

Trip Generation and Parking Demand Roosevelt High School

Final Report

 at the  UNIVERSITY *of* WASHINGTON

2010 ITE District 6 - Data Collection Project
Institute of Transportation Engineers Student Chapter at the University of Washington

Trip and parking generation data were collected from Roosevelt high school in the Seattle metropolitan area. The high school is located in the Roosevelt neighborhood and is surrounded by NE 68th St, NE 66th St, 12th Ave NE, and 15th Ave NE. 114 teachers and administrative people, and 1676 students become to this high school. People can access the school by: foot, bikes, transit buses, and cars. Students can also travel by school bus.

The general location of this high school is presented in Figure 1 and a closer view is provided in Figure 2. Transit bus stop locations are shown as blue icons in Figure 2. A detail of car parking areas is shown in Figure 3.

Trip generation and parking demand data were collected manually on three weekdays: Thursday, March 4th, 2010; Tuesday, March 9th, 2010; and Wednesday, March 10th, 2010. Transit data were collected only on March 9th. The data were tracked in 5-min intervals during the morning peak period (7:00 AM – 8:30AM) and afternoon peak period (2:00 PM – 3:00 PM) and for some type of data at the beginning of each hour starting at 6:00 AM. Details in the next paragraphs.

Data include drop offs/pickups, number of vehicles in the high school's parking lot and on-street parking, number of school buses and people in them, and number of transit buses and people taking/getting off from the them. In addition to this data, number of cars parked in the neighborhood streets, not further than one block from the high school, were also measured.

Drops offs and pickups were measured in 5-min interval during each of the peak periods. Figure 4 shows number of people from drop offs in the morning peak and Figure 5 from pickup in the afternoon peak. Figure 8 and Figure 9 show analog information but for the number of vehicles

The parking lot and on-street parking data were collected also during the peak periods. Figure 6 and Figure 7 show the number of people arriving and leaving the school during the morning and afternoon peak period respectively. Figure 10 and Figure 11 show analog information but for the number of cars. Figure 12 shows the data for the parking lot plus on-street parking data for each hour. In this figure, it is possible to see a steep increase from 7:00 AM to 8:00 AM since people is arriving but slowly leave from 2:00 PM on due sports, extracurricular activities spread during the afternoon.

Based on on-site observations during the study days, the vehicle occupancy rate for cars parking in the school is estimated to be 1.1 and two for those which either drop off or pick up passengers.

Data from school buses were collected in 5-minutes interval in the peak periods. These data come from two types of school buses with different capacities. The first one, can have fifteen students seated, the second one forty. An occupation rate of 25%, 50%, 75, or 100% was estimated when it was not possible to count the number of students in the bus. These percentages are then multiplied by the bus capacity.

Transit bus data were collected by camera from three bus stops and by hand from a fourth one: 15th Ave NE & NE 65th St, NE 65th St & 15th Ave NE, 12th Ave NE & NE 65th St., and 15th Ave NE & NE 68th St. An extra camera at 12th Ave NE and NE 68th St. did not work so the average of the activity in the other bus stops is assumed as the demand here.

The neighborhood parking was only measured at 6:00 AM, 9:00 AM, and 3:00 PM. We assume all cars arriving between 6:00 and 9:00 AM are generated by the high school and are assigned to the AM peak hour generator. The difference in number of cars between 3:00 PM and 9:00 AM is assumed as cars leaving and included in the PM peak hour generator. The streets included in the neighborhood parking are shown in Figure 13. Nonetheless, these streets do not have any type of parking restrictions.

The AM peak period generator takes place between 7:10 - 8:10AM and the PM one between 2:00 to 3:00PM. The modal shift is: 82% all cars, 13% bus, 4% school buses, and 0.2% bikes. In average, there is 0.53 vehicle trips per student + employees during the AM peak hour generator (7:10 to 8:10AM), 0.19 vehicle trips per student + employees for the PM one (2:00 to 3:00PM), and 0.08 parked vehicle per student + employees between 1:00 and 2:00 PM.

Finally, a summary of the trip and parking generation for both the AM and PM hour generator is presented in Table 1. Data for the modal shift calculations comes from this table using the occupation rates presented above.



Figure 1: Location of Roosevelt High School in the Seattle Area



Figure 2: Aerial View of Roosevelt High School. Detail of Surrounding Roads and Location of Transit Buses



Figure 3: Parking Lot and On-Street Parking

Location	1478 NE 66 th St, Seattle, WA 98115
Parking Availability	80 parking spaces on NE 68 th St. 35 parking spaces on NE 66 th St. (Total: 115 on-street spots) 171 spots in the parking lot. ----- 286 parking spaces in total
Site Area	413,820 sq-ft
High School Building Area	256,482 gross sq-ft
Regular Classes	8am ~ 2:35pm

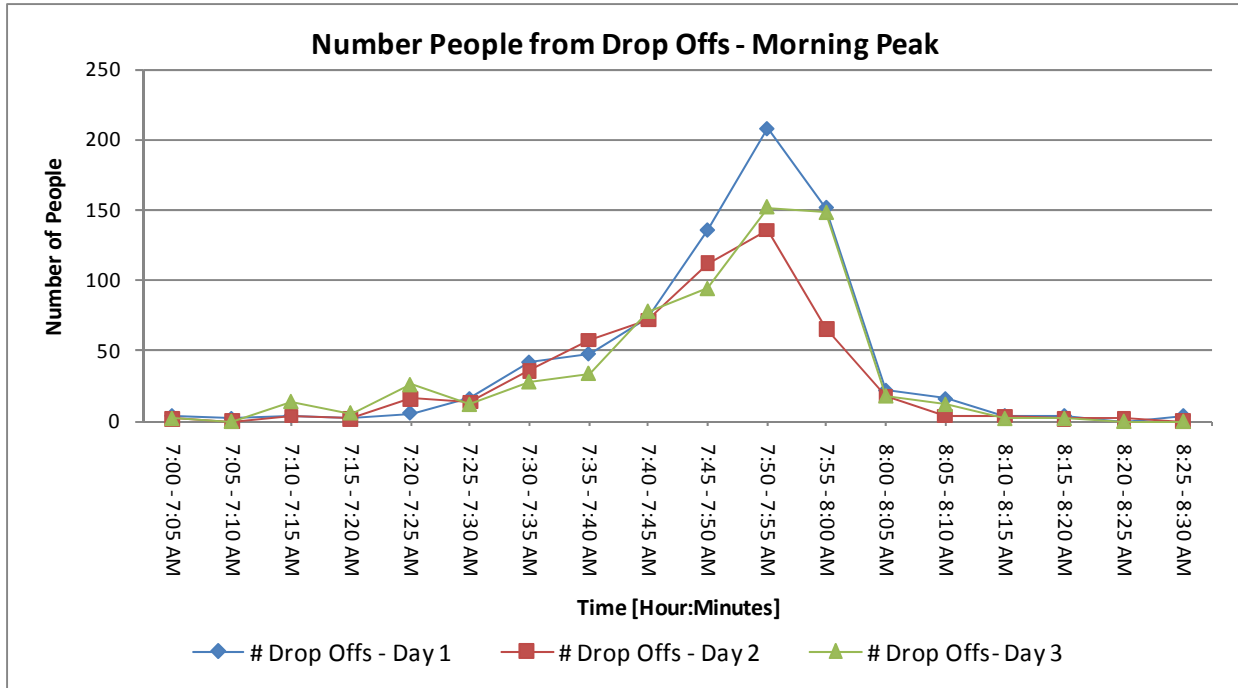


Figure 4: Number of people from drop offs during the 7:00 AM - 8:30 AM period for each of the three days in study in 5-minute increments. Occupancy rate of 2.0 is used.

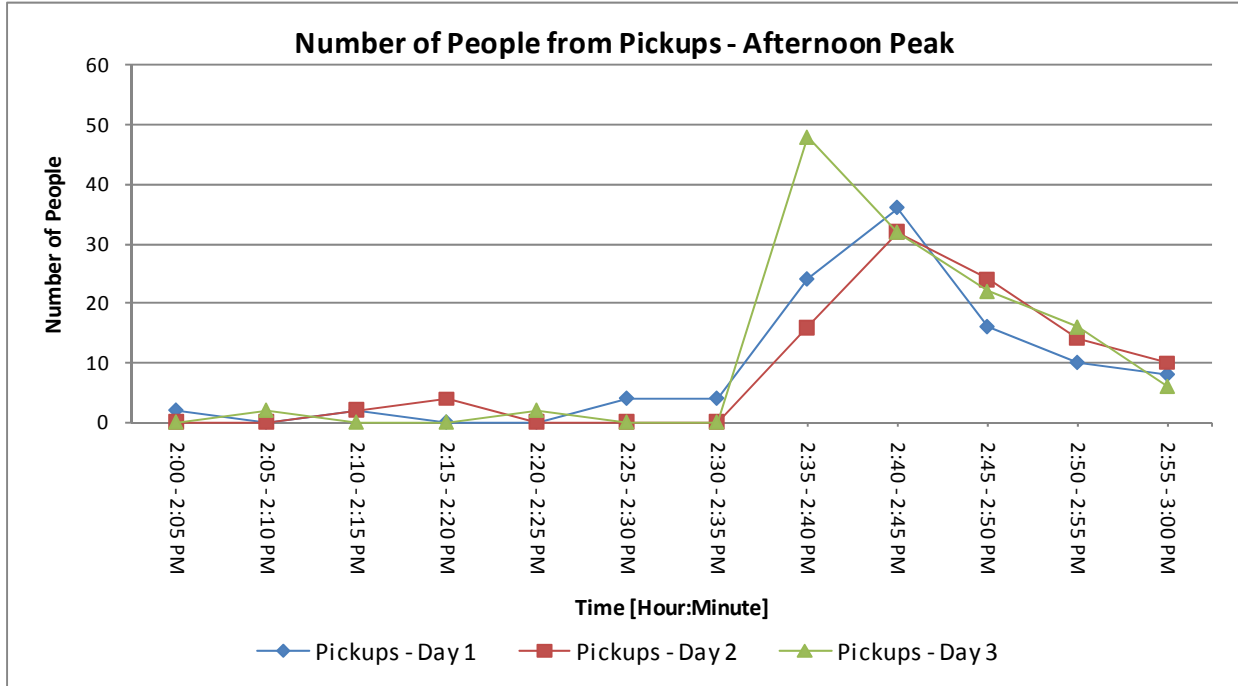


Figure 5: Number of people from pickups during the 2:00 PM - 3:00 PM period for each of the three days in study in 5-minute increments. Occupancy rate of 2.0 is used.

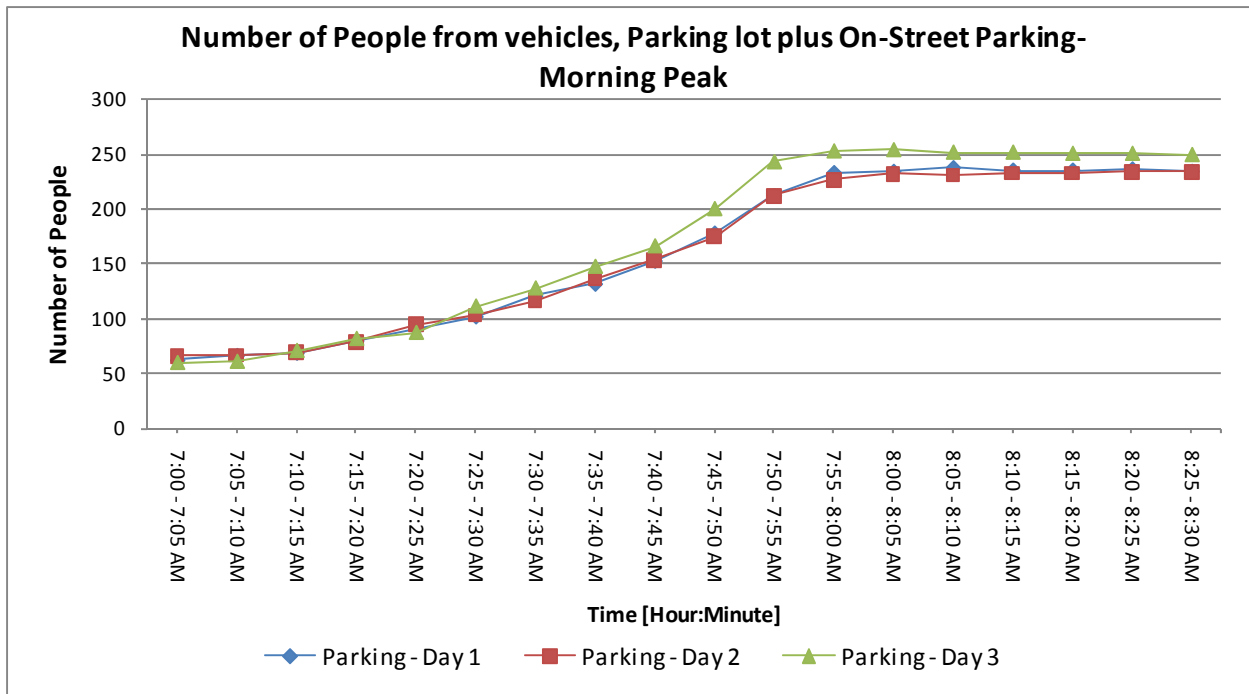


Figure 6: Total Number of people from vehicles parking during the 7:00 AM - 8:30 AM period for each of the three days in study in 5-minutes increments. Occupancy rate of 1.1 is used.

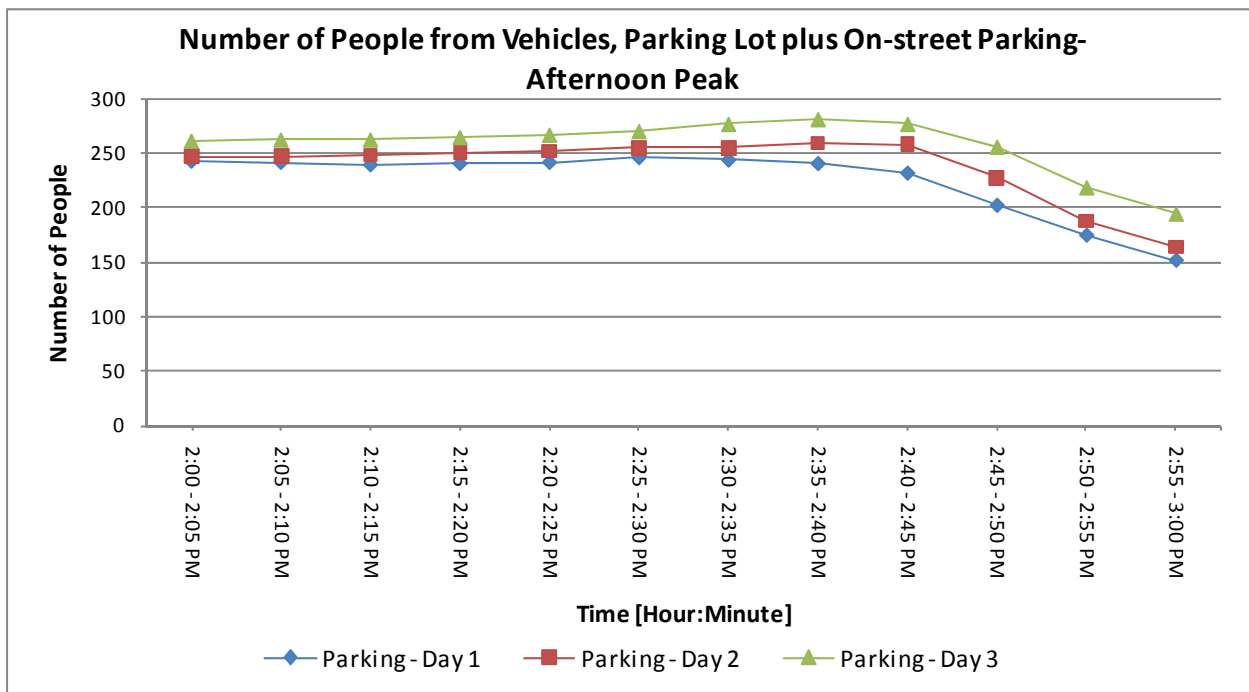


Figure 7: Total Number of people from vehicles parking during the 2:00 PM - 3:00 PM period for each of the three days in study in 5-minutes increments. Occupancy rate of 1.1 is used.

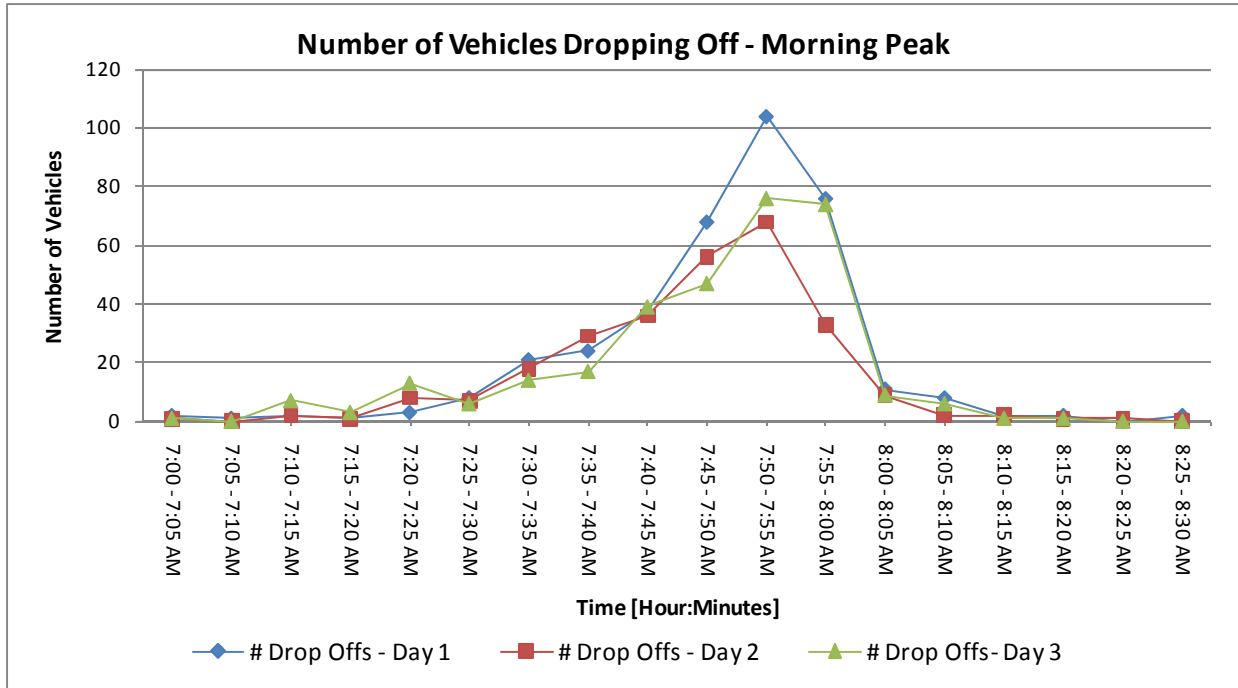


Figure 8: Number of vehicles dropping offs people during the 7:00 AM - 8:30 AM period for each of the three days in study in 5-minutes increments.

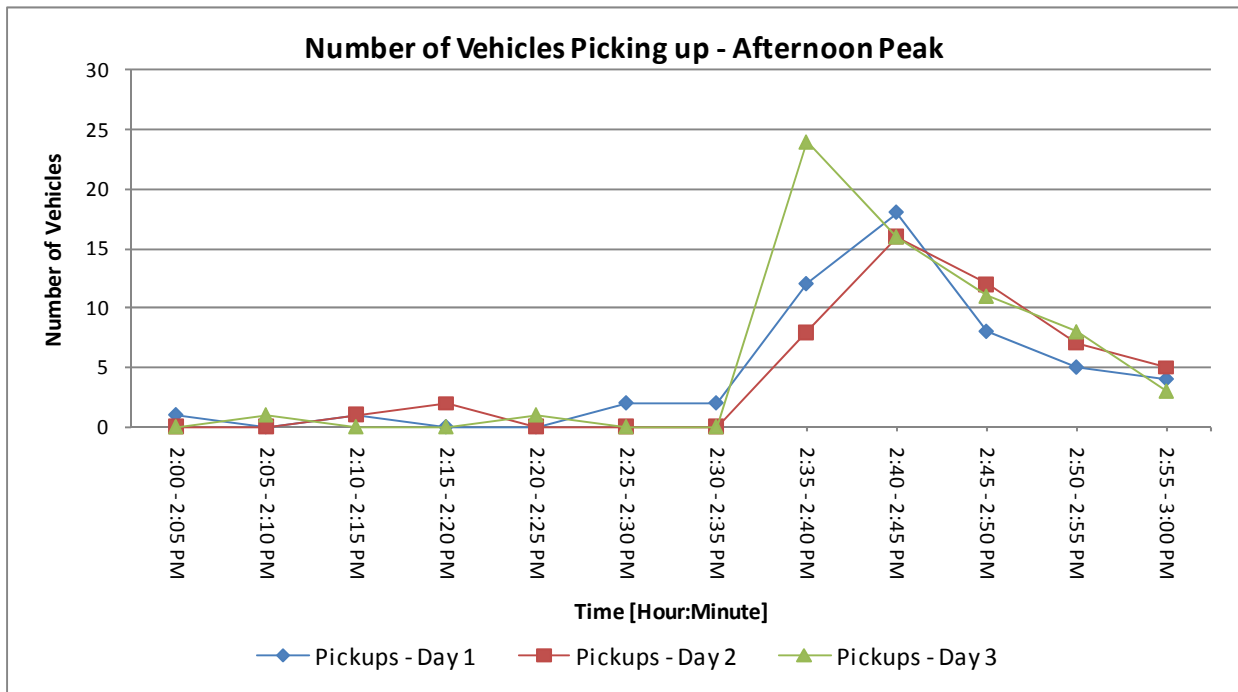


Figure 9: Number of vehicles picking up people during the 2:00 PM - 3:00 PM period for each of the three days in study in 5-minutes increments.

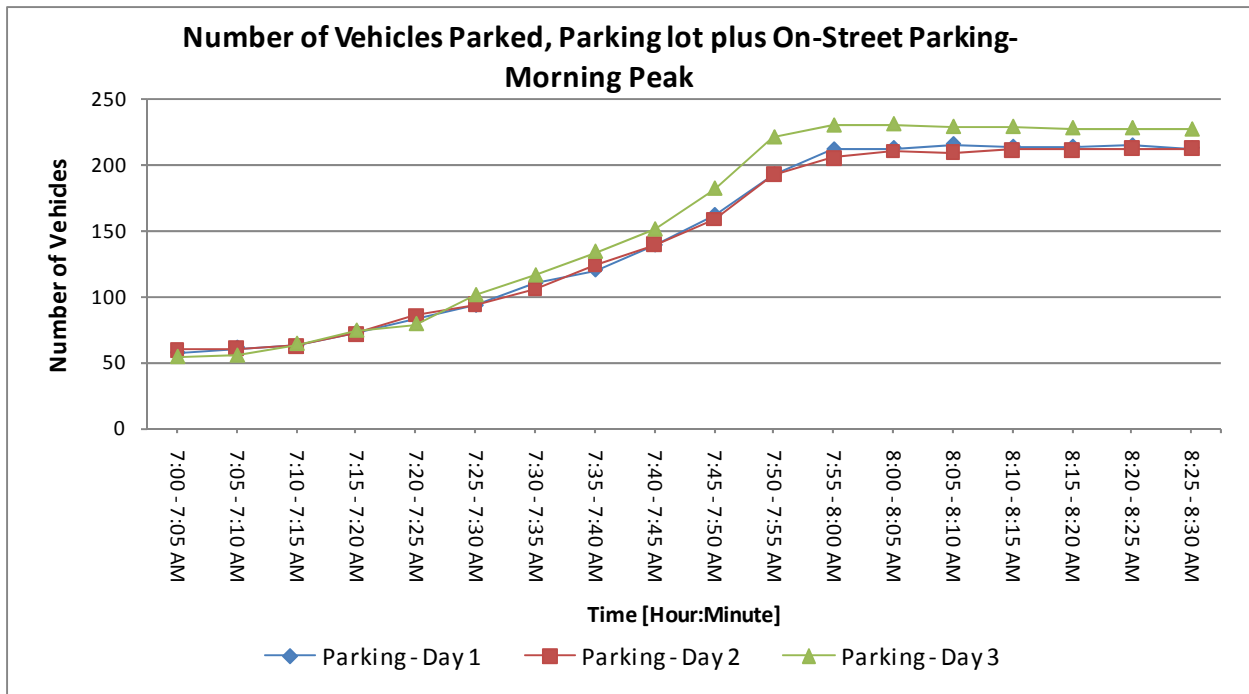


Figure 10: Total number of vehicles parking during the 7:00 AM - 8:30 AM period for each of the three days in study in 5-minutes increments.

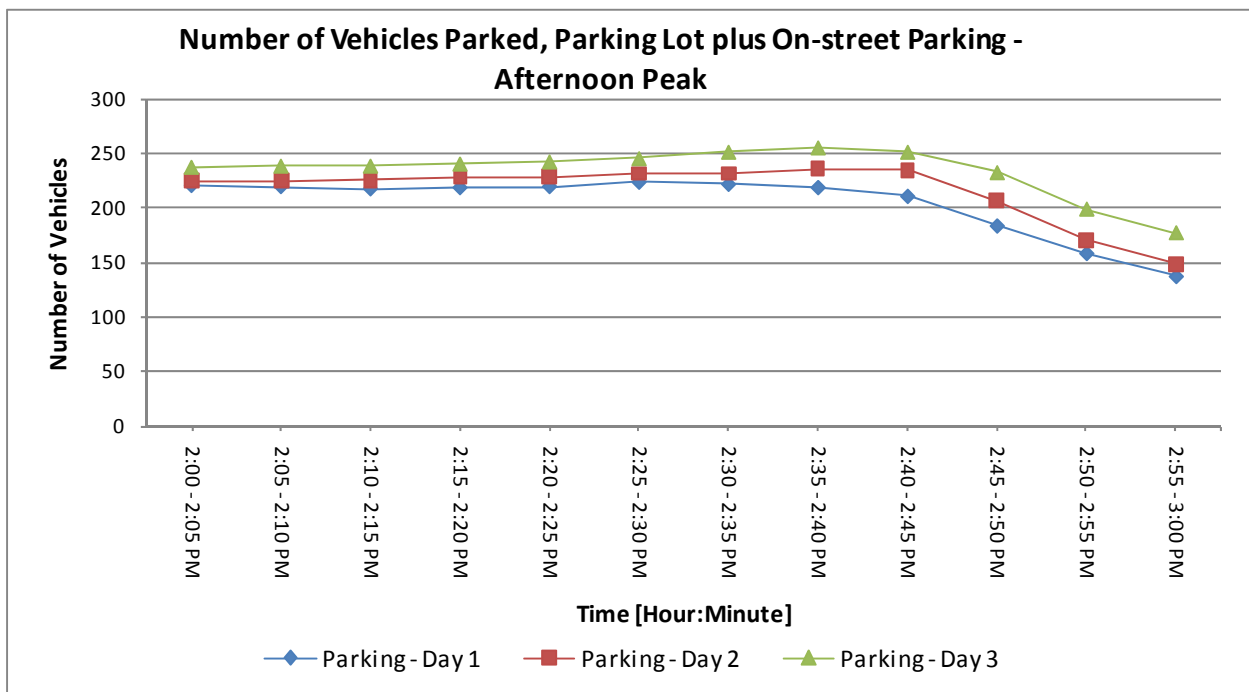


Figure 11: Total number of vehicles parking during the 2:00 PM - 3:00 PM period for each of the three days in study in 5-minutes increments.

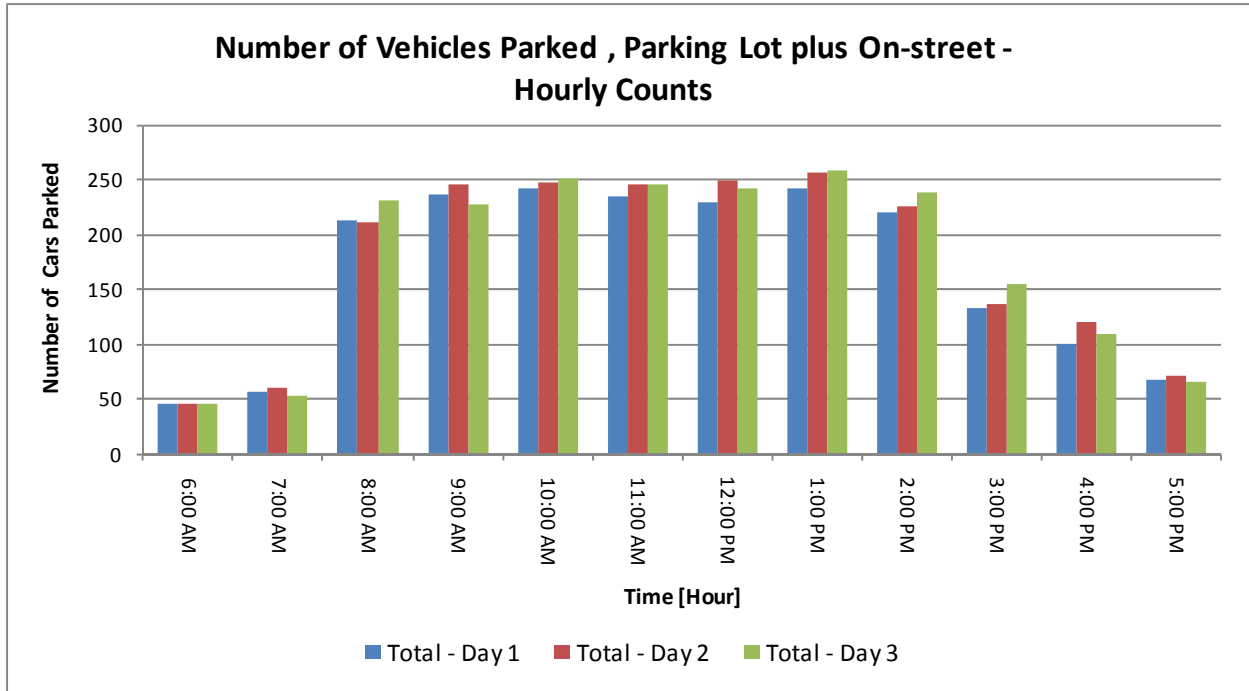


Figure 12: Total Number of cars parked (parking lot plus on-street parking) from 6:00 AM - 5:00 AM for each of the three days in study. Each value was obtained by visiting all the location starting at the time indicated in the X axis.



Figure 13: Street included in neighborhood parking demand data collection

Table 1: Trip and Parking Generation for the AM and PM Hour Generator

		Trip Generation. Number of Vehicles - AM		
		AM Peak Hour Generator: 7:10 - 8:10		
		Thursday, March 04	Tuesday, March 09	Wednesday, March 10
Generated by [# of Veh]	Parking Lot	198	186	197
	On-Street Parking	56	53	69
	Drop-Offs	726	538	622
	School Bus	20	22	20
	Neighborhood Parking	42	58	53
Total # of Vehicles		1,042	857	961
% Veh Entering		64%	67%	67%
%Veh Exiting		36%	33%	33%
Rate: Veh Trips / Students		0.62	0.51	0.57
Rate: Veh Trips / Employees		9.14	7.52	8.43
ITE Trip. Gen. Rate (Land Use 530) Trips / Students		0.42		
ITE Trip. Gen. Rate (Land Use 530) Trips / Employees		4.68		
		Trip Generation. Number of Vehicles - PM		
		PM Peak Hour Generator: 2:00 - 3:00		
		Thursday, March 04	Tuesday, March 09	Wednesday, March 10
Generated by [# of Veh]	Parking Lot	136	134	182
	On-Street Parking	44	53	38
	Pickups	106	102	128
	School Bus	24	20	12
	Neighborhood Parking	7	13	4
Total # of Vehicles		317	322	364
% Veh Entering		79%	81%	81%
%Veh Exiting		21%	19%	19%
Rate: Veh Trips / Students		0.19	0.19	0.22
Rate: Veh Trips / Employees		2.78	2.82	3.19
ITE Trip. Gen. Rate (Land Use 530) Trips / Students		0.29		
ITE Trip. Gen. Rate (Land Use 530) Trips / Employees		3.23		
		Trip Generation. People per Modes - AM		
		AM Peak Hour Generator: 7:10 - 8:10		
		Thursday, March 04	Tuesday, March 09	Wednesday, March 10
Other Modes [# of people]	Vehicles	1052	865	973
	Bicycle Trips	2	2	2
	Transit Trips	No Data	156	No Data
	School Bus Trips	36	12	103
			Trip Generation. People per Modes - PM	
		PM Peak Hour Generator: 2:00 - 3:00		
		Thursday, March 04	Tuesday, March 09	Wednesday, March 10
Other Modes [# of people]	Vehicles	312	322	374
	Bicycle Trips	2	2	2
	Transit Trips	No Data	113	No Data
	School Bus Trips	73	40	10
			Parking Generation	
		Time Peak Hour: 1:00 - 2:00PM		
		Thursday, March 04	Tuesday, March 09	Wednesday, March 10
# of Vehicles *		132	143	145
Rate: # Veh / Students**		0.08	0.09	0.09
Rate: # Veh / Employees***		1.16	1.25	1.27
ITE Trip. Gen. Rate (Compare)		None Specified	None Specified	None Specified
*Only in parking lot				
** # Students = 1,676				
*** # Employess = 114				