visitor duration.

It was estimated that the proportional increase in visitor duration would be somewhat greater than the proportional increase in peak parking demand. It was assumed that increased visitor duration would spread the peak parking demand time and result in a lower ratio of peak parking demand to total daily parkers. A methodology was developed to test this hypothesis and analyze the impact of increased visitor duration. The analysis used data collected by the DCMS to determine the impact of increased visitor duration.

Traffic count data from Saturday, December 17th, was processed to determine overall inbound and outbound volumes on a 15-minute basis. After the DCMS system was activated on December 10th, several adjustments were made during the first week of operation. The data from December 17th was the highest-quality available for a Saturday in the holiday shopping season.

The inbound and outbound counts were factored to balance with the daily totals for inbound and outbound volumes. The number of parkers was determined on a 15-minute basis by subtracting the outbound volumes from the inbound volumes. Because more parkers are present at the midnight start time than at 3:00 A.M., it was necessary to set the midnight value to a number that would produce 0 parkers at 3:00 A.M. The results were calibrated (factored) to be consistent with the data collected on December 10th.

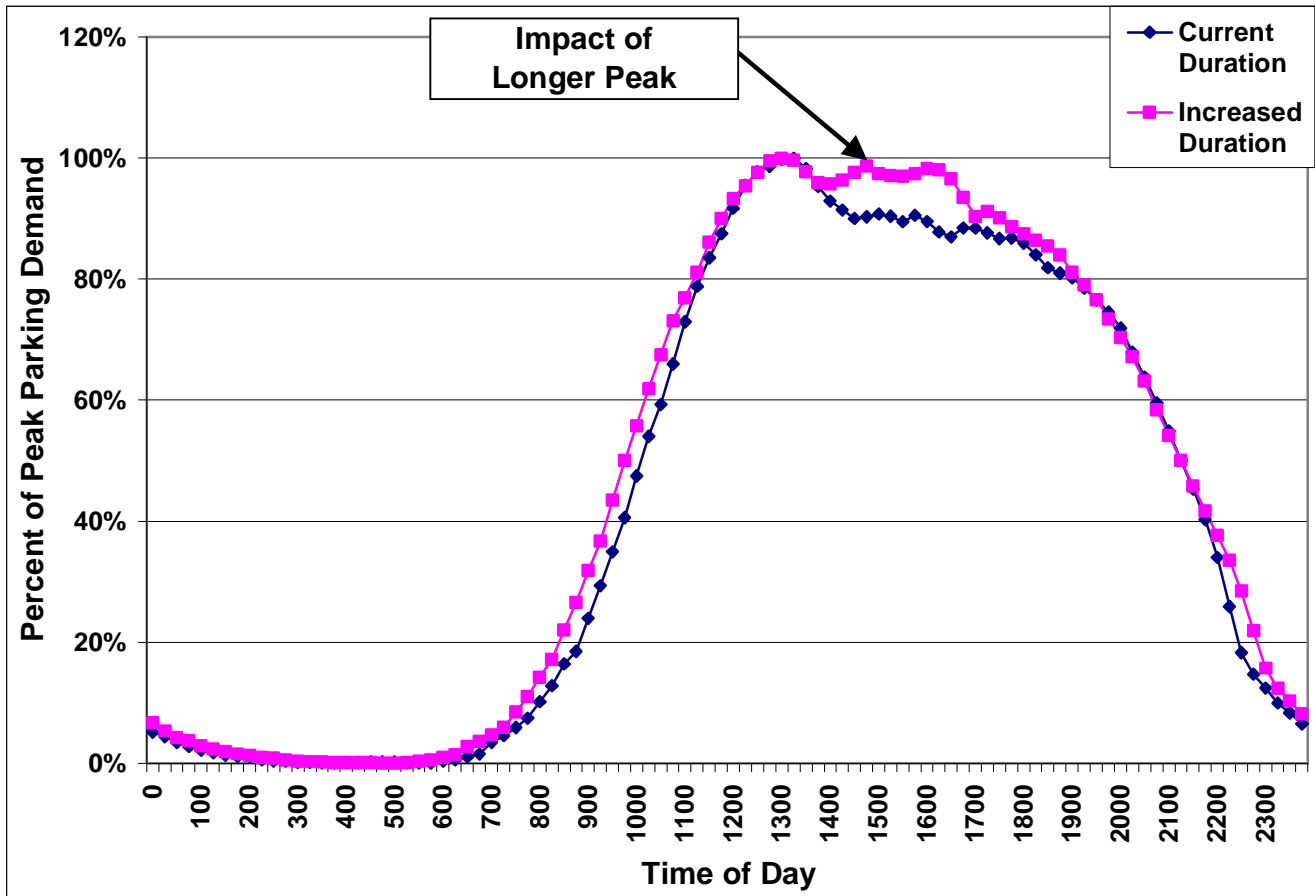
To model the impact of an approximate 1 hour increase in visitor duration, the 15-minute counts were shifted 30 minutes earlier for arrivals and 30 minutes later for departures. The impact of this shifting was to increase the visitor duration by 1 hour. The numbers of peak period parkers determined by analysis of the collected data and of the DCMS data were compared.

The ratio of peak parking values was calculated to increase by a multiplier of 35.6%. This is somewhat less than the 44.5% increase in duration to Phase II (Phase II 3.41 hours / Phase I 2.36 hours).

Figure 3.3.3.1 compares the parking demand by time as a percent of peak parking. This figure illustrates the spreading of the peak period.

This analysis determined that parking capacity should be increased by a factor of 35.6% to account for the expected increase in visitor duration.

Figure 3.3.3.1  
Impact of Increased Visitor Duration as a Percent of Peak Parking  
for a Saturday in December



### 3.3.4 Other Factors

#### Shared Parking

The multi-use aspect of the Mall expansion provides ample opportunity to make effective use of shared parking principles. Peak parking for the office use occurs on weekdays, when the retail component is not at its peak. On Saturdays, when the retail component parking demand reaches its peak, the office demand is at a minimal level.

The publication “Parking Spaces / Community Places: Finding the Balance through Smart Growth Solutions” (EPA 231-K-06-001, January 2006) presents an example of the cost savings possible by using shared parking principles:

*“Under generic minimum parking requirements, Circle Centre [in Indianapolis, Indiana] would have needed about 6,000 parking spaces. By using shared parking, the project was built with just 2,815 spaces. . . . This reduction in parking demand translates into considerable cost savings. At parking costs of about \$10,000 per space for aboveground structured parking, development costs were reduced by about \$30 million.”*

***Employee Parking***

A separate calculation was performed to determine employee parking. The parking generation rates and procedures contained in the ULI Shared Parking report were used to determine employee parking for the major mixed uses. The resulting estimates are shown in Figure 3.3.4.1 by time-of-day and day-of-week for two distinct timeframes, August and December.

Rates contained in the ULI Shared Parking report were used to determine the Saturday peak parking period for office and hotel employees, who are not included in the ratio calculations for the initial peak parking demand for the MOA shopping center retail. Also, the employee parking demand factors for performing arts centers are fairly significant and greater than for shopping center uses. The number of employee parkers for the Performing Arts Center was provided by the MOA from data for a similarly sized theater and was factored to calculate peak period parkers based on ULI daily and hourly rates. As shown in Table 3.3.4.1, the increased number of parkers for the Performing Arts Center employees was added, while employee parkers for a shopping center of equal size were subtracted.

**Table 3.3.4.1  
Non-Retail Peak Parking Demand  
(Saturday Afternoon in December)**

<b>Land Use</b>	<b>Peak Period Parkers</b>
Office	81
Hotel	184
Performing Arts Center	153
<b>Subtotal</b>	<b>418</b>
Deduction for Retail Reclassified as Performing Arts Center	- 135
<b>Total Additional Employee Parking</b>	<b>283</b>

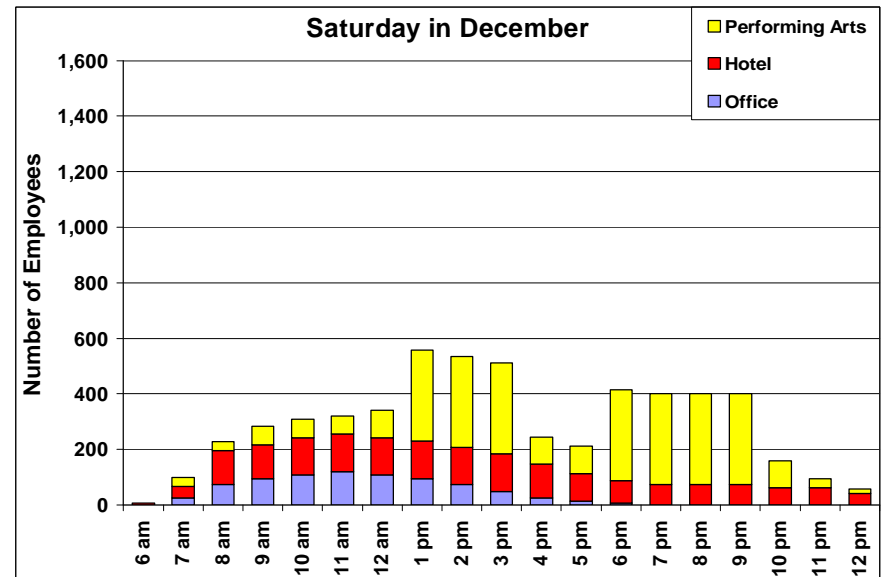
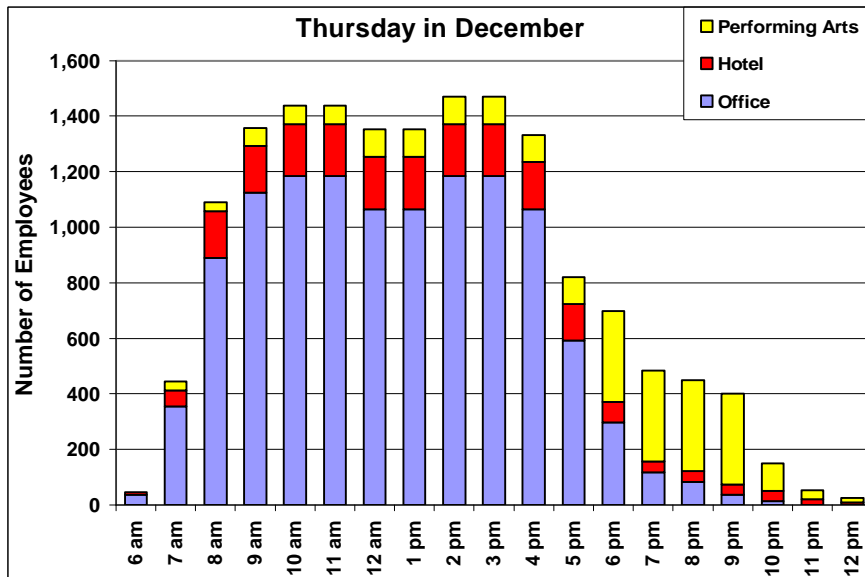
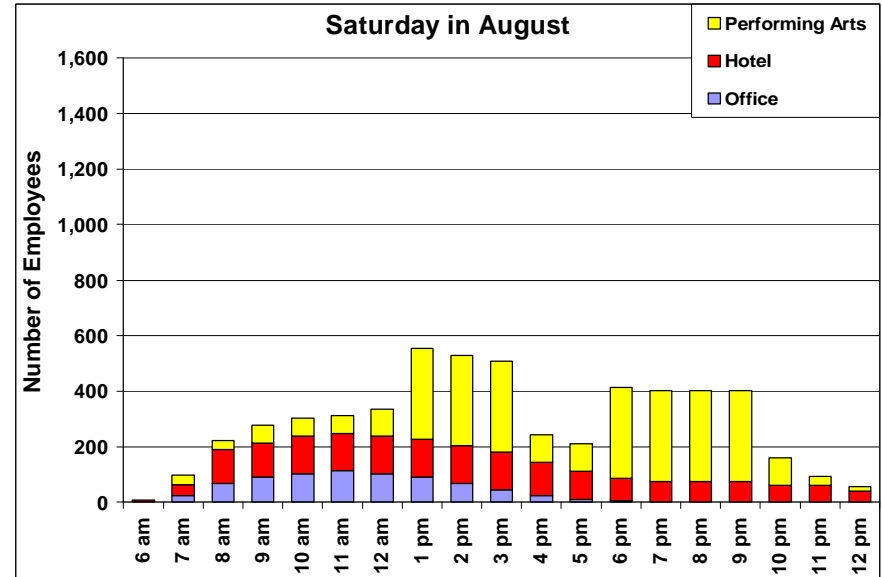
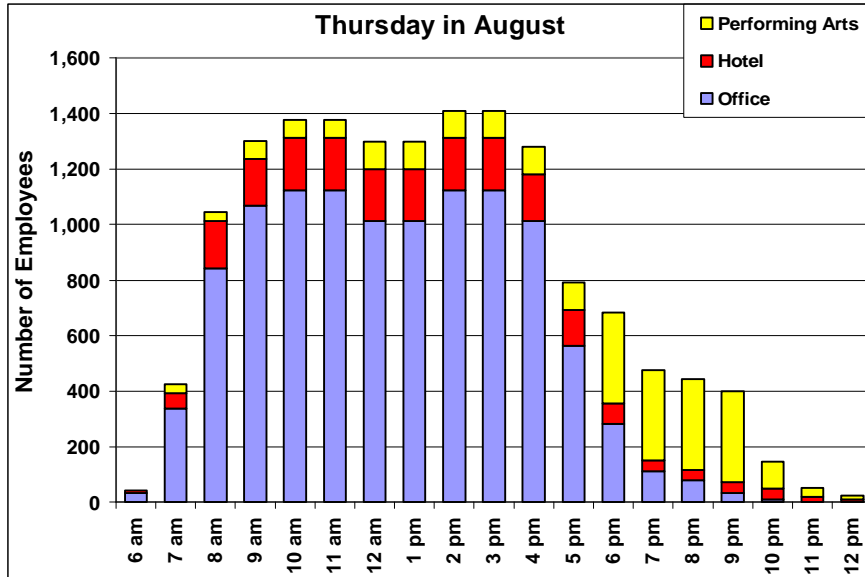
***Hotel Guest Parking***

The MOA is a thriving complex which generates many visitors and employees. The overall experience, including retail, entertainment and restaurants, entices visitors and employees to remain on-site for long periods of time. Hotel patrons, MOA employees and office employees will choose to stay on-site to take advantage of opportunities offered by the MOA. Many will stay on-site rather than choose the inconvenience of leaving for a short period of time and returning. The visitors and employees who take advantage of the multiple opportunities at the MOA are considered captive to the site. To avoid double counting, reductions in overall parking must be made to adjust for captive parkers.

Based on factors contained in the ULI report, 184 hotel peak period Saturday parkers are forecast. However, it is assumed that the hotel visitors are considered captive to the Mall of America complex (i.e., they have already been counted as Mall parkers). Therefore, no additional parking is necessary for these parkers.

Section 3.0 – PARKING ANALYSIS

Figure 3.3.4.1  
Phase II Employee Parking Estimates for Performing Arts, Hotel & Office  
by Time-of-Day & Day-of-Week



### **3.3.5 Peak Parking Demand**

The current parking capacity for visitors and employees at the Mall is 12,287. With Phase II, the number of visitors increases by 39.5% and visitor duration increases by 35.6%. The increase for non-retail employees is 283 parking spaces.

The equation to determine the MOA Phase II peak parking requirement for a Saturday in December is:

$$( \text{Parking Capacity} \times \text{Visitor Factor} \times \text{Duration Factor} ) + \text{Non-Retail Employees}$$

$$( 12,287 \times 1.395 \times 1.356 ) + 283 = 23,525$$

A spreadsheet model was created to calculate the percent of peak parking demand for a Shopping Center based on monthly, day-of-week and hourly factors. Graphs shown on Figures 3.3.5.1 and 3.3.5.2 illustrate peak parking characteristics from the model.

The ULI Shared Parking report suggests designing parking facilities to accommodate the 20th highest annual hour of peak parking demand. Based on data from the DCMS system, the Intercept Study and the ITE Parking Generation report, parking demands were calculated for every hour of the year. Figure 3.3.5.1, showing the graph titled “Peak Parking Demand by Hour,” illustrates how parking demand decreases by hour. The 20th highest hour for the current Mall of America facility was determined to be 87% of the peak parking demand.

The ULI Shared Parking report notes that in the past, design standards were often set to accommodate the 85th percentile of all peak hours. Figure 3.3.5.2, showing the graph titled “Peak Parking Demand by Day,” illustrates how parking demand decreases by day of year. The 85th percentile, which is the 55th highest day for the current Mall of America facility, corresponds to 67% of the peak parking demand.

The peak parking demand for a Saturday in December was estimated at 23,525. Utilizing the process suggested in Shared Parking, this peak parking demand number can be translated into a “20th highest hour design demand” parameter. As noted above, the 20th highest hour equates to 87% of the peak parking demand. Therefore, a reduction of  $(100\% - 87\%) = 13\%$  (a reduction of 3,058 spaces) yields a recommended design target of 20,467 spaces.

The recommended number of new spaces is calculated as follows:

$$20,467 - 1,407 \text{ IKEA} - 12,287 \text{ Existing Spaces} = 6,773.$$

Figure 3.3.5.1  
Peak Parking Demand by Hour

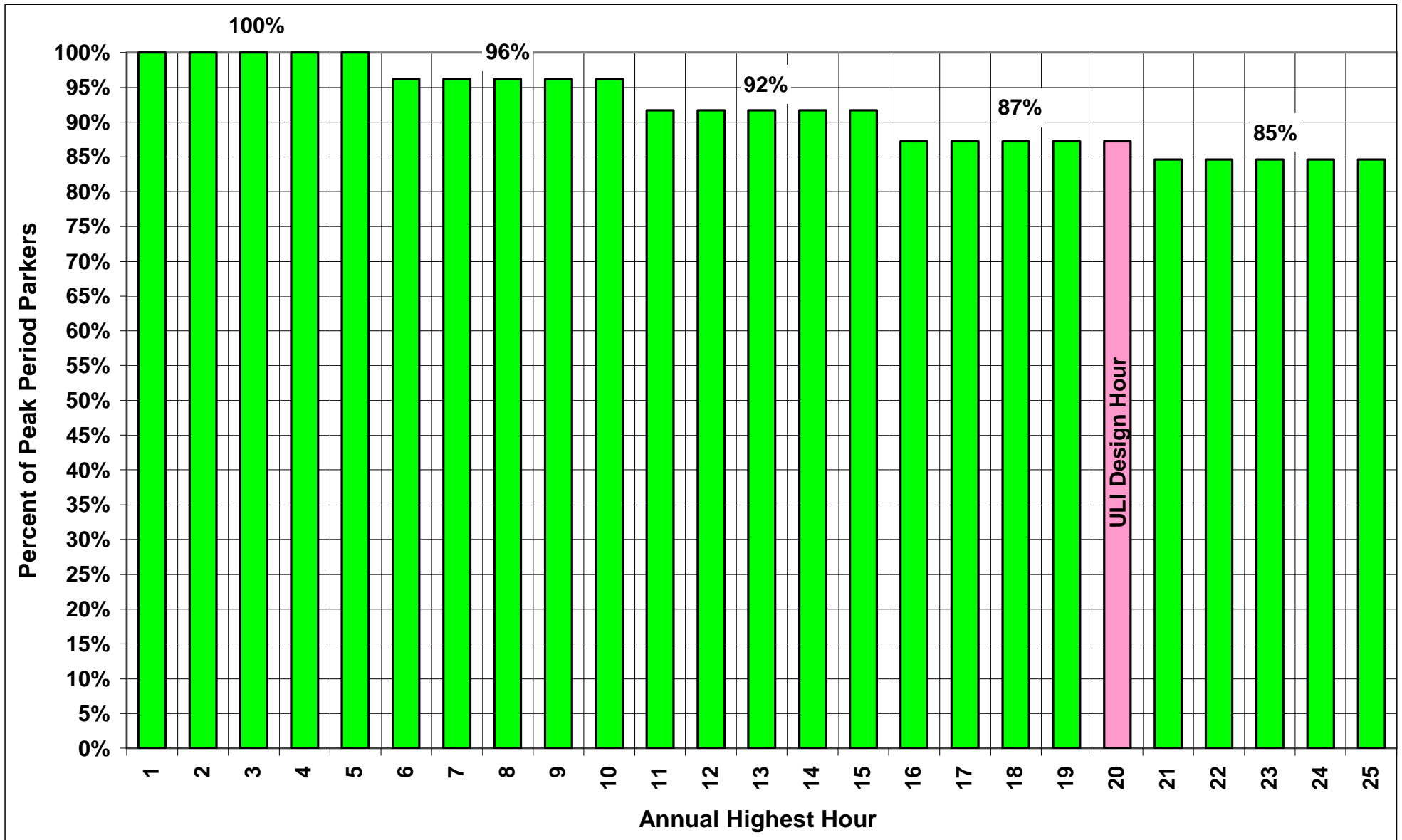
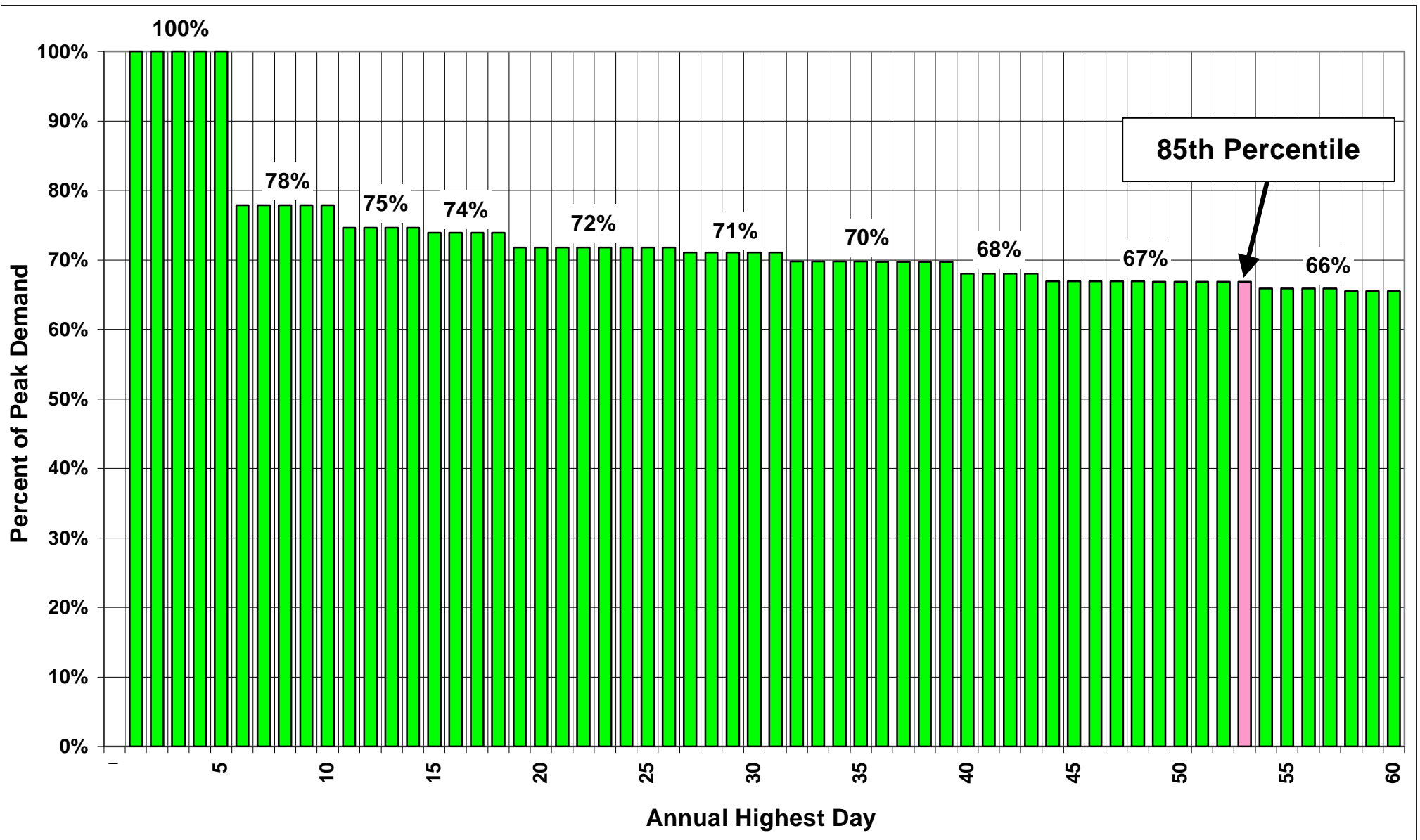


Figure 3.3.5.2  
Peak Parking Demand by Day



## 4.0 CONCLUSIONS & RECOMMENDATIONS

### 4.1 Objectives

The more traditional means of projecting the number of parking spaces would be to utilize the ITE Parking Generation report and, more recently, the ULI Shared Parking report. The ITE report has a substantial database of uses, going back over many years of data collection. Because much of the ITE report's data for large-scale retail complexes is older material. Use of the ULI report in conjunction with ITE's report provides the most accuracy.

The Second Edition of the ULI Shared Parking study was published in late 2005 and used a more comprehensive methodology for analyzing parking in a major mixed-use development. The ULI study often references the need to utilize data collected from the area being studied to properly formulate the actual parking demand.

We have incorporated the information from each of these sources into our Visitor and Parking analyses.

### 4.2 Validation of Forecasts

In Section 3.3 the recommended total parking spaces for the Mall of America Phase II was determined to be 20,467. This section compares the results of the analysis effort using the Visitor Analysis, parking data collection and data collected by the DCMS with the results calculated using the methodologies contained in two references: Parking Generation, 3rd Edition, 2004, published by the Institute of Transportation Engineers (ITE) and Shared Parking, 2nd Edition, 2005, published by the Urban Land Institute (ULI).

#### 4.2.1 ITE Calculations

##### *Validation of Parking Demand*

The ITE Parking Generation report summarizes statistical data from parking studies contained in its database. Statistics in this report provide averages, ranges and statistical quality values to aid in analyzing parking demand for a given land use. Although much of the data contained in the ITE report dates to the late 1980s, the information can still be used as part of the validation process. Table 4.2.1.1 presents the results of calculations to determine parking demand for the ITE Shopping Center category, which includes such uses as office space, movie theaters, restaurants and recreational facilities in addition to retail uses.

**Table 4.2.1.1  
ITE Parking Demand Calculation  
Shopping Center**

		<b>Mall of America Leasable Area</b>	
		<b>Phase I</b>	<b>Phases I &amp; II</b>
<b>December</b>	<b>Equations from Report *</b>	<b>2,574,505</b>	<b>4,949,089</b>
Monday - Thursday	$P = 3.62 \times GLA + 120$	9,440	18,036
Friday	$P = 3.89 \times GLA + 110$	10,125	19,362
Saturday	$P = 4.59 \times GLA + 140$	11,957	22,856
Sunday	$P = 3.89 \times GLA + 320$	10,335	19,572

		<b>Mall of America Leasable Area</b>	
		<b>Phase I</b>	<b>Phases I &amp; II</b>
<b>Non-December</b>	<b>Equations from Report *</b>	<b>2,574,505</b>	<b>4,949,089</b>
Monday - Thursday	$P = 1.60 \times GLA + 140$	4,259	8,059
Friday	$P = 2.15 \times GLA + 40$	5,575	10,681
Saturday	$P = 3.37 \times GLA - 94$	8,582	16,584
Sunday	$P = 1.70 \times GLA + 96$	4,473	8,509

\* Where P is peak period parking demand

The peak parking result for Phases I & II was 22,856 for a Saturday in December. The report states that shopping centers with transit connections experience lower peak parking demand. Based on limited data, the ITE Parking Generation report notes that reductions can range from less than 1 percent up to 8 percent. Because of the high non-auto rate for Mall visitors as recorded in the Intercept Study, the maximum reduction of 8 percent was used in this calculation. The peak parking space requirement based on ITE procedures is shown in Table 4.2.1.2.

The additional 283 peak period parkers for non-retail employees (calculated in Section 3.3) must also be included in the calculation. The resulting total parking requirement is 21,311 spaces.

**Table 4.2.1.2  
Peak Parking Space Requirement  
Calculation Based on ITE Procedures**

<b>Description</b>	<b>Number of Parking Spaces</b>
Size & Ratio-Based Calculation	22,856
Less Discount for Transit	-1,828
Non-Shopping Center Employees	283
<b>Total Peak Parking Requirement for Saturday in December</b>	<b>21,311</b>

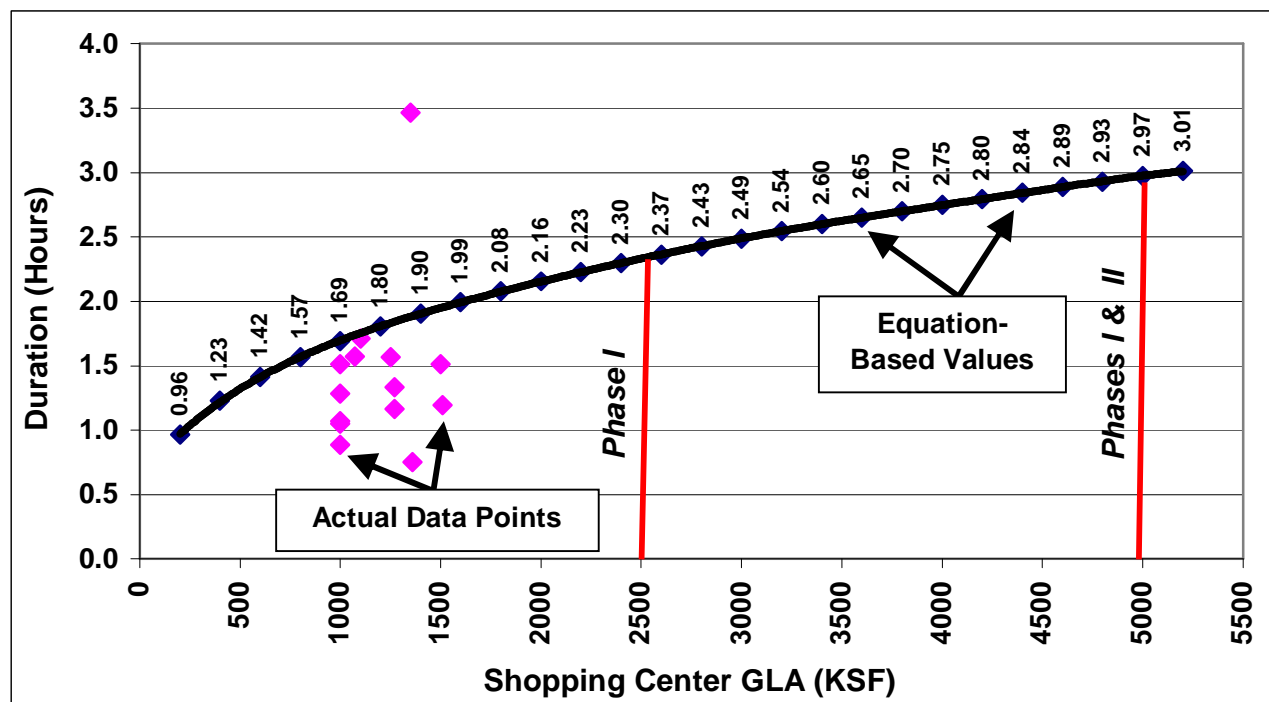
**Validation of Visitor Duration**

The size of a shopping center has an effect on how long visitors will stay, with larger centers providing more shopping opportunities and a corresponding longer duration. The Intercept Study collected current visitor duration information and the Visitor Analysis forecasted an increase in visitor duration. A comparison between this data and an analysis of ITE trip generation data may be useful in supporting the validity of the previous assumptions.

Figure 4.2.1.1 illustrates the impact of shopping center size on visitor duration. The graph is based on the trip generation equation for shopping centers contained in the ITE Trip Generation report and on the visitor duration determined for the existing Mall in the Intercept Study. Data points for shopping centers larger than those presented in the ITE report were calculated by assuming that the visitor hours per unit of GLA would remain constant. Trip generation rates calculated using the ITE equation decrease as the size of the shopping center increases. To account for the lower trip generation for larger centers, the visitor’s duration must increase to maintain the same level of customer activity by unit of area. This makes logical sense in that visitors would tend to shop longer at larger shopping centers.

Figure 4.2.1.1 graphs the relationship between visitor duration and shopping center size. The equation-based numbers are connected by a trend line. The data points for shopping centers equal to or greater than 1,000 KSF are plotted separately. It must be noted that no data points are provided in the ITE Trip Generation report for shopping centers larger than 1,600 KSF.

**Figure 4.2.1.1  
Visitor Duration by GLA**



The current Mall of America visitor duration is 2.36 hours in 2,574 KSF of GLA. The forecasted increase contained in the Visitor Analysis for the Phase II expansion is 3.41 hours in 4,949 KSF of GLA. The value shown on the graph above for the size of the Phase II expansion is 2.97 hours. The difference between 3.41 and 2.97 can be partially attributed to the uniqueness of

the Mall of America. The ITE Trip Generation equation was based on data for smaller shopping centers. It is likely that the equation did not fully reflect the decrease in trip generation as shopping centers increase to a size of this magnitude. Regardless, the forecasted duration range between 2.97 and 3.41 is reasonable. Since 3.41 hours is the value used in the parking calculations, the results should be considered conservative.

### **4.2.2 ULI Shared Parking Validation**

The ULI Shared Parking report defines strategies to determine peak parking demand. The report includes base parking ratios for a variety of uses. Separate ratios are provided for visitors and employees. The publication also includes factors for month-of-year, day-of-week and hour-of-day. There is a wide variation in the factors provided for shopping centers. The factors relating to time and day are equal to 100% at the peak day and time of the shopping season. Table 4.2.2.1 shows the results of the calculation for peak parking space requirement.

In developing the forecasts in Table 4.1.2.1 above the non-auto percentage was assumed to be a conservatively low value of 12%. Non-auto visitors consist of bus riders, LRT riders and those who use hotel shuttles, tour buses and other modes of transportation.

**Section 4.0 – CONCLUSIONS & RECOMMENDATIONS**

**Table 4.2.2.1  
Peak Parking Demand Determined by  
ULI Shared Parking Analysis**

Use	Units	Description	ULI Ratio Factor	Unadjusted Parking	Monthly Adjustment December	Peak Hour Adjustment 2 PM	Non-Captive Daytime	Mode Adjustment Daytime	Peak Demand Parking Saturday 2 PM
<b>Office</b>	<b>410,400</b>	<b>Sq. Ft.</b>							
Staff			0.26	107	100%	100%	40%	88%	38
Visitor			0.02	8	100%	100%	40%	88%	3
<b>Total</b>				<b>115</b>					<b>41</b>
<b>Performing Arts</b>	<b>6,000</b>	<b>Seats</b>							
Patron	3.1	1,935	0.33	1,980	100%	67%	40%	100%	531
Employee			0.07	420	100%	100%	80%	88%	296
<b>Total</b>				<b>2,400</b>					<b>827</b>
<b>Leisure Hotel</b>	<b>1,500</b>	<b>Rooms</b>							
Guest			1.00	1,500	80%	70%	40%	100%	336
Employee			0.18	270	100%	100%	80%	88%	190
<b>Total</b>				<b>1,770</b>					<b>526</b>
<b>Retail/Entertainment *</b>	<b>4,799,089</b>	<b>GLA</b>							
Visitor			3.60	17,277	100%	100%	100%	88%	15,204
Employee			0.90	4,319	100%	100%	100%	88%	3,801
<b>Total</b>				<b>21,596</b>					<b>19,005</b>
<b>Totals</b>									
Staff, Visitor, Guest				20,864					16,109
Employee, Office Visitor				5,017					4,290
<b>Totals</b>				<b>25,881</b>					<b>20,399</b>
								Reduction for Shared Parking	<b>79%</b>

\* 4,799,089 GLA is MOA Gross Leasable Area of 4,949,089 sq. ft. minus 150,000 sq. ft. for the Performing Arts Center

### **4.2.3 Comparison of Methods**

Table 4.2.3.1 summarizes the results produced by each of the three methods used to calculate the peak parking space requirement. The data analysis methods described in this report resulted in a value between those of the ITE and ULI calculation methods. The primary difference between the ITE and ULI published methods is that the ITE publication suggests a discount range of 1% to 8% for transit, while the ULI method suggests a reduction based on the actual non-auto percent.

**Table 4.2.3.1  
Comparison of Methods**

<b>Description</b>	<b>Visitor Analysis</b>	<b>ITE Calculation</b>	<b>ULI Calculation</b>
Calculated Number of Spaces	20,467	21,311	20,399
IKEA Spaces	-1,407	-1,407	-1,407
Existing Spaces	-12,287	-12,287	-12,287
New Spaces	6,773	7,617	6,705

The methods presented here assumed that the peak parking demand time was Saturday afternoon. Each method calculated parking demand for the shopping center, and considered other parking calculations, separately. The other parking demand calculations were based on the number of employees for non-shopping center usages. In addition, hotel parkers were considered captive to the Mall of America; that is, they were already counted in with the shopping center parkers.

### **4.3 Management of Peak Parking**

This section introduces ideas and concepts that should be considered in peak parking management planning. It is suggested that a written plan be developed to document concepts and strategies necessary to successfully manage peak parking.

One key to parking management is determining when special strategies are needed to minimize or alleviate anticipated parking shortages. The DCMS system that the Mall of America has installed can be very helpful in this determination. The expansion of this system to include the Phase II development parking areas is encouraged.

It will be important to develop strategies intended to reduce peak parking demand and efficiently manage parkers at critical times. It is also suggested that a brief diary be developed to document when special parking management strategies were deployed or should have been deployed and the success of these strategies.

#### **4.3.1 Definition of Peak Parking**

The recommended number of total parking spaces was calculated to accommodate 87% of the peak demand parkers. A peak parking condition should be considered as any time when the parking demand is expected to exceed 90% to 95% of the available parking spaces. In general, this condition will be limited to Saturdays in December, the day after Thanksgiving and possibly some Sundays in December. Special events may also raise parking demand above the 90% level.

Graphs presented in Figures 4.3.1.1 and 4.3.1.2 show how parking demands vary by hour-of-day and day-of-year based on typical shopping center factors. These graphs can provide guidance as to the frequency with which peak parking conditions may be exceeded. However, the Mall of America is a unique site with unique characteristics. It is suggested that the Mall use data from the DCMS system to develop a set of monthly, daily and hourly factors that apply specifically to this site. Special events can have a large impact on parking demands. The DCMS system can be used to determine how special events such as performances in the Theater of the Arts change parking demands.

Figure 4.3.1.1  
Peak Parking Demand by Hour

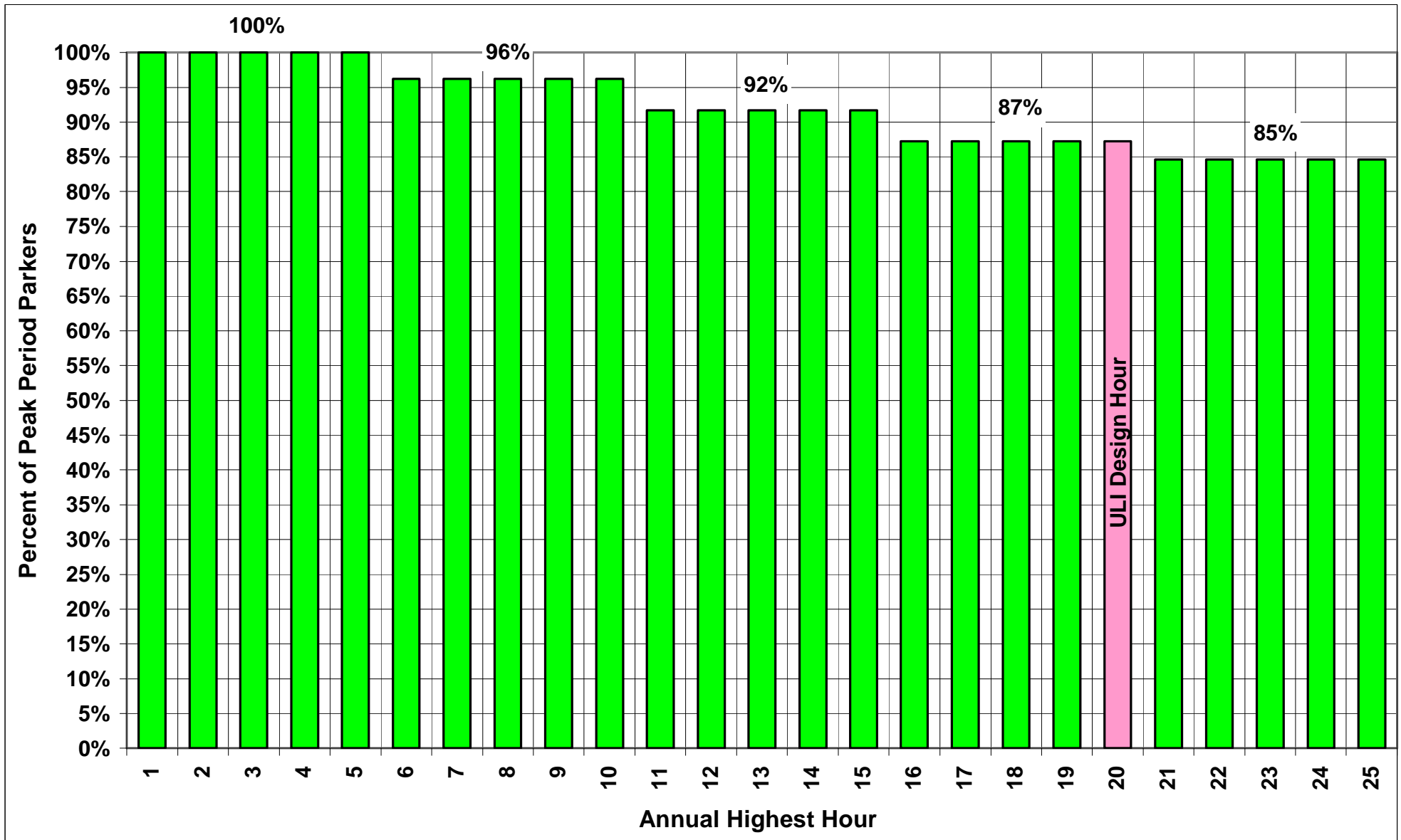
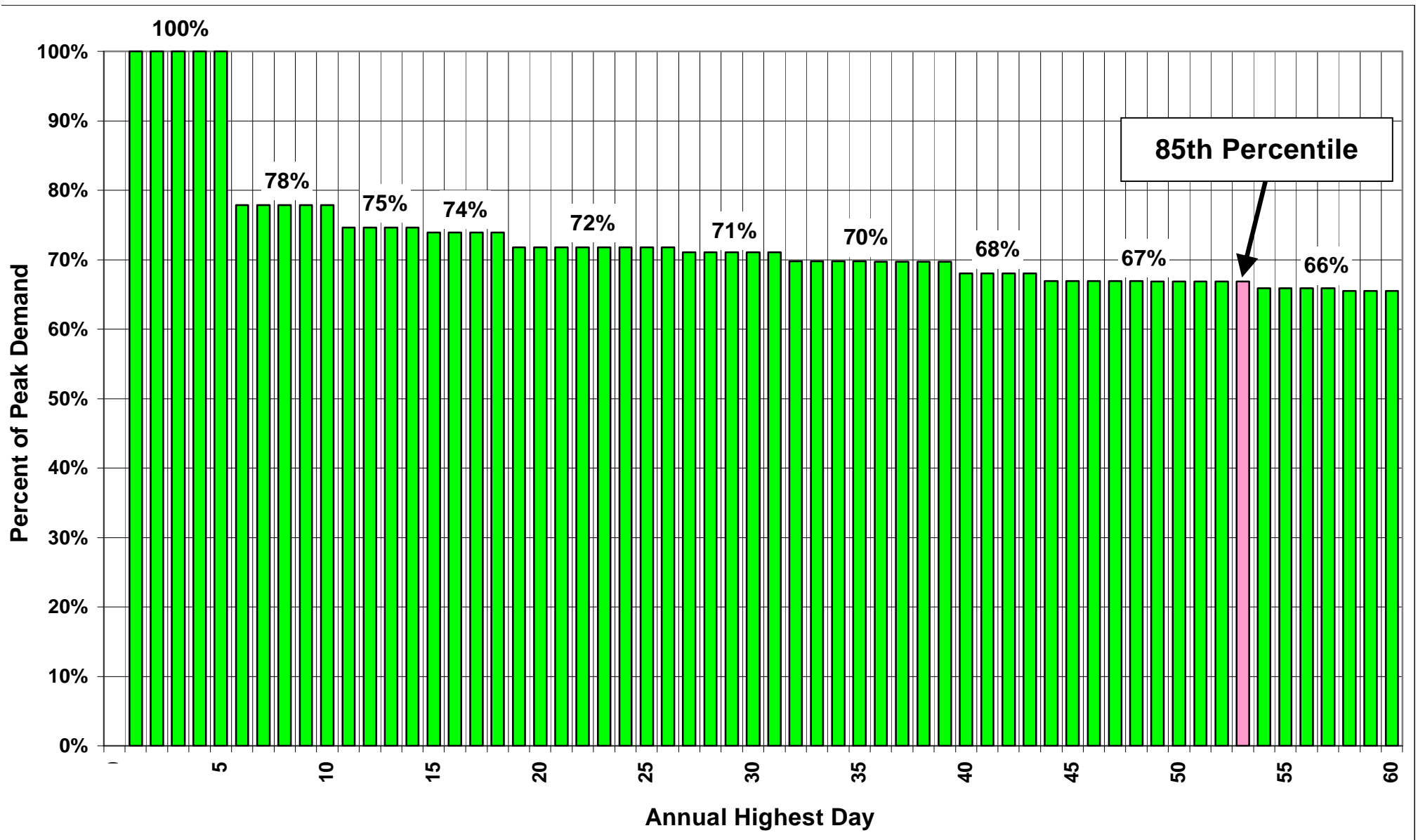


Figure 4.3.1.2  
Peak Parking Demand by Day



### 4.3.2 Parking Management Plan

It is suggested that a written parking management plan be developed. Such a plan should include the following:

- Methods to determine when peak parking thresholds will be exceeded. This can be based on historical experience, data collected by the DCMS and other techniques. It is also important to forecast how long the parking thresholds are expected to be exceeded.
- Deployment strategies which can be used to mitigate peak parking conditions.
- Mechanism used to deploy the mitigation strategies. This would include defining which personnel have the authority to deploy these strategies.
- Requirement to log parking events. It is suggested that a short report be prepared on an as-needed basis to describe the peak parking event, the mitigations that were used and the success of the mitigations.

### 4.3.3 Management Strategies

#### *Reducing Parking Demand*

Several strategies may be employed to reduce parking demand:

- Encourage employees to park off-site during peak demand periods.
- Avoid overlapping special events that will attract many visitors during periods of peak parking demand. Scheduling for large Theater of the Arts events will need to consider parking demands generated by the other Mall uses as well.
- Make use of off-site parking with a shuttle bus system. Critical situations may be improved if employees and visitors have the opportunity to park at another location and be shuttled to the Mall.
- Promote use of transit during critical times by informing visitors of opportunities to park at other locations and take the LRT or bus to the Mall.
- Wayfinding signage, both on-site and off-site, can help direct drivers to the best parking location. The information system should be designed to help balance the flows between ramps.

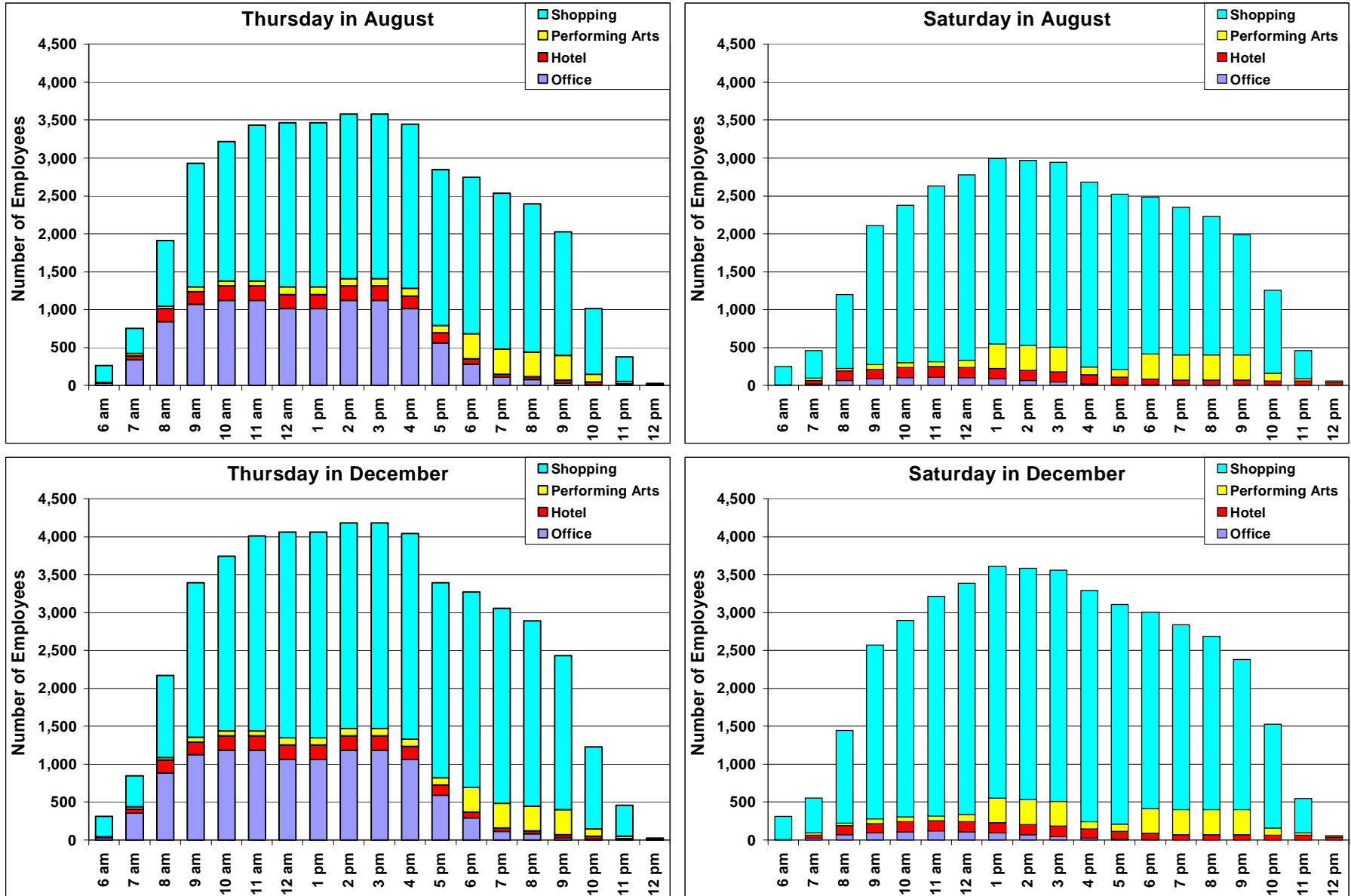
#### *Traffic Control*

The Mall will continue to develop strategies to effectively use the available parking. It will be important to direct parkers to the most convenient parking locations and avoid overfilling ramps. It may be necessary to temporarily close parking ramp entrances.

Figure 4.3.3.1 illustrates the potential number of employee parkers who could be redirected to other locations during peak conditions. During the peak demand on a Saturday in December, it is estimated that there are between 3,000 and 3,500 employee parkers. The peak parking demand could be significantly reduced if employees would choose to park off-site.

Section 4.0 – CONCLUSIONS & RECOMMENDATIONS

Figure 4.3.3.1  
Phase II Employee Parking Estimates by Time-of-Day & Day-of-Week



### **4.4 Conclusions**

The Visitor Analysis method developed by Westwood and documented in this report estimates a parking demand of 20,467 spaces for the full build out of the Mall of America.

This estimate of demand was validated by using two other published parking analysis methodologies, those of The Institute of Transportation Engineers and The Urban Land Institute, each customized to match the peak parking characteristics of the MOA. The 20,467 spaces obtained with the Visitor Analysis method falls between the 21,311 calculated by the ITE method and the 20,399 result using the ULI method.

All of the analysis methods considered the impacts of shared parking in the procedures and calculations.

The ITE procedures, based on Mall GLA, with additions for shared parkers of non-retail uses and reductions for transit, yielded a parking demand estimate of 21,311.

The ULI procedures, based on ULI parking ratios, peak period (monthly, daily, hourly) parking factors and reductions for captive parkers and non-auto users, yielded a parking estimate of 20,399.

It is recommended that the results of the Visitor Analysis be used in the planning for MOA parking facilities. This procedure is based on data collected at the Mall and calculations based on actual MOA traffic demands. This is in keeping with the guidance contained in the published methodologies, which suggest that analyses should use specific, local data when available.

The ITE methods are based on numerous data samples, many of which are now somewhat dated. Furthermore, the data samples are for sites which do not approach the size of the MOA and which typically have very low transit usage. Also, the ITE procedures are primarily geared toward isolated, single-use properties. For these reasons, it is thought that the ITE methods could not be used as the primary tool for estimating MOA parking demand, but the methods do have value in providing a general comparison and validation.

The ULI methods were published at a later date than the ITE methods and make use of the ITE database where appropriate. The methodology is directed toward facilities featuring shared parking. The more rigorous ULI procedures directly address employee and visitor factors. The results of the ULI procedures yield the lowest estimate of MOA demand.

While we recommend the use of the Visitor Analysis procedures for estimating parking demand, the ULI comparison demonstrates that the Visitor Analysis produced a conservative result, which will provide a high level of confidence in use of the Visitor Analysis results.