

# **Trip and Parking Generation Study of Small Office Buildings**

**Trip Generation and Parking Demand for Small Office Complexes in Montana**

**Submitted to:  
Western ITE District 6**

**Submitted by:**



*Mountains & Minds*

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**Submitted on:  
May 28, 2009**

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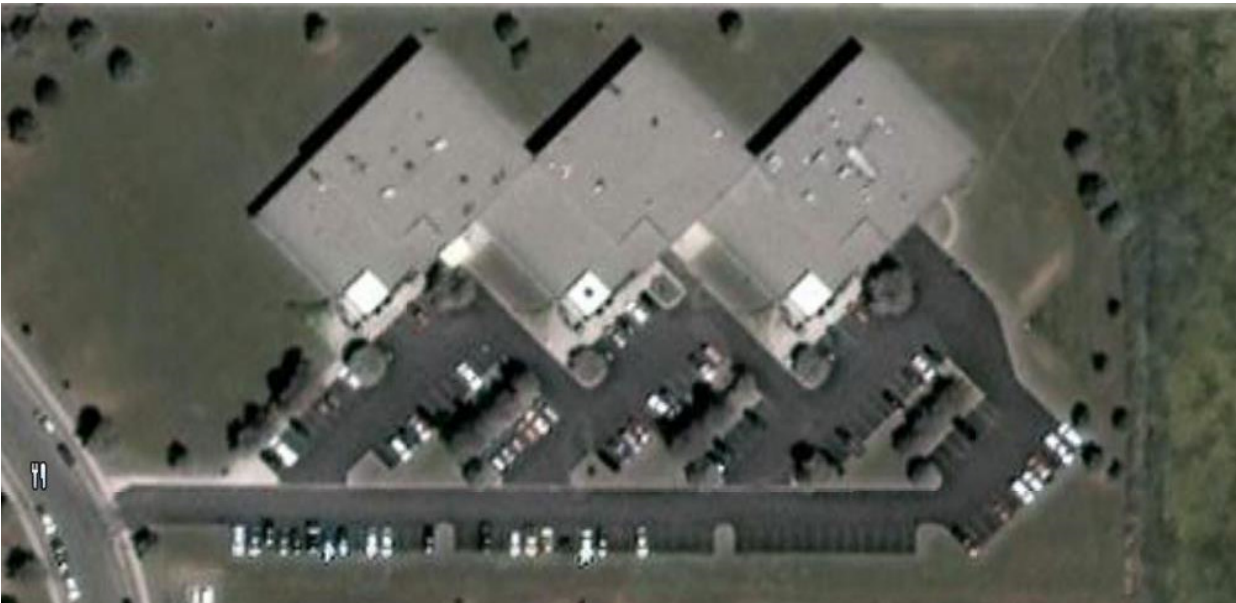
## **Trip Generation and Parking Demand for Small Office Complexes in Montana**

The Montana State University Institute of Transportation Engineers (MSU-ITE) gathered field observations in order to produce trip generation data and parking demand data for small office complexes. Physical observations and data collection at the Nopper Technology Building located within Advanced Technology Park in Bozeman, MT, were completed by MSU-ITE. Physical observations were taken in both the morning and evening during peak flow hours.

MSU-ITE utilized traffic tubes continuously for all hours during a consecutive three-day period. The traffic counter used recorded counts split into “lanes”. Using the physical observations, the entrance and exit “lanes” were determined such that traffic counts could be deemed as traffic entering the site or exiting the site. MSU-ITE then determined how trips and parking were generated.

Nopper Technology Building is comprised of three equally sized modules. Each module has a floor area of 14,148 square feet according to the City of Bozeman Building Department, totaling 42,444 square feet of floor space. The Gallatin County Assessor has a record of 58,774 square feet for the site, but this number most likely does not accurately account for the square footage of mezzanines and thus the Gallatin County Assessor’s area was not used for calculations. As the current Trip Generation and Parking Generation manuals do not contain a small office land use, MSU-ITE compared the collected data to data available for land use code 760, a research and development center, due to the types of businesses on-site and the type of office space.

MSU-ITE assumed the site fully occupied, as MSU-ITE discovered no evidence, such as “For Lease” signs, to indicate otherwise. An estimate of the number of employees on-site is 50 – 70 employees, by examining data from parking demand and the businesses located on-site. Approximately 120 parking places are provided at the building. A satellite image from Google Earth is shown in Figure 1.



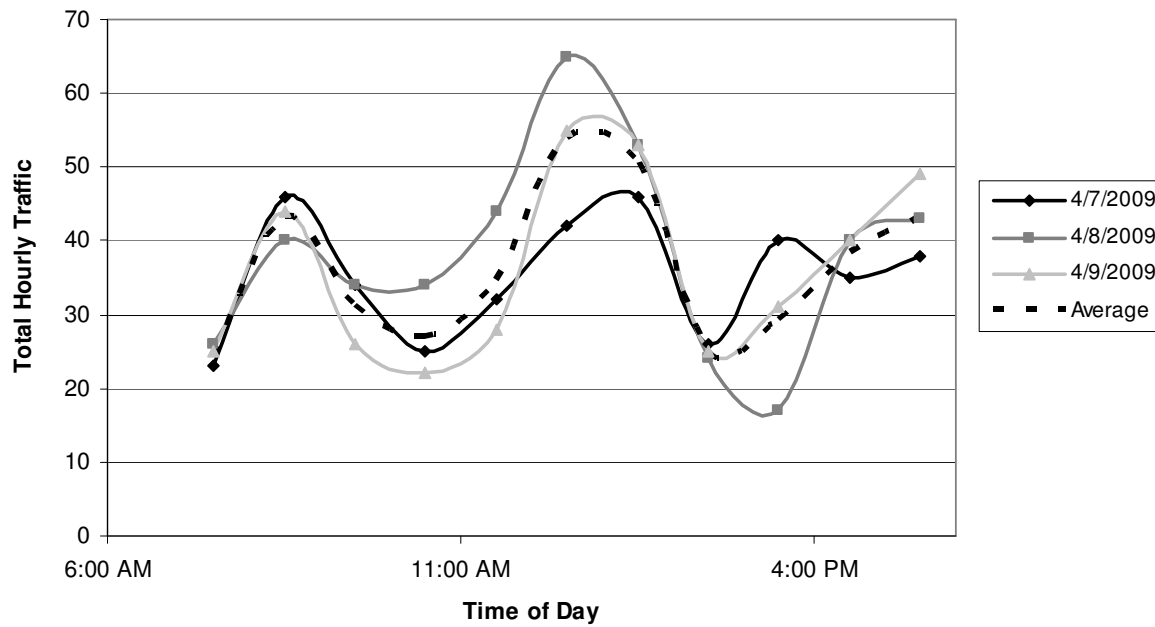
**Figure 1: Satellite View of Nopper Technology Building**

Figure 2 below represents a street view, from Google Earth, of the driveway where road tubes were installed and manual traffic counts were taken.



**Figure 2: Street View of Road Tube Installation Site**

**MSU - ITE Nopper Technology Building**



**Figure 3: Total Trips for the Nopper Technology Building**

Total trips from the site indicate the same pattern of total trips with the most trips generated in the 12:00 Noon to 2:00 PM hours. Each of the three days follows the average data trend as plotted in Figure 3. Trip generation data from the site, shown in Table 1, indicates that the trip generation rate is smaller than the ITE published rate in the AM Peak Hour, but higher than the published PM Peak Hour rate on average. Parking generation data, included in Table 2, could not be compared to an ITE published rate, as non currently exists.

**Table 1: Trip Generation for the Nopper Technology Building**

Trip Generation			Vehicle	Trip Rate <sup>1</sup>	ITE Rate <sup>2</sup>	Bicycle	Pedestrian	Total Trips
Date	Time Period	Time Period	Trips	42,444 ft <sup>2</sup>				
7-Apr	<b>AM Peak Hour</b>	8:00 - 9:00 AM	46	1.08	1.24	1	0	47
7-Apr	<b>PM Peak Hour</b>	4:15 - 5:15 PM	43	1.01	1.08	3	0	46
8-Apr	<b>AM Peak Hour</b>	7:45 - 8:45 AM	45	1.06	1.24	1	0	46
8-Apr	<b>PM Peak Hour</b>	4:45 - 5:45 PM	49	1.15	1.08	1	0	50
9-Apr	<b>AM Peak Hour</b>	7:45 - 8:45 AM	44	1.04	1.24	0	1	45
9-Apr	<b>PM Peak Hour</b>	4:30 - 5:30 PM	62	1.46	1.08	0	3	65
Average	<b>AM Peak Hour</b>	N/A	45.00	1.06	1.24	0.67	0.33	46.00
Average	<b>PM Peak Hour</b>	N/A	51.33	1.21	1.08	1.33	1.00	53.67

Note 1: 42,444 ft<sup>2</sup> obtained from City of Bozeman Building Department. Trip Rate is per 1000 ft<sup>2</sup>.

Note 2: From 7th Ed., Vol. 3 of 3, land use 760, 1.24 and 1.08 (AM and PM Peak Hours) trips per 1000 square feet.

**Table 2: Parking Generation for the Nopper Technology Building**

Motor Vehicle						
Parking Generation		Time of	Mean Number	Parking Rate <sup>3</sup>	ITE Rate <sup>4</sup>	Bicycle <sup>5</sup>
Date	Building	Peak Hour	Vehicles	42,444 ft <sup>2</sup>		Parking
7-Apr	<b>Nopper Tech.</b>	9:45 - 10:45 AM	68.75	1.62	N/A	N/A
8-Apr	<b>Nopper Tech.</b>	9:15 - 10:15 AM	76.5	1.80	N/A	N/A
9-Apr	<b>Nopper Tech.</b>	2:00 - 3:00 PM	70.75	1.67	N/A	N/A
Average	<b>Nopper Tech.</b>	N/A	70.75	1.67	N/A	N/A

Note 3: Parking Rate is per 1000 ft<sup>2</sup>.

Note 4: Data for ITE land use 760 (R&D Center) is not provided in the 3rd Ed. of the ITE Parking Generation Manual.

Note 5: Bicycle parking data was only obtained during the peak trip hours.

Summary tables are provided on the next page for AM and PM Peak Hour data obtained by MSU-ITE at the Nopper Technology Building. Trip Generation, Parking Generation, and the data collected by MSU-ITE are attached in the appendices.

**Table 3: AM Peak Hour Summary Data**

<b>Variable</b>	<b>Tuesday April 7</b>	<b>Wednesday April 8</b>	<b>Thursday April 9</b>	<b>Average</b>
Peak Hour	8:00 - 9:00 AM	7:45 - 8:45 AM	7:45 - 8:45 AM	N/A
All Vehicles	46	45	44	45.00
Trucks	0	0	0	0.00
Vehicle Occupants	Unknown	47	47	Unknown
Average Occupancy	Unknown	1.04	1.07	Unknown
Pedestrians	0	0	1	0.33
Bicycles	1	1	0	0.67
Total Trips	47	46	45	46.00
Trip Rate <sup>5</sup> - 42,444 sq. ft.	1.08	1.06	1.04	1.06
% Entering	89.13%	91.11%	90.91%	90.38%
% Exiting	10.87%	8.89%	9.09%	9.62%

Note 5: 42,444 ft<sup>2</sup> obtained from City of Bozeman Building Department. Trip Rate is per 1000 ft<sup>2</sup>.

**Table 4: PM Peak Hour Summary Data**

<b>Variable</b>	<b>Tuesday April 7</b>	<b>Wednesday April 8</b>	<b>Thursday April 9</b>	<b>Average</b>
Peak Hour	4:15 - 5:15 PM	4:45 - 5:45 PM	4:30 - 5:30 PM	N/A
All Vehicles	43	49	62	51.33
Trucks	0	0	0	0.00
Vehicle Occupants	Unknown	50	Unknown	Unknown
Average Occupancy	Unknown	1.02	Unknown	Unknown
Pedestrians	0	0	3	1.00
Bicycles	3	1	0	1.33
Total Trips	46	50	65	53.67
Trip Rate <sup>6</sup> - 42,444 sq. ft.	1.01	1.15	1.46	1.21
% Entering	16.28%	12.24%	29.03%	19.19%
% Exiting	83.72%	87.76%	70.97%	80.81%

Note 6: 42,444 ft<sup>2</sup> obtained from City of Bozeman Building Department. Trip Rate is per 1000 ft<sup>2</sup>.

**Appendix A**  
**Trip Generation Forms**

# Trip Generation Data Form (Part 1)

Land Use/Building Type: Small Office / R&D CENTER ITE Land Use Code: 760  
 Source: NOOPER TECHNOLOGY BUILDING Source No. (ITE use only):  
 Name of Development: Advanced Technology Park Day of the Week: Monday - Thursday Year: 2009  
 City: Bozeman Day: 7th - 9th Month: April  
 State/Province: MT Zip/Postal Code: 59715 Metropolitan Area: Bozeman  
 Country: United States

1. For fast-food land use, please specify if hamburger- or nonhamburger-based.

Location Within Area:  
 (1) CBD  (3) Suburban (Non-CBD)  (5) Rural  
 (2) Urban (Non-CBD)  (4) Suburban CBD  (6) Freeway Interchange Area (Rural)  
 (7) Not Given

Detailed Description of Development:<sup>3</sup>  
A set of small buildings in a large office park.

Independent Variable: (include data for as many as possible) ?	Actual	Estimated
(1) Employees (#)	<input type="checkbox"/>	<input type="checkbox"/>
(2) Persons (#)	<input type="checkbox"/>	<input type="checkbox"/>
(3) Total Units (#) (indicate unit: _____)	<input type="checkbox"/>	<input type="checkbox"/>
(4) Occupied Units (#) (indicate unit: _____)	<input type="checkbox"/>	<input type="checkbox"/>
(5) Gross Floor Area (gross sq. ft.) <u>42444</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(% of development occupied _____)	<input type="checkbox"/>	<input type="checkbox"/>
(6) Net Rentable Area (sq. ft.)	<input type="checkbox"/>	<input type="checkbox"/>
(7) Gross Leasable Area (sq. ft.)	<input type="checkbox"/>	<input type="checkbox"/>
(% of development occupied _____)	<input type="checkbox"/>	<input type="checkbox"/>
(8) Total Acres (% developed: _____)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(9) Parking Spaces (% occupied: <u>60</u> )	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(10) Beds (% occupied: _____)	<input type="checkbox"/>	<input type="checkbox"/>
(11) Seats (#)	<input type="checkbox"/>	<input type="checkbox"/>
(12) Servicing Positions/Vehicle Fueling Positions	<input type="checkbox"/>	<input type="checkbox"/>
(13) Shopping Center % Out-parcels/pads	<input type="checkbox"/>	<input type="checkbox"/>
(14) A.M. Peak Hour Volume of Adjacent Street Traffic	<input type="checkbox"/>	<input type="checkbox"/>
(15) P.M. Peak Hour Volume of Adjacent Street Traffic	<input type="checkbox"/>	<input type="checkbox"/>
(16) Other _____	<input type="checkbox"/>	<input type="checkbox"/>
(17) Other _____	<input type="checkbox"/>	<input type="checkbox"/>

2. Definitions for several independent variables can be found in the Trip Generation, Second Edition, User's Guide Glossary.

3. Please provide all pertinent information to describe the subject project, including the presence of bicycle/pedestrian facilities. To report bicycle/pedestrian volumes, please refer to Part 4 of this data form.

Other Data:

Vehicle Occupancy (#):  
 A.M. \_\_\_\_\_ P.M. \_\_\_\_\_ 24-hour % \_\_\_\_\_  
 Percent by Transit:  
 A.M. % \_\_\_\_\_ P.M. % \_\_\_\_\_ 24-hour % \_\_\_\_\_  
 Percent by Carpool/Vanpool:  
 A.M. % \_\_\_\_\_ P.M. % \_\_\_\_\_ 24-hour % \_\_\_\_\_

Employees by Shift:

Shift	Start Time	End Time	Employees (#)
First Shift	_____	_____	_____
Second Shift	_____	_____	_____
Third Shift	_____	_____	_____

Parking Cost on Site: \_\_\_\_\_ Hourly \_\_\_\_\_ Daily \_\_\_\_\_

Transportation Demand Management (TDM) Information:  
 At the time of this study, was there a TDM program (that may have impacted the trip generation characteristics of this site) underway?  
 No  
 Yes (if yes, please check appropriate box/boxes, describe the nature of the TDM program(s) and provide a source for any studies that may help quantify this impact. Attach additional sheets if necessary)

<input type="checkbox"/> (1) Transit Service	<input type="checkbox"/> (5) Employer Support Measures	<input type="checkbox"/> (9) Tolls and Congestion Pricing
<input type="checkbox"/> (2) Carpool Programs	<input type="checkbox"/> (6) Preferential HOV Treatments	<input type="checkbox"/> (10) Variable Work Hours/Compressed Work Weeks
<input type="checkbox"/> (3) Vanpool Programs	<input type="checkbox"/> (7) Transit and Ridesharing Incentives	<input type="checkbox"/> (11) Telecommuting
<input type="checkbox"/> (4) Bicycle/Pedestrian Facilities and Site Improvements	<input type="checkbox"/> (8) Parking Supply and Pricing Management	<input type="checkbox"/> (12) Other _____

# ITE Institute of Transportation Engineers Trip Generation Data Form (Part 2)

## Summary of Driveway Volumes

(All = All Vehicles Counted, Including Trucks; Trucks = Heavy Duty Trucks and Buses)

	Average Weekday (M-F)						Saturday						Sunday					
	Enter		Exit		Total		Enter		Exit		Total		Enter		Exit		Total	
	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
24-Hour Volume	203		199		402													
A.M. Peak Hour of Adjacent <sup>1</sup> Street Traffic (7 - 9) 7:45	41		4		45													
Time (ex.: 7:15 - 8:15) - 8:15																		
P.M. Peak Hour of Adjacent <sup>2</sup> Street Traffic (4 - 6)	9		29		38													
Time: 4 - 5 pm																		
A.M. Peak Hour Generator <sup>2</sup>	41		4		45													
Time: 7:45 - 8:45																		
P.M. Peak Hour Generator <sup>1</sup>	36		18		54													
Time: 12:15 - 1:15																		
Peak Hour Generator																		
Time (Weekend):																		

1. Highest hourly volume between 7 a.m. and 9 a.m. (4 p.m. and 6 p.m.). Please specify the peak hour.
  2. Highest hourly volume during the a.m. or p.m. period. Please specify the peak hour.
  3. Highest hourly volume during the entire day. Please specify the peak hour.
- Please refer to the Trip Generation User's Guide for full definition of terms.

## Hourly Driveway Volumes - Average Weekday (M-F)

A.M. Period	Enter		Exit		Total		Mid-Day Period		Exit		Total		P.M. Period		Exit		Total	
	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks	All	Trucks
6:00-7:00					15		11:00-12:00		19.67		34.7		3:00-4:00		17		29.3	
6:15-7:15					15		11:15-12:15		31		46		3:15-4:15		17		24.7	
6:30-7:30					17.3		11:30-12:30		34.7		52		3:30-4:30		11.7		36.7	
6:45-7:45					23.3		11:45-12:45		31.7		55		3:45-4:45		9.33		37.6	
7:00-8:00	24		.67		24.7		12:00-1:00		26.3		56		4:00-5:00		9.33		38.3	
7:15-8:15	34.3		1.67		36		12:15-1:15		17.7		53.3		4:15-5:15		8.7		48	
7:30-8:30	38.7		1.67		40.3		12:30-1:30		20		57.3		4:30-5:30		6		48.7	
7:45-8:45	41		3.67		44.7		12:45-1:45		24		56.3		4:45-5:45		5.7		48.3	
8:00-9:00	38.7		4.67		43.3		1:00-2:00		27.3		50.6		5:00-6:00		2.7		43.3	

Check if Part 3, 4 and/or additional information is attached.

Survey conducted by: Name: MSU-ITE

Organization: \_\_\_\_\_

Address: \_\_\_\_\_

City/State/Zip: BORISMAS, MT 59715

Telephone #: \_\_\_\_\_

Fax #: \_\_\_\_\_

E-mail: \_\_\_\_\_

Please return to: Institute of Transportation Engineers  
 Technical Projects Division  
 1099 14th Street NW, Suite 300 West  
 Washington, DC 20005-3438 USA  
 Telephone: +1 202-289-0222  
 Fax: +1 202-289-7722  
 ITE on the Web: www.ite.org



# Trip Generation Data Form (Part 3)

Name/Organization: MSU ITE City/State: Bremen, MT

Telephone Number: \_\_\_\_\_

Detailed Driveway Volumes: Attach this sheet to Parts 1 and 2 if you are providing additional information.

Day of the week: Tuesday (4/7) (All = All Vehicles Counted, Including Trucks; Trucks = Heavy Duty Trucks and Buses)

A.M. Period	Enter		Exit		Total		P.M. Period	Enter		Exit		Total	
	All	Trucks	All	Trucks	All	Trucks		All	Trucks	All	Trucks	All	Trucks
12:00-12:15	0		0		0		12:00-12:15	1		10		11	
12:15-12:30	0		0		0		12:15-12:30	5		5		10	
12:30-12:45	0		0		0		12:30-12:45	5		2		7	
12:45-1:00	0		0		0		12:45-1:00	9		5		14	
1:00-1:15	0		0		0		1:00-1:15	8		5		13	
1:15-1:30	0		0		0		1:15-1:30	12		7		19	
1:30-1:45	1		1		2		1:30-1:45	1		5		6	
1:45-2:00	0		0		0		1:45-2:00	7		1		8	
2:00-2:15	0		0		0		2:00-2:15	2		3		5	
2:15-2:30	0		0		0		2:15-2:30	4		8		12	
2:30-2:45	0		0		0		2:30-2:45	1		2		3	
2:45-3:00	0		0		0		2:45-3:00	3		3		6	
3:00-3:15	1		1		2		3:00-3:15	5		5		10	
3:15-3:30	0		0		0		3:15-3:30	4		6		10	
3:30-3:45	0		0		0		3:30-3:45	5		5		10	
3:45-4:00	0		0		0		3:45-4:00	2		8		10	
4:00-4:15	0		0		0		4:00-4:15	2		8		10	
4:15-4:30	0		0		0		4:15-4:30	2		6		8	
4:30-4:45	0		0		0		4:30-4:45	1		8		9	
4:45-5:00	0		0		0		4:45-5:00	2		6		8	
5:00-5:15	1		1		2		5:00-5:15	2		16		18	
5:15-5:30	1		1		2		5:15-5:30	0		5		5	
5:30-5:45	1		0		1		5:30-5:45	1		8		9	
5:45-6:00	2		1		3		5:45-6:00	0		6		10	
6:00-6:15	6		0		0		6:00-6:15	0		4		4	
6:15-6:30	1		0		1		6:15-6:30	0		2		2	
6:30-6:45	2		0		2		6:30-6:45	0		3		3	
6:45-7:00	0		0		0		6:45-7:00	0		1		1	
7:00-7:15	4		1		5		7:00-7:15	0		0		0	
7:15-7:30	4		0		4		7:15-7:30	0		0		0	
7:30-7:45	8		0		8		7:30-7:45	1		0		1	
7:45-8:00	6		0		6		7:45-8:00	1		1		2	
8:00-8:15	18		2		20		8:00-8:15	2		2		4	
8:15-8:30	11		0		11		8:15-8:30	1		2		3	
8:30-8:45	7		1		8		8:30-8:45	0		0		0	
8:45-9:00	5		2		7		8:45-9:00	1		2		3	
9:00-9:15	7		3		10		9:00-9:15	0		1		1	
9:15-9:30	5		2		7		9:15-9:30	0		0		0	
9:30-9:45	5		3		8		9:30-9:45	0		0		0	
9:45-10:00	6		3		9		9:45-10:00	0		0		0	
10:00-10:15	3		2		5		10:00-10:15	0		1		1	
10:15-10:30	3		5		8		10:15-10:30	0		0		0	
10:30-10:45	5		5		10		10:30-10:45	1		0		1	
10:45-11:00	1		1		2		10:45-11:00	0		1		1	
11:00-11:15	2		2		4		11:00-11:15	0		0		0	
11:15-11:30	1		2		3		11:15-11:30	0		0		0	
11:30-11:45	3		4		7		11:30-11:45	0		0		0	
11:45-12:00	7		11		18		11:45-12:00	0		0		0	

# Trip Generation Data Form (Part 3)

Name/Organization: MSU ITE City/State: Buzzards, N7

Telephone Number: \_\_\_\_\_

Detailed Driveway Volumes: Attach this sheet to Parts 1 and 2 if you are providing additional information.

Day of the week: Wednesday (4/8) (All = All Vehicles Counted, Including Trucks; Trucks = Heavy Duty Trucks and Buses)

A.M. Period	Enter		Exit		Total		P.M. Period	Enter		Exit		Total	
	All	Trucks	All	Trucks	All	Trucks		All	Trucks	All	Trucks	All	Trucks
12:00-12:15	0		0		0		12:00-12:15	4		15		19	
12:15-12:30	0		0		0		12:15-12:30	9		7		16	
12:30-12:45	0		0		0		12:30-12:45	14		3		17	
12:45-1:00	0		0		0		12:45-1:00	9		4		13	
1:00-1:15	0		0		0		1:00-1:15	10		3		13	
1:15-1:30	0		0		0		1:15-1:30	4		6		10	
1:30-1:45	0		0		0		1:30-1:45	7		12		19	
1:45-2:00	0		0		0		1:45-2:00	5		6		11	
2:00-2:15	0		0		0		2:00-2:15	4		4		8	
2:15-2:30	0		0		0		2:15-2:30	1		3		4	
2:30-2:45	0		0		0		2:30-2:45	6		2		8	
2:45-3:00	0		0		0		2:45-3:00	2		2		4	
3:00-3:15	0		0		0		3:00-3:15	1		2		3	
3:15-3:30	0		0		0		3:15-3:30	1		2		3	
3:30-3:45	1		1		2		3:30-3:45	2		4		6	
3:45-4:00	0		0		0		3:45-4:00	2		3		5	
4:00-4:15	0		0		0		4:00-4:15	2		7		11	
4:15-4:30	0		0		0		4:15-4:30	4		8		12	
4:30-4:45	0		0		0		4:30-4:45	1		7		8	
4:45-5:00	0		0		0		4:45-5:00	4		5		9	
5:00-5:15	1		1		2		5:00-5:15	0		16		16	
5:15-5:30	1		0		1		5:15-5:30	0		11		11	
5:30-5:45	1		1		2		5:30-5:45	2		11		13	
5:45-6:00	1		0		1		5:45-6:00	0		3		3	
6:00-6:15	2		1		3		6:00-6:15	1		4		5	
6:15-6:30	3		1		4		6:15-6:30	0		0		0	
6:30-6:45	1		0		1		6:30-6:45	0		1		1	
6:45-7:00	0		1		1		6:45-7:00	0		1		1	
7:00-7:15	2		0		2		7:00-7:15	0		1		1	
7:15-7:30	5		0		5		7:15-7:30	0		0		0	
7:30-7:45	7		0		7		7:30-7:45	0		0		0	
7:45-8:00	12		0		12		7:45-8:00	2		2		4	
8:00-8:15	9		1		10		8:00-8:15	2		1		3	
8:15-8:30	11		1		12		8:15-8:30	0		0		0	
8:30-8:45	9		2		11		8:30-8:45	1		1		2	
8:45-9:00	7		0		7		8:45-9:00	1		4		5	
9:00-9:15	8		2		10		9:00-9:15	0		0		0	
9:15-9:30	13		3		16		9:15-9:30	0		1		1	
9:30-9:45	4		1		5		9:30-9:45	0		0		0	
9:45-10:00	1		2		3		9:45-10:00	0		1		1	
10:00-10:15	4		1		5		10:00-10:15	0		0		0	
10:15-10:30	3		13		16		10:15-10:30	0		0		0	
10:30-10:45	1		9		10		10:30-10:45	0		0		0	
10:45-11:00	1		2		3		10:45-11:00	1		1		2	
11:00-11:15	5		3		8		11:00-11:15	0		0		0	
11:15-11:30	4		1		5		11:15-11:30	0		0		0	
11:30-11:45	8		9		17		11:30-11:45	0		0		0	
11:45-12:00	4		10		14		11:45-12:00	0		0		0	

# Trip Generation Data Form (Part 3)

Name/Organization: MSU ITE City/State: Buzzards, MI

Telephone Number: \_\_\_\_\_

Detailed Driveway Volumes: Attach this sheet to Parts 1 and 2 if you are providing additional information.

Day of the week: Thursday (1/4) (All = All Vehicles Counted, Including Trucks; Trucks = Heavy Duty Trucks and Buses)

A.M. Period	Enter		Exit		Total		P.M. Period	Enter		Exit		Total	
	All	Trucks	All	Trucks	All	Trucks		All	Trucks	All	Trucks	All	Trucks
12:00-12:15	0		0		0		12:00-12:15	2		14		16	
12:15-12:30	0		0		0		12:15-12:30	5		5		10	
12:30-12:45	0		0		0		12:30-12:45	10		3		13	
12:45-1:00	0		0		0		12:45-1:00	10		6		16	
1:00-1:15	0		0		0		1:00-1:15	13		5		18	
1:15-1:30	0		0		0		1:15-1:30	8		11		19	
1:30-1:45	0		0		0		1:30-1:45	6		3		9	
1:45-2:00	0		0		0		1:45-2:00	4		3		7	
2:00-2:15	0		0		0		2:00-2:15	3		2		5	
2:15-2:30	0		0		0		2:15-2:30	5		4		9	
2:30-2:45	0		0		0		2:30-2:45	2		3		5	
2:45-3:00	0		0		0		2:45-3:00	4		2		6	
3:00-3:15	0		0		0		3:00-3:15	1		4		5	
3:15-3:30	0		0		0		3:15-3:30	4		2		6	
3:30-3:45	1		0		1		3:30-3:45	4		5		9	
3:45-4:00	0		1		1		3:45-4:00	5		6		11	
4:00-4:15	0		0		0		4:00-4:15	3		10		13	
4:15-4:30	0		0		0		4:15-4:30	2		3		5	
4:30-4:45	0		0		0		4:30-4:45	2		9		11	
4:45-5:00	0		0		0		4:45-5:00	3		8		11	
5:00-5:15	0		0		0		5:00-5:15	3		26		29	
5:15-5:30	0		0		0		5:15-5:30	0		11		11	
5:30-5:45	2		1		3		5:30-5:45	0		5		5	
5:45-6:00	1		0		1		5:45-6:00	0		4		4	
6:00-6:15	1		1		2		6:00-6:15						
6:15-6:30	2		0		2		6:15-6:30						
6:30-6:45	0		1		1		6:30-6:45						
6:45-7:00	2		0		2		6:45-7:00						
7:00-7:15	3		0		3		7:00-7:15						
7:15-7:30	6		1		7		7:15-7:30						
7:30-7:45	7		0		7		7:30-7:45						
7:45-8:00	8		0		8		7:45-8:00						
8:00-8:15	13		1		14		8:00-8:15						
8:15-8:30	6		0		6		8:15-8:30						
8:30-8:45	13		3		16		8:30-8:45						
8:45-9:00	7		1		8		8:45-9:00						
9:00-9:15	7		2		9		9:00-9:15						
9:15-9:30	5		3		8		9:15-9:30						
9:30-9:45	5		3		8		9:30-9:45						
9:45-10:00	1		0		1		9:45-10:00						
10:00-10:15	5		1		6		10:00-10:15						
10:15-10:30	4		4		8		10:15-10:30						
10:30-10:45	1		3		4		10:30-10:45						
10:45-11:00	1		3		4		10:45-11:00						
11:00-11:15	0		0		0		11:00-11:15						
11:15-11:30	7		3		10		11:15-11:30						
11:30-11:45	0		4		4		11:30-11:45						
11:45-12:00	4		10		14		11:45-12:00						

# Trip Generation Data Form (Part 4)

## Summary of Bicycle Volumes

	Average Weekday (M-F)			Saturday			Sunday		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
24-Hour Volume	1.33	1	2.33						
A.M. Peak Hour of Adjacent Street Traffic (7 - 9) Time (ex.: 7:15 - 8:15):									
P.M. Peak Hour of Adjacent Street Traffic (4 - 6) Time:									
A.M. Peak Hour Generator <sup>1</sup> Time:									
P.M. Peak Hour Generator <sup>2</sup> Time:									
Peak Hour Generator Time (Weekend):									

- Highest hourly volume between 7 a.m. and 9 a.m. (4 p.m. and 6 p.m.) as defined in Trip Generation Data Form (Part 2). Please specify the peak hour.
- Highest hourly volume during the a.m. or p.m. period. Please specify the peak hour.
- Highest hourly volume during the entire day. Please specify the peak hour. Please attach supplemental hourly volumes. Please refer to the Trip Generation User's Guide for full definition of terms.

## Summary of Pedestrian Volumes

	Average Weekday (M-F)			Saturday			Sunday		
	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit	Total
24-Hour Volume	.67	.67	1.33						
A.M. Peak Hour of Adjacent Street Traffic (7 - 9) Time (ex.: 7:15 - 8:15):									
P.M. Peak Hour of Adjacent Street Traffic (4 - 6) Time:									
A.M. Peak Hour Generator <sup>1</sup> Time:									
P.M. Peak Hour Generator <sup>2</sup> Time:									
Peak Hour Generator Time (Weekend):									

Survey conducted by: Name: \_\_\_\_\_  
 Organization: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 City/State/Zip: \_\_\_\_\_  
 Telephone #: \_\_\_\_\_ Fax #: \_\_\_\_\_ E-mail: \_\_\_\_\_

Please return to: Institute of Transportation Engineers  
 Technical Projects Division  
 1099 14th Street, NW, Suite 300 West  
 Washington, DC 20005-3438 USA  
 Telephone: +1 202-289-0222  
 Fax: +1 202-289-7722  
 ITE on the Web: www.ite.org

**Appendix B**  
**Parking Demand Form**



# Parking Demand Survey Form

Institute of Transportation Engineers

(fill in all highlighted cells - \* are required data)

Land Use Code\* **760**

Name of Site **Nopper Technology Building**

Brief Description of Site

Three small office buildings with a single driveway in and out.

Transit\* **NO**

Area\* **RUR**

TMP\* **NO**

City **Bozeman, MT**

State **MT** Country **USA**

Parking Price\* \$

Daily Rate \$ Hourly Rate

Site Size\* **42,444**

Units\* **sq. ft.**

Occupancy\* **100%**

Land Use

Site Size

Units

Occupancy

Site Size

Units

Occupancy

Site Size

Units

Occupancy

Number of Parking Spaces Provided at Site

Highest Observed Parking Demand for the following hours of the day (hour beginning)\*

Date	4/7/2009	4/8/2009	4/9/2009			
Day	Tuesday	Wednesday	Thursday			
12 Mid						
1:00 AM						
2:00 AM						
3:00 AM						
4:00 AM						
5:00 AM						
6:00 AM						
7:00 AM	21	26	23			
8:00 AM	57	58	57			
9:00 AM	69	76	67			
10:00 AM	68	60	67			
11:00 AM	62	58	61			
12 Noon	60	65	60			
1:00 PM	70	64	69			
2:00 PM	64	66	72			
3:00 PM	56	61	69			
4:00 PM	35	43	49			
5:00 PM	3	4	6			
6:00 PM						
7:00 PM						
8:00 PM						
9:00 PM						
10:00 PM						
11:00 PM						

Person **Brian V. Church**

Organization **Montana State University - ITE**

Phone **406.994.2111**

Fax

Email [bvchurch@montana.edu](mailto:bvchurch@montana.edu)

Notes

Enter data on the web at [www.ite.org](http://www.ite.org)

Comments to: [ite\\_staff@ite.org](mailto:ite_staff@ite.org)

IF not entered on web site, please mail to:

Institute of Transportation Engineers, 1099 14th Street, NW Suite 300 West; Washington, DC 20005-3438

**Appendix C**  
**Data Collected by MSU-ITE**

MSU-ITE  
Western ITE Data Collection  
Small Office Space

Nopper Technology Building

Starting	Until	Entering Vehicles					Exiting Vehicles					Total Trips					Parked Vehicles				
		4/7/2009	4/8/2009	4/9/2009	Total	Average	4/7/2009	4/8/2009	4/9/2009	Total	Average	4/7/2009	4/8/2009	4/9/2009	Total	Average	4/7/2009	4/8/2009	4/9/2009	Total	Average
7:00 AM	7:15 AM	4	2	3	9	3.00	1	0	0	1	0.33	5	2	3	10	3.33	3	2	3	8	2.67
7:15 AM	7:30 AM	4	5	6	15	5.00	0	0	1	1	0.33	4	5	7	16	5.33	7	7	8	22	7.33
7:30 AM	7:45 AM	8	7	7	22	7.33	0	0	0	0	0.00	8	7	7	22	7.33	15	14	15	44	14.67
7:45 AM	8:00 AM	6	12	8	26	8.67	0	0	0	0	0.00	6	12	8	26	8.67	21	26	23	70	23.33
8:00 AM	8:15 AM	18	9	13	40	13.33	2	1	1	4	1.33	20	10	14	44	14.67	37	34	35	106	35.33
8:15 AM	8:30 AM	11	11	6	28	9.33	0	1	0	1	0.33	11	12	6	29	9.67	48	44	41	133	44.33
8:30 AM	8:45 AM	7	9	13	29	9.67	1	2	3	6	2.00	8	11	16	35	11.67	54	51	51	156	52.00
8:45 AM	9:00 AM	5	7	7	19	6.33	2	0	1	3	1.00	7	7	8	22	7.33	57	58	57	172	57.33
9:00 AM	9:15 AM	7	8	7	22	7.33	3	2	2	7	2.33	10	10	9	29	9.67	61	64	62	187	62.33
9:15 AM	9:30 AM	5	13	5	23	7.67	2	3	3	8	2.67	7	16	8	31	10.33	64	74	64	202	67.33
9:30 AM	9:45 AM	5	4	5	14	4.67	3	1	3	7	2.33	8	5	8	21	7.00	66	77	66	209	69.67
9:45 AM	10:00 AM	6	1	1	8	2.67	3	2	0	5	1.67	9	3	1	13	4.33	69	76	67	212	70.67
10:00 AM	10:15 AM	3	4	5	12	4.00	2	1	1	4	1.33	5	5	6	16	5.33	70	79	71	220	73.33
10:15 AM	10:30 AM	3	3	4	10	3.33	5	13	4	22	7.33	8	16	8	32	10.67	68	69	71	208	69.33
10:30 AM	10:45 AM	5	1	1	7	2.33	5	9	3	17	5.67	10	10	4	24	8.00	68	61	69	198	66.00
10:45 AM	11:00 AM	1	1	1	3	1.00	1	2	3	6	2.00	2	3	4	9	3.00	68	60	67	195	65.00
11:00 AM	11:15 AM	2	5	0	7	2.33	2	3	0	5	1.67	4	8	0	12	4.00	68	62	67	197	65.67
11:15 AM	11:30 AM	1	4	7	12	4.00	2	1	3	6	2.00	3	5	10	18	6.00	67	65	71	203	67.67
11:30 AM	11:45 AM	3	8	0	11	3.67	4	9	4	17	5.67	7	17	4	28	9.33	66	64	67	197	65.67
11:45 AM	12:00 PM	7	4	4	15	5.00	11	10	10	31	10.33	18	14	14	46	15.33	62	58	61	181	60.33
12:00 PM	12:15 PM	1	4	2	7	2.33	10	15	14	39	13.00	11	19	16	46	15.33	53	47	49	149	49.67
12:15 PM	12:30 PM	5	9	5	19	6.33	5	7	5	17	5.67	10	16	10	36	12.00	53	49	49	151	50.33
12:30 PM	12:45 PM	5	14	10	29	9.67	2	3	3	8	2.67	7	17	13	37	12.33	56	60	56	172	57.33
12:45 PM	1:00 PM	9	9	10	28	9.33	5	4	6	15	5.00	14	13	16	43	14.33	60	65	60	185	61.67
1:00 PM	1:15 PM	8	10	13	31	10.33	5	3	5	13	4.33	13	13	18	44	14.67	63	72	68	203	67.67
1:15 PM	1:30 PM	12	4	8	24	8.00	7	6	11	24	8.00	19	10	19	48	16.00	68	70	65	203	67.67
1:30 PM	1:45 PM	1	7	6	14	4.67	5	12	3	20	6.67	6	19	9	34	11.33	64	65	68	197	65.67
1:45 PM	2:00 PM	7	5	4	16	5.33	1	6	3	10	3.33	8	11	7	26	8.67	70	64	69	203	67.67
2:00 PM	2:15 PM	2	4	3	9	3.00	3	4	2	9	3.00	5	8	5	18	6.00	69	64	70	203	67.67
2:15 PM	2:30 PM	4	1	5	10	3.33	8	3	4	15	5.00	12	4	9	25	8.33	65	62	71	198	66.00
2:30 PM	2:45 PM	1	6	2	9	3.00	2	2	3	7	2.33	3	8	5	16	5.33	64	66	70	200	66.67
2:45 PM	3:00 PM	3	2	4	9	3.00	3	2	2	7	2.33	6	4	6	16	5.33	64	66	72	202	67.33
3:00 PM	3:15 PM	5	1	1	7	2.33	5	2	4	11	3.67	10	3	5	18	6.00	64	65	69	198	66.00
3:15 PM	3:30 PM	4	1	4	9	3.00	6	2	2	10	3.33	10	3	6	19	6.33	62	64	71	197	65.67
3:30 PM	3:45 PM	5	2	4	11	3.67	5	4	5	14	4.67	10	6	9	25	8.33	62	62	70	194	64.67
3:45 PM	4:00 PM	2	2	5	9	3.00	8	3	6	17	5.67	10	5	11	26	8.67	56	61	69	186	62.00
4:00 PM	4:15 PM	2	2	3	7	2.33	8	9	10	27	9.00	10	11	13	34	11.33	50	54	62	166	55.33
4:15 PM	4:30 PM	2	4	2	8	2.67	6	8	3	17	5.67	8	12	5	25	8.33	46	50	61	157	52.33
4:30 PM	4:45 PM	1	1	2	4	1.33	8	7	9	24	8	9	8	11	28	9.33	39	44	54	137	45.67
4:45 PM	5:00 PM	2	4	3	9	3	6	5	8	19	6.33	8	9	11	28	9.33	35	43	49	127	42.33
5:00 PM	5:15 PM	2	0	3	5	1.67	16	16	26	58	19.3	18	16	29	63	21	21	27	26	74	24.67
5:15 PM	5:30 PM	0	0	0	0	0	5	11	11	27	9	5	11	11	27	9	16	16	15	47	15.67
5:30 PM	5:45 PM	1	2	0	3	1	8	11	5	24	8	9	13	5	27	9	9	7	10	26	8.67
5:45 PM	6:00 PM	0	0	0	0	0	6	3	4	13	4.33	6	3	4	13	4.33	3	4	6	13	4.33

Note: Peak hours are highlighted for total trips and parked cars for each day.