bunt & associates

Child Care Services
Parking and Traffic Study
Final Report

Prepared for

City of Edmonton

Date

March 3, 2025

Project No.

03-24-0077

Bunt & Associates acknowledges and respects the Traditional Territories upon which our work spans, and from which we benefit. We are grateful for the unique cultures and histories of Indigenous Peoples that enrich our understanding and connection to the lands we call home. We honour learning, listening, and truth in our journey to reconciliation.

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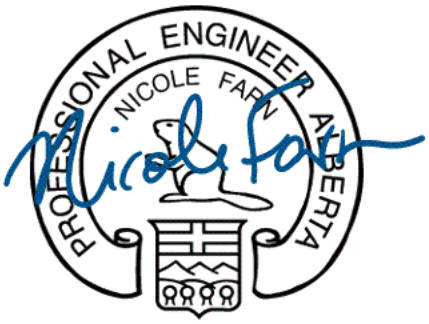
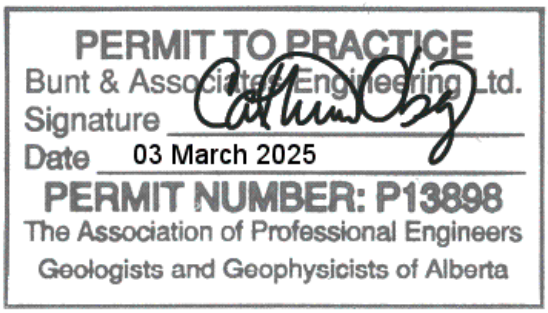
Date: March 3, 2025
Project No. 03-24-0077
Status: Final Report





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Written with respect and gratitude for the Traditional Territories upon which we work and live.

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TABLE OF CONTENTS

EXHIBITS

TABLES

1. INTRODUCTION

1.1 Background

The current City of Edmonton Zoning Bylaw 20001 was passed by City Council on October 23, 2023 and came into effect January 1, 2024. As part of Administration's one-year review, City Council requested that Administration review the Child Care Services provision and provide potential amendments to further expand opportunities to implement Child Care Services across the City.

1.2 Scope

As part of the review, the City identified the need to determine the potential traffic and parking characteristics of Child Care Services within residential neighbourhoods. The City prepared a scope of work for the completion of the review, which includes the identification of the existing minimum pick-up/drop-off space requirements for Child Care services under Zoning Bylaw 20001 (Section 5.80.6.10.3) and the identification of parking and traffic impacts of small-scale Child Care Services operating in residential neighbourhoods.

The City of Edmonton provided video footage documenting the traffic and parking activity at 10 existing Child Care developments and provided available development permit (DP) information outlining the operating characteristics of the sites. Bunt & Associates (Bunt) utilized the video footage and DP information to determine trip generation rates, mode splits, parking generation rates, peak parking duration for the small-scale Child Care Service operations, and ultimately provide recommendations for on-site pick-up/drop-off stall requirements.

1.3 Report Organization

In addition to this introductory section, the report is organized into the following sections:

- Section 2: Data Collection Methodology
- Section 3: Parking Generation Survey Results
- Section 4: Trip Generation Survey Results
- Section 5: Conclusions and Recommendations

2. DATA COLLECTION METHODOLOGY

The ten sites selected for review represent Child Care sites located in residential neighbourhoods within former single detached homes. The sites range in size from accommodating a maximum of 20 children to a maximum of 84 children. The study sites have been assigned a number for reference throughout. **Table 2.1** summarizes the study sites and their operating characteristics, including hours of operation, maximum allowable number of children, the required number of on-site pick-up/drop-off parking spaces based on the Zoning Bylaw, and the number of spaces provided. **Exhibit 2.1** identifies their general locations within the City of Edmonton.

Table 2.1: Study Sites

SITE	HOURS OF OPERATION	MAX. # OF CHILDREN	ON-SITE PARKING (PICK-UP/DROP-OFF SPACES)	
			REQUIRED	PROVIDED
1	7AM-5PM	20	3	3
2	6:30AM-6PM	33	4	2 (deficient by 2)
3	6AM-8PM	34	4	4
4	7AM-6PM	40	5	5
5	7:30AM-5:30PM	49	5	2 (deficient by 3)
6	7AM-6PM	49	5	2 (deficient by 3)
7	7AM-5:30PM	50	6	6
8	6:30AM-6PM	52	6	6
9	6:30AM-6PM	66	7	6 (deficient by 1)
10	6:30AM-6PM	84	9	5 (deficient by 4)

The data collection portion of the study was completed by the City of Edmonton in the fall of 2024. Through the use of cameras, the City of Edmonton collected 24-hours of video footage from two camera angles at the ten study sites. The position of the two cameras allowed activity to/from both on-site parking spaces and adjacent on-street parking spaces to be in the collective field of view. As well, the movement of patrons entering/exiting the day care buildings and associated pedestrian/bicycle activity generated to/from the sites were visible in the videos.

With the exception of Site 9, the video data was collected on a Tuesday during the month of October 2024. Video data for Site 9 was captured in August 2024 as it represented the test pilot site during project development. **Table 2.2** summarizes the dates of survey for each site.

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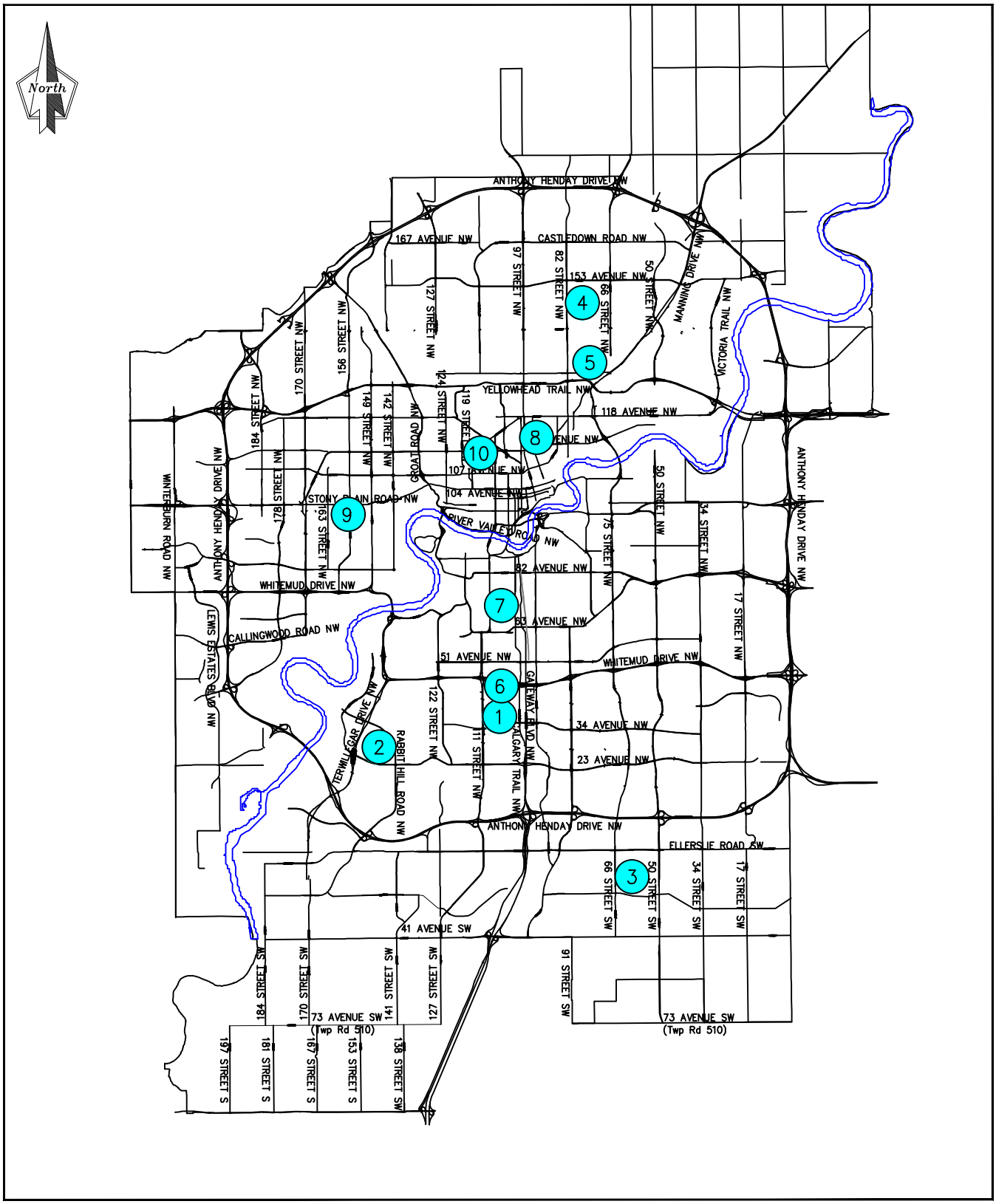


Exhibit 2.1

Subject Site Locations

Table 2.2: Video Data Collection Program

SITE	WEEKDAY	DATE	DAY CARE HOURS OF OPERATION	AM HOURS REVIEWED	PM HOURS REVIEWED
1	Tuesday	October 8, 2024	7AM-5PM	7AM-10AM	2PM-5:30PM
2	Tuesday	October 1, 2024	6:30AM-6PM	6:30AM-9:30AM	3PM-6PM
3	Tuesday	October 1, 2024	6AM-8PM	6AM-9:30AM	3:30PM-6:30PM
4	Tuesday	October 15, 2024	7AM-6PM	6:30AM-10AM	3PM-6PM
5	Tuesday	October 15, 2024	7:30AM-5:30PM	7:30AM-10:30AM	2:30PM-6PM
6	Tuesday	October 1, 2024	7AM-6PM	7AM-10AM	3PM-6PM
7	Tuesday	October 8, 2024	7AM-5:30PM	7AM-10AM	2:30PM-5:30PM
8	Tuesday	October 15, 2024	6:30AM-6PM	6:30AM-9:30AM	3PM-6PM
9	Monday	August 19, 2024	6:30AM-6PM	6:30AM-9:30AM	3PM-6PM
10	Tuesday	October 15, 2024	6:30AM-6PM	6:30AM-10AM	2:30PM-6PM

Bunt completed a thorough review of a minimum of six hours of video footage (three hours in the morning, three hours in the afternoon) for each site to collect traffic and parking data for use in the analysis. The hours reviewed for each site varied slightly depending on the operating hours of the day care; generally covering the first three hours of operation and the last three hours of operation. In some instances, the review period was extended to distinguish ongoing or in-progress parking and traffic activity. The hours reviewed are also summarized in Table 2.2.

2.1 Parking Generation Rate Methodology

The determination of parking generation rates starts with the completion of parking accumulation surveys, which identify the number of parked vehicles at set intervals. Parking accumulation surveys are typically completed in 15- or 30-minute intervals; however, as the duration of parking associated with pick-up/drop-off activity was anticipated to be quite short, a 5-minute parking interval was selected for the parking accumulation surveys. While the information was collected in 5-minute intervals, the determination of the parking generation rate considers the peak parking demand that was sustained for a minimum duration of 15 minutes (three, consecutive 5-minute intervals). The use of a 15-minute duration provides a solid foundation for the determination of an appropriate parking supply in the future, while limiting the potential to over design the supply based on spikes in activity.

In addition to calculating the parking generation rate for each site, the methodology includes the determination of a weighted average parking demand rate based on the combined data for all 10 sites. The rate was calculated using the maximum number of children allowed on each site divided by 10 as the independent variable. The calculation of the weighted average assumes a linear relationship between the number of parked vehicles and the maximum number of children allowed on site and is calculated by dividing the total peak parking demand at all sites by the combined total of the maximum number of children for all sites divided by 10 (e.g. spaces/10 children).

2.1.1 On-Street Parking

The number of vehicles associated with day care activity that were parked on-street at the top of each five-minute interval was recorded.

Observation of the on-street parking demand allowed for a determination of the following:

- The peak number of on-street parked vehicles generated by the daycare during the AM and PM review periods for each site.
- The peak on-street parking demand rate during the AM and PM review periods (spaces/10 children) for each site.

2.1.2 On-Site Parking

The number of vehicles associated with day care activity that were parked in on-site parking spaces at the top of each five-minute interval was recorded. Observation of the on-site parking demand allowed for a determination of the following:

- The peak number of on-site parked vehicles generated during the AM and PM review periods for each site.
- The peak utilization of on-site parking spaces (percentage used of available) for each site.
- The peak on-site parking demand rate during the AM and PM review periods (spaces/10 children) for each site.

2.1.3 Combined On-Street and On-Site Parking

The total number of vehicles associated with day care activity that were parked both on-street and on-site at the top of each five-minute interval was used to determine the overall peak period of demand for each site. The combined parking demand allowed for a determination of the following:

- The peak number of parked vehicles generated by the daycare during all review periods for each site.
- The peak parking demand rate (spaces/10 children) for each site.
- A weighted average peak total combined parking demand rate in consideration of data from all sites.

2.1.4 Methodology Limitations

The determination of the parking generation rates in this study may include the following potential limitations:

- The parking demand data may also include daycare staff.
- Given that the actual number of children attending each of the sites on a given day is unknown, the maximum number of children (as per the DP) has been used as the independent variable in the determination of parking demand rates. Should the actual number of children attending the sites be fewer than the maximum number of students, the actual demand rates would be higher. It is anticipated that the data was collected on a day reflecting typical operations.
- The 5-minute interval was selected based on the anticipated peaking characteristics of child care services; however, there is the potential for vehicles to arrive and depart in the middle of a five-minute interval, which would not be captured within the surveys. As the determination of the parking generation rates considers the peak demand sustained for a minimum 15-minute period, this is not anticipated to significantly impact the study results.

2.2 Trip Generation Rate Methodology

The traffic activity (arrivals and departures) for each site was summarized in 5-minute intervals.

Arrivals included:

- Vehicles parking on-street or on-site with occupants who access the day care;
- People arriving on-foot to access the day care; and
- Arrivals by bicycle.

Departures included:

- Vehicles leaving either an on-street or on-site parking stall with occupants who exited the day care;
- People departing on-foot from the day care; and
- Departures by bicycle.

For the determination of pedestrian and bicycle trips, when multiple people arrived/departed on foot or by bicycle to pick up or drop off a child/children, this was counted as a single trip. For example, when an adult and two children arrived on foot, and the adult then left alone, this activity was recorded as one arrival trip and one departure trip.

Observation of the arrivals and departures by all modes in 5-minute intervals allowed for a determination of the following:

- AM and PM peak hours of traffic activity associated with each site.
- Number of trips generated by each site during the identified peak hours.
- Mode Split: Proportion of vehicle trips, pedestrian trips, and bicycle trips generated during the identified peak hours for each site.
- The AM and PM peak hour trip generation rates per child for each site. (The maximum number of children permitted for each site was used as the independent variable.)
- A weighted average trip generation rate in consideration of data from all sites.

A weighted average trip generation rate assumes a linear relationship between the number of trips and the independent variable for a land use sub-category. It is calculated by dividing the total trips counted at all sites by the combined total of the independent variable (i.e. max number of children) for all sites.

The calculated trip rates were compared to available trip generation rates published in the ITE Trip Generation Manual, 11th Edition for a Day Care Center (ITE Land Use 565). As well, the measured peak hour vehicle trips were compared to a) the number of peak hour trips typically generated by a single detached house using City of Edmonton LDR trip generation rates and b) the number of peak hour trips typically generated by an 8-unit townhouse using City of Edmonton measured row-housing rates.

2.2.1 Methodology Limitations

The determination of trip generation rates in this study may include the following potential limitations:

- Given that the actual number of children attending each of the sites is unknown, the maximum number of children (as per the DP) has been used as the independent variable in the determination of trip generation rates. Should the actual number of children attending the sites be fewer than the maximum number of students, the actual trip generation rates would be higher. It is anticipated that the data was collected on a day reflecting typical operations.

3. PARKING GENERATION SURVEY RESULTS

Appendix A includes the graphically represented on-street, on-site, and total parking demand profiles over time for each site for the AM and PM review periods.

3.1 On-Street Parking

3.1.1 On-Street Parking Demand by Site

Table 3.1 and **Table 3.2** summarize the peak AM and PM on-street parking demand observed during the respective data review periods at each of the study sites. The tables include, for each site, the observed peak on-street parking demand (generated by the day care), the calculated peak parking demand rate (spaces/10 children), and the maximum observed duration of the peak parking demand. Based on the stated methodology, a minimum duration of 15 minutes was established for the determination of the peak demand. If multiple occurrences of the peak parking demand were observed, the longest duration is reported. The duration of a peak parking demand that occurred at the end of the review period, thus potentially extending beyond the review period, is noted with a '+' notation.

Table 3.1: AM On-Street Parking Demand Summary by Site
Peak Parking Demand for a Minimum Duration of 15 Minutes

SITE	MAX. # OF CHILDREN	PEAK PARKING DEMAND[1] (VEHICLES)	PEAK PARKING DEMAND RATE (SPACES/10 CHILDREN)	MAX. DURATION OF PEAK PARKING DEMAND (MINUTES)
1	20	1	0.50	20
2	33	1	0.30	50+
3	34	1	0.29	35+
4	40	1	0.25	70
5	49	2	0.41	125
6	49	6	1.22	35+
7	50	2	0.40	25
8	52	0	0.00	0
9	66	2	0.30	45+
10	84	1	0.12	85+
TOTAL	477	17	-	-
WEIGHTED AVERAGE AM ON-STREET PARKING DEMAND RATE			0.36	-

1. Peak parking demand for a minimum duration of 15 minutes.

Table 3.2: PM On-Street Parking Demand Summary by Site
Peak Parking Demand for a Minimum Duration of 15 Minutes

SITE	MAX. # OF CHILDREN	PEAK PARKING DEMAND[1] (VEHICLES)	PEAK PARKING DEMAND RATE (SPACES/10 CHILDREN)	MAX. DURATION OF PEAK PARKING DEMAND (MINUTES)
1	20	2	1.00	15
2	33	1	0.30	175
3	34	2	0.59	40
4	40	2	0.50	20
5	49	3	0.61	80
6	49	4	0.82	70
7	50	4	0.80	15
8	52	0	0.00	0
9	66	3	0.45	70
10	84	2	0.24	35
TOTAL	477	23	-	-
WEIGHTED AVERAGE PM ON-STREET PARKING DEMAND RATE			0.48	-

1. Peak parking demand for a minimum duration of 15 minutes.

The peak on-street parking demand rate ranged between 0 and 1.22 spaces/10 children, with a weighted average on-street parking demand rate of 0.36 spaces/10 children in the AM and 0.48 spaces/10 children in the PM.

3.2 On-Site Parking

3.2.1 On-Site Parking Demand by Site

Table 3.3 and **Table 3.4** summarize the peak AM and PM on-site parking demand observed during the respective data review periods at each of the study sites. The tables include, for each site, the on-site parking supply (based on the DP), the observed peak on-site parking demand, the peak parking utilization observed, the calculated peak parking demand rate (spaces/10 children), and the maximum observed duration of the peak parking demand. Based on the stated methodology, a duration of 15 minutes was established as the minimum duration in the determination of the peak demand. If multiple occurrences of the peak parking demand were observed, the longest duration is reported. The duration of a peak parking demand that occurred at the end of the review period, thus potentially extending beyond the review period, is noted with a '+' notation. It is noted that longer duration parking could be indicative of staff or resident parking.

The peak on-site parking demand rate ranged between 0 and 1.0 space/10 children, with a weighted average on-site parking demand rate of 0.25 spaces/10 children in the AM and 0.38 spaces/10 children in the PM.

Table 3.3: AM Peak Hour On-Site Parking Demand Summary by Site
Peak Parking Demand for a Minimum Duration of 15 Minutes

SITE	MAX. # OF CHILDREN	PARKING SUPPLY (SPACES)	PEAK PARKING DEMAND[1] (VEHICLES)	PEAK PARKING UTILIZATION	PEAK PARKING DEMAND RATE (SPACES/10 CHILDREN)	MAX. DURATION OF PEAK PARKING DEMAND (MINUTES)
1	20	3	1	33%	0.50	95+
2	33	2	1	50%	0.30	30
3	34	4	1	25%	0.29	35+
4	40	5	3	60%	0.75	80+
5	49	2	1	50%	0.20	40
6	49	2	0	0%	0.00	0
7	50	6	3	50%	0.60	15
8	52	6	1	17%	0.19	145
9	66	6	1	17%	0.15	180+
10	84	5	1	20%	0.12	180+
TOTAL	477	-	12	-	-	-
WEIGHTED AVERAGE AM ON-SITE PARKING DEMAND RATE				-	0.25	-

1. Peak parking demand for a minimum duration of 15 minutes.

Table 3.4: PM Peak Hour On-Site Parking Demand Summary by Site
Peak Parking Demand for a Minimum Duration of 15 Minutes

SITE	MAX. # OF CHILDREN	PARKING SUPPLY (SPACES)	PEAK PARKING DEMAND[1] (VEHICLES)	PEAK PARKING UTILIZATION	PEAK PARKING DEMAND RATE (SPACES/10 CHILDREN)	MAX. DURATION OF PEAK PARKING DEMAND (MINUTES)
1	20	3	1	33%	0.50	185
2	33	2	1	50%	0.30	20
3	34	4	0	0%	0.00	0
4	40	5	4	80%	1.00	55
5	49	2	1	50%	0.20	25
6	49	2	0	0%	0.00	0
7	50	6	4	67%	0.80	15
8	52	6	2	33%	0.38	25
9	66	6	1	17%	0.15	180+
10	84	5	4	80%	0.48	40
TOTAL	477	-	18	-	-	-
WEIGHTED AVERAGE PM ON-SITE PARKING DEMAND RATE				-	0.38	-

1. Peak parking demand for a minimum duration of 15 minutes.

As presented, the utilization of on-site parking spaces ranged between 0% and 80%, with the majority of sites achieving a utilization of 50% or less. As the sites did not reach 100% utilization of their on-site parking supply, this suggests that the users found the on-street spaces to be more convenient than the on-site spaces. It is noted that on-street parking spaces were generally provided at the rear or the side of the sites, while the main entrances faced the street. It is suggested that this layout, in combination with

the use of on-site spaces requiring an additional maneuver (i.e., backing out) made the available on-street parking more convenient and efficient, making it an attractive option.

3.3 Total Parking Demand (Combined On-Street and On-Site Parking)

3.3.1 Total Peak Parking Demand by Site

The total parking demand was determined for each site based on the sum of the on-street and on-site parking demand for each 5-minute interval throughout the measured periods. The peak total parking demand used in the assessment was then determined based on the peak total demand with a minimum duration of fifteen minutes. It should be noted that as the on-site and on-street parking demands did not always peak at the same time, the total peak parking demand does not necessarily represent the sum of the on-site and on-street values summarized in Tables 3.1 through 3.4.

Table 3.5 summarizes the overall peak total parking demand observed at each of the study sites. The table includes, for each site, the maximum number of children permitted, the time period when the overall peak parking demand occurred (AM or PM), the observed peak parking demand, and the calculated total peak parking demand rate (spaces/10 children). The overall weighted peak parking demand rate is also included. In general, the PM peak period typically had the highest overall measured parking demand.

The peak total parking demand rate (inclusive of on-street and on-site demands) ranged between 0.38 and 1.60 spaces/10 children, with a weighted average total parking demand rate of 0.90 spaces/10 children.

Table 3.5: Total Peak Parking Demand Summary by Site
Peak Parking Demand for a Minimum Duration of 15 Minutes

SITE	MAX. # OF CHILDREN	PEAK PERIOD	PEAK TOTAL PARKING DEMAND[1] (VEHICLES)	PEAK TOTAL PARKING DEMAND RATE (SPACES/10 CHILDREN)
1	20	PM	3	1.50
2	33	PM	3	0.91
3	34	PM	2	0.59
4	40	PM	6	1.50
5	49	PM	3	0.61
6	49	AM	6	1.22
7	50	PM	8	1.60
8	52	PM	2	0.38
9	66	PM	4	0.61
10	84	PM	6	0.71
TOTAL	477	-	43	-
WEIGHTED AVERAGE TOTAL PEAK PARKING DEMAND RATE				0.90 SPACES/ 10 CHILDREN

1. Peak parking demand for a minimum duration of 15 minutes.

3.3.2 On-Site vs On-Street Demand

Based on a review of the parking demand surveys, significant variations were noted between the use of on-site and on-street parking throughout the survey periods. For example, within one 5-minute interval, on-site parking may represent 100% of the total parking demand, but within the next 5-minute interval, only 50% of the total parking demand was measured on-site. This reflects the low parking demand numbers as well as the high turnover activity associated with pick-up/drop-off activity. Therefore, in order to understand the use of on-site vs on-street parking areas, each of the 5-minute on-site and on-street observations were summed for the AM and PM peak hours to determine an average percentage of on-site versus on-street parking demand.

Table 3.6 summarizes the proportion of the peak parking demand accommodated on-site and on-street for each of the study sites during the peak hours of parking demand.

Table 3.6: Total Peak Hour of Parking Demand Distribution

SITE	AM		PM	
	ON-STREET % of total parking demand	ON-SITE % of total parking demand	ON-STREET % of total parking demand	ON-SITE % of total parking demand
1	52%	48%	56%	44%
2	50%	50%	58%	42%
3	100%	0%	100%	0%
4	22%	78%	33%	67%
5	82%	18%	100%	0%
6	97%	3%	91%	9%
7	38%	62%	42%	58%
8	12%	88%	0%	100%
9	64%	36%	77%	23%
10	47%	53%	32%	68%
WEIGHTED AVERAGE	57%	43%	58%	42%

As presented in Table 3.6, the proportion of total parking accommodated on-site during the peak hour of parking demand observed was 42% to 43% (weighted average), with the balance accommodated on-street. As previously noted in Section 3.2.1, the on-site parking utilization ranged between 0% and 80% with the majority of sites achieving a utilization of 50% or less. Based on these two data sets, it is inferred that on-street parking is considered more convenient or more easily accessible than on-site parking at the study sites.

3.3.3 Total Parking Demand Comparison with Bylaw Requirement

The City of Edmonton Zoning Bylaw (Section 6.10) specifies a requirement for passenger pick-up/drop-off spaces for Child Care Services as follows:

- 2 spaces for 10 children or fewer;
- 1 additional space for each additional 10 children.

Table 3.7 summarizes the Bylaw parking requirement for each of the subject sites based on a strict interpretation of the Zoning Bylaw (notwithstanding subsequent variances that may have been granted). For comparison purposes, the peak total parking demand (on-street + on-site) experienced by each site is also summarized. Notwithstanding the tiered nature of the existing bylaw requirement, the bylaw requirement has been converted to a simple rate per 10 children for ease of comparison with the weighted average rate.

As presented in Table 3.7, the weighted average bylaw parking requirement is 1.13 spaces/10 children, compared to the weighted average total parking demand of 0.90 spaces/10 children. It is noted that the weighted average total parking demand observed is 20% less than the City's Bylaw parking requirements.

As shown in Table 3.7, the calculated bylaw requirements are sufficient to meet the measured total demands at seven of the 10 sites measured. Where peak demands exceed the bylaw parking requirement, the difference ranged from one to two spaces and occurred for a short duration. This magnitude of parking variance is considered minor and is not anticipated to significantly impact or interfere with adjacent land uses.

Table 3.7: Bylaw Parking Requirement vs Total Parking Demand

SITE	MAX. # OF CHILDREN	ON-SITE PARKING SUPPLY	BYLAW PARKING REQUIREMENT	PEAK TOTAL PARKING DEMAND[1]	DIFFERENCE (BYLAW-DEMAND)
1	20	3	3	3	0
2	33	2	4	3	1
3	34	4	4	2	2
4	40	5	5	6	-1
5	49	2	5	3	2
6	49	2	5	6	-1
7	50	6	6	8	-2
8	52	6	6	2	4
9	66	6	7	4	3
10	84	5	9	6	3
WEIGHTED AVERAGE PARKING RATE			1.13 spaces /10 children	0.90 spaces /10 children	-

1. Peak parking demand for a minimum duration of 15 minutes.

4. TRIP GENERATION SURVEY RESULTS

4.1 Total Trip Generation (All Modes)

Table 4.1 and **Table 4.2** summarize the AM and PM peak hour trip generation results, respectively, as they relate to the study sites. The tables include, for each site, the observed peak hour; the inbound, outbound, and total trips generated; and the calculated trip rate (trips/child). The tables also include the calculated weighted average trip rate, which was calculated by dividing the total trips counted at all sites by the combined total of the independent variable (max allowable children) for all sites.

As per the methodology, the total trips include vehicles parking both on-street and on-site, as well as bicycle and pedestrian trips.

Table 4.1: AM Peak Hour Total Trip Generation Summary by Site

SITE	MAX. # OF CHILDREN	PEAK HOUR	INBOUND TRIPS	OUTBOUND TRIPS	TOTAL TRIPS	TRIP RATE (TRIPS/CHILD)
1	20	7:55-8:55	11	10	21	1.05
2	33	7:50-8:50	16	12	28	0.85
3	34	8:10-9:10	14	11	25	0.74
4	40	7:00-8:00	8	9	17	0.43
5	49	7:40-8:40	9	9	18	0.37
6	49	7:55-8:55	32	24	56	1.14
7	50	7:25-8:25	28	14	42	0.84
8	52	8:10-9:10	9	8	17	0.33
9	66	7:45-8:45	15	11	26	0.39
10	84	7:15-8:15	11	12	23	0.27
TOTAL	477	-	153 (56%)	120 (44%)	273	-
WEIGHTED AVERAGE TRIP RATE						0.57 TRIPS/CHILD

Table 4.2: PM Peak Hour Total Trip Generation Summary by Site

SITE	MAX. # OF CHILDREN	PEAK HOUR	INBOUND TRIPS	OUTBOUND TRIPS	TOTAL TRIPS	TRIP RATE (TRIPS/CHILD)
1	20	4:10-5:10	14	15	29	1.45
2	33	4:15-5:15	13	14	27	0.82
3	34	4:00-5:00	20	17	37	1.09
4	40	4:05-5:05	9	9	18	0.45
5	49	4:40-5:40	9	14	23	0.47
6	49	4:05-5:05	17	21	38	0.78
7	50	4:00-5:00	26	28	54	1.08
8	52	4:15-5:15	8	12	20	0.38
9	66	4:00-5:00	14	9	23	0.35
10	84	4:15-5:15	10	13	23	0.27
TOTAL	477	-	141 (48%)	151 (52%)	292	-
WEIGHTED AVERAGE TRIP RATE						0.61 TRIPS/CHILD

4.2 Trip Generation By Mode

4.2.1 Mode Split

Table 4.3 and **Table 4.4** break down the total trips by mode including vehicle trips, pedestrian trips, and bicycle trips. As per the methodology, multiple people arriving on foot or by bicycle to pick up or drop off a child is counted as a single trip.

As presented, the observed mode split to vehicle was 81% during the AM survey period and 85% during the PM survey period. The balance of trips were pedestrian and bicycle trips, with the majority being pedestrian trips.

Table 4.3: AM Peak Hour Total Trip Generation Summary by Mode

SITE	TOTAL TRIPS	VEHICLE TRIPS		PEDESTRIAN TRIPS		BICYCLE TRIPS	
		TOTAL TRIPS	MODE SPLIT	TOTAL TRIPS	MODE SPLIT	TOTAL TRIPS	MODE SPLIT
1	21	15	71%	6	29%	0	0%
2	28	23	82%	5	18%	0	0%
3	25	19	76%	6	24%	0	0%
4	17	15	88%	2	12%	0	0%
5	18	18	100%	0	0%	0	0%
6	56	46	82%	10	18%	0	0%
7	42	29	69%	10	24%	3	7%
8	17	15	88%	2	12%	0	0%
9	26	21	81%	5	19%	0	0%
10	23	20	87%	3	13%	0	0%
WEIGHTED AVG MODE SPLIT	-	-	81%	-	18%	-	1%

Table 4.4: PM Peak Hour Total Trip Generation Summary by Mode

SITE	TOTAL TRIPS	VEHICLE TRIPS		PEDESTRIAN TRIPS		BICYCLE TRIPS	
		TOTAL	MODE SPLIT	TOTAL	MODE SPLIT	TOTAL	MODE SPLIT
1	29	23	79%	6	21%	0	0%
2	27	22	81%	5	19%	0	0%
3	37	28	76%	9	24%	0	0%
4	18	17	94%	1	6%	0	0%
5	23	21	91%	2	9%	0	0%
6	38	37	97%	1	3%	0	0%
7	54	43	80%	10	18%	1	2%
8	20	15	75%	5	25%	0	0%
9	23	23	100%	0	0%	0	0%
10	23	18	78%	3	13%	2	9%
WEIGHTED AVG MODE SPLIT	-	-	85%	-	14%	-	1%

4.2.2 Vehicle Trip Generation

Table 4.5 and **Table 4.6** summarize the vehicle trips generated by each site during the AM and PM peak hours of overall trip-making activity, respectively. The corresponding vehicle trip rate by site and the weighted average trip rate are also included in the tables.

The weighted average vehicle trip rates observed have been calculated as 0.46 trips/child in the AM period and 0.52 trips/child in the PM period.

Table 4.5: AM Peak Hour Vehicle Trip Generation Summary by Site

SITE	MAX. # OF CHILDREN	PEAK HOUR	INBOUND VEHICLE TRIPS	OUTBOUND VEHICLE TRIPS	TOTAL VEHICLE TRIPS	VEHICLE TRIP RATE (TRIPS/CHILD)
1	20	7:55-8:55	9	6	15	0.75
2	33	7:50-8:50	13	10	23	0.70
3	34	8:10-9:10	10	9	19	0.56
4	40	7:00-8:00	7	8	15	0.38
5	49	7:40-8:40	9	9	18	0.37
6	49	7:55-8:55	25	21	46	0.94
7	50	7:25-8:25	17	12	29	0.58
8	52	8:10-9:10	7	8	15	0.29
9	66	7:45-8:45	11	10	21	0.32
10	84	7:15-8:15	10	10	20	0.24
TOTAL	477	-	118 (53%)	103 (47%)	221	-
WEIGHTED AVERAGE VEHICLE TRIP RATE						0.46 TRIPS/CHILD

Table 4.6: PM Peak Hour Vehicle Trip Generation Summary by Site

SITE	MAX. # OF CHILDREN	PEAK HOUR	INBOUND VEHICLE TRIPS	OUTBOUND VEHICLE TRIPS	TOTAL VEHICLE TRIPS	VEHICLE TRIP RATE (TRIPS/CHILD)
1	20	4:10-5:10	13	10	23	1.15
2	33	4:15-5:15	11	11	22	0.67
3	34	4:00-5:00	15	13	28	0.82
4	40	4:05-5:05	8	9	17	0.43
5	49	4:40-5:40	8	13	21	0.43
6	49	4:05-5:05	17	20	37	0.76
7	50	4:00-5:00	21	22	43	0.86
8	52	4:15-5:15	7	8	15	0.29
9	66	4:00-5:00	14	9	23	0.35
10	84	4:15-5:15	8	10	18	0.21
TOTAL	477	-	122 (49%)	125 (51%)	247	-
WEIGHTED AVERAGE VEHICLE TRIP RATE						0.52 TRIPS/CHILD

In addition to the determination of the weighted average vehicle trip rate, the standard deviations and R2 values were calculated to determine an appropriate vehicle trip generation rate for use in future assessments.

The standard deviations of the vehicle trip generation rates were calculated and compared to the weighted average trip rate. The ITE Trip Generation Handbook (3rd Edition) indicates that the weighted average rate is acceptable when at least three sites are included and the standard deviation is less than or equal to 110% of the weighted average. In the case of the data collected, the standard deviation was calculated to be within this range; therefore, the weighted average rates are considered acceptable.

Regression curves and equations were determined using chart functions within Microsoft® Excel. The data was plotted and a regression curve was plotted with the associated equation. Both linear and logarithmic regression lines/curves were evaluated, and the R^2 value was calculated. The R^2 value provides an indication of the level of correlation between the number of trips and the independent variable. The closer the R^2 value is to 1.0, the better the correlation. The ITE Trip Generation Handbook identifies that the use of regression equations is acceptable when at least four sites are included and the R^2 value is at least 0.75. In the case of the data collected, the R^2 values do not meet this criteria; therefore, regression equations have not been used.

The calculated vehicle trip rates were compared to available trip generation rates published in the ITE Trip Generation Manual, 11th Edition for a Day Care Center (ITE Land Use 565). The AM and PM peak hour comparison is summarized in **Table 4.7**.

Table 4.7: Vehicle Trip Rate Comparison

PEAK PERIOD	DAY CARE WEIGHTED AVG	ITE 565 DAY CARE CENTER (AVG RATE)
AM Peak Hour	0.46 trips/child	0.78 trips/child
PM Peak Hour	0.52 trips/child	0.79 trips/child

In addition, the measured peak hour vehicle trips were compared to the number of peak hour trips typically generated by a single detached house or an eight-unit townhouse.

- Based on City of Edmonton LDR trip generation rates, a single detached house could generate 1 trip in the AM peak hour and 1 trip in the PM peak hour.
- Based on City of Edmonton Row Housing trip generation rates, an eight-plex could generate 4 trips in the AM peak hour and 5 trips in the PM peak hour.

The number of vehicle trips generated by the subject day care sites ranged from 15 to 46 trips in the AM peak hour and 17 to 43 trips in the PM peak hour; therefore, day care sites generate significantly more peak hour traffic than typical single-family homes or potential eight-plex buildings. It is noted that the number of trips anticipated to be generated by an eight-plex residential row-house is generally equivalent to the number of trips anticipated to be generated by a day care site with a maximum capacity of 10 children (based on the weighted average trip generation rates calculated), which is smaller than the typical capacity of a day care use.

4.2.3 Alternative Modes (Pedestrian and Bicycle) Trip Generation

Alternative mode trips observed were predominantly pedestrian trips; very few bicycle trips were observed. Therefore, pedestrian and bicycle trips have been combined for the determination of alternative modes trip generation rates**. Table 4.8** and **Table 4.9** summarize the trips made by alternative modes that were generated for each site during the AM and PM peak hours of overall trip-making activity, respectively. The corresponding alternative mode trip rates are included in the tables.

Table 4.8: AM Peak Hour Pedestrian and Bicycle Trip Generation Summary by Site

LOCATION	MAX. # OF CHILDREN	PEAK HOUR	INBOUND PED+BIKE TRIPS	OUTBOUND PED+BIKE TRIPS	TOTAL PED+BIKE TRIPS	PED+BIKE TRIP RATE (TRIPS/CHILD)
1	20	7:55-8:55	2	4	6	0.30
2	33	7:50-8:50	3	2	5	0.15
3	34	8:10-9:10	4	2	6	0.18
4	40	7:00-8:00	1	1	2	0.05
5	49	7:40-8:40	0	0	0	0.00
6	49	7:55-8:55	7	3	10	0.20
7	50	7:25-8:25	11	2	13	0.26
8	52	8:10-9:10	2	0	2	0.04
9	66	7:45-8:45	4	1	5	0.08
10	84	7:15-8:15	1	2	3	0.04
TOTAL	477	-	35 (67%)	17 (33%)	52	-
WEIGHTED AVERAGE ALTERNATIVE MODE TRIP RATE						0.11 TRIPS/CHILD

Table 4.9: PM Peak Hour Pedestrian and Bicycle Trip Generation Summary by Site

LOCATION	MAX. # OF CHILDREN	PEAK HOUR	INBOUND PED+BIKE TRIPS	OUTBOUND PED+BIKE TRIPS	TOTAL PED+BIKE TRIPS	PED+BIKE TRIP RATE (TRIPS/CHILD)
1	20	4:10-5:10	1	5	6	0.30
2	33	4:15-5:15	2	3	5	0.15
3	34	4:00-5:00	5	4	9	0.26
4	40	4:05-5:05	1	0	1	0.03
5	49	4:40-5:40	1	1	2	0.04
6	49	4:05-5:05	0	1	1	0.02
7	50	4:00-5:00	5	6	11	0.22
8	52	4:15-5:15	1	4	5	0.10
9	66	4:00-5:00	0	0	0	0.00
10	84	4:15-5:15	2	3	5	0.06
TOTAL	477	-	18 (40%)	27 (60%)	45	-
WEIGHTED AVERAGE ALTERNATIVE MODE TRIP RATE						0.09 TRIPS/CHILD

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Results

5.1.1 Parking Demand

- The peak on-site parking demand rate ranged between 0 and 1.0 space/10 children, with a weighted average on-site parking demand rate of 0.25 spaces/10 children in the AM and 0.38 spaces/10 children in the PM.
- The peak on-street parking demand rate ranged between 0 and 1.22 spaces/10 children, with a weighted average on-street parking demand rate of 0.36 spaces/10 children in the AM and 0.48 spaces/10 children in the PM.
- The peak total parking demand rate (inclusive of on-street and on-site demands) ranged between 0.38 and 1.60 spaces/10 children, with a weighted average total parking demand rate of 0.90 spaces/10 children.
- The utilization of on-site parking spaces ranged between 0% and 80%, with the majority of sites achieving a utilization of 50% or less.
- On-site peak hour parking demand represented 42%-43% (weighted average) of the total demand, with the balance accommodated on-street.
- The observed weighted average total parking demand of 0.90 spaces/10 children is approximately 20% less than the City's Bylaw parking requirements (when converted to a simple rate of 1.13 spaces/10 children).
- On-street parking demand associated with the subject sites was observed to represent high-turnover, low-duration parking activity (5-10 minute peaks) and its use to accommodate spikes in day care drop-off/pick-up activity was not observed to significantly impact or interfere with adjacent land uses

5.1.2 Traffic Demand

- The observed weighted average vehicle trip rates have been calculated as 0.46 trips/child in the AM peak hour and 0.52 trips/child in the PM peak hour.
- The observed mode split to vehicles was 81% during the AM survey period and 85% during the PM survey period. The balance of trips were pedestrian and bicycle trips, with the majority being pedestrian trips.

5.2 Recommendations

5.2.1 Parking Rate

The recommended rate for the provision of pick-up/drop-off spaces for child care services in Edmonton considers the results of the parking surveys from the perspective of the total overall peak 15-minute demand as well as the use of on-site versus on-street supplies. As on-street parking is not always available, consideration of the context of a site in relation to the existing transportation network was deemed to continue to be important.

As noted above, the weighted average peak total parking demand was 0.90 spaces/10 children, which is approximately 20% lower than the equivalent City of Edmonton bylaw rate, indicating that a reduction in the required minimum on-site parking supply for pick-up/drop-off spaces for child care services is appropriate. Therefore, it is recommended that the minimum passenger pick-up and drop-off spaces for child care services be established at 0.90 spaces per 10 children for all sites.

On average, 42% to 43% of the parking demand was measured to occur on-site, notwithstanding that additional on-site parking capacity was available. Therefore, in RS and RSF zones, the inclusion of a clause which allows for up to 50% of the spaces to be provided on-street without a variance when on-street parking is typically permitted adjacent to the development site is recommended (i.e., sites within RS and RFS zones located adjacent to roadways with unrestricted on-street parking; roadways subjected to seasonal parking bans would continue to be eligible).

It is assumed that child care sites within RS and RFS zones will continue to represent corner lots. When unrestricted on-street parking is located along the frontages, the requirement for the reduction in on-site parking is met. It is, however, acknowledged that *unrestricted* parking is not the same as *available* parking. A site could abut unrestricted on-street parking, but the parking could be unavailable (i.e. typically occupied by parking generated by other area users). The onus continues to fall to the owner/operator (similar to the existing bylaw for other uses) to determine whether the needs of patrons can be met satisfactorily. In such a case, a choice could be made by the owner/operator to provide on-site parking over and above the bylaw requirement.

On-street parking is not consistently located within close proximity to the primary entrance for child care services located within commercial, mixed-use, or industrial sites; therefore, the 50% reduction in on-site parking supply based on available on-street parking without requiring a variance is only applicable to the RS and RSF zones.

5.2.2 Signage

The inclusion of a requirement to implement signage to designate on-street pick-up/drop-off spaces is not recommended. Signage essentially reserves spaces for the use but does not require people to use them. As identified by the surveys, people will utilize spaces that are convenient for them. The opportunity to share publicly available on-street parking spaces is greatest when the spaces are available to all potential users.

With respect to on-site pick-up/drop-off spaces for sites located in RS and RSF zones, on-site signage is not required, as evidenced by the parking data. If there is a concern with the use of on-site drop-off-pick up spaces associated with an RS/RSF site, direct communication between the operator and the patron is an available recourse. With respect to on-site pick-up/drop-off spaces for sites where the on-site parking supply is shared across multiple users (e.g. commercial site or mixed-use development), signage is recommended to reserve the spaces for the intended day care use during specified AM and PM peak hours in order to balance tenant needs.

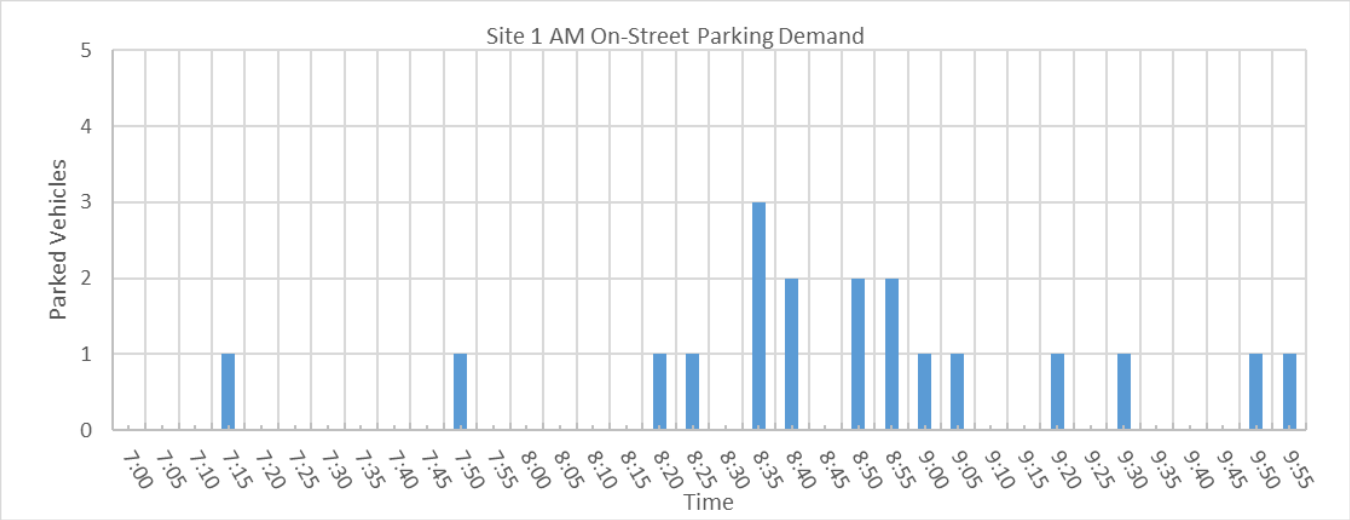
5.2.3 Trip Rate

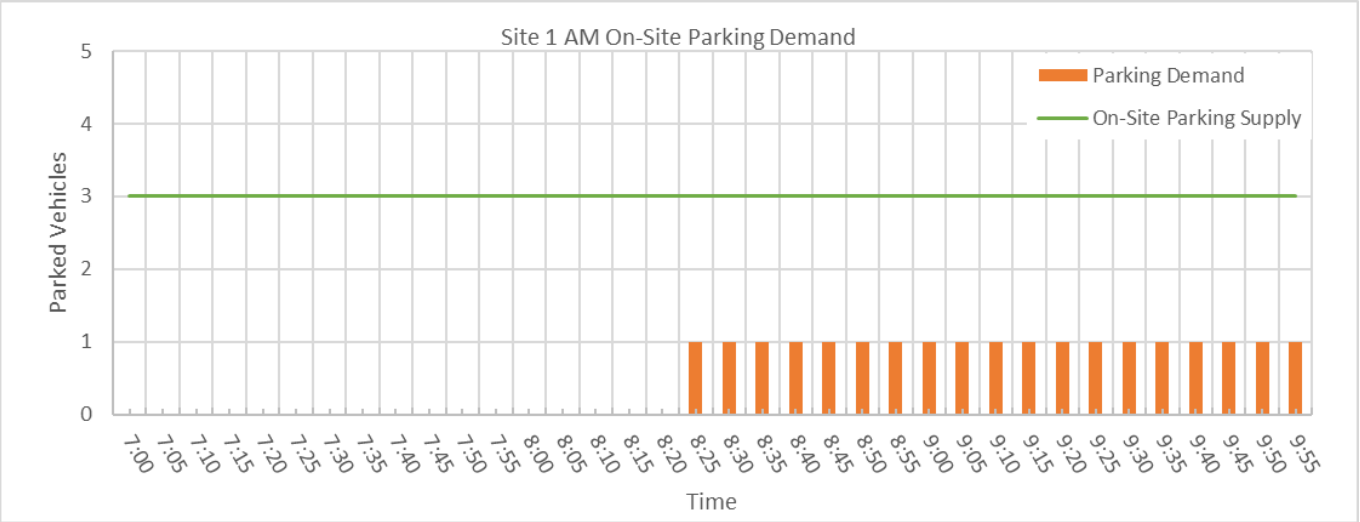
Based on the surveys completed, the weighted average vehicle trip rate was calculated as 0.46 trips/child in the AM peak hour and 0.52 trips/child in the PM peak hour. Although these trip rates are less than ITE trip generation rates, they are recommended for use in the context of daycare sites in the Edmonton marketplace.

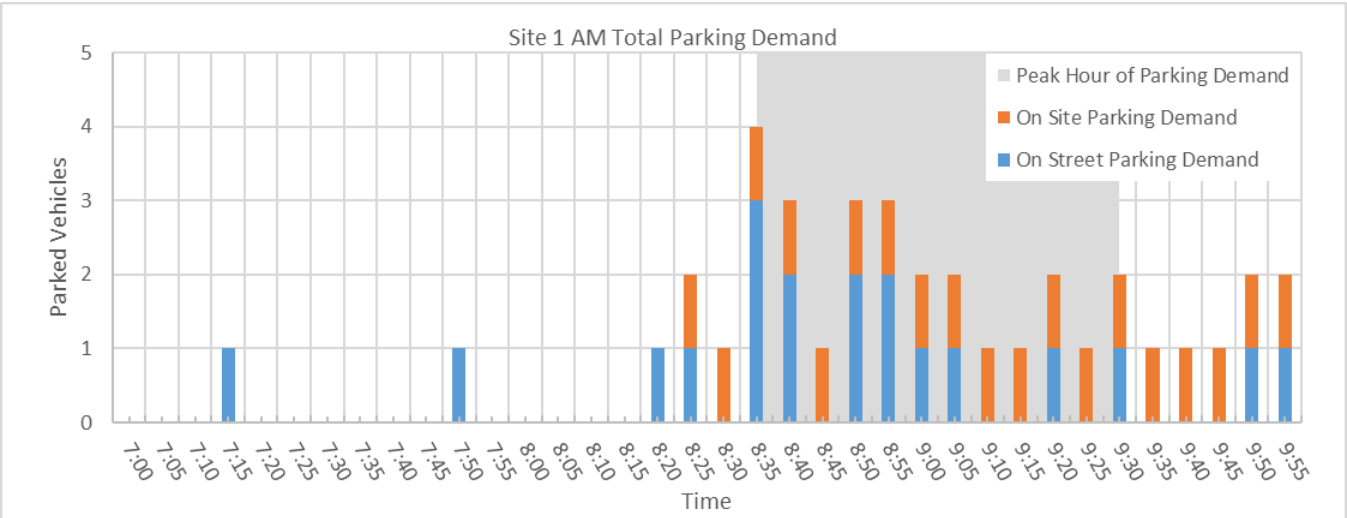
APPENDIX A

Site Summaries

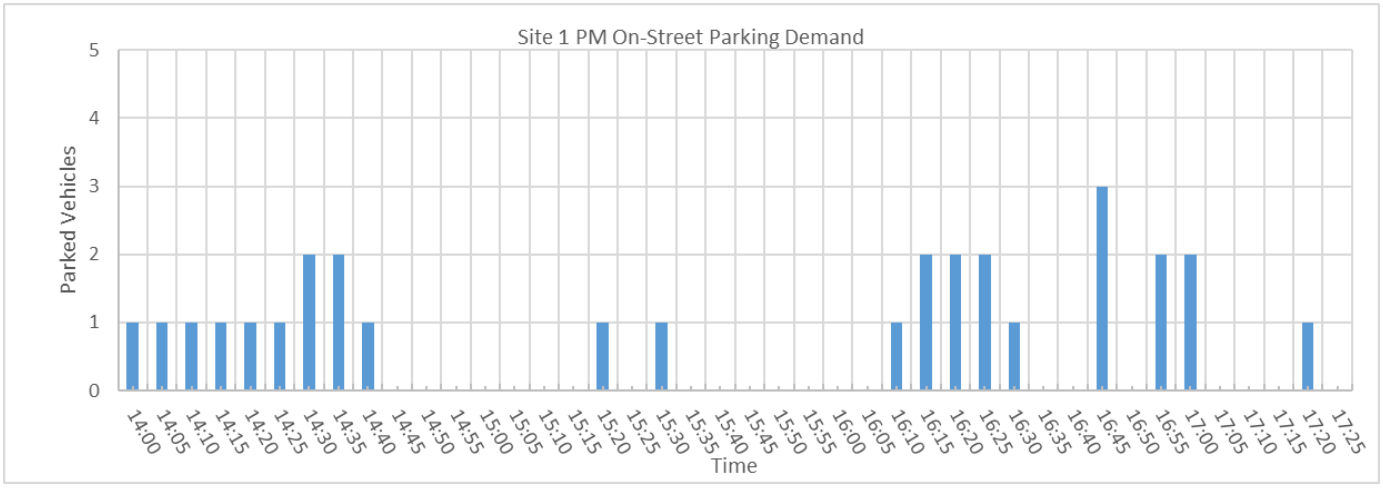
Site 1
AM Observed Parking Demand

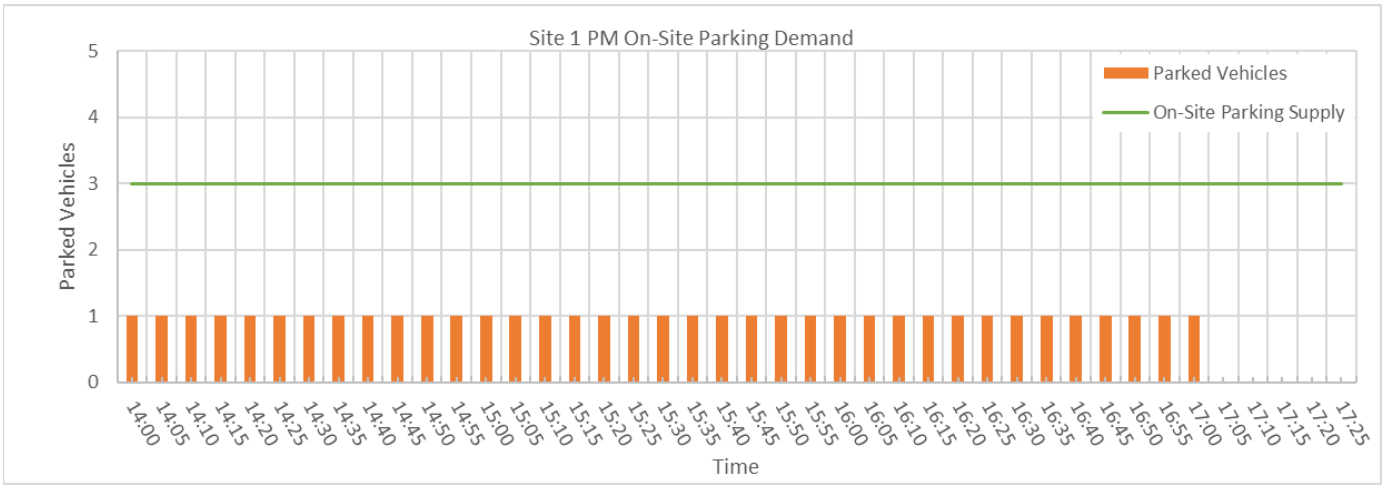


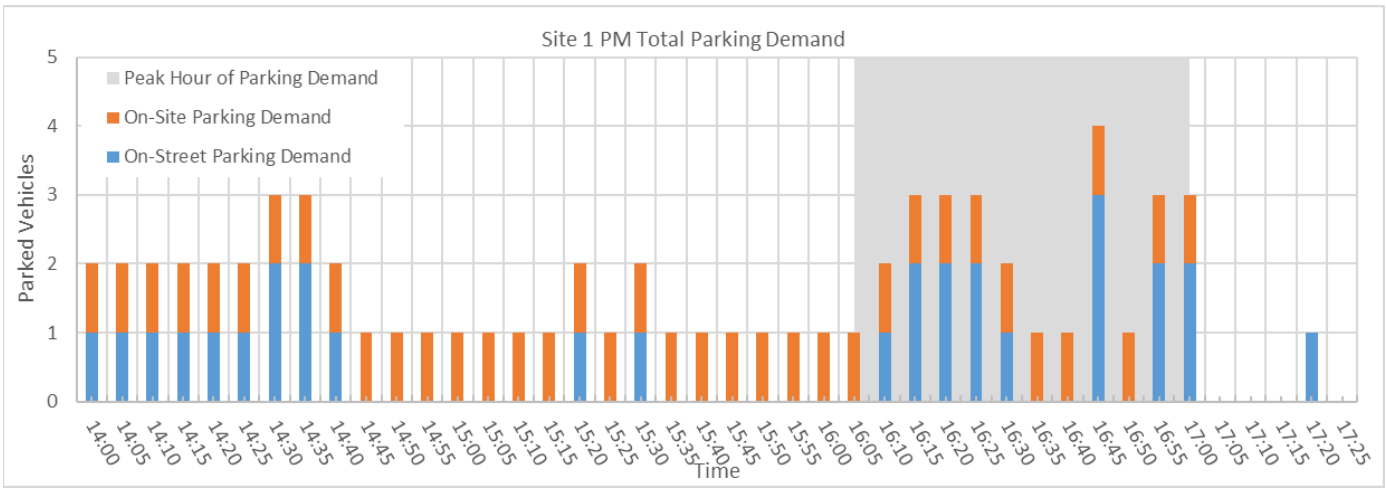




Site 1
PM Observed Parking Demand







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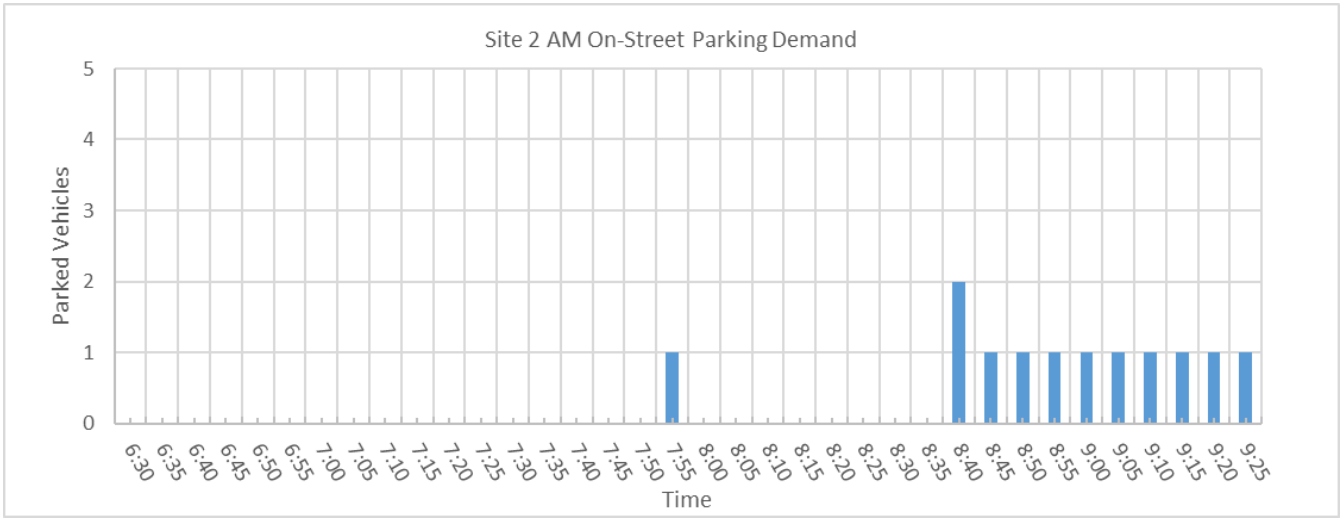
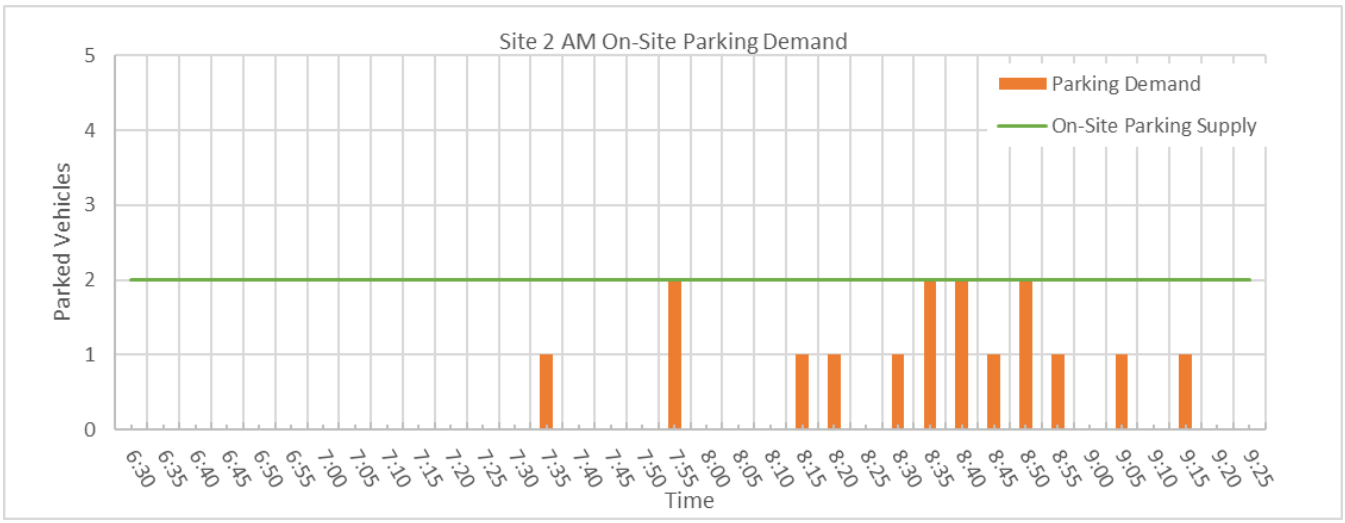
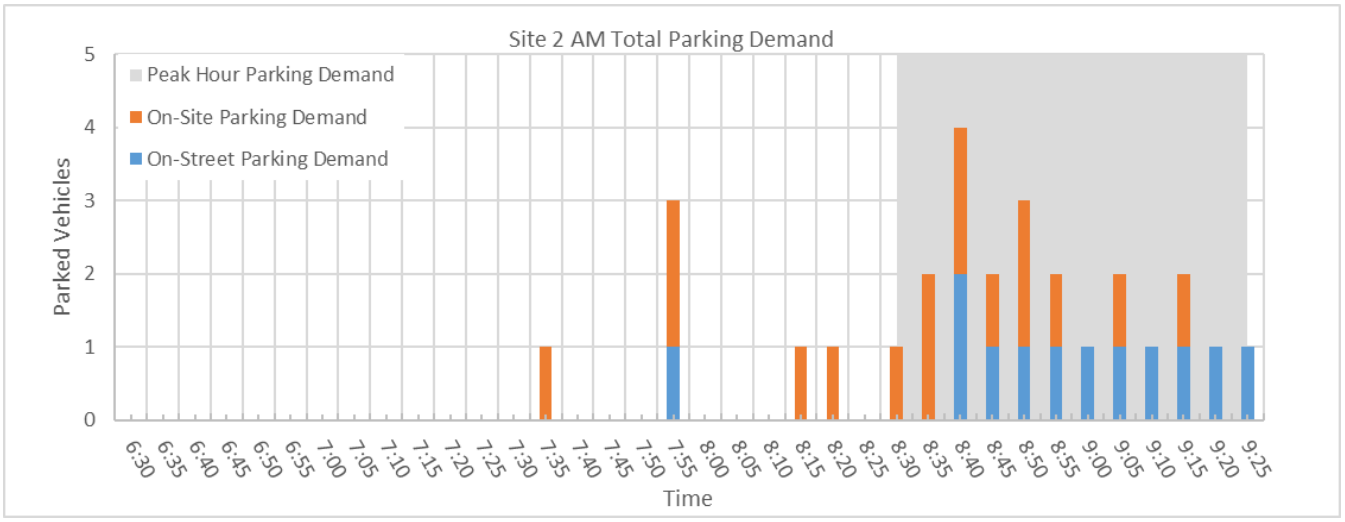
AM Observed Parking Demand







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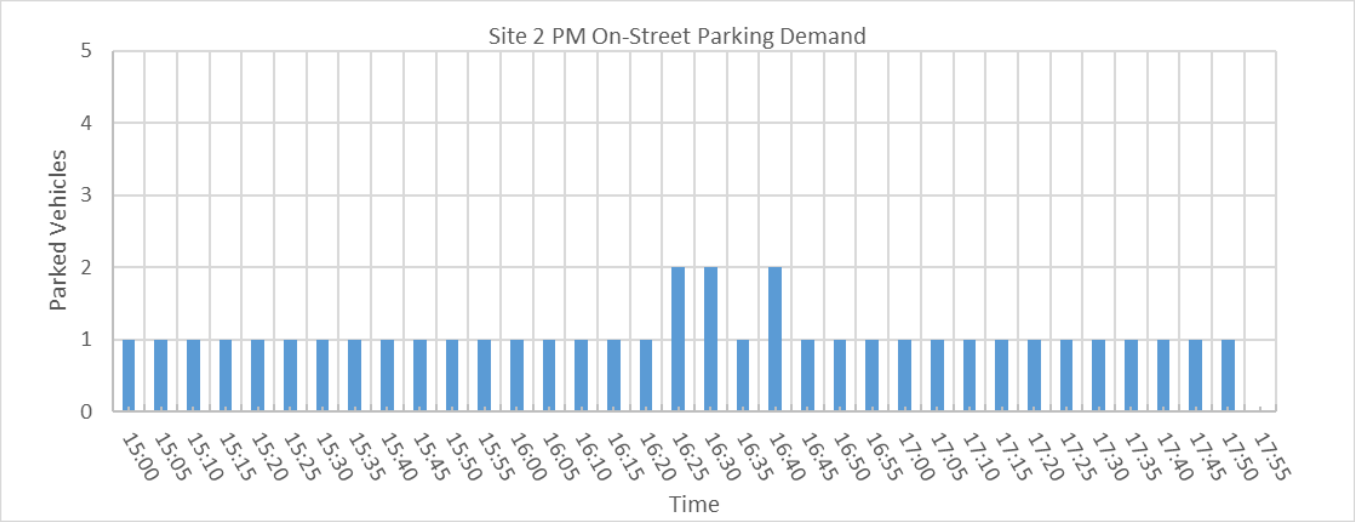
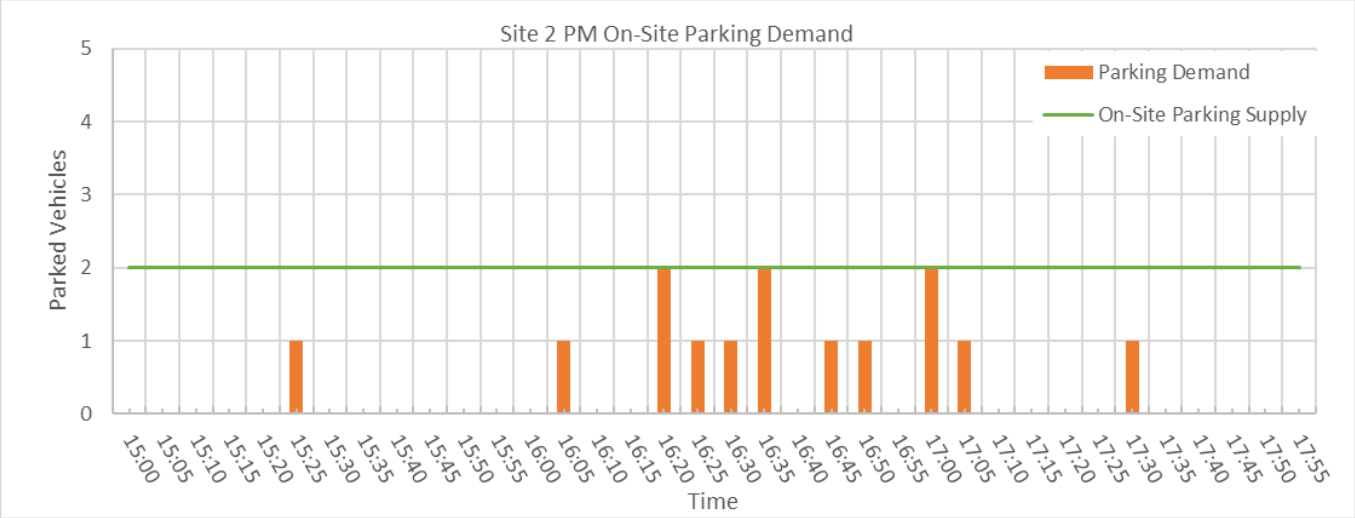
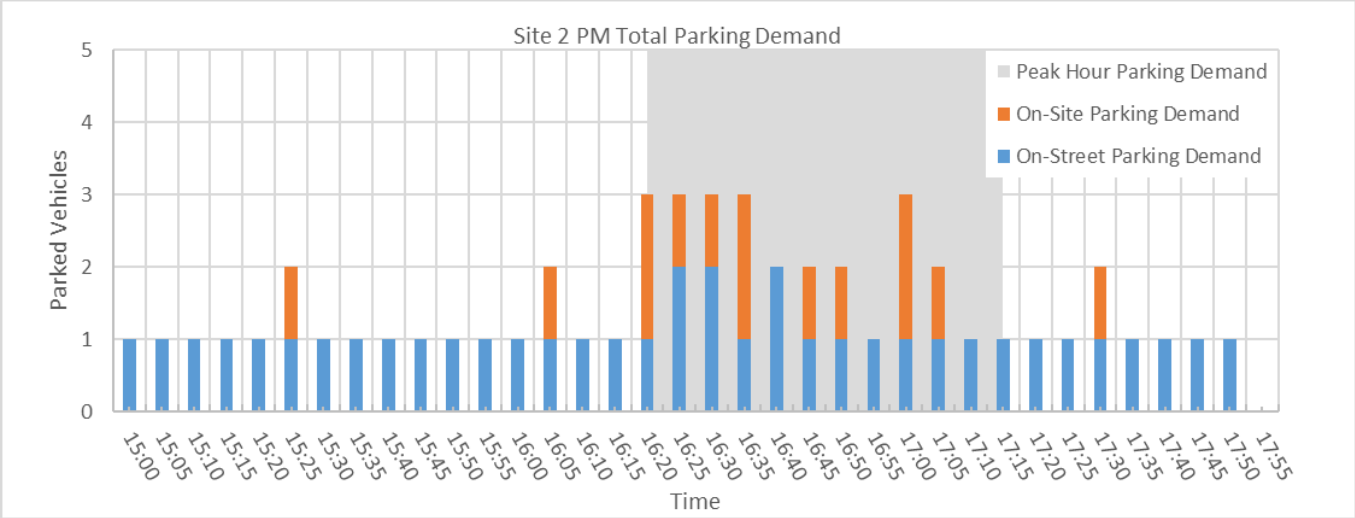
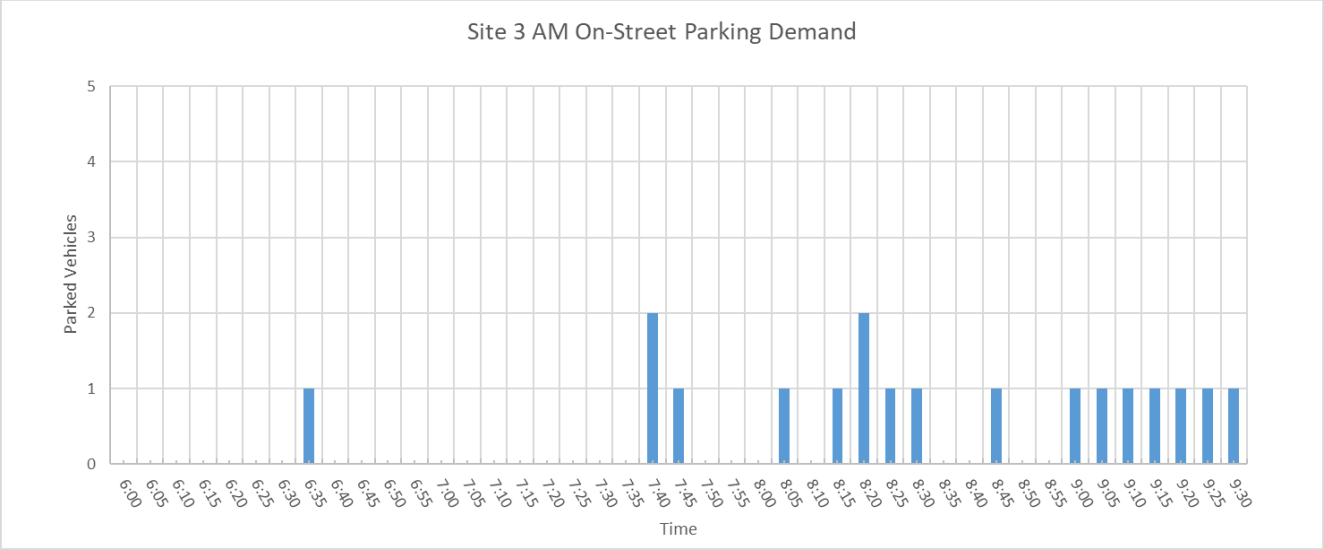
PM Observed Parking Demand

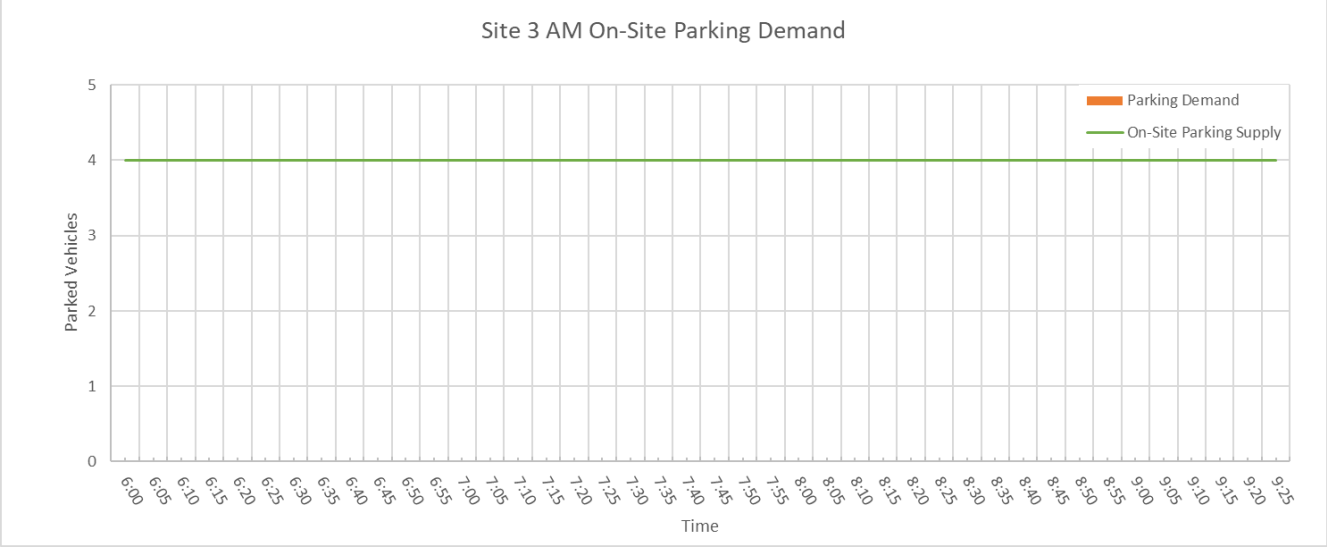


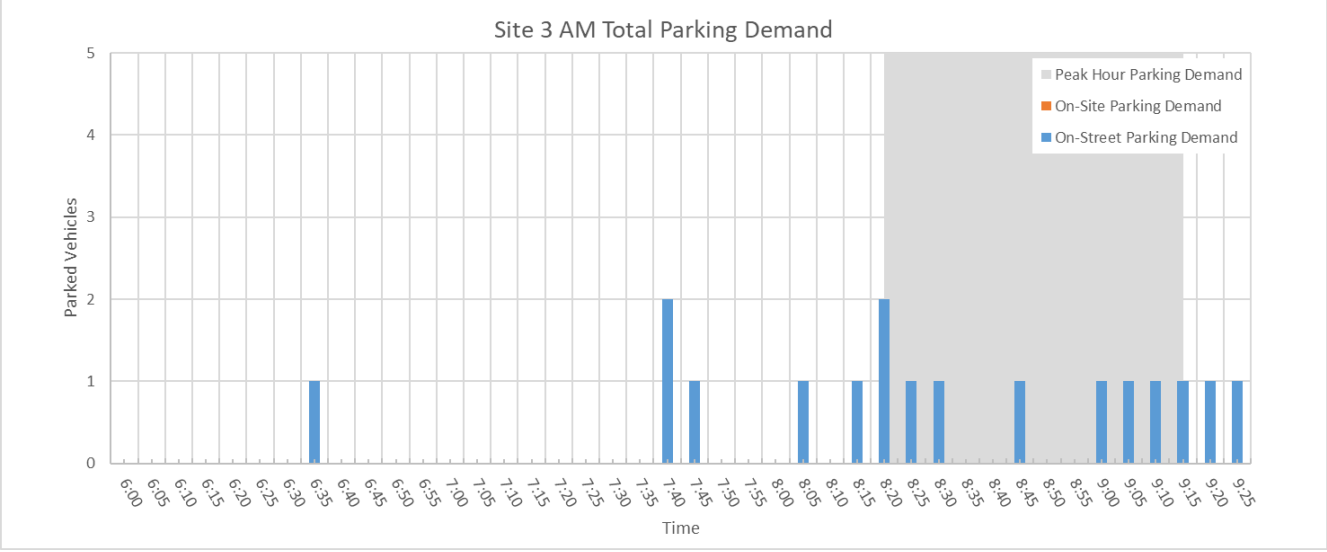




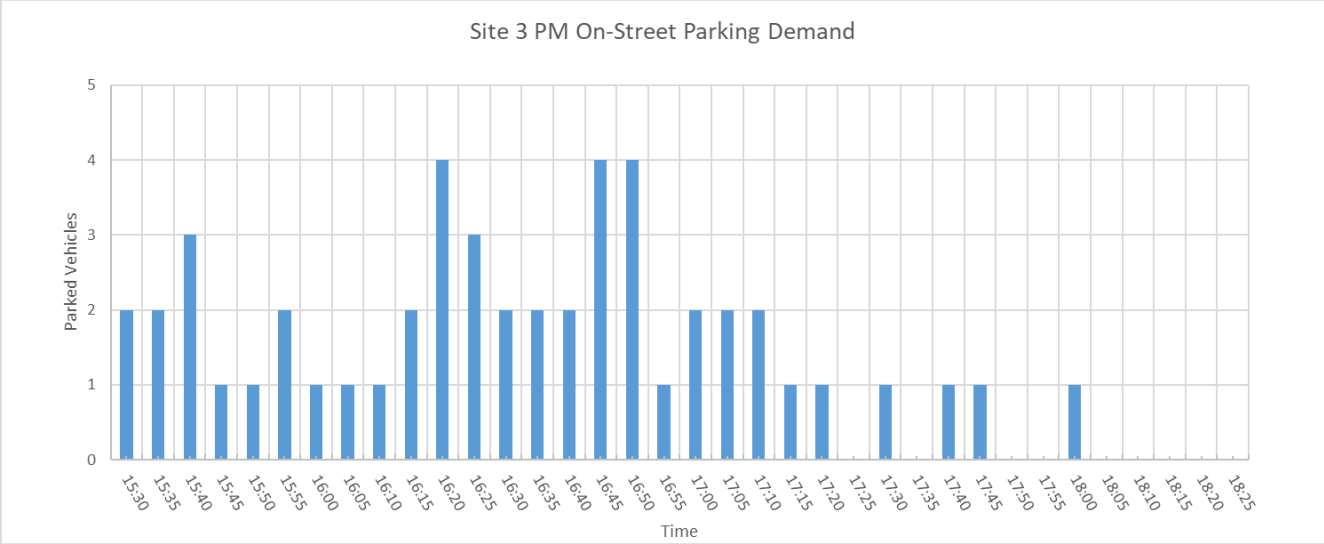
Site 3
AM Observed Parking Demand

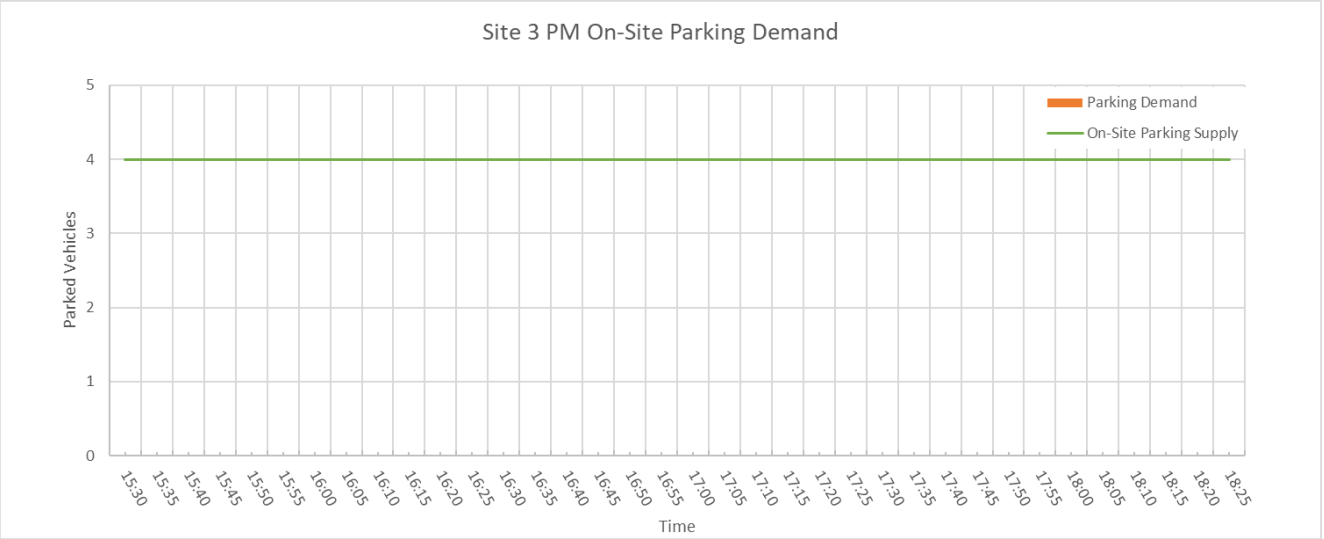


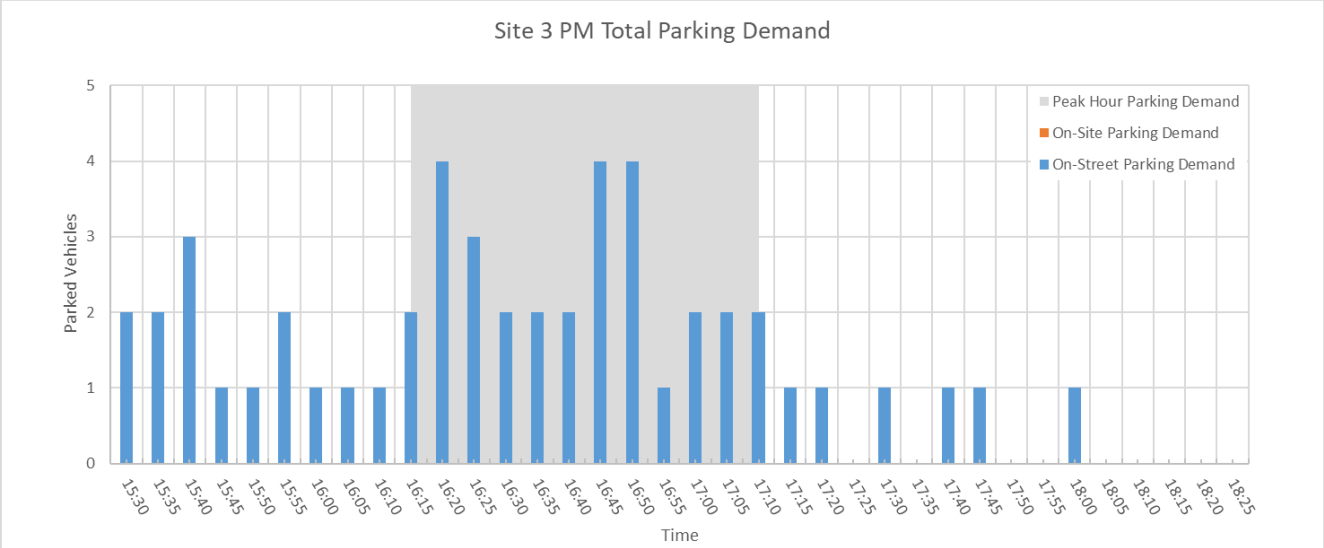




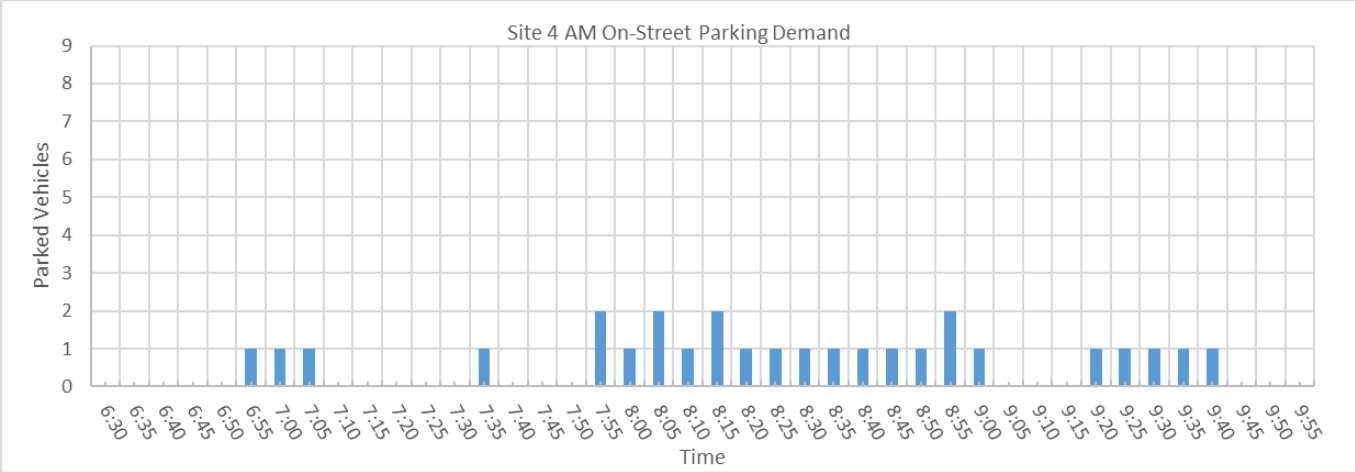
Site 3
PM Observed Parking Demand

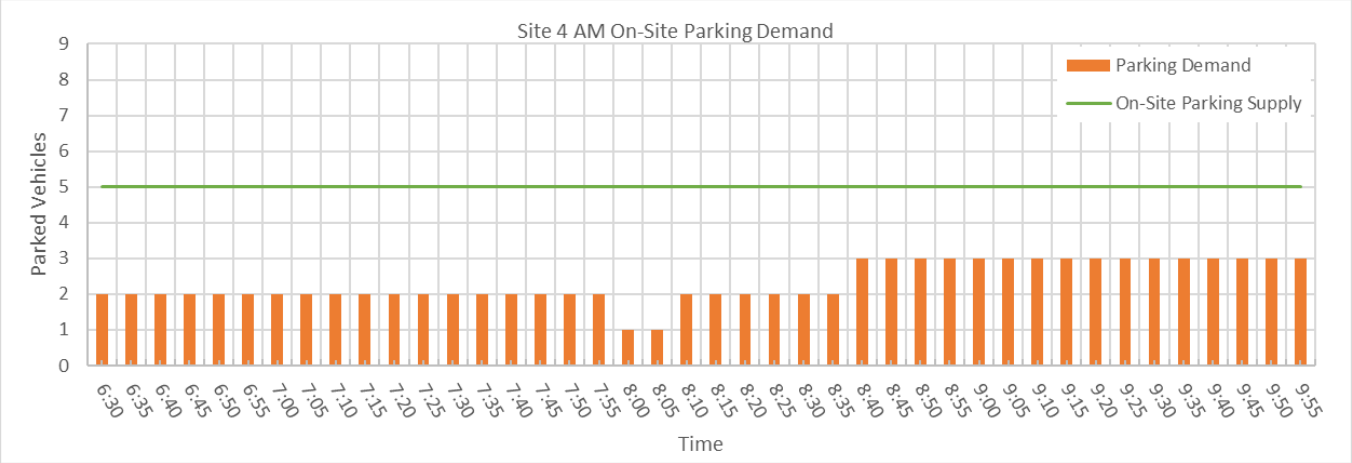


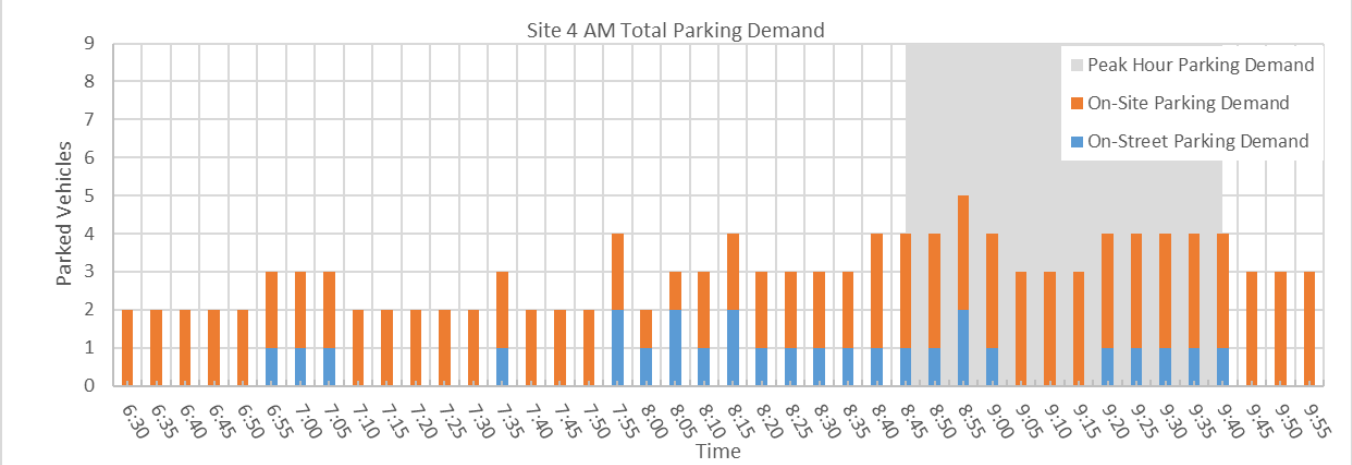




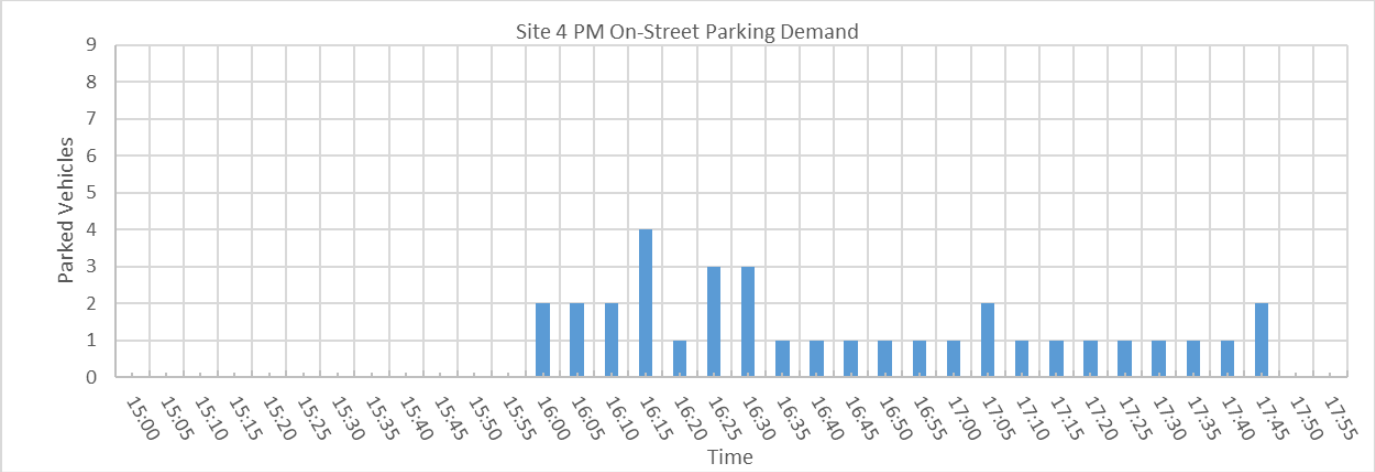
Site 4
AM Observed Parking Demand

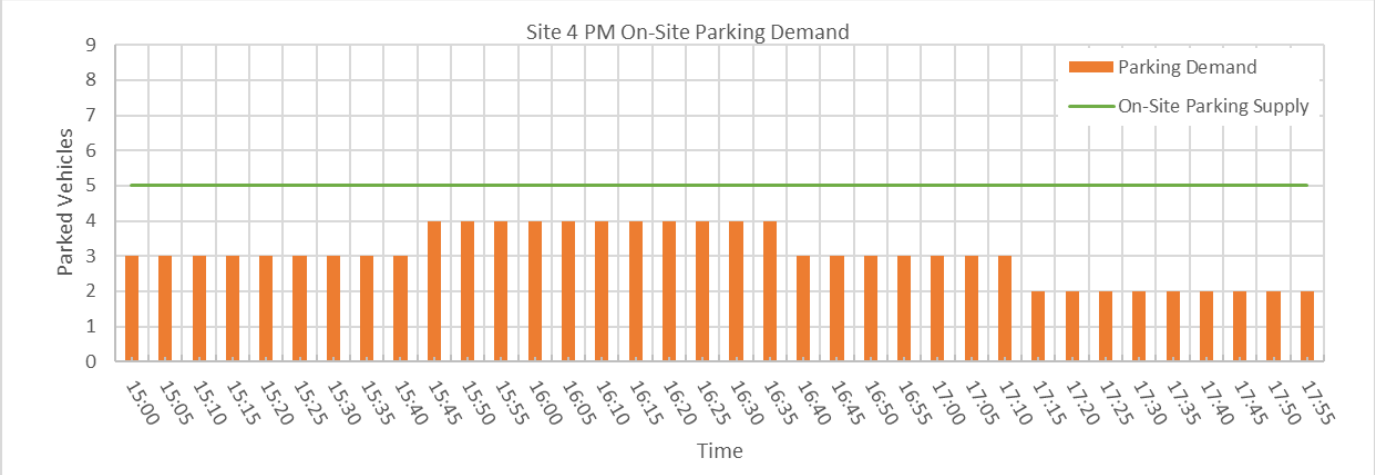


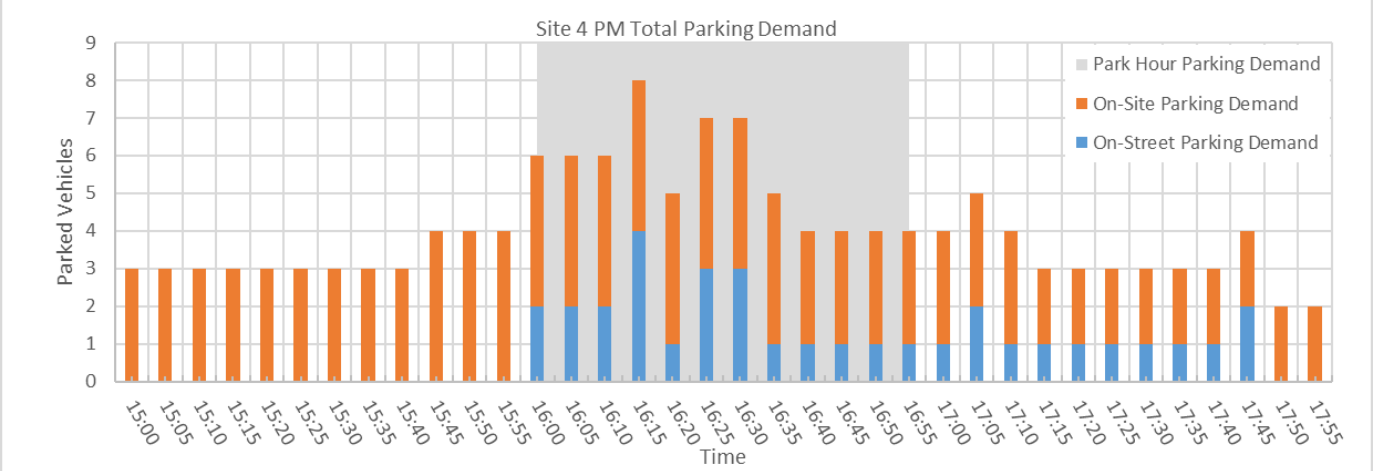




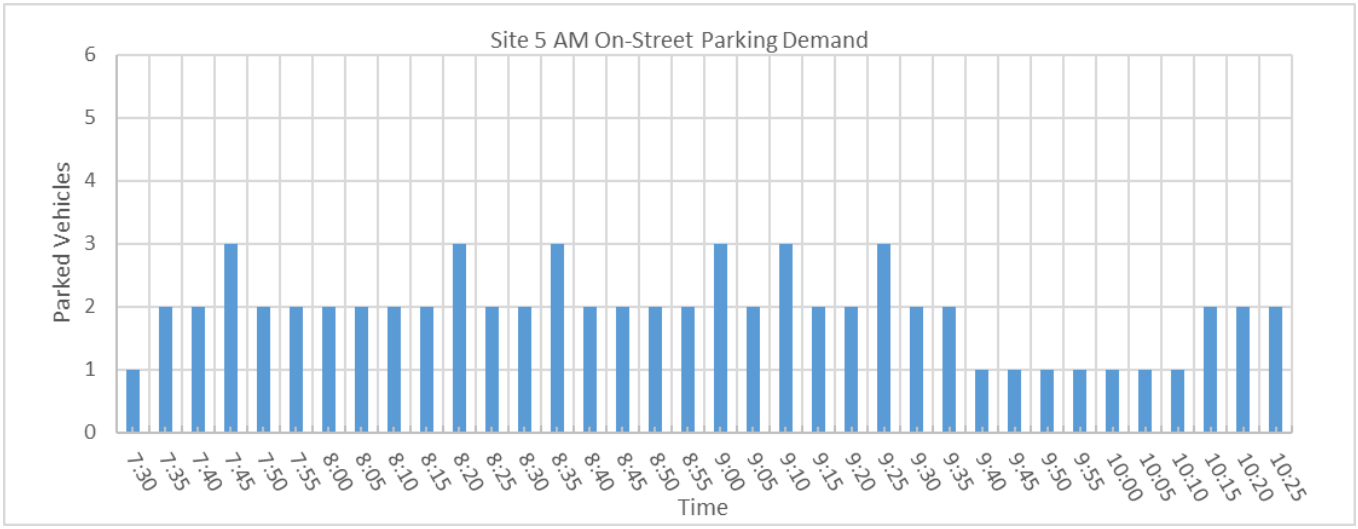
Site 4
PM Observed Parking Demand

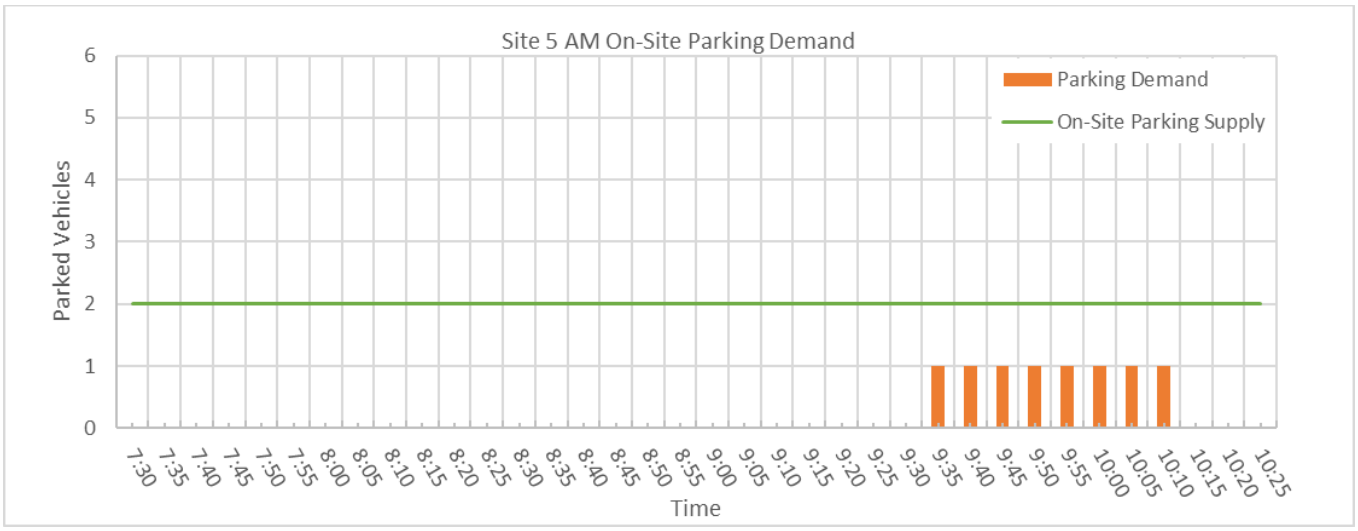


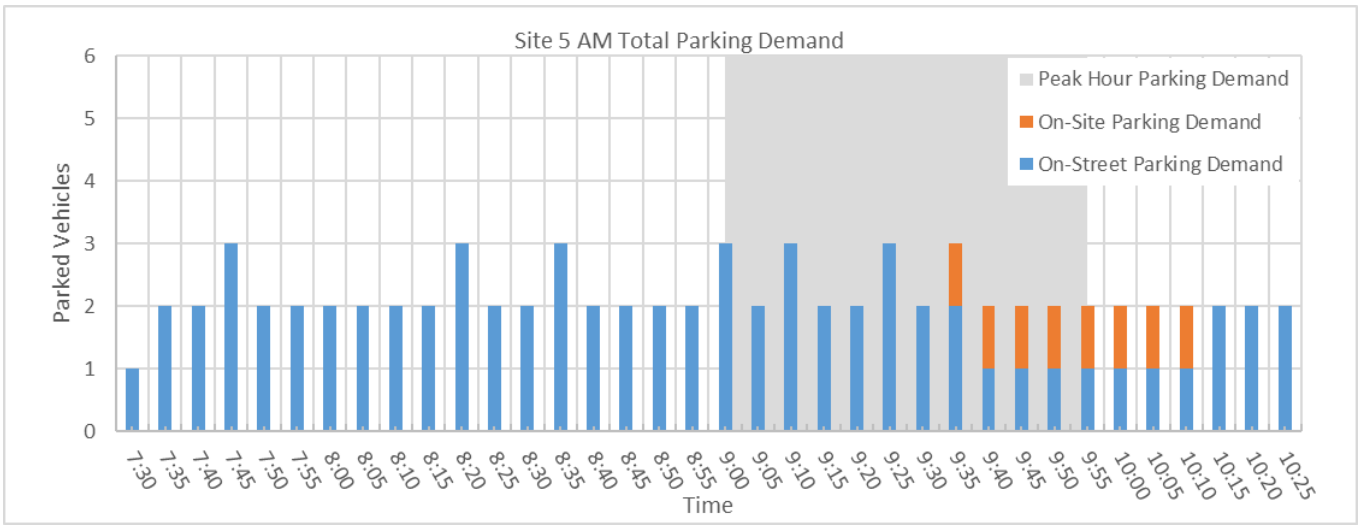




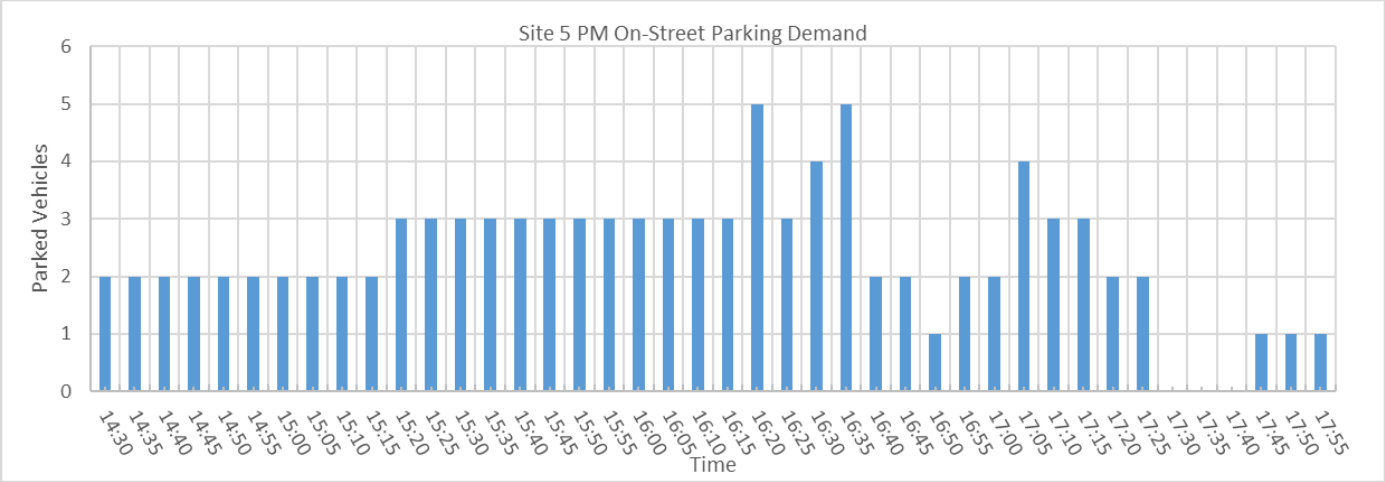
Site 5
AM Observed Parking Demand

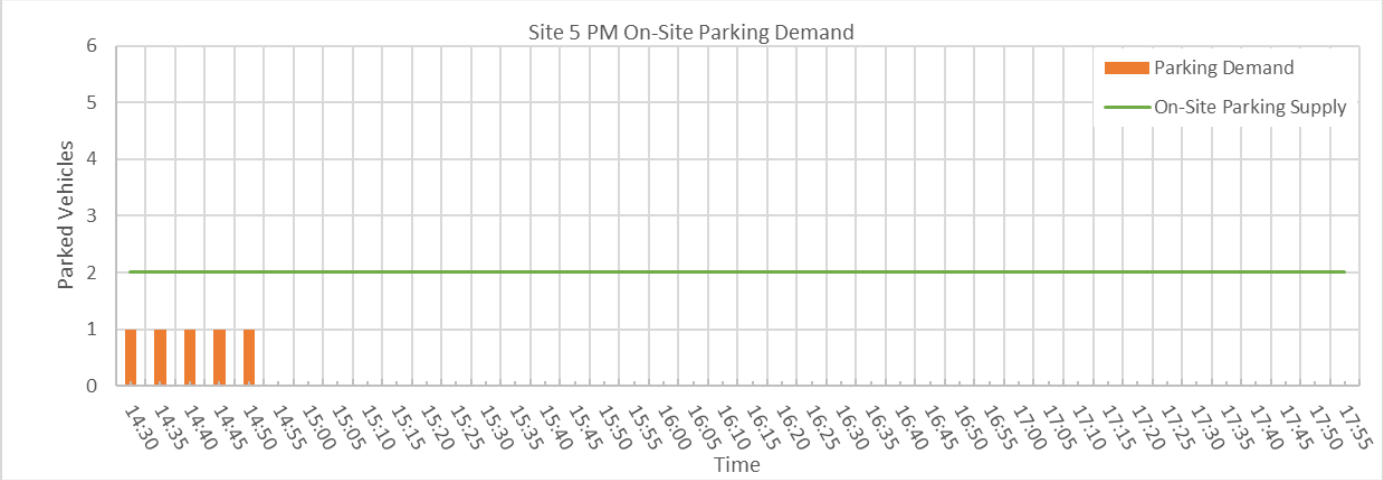


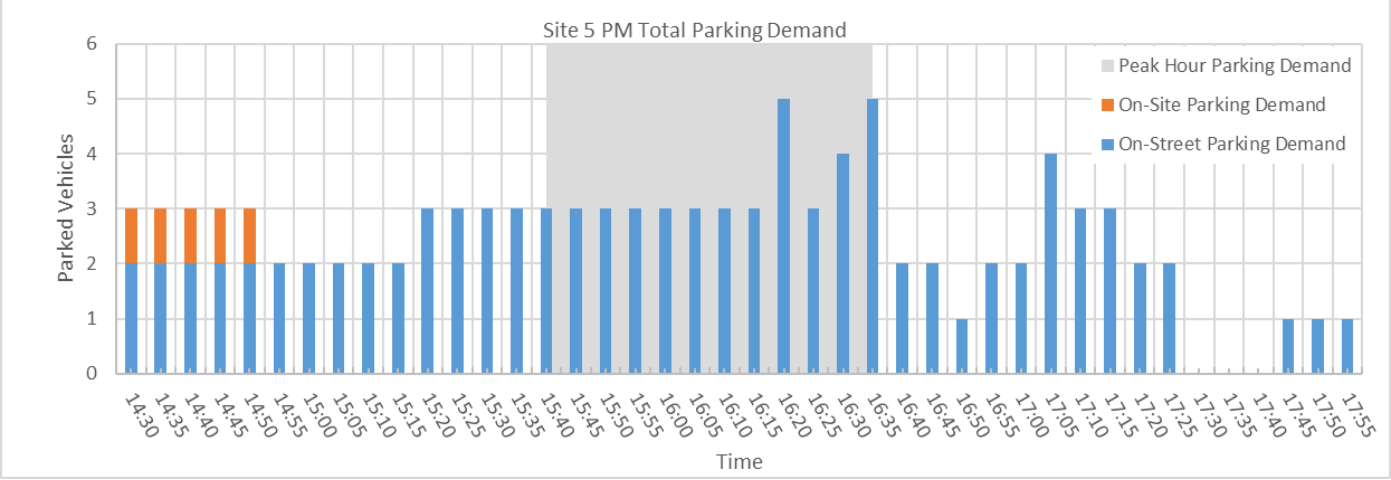




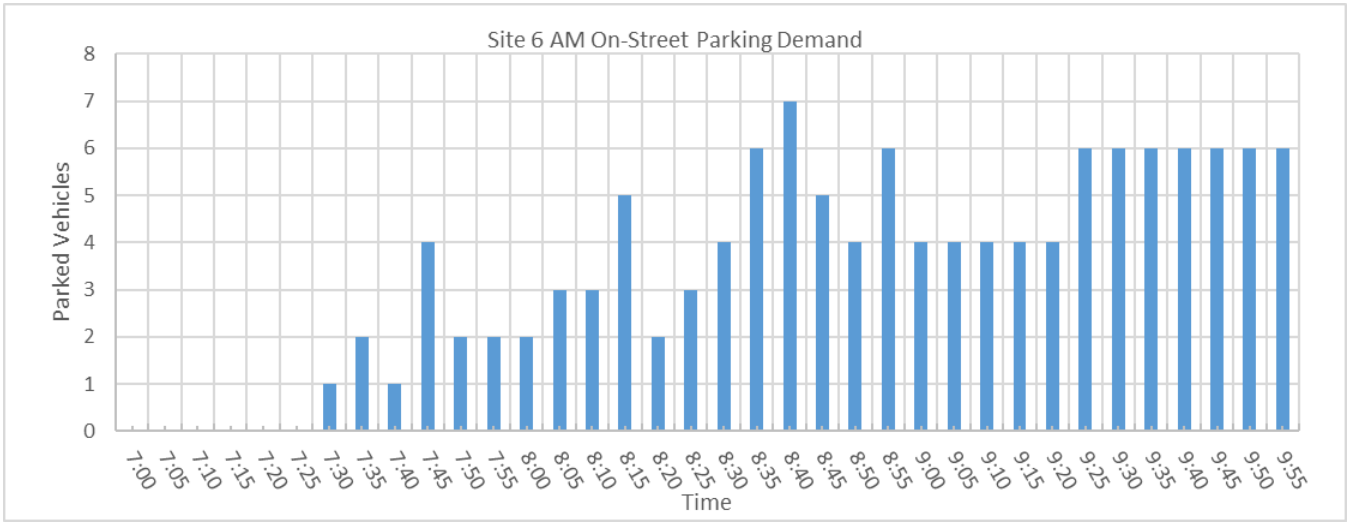
Site 5
PM Observed Parking Demand

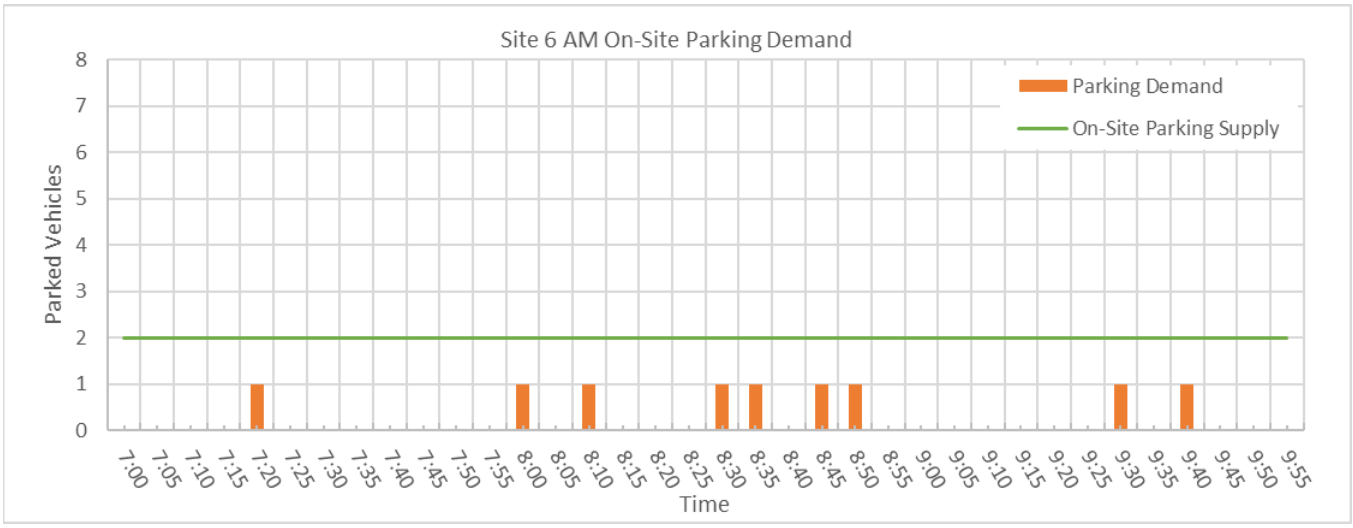


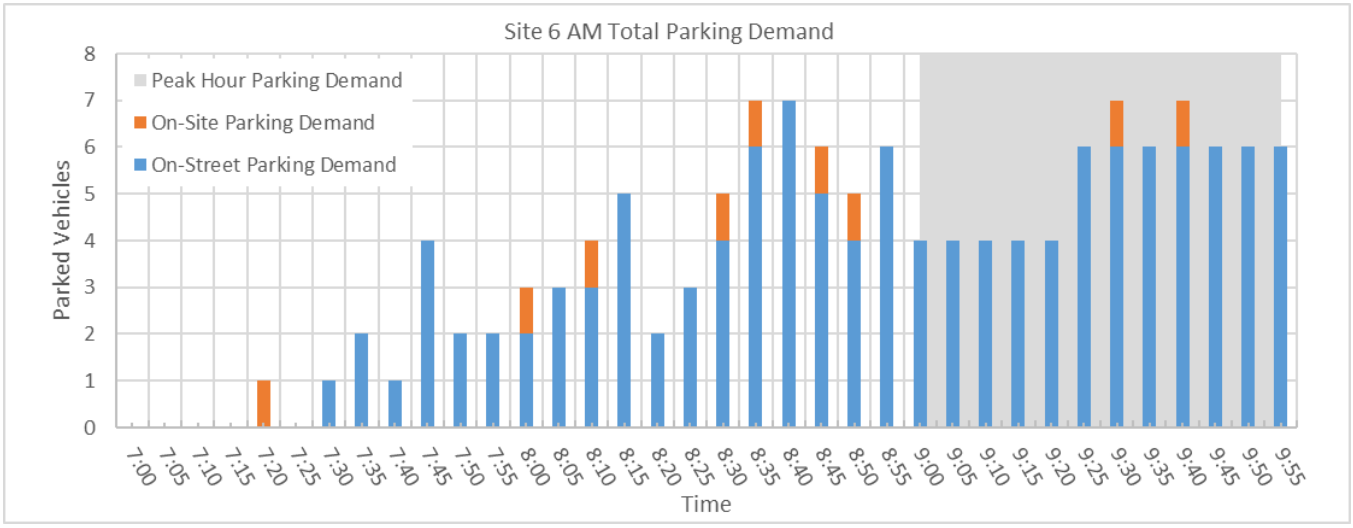




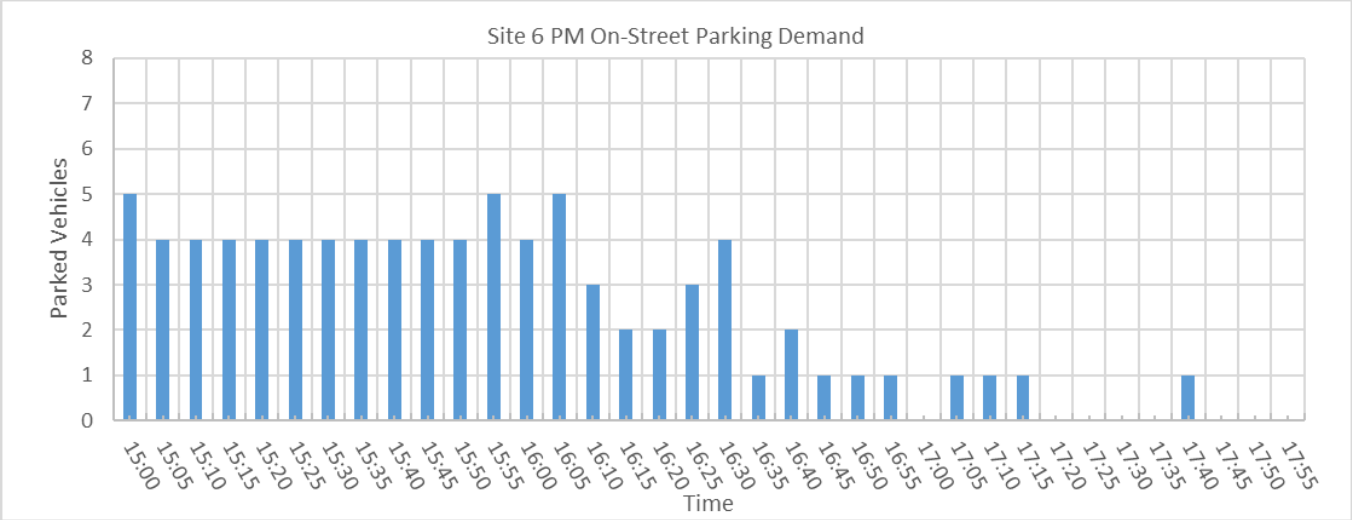
Site 6
AM Observed Parking Demand

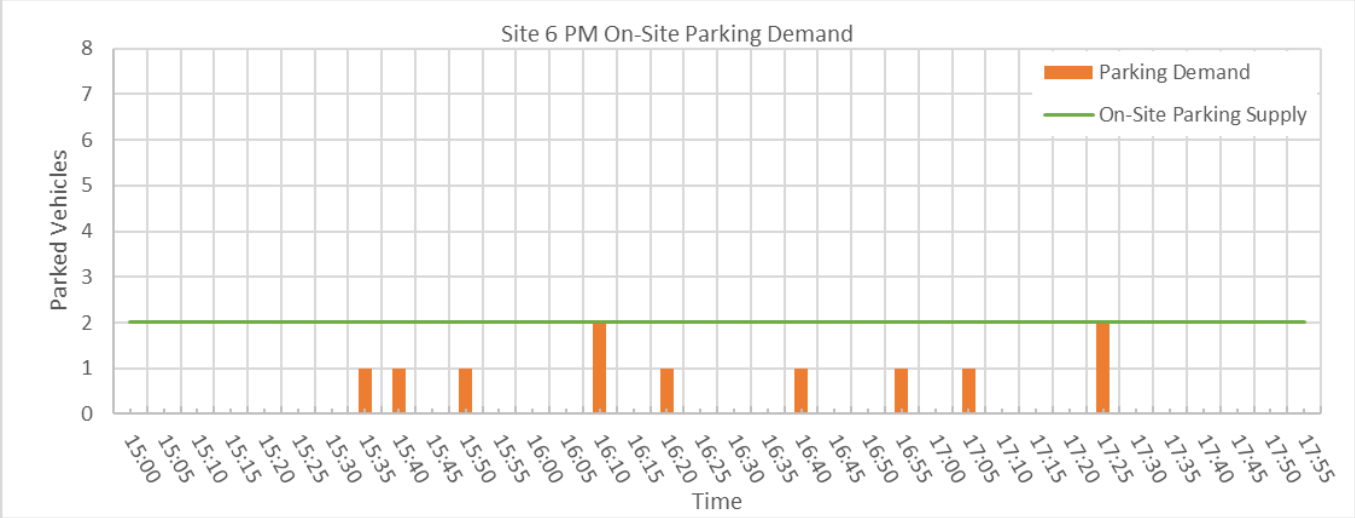


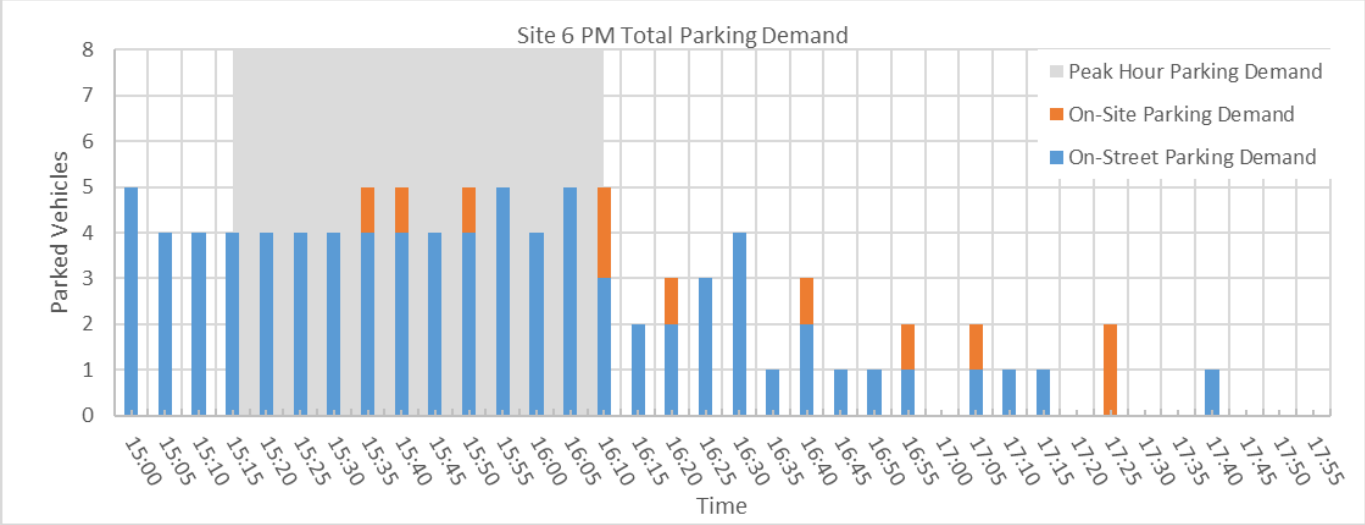




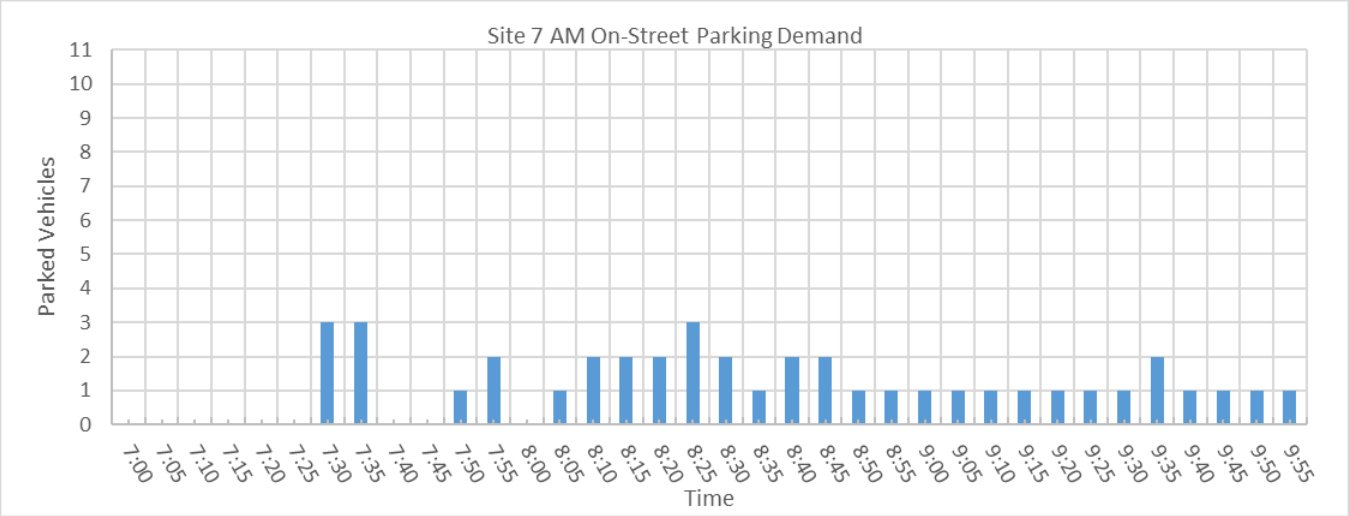
Site 6
PM Observed Parking Demand

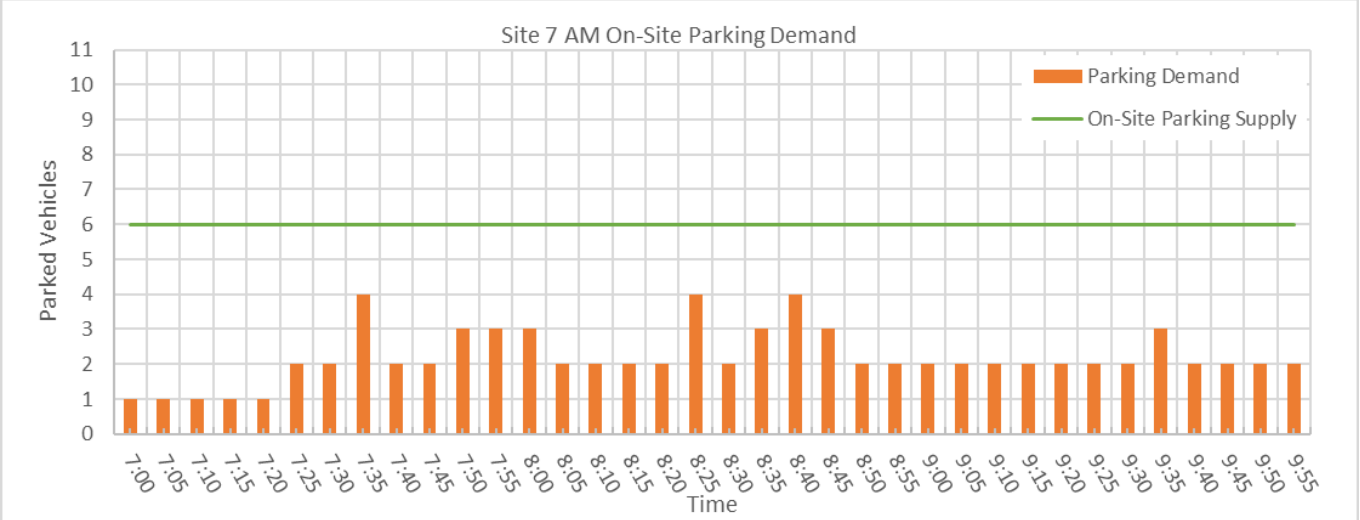


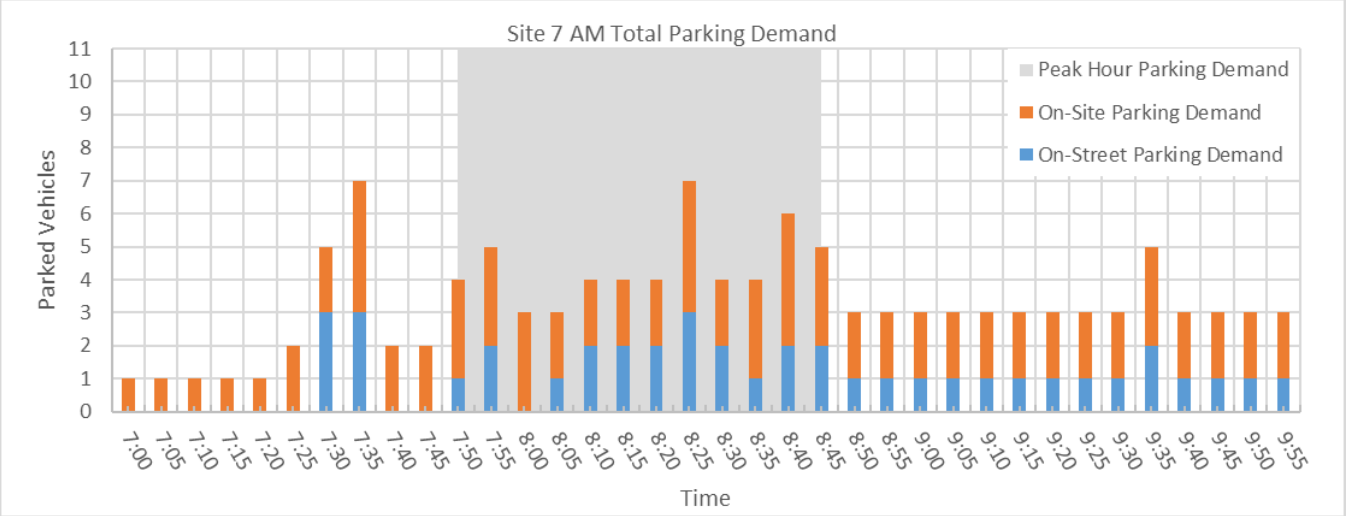




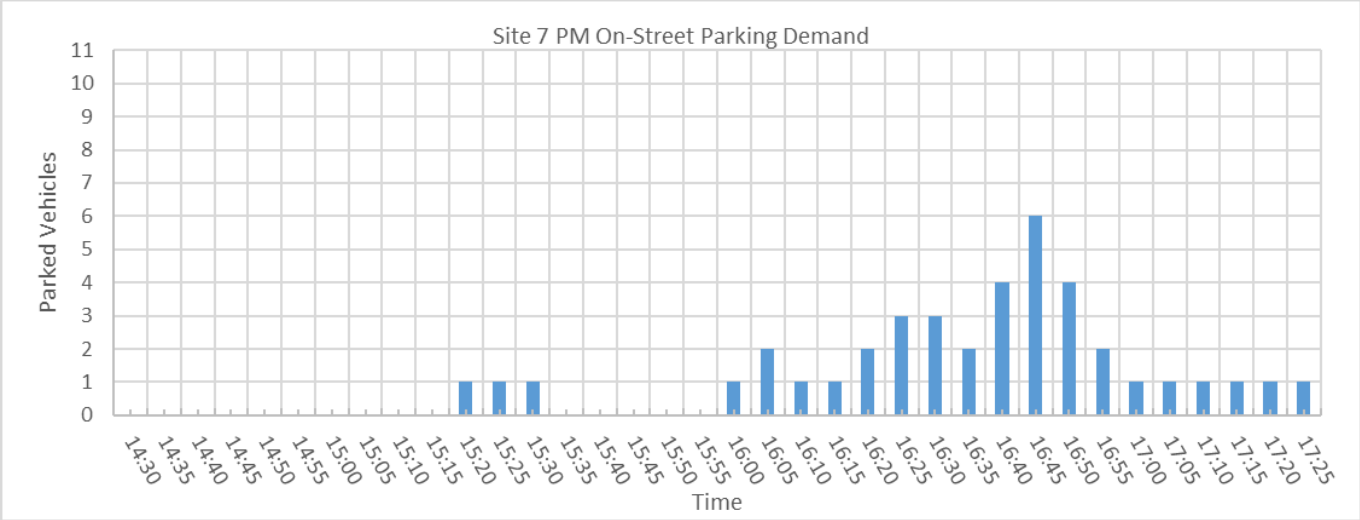
Site 7
AM Observed Parking Demand

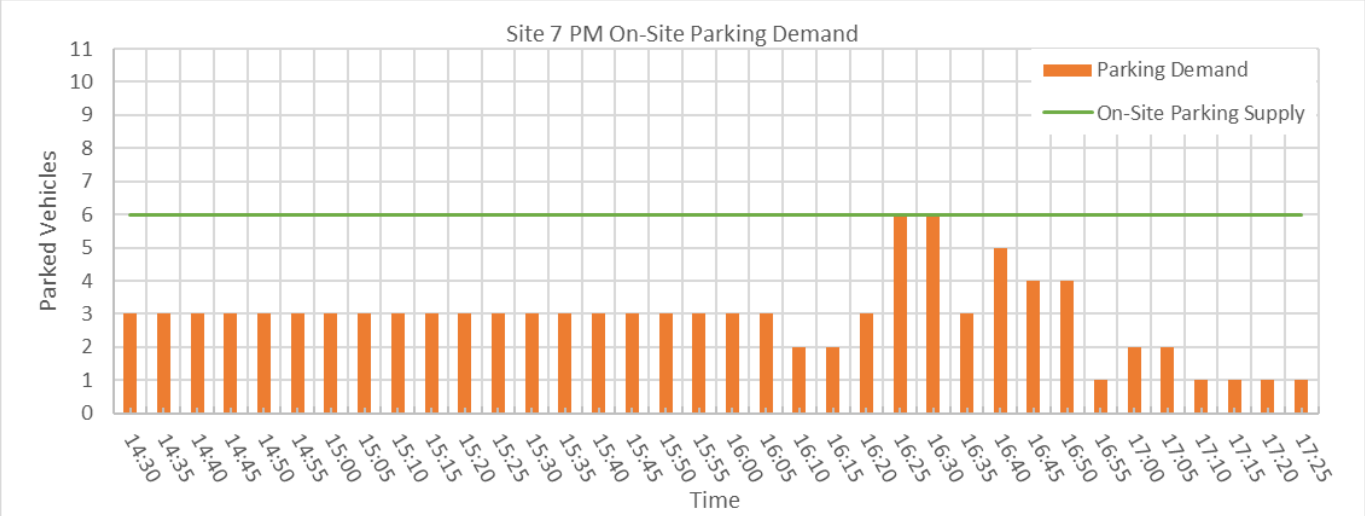


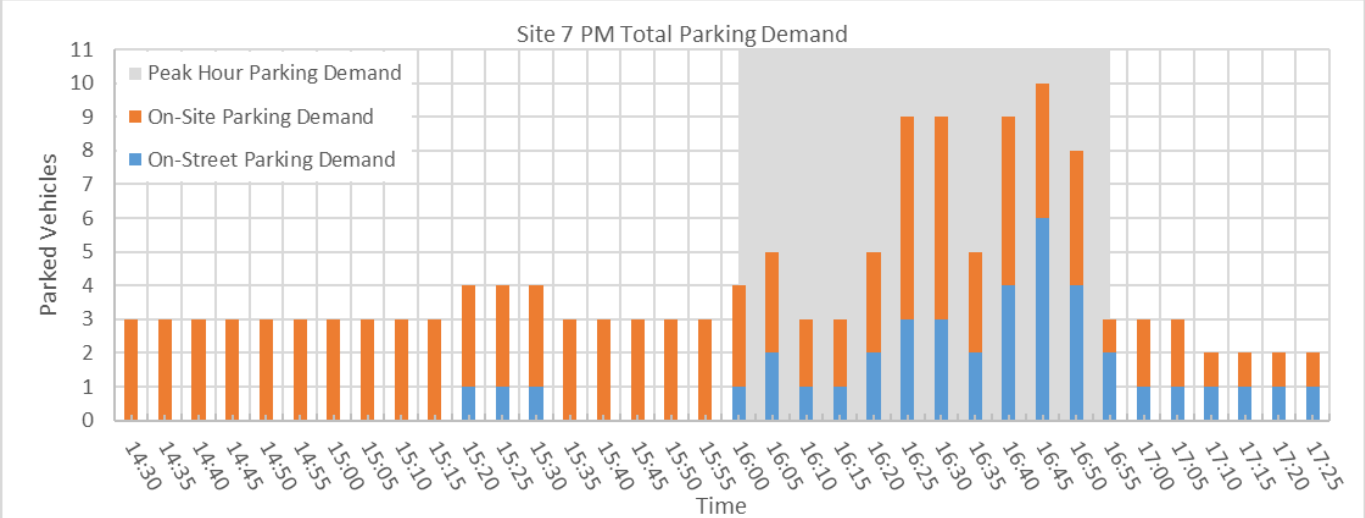




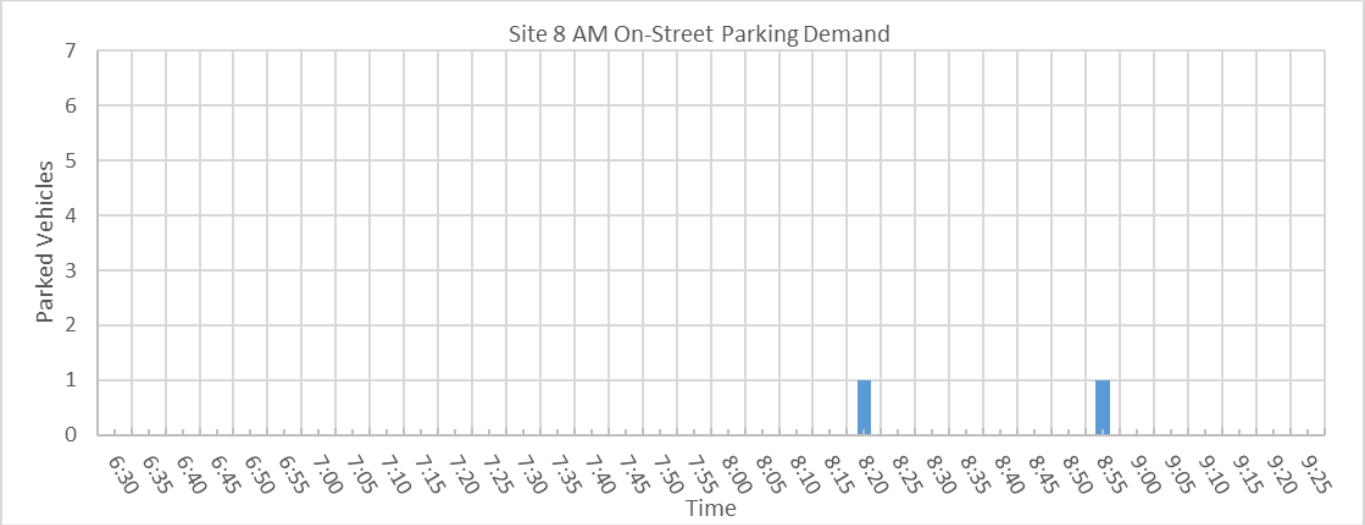
Site 7
PM Observed Parking Demand

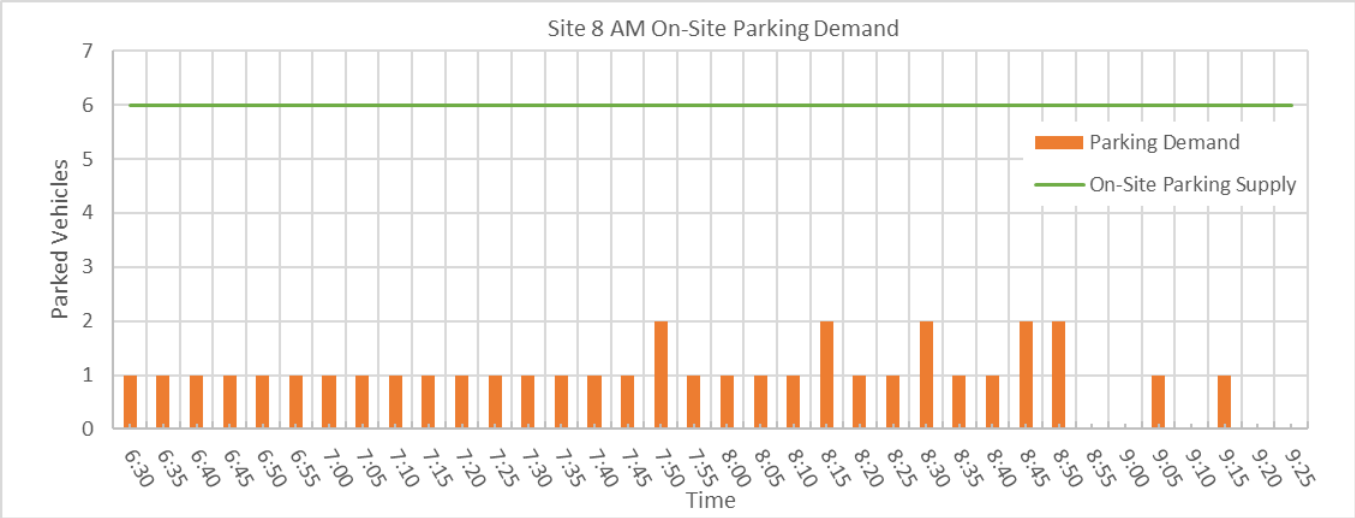


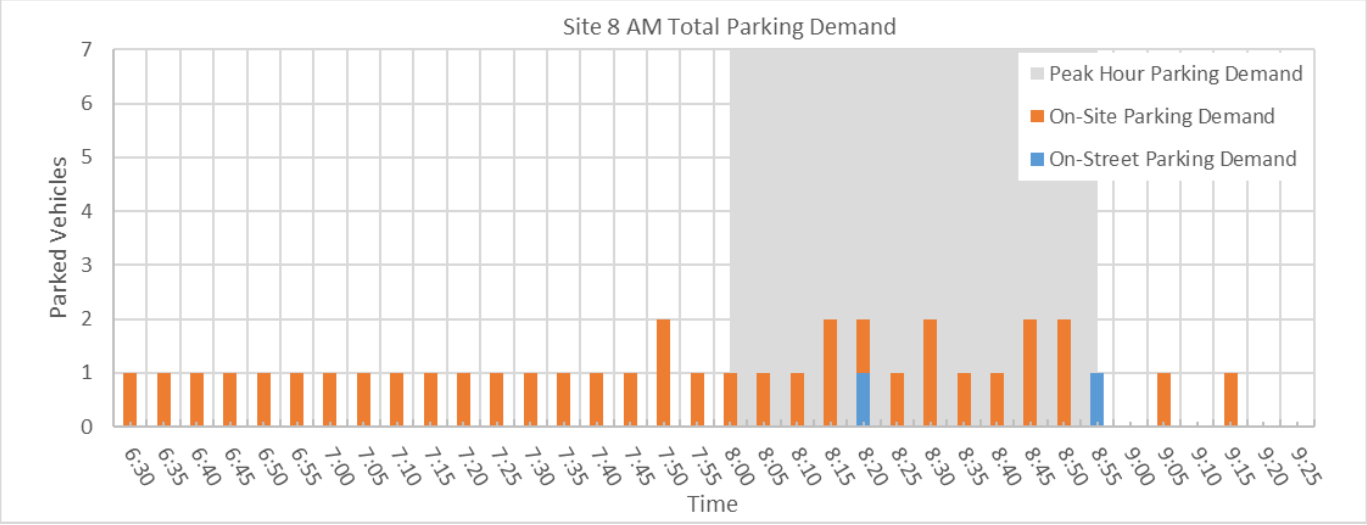




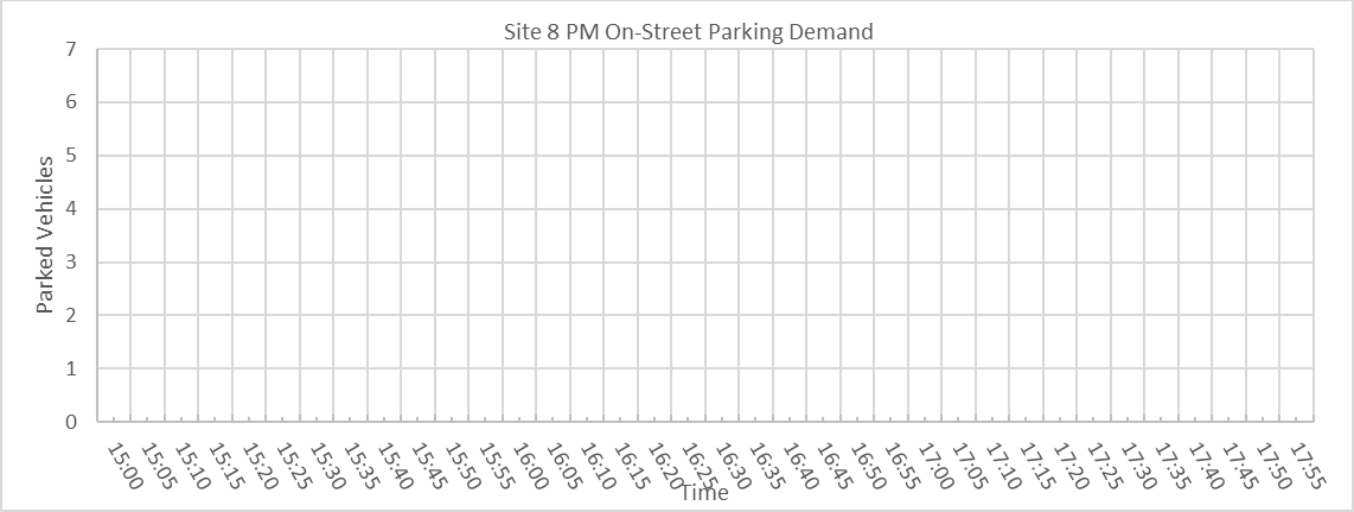
Site 8
AM Observed Parking Demand

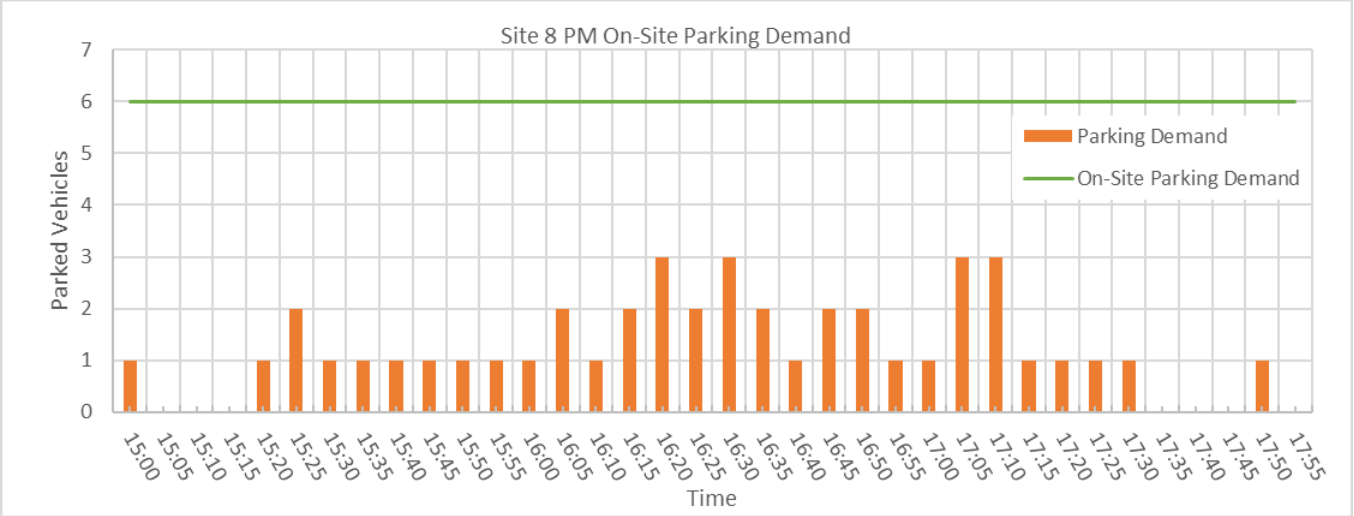


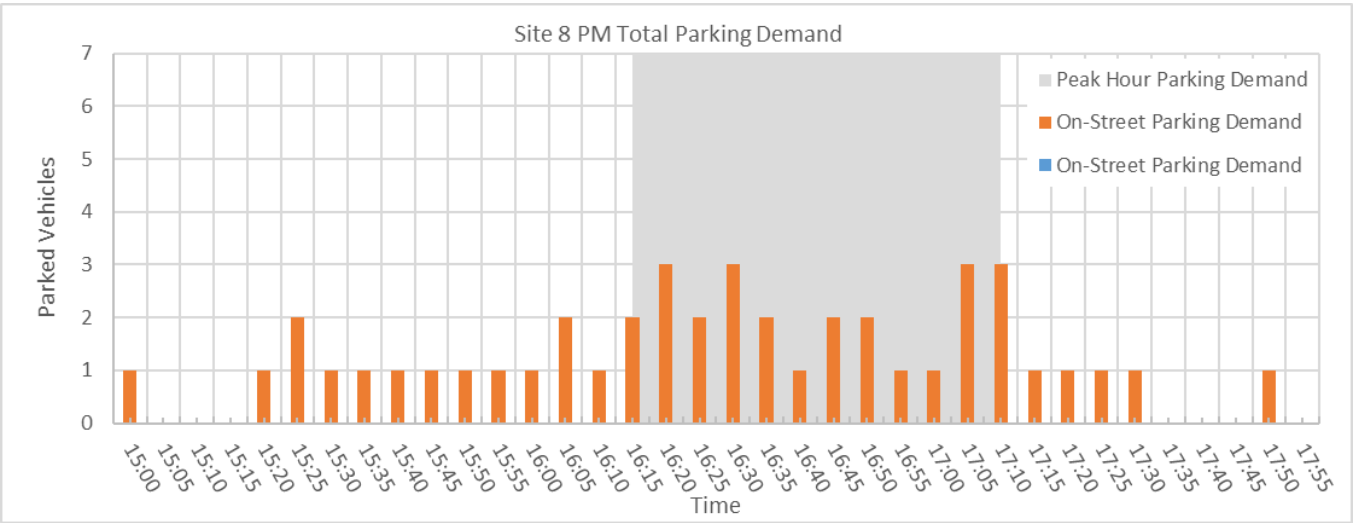




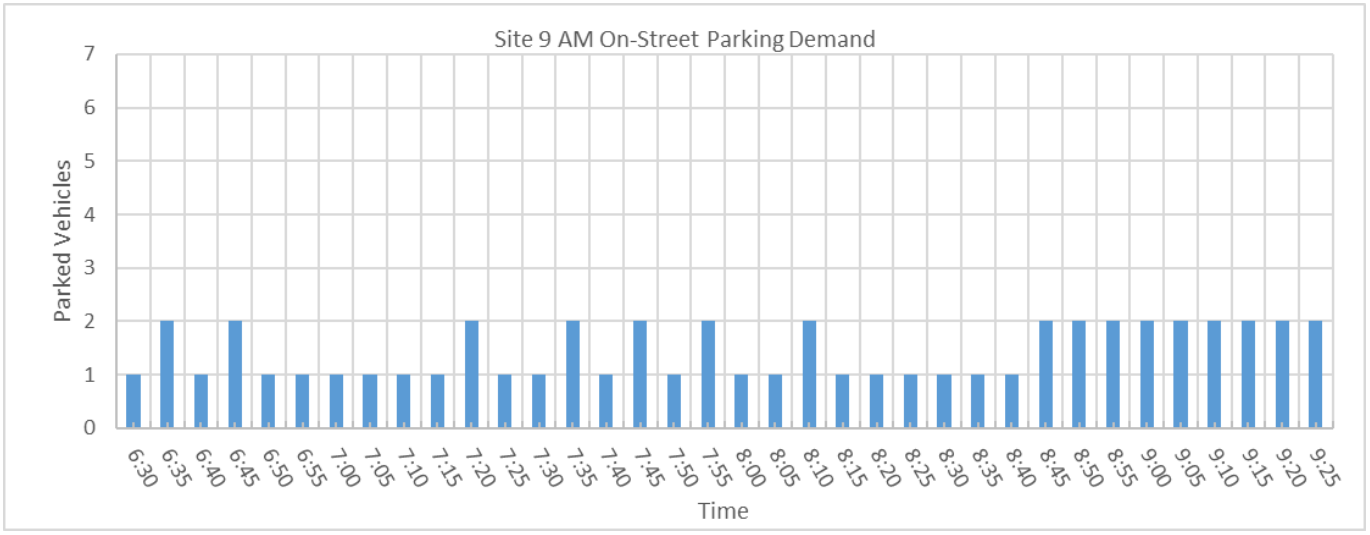
Site 8
PM Observed Parking Demand

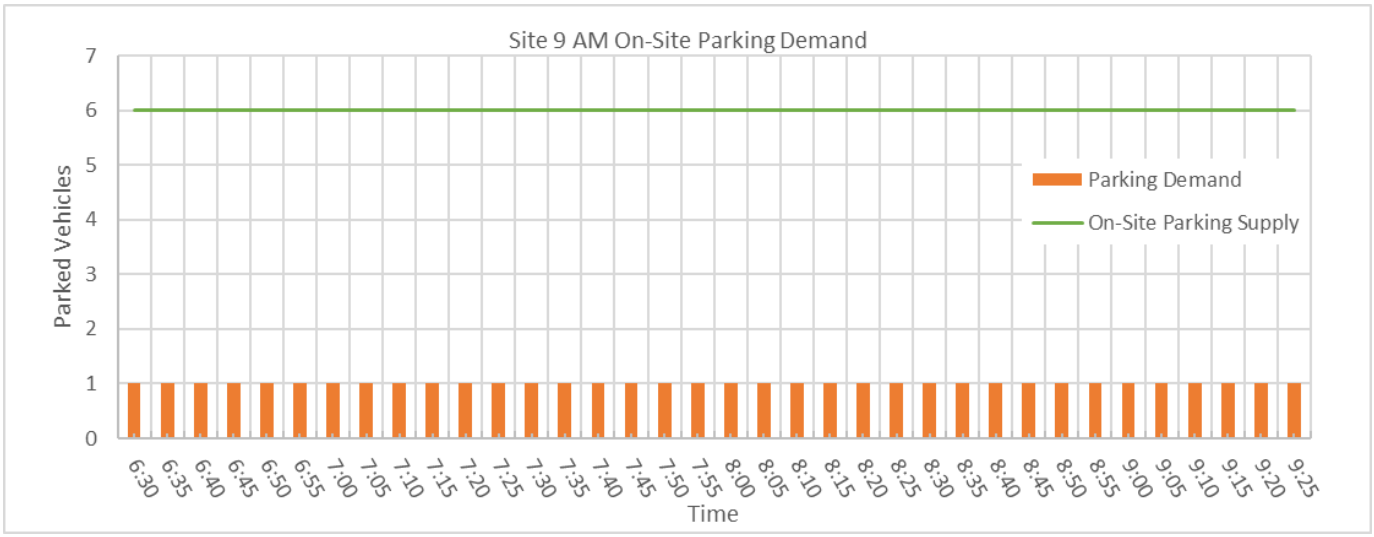


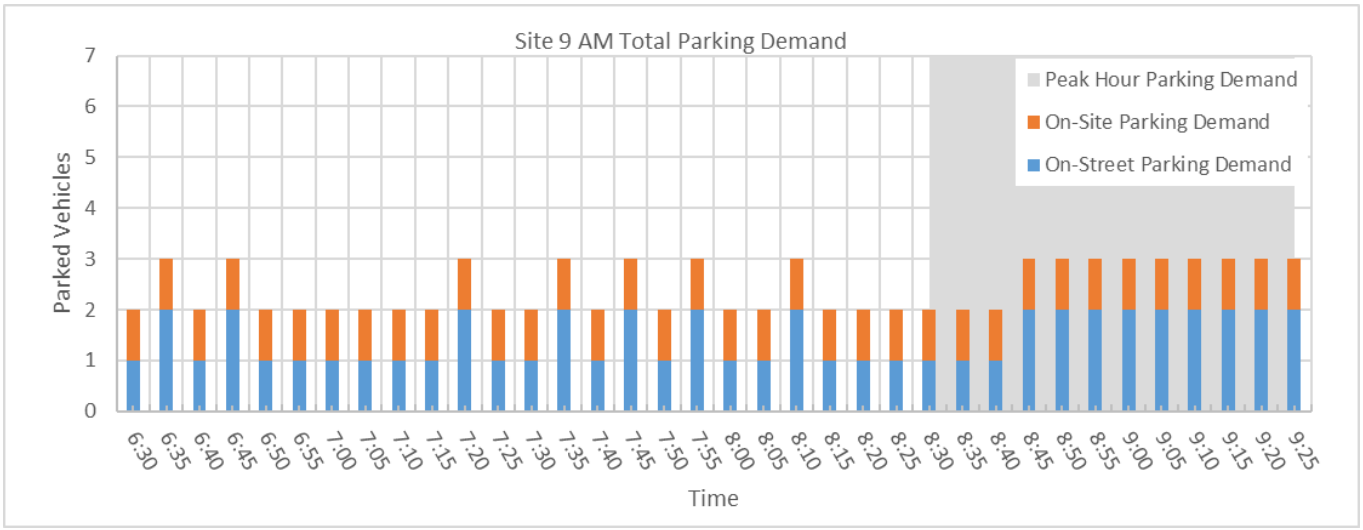




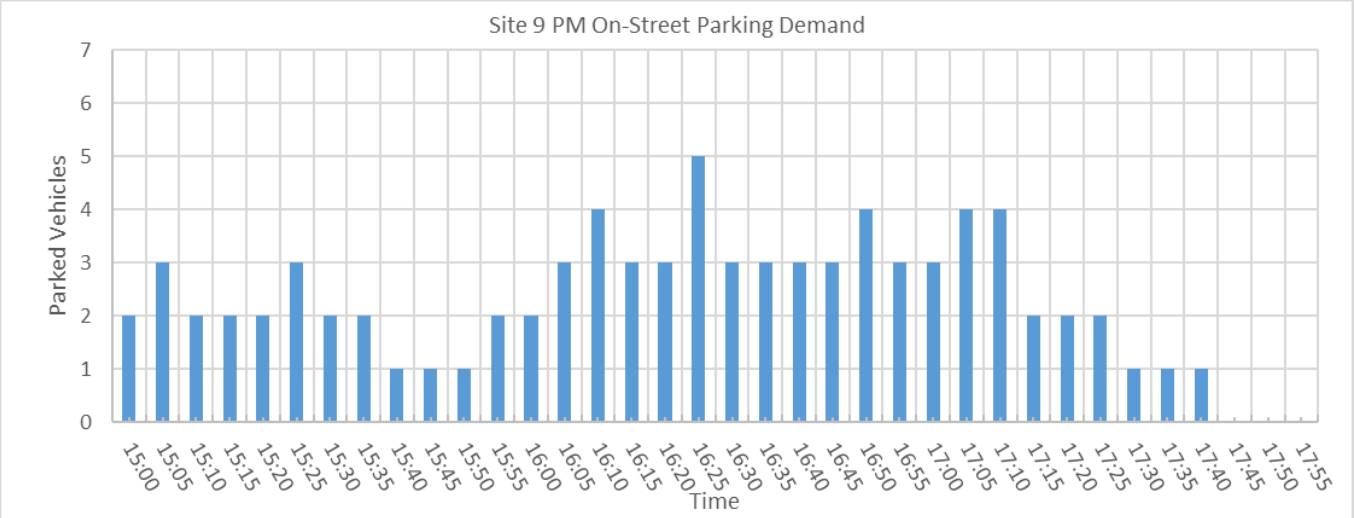
Site 9
AM Observed Parking Demand

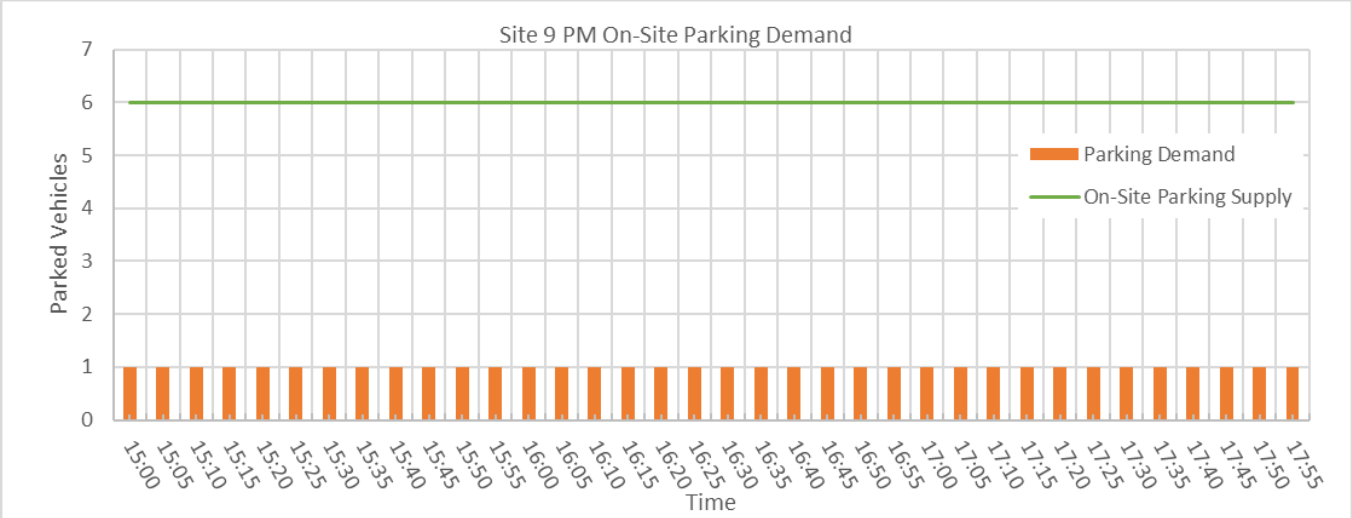


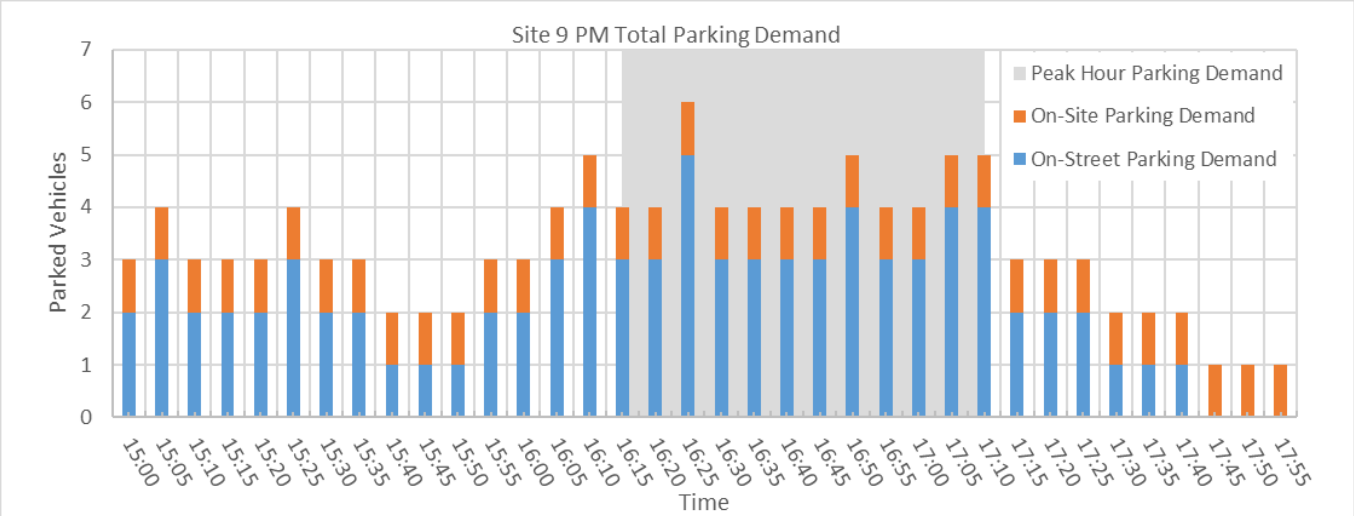




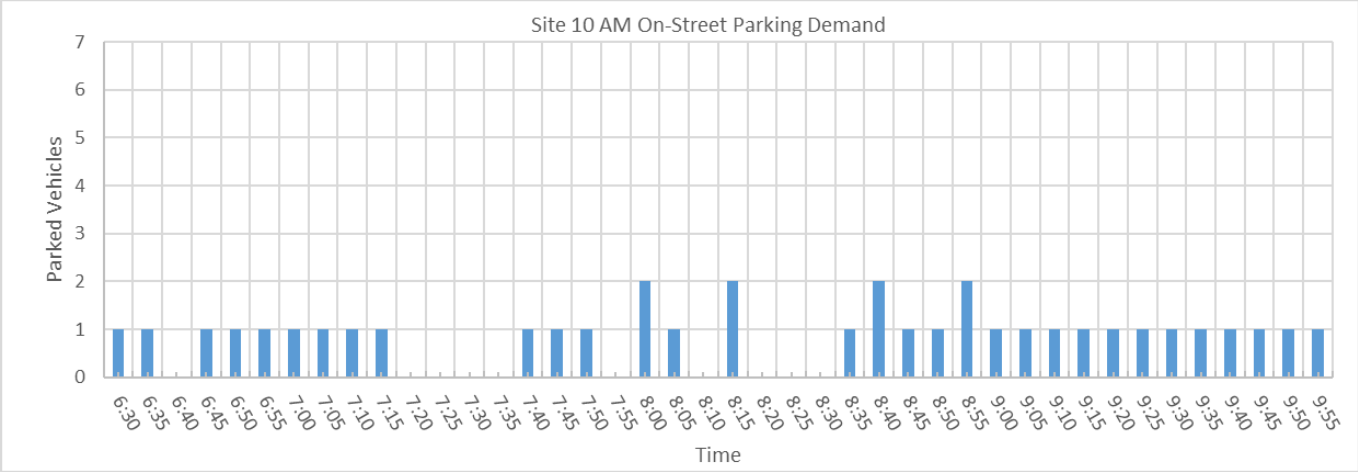
Site 9
PM Observed Parking Demand

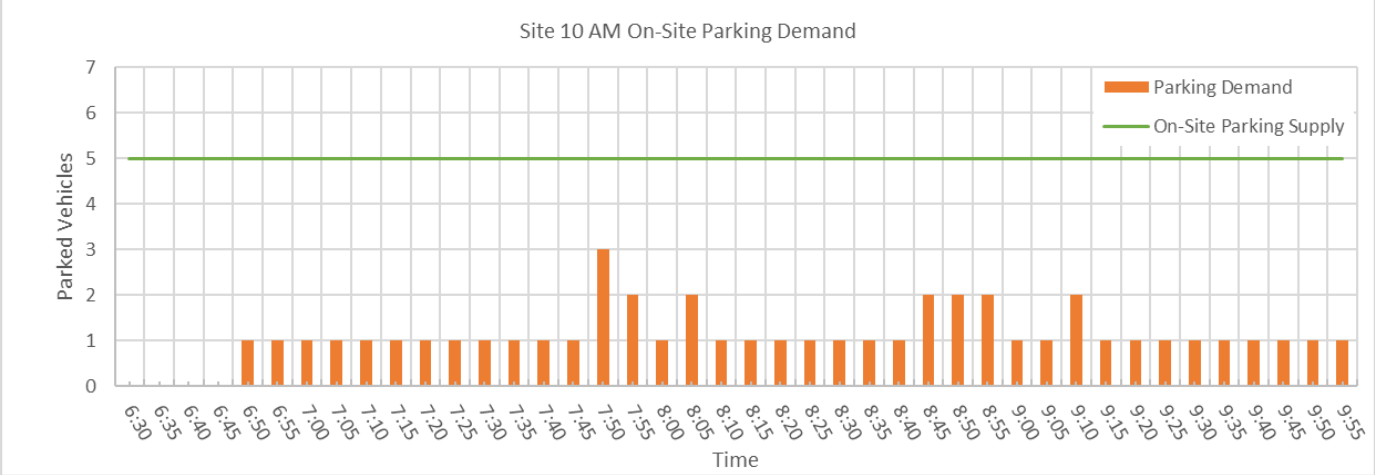


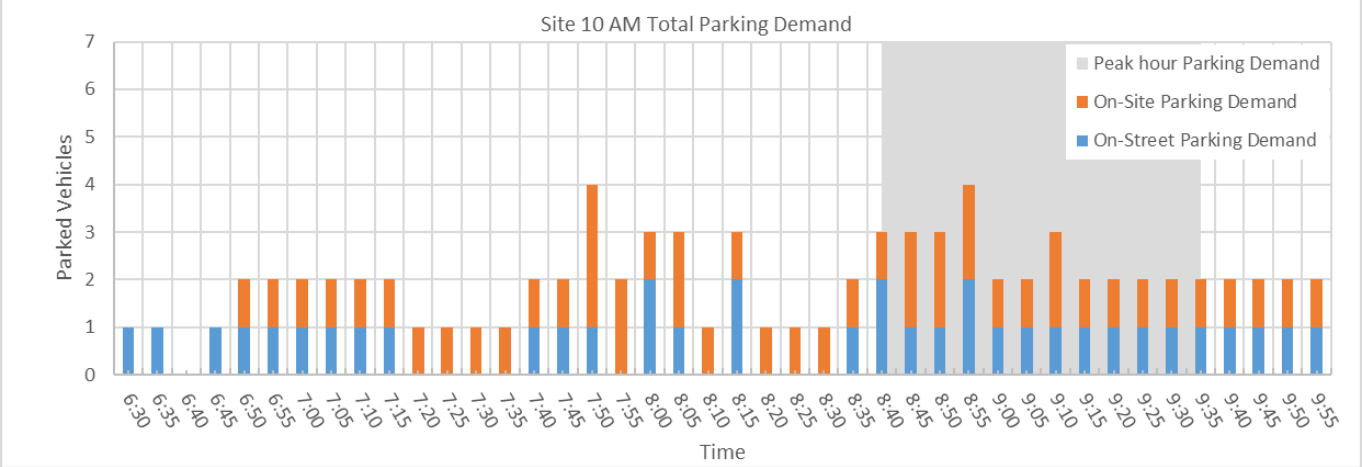




Site 10
AM Observed Parking Demand







Site 10
PM Observed Parking Demand