Travel Demand Management

An analysis of the effectiveness of TDM Plans in reducing traffic and parking in the Minneapolis-St. Paul Metropolitan Area

By Mike Spack, PE, PTOE &
Jonah Finkelstein, EIT

January 7, 2014

Spack
CONSULTING
THE TRAFFIC STUDY COMPANY

Introduction
The goal of a Travel Demand Management (TDM) Plan is to encourage the reduction of single occupancy vehicle use during rush hours. Based on our literature search, the effectiveness of TDM Plans has been minimally studied. Several positive case studies were found, but no data on mediocre or non-effective TDM Plans was found. Is it possible TDM may not provide all of the claimed benefits?

We conducted a study in 2009 that analyzed the effectiveness of TDM Plans in reducing traffic generation and peak parking demand, but there were concerns that the traffic patterns may have been impacted by the recession. The purpose of this study is to objectively study the traffic and parking characteristics of office buildings in the Twin Cities Metropolitan Area (Minneapolis/St. Paul, Minnesota) who are actively implementing TDM Plans now that the economy has rebounded.

Findings & Recommendations
Compared to Institute of Transportation Engineers' average data rates, this study found office buildings that implemented TDMP Plans generate, on average, 34% to 37% less traffic and need 17% to 24% less parking on site. These results are similar to the 27% to 37% traffic and 11% to 21% parking reductions found in 2009. These findings prove there are significant traffic and parking reduction benefits associated with employers providing Travel Demand Management programs. It is recommended transportation professionals use this finding in two ways:

1. Encourage employers to implement TDM Plans
2. Account for reduced parking and traffic generation in Traffic Impact Studies for developments that are committed to implementing TDM Plans

For development Traffic Impact Studies conducted in the Twin Cities region, trip generation should be reduced by 30% and peak parking generation should be reduced by 15% for office developments that will be implementing TDM Plans. It is expected TDM Plans will yield similar reductions in different regions, but that should be corroborated with location specific data similar to this study.

Study Methodology
A host of potential office complexes utilizing TDM Plans were identified in the Twin Cities Region with the help of local traffic engineers and transportation management professionals. Aerial photos were then used to examine the sites to determine if the site's traffic could be counted with the video-based COUNTcam traffic analysis system. No central business district sites met this initial criterion because employees could park in multiple parking ramps within the downtown area.

Staff at each office complex where the entering/exiting traffic volumes could be counted was contacted. Of these sites, property managers or transportation managers from nine of the sites responded positively with statistical data related to their site (see Table 1). The Appendix contains detailed descriptions of each site. Several managers supplied data with the request that the name and location of the business be kept anonymous. All businesses have been kept anonymous to respect these requests.

Trip generation and parking counts were collected at these nine sites, over 24 hour periods, on non-holiday weekdays to ensure the data was collected during normal conditions. Data was collected in the Fall of 2013 and is included in the Appendix. The summary data is included in Table 1 while the data is analyzed in the next two sections of this report.

Table 1 – Office Building Site Characteristics

		A	B	C	D	E	F	G	H	I
Site Data	**Sq. Footage**	166,000	181,000	292,000	573,116	712,868	246,775	119,000	1,400,000	64,240
	Employees	275	304	1314	2123	2,800	458	600	~6000	220
	Location	Suburb	Urban	Suburb	Urban	Suburb	Suburb	Suburb	Suburb	Suburb
	Parking Stalls	341	270	1263	1646	2361	351	552	6988	268
Traffic Data	**Daily Volume**	675	599	3799	6248	5097	701	1178	14667	464
	AM Peak Hr Volume	100	91	395	800	769	112	172	2062	73
	PM Peak Hr Volume	95	75	431	841	717	903	145	2180	67
	Maximum Stalls Parked	191	239	959	1405	1563	270	427	5080	147
Transit Services	**Bus Stop**		x	x	x	x	x			
	Distance		2	1	on site	1	6			
	Enhanced Bus Amenities			x						
	Shuttle Service			x	x					
Parking Management	**Paid**									
	HOV Preferential	x	x	x	x		x		x	
	Pedestrian Accessibility	x	x	x	x		x	x	x	
Incentive Programs	**Free Transit**								x	
	Discounted Transit			x						
	Cash						x	x	x	x
	Non-Money Reward				x	x	x			
	Tax Subsidies									
Rideshare Programs	**Carpool / Vanpool**	x	x	x	x	x	x	x	x	x
	Car Sharing	x			x					
	Bike Sharing				x	x				
	Guaranteed Ride Home	x		x	x					
	Rideshare Matching		x	x	x					
Alternative Schedule	**Telework**		x	x	x	x	x			x
	Flextime	x	x	x	x	x	x			x
	Compressed Weeks		x		x					x
Bicycle Infrastructure	**Racks**	x	x	x	x	x	x		x	
	Showers	x	x	x	x	x	x		x	x
	Lockers			x	x		x		x	x
	Cycling Improvements						x			
	Walking / Cycling			x	x	x	x			
Advertising / Communication	**Posters / Kiosks**			x			x	x	x	x
	Newsletters			x	x	x	x			
	Internet			x	x	x	x	x		
	Transportation Coordinators			x		x	x			

Traffic Generation Analyses

Figure 1 shows the amount of total traffic entering and exiting each site during the a.m. peak hour, generated per 1,000 square feet of building space at each facility. The highest rate observed in the morning rush hour was 1.40 trips per 1,000 square feet while the lowest was 0.45 trips per 1,000 square feet. Using the values from all nine sites, an average total traffic value of 1.02 trips per 1,000 square feet was determined. This rate corresponds with a 35% reduction in trips, compared to the industry average rate of 1.56 documented in the Institute of Transportation Engineers' *Trip Generation Report, 9th Edition.* All nine values for a.m. peak hour trips fell below this industry average.

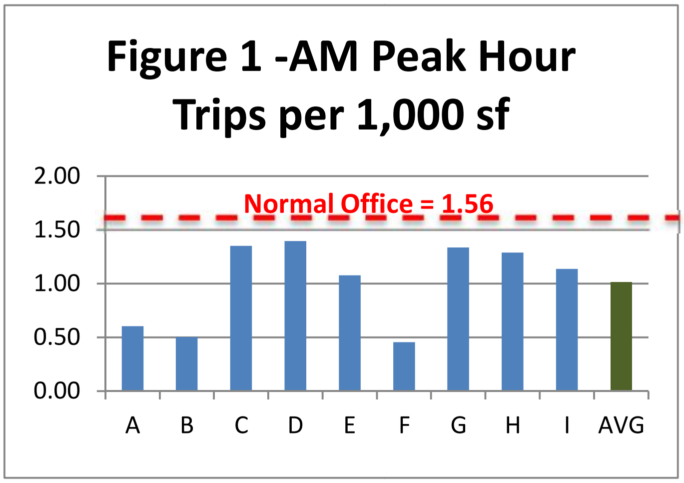
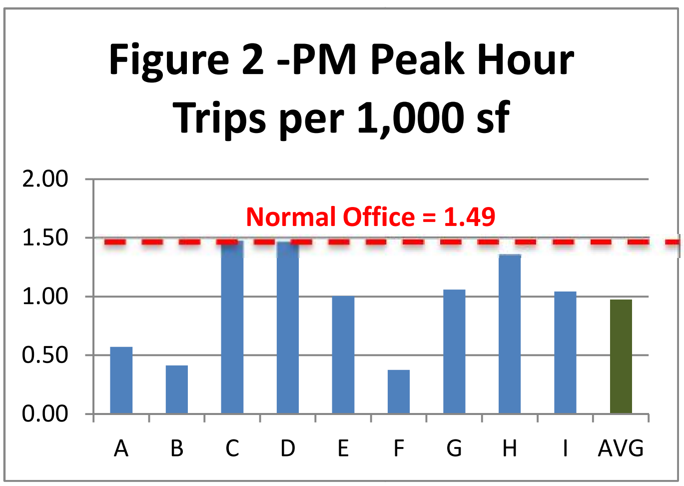


Figure 2 shows the amount of total traffic entering and exiting each site during the p.m. peak hour, generated per 1,000 square feet of building space at each facility. The highest and lowest observed rates during the evening rush hour were 1.48 and 0.38 trips per 1,000 square feet respectively. The average for all nine observed sites was 0.98. This rate corresponds with a 34% reduction in trips, compared to the industry average rate of 1.49 documented in the Institute of Transportation Engineers' *Trip Generation Report, 9th Edition.* None of the nine values for p.m. peak hour trips exceeded the industry average.



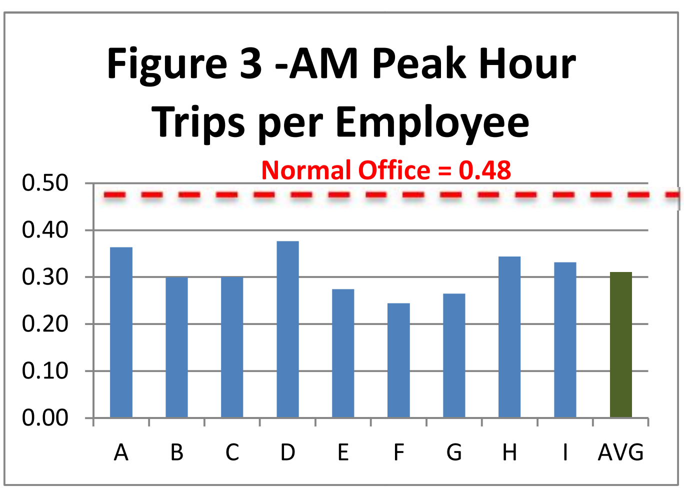
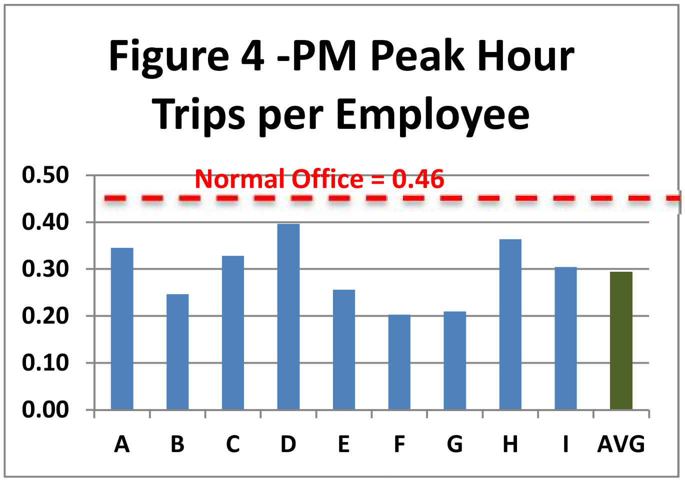


Figure 3 shows the amount of total traffic generated per employee at each site during the a.m. peak hour. The highest rate observed was 0.38 trips per employee while the lowest was 0.24 trips per employee. The average trip rate was calculated as 0.31 trips per employee, which is a 35% reduction in trips compared to the industry average rate of 0.48 trips per employee. All collected values were below the expected industry average.

Figure 4 shows the amount of total traffic generated per employee at each site during the p.m. peak hour. The highest rate observed was 0.40 trips per employee while the lowest was 0.20 trips per employee. The average trip rate was calculated as 0.29 trips per employee, which is a 37% reduction in trips compared to the industry average rate of 0.46 trips per employee. All collected values were below the expected industry average.



Parking Generation Analyses

Figure 5 shows the peak number of parked stalls filled per 1,000 square feet of building during the study periods. The highest rate observed was 3.59 stalls parked per 1,000 square feet, while the lowest rate observed was 1.09 stalls parked per 1,000 square feet. The average from all nine sites was 2.28 stalls parked per 1,000 square feet. This value is 20% lower than the industry average (the average peak parking demand rate of 2.84 parked vehicles per 1,000 square feet, suburban locations, from the Institute of Transportation Engineers' *Parking Generation, 4th Edition)*.

Three sites observed had peak parked stall per 1,000 square feet values above the industry average. These three anomalies can possibly be explained due to location of the site and number of employees at the locations. All three sites are in suburban locations and would require extra transfers in order to use public transportation to travel to work, which lowers the incentive to use this mode of transportation. The three sites had the highest numbers of employees per square foot, which would lead to a higher number of parked stalls per 1,000 square feet due to a larger volume of cars.

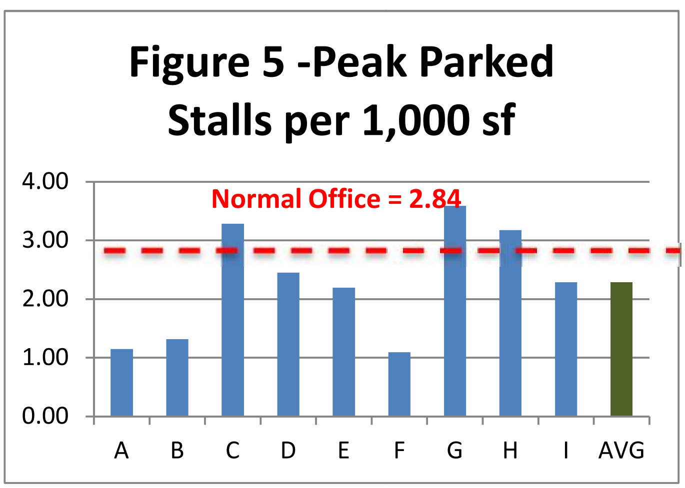
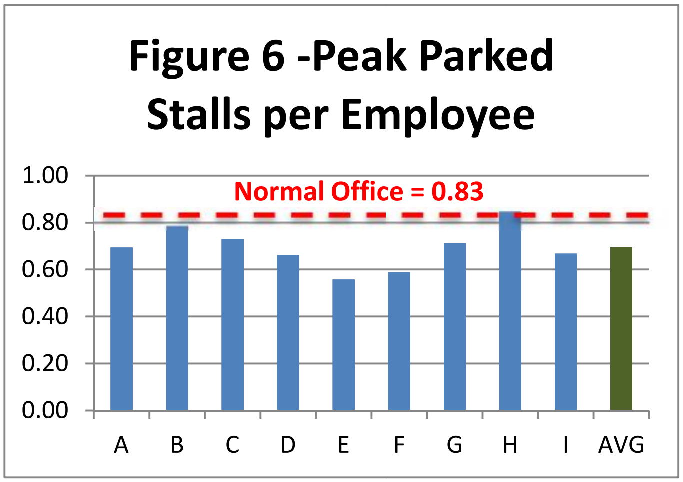


Figure 6 displays the peak number of parked stalls per employee. The highest and lowest observed rates were determined as 0.85 and 0.56 parked stalls per employee respectively. The average value of 0.69 parked stalls per employee was determined. This value is 17% lower than the industry average of 0.83 peak parked stalls per employee for a normal office building (Institute of Transportation Engineers' *Parking Generation, 4th Edition)*.



Only one site had a value higher than the expected industry average, which was 2.4% over the average. This higher value could be explained due to a small retail and customer service store that opened in the location. This would lead to higher traffic from customers entering and exiting the campus.

Conclusions

The office complexes with implemented TDM Plans generated 34% to 37% less peak hour traffic and 17% to 24% less peak parking demand when compared to the Institute of Transportation Engineers' expected average values. This study demonstrates implementing TDM Plans does in fact measurably reduce peak hour traffic generation and peak period parking demand.

Next Steps

This study analyzed the effectiveness of TDM strategies at nine sites in Minnesota. Our findings are encouraging, but more data should be collected. Due to the limited dataset, we were not able to determine TDM "best practices" which could be identified with a larger dataset. Comparing the results in office buildings without TDM plans would be interesting as well, and would help show if the lower traffic generation and peak parked stalls were due to the TDM Plans in place or the standard for Minnesota office buildings. The universality of our findings could also be corroborated with data from different regions of the country.

APPENDIX A - Description of Sites

This section contains a description of the nine sites surveyed. Table 1 identified which TDM strategies each site utilized at the time the data was collected along site data for each observed campus.

Site A is an energy company in a second tier suburb in the northwest metro. The company is located in a high density, heavily traveled shopping area. This site is a LEED certified building. LEED points were earned in the area of alternative transportation through its close proximity to a regional mass transit station and incentives for car sharing, carpooling, and vanpooling.

Site A
No. of Stalls: 341
No. of Employees: 275
Building Size: 166,000 sf
Location: Suburban

The parking area contains 341 stalls and has two access points. The main access point is used by a majority of vehicles and branches off the main road in front of the building. A secondary, gate controlled, access point is located on the west side of the site. This driveway leads to the parking lot of a shopping center. The gate will open automatically for cars leaving the lot, however a card is needed for cars entering the lot. Only a small number of employees have these cards, although the specific number was not available.

Site B is a privately-owned medical device manufacturer occupying a LEED certified multi-story office building. The site is categorized as being urban and in close proximity to downtown Minneapolis.

Site B
No. of Stalls: 270
No. of Employees: 304
Building Size: 181,000 sf
Location: Urban

The site contains two surface parking areas. The primary traffic within this site was generated by employees, visitors, deliveries/pick-ups, and company vehicles (trucks). The front visitor lot contains 19 parking stalls with two access points. The second parking lot is used by employees and deliveries and contains 251 spaces with two "card controlled" sliding-fence gates. During observation both of the gates were open during normal business hours.

Site C is occupied by four manufacturing buildings operated by the same company. There are five total parking areas for the campus. This site is suburban. During peak hour observation, the number of employees taking advantage of the bus service was relatively low, presumably due to the site being suburban and transfers likely needed to reach the destination. This site also provided high incentives for carpooling and vanpooling. The preferential carpooling designated stalls were full throughout the peak periods.

Site C
No. of Stalls: 1263
No. of Employees: 1314
Building Size: 292,000 sf
Location: Suburban

They parking lots contain 1,263 employee-based parking spaces. A small visitor lot containing approximately 30 stalls was not included in the calculations because data was not collected at this lot.

Site D is occupied by three Minnesota government agencies. Each agency occupies a separate multi-story building but all three agencies share open surface parking areas. This site is urban in close proximity to downtown St. Paul (high density mixed-use buildings).

Site D
No. of Stalls: 1646
No. of Employees: 2123
Building Size: 573,116 sf
Location: Urban

This site provides incentives for utilizing local transit services and rideshare programs. It was noted during the observation; three local bus routes provided frequent service. Most car-pooling designated stalls were full throughout the peak periods.

Four surface parking areas were observed for this study, providing 1,646 employee based parking spaces.

Site E occupies two separate multi-story suburban office buildings and is the world headquarters of an insurance company. Both buildings share a multiple level garage and surface parking lot. The main building has a front parking lot mainly for visitors with 32 stalls. The parking garage permits entry with security card clearance; having a capacity of 2,130 stalls. The shared surface lot with 199 parking stalls has visitor parking yet is primarily used by employees. High incentives are placed on carpooling along with preferential parking for carpool vehicles.

Site E
No. of Stalls: 2361
No. of Employees: 2800
Building Size: 712,868 sf
Location: Suburban

Site F is occupied by the central hub of a bicycle manufacturing company. The building's suburban location includes both office and warehouse space. The company has incentives for carpooling, biking and walking, along with designated lockers for people who bike or walk to the location. It was noted that many employees utilized the bike racks and lockers as biking is very popular within the office's community.

Site F
No. of Stalls: 351
No. of Employees: 458
Building Size: 246,775 sf
Location: Suburban

The parking lot is connected to the main entrance of the company and has 331 stalls with one entrance and exit. A second smaller lot, of 20 stalls, is located in the rear by the warehouse section of the building.

Site G is occupied by a large military manufacturing company. The suburban location has one entrance. The company has a high incentive for carpooling, walking or biking and has a $40 monthly cash incentive for employees that participate in these modes of transportation.

Site G
No. of Stalls: 552
No. of Employees: 600
Building Size: 119,000 sf
Location: Suburban

There is one large parking lot which consists of 552 parking stalls with smaller arterial parking lots branching off and surrounding the building.

Site H is the international headquarters of an electronics distributer. The large suburban campus, consisting of two companies, includes four separate buildings connected by a central hub. The company has incentives for employees along with worker housing directly across the street.

Site H
No. of Stalls: 6988
No. of Employees: 6000
Building Size: 1,600,000 sf
Location: Suburban

The parking facilities include a covered parking ramp with 6,700 stalls with two access point. An additional 271 stalls are located outside for visitor parking in two separate areas. A 17 stall delivery lot is also located near the rear of the campus.

Site I is the corporate headquarters of an HVAC manufacturing company. The suburban location is centered on the multi-story building complex. The company had low participation in the discounted transit incentives as the location was not cohesive with bus travel.

Site I
No. of Stalls: 268
No. of Employees: 220
Building Size: 64,240 sf
Location: Suburban

The parking facilities at the location included a single access point parking lot with 268 stalls. The parking lot had one main area connected to the front door with a single lane of stalls lining the perimeter of the campus.

APPENDIX B - Traffic Count Data

	Site A		Site B		Site C		Site D		Site E		Site F		Site G		Site H		Site I	
	10/23/2013		10/23/2013		10/24/2013		10/30/2013		10/23/2013		11/7/2013		11/7/2013		11/7/2013		11/7/2013	
Time	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
00:00	0	0	0	2	2	3	1	5	0	0	0	0	0	0	0	4	0	0
00:15	0	0	0	0	1	1	1	2	1	1	0	0	0	0	1	5	0	0
00:30	0	0	0	0	2	4	1	0	0	4	0	0	0	1	1	3	0	0
00:45	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
01:00	0	0	0	0	0	4	0	0	1	0	0	3	0	0	0	7	0	0
01:15	0	0	0	0	0	6	0	0	1	0	0	0	0	0	0	8	0	0
01:30	0	0	0	0	1	17	1	0	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	1	0	0
02:00	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	8	8	1	2	2	0	0	0	0	0	0	0	0	0
02:30	0	0	1	0	3	19	1	1	0	0	0	0	0	0	0	1	1	1
02:45	0	0	0	0	0	2	1	2	0	0	0	0	1	1	0	0	1	1
03:00	0	0	0	0	3	1	2	3	1	1	0	0	0	0	0	0	1	0
03:15	0	0	0	0	0	2	0	0	1	1	0	0	2	0	0	2	0	0
03:30	0	0	1	0	1	1	3	3	0	0	0	0	1	0	0	0	0	0
03:45	0	0	3	0	2	1	0	0	1	0	0	0	2	0	4	2	0	0
04:00	0	0	2	0	1	2	2	3	0	0	0	0	0	0	2	0	0	0
04:15	0	0	1	0	1	1	2	2	0	0	0	0	3	0	5	1	1	0
04:30	0	0	1	0	2	1	1	1	2	0	0	0	0	0	15	4	2	0
04:45	1	0	3	1	5	1	4	0	0	0	4	0	7	1	15	4	0	0
05:00	0	0	3	1	6	1	9	1	4	1	0	0	3	0	20	1	4	0
05:15	2	0	2	0	8	1	14	4	11	1	1	0	4	0	26	3	1	0
05:30	0	1	6	0	28	1	14	3	20	2	0	0	11	0	50	4	2	0
05:45	3	1	14	0	31	14	32	6	33	3	1	0	27	0	106	11	3	0
06:00	2	1	3	0	46	8	47	3	40	5	3	1	29	2	103	11	5	0
06:15	8	0	6	0	65	3	54	7	57	3	2	0	21	0	145	15	3	1
06:30	11	4	6	0	64	2	71	16	73	8	6	0	39	2	179	17	7	0
06:45	14	1	8	0	71	9	88	12	121	9	9	0	37	0	286	27	11	0
07:00	17	0	14	1	58	7	107	17	106	12	1	0	42	1	331	25	13	0
07:15	15	0	18	1	74	6	145	24	135	14	7	0	40	4	438	30	14	0
07:30	18	2	19	1	91	3	154	29	158	21	17	2	48	0	393	27	20	0
07:45	27	2	16	0	88	4	164	37	179	20	31	0	24	0	424	14	19	0
08:00	24	3	25	1	89	8	195	49	171	13	21	0	32	0	508	25	20	0
08:15	22	2	20	0	103	6	134	38	187	20	24	0	28	0	536	14	9	0

APPENDIX B - Traffic Count Data

	Site A		Site B		Site C		Site D		Site E		Site F		Site G		Site H		Site I	
	10/23/2013		10/23/2013		10/24/2013		10/30/2013		10/23/2013		11/7/2013		11/7/2013		11/7/2013		11/7/2013	
Time	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
08:30	8	0	18	4	83	14	141	21	144	23	31	2	18	4	511	16	2	0
08:45	12	3	21	2	66	20	104	24	135	17	34	0	6	2	441	11	3	0
09:00	8	3	10	0	55	12	101	25	73	14	16	0	12	1	279	17	6	3
09:15	8	2	4	1	40	18	69	18	72	27	11	1	6	4	233	19	0	0
09:30	9	6	1	0	19	12	57	38	40	21	11	0	3	1	165	26	2	0
09:45	4	2	6	2	20	11	57	24	32	13	14	0	5	1	106	31	0	3
10:00	5	1	7	0	20	15	32	29	17	7	10	3	4	4	74	42	1	0
10:15	4	0	1	1	22	20	35	28	12	10	2	1	2	4	79	29	2	0
10:30	3	2	0	0	17	20	30	32	13	16	6	1	4	6	72	56	2	0
10:45	6	5	1	0	25	22	28	32	17	23	4	0	3	4	68	52	2	1
11:00	6	6	2	1	23	24	28	39	16	35	2	1	3	14	65	100	3	5
11:15	5	5	2	1	21	41	49	51	14	27	2	2	7	17	81	111	3	5
11:30	2	5	3	2	33	49	50	100	26	52	4	1	10	12	70	104	6	21
11:45	0	7	0	4	21	50	44	74	35	51	3	6	15	8	94	88	3	10
12:00	4	6	1	1	25	50	51	74	30	43	4	13	5	7	78	115	6	9
12:15	11	5	1	2	37	34	70	58	31	31	5	3	14	6	106	89	15	7
12:30	6	6	2	3	35	29	85	62	34	15	9	2	10	3	99	80	6	3
12:45	17	11	3	1	55	39	73	50	42	33	11	4	13	6	89	58	9	1
13:00	11	10	3	2	53	27	94	45	41	32	1	7	5	5	63	92	7	1
13:15	5	10	1	1	39	24	79	48	13	22	11	4	3	12	66	57	3	1
13:30	5	2	6	1	31	16	54	40	24	18	5	2	5	8	58	83	1	1
13:45	2	1	15	6	32	22	41	43	20	12	5	2	4	7	52	60	1	1
14:00	3	5	0	6	22	20	44	47	15	25	1	4	3	13	48	96	0	2
14:15	2	4	0	2	11	21	24	30	19	27	1	6	2	7	37	113	0	5
14:30	3	2	3	41	19	31	17	35	11	26	0	2	2	21	38	122	1	1
14:45	2	5	0	8	19	32	10	26	11	29	0	4	0	16	53	132	2	2
15:00	1	17	0	5	23	63	22	46	8	58	3	13	4	21	35	231	1	4
15:15	2	13	4	6	14	80	24	67	6	62	1	11	5	21	54	230	0	5
15:30	1	18	0	12	23	107	13	145	5	71	4	11	4	26	57	349	1	21
15:45	2	25	2	11	29	73	26	103	17	63	4	11	2	29	62	308	2	10
16:00	0	25	1	11	13	92	35	186	14	160	0	27	0	37	37	564	0	10
16:15	2	14	0	15	9	77	53	148	13	133	1	22	1	36	32	506	0	11
16:30	2	25	0	18	7	85	28	238	17	157	0	24	1	39	32	517	1	17
16:45	2	15	0	11	9	94	37	116	14	164	2	17	0	25	35	457	1	15

APPENDIX B - Traffic Count Data

Time	Site A		Site B		Site C		Site D		Site E		Site F		Site G		Site H		Site I	
	10/23/2013		10/23/2013		10/24/2013		10/30/2013		10/23/2013		11/7/2013		11/7/2013		11/7/2013		11/7/2013	
	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out
17:00	3	13	3	18	7	87	32	141	23	189	0	21	1	23	14	455	0	22
17:15	4	7	1	24	5	55	32	107	14	139	0	23	0	24	15	446	0	6
17:30	0	9	0	13	2	39	21	86	21	112	0	27	1	20	20	307	0	8
17:45	0	3	1	7	6	45	13	78	15	96	0	9	0	17	12	243	0	6
18:00	0	2	0	11	5	56	13	34	7	118	0	11	0	17	6	201	0	1
18:15	2	2	1	5	4	41	9	34	3	39	1	7	1	13	4	100	0	5
18:30	0	4	0	4	1	13	16	28	5	50	1	4	1	9	4	90	1	2
18:45	0	4	0	3	2	8	10	26	8	29	0	4	0	5	8	57	0	0
19:00	1	0	0	6	2	12	6	14	6	36	0	4	0	5	7	56	0	0
19:15	0	3	0	4	1	7	12	12	6	25	1	14	0	4	2	41	0	1
19:30	0	0	0	3	3	11	12	14	6	13	0	10	0	0	7	30	0	0
19:45	0	0	0	0	1	1	5	13	6	16	0	2	0	3	11	23	0	1
20:00	0	0	1	5	1	2	3	9	6	7	0	0	0	2	3	23	0	0
20:15	0	0	0	0	4	3	2	18	5	10	0	0	0	0	1	18	0	0
20:30	1	1	0	0	2	5	4	11	3	7	0	0	0	0	7	11	0	0
20:45	0	0	0	1	3	2	0	3	4	9	1	0	0	2	4	13	1	0
21:00	0	0	0	0	6	0	2	11	5	4	1	2	0	1	4	19	0	0
21:15	0	0	0	0	4	2	5	12	4	4	0	0	0	0	4	14	0	0
21:30	0	0	0	0	1	2	1	8	5	7	0	0	0	1	4	7	1	0
21:45	0	0	0	0	0	1	0	0	3	4	0	0	0	2	4	12	0	2
22:00	1	1	0	0	1	2	0	3	6	5	0	0	0	0	3	6	0	0
22:15	0	4	0	0	1	3	0	1	0	1	0	0	0	0	2	9	0	0
22:30	0	0	1	0	0	1	0	1	1	7	0	0	0	0	5	9	0	0
22:45	0	0	0	8	0	0	3	3	2	2	0	0	0	0	1	8	0	0
23:00	0	0	0	0	0	12	2	2	0	2	0	0	0	0	1	10	0	0
23:15	0	0	0	0	0	1	3	2	2	0	0	0	2	1	2	5	0	0
23:30	0	0	0	0	1	1	0	1	3	3	0	0	0	1	1	7	0	0
23:45	0	0	0	0	4	0	1	2	0	2	0	0	0	1	2	4	0	0