Chautauqua Parking Analysis

Prepared for:
Colorado Chautauqua Association & the City of Boulder

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DN12-0365

FEHR PEERS

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EXECUTIVE SUMMARY

The City of Boulder and the Colorado Chautauqua Association (CCA) worked with Fehr & Peers to undertake the Chautauqua Parking Study during the summer of 2012. The study is intended to provide an analysis of the existing parking utilization, duration, and identify surplus/shortage of parking in any of the surveyed parking areas. A variety of new and proven data collection methods were utilized to provide data to help answer questions about parking in and around Chautauqua.

Overall, the parking situation is similar to what it was during prior studies performed in 2005 and 2010, but new data collection techniques have provided useful data to help inform policy change. A highlight of the key findings is shown below. Each of these findings is documented with data contained in this report.

KEY FINDINGS

- The highest utilization of parking within the Chautauqua area or in its surrounding neighborhoods occurred in the Ranger lot and in the parking surrounding the Chautauqua green. The parking on the south side of Baseline Road was the next highest utilized parking.

- The parking within the leasehold area showed relatively low utilization on most blocks throughout both of the weekdays studied. Parking utilization in the leasehold area was much higher on the weekend. The parking in the surrounding neighborhood blocks showed low utilization on almost every block in almost every time period. The only exception was the block of Grant Place north of Baseline, which had higher utilization on the weekend.

The peak periods of parking utilization were from 10am to 1pm on both weekday and weekend conditions. There were over 200 vehicles parked in the Chautauqua area during these time periods on weekdays and over 300 vehicles parked in the Chautauqua area on weekends.

- During the weekday, the majority of vehicles in the Chautauqua area (between 50% and 85% depending on the lot or block) parked for less than 2 hours. A small minority (between 0% and 20% depending on the lot or block) parked for more than 4 hours.

- During the weekend, the duration of parking in the Chautauqua area was typically longer. High turnover numbers remained in the Ranger lot, the Chautauqua green and in the Academic lot (near

the McClintock trailhead), but in other lots and blocks the duration of parking was longer with only 30% to 45% parked for less than 2 hours, and 5% to 35% parked for longer than 4 hours.

- The number of hang tags observed for most user groups was lower in June than in either of the July dates. This may have been due to lower hang tag usage at the beginning of the summer (getting use to using the tags) or it could be that the Chautauqua area is simply used more by most user groups in July than it is in June.

- User groups such as private cottage guests, CCA staff, and lodging guests were generally a majority of the vehicles parked within the leasehold area. They were a much larger percentage of vehicles parked in the leasehold on the weekdays than they were on the weekend (the number of no tag vehicles were much higher on the weekend).

- A significant majority (80% to 90%) of the vehicles entering the Chautauqua area did so from the main entrance (Baseline and Grant), rather than the 12th Street entrance.

- Almost all of the people who entered Chautauqua at the main entrance, departed at the main entrance as well. However more than half of the people who entered from 12th Street also exited at the main entrance.

- More than 20% of the people entering the Chautauqua area on the weekend and approximately 18% of such people on the weekday, had a duration of stay in the Chautauqua area of less than 5 minutes.

- Duration of parking on surrounding neighborhood streets varied by street but had some similarities.

1.0 INTRODUCTION

The City of Boulder and the Colorado Chautauqua Association (CCA) worked with Fehr & Peers to undertake the Chautauqua Parking Study. The study is intended to provide the City and CCA with an analysis of the existing parking utilization, duration, and identify surplus/shortage of parking in any of the surveyed parking areas. The report includes a description of the existing conditions, an explanation of the study methods, the nature and source of the base data, and a summary of results of the data collected.

Chautauqua is a National Historic Landmark which has an estimated 560,300 visitors annually. Of this number, Open Space users consist of 71% of all visitors, Chautauqua Association activity users consist of 25% of all visitors, and Green users consist of 4% of all visitors. Open Space usage is more evenly distributed throughout the day during summer, while CCA activity is more concentrated around events/dinner in the evening.

The Chautauqua Park is surrounded by City of Boulder Open Space and Mountain Parks. The Chautauqua Trailhead, used by an estimated one million users annually, is immediately adjacent to and generally accessed through Chautauqua Park but is not a part of Chautauqua Park or the landmark district.

Chautauqua's cottages and lodges are used by visitors year-round ranging from overnight to several months. Its meeting venues host business and spiritual retreats, family reunions, weddings and other "life memory" events as well as programs year-round. The 1300-seat Chautauqua Auditorium has been the setting for the Colorado Music Festival's classical series each summer since 1978 and a wide variety of other music and dance performances.

In 2005, a document was produced with data collected from the summer and fall of 2005 in an effort to quantify and better describe the transportation activities in and around Chautauqua. More recently, in the summer of 2010, the same level of data was collected to see if changes in transportation patterns have occurred. Now in 2012, a similar level of data collection was undertaken with some additional technologies that have helped better quantify specific aspects of parking and visitors such as parking duration and length of time vehicles that either park or just drive through the area.

1.1 STUDY AREA

The study was focused on Chautauqua and the surrounding neighborhoods. Chautauqua consists of all the areas accessible between the main entrance on Baseline Road and the south entrance on 12th St. The neighborhood study area includes the area to the north between 7th, 12th, Baseline, and Aurora. The neighborhood within a block of the 12th street entrance was also included in the study area. Utilization from prior years which included a larger neighborhood study area indicated that other streets outside of this new study area were not as greatly impacted by Chautauqua visitors.

1.2 STUDY SCOPE

The scope of analysis for this study was developed between multiple departments in conjunction with the City of Boulder and Colorado Chautauqua Association. The base assumptions, methodologies and geographic coverage of the study were all identified as part of the study approach and follow nationally recognized and accepted principles for conducting parking demand and utilization studies. At the onset of the study, current evening event management strategies are working well and event shuttle service is working well.

1.3 GOALS AND PRIORITIES

The parking study was an effort to build a data set to help answer management questions about parking demand and access patterns in the Chautauqua area and the surrounding neighborhood. To help answer these questions , additional data collection and study was scheduled for the summer of 2012. This study was designed to document parking and circulation patterns in summer 2012 using enhanced data collection methods.

2.0 PARKING STUDY OVERVIEW

The key element of this study was to understand the conditions of the parking system in the Chautauqua core as well as the surrounding neighborhoods where visitors to Chautauqua might park. The data collection program included utilizing inventories of parking areas from previous studies and utilizing a variety of data collection techniques and field observations to better understand the parking situation.

An inventory of the exiting parking supply in the Chautauqua lease hold area, the Ranger Parking Lot, the Green Parking Lot, and the surrounding neighborhood to the north was conducted in previous parking studies conducted in 2005, 2010, and 2011. The previously collected detailed inventory of parking spaces was utilized during this study to calculate percentage of utilization. Parking spaces were inventoried and aggregated to block face for on-street parking and to parking lots for off-street parking.

A parking utilization and duration study was performed on three different musical event days with peak attendance on June 13, July 7, and July 16. In previous years, counts were taken at 11 AM, 3 PM and 8 PM to be consistent with other studies and to allow for a direct comparison, so the data collected this year covered more hours throughout the day. This increase to hourly counts was done to better understand parking utilization and duration. The parking areas described in the preceding sections were surveyed on the three days to determine the number of vehicles parked and the average parking duration in each of the spaces. Prior to commencement of data collection, a site visit was undertaken to gather information regarding parking conditions in the study area. The surveys were then designed and undertaken to examine the parking areas in detail.

To facilitate comparison with prior years and peak use days, a variety of days throughout the summer were included for data collection. For each selected date, a backup date was also selected in case of inclement weather or other factors that cause the counts not to occur successfully. Details about the selected dates for data collection are shown in Table 2-1.

Table 2-1: Data Collection Schedule

Count Date	Weekday	Weekend	Non-event	Event	CMF	Auditorium Event	OSMP Event	Backup Date
6/13	X		X					6/20
7/7		X		X	Rehearsal	Concert		7/21
7/16	X			X	Rehearsal	Concert		8/15

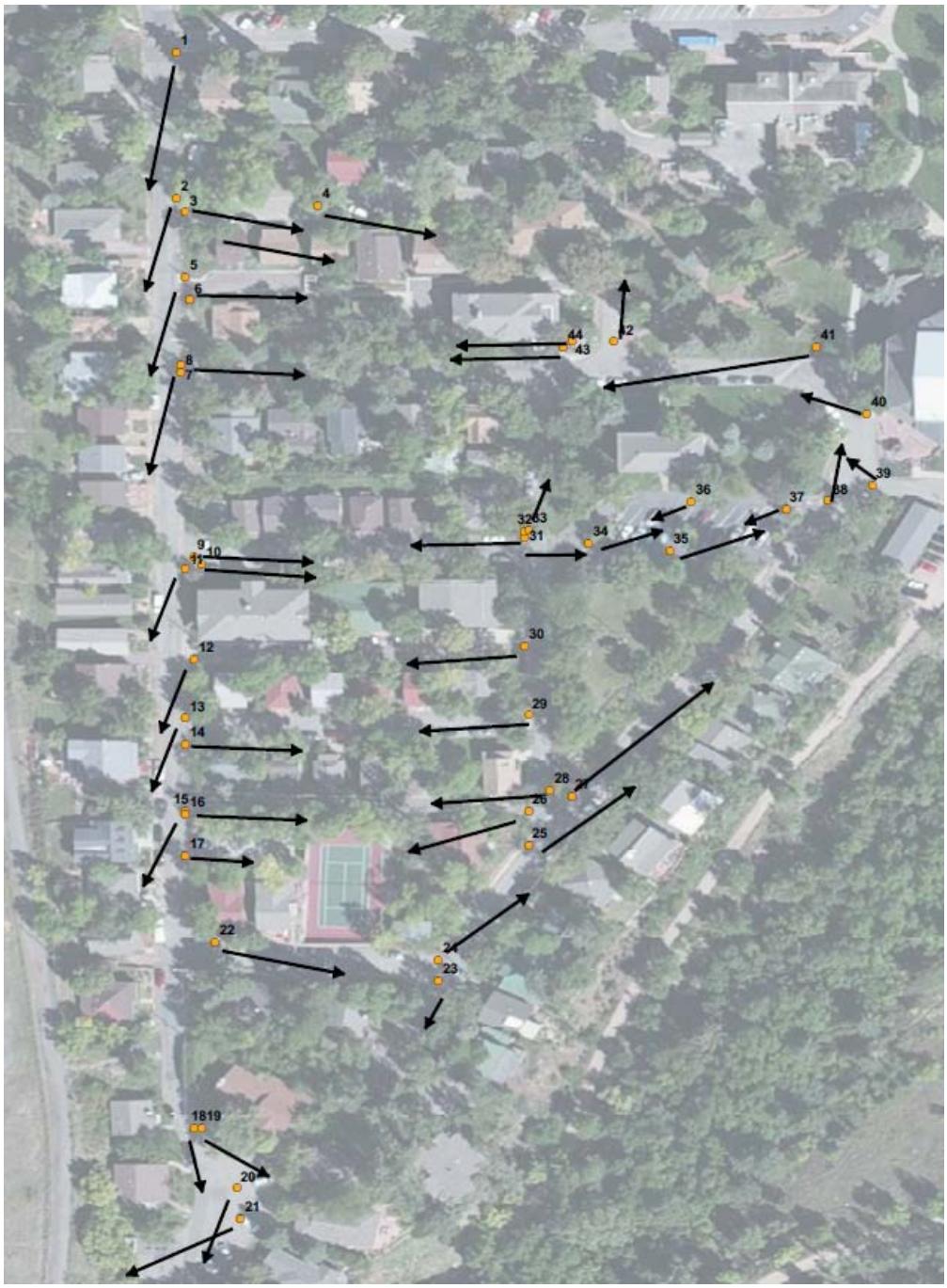
CMF – Colorado Music Festival , OSMP – Open Space & Mountain Parks

Parking in Chautauqua and in the surrounding neighborhoods, as with most areas, is dependent upon several factors including time of day, time of year, and other local conditions. The parking surveys were designed to collect data on a peak event day and on days that exhibited typical use during peak events. In discussions with staff, it was determined that the chosen days of Wednesday June 13, Saturday July 7, and Monday July 16 were representative of typical summer event activity on both weekend days and weekdays. The methodology used to survey these locations and determine the utilization percentage is described below.

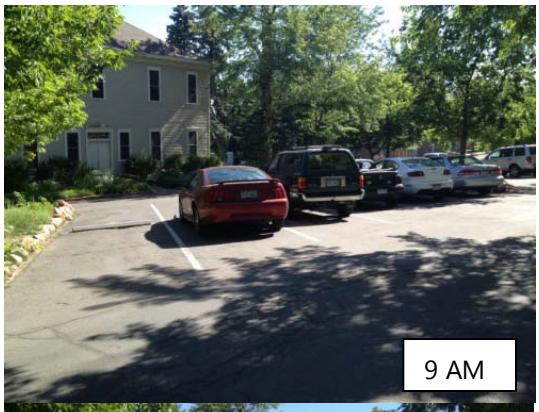
2.1 PHOTO SURVEY DATA COLLECTION

Each day of data collection, a photo survey was conducted to document the parking occupancy of the parking lots and the on-street parking on the hour for each hour between 9:00 AM and 5:00 PM (total of 8 hours). A photo survey consists of taking pictures of all parked cars every hour and then reviewing the photos afterwards to see if spaces were occupied, how long cars were parked there, and how many spaces turned over. The results of the analysis provide an indication of the number of occupied spaces and duration. This information was used to assess the parking demand by time of day and determine the utilization percentage for each parking area. The results identify the peak periods of usage and the potential deficiencies or opportunities in supply. The locations used in the survey are shown in Figure 2-1.

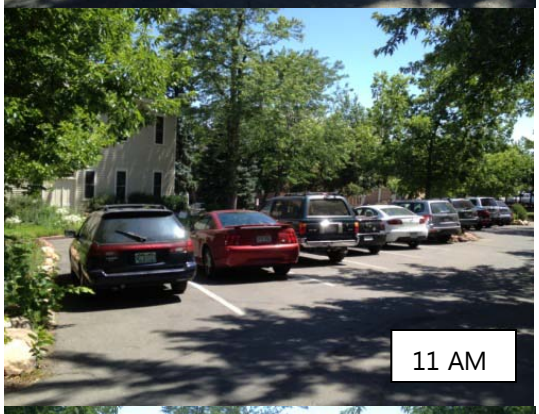
Figure 2-1: Photo Survey Locations



Photos were taken every 50 to 80 feet in each parking lot and potential on-street parking location and were taken from the same location as in the morning. An example of the photos taken from one location each hour of the day starting at 8:00AM is shown below.


9 AM


10 AM


11 AM


12 PM


1 PM


2 PM


3 PM


4 PM

2.2 PARKING LICENSE PLATE RECOGNITION DATA COLLECTION

The City of Boulder collected data with their License Plate Recognition (LPR) vehicles in off-site areas and in the ranger, green, and court lot parking areas to determine parking duration and utilization. The parking enforcement vehicle collected a picture of each vehicle license plate, a timestamp, and location information. Counts were then summarized by zones for each block face within the study area. The route shown in Figure 2-2 was driven once per hour between 9AM and 5PM (8 hours total) on all three days of data collection.

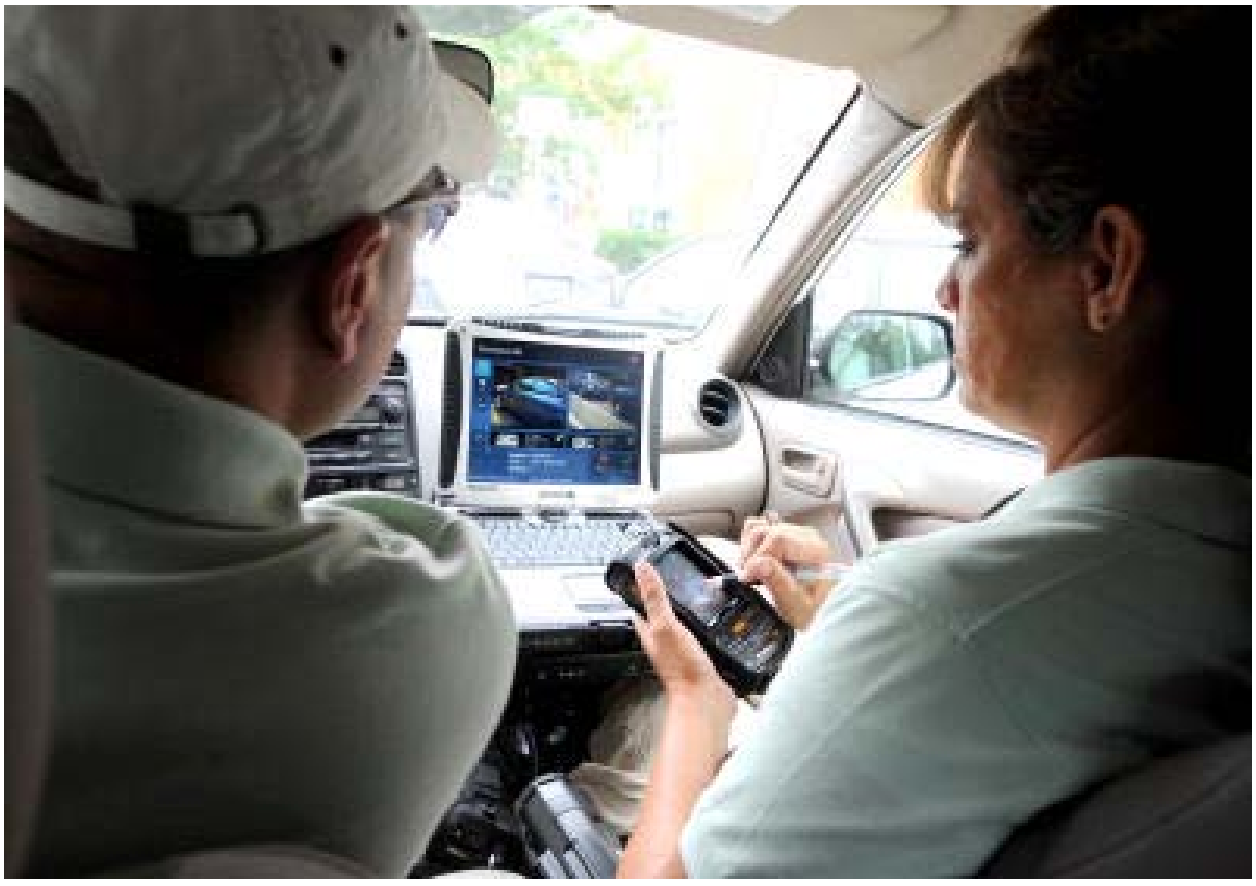


Figure 2-2: LPR Driving Route

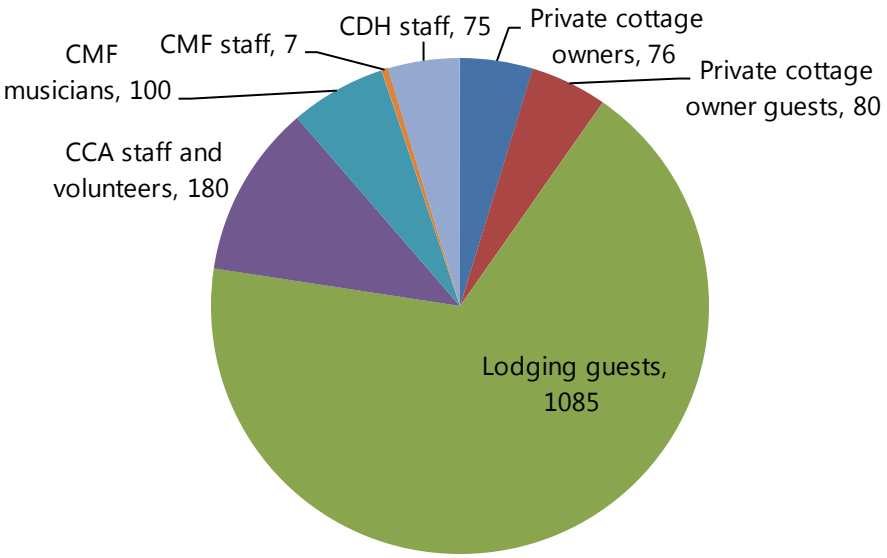
Location and time details for each surveyed vehicle were collected during the LPR process, and the results were then summarized to block face for on-street and parking lot for off-street parking locations. The zones used for summarization are shown in Figure 2-3. The collected data is useful for both parking utilization calculations and parking duration calculations.

Figure 2-3: LPR Analysis Zones

2.3 HANG TAG DATA COLLECTION

As part of the hybrid approach to parking strategies identified in prior studies, hang tags were issued to specific user groups that park in Chautauqua to better understand parking patterns. Over 1600 hang tags were distributed to a variety of user groups shown in Figure 2-4.

Figure 2-4: Number of Hang Tags Issued in summer 2012



Hang tag data was collected hourly from 9 AM – 5 PM during the three days identified through other data collection processes. The hang tag data can be used for a variety of analysis including parking utilization, parking utilization by specific user groups, and distribution of CCA users on site.

2.4 VEHICLE ENTRANCE/EXIT DATA COLLECTION

Vehicle entrance and exit data was collected on Saturday July 7 and Wednesday August 15 from 9 AM – 7 PM. Inbound and outbound vehicles were detected using cameras at the Baseline entrance and 12th Avenue entrance. The data is useful to a number of analyses including duration vehicles reside within Chautauqua (parked and drive thru), and number of vehicles entering and exiting.

3.0 ANALYSIS AND RESULTS

Much of the summarized data shown below is based on detailed hourly data that could be shown in a variety of ways. Because of the sheer volume of data, a summary of the results of all the data collection techniques are shown below. Additional detailed data is available in spreadsheets, and instructions for accessing this data are documented in Appendix A.

3.1 PARKING UTILIZATION

Photos taken in the photo survey were compared by hour to determine the occupied spaces and duration of each vehicle per space. License Plate recognition was also used for some of the areas being analyzed. Photos were not compared to determine if vehicles leaving a parking space returned and parked in another parking space. The photos identified the length of stay of each vehicle in each space. Chautauqua areas data is summarized by hour through each of the observation days, and neighborhood data is summarized by the peak hour of utilization to more clearly represent the detailed data. The utilization and duration data was summarized by parking lot, area, or street.

For the purpose of parking demand analysis, a parking facility is considered to have reached its effective supply if 85-90 percent of the spaces in the facility are utilized. Effective supply is the cushion of extra spaces that a parking system must have to account for operating fluctuations, vehicle maneuvers, misparked vehicles, minor construction, etc. A parking system operates at optimum efficiency at slightly less that its actual capacity. It is unrealistic to expect an arriving parker to find the last available parking space in a system without significant frustration and the resulting perception that parking is inadequate. Because "perception is reality", parking "demand" must include this effective supply cushion (Parking Structure – Planning, Design, Construction and Repair, 3rd ed. [Anthony P Chrest… et al., 2001]). A 10-15 percent cushion provides an adequate cushion to handle the turnover of parking spots throughout the day.

3.1.1 CHAUTAUQUA AREA UTILIZATION

The Chautauqua area includes all of the areas in between the Baseline entrance and the 12th Street entrance. Parking within the Chautauqua area varied according to weekday versus weekend as well as other factors and events. The Ranger Lot and Green Lots were consistently the highest utilized parking areas in the study area. The Academic Hall Parking Lot was also consistently utilized at ranges between 45% and 90%. Results are shown for each day in Figures 3-1, 3-2, and 3-3.

Figure 3-1: Chautauqua Parking Utilization on Wednesday, June 13

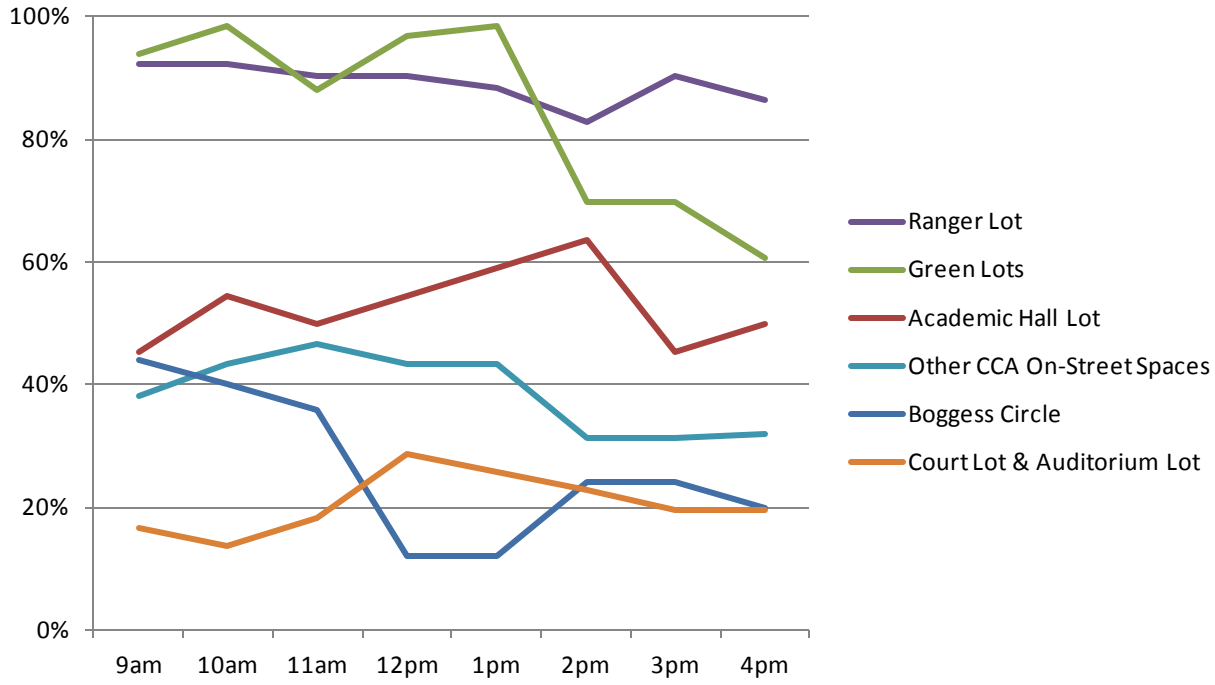


Figure 3-2: Chautauqua Parking Utilization on Saturday July 7

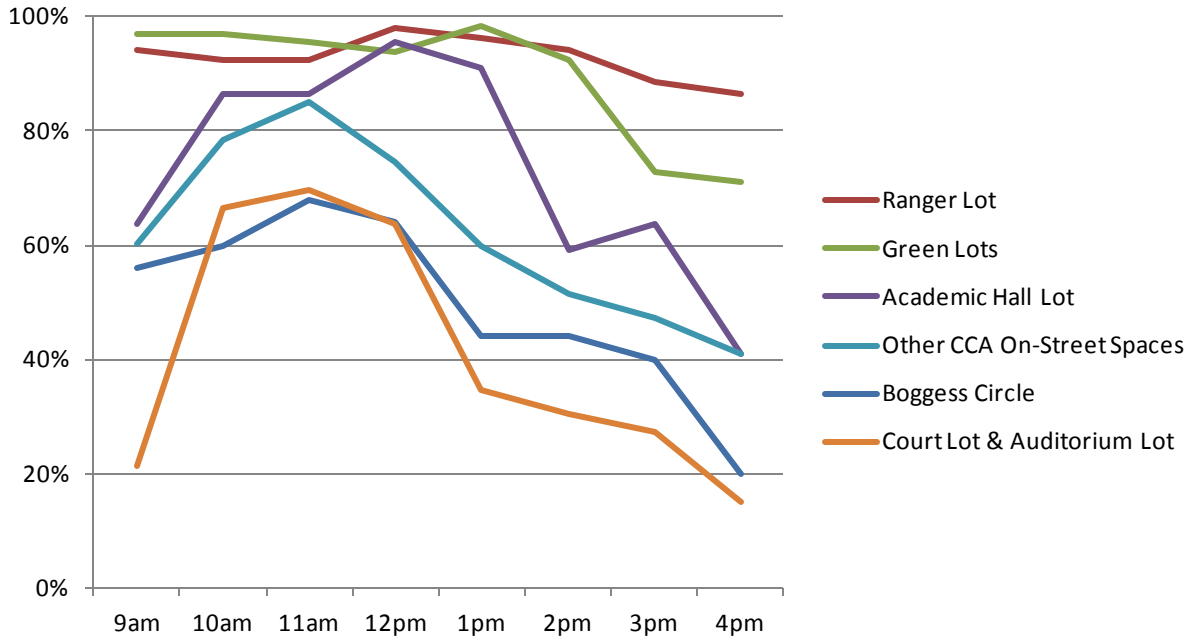
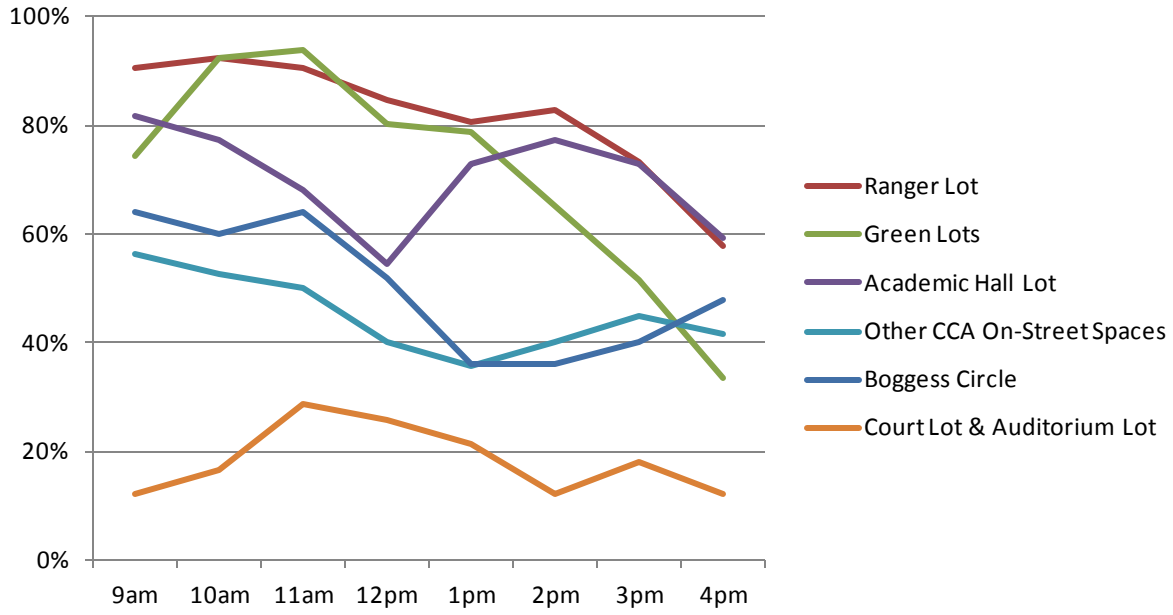


Figure 3-3: Chautauqua Parking Utilization on Monday July 16



3.1.2 NEIGHBORHOOD UTILIZATION

The neighborhood of analysis includes the areas directly adjacent to the Chautauqua entrances where visitors to Chautauqua may park. This includes the areas between 7th and 12th and Baseline and Aurora. It also includes the neighborhood near the 12th Street entrance. Utilization rates for each of the days of analysis are shown in Figure 3-4, Figure 3-5, and Figure 3-6 for the peak hour of parking during that day.

Figure 3-4: Neighborhood Peak Parking Utilization on Wednesday, June 13 at 11AM

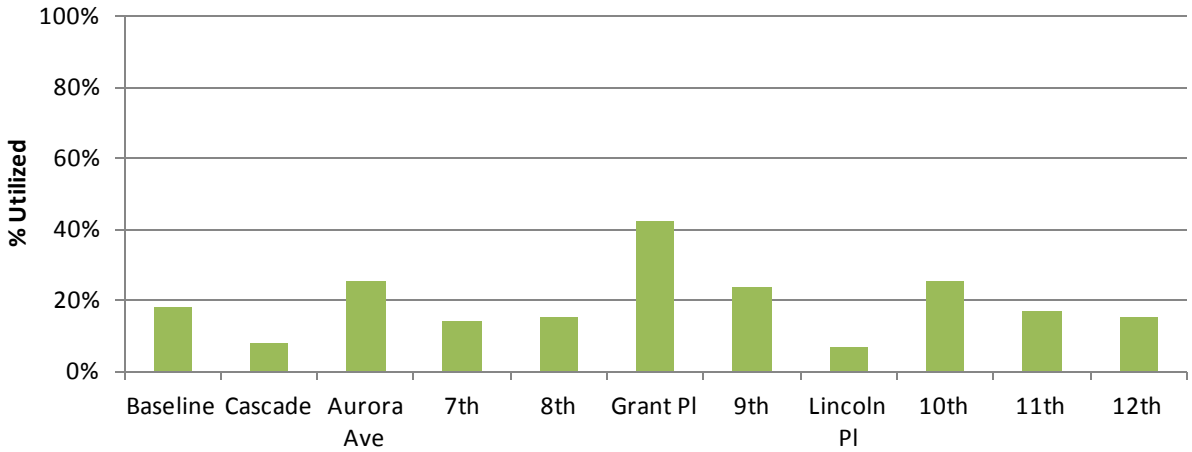


Figure 3-5: Neighborhood Peak Parking Utilization on Saturday, July 7 at 12 pm

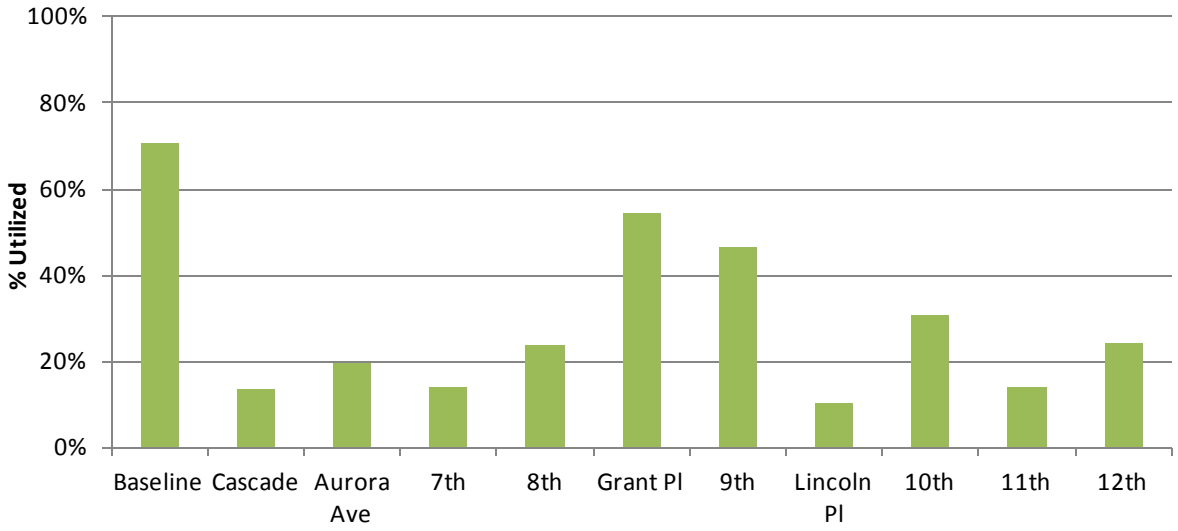
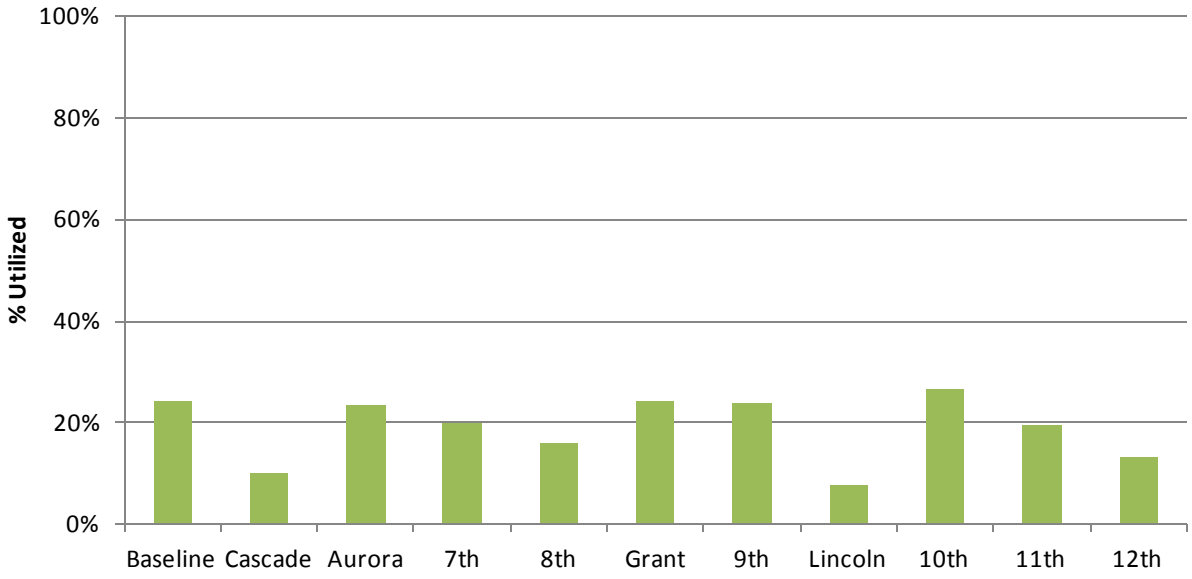


Figure 3-6: Neighborhood Peak Parking Utilization on Monday July 16 at 12 PM



3.2 PARKING DURATION

Parking duration statistics were calculated for all areas of analysis including the areas covered by photo survey in Chautauqua as well as the areas in the neighborhood covered by LPR.

3.2.1 CHAUTAUQUA DURATION

The Chautauqua area includes all of the areas in between the Baseline entrance and the 12th Street entrance. The majority of visitors parked in this area less than 2 hours on all of the observed days except for the Court Lot and Auditorium Lot on the Saturday observation where visitors parked for longer periods of time. Results for each of the days are shown in Figure 3-7, Figure 3-8, and Figure 3-9.

Figure 3-7: Chautauqua Parking Duration on Wednesday, June 13

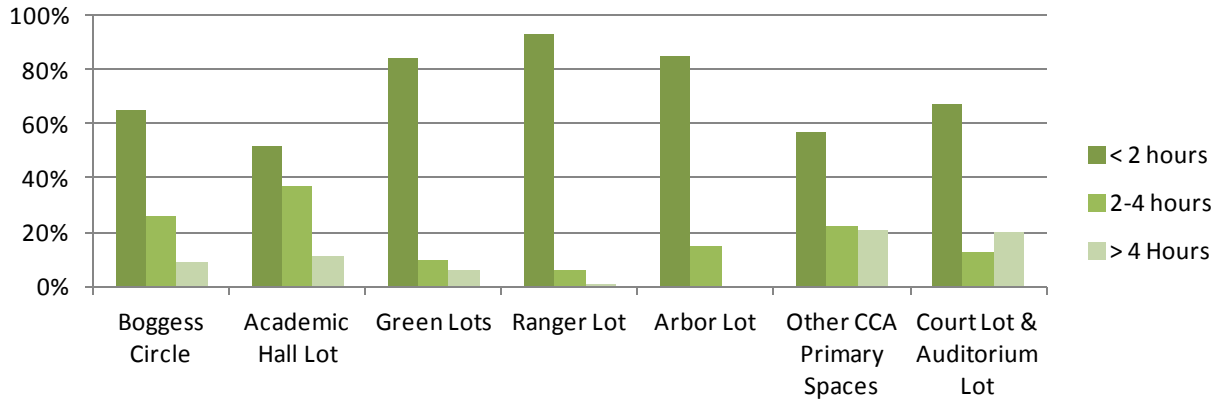


Figure 3-8: Chautauqua Parking Duration on Saturday, July 7

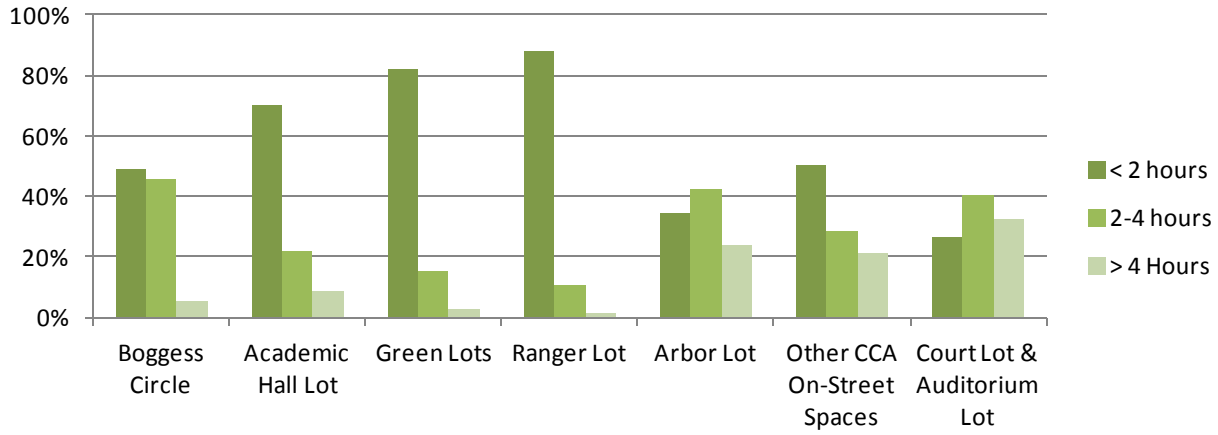
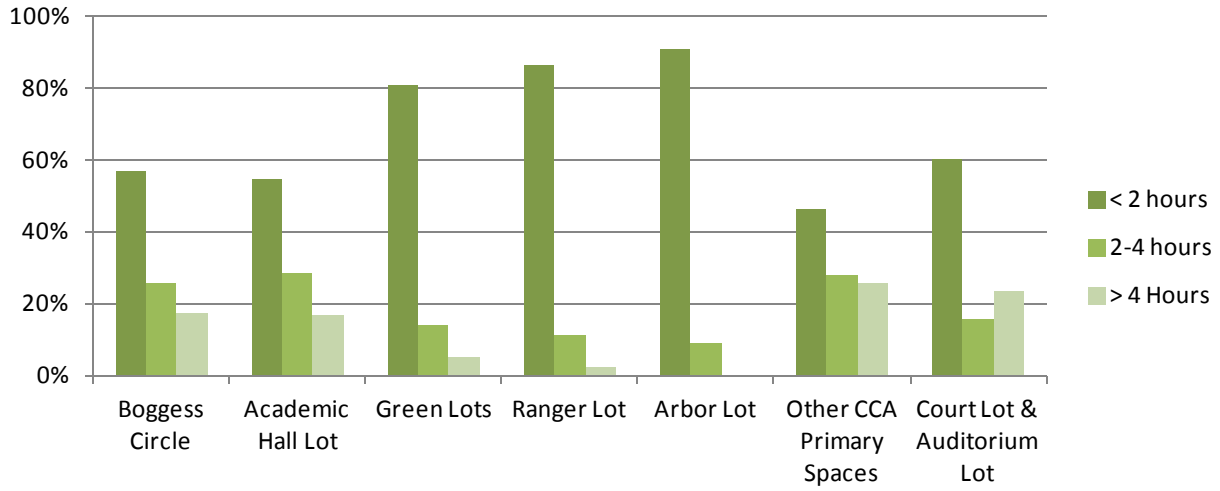


Figure 3-9: Chautauqua Parking Duration on Monday, July 16



3.2.2 NEIGHBORHOOD DURATION

The neighborhood of analysis includes the areas directly adjacent to the Chautauqua entrances where visitors to Chautauqua may park. This includes the areas between 7th and 12th and Baseline and Aurora. It also includes the neighborhood near the 12th Street entrance. Average parking duration varies according to street, but patterns were very similar on all three observed days. The general pattern shows that streets very close to the Baseline entrance have shorter parking duration than streets further away which indicates short term visitors to Chautauqua are likely parking on these streets in addition to neighbors who may leave their vehicles on the street throughout the day. Results are summarized for each day in Figure 3-10, Figure 3-11, and Figure 3-12.

Figure 3-10: Neighborhood Average Parking Duration on Wednesday, June 13

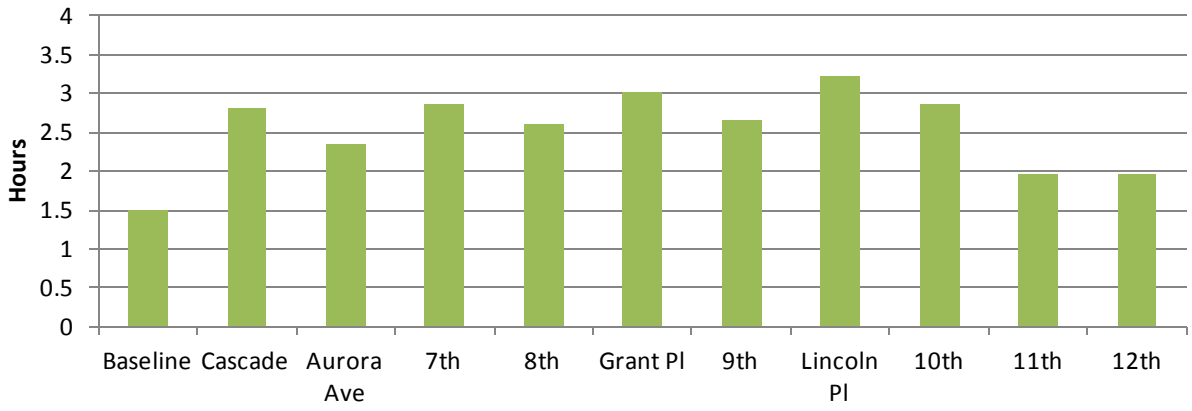


Figure 3-11: Neighborhood Average Parking Duration on Saturday, July 7

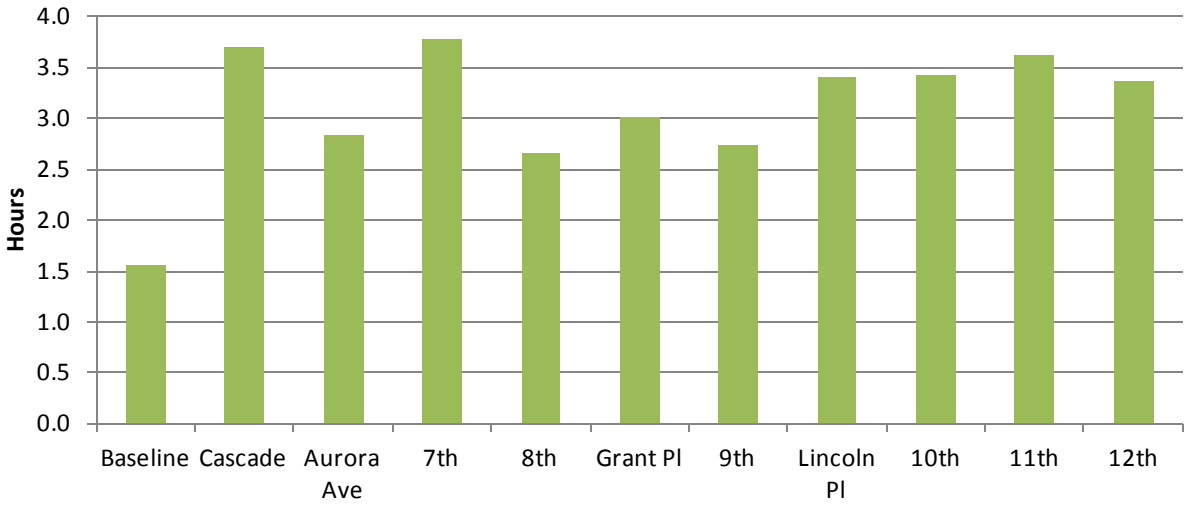
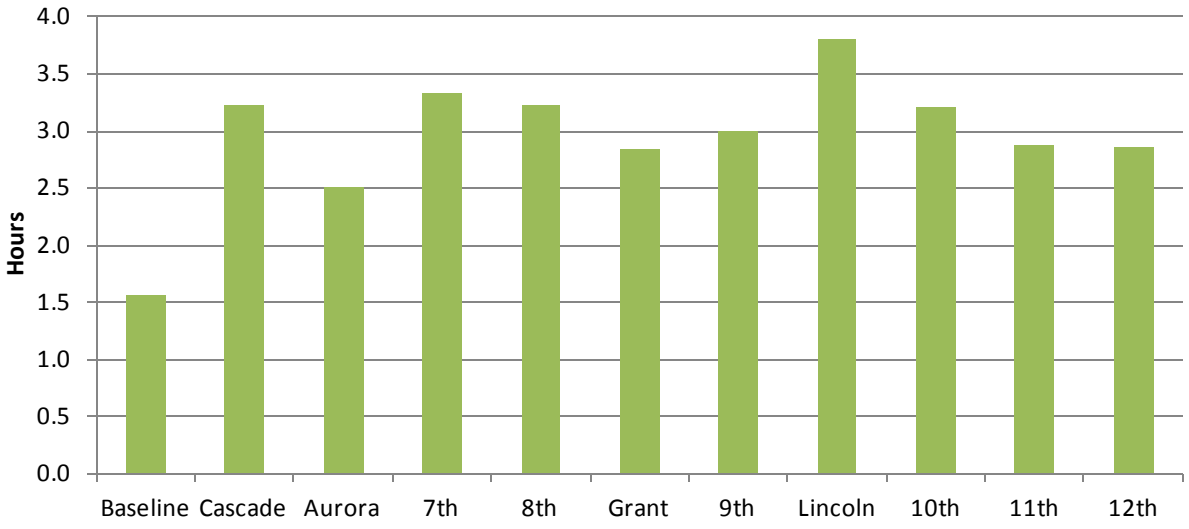


Figure 3-12: Neighborhood Average Parking Duration on Monday, July 16



3.3 HANG TAG USER GROUPS

Detailed data on user groups collected through hang tag analysis are shown by day in Figure 3-13, Figure 3-14, and Figure 3-15. Each figure shows the total number of vehicles counted in the CCA lease area which includes a breakdown of vehicles that with or without a hangtag.

Figure 3-13: Hang Tag Summary on Wednesday, June 13

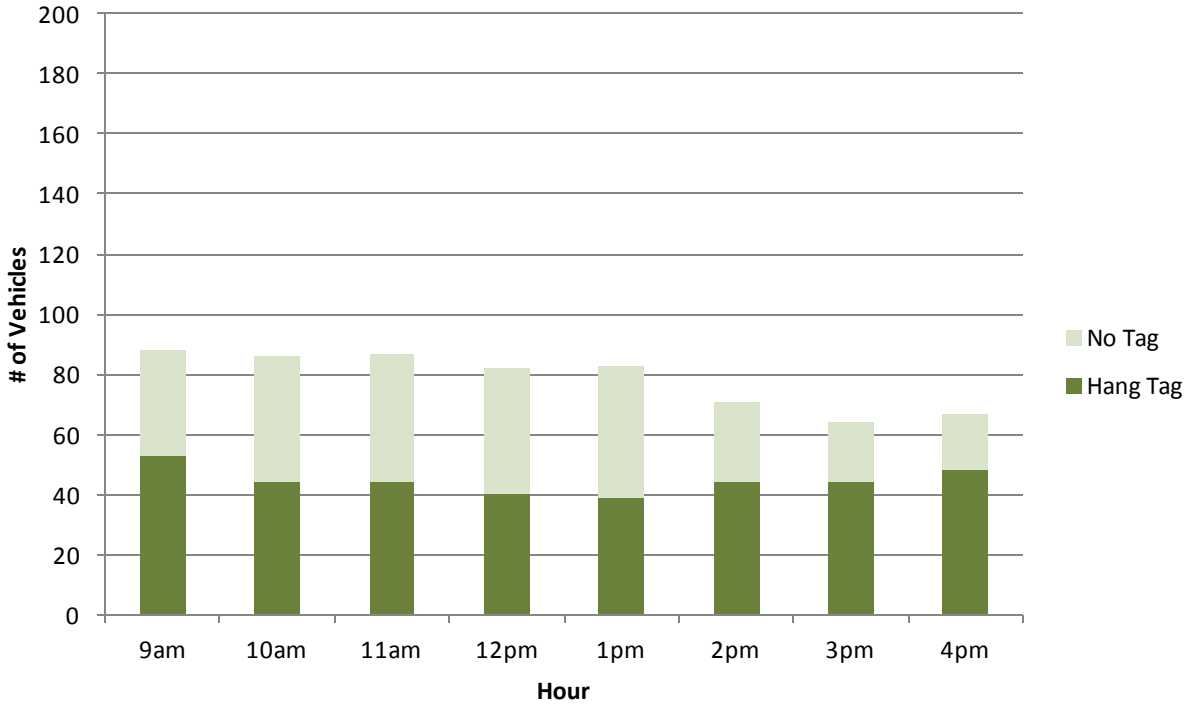


Figure 3-14: Hang Tag Summary on Saturday, July 7

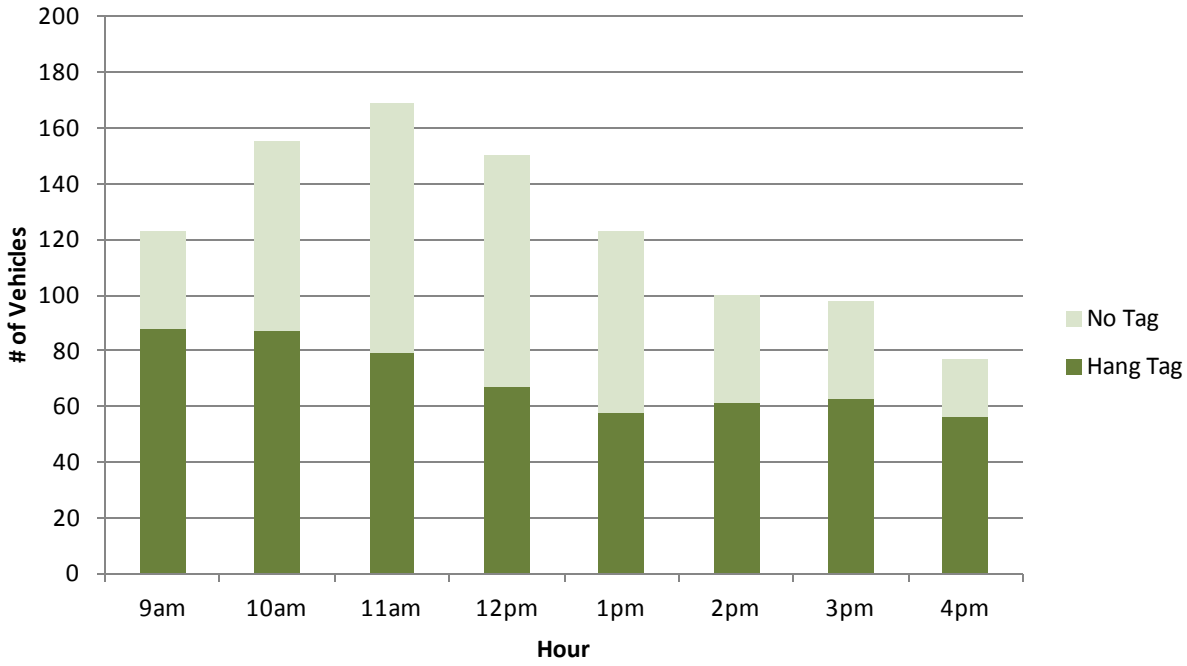
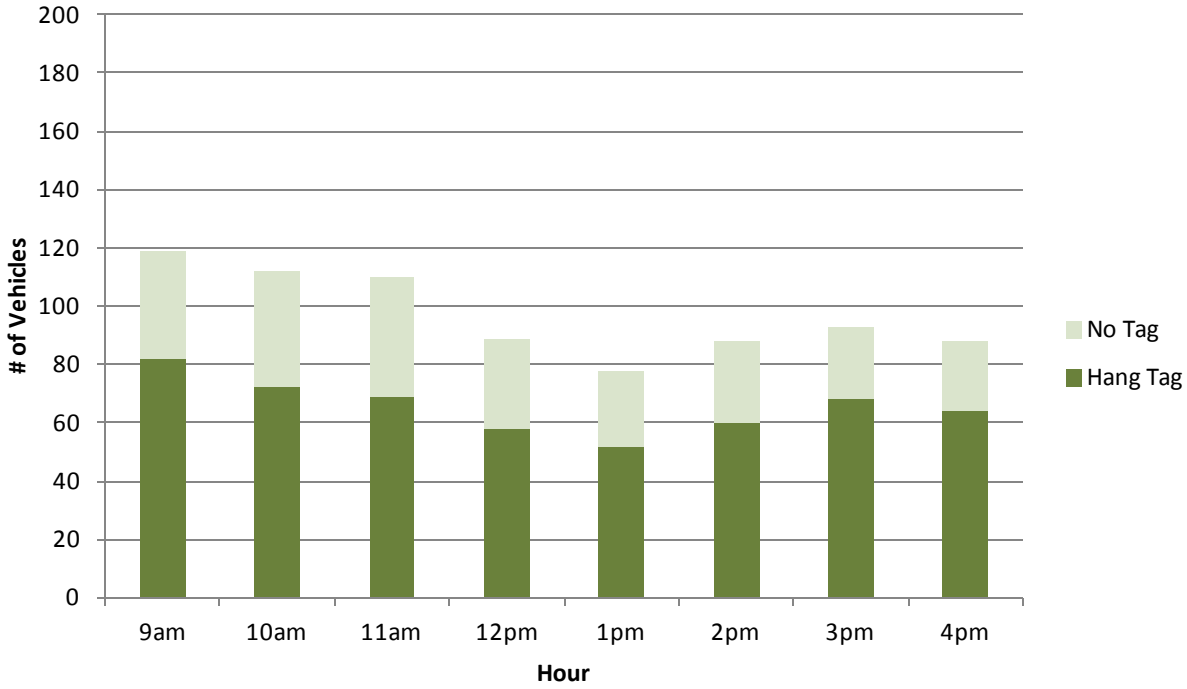


Figure 3-15: Hang Tag Summary on Monday, July 16



3.4 VISITOR ENTRANCE ANALYSIS

Eighty-four to ninety-two percent of all vehicles entering Chautauqua use the Baseline entrance on observed days. All other visitors used the 12th Street entrance. Similar patterns for entrance and exit choices were observed on both the weekend and weekday observation. Figure 3-16 and 3-17 show the breakdown of entrance and exit usage patterns for the observed days.

Figure 3-16: Vehicles Entering and Exiting, Saturday July 7 from 9 AM – 7 PM

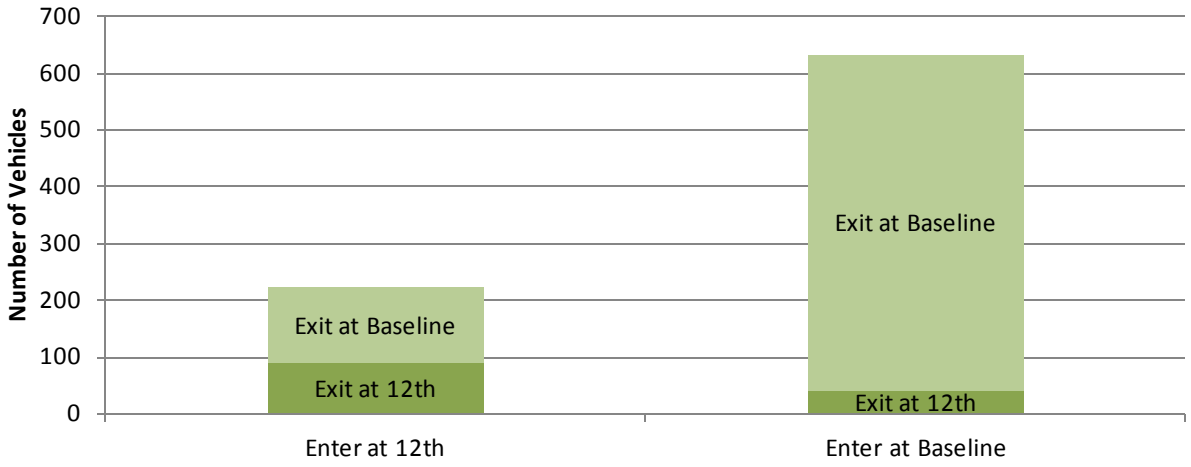
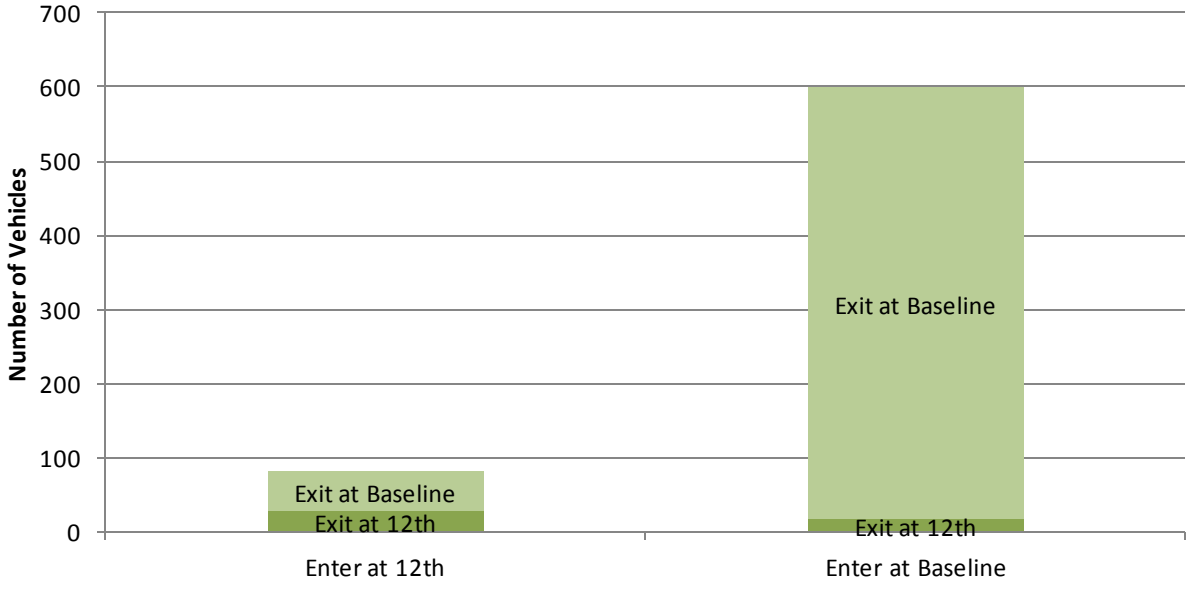


Figure 3-17: Vehicles Entering and Exiting, Wednesday, August 15 from 9 AM - 7 PM



Other analysis done with the vehicle entrance/exit data shows how long vehicles spend in Chautauqua. A large percentage of vehicles entering on Baseline stayed less than 5 minutes. On the Saturday observation date, a greater number of vehicles stayed for short periods of time indicating they likely entered looking for parking and then exited because none was available.

Figure 3-18: Length of Time Vehicles Spent in Chautauqua on Saturday, July 7

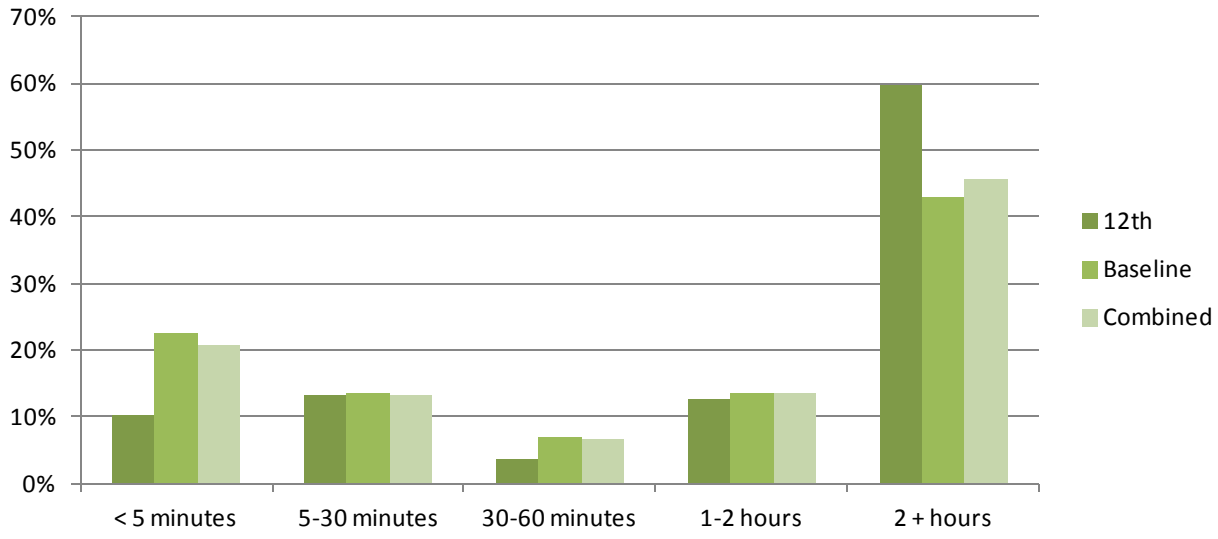
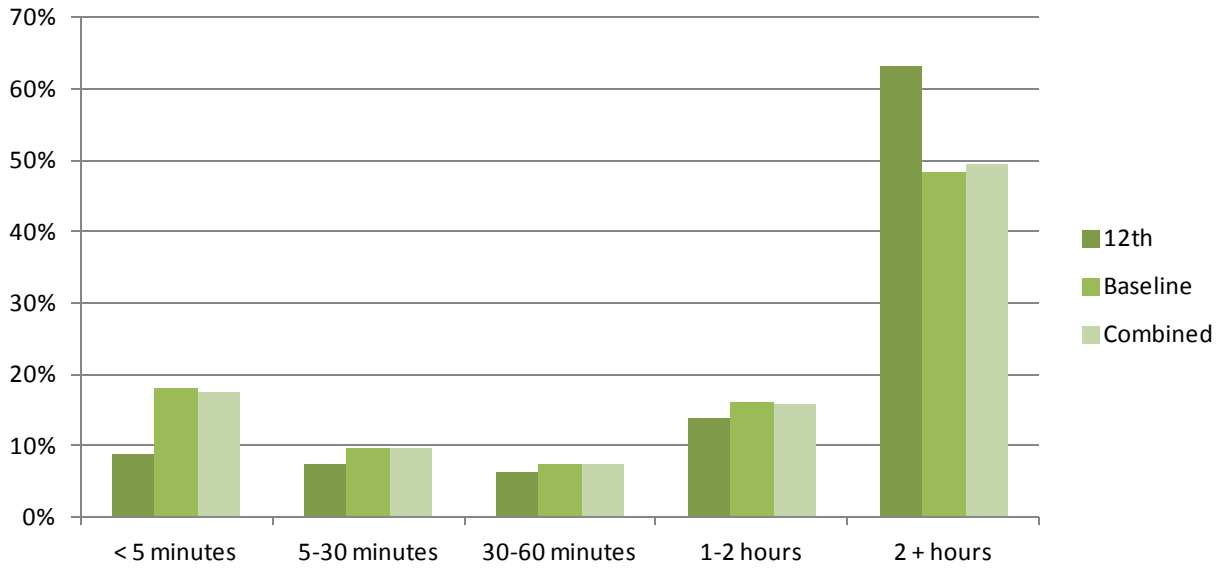


Figure 3-19: Length of Time Vehicles Spent in Chautauqua on Wednesday, August 15



APPENDIX A: DOCUMENTATION OF DETAILED DATA

Each method of data collection utilized during this study resulted in detailed data that could be summarized or analyzed at a variety of scales. The detailed results are available which could be utilized for future study or alternate summaries not included in this report. Filenames and general orientation of the data is summarized below for each method of data collection.

Hang Tag Data

A summary of the user groups parked in the Chautauqua leasehold area is shown below for each of the three observation days.

Additional details on hang tag data were recorded for each hour in the following spreadsheets:

- Chautauqua2012HangTagAnalysis_6-13-12.xls
- Chautauqua2012HangTagAnalysis_7-7-12.xls
- Chautauqua2012HangTagAnalysis_7-16-12.xls

Each tab in each of the spreadsheets represents one hour of observation. A summary tab in each sheet shows daily totals for each of the user groups represented by hang tags.

Entrance/Exit License Plate Data

Each of the two days of data collected at the entrance and exits is captured in the following spreadsheets.

- MioVisionALPR_07-07-12_Analysis.xlsx
- MioVisionALPR_8-15-12_Analysis.xlsx

Each spreadsheet contains a record of the license plate, time, inbound/outbound characteristic, and entrance for each license plate that was captured. With this information, the spreadsheet shows various calculations about duration and entrance statistics.

License Plate and Photo Survey Data

The results of the hourly LPR and photo survey analysis results are stored in spreadsheets named by the day they were gathered. In total, the following spreadsheets contain all of the results:

- LPR Data Spreasheets
    - Chautauqua_June13_2012_LPR_Results.xlsx
    - Chautauqua_July7_2012_LPR_Results.xlsx
    - Chautauqua_July16_2012_LPR_Results.xlsx

- Photo Survey Data Spreadsheets
    - Chautauqua Internal Parking Duration & Capacity 6.13.xlsx
    - Chautauqua Internal Parking Duration & Capacity 7.7.xlsx
    - Chautauqua Internal Parking Duration & Capacity 7.16.xlsx

Each spreadsheet contains a group of numbered tabs. The LPR sheets are numbered from 1-92 which each represent a specific analysis area within the study area. The photo survey sheets are numbered from 1-44 which each represent a separate picture taken each hour, and additional sheets are labeled A-Y which aggregate numbered photo survey locations to the same geographies utilized in prior studies to directly compare inventory and utilization statistics. Typically, each block face is represented by one tab and each parking lot is represented by one tab. Within each analysis area, each unique license plate or vehicle is tracked throughout each of the hourly counts and shown graphically. Summary statistics about how long each vehicle was parked and how many vehicles total during each hour area represented in each tab.

A summary tab shows all analysis zones in the study area by pulling data from each individual tab. Number of vehicles parked and an estimated capacity utilization percentage are calculated for each hour between 9AM and 5PM. Duration statistics are also summarized by the number of vehicles in each category from <1 hour to > 7 hours. Average parking duration, % parked < 2 hours, % parked 2-4 hours, and % parked > 4 hours are also calculated in the summary tab for each analysis area. Additional summary charts showing utilization by street and duration by street are included in separate tabs.