FOREST GROVE OREGON

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CITY RECORDER USE ONLY:	
AGENDA ITEM #:	F. 3.
MEETING DATE:	09/12/2022
FINAL ACTION:	RESO 2022-59

CITY COUNCIL STAFF REPORT

TO: *City Council*

FROM: *Jesse VanderZanden, City Manager*

MEETING DATE: *September 12, 2022*

PROJECT TEAM: *Dan Riordan, Senior Planner, Bryan Pohl, Community Development Director*

SUBJECT TITLE: *Acceptance of Downtown Parking Management Plan*

ACTION REQUESTED:		**Ordinance**		**Order**	**X**	**Resolution**		**Motion**		**Informational**

X all that apply

ISSUE STATEMENT: In March, the City's parking consultant (Studio Davis LLC) provided a presentation to Council highlighting results of the downtown parking analysis. Subsequently, Studio Davis finalized the Forest Grove Downtown Parking Management Plan (Plan) (Attachment A) for City acceptance. A resolution with the Plan as an exhibit is attached for Council's review and approval.

BACKGROUND: The parking analysis prepared by Studio Davis included an assessment of the public parking supply, demand and turnover. The consultant also evaluated parking impacts with Pacific University nearby. In addition, parking supply and demand on 21st Avenue was analyzed to provide information helpful for the Festival Street project. This information is in the Plan.

The consultant also prepared recommendations for parking improvements. The consultant's recommendations include improving parking lot signage, expanding parking supply through striping, branding the City-owned parking lots, managing long-term parking, and adding wayfinding signage near the parking lots with information about nearby destinations including estimated walking times. The Plan attached to the resolution includes both the technical analysis and recommendations.

FISCAL IMPACT: Approving the resolution will have no direct fiscal impact on the City. Decisions about funding specific improvement projects identified in the Plan will be made as part of the annual City budget process.

STAFF RECOMMENDATION: Staff recommends the City Council approve the attached resolution accepting the Downtown Forest Grove Parking Management Plan.

ATTACHMENT(s):

A. Resolution accepting the Downtown Parking Management Plan, dated June 14, 2022.
B. PowerPoint presentation

RESOLUTION NO. 2022-59

RESOLUTION ACCEPTING 2022 DOWNTOWN FOREST GROVE PARKING MANAGEMENT PLAN

WHEREAS, the City retained Lancaster Engineering, and subsequently Studio Davis LLC, to prepare a comprehensive analysis of the on-street and off-street public parking supply, demand and turnover in downtown Forest Grove; and

WHEREAS, Lancaster Engineering and Studio Davis also prepared parking management recommendations based on the analysis for City Council consideration; and

WHEREAS, the parking analysis and parking management recommendations are contained in the Downtown Forest Grove Parking Management Plan; and

WHEREAS, Studio Davis completed the Parking Management Plan to the satisfaction of the City.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY OF FOREST GROVE AS FOLLOWS:

Section 1. The Forest Grove City Council accepts the Parking Management Plan dated June 14, 2022 (Exhibit A).

Section 2. The Forest Grove City Council hereby directs the City Manager to use the Parking Management Plan to guide future improvements to downtown parking and management of public parking spaces.

Section 3. This resolution is effective immediately upon its enactment by the City Council.

PRESENTED AND PASSED this 12th day of September, 2022.

_____
Anna D. Ruggles, City Recorder

APPROVED by the Mayor this 12th day of September, 2022.

_____
Peter B Truax, Mayor

EXHIBIT A

Downtown Forest Grove Parking Management Plan

Final Report—June 14, 2022

Prepared for:
Community Development Department
City of Forest Grove, Oregon
1924 Council Street
Forest Grove, OR 97116

Prepared by:
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studiodavis

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studiodavis

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1. Introduction

Overview & Project Goals

This document presents a comprehensive parking management plan for downtown Forest Grove, Oregon. Over the past several years, the core of Forest Grove has grown and downtown has emerged as a vibrant commercial district surrounded by a mix of uses including residential, educational, civic, and others. Demand for parking in the area has grown accordingly. As the impacts of COVID-19 wane and activity returns to downtown, the area's recovery and growth are expected to continue. The goal of the parking management plan presented herein is to help the City successfully manage parking both now and in the future.

Parking management is a critical component of placemaking. A right-sized and well-managed parking system is not only critical to a neighborhood's economic success, but also to its livability, vibrancy, and overall sense of place. The plan presented herein draws upon robust data collection efforts undertaken to quantify the number and types of parking stalls available in the downtown area, the demand patterns within the area, and the turnover patterns within the busiest parts of downtown. It also draws upon a significant public input and outreach efforts, undertaken with a goal of producing recommendations that are likely to be both effective and broadly supported.

Project History

Work on the Downtown Forest Grove parking management plan began in 2019. In early summer 2019, the project was initiated and a group of stakeholders were identified. Three separate meetings with the stakeholder group were conducted over the course of the summer and fall of 2019 to learn about the perceptions, challenges, and impacts of parking felt by local businesses and residents, and to discuss early findings and recommendations.

A robust data collection effort was conducted in August 2019, with two rounds of observations: A first set during a weekday intended to represent typical operating conditions, and a second set during a large downtown event (Forest Grove *UnCorked)* that was intended to represent the busiest operating conditions for the downtown parking system. Draft analyses and recommendations were produced during fall and winter of 2019 and presented to the stakeholder group and Forest Grove City Council.

At the direction of Council, a further set of observations was scheduled to support the previous work. The goals of the second set of observations were to better understand the impacts of Pacific University on the downtown parking system, and to capture data for a more typical weekend day than the event day observed previously. These observations were set to take place in March 2020 but were postponed at the onset of the COVID-19 pandemic.

Data collection efforts resumed in February 2022 as economic activity began to return to a significant share of pre-pandemic levels. Given the time elapsed between rounds of data collection, the second set of observations were designed to help understand the impacts of COVID-19 and the related changes in land use in addition to the goals stated above. The resulting plan draws from insights from both rounds of data collection.

Study Area and Analysis Methodology

The study area consists of the downtown core of Forest Grove and immediately outlying blocks. A total of 48 block faces and seven public parking lots were selected for observation, designed to provide an understanding of the various factors impacting demand in the downtown area. The study area is generally bounded by A street to the west, 19th Avenue to the south, Cedar Street to the east, and University Avenue to the north. A robust mix of land uses exists within the study area, including residential, retail, restaurant, office, school uses, and others.

To evaluate how parking usage varies between the different contexts, the study area was initially divided into the following four subareas:

Central: The Central subarea encompasses Main Street, 21st Avenue, and Pacific Avenue which front many different types of retail and restaurant uses. Because of the central location and the mix of nearby land uses, it is expected that this subarea will generally be the busiest and may also display the most complex demand patterns. The subarea consists of 18 block faces.

Northeast: The Northeast subarea is comprised of 8 block-faces along College Way and Pacific Avenue, including two long "superblock" faces, directly in front of Pacific University. While these blocks do not encompass all available parking for Pacific University, it is assumed that demand for these blocks is generally driven by the University.

Northwest: The Northwest subarea is comprised of block-faces along 21st Avenue, 22nd Avenue, and A Street. Land uses within this subarea are primarily residential in nature, and it is expected that residential uses drive parking demand within the subarea. The subarea consists of 10 block faces; four additional bock faces in the area do not allow parking.

South: The South subarea encompasses 14 block-faces along 19th Avenue, Ash Street, and A Street. There are several uses within the subarea including retail uses, the police department, fire department, and some city offices and other employment uses. The mix of uses is somewhat similar to the City Center subarea, albeit with employment uses expected to generate more of the demand observed within the subarea than within the City Center subarea.

The study area and subareas are shown in Figure 1.

The data collection was conducted in two steps: an inventory of parking supply, followed by observations and analyses of demand and turnover. The parking supply inventory was conducted in the field, with the project team recording the number of stalls and the types of stalls and/or regulatory signage/striping for each block face and public parking lot within the study area. Quantifying the number of stalls is straightforward for block faces and lots with striped parking; for unstriped parking, a combination of physical measurements and utilization observations were used to determine an approximate number of stalls.

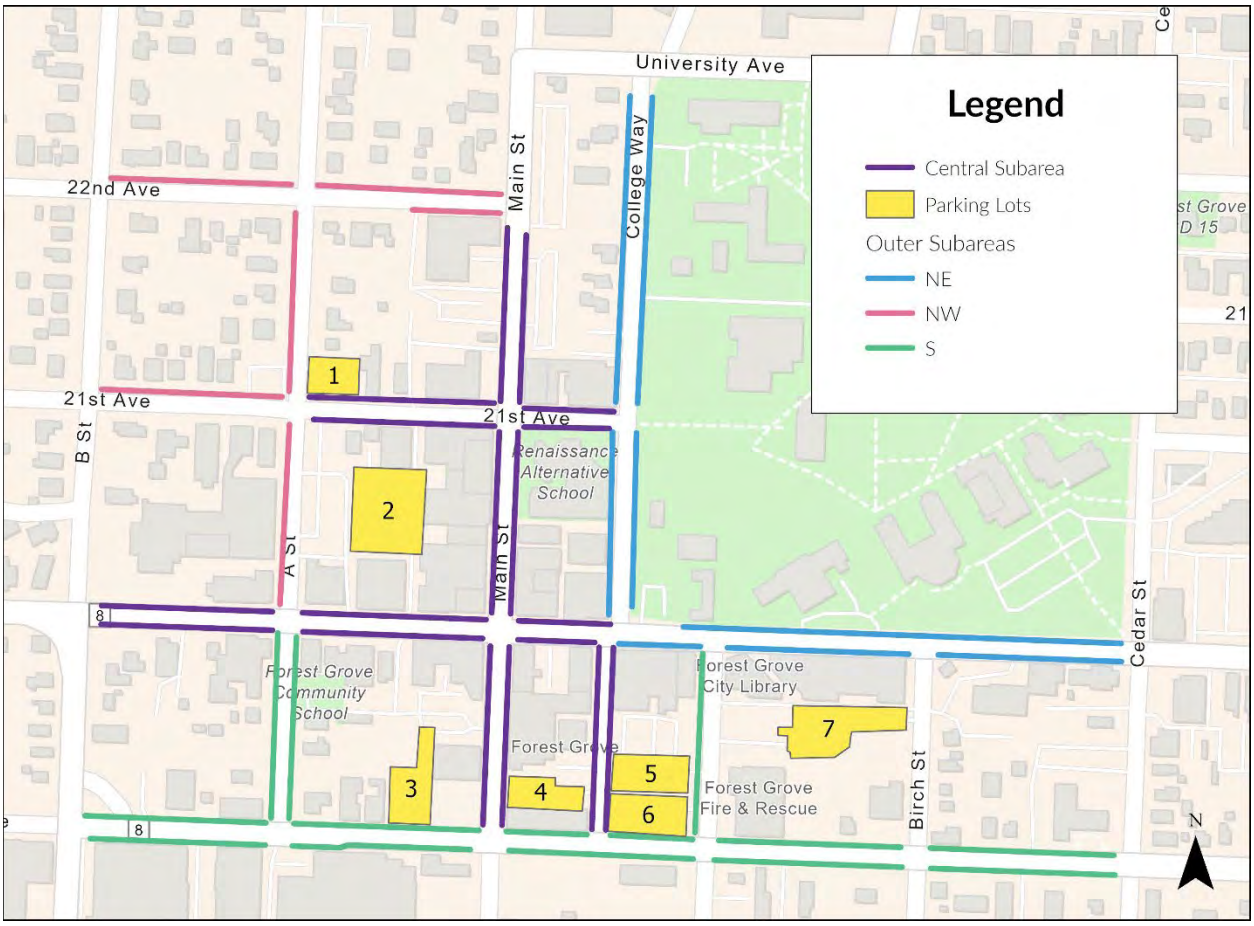


Figure 1: Study area block faces and parking lots

Demand observations were conducted following conclusion of the supply inventory. The initial work on this project included observations on two study days:

- Data were collected on Saturday, August 17, 2019, to observe a heavy-demand scenario: The *Forest Grove UnCorked* festival, which drew a significant number of visitors and entailed the closure of parking along Main Street between Pacific and 21st Avenues. This study day was expected to be among the busiest days of the year.
- Data were collected on Thursday, August 22, 2019, to observe what was expected to be a typical weekday.

As described above, when work on the project resumed in early 2022, two additional study days were selected:

- Data were collected on Saturday, February 5, 2022, to observe a typical weekend day with Pacific University in session.

- Data were collected on Tuesday, February 8, 2022, to observe a typical weekday with Pacific University in session.

The type and frequency of demand observations varied by subarea as follows:

- For the **City Center subarea,** hourly occupancy and turnover data were collected. This entails recording a unique identifying feature for each vehicle observed—typically the first three to four characters of the license plate—to determine how long vehicles are occupying a particular stall. The data collection occurred from 10:00 am to 8:00 pm.
- For the **seven parking lots,** hourly occupancy data were collected. These data are collected simply by counting the number of vehicles parked each hour. Some lots include spaces that are unavailable for public use, e.g., much of the parking in parking lot #5 is reserved for city employees; these stalls were not included in the data collection efforts. Data collection hours were again 10:00 am to 8:00 pm.
- For the **South, Northeast, and Northwest subareas**—also referred to as outer subareas within this document—occupancy data were collected three times on each study day. Data were collected at expected peak times during each day: 11:00 am, 1:00 pm, and 5:00 pm during the midweek study day and 12:00 pm, 2:00 pm, and 6:00 pm during the weekend study day.

Stall Counts and Types

The results of the parking inventory are summarized in Table 1. Descriptions of the stall types are provided below.

Table 1: Locations, numbers, and types of stalls in the downtown study area

	Stall Counts by Type					
Location	Unregulated	Timed	ADA	EV	School	**Total**
On-Street						
Central Subarea	0	169	2	0	0	**171**
Northeast Subarea	0	180	1	4	0	**185**
Northwest Subarea	46	24	0	0	0	**70**
South Subarea	69	73	0	0	0	**142**
Lots						
Lot #1	18	0	1	0	0	**19**
Lot #2	49	0	3	3	0	**55**
Lot #3	22	0	2	0	7	**31**
Lot #4	0	22	1	0	0	**23**
Lot #5	0	15	1	0	0	**16**
Lot #6	30	0	2	1	0	**33**
Lot #7	22	0	3	0	0	**25**

The study area includes the following types of parking stalls:

- **2-Hour:** Stalls that allow for time stays up to two hours between 8:00 am and 5:00 pm. These are found throughout the downtown area, and striped parallel stalls are often signed as 2-hour stalls.
- **4-Hour:** Stalls that allow for stays up to four hours between 8:00 am and 5:00 pm. Within the study area, these are found primarily along College Way
- **Short-stay:** These stalls are signed for 30 minute maximum stays and are located sporadically throughout the study area.
- **Unregulated:** Spaces that have no signage or restrictions on the amount of time a vehicle stays
- **Disabled:** Spaces reserved for use by those displaying a disabled placard, license plate, or other legal permit
- **School parking:** Spaces that are reserved for school/university demand during some or all of the day
- **Unregulated:** Stalls that do not have time limits or use restrictions.

Terminology

The key metrics employed in this analysis are described below:

Occupancy is a measure of how much of the parking supply of a given area is utilized, expressed as a percentage of the total parking supply. For on-street parking, parking is considered "functionally full" when occupancy levels exceed 85%; this is often indicative of a need for a change in management. The term 'peak hour(s)' is used in this report to indicate the hour of the day when occupancy was observed to be the highest. The timing of the peak hour and the occupancy level during the peak hour relative to other times of the day reveal important information about drivers of demand.

Stay length is the duration of time that a particular vehicle was observed to occupy a particular parking space. Stay lengths of more than three to four hours likely indicate residential or commuter demand, while shorter stay lengths are likely to indicate demand for retail, restaurant, entertainment, or commercial uses. Since each parking space for which turnover was measured was observed once per hour, stay lengths are recorded as the total number of hours that a particular vehicle was observed.

Total vehicles quantifies the number of unique vehicles (based on the recorded license plate numbers) observed during a given study period. This metric complements duration of stay in providing an understanding of the turnover of parking stalls. Along commercial corridors, it is desirable for parking to serve as many unique vehicles as is practical, as it indicates a high turnover of customers. A parking stall serving fewer than three unique vehicles over the study day is likely serving residential demand or a lower demand area, while three or more unique vehicles served is more likely indicative of a parking space serving commercial uses or a mix of uses. Since data were collected once per hour, the number of unique

vehicles served reported therein is likely lower than the actual number of unique vehicles served, as there is a chance any stay under one hour total will not be observed.

Percentage of overstays is reported for stalls that have a signed maximum stay length, and refers to the percentage of vehicle that were observed to exceed the time limit. High percentage of overstays could indicate that time limits are not adequate to serve demand; conversely, they could also represent the need for more robust enforcement. As with other turnover metric, the percentage of overstays reported herein are affected by the one-hour resolution of data, and thus entail uncertainty for spaces with time limits of one hour or less.

2. Parking Supply, Demand, and Turnover Analysis

Occupancy Maps

This section presents the observations and analyses for the parking study conducted in February 2022. The previous analyses for this planning effort, based upon data collection that took place in August 2019, were originally presented in a memorandum from November 2019; this memorandum is included in the appendix to this report. Where appropriate, these analyses highlight key differences between the current findings and those from 2019. The recommendations presented in the following section take the aggregate of these analyses into account.

One of the best tools for visualizing parking demand is by composing a heatmap where each block face or parking lot is colored based upon the percentage of overall stalls occupied.

The following six figures present heat maps for the February 2022 round of observations in Forest Grove:

- Figure 2 on page 13 illustrates the demand during the 11:00 am hour on the midweek study day
- Figure 3 on page 1413 illustrates the demand during the 1:00 pm hour on the midweek study day
- Figure 4 on page 15 illustrates the demand during the 5:00 pm hour on the midweek study day
- Figure 5 on page 16 illustrates the demand during the 12:00 pm hour on the weekend study day
- Figure 6 on page 17 illustrates the demand during the 2:00 pm hour on the weekend study day
- Figure 7 on page 18 illustrates the demand during the 6:00 pm hour on the weekend study day

Within these figures, brighter greens and cooler colors represent block faces Sand lots with low demand and thus available parking, while brighter reds and warmer colors represent block faces and lots with high demand and thus little to no available parking. A common rule of thumb in parking management is that demand levels above ~85% is considered "functionally full," as research has shown that detrimental impacts to the overall system begin to occur at this level. Thus, demand at or above 85% is shown as "fully red" on the maps.

Maps for the remaining observation hours, during which only the Central subarea and parking lots were observed, are shown in Appendix A.

Occupancy Map | Tuesday February 8, 2022 11:00 am

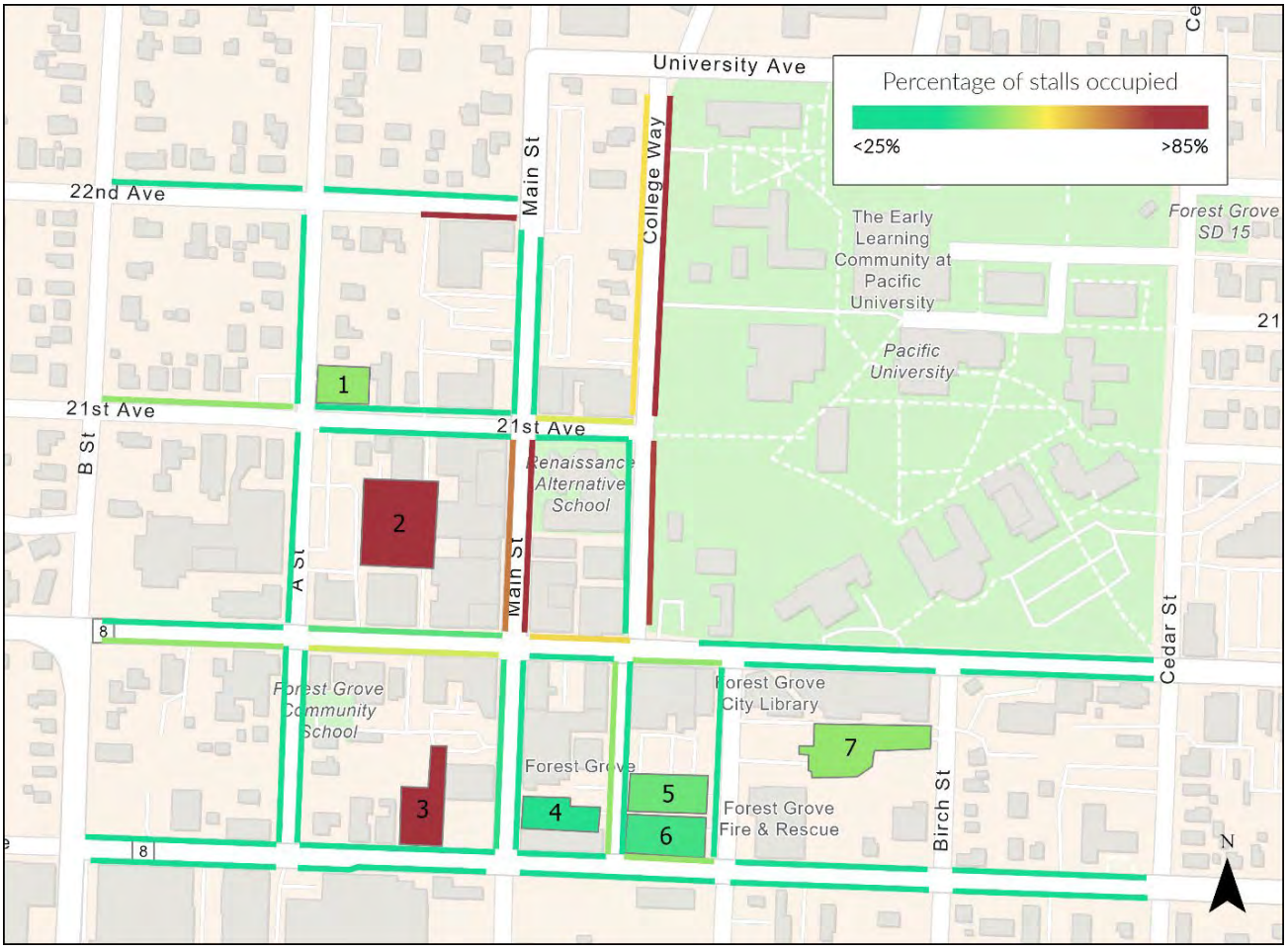


Figure 2: Percentage of stalls occupied for each blockface and parking lot in the study area at 11am on the midweek study day

Takeaways:

- Demand early in the day is concentrated along the block of Main Street between Pacific and 21st Avenues, along College Way adjacent to Pacific University, and within parking lots #2 and #3. Outside these areas, there is ample parking available throughout the study area. Most land uses in the area begin to peak after the 11:00 am hour and this appears to manifest in the demand patterns.

Occupancy Map | Tuesday February 8, 2022 1:00 pm

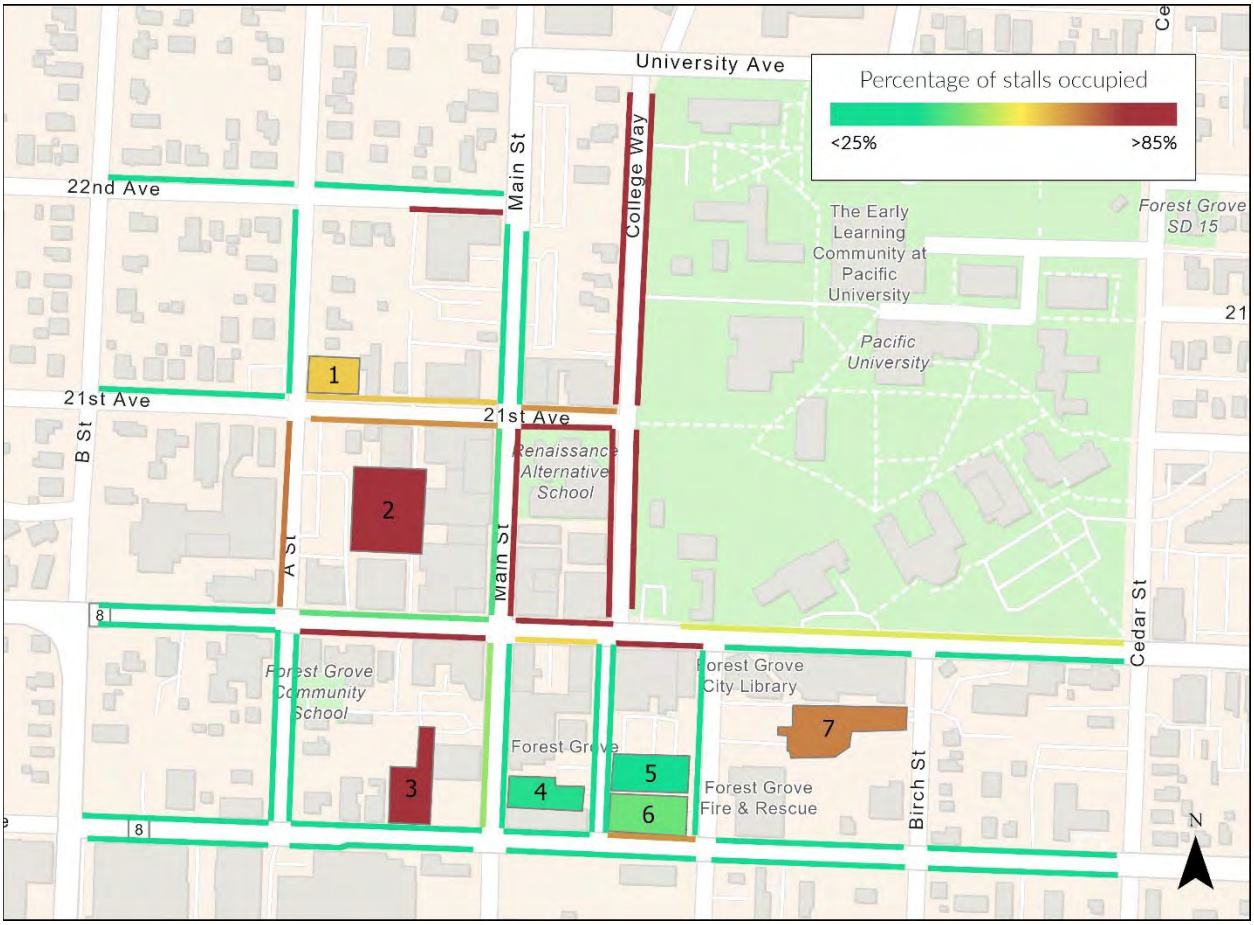


Figure 3: Percentage of stalls occupied for each blockface and parking lot in the study area at 1pm on the midweek study day

Takeaways:

- The 1:00 pm hour was observed to be the earlier of two observed peaks during the midweek study day; this is described in more detail in the following section. During this hour, Main Street and adjacent to Pacific University continue to see the high demand observed at 11:00 am. Additionally, parking along other block faces along Pacific Avenue, College Way, 21st Avenue, and A Street is beginning to fill, and increased demand is evident in parking lots #1 and #7 while lots #2 and 3 remain at or near capacity. Parking areas south of Pacific Avenue remain reasonably low in demand at this hour.

Occupancy Map | Tuesday February 8, 2022 5:00 pm

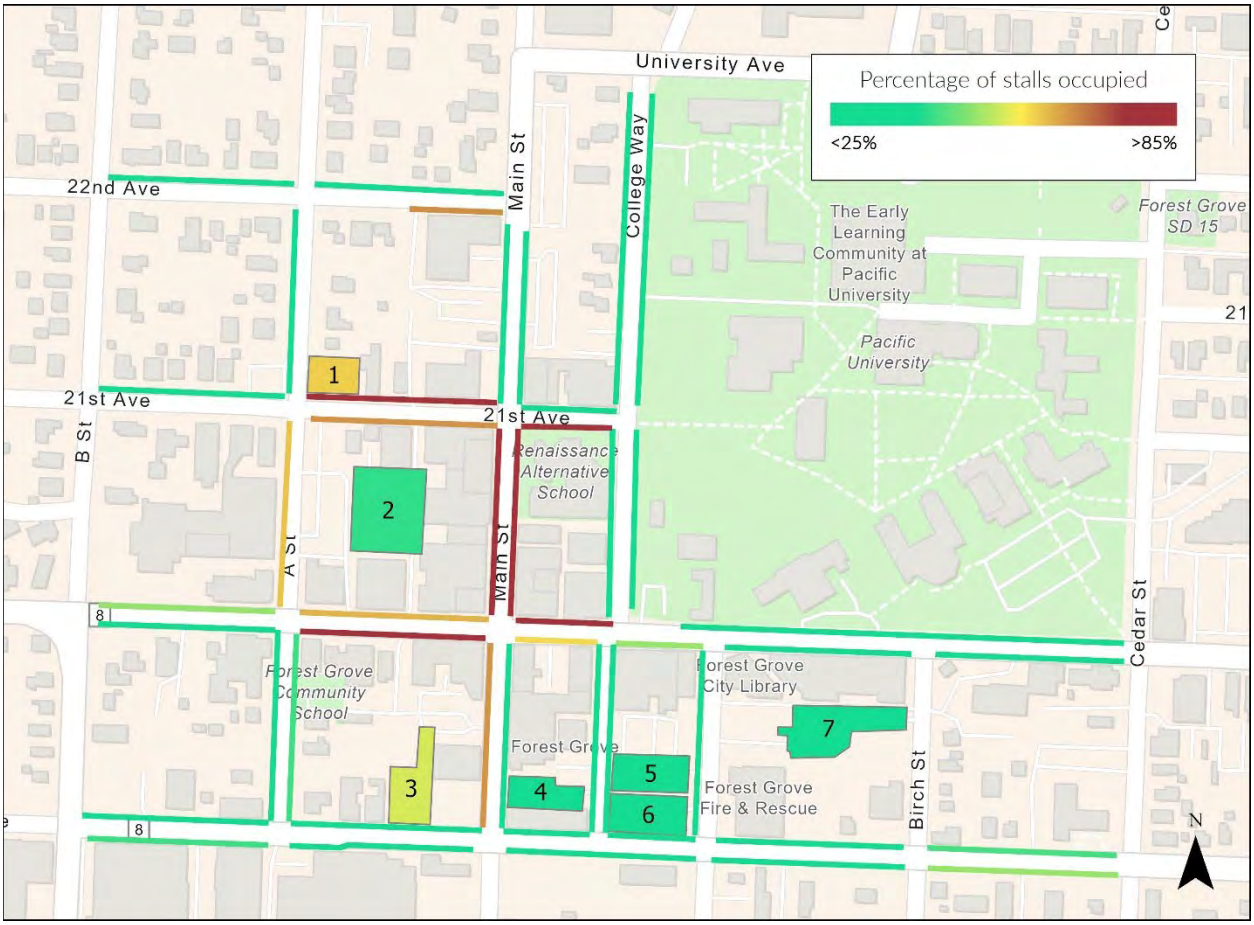


Figure 4: Percentage of stalls occupied for each blockface and parking lot in the study area at 5pm on the midweek study day

Takeaways:

- The 5:00 pm hour on Tuesday was found to be the peak hour for parking demand on-street within the Central subarea. High demand rates are observed along Main Street, Pacific Avenue, and 21st Avenue, and A Street. This is likely due primarily to the retail, restaurant, and related uses downtown as demand from Pacific University has waned by 5pm and parking occupancy in the *Northeast* subarea is accordingly low. Some demand due to restaurant and entertainment uses south of Pacific is evident within Lot #3 and nearby on-street parking.

Occupancy Map | Saturday February 5, 2022 12:00 pm

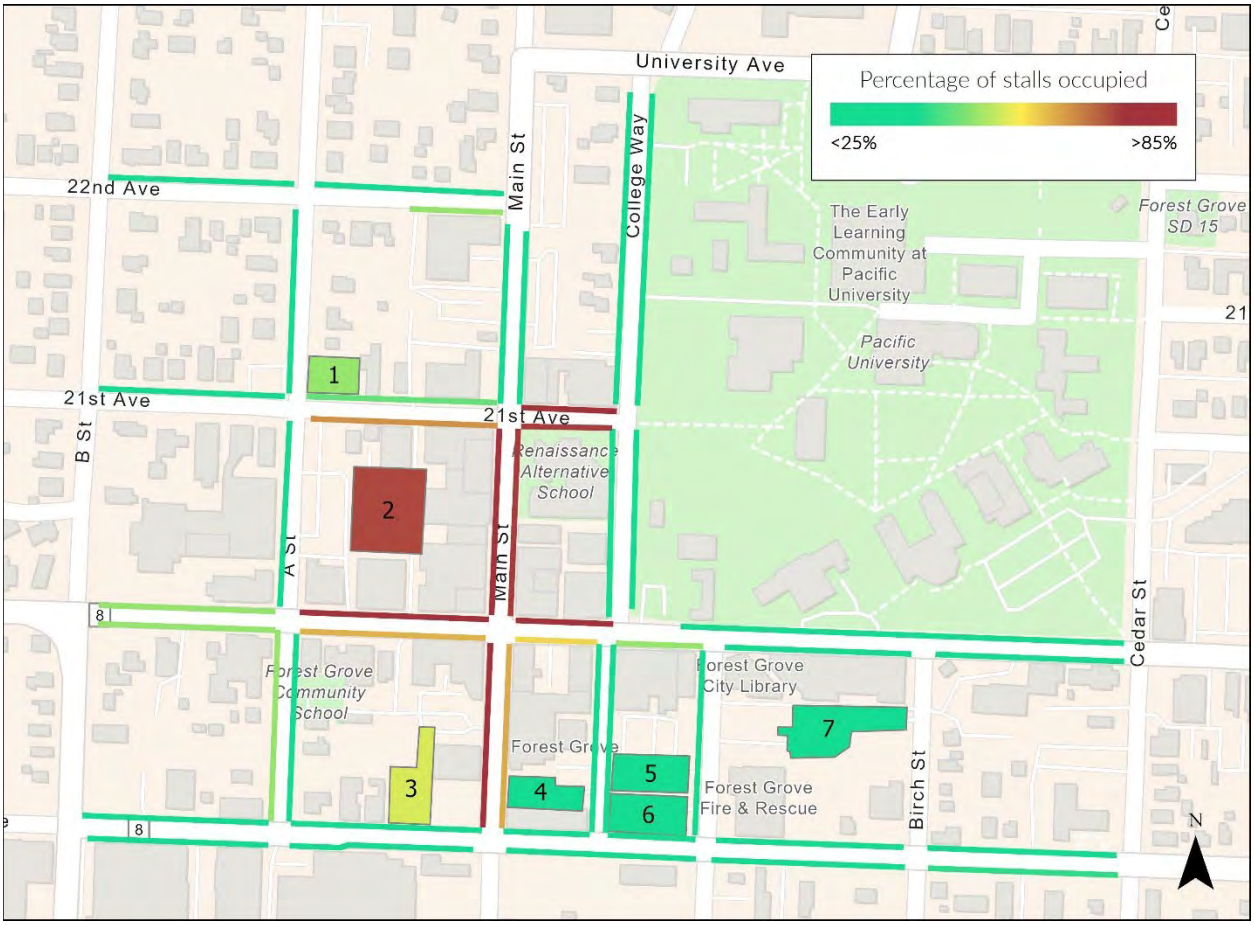


Figure 5: Percentage of stalls occupied for each blockface and parking lot in the study area at 12pm on the weekend study day

Takeaways:

- The 12:00 pm hour on Saturday was observed to be the busiest hour of the day for on-street parking within the Central subarea and parking lot#2. High demand is observed along Main Street, 21st Avenue, and Pacific Avenue, and on-street parking is in greater demand south of Pacific Avenue now than at any point during the weekday study day. Notably, demand along Main Street at the northern extents of the study area remains low even as nearby parking fills. It is expected that this demand derives primarily from downtown's restaurant, retail, and entertainment uses, and people generally park adjacent to their destination where possible—which it typically is—and take parking further away only where it is not.

Occupancy Map | Saturday February 5, 2022 2:00 pm

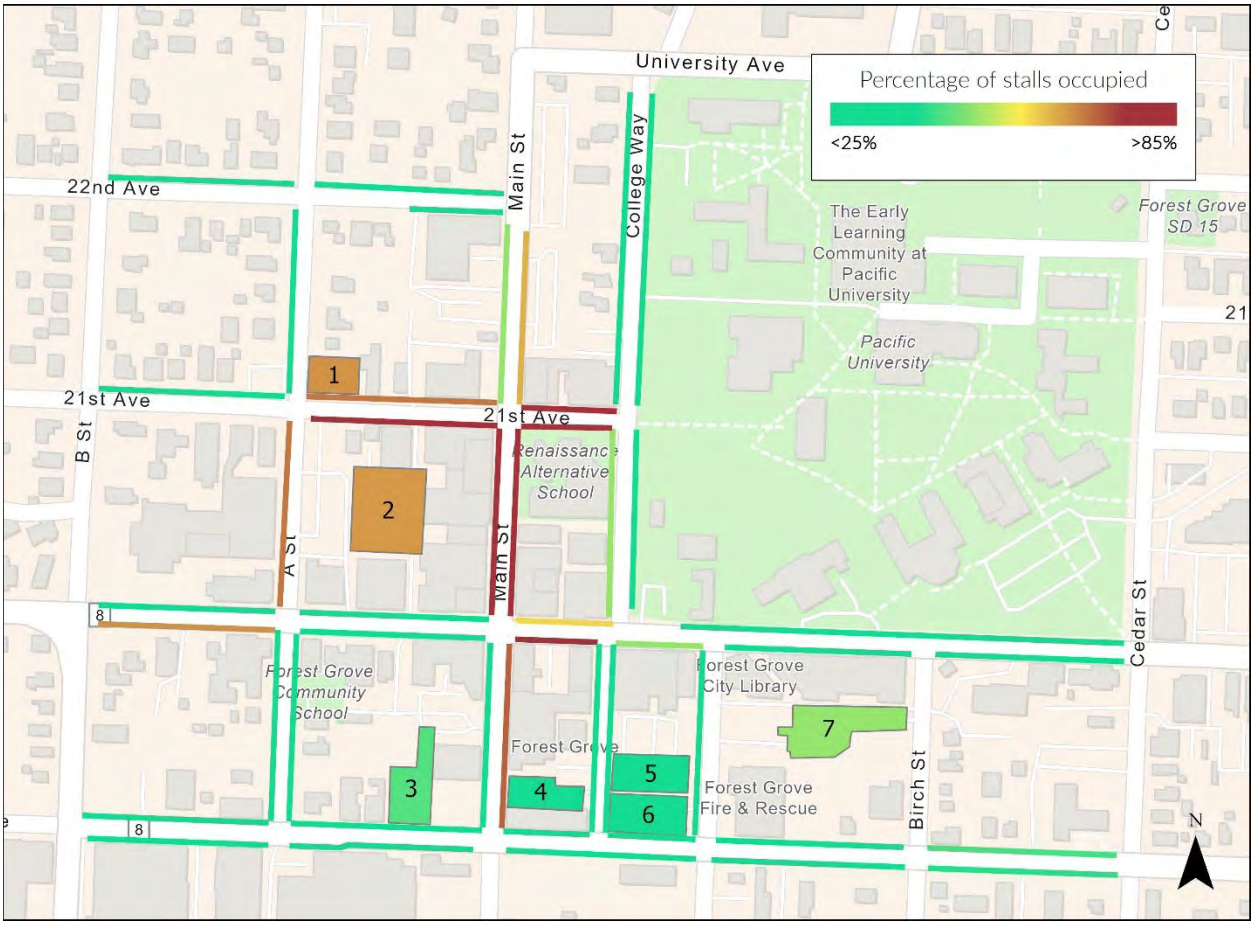


Figure 6: Percentage of stalls occupied for each blockface and parking lot in the study area at 2pm on the weekend study day

Takeaways:

- Throughout the earlier hours of the weekend study day demand levels are observed to be relatively consistent, and aggregate demand at 2:00 pm is nearly identical to demand at noon although in some cases the busiest block faces have moved. Parking along the segment of Main Street between Pacific and 21st Avenues remains in high demand, and parking along 21st Avenue and Lot #1 are observed to be busier than at noon while demand in Lot #2 and along Pacific Avenue has fallen off somewhat. Parking along Main Street north of 21st sees its highest demand of the study during this hour (though it is sill in relatively low demand) while other outlying areas remain in low demand.

Occupancy Map | Saturday February 5, 2022 6:00 pm

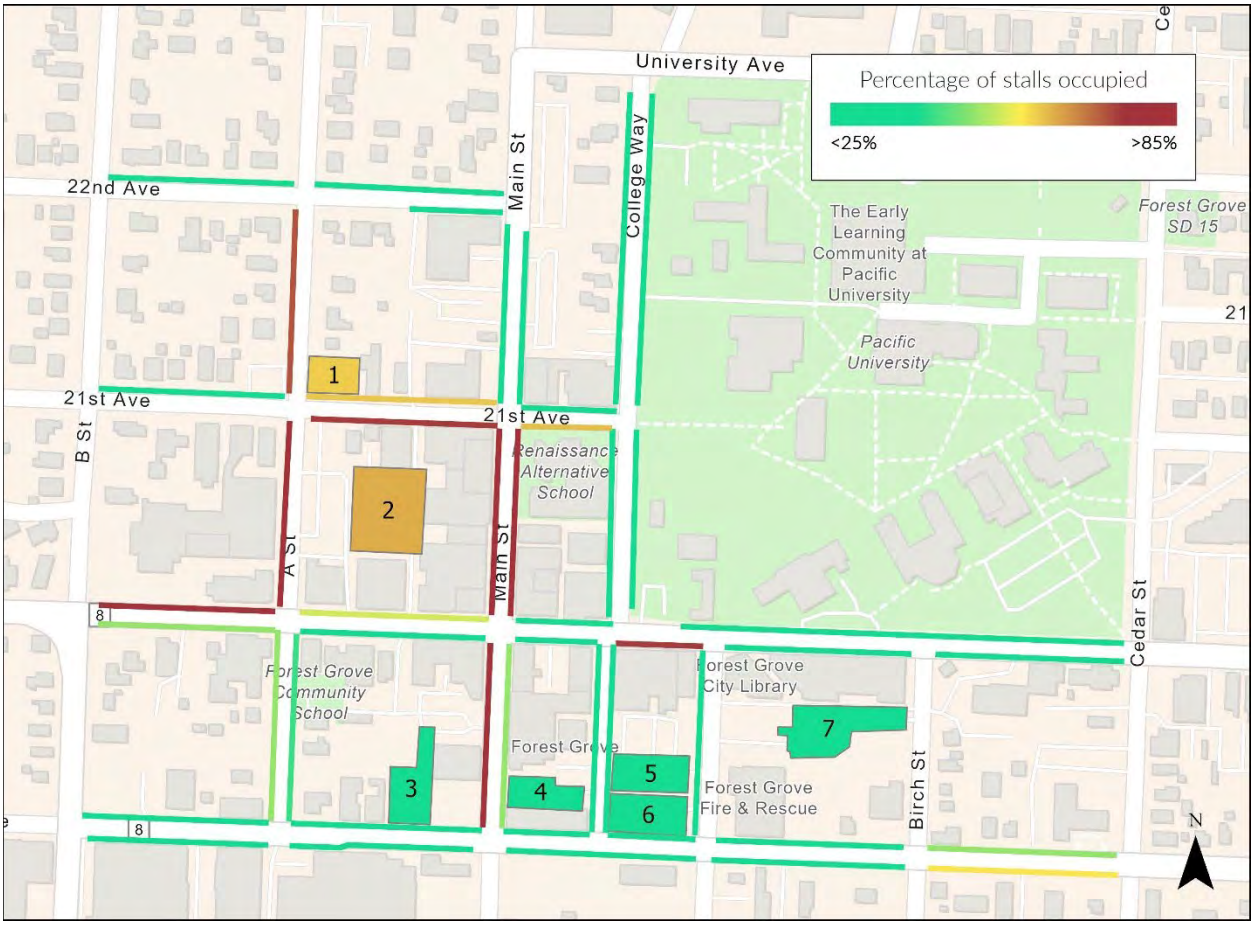


Figure 7: Percentage of stalls occupied for each block face and parking lot in the study area at 6pm on the weekend study day

Takeaways:

- By 6:00 pm on the weekend study day demand has fallen off a bit compared to the busier earlier hours, but the Central subarea remains relatively busy. Additionally, demand along some outlying blocks is busier than other observation periods, typically driven by adjacent popular land uses. Segments of Main Street both north and South of Pacific Avenue along with segments of A Street, 21st, and Pacific Avenues remain in heavy demand, and lots north of Pacific Avenue see moderate to heavy demand.

Central Subarea Occupancy

Another useful way to visualize parking demand is by plotting the percentage of occupied stalls versus time of day as a line graph. These charts are often colloquially called "camel curves," as the number, size, and timing of the "humps" reveals important information about the demand patterns and uses driving them.

The occupancy curve for the midweek study day for the Central subarea is shown in Figure 8. The occupancy curve for the weekend study day for this subarea is shown in Figure 9.

Figure 8: Percentage of stalls occupied by hour in Central Forest Grove during midweek study day

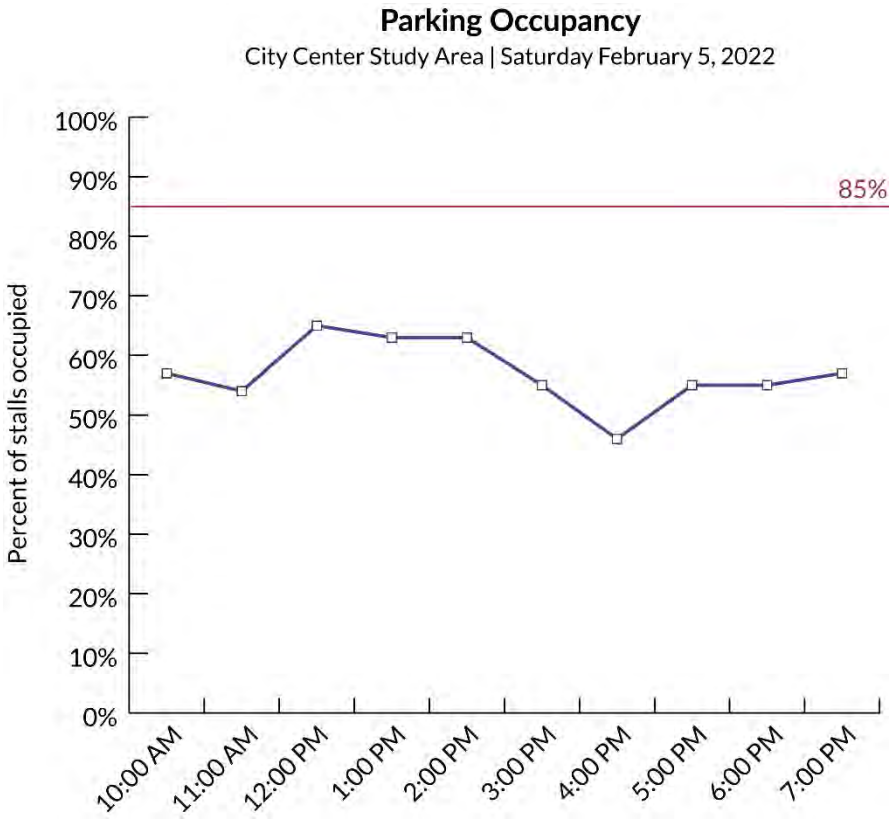


Figure 9: Percentage of stalls occupied by hour in Central Forest Grove during weekend study day

Takeaways:

- For the weekday study day, two distinct peaks were observed: an early peak during the 1:00 pm hour and a second peak during the 5:00 pm hour. Peak periods on Saturday were longer and less distinct. These patterns are typical of those seen in mixed-use commercial settings, with peaks corresponding roughly to lunch and dinner hours indicative of the retail, restaurant, and entertainment uses driving the bulk of demand in this area.
- Demand levels varied between about 40% and 70% during the weekday study day. On Saturday, they remained within an even tighter window, between 46% and 65%. This is likely indicative of a robust mix of uses driving demand, which generate peak demand at different times and thus in total generate a consistent level of demand over the course of the day. Notably, demand does not fall off significantly after 5:00 pm although stay time regulations are signed to end at this time.
- While demand within the Central subarea as a whole does not approach 85%, the parking north of Pacific Avenue tends to see higher demand levels than parking south of Pacific. A closer look is taken at this high-demand area in a subsequent section.

Turnover

Turnover properties for the Central subarea are shown in Figure 10 for the midweek study day and in Figure 11 for the weekend study day. These figures show a graph of the number of vehicles observed in "bins" based upon the number of hours they are observed to stay. As a measurement of the overall impact on the parking system, the number of stall-hours occupied by vehicles for each one-hour time stay bin is also shown. As an example, one vehicle parked for five hours and five vehicles each parked for one hour would each represent five stall-hours.

The total number of vehicles observed, the average stay time, and the percentage of total vehicles observed to have exceeded the two-hour time limit are also reported.

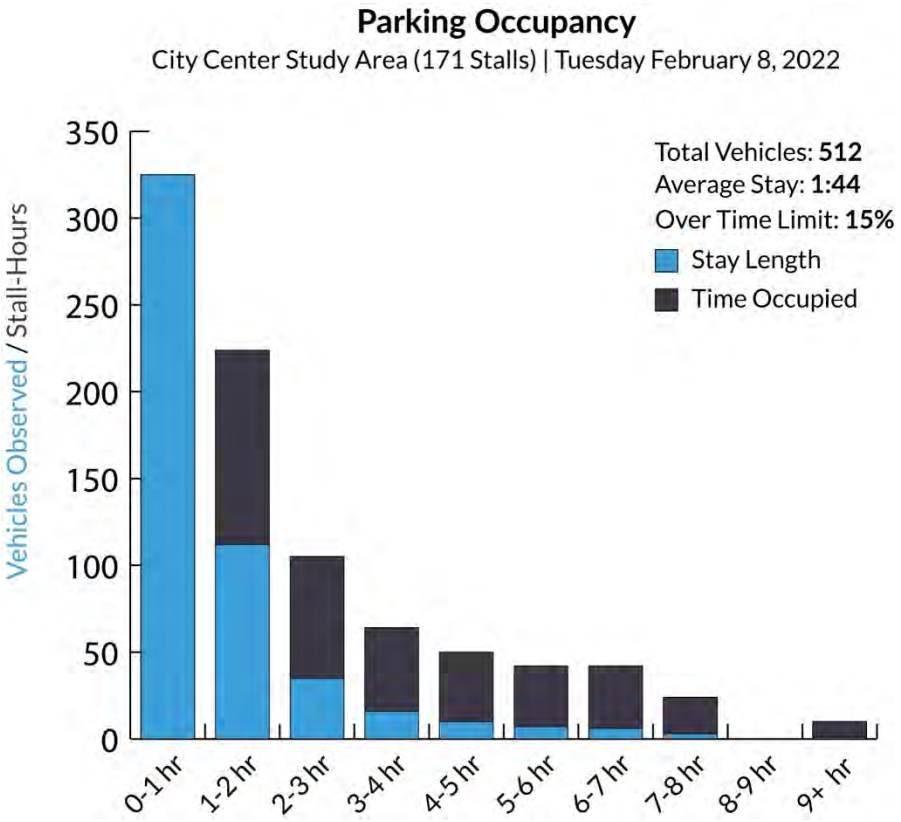


Figure 10: Stay lengths for weekday study day

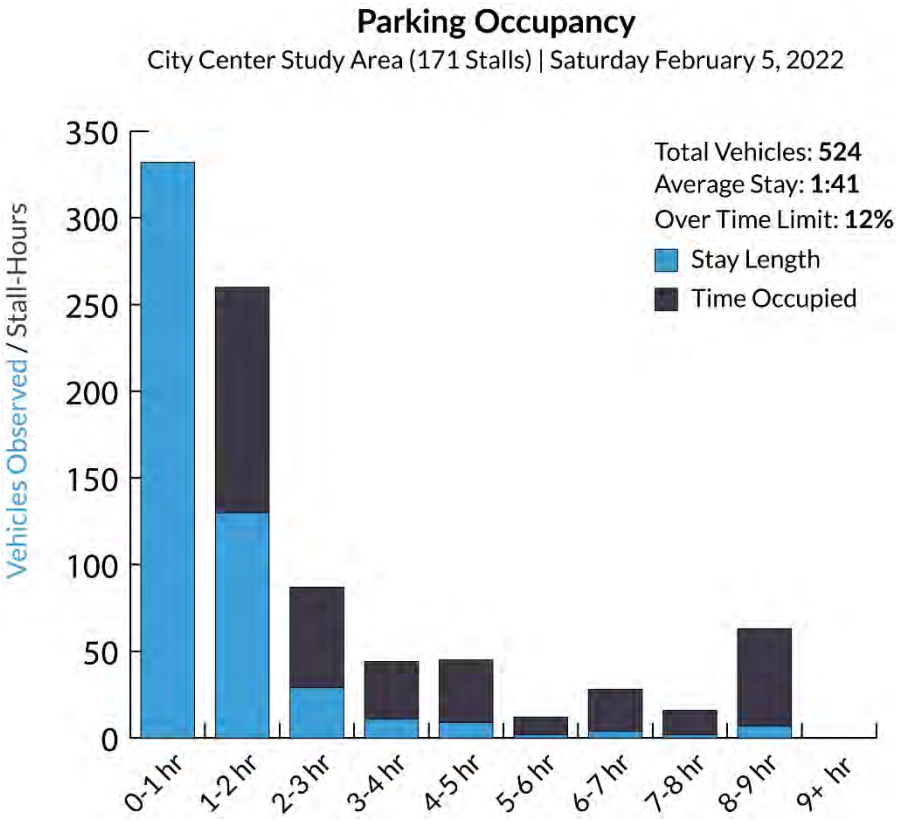


Figure 11: Stay lengths for weekend study day

Takeaways

- Turnover properties were largely similar on both study days. The system served 512 vehicles during the weekday study period and 524 during the weekend. Average stay times were 1 hour 44 minutes during the weekday and 1 hour 41 minutes during the weekend. A total of 15% and 12% of vehicles were observed to exceed the signed two-hour time limits on the weekday and weekend, respectively.
- The two-hour time limits appear to be appropriate for most of the demand served by the system. On both study days, a majority of vehicles were observed to stay one hour or less, and a majority of the remaining vehicles stayed less than two hours. These shorter stays accounted for most of the overall demand upon the system in terms of time-based impact.
- For longer stays, it is likely that those in the three- to four-hour range are visitors and customers while the longer stays are likely employees or proprietors of local businesses. Management measures aimed at driving this longer-term demand to parking lots may help relieve congestion; however, the overall impact of overstays upon the system is reasonably light and tends to concentrate toward times and areas where demand is lower.

Highest Demand Area ("Central T") Occupancy

As noted above, it is evident that during the commercial peak demand periods parking north of Pacific Avenue within the downtown area tends to be more congested than the parking south of Pacific Avenue. To further explore trends within this area, occupancy curves are presented for the highest-demand area within downtown, dubbed the "Central T" and consisting of the segment of Main Street between Pacific and 21st Avenues, and the segment of 21st Avenue between College Way and A Street.

The occupancy curve for the midweek study day is shown in Figure 12 and the occupancy curve for the weekend study day is shown in Figure 13.

Figure 12: Percentage of stalls occupied by hour within highest demand area during weekday study day

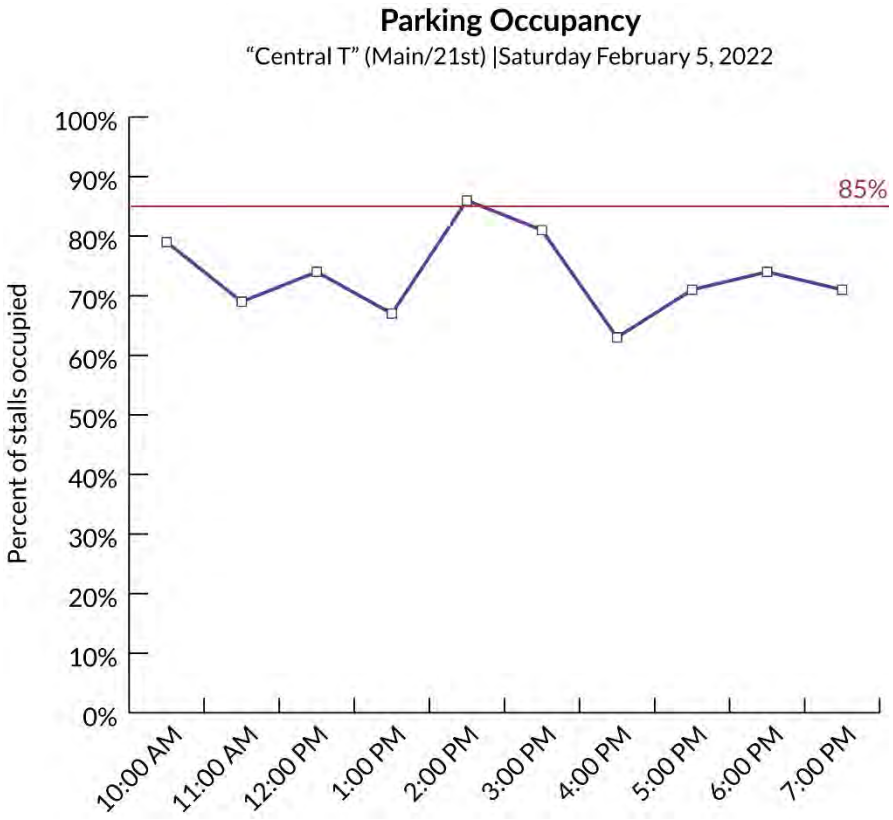


Figure 13: Percentage of stalls occupied by hour within highest demand area during weekend study day

Takeaways

- During both study days, occupancy was at or near 85% of capacity during the peak demand periods. This is the point at which potential or perceived negative impacts from parking congestion often begin to manifest. Because this part of downtown operates relatively independently of the rest of the Central subarea and sees demand consistently approach this level, customers and businesses downtown likely experience these impacts even though parking supply in aggregate is sufficient in downtown.

- As with the greater Central subarea, demand within the "Central T" was observed to be more consistent on the weekend study day than during the weekday. During the weekend, only one apparent peak was observed, occurring during the 2:00 pm hour. During this time, demand was 86%. During the rest of the study day demand was consistently 63% or higher. By contrast, two apparent peaks—at 1:00 pm and 6:00 pm—were observed during the weekday study day, and demand was observed to be as low as 43% at 10:00 am and as high as 88% during the 6:00 pm peak. In both cases, these patterns are indicative of those driven by retail, restaurant, and entertainment uses, which display similar peaks during weekdays and flatter demand levels on weekends.

Festival Street Impacts

A Festival Street is proposed for the segment of 21st Avenue between College Way and A Street, which would feature numerous elements to enhance the vibrancy of the street and create a destination for events and activities. The proposed redesign reduces the on-street parking supply by seven stalls. A key element of this parking plan is to identify and address any potential impacts arising from the proposed Festival Street.

At the time of the 2022 analysis, there were 40 functional parking stalls along the segment of 21st Avenue proposed for redesign. It is noted that this is a reduction of one stall from the 2019 counts; this stall has been converted to outdoor seating for Bella Donna's restaurant. The redesign of 21st Avenue currently under consideration shows 33 parking stalls.

Figures 14 and 15 summarize the parking occupancy and availability along the affected segment of 21st Avenue for the weekday and weekend study day, respectively. These figures present stacked bars corresponding to each study hour, with occupied stalls shown at bottom in red and available stalls shown above in green.

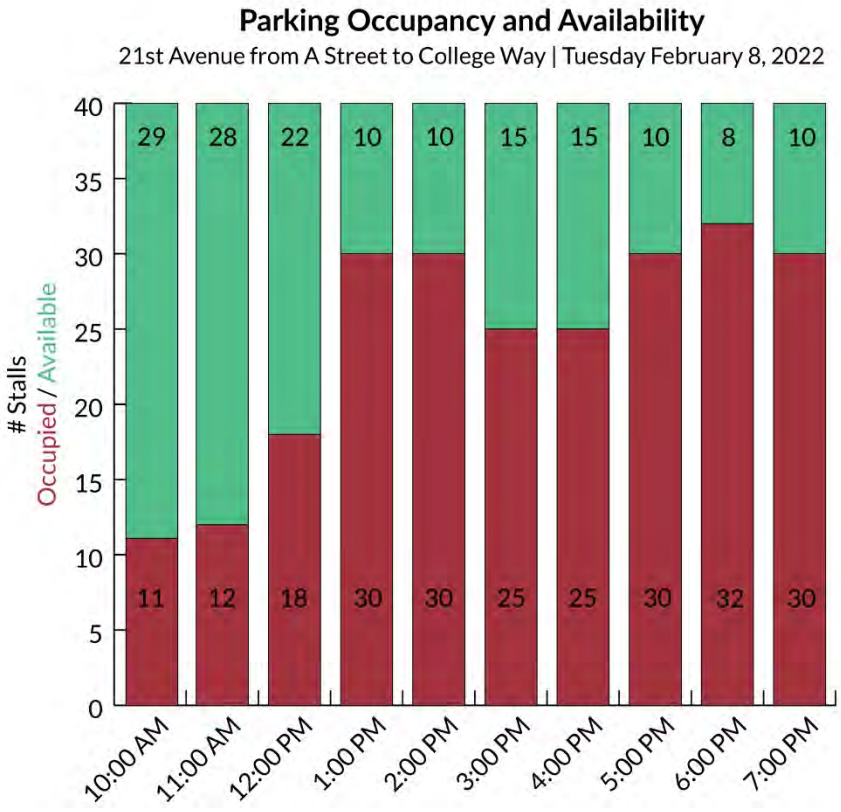


Figure 14: Occupied and available on-street parking stalls by hour on weekday study day for segment of 21st Avenue proposed as Festival Street

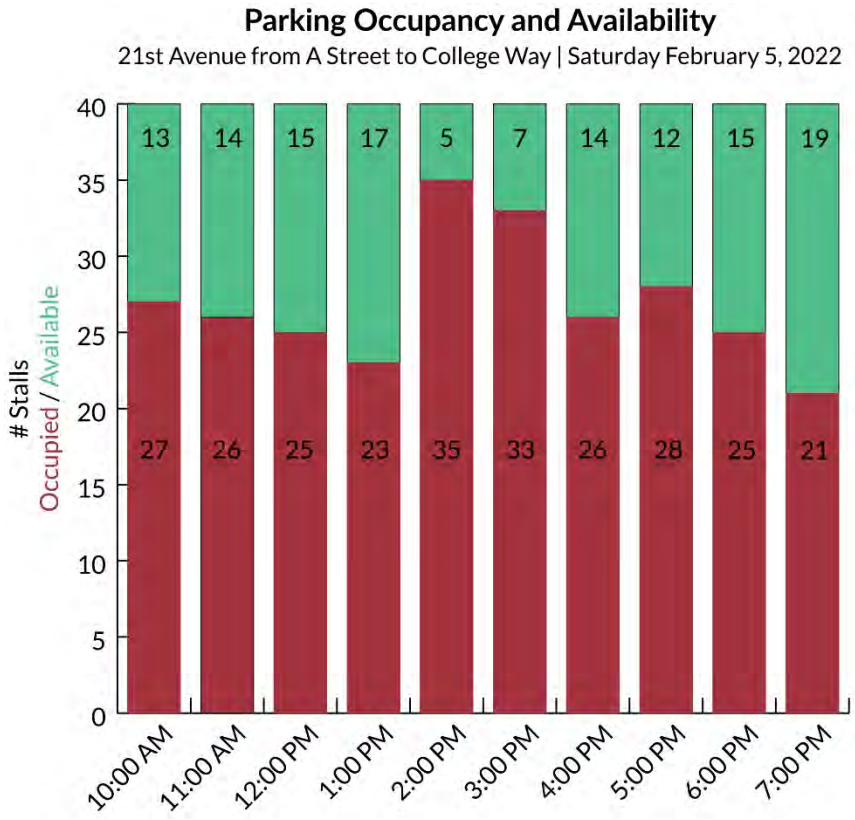


Figure 15: Occupied and available on-street parking stalls by hour on weekend study day for segment of 21st Avenue proposed as Festival Street

Takeaways

- For most of the day on both study days, there is ample parking supply along 21st Avenue to accommodate observed demand. There was more demand than could be accommodated by the 33 stalls remaining after the redesign observed during only one study hour: the 2:00 pm Saturday afternoon peak, with a demand for 35 stalls. While parking would be tight or full during several other hours following the redesign, there would be sufficient parking to accommodate that demand directly on 21st Avenue during all other hours.

- As described above, there are numerous empty stalls within the downtown area even during the busiest hours. The nearby public lots in particular have capacity to handle displace demand from the redesign. Thus even without mitigations, typical demand can be met with available supply within one block of the Festival Street. However, several recommendations are offered in the following section designed to help people find and access these spaces more easily, and to stripe additional nearby street frontage to create additional parking stalls. As conversion of 21st Avenue to a Festival Street is likely to attract events and corresponding parking demand to the area, recommendations focusing on activating underutilized resources like the public parking lots will be important to the success of the Festival Street.

Parking Lots

The downtown study area includes seven parking lots with some or all spaces available for public use. From the 2019 study and the initial observations conducted in February 2022, it became clear that the busiest and potentially most important parking lot to the overall system was Parking Lot #2. This lot, centrally located on the block bound by Pacific Avenue, 21st Avenue, A Street, and Main Street, had high demand levels consistently throughout the study.

Occupancy curves for Parking Lot #2 for both study days are presented in Figure 16 below. Occupancy curves for the remaining six public lots are presented in Figure 17 on page 28. Key takeaways for all lots follow.

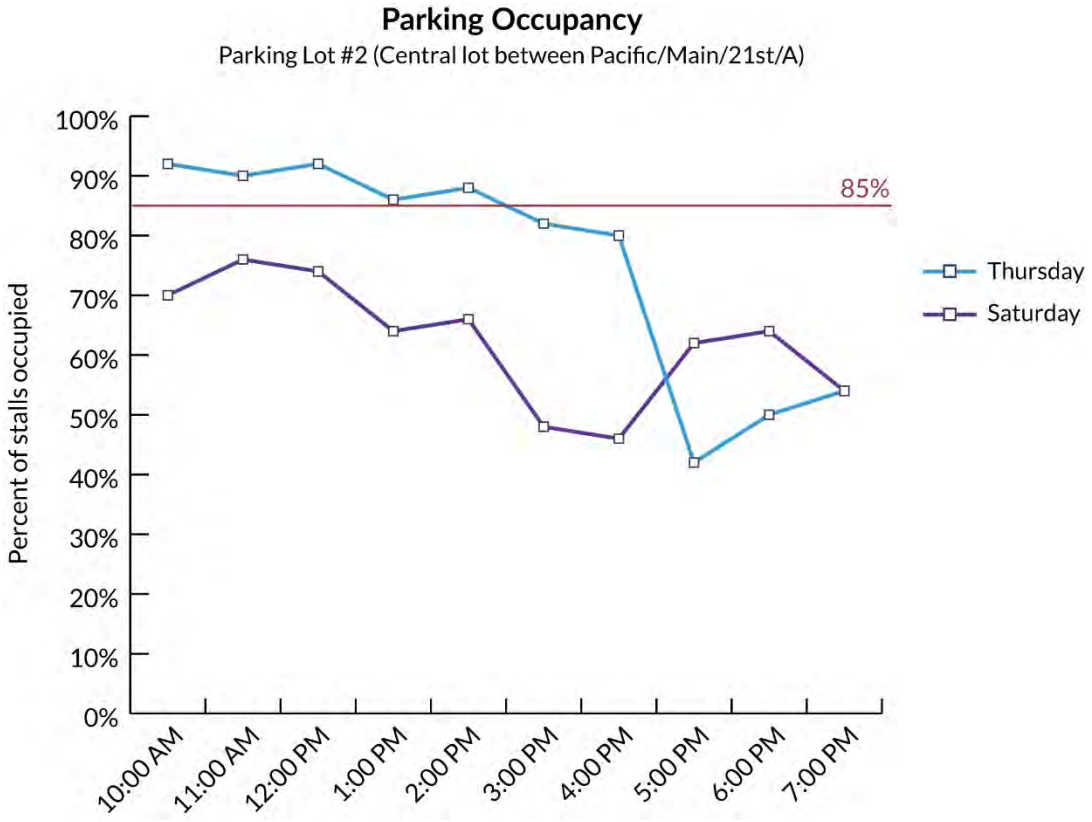


Figure 16: Hourly occupancy of Parking Lot #2 during both study days

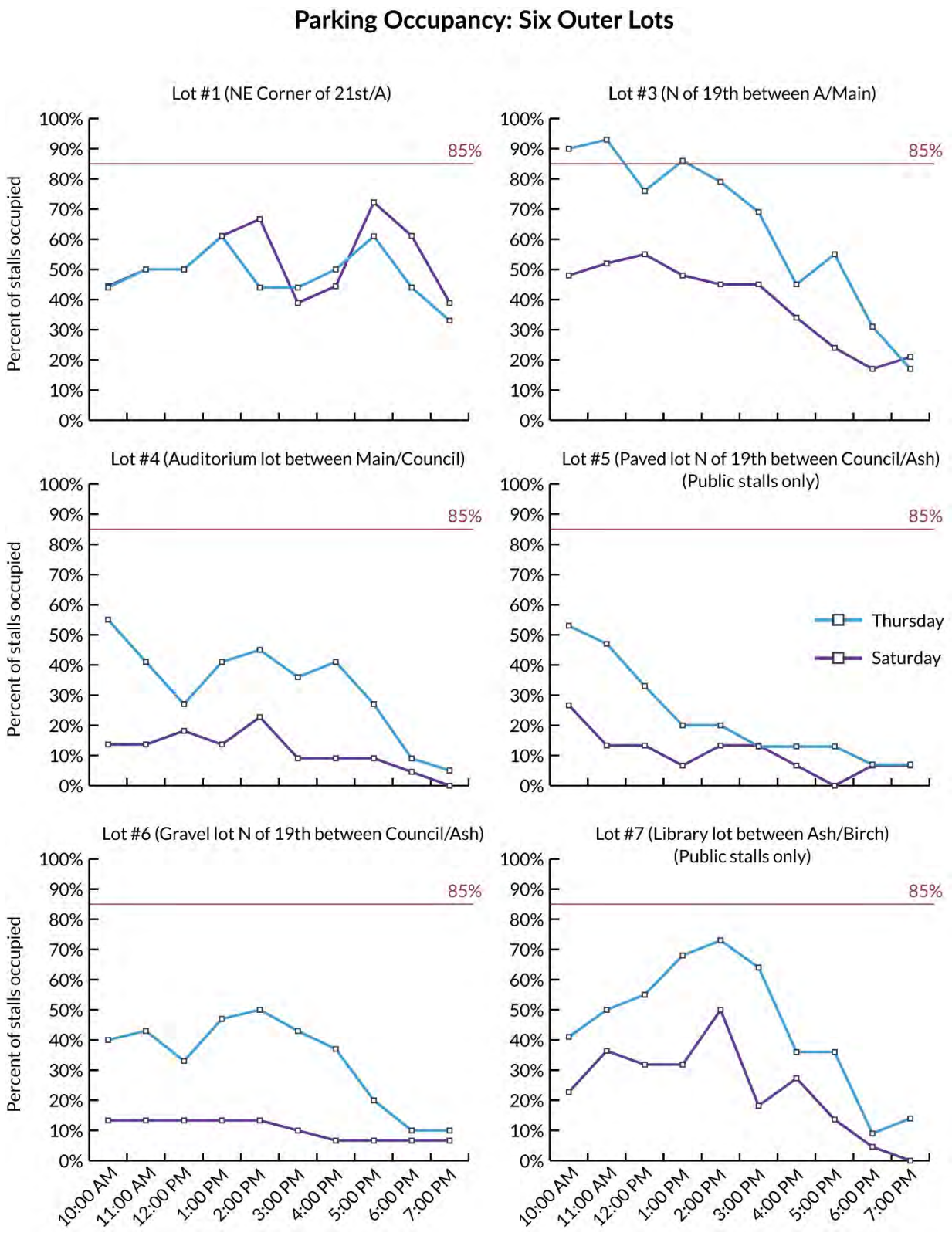


Figure 17: Hourly occupancy of Lot #1 and Lots 3-7

Takeaways:

- **Lot #1** saw a fairly consistent level of demand varying between about 40% and 70% throughout the day on both study days. The peak periods and less busy periods observed within this lot are generally similar to those that were observed for on-street parking along blocks near this centrally-located lot. Like the Central subarea as a whole, demand for this lot was slightly lower in aggregate for this study period than in 2019. Combined with its location and overall visibility, this suggests that this lot acts as an extension of the nearby on-street system, absorbing excess demand as on-street parking fills.

- As mentioned, **Lot #2** was observed to be the busiest lot, both in terms of the number of vehicles accommodated and the percentage of occupied stalls. The lot was busiest during the daytime hours of the mid-week study day, when the lot was operating near or at capacity for the first seven observation hours before falling off at 5:00 pm. During other hours, the lot typically operated above 60% of capacity and rarely fell below 50%. Because this is the largest lot with 55 total stalls, this represents a significant number of vehicles. Even at the lowest demand levels, the lot was still observed to accommodate 24 vehicle (Tuesday 2/8) and 27 vehicles (Saturday 2/5).

  Based upon these observed usage patterns, it appears that this lot is serving primarily demand from local employees and shopkeepers, likely including many that work at businesses adjacent to the lot. Because these are high-duration stays, this relieves significant demand from the nearby on-street system. As the lot is located centrally within the highest demand area, Lot#2's impacts are likely a key reason that the system as a whole appears to be working reasonably well.

- **Lot #3** was observed to operate at or near capacity for the earlier part of the midweek study day, with demand driven by Forest Grove Community School. During these times most or all of the seven stalls reserved for school use were full, with significant demand observed within the public stalls as well. During the weekend study day, the lot operated at approximately 50% of capacity for the early part of the day. In both cases, demand for the lot begins to fall off later in the day. This is likely a function of the earlier peak periods of nearby land uses (school, bank, City offices) relative to retail, restaurant, and related uses north of Pacific Avenue.

- **Lot #4** also saw demand levels hover consistently around 40% to 50% during the midweek study day before falling off later in the day. This lot saw little to no demand during the weekend study day. This likely indicates that demand for this lot is primarily driven by the adjacent City Auditorium and other nearby city offices.

- **Lot #5** saw demand levels of around 50% early during the midweek study day, but demand fell off earlier in this lot than in Lot #4. Low levels of demand were observed throughout the weekend study day. This lot likely serves demand for visitors to nearby city offices. It is noted that this most of the parking stalls in this lot are reserved for city employees during daytime weekday hours. Only full-time public stalls are analyzed here; however employee stalls represent a potential source of additional parking for special events on weekends.

- **Lot #6** saw some demand during the midweek study period, during which it appeared to be sparsely populated by vans, pick-up trucks, and other work-related vehicles. During the weekend, it appeared to only serve a small number of vehicles. This lot appears to have ample capacity to accommodate additional demand at most or all times.
- **Lot #7** saw similar demand patterns on both the midweek and weekend study day, with a noticeable peak at the 2:00 pm hour and demand at is lowest levels at the beginning and end of the observation period. Demand was somewhat higher during the weekday than the weekend, though the overall shape of the curve is similar. This likely indicates that this lot is serving primarily demand from Forest Grove City Library and potentially visitors to the Police Department.

Outer Subareas

Parking occupancy curves for the three outer subareas—the Northeast, Northwest, and South subareas—are shown in Figure 18. These figures show the occupancy during each of the three observation periods for these subareas, with both study days combined onto one chart.

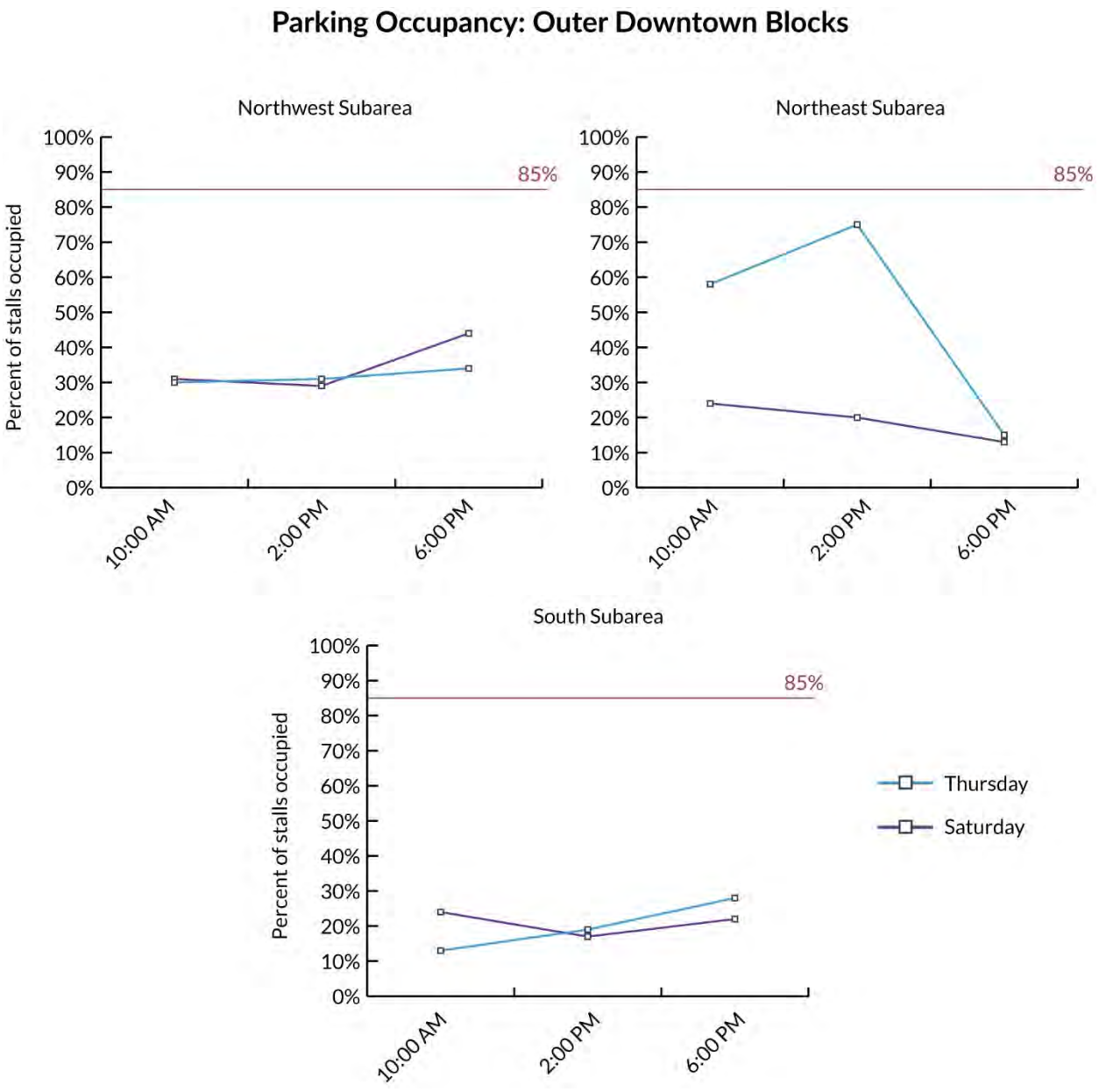


Figure 18: Hourly occupancy for outer-downtown subareas during both study days

Takeaways

- Within all three of the outer subareas, demand was generally observed to be reasonably low in aggregate. All high-demand block faces observed appeared to arise from nearby and uses; for example, demand adjacent to restaurants in these subareas (e.g. Forest Grove sushi, Growler Garage) was high during mealtime observation periods but low otherwise.
- By far, the busiest parts of the outer subareas were the block faces adjacent to Pacific University during the midweek study day. However, while these block faces accommodate a significant number of vehicles, the parking capacity adjacent to the university was observed to be sufficient to accommodate University-generated demand. Parking along the east side of College Way is striped diagonally, with 86 stalls total on the east side of the street between Pacific Avenue and University Avenue, and parallel stalls in place elsewhere adjacent to the University. Thus, while demand attributable to Pacific University was observed to be significant during the weekday, it was observed to remail local to block faces adjacent to the University with little to no spillover onto the rest of the system observed. Like other outer subarea locations, this parking saw little demand during nights and during the weekend observations. The high capacity and location of the diagonal stalls along College Way are thus good for accommodating excess demand for special events.

3. Recommendations

Overview

The results of the analyses conducted for this study generally paint a picture of a parking system working reasonably well. While there can be localized congestion and areas with little to no parking during peak times, this congestion is typically limited to small areas at any one time, and downtown as a whole has ample parking supply to accommodate demand, even during the busiest times.

There are, however, significant challenges to management of the parking system, both in the present context and as Forest Grove continues to grow. As the City recovers from COVID, it is expected that downtown parking demand will only continue to grow. Maintaining good operating conditions will likely necessitate activation of parking lots and other facilities that are underutilized at present. And while parking is typically available within a block or two of any downtown destination, the highest-demand block faces often fill to capacity which can be problematic. Lastly, periodic special events such as the *UnCorked* festival attract enough demand to fill a significant share of public resources to capacity.

The set of recommendations that follows is designed to preserve and enhance the elements of the parking system that are currently working well, while improving upon observed inefficiencies and activating underutilized resources. A number of specific and immediately actionable recommendations are offered, along with a longer-term vision and future actions the City can consider and integrate with other planning efforts for the downtown area.

Parking Lot Maintenance, Activation, and Branding

Demand across the public parking lots within downtown Forest Grove varied significantly from lot to lot, with lots toward the northern and western end of the study area generally much busier than lots toward the eastern and southern end. Below, several recommendations are offered which aim to preserve and protect the utility of the busier lots while activating presently underutilized lots to the extent possible.

Maintenance and Preservation of Central Lot

The centrally located downtown parking lot—Parking Lot #2 as identified previously—accommodates a significant amount of overall parking demand in downtown Forest Grove, particularly during the daytime peak hours. As described in the analysis, it appears that much of the demand for this lot derives from proprietors and employees of the businesses surrounding. This means that many of the parked vehicles that use this lots are long-duration stays. Because of this, Lot #2 is of paramount importance to the overall parking system and operations and the City should prioritize its maintenance and upkeep.

In early 2020, this lot was resurfaced and re-striped. While mostly still in good repair, it is beginning to show signs of fatigue, with cracks emerging and striping fading; an example is visible in the photo in Figure 19. Further, while the parking lot is reasonably well-lit, safety concerns may arise later at night when activity downtown wanes and the lot begins to empty.

The City should prioritize maintenance of this parking lot, ensuring that the pavement a striping is refreshed on a regular basis. Because of the heavy use this lot sees, it may require these basic elements of maintenance more regularly than other lots or resources. In the longer term, the City may consider

measures to address potential safety concerns within the lot, such as encouraging dumpsters and trash receptacles to be placed in less visible locations where possible, and encouraging more adjacent businesses to utilize lot-facing frontage to bring more activity to the area.

As described above, the lot appears to serve primarily demand from nearby employees and shopkeepers at present. This is an ideal use of the lot given its location and dynamics, as it absorbs much of the long-duration demand, allowing on-street parking to remain available for valuable shorter stays likely to be driven by customers and visitors. The City may want to formalize this use of the lot by designating this as employee parking. This could potentially be done by issuing permits to park in the lot, perhaps as part of a greater permit program, but it could also simply be an "honor system" measure. Similar to the signed two-hour parking, simply signing the stalls as employee parking might result in high overall compliance even without enforcement, especially given that the parking is already largely used in this fashion.

Figure 19: Parking lot #2, with some signs of pavement fatigue and striping fading emerging

Branding/Signage

At present, publicly available lots and stalls in Forest Grove can be hard to find and identify. Signage for these lots is inconsistent, with several different types of signage in use. Figure 20 shows examples of the different styles of signage currently installed within public lots. These differences in signage can

sometimes present ambiguity or cause confusion among visitors. It is recommended that the City install consistent, uniform signage as budget allows, ensuring that all public parking lots are designated with the same sign or style of signs, and any signage managing parking within the lots—e.g., signs marking two-hour time limits—is consistent from lot to lot.

Figure 20: Several different types and styles of signage are used within the public lots in downtown Forest Grove. It is recommended that the City install consistent, uniform signage.

Grants Pass, Oregon, provides a good example of effective parking lot branding. Lots are each named based on a theme—local animals in this case, e.g.., Duck Lot, Owl Lot, Beaver Lot—and each lot has an accompanying piece of art or signage. The public lots are clearly and consistently signed with a sign style that incorporates the city's logo and is consistent with its other branding. Some examples of the signage from Grants Pass are shown in Figure 21.

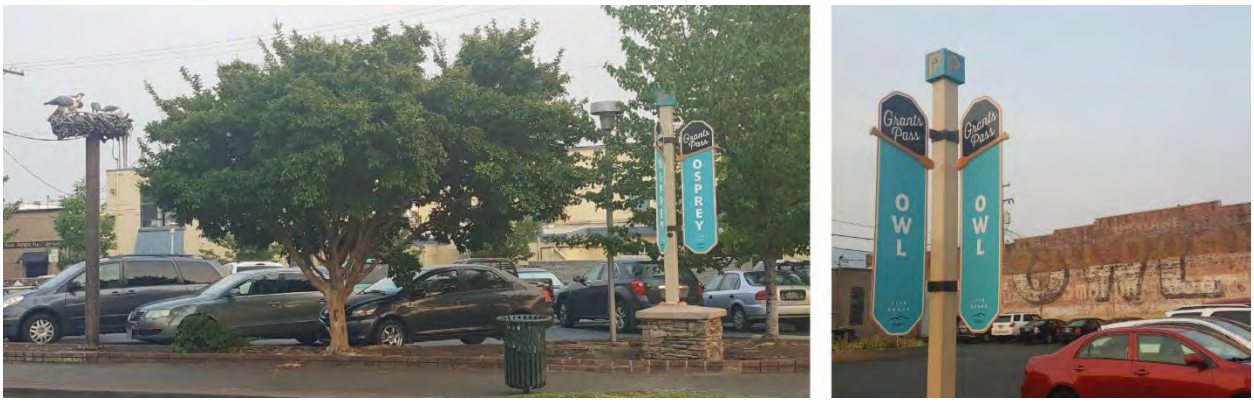


Figure 21: Signage and accompanying art/murals from Grants Pass, Oregon provide a best practice for parking lot branding

This sort of branding and signage can be an excellent way to encourage utilization of parking lots, helping in two ways:

1. It provides affirmation for visitors and others who may not be familiar with local regulations that the parking is indeed legal and publicly available; and
2. For those who may be unfamiliar with the area, it provides a landmark that helps them to navigate and easily locate their vehicle at the end of their stay.

The City of Forest Grove should adopt a similar branding convention. Lot names and potentially amenities could be integrated into other planning and placemaking efforts as with Grants Pass, or the City might consider naming lots based on their desired or expected use. An example of the latter might entail rebranding Lot #1 as the "Festival Street Lot," Lot #2 as the "Employee Lot," Lot #4 as the "Auditorium Lot," etc. Regardless of the naming convention, the key is to provide clear and consistent signage, and to ensure that the lots are consistently labeled across the City's wayfinding, maps, and related resources.

Paving and Striping Lot #6

Over the longer term, the City may consider paving and striping Lot #6. This lot is currently gravel and was observed to be inefficiently utilized even during periods where there may be nearby demand. Striping and paving this lot is a clear way to add capacity to the system and effectively create a new resource to relieve pressure on the greater system. However, this is likely to be among the more expensive projects to implement recommended here, and there is not presently significant demand for this parking aside from the busiest days of the year. Thus, this project is recommended as a potential future mitigation as demand in the area rises and funding becomes available.

New On-Street Striped Parking

In most downtown contexts, striping on-street parking stalls leads to more efficient utilization of the space by providing affirmation and guidance. While much of the highest-demand parking in downtown Forest Grove is presently striped, it is recommended that the following additional striping be added to improve efficiency of the system and support emerging land use and demand patterns.

Main Street between 21st and 22nd Avenues

As noted above, the segment of 21st Avenue between College Way and A Street is proposed for a "Festival Street" redesign that would reduce parking supply along the impacted segments from 40 stalls to 33.

While parking supply in the downtown area was found to be sufficient to accommodate typical demand as-is, a key recommendation identified in this planning work is the addition of striping for 19 total stalls—an increase of 16 from the three striped currently—to the segment of Main Street north of 21st Avenue. This parking was not observed to be in high demand currently, and is thus ideally situated to relieve pressure on the system resulting from the Festival Street redesign. Striping this parking will increase effective capacity of the system and improve the efficiency with which the parking is utilized.

This proposed restriping along Main Street is shown in Figure 22.

Figure 22: Recommended striping to create additional stalls along Main Street north of 21st Ave

Other Centrally Located Streets

City of Forest Grove Public Works has identified five additional locations where an additional parking stall could be created through restriping. Based upon the results of our study, these stalls are located within the highest-demand areas downtown and addition of these stalls would not have a deleterious impact on the walking environment or street culture. Thus, we recommend that the City restripe to create these stalls as proposed by Public Works.

A map showing the locations of the five new parking stalls as proposed is shown in **Figure 23.**

Figure 23: Additional recommended parking as identified by Forest Grove Public Works

Pacific and Western Downtown

In addition to the areas noted above, there was one block face within the Central subarea that is not currently striped despite reasonably high demand: The south face of Pacific Avenue between A and B Streets. This segment is signed for two-hour parking and could be striped to accommodate six stalls. Generally, it is worthwhile to stripe parking that is signed with a time limit, and demand along this segment appears high enough to warrant both the time limit and striping.

As the retail and residential segments of the *Jesse Quinn* building have been built out and occupied, parking demand within the western portion of downtown has grown. If development along the western

edge of downtown continues apace, it will likely become advantageous to stripe additional parking in this area along segments including B Street between Pacific and 21st Avenues and 21st Avenue between A and B Streets.

Wayfinding

Guiding visitors to and from parking assets within downtown should be a primary consideration for the City's wayfinding efforts, and as budget allows, it is recommended additional signage be installed to this end. In addition to City-provided signage, wayfinding can be incorporated into public facing maps and visitor guides, and in tandem with branding efforts recommended above, can be a powerful tool to help downtown's visitors navigate to parking both in their cars and on foot.

Wayfinding efforts should consider the differing needs of drivers and pedestrians and be deigned accordingly. To wit:

- **Drivers,** ideally, would access parking as directly as possible from the main routes into the area—primarily Pacific Avenue and 19th Street—while spending as little time as possible on busier pedestrian-oriented streets like Main Street and 21st Avenue. Driver-targeted wayfinding should be designed to this end. The City should consider installation of signs along these main routes that direct people toward the public lots, particularly those south of Pacific Avenue as these car trips don't impact the pedestrian-oriented area to the north of Pacific.
- For **pedestrians,** wayfinding should again focus on helping people find and identify lots, but should reinforce the walkability of downtown and generally try to encourage people to park once and walk to other destinations. An excellent example of a pedestrian-focused wayfinding sign is located just north of Pacific Avenue on the east side of Main Street, labeling streets, public parking and nearby destinations (although it is noted that Parking Lots #1 and #4 do not appear to be labeled on this sign, potentially causing confusion). This sign is pictured in Figure 24.

  The City should install this or similar signage in other locations downtown, ideally near parking lots and other key intersections. Additional information on these signs could include walking times to various parking lots and destinations. These could be supported with other smaller signs or pavement markings indicating directions and walking times to lots and destinations.

Figure 24: Pedestrian-oriented wayfinding sign in downtown Forest Grove

Permits and Policy Considerations

Several recommendations are offered below regarding parking management policy and time limits, aimed at supporting current management measures that were observed to work well and addressing observed inefficiencies that could be ameliorated through signage, permits, or other policy measures.

Employee Parking

Managing parking for employees of commercial businesses downtown is a key priority in downtown contexts, as stay times within parking stalls are generally long and employees often arrive at times where they have "first choice" of available parking. In Forest Grove, much employee demand appears to be organically absorbed by the Lot #2 as described previously. However there is some evidence of employee trips impacting the system, and as the Lot #2 nears capacity these impacts may increase absent mitigation.

The time limits in place limiting on-street parking to two hours are largely effective, but there are some stays of six or more hours observed which likely are due to employee demand. These impacts and other future impacts of employee parking could be minimized by ensuring that employees have safe, legal dedicated parking near to their destinations. This could be accomplished by officially designating Lot #2 as employee parking, potentially implementing a permit system if resources are available for administration. Other underutilized parking lots like those south of Pacific Avenue could also be designated for employee parking, in part or in full. It is noted that Lot #1 is ideally located and situated for

visitors and patrons, so it is not recommended that employees be encouraged or permitted to park in this lot.

Time Limits

By and large, the signed time limits downtown are appropriate given the nearby land uses and the way resulting parking utilization manifests. The two-hour limits throughout most on-street parking downtown, the four-hour limits adjacent to Pacific University, and the two-hour limits within Lots #4 and #5 all appear to be accommodating demand as intended.

Some gains in efficiency and functional capacity could likely be realized through the following changes to time limits:

Parking Lot #1 currently does not have time limits. It appears that at least some demand from this lot arises from employee parking. Given its central location and utility to visitors, particularly following the Festival Street redesign along 21st Avenue, the City should consider signing this lot with two hour time limits in tandem with other employee-focused measures described above to free this parking for visitors.

There are two 30-minute stalls along the East side of Council Street between 19th and Pacific Avenues that were observed to accommodate very little demand. 30-minute stalls are typically most useful in retail settings with locations attracting very quick trips, e.g., fast food, coffee shops, drycleaners. In areas closer to offices and more standard retail such as the area near these stalls, two-hour limits are more appropriate. These stalls would accommodate a wider range of demand with few negative impacts if converted to two-hour stalls.

Finally, if additional parking is striped in the future—potential examples identified above include 21st Avenue between A and B Streets and B Street between Pacific and 21st Avenues—these segments should likely be signed with appropriate time limits (e.g., two hours if the general downtown mix of land uses is driving demand).

It is noted that additional enforcement of time limits is not recommended at this time. Enforcement is a costly mitigation, and in areas where there is no fee for parking it is unlikely to bring in a corresponding amount of revenue. Further, the benefits of enforcement in downtown are likely to be marginal, as overstays were not observed to have a significant impact on the system. These long stays can be more effectively addressed through other measures recommended herein.

Long-Term Vision

The parking analyses presented herein show clearly that the system tends to be far busier during most periods in the part of downtown located north of Pacific Avenue than in the part located south of Pacific. This is likely due to a confluence of two factors:

1. The land uses that tend to attract high, shorter-term parking demand (food and drink, retail, entertainment) are much higher in intensity north of Pacific Avenue than south; and

2. Pacific Avenue itself handles a high volume of traffic and can be unpleasant or intimidating to cross at times, so it divides downtown to some degree.

These insights can provide context to the City's long-term planning efforts. The areas of downtown south of Pacific tend to have fewer active land uses and street-facing windows. This can make sidewalks feel narrow and degrade the walking environment generally; an example of this is the segment of Council Street approaching Pacific Avenue, pictured in Figure 25. Encouraging more street-facing activity in this area would improve the walking environment and help connect parking resources in this area to the busier parts of downtown in addition to generating new and healthy demand locally.

In tandem, the City should focus on maintaining walkability along and especially across Pacific Avenue. Two signalized crossings of Pacific are available in close proximity to one another at Main Street and College Way/Council Street. However these are the only signalized crossings downtown. The next crossing to the west is at B Street, more than 800 feet from Main Street and the next crossing to the east is at Cedar Street, more than 1,000 feet from College Way. As the downtown core grows it will likely be beneficial to install additional crossings.

In particular, the City should explore opportunities to upgrade the existing marked crosswalk at A Street. New activity from the *Jesse Quinn* and the westward growth of downtown generally has likely increased demand at this crosswalk, and engineering warrants for improvement may be met now or in the near future. Improving this crossing to a signalized or beaconized crossing would help connect parking resources and improve the walking environment generally.

Figure 25: Council Street approaching Pacific Avenue, where narrow sidewalks and few street-facing windows degrade the walking environment

Appendix A:
Hourly Occupancy Maps

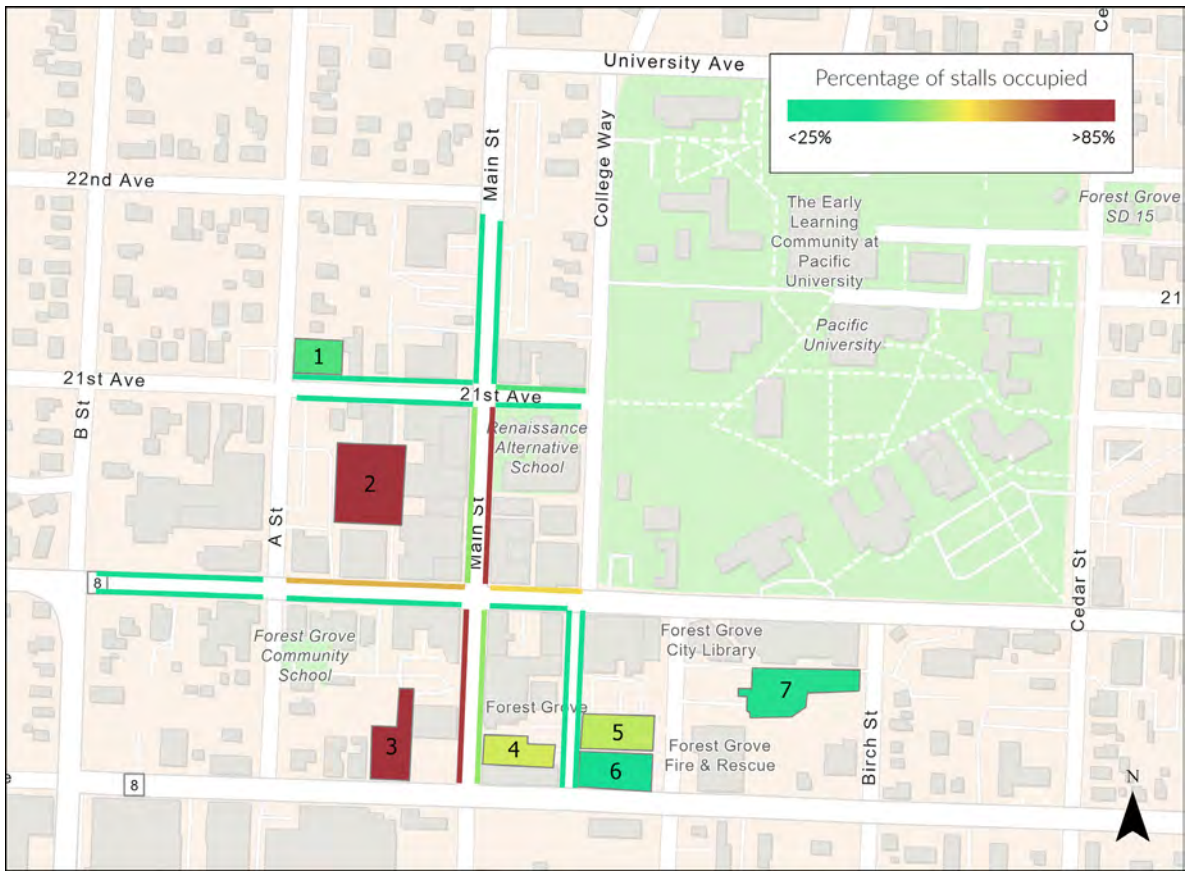


Figure A1: Occupancy map for 10am Tuesday February 8

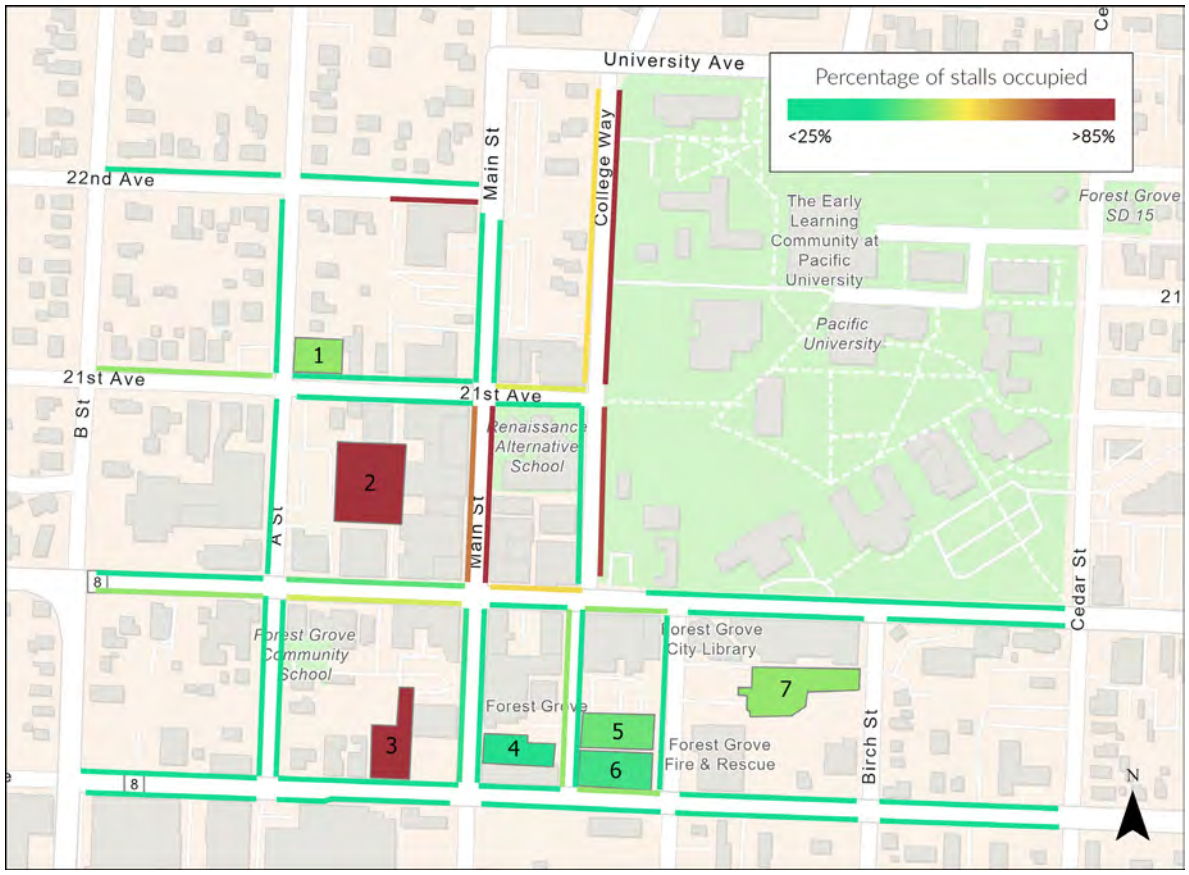


Figure A2: Occupancy map for 11am Tuesday February 8

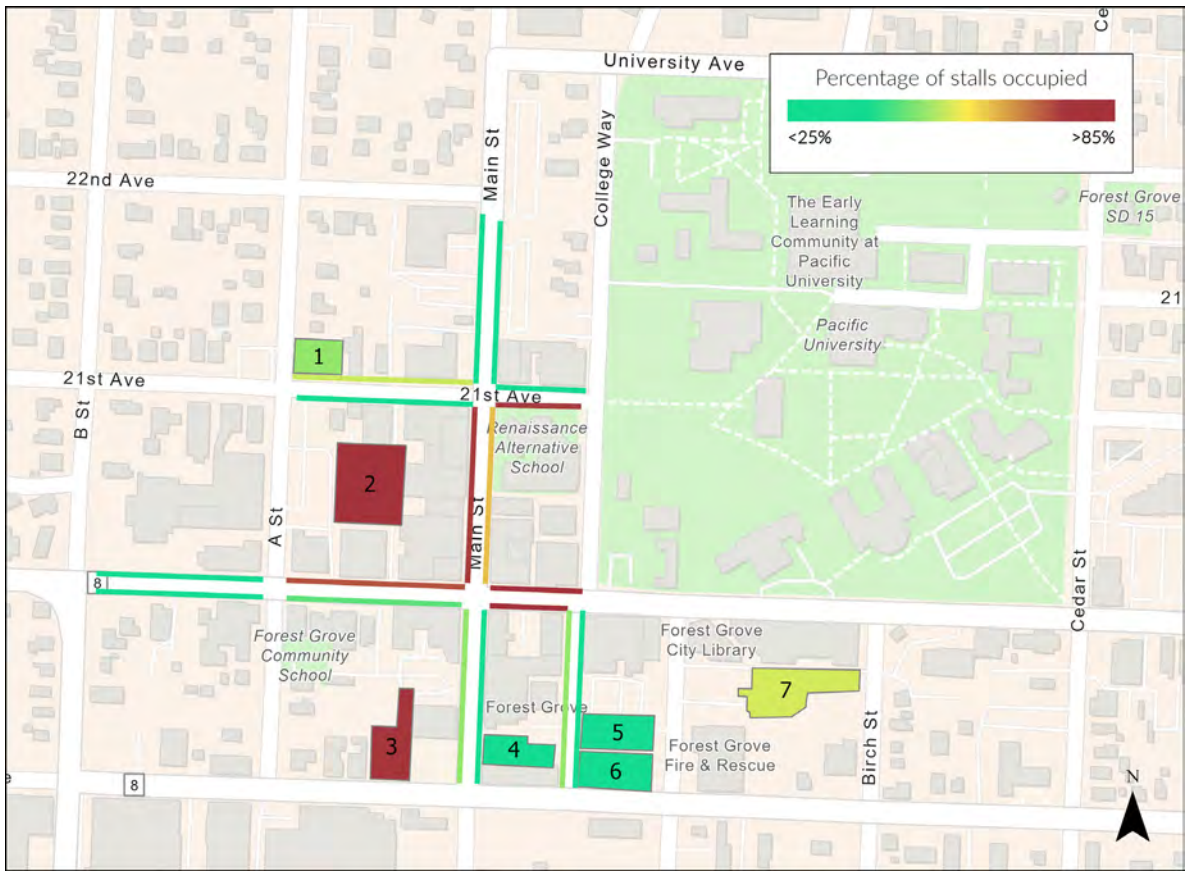


Figure A3: Occupancy map for 12pm Tuesday February 8

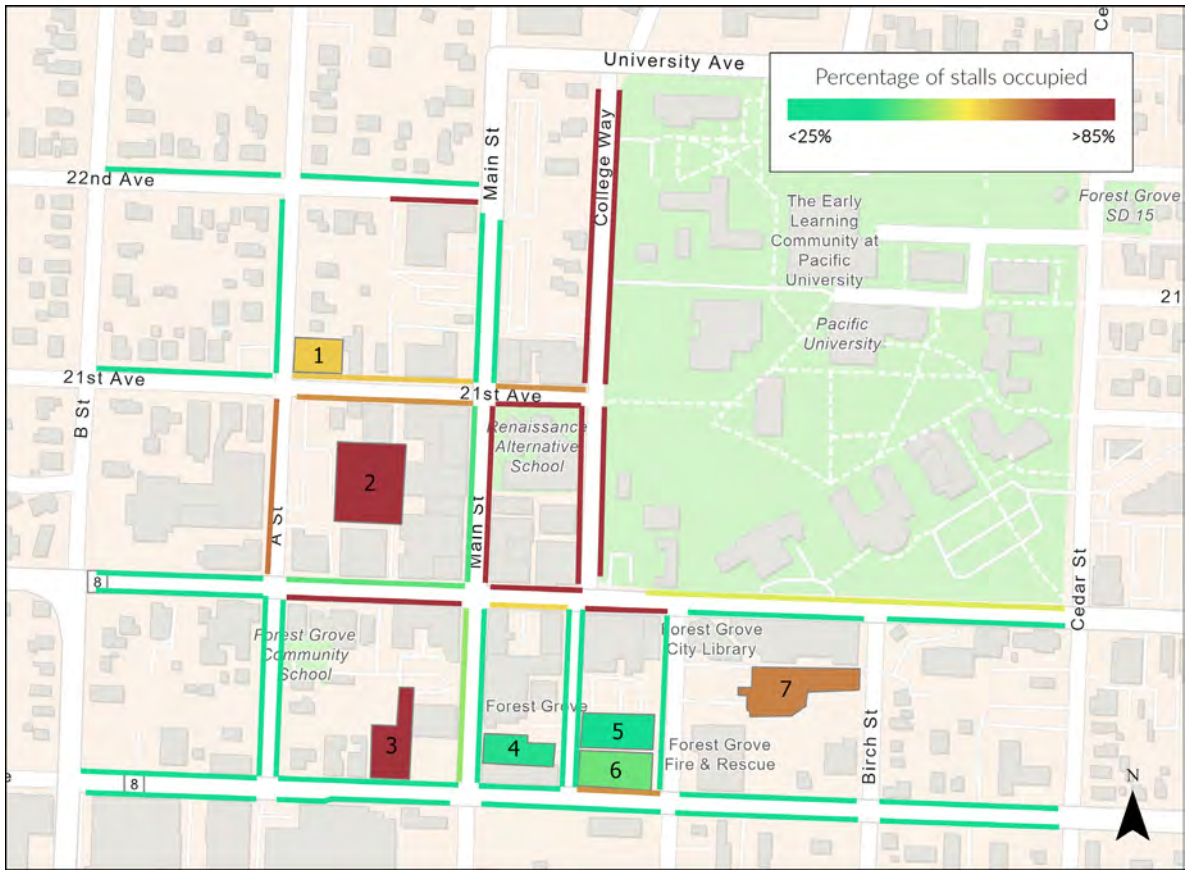


Figure A4: Occupancy map for 1pm Tuesday February 8

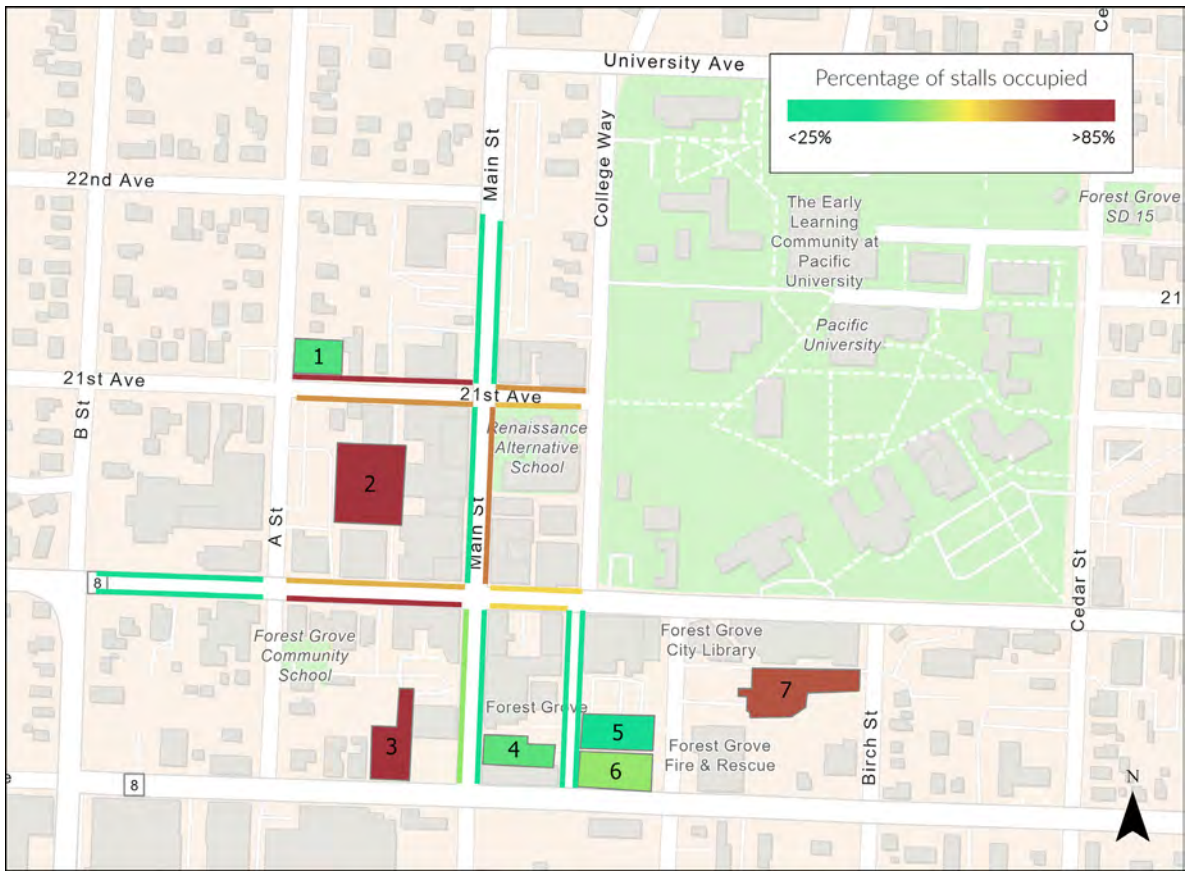


Figure A5: Occupancy map for 2pm Tuesday February 8

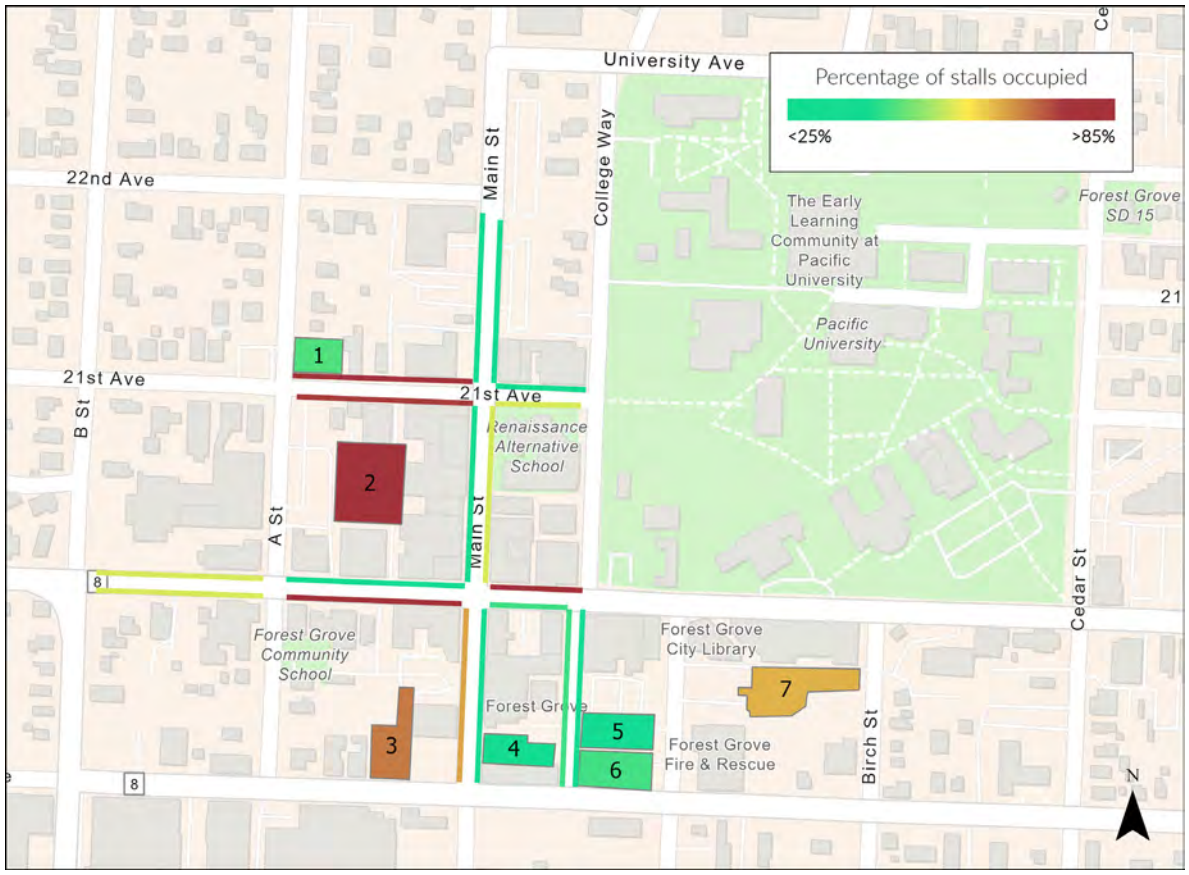


Figure A6: Occupancy map for 3pm Tuesday February 8

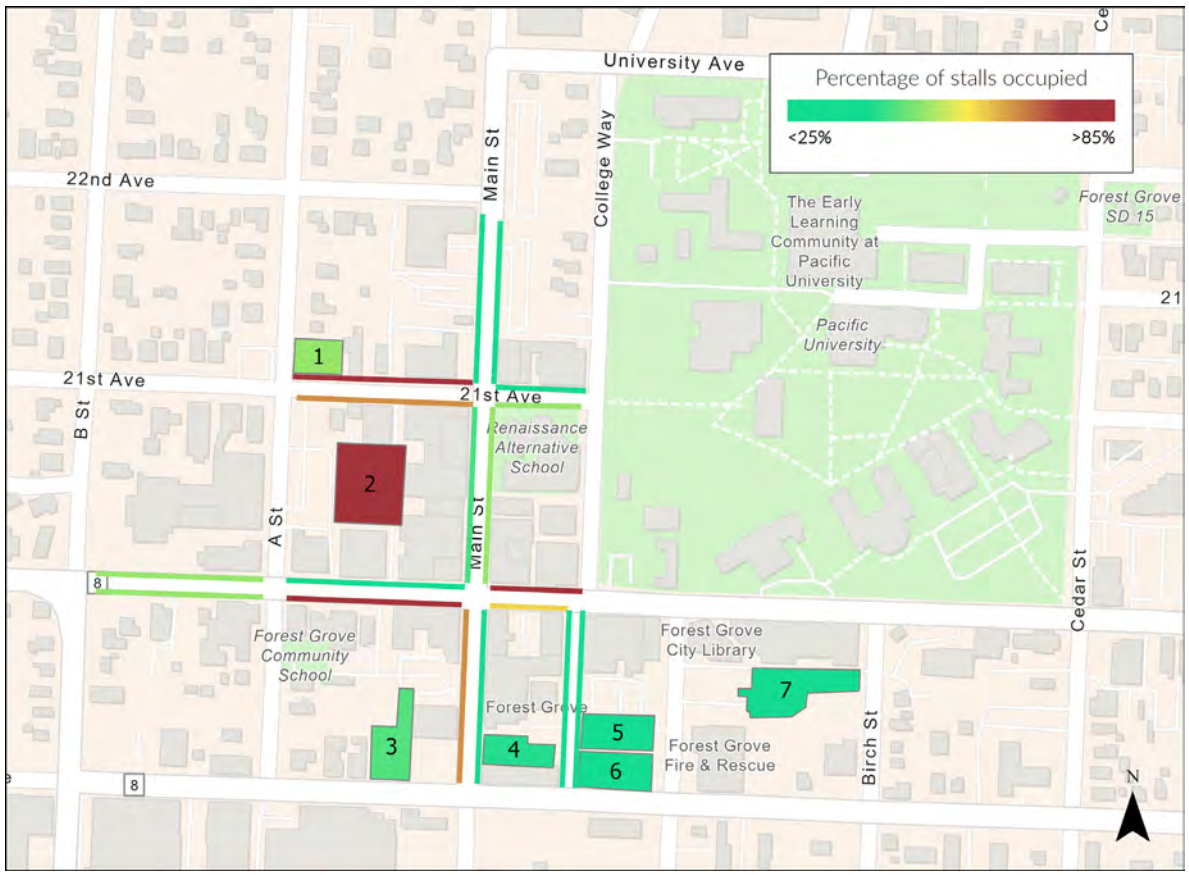


Figure A7: Occupancy map for 4pm Tuesday February 8

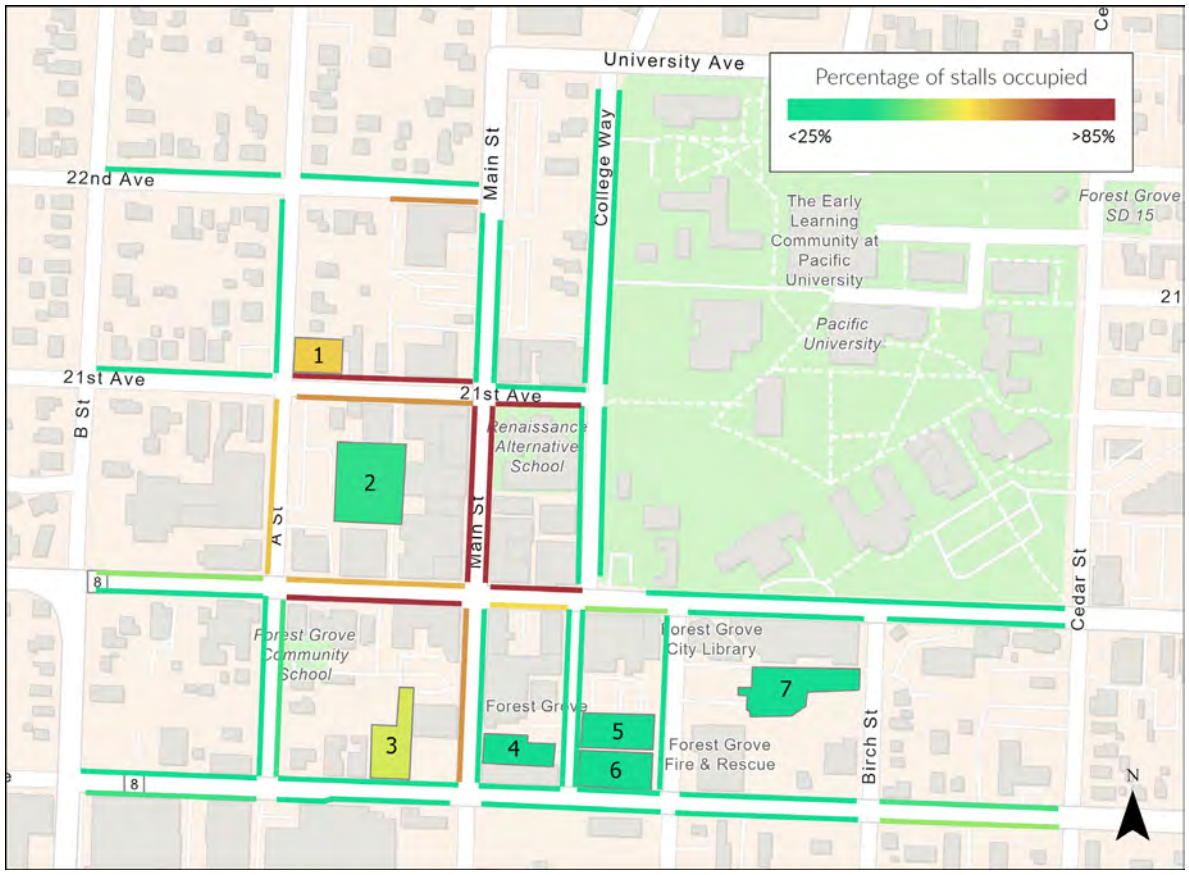


Figure A8: Occupancy map for 5pm Tuesday February 8

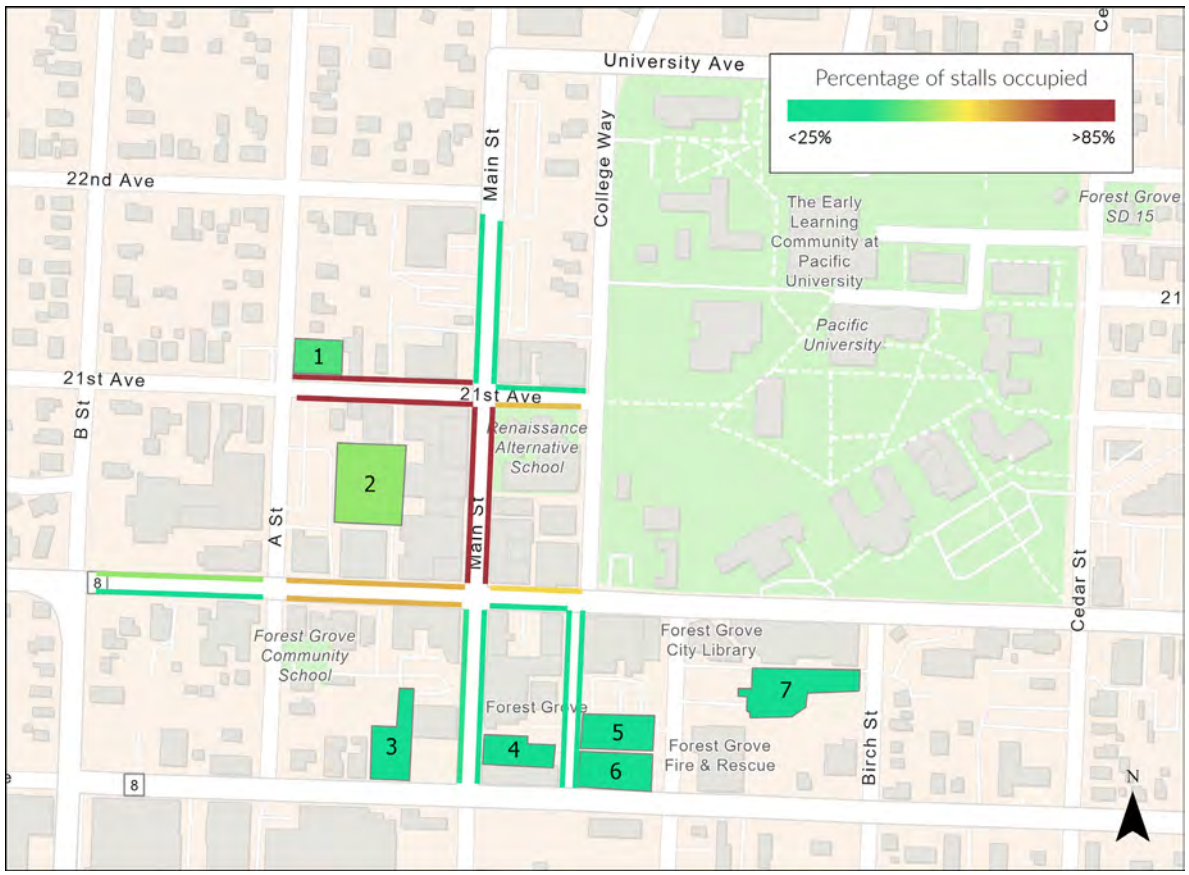


Figure A9: Occupancy map for 6pm Tuesday February 8

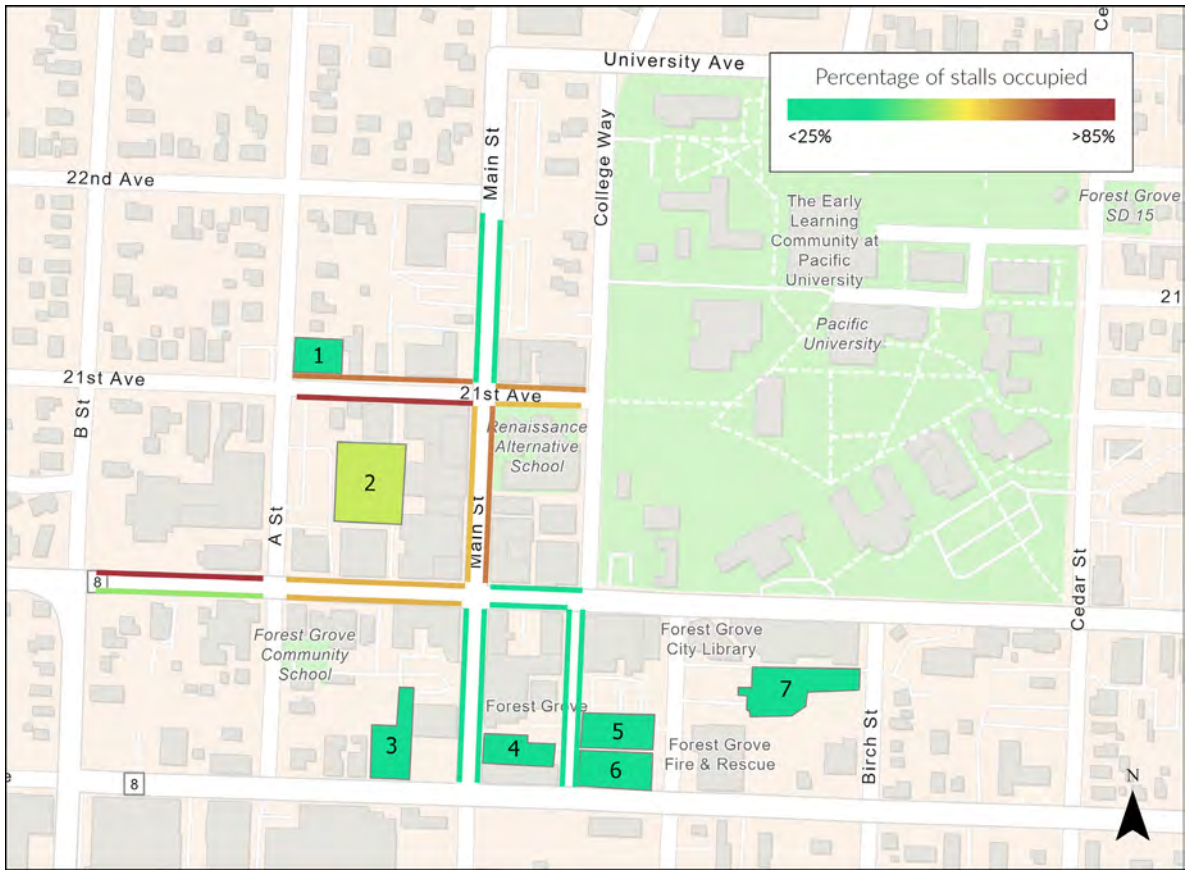


Figure A10: Occupancy map for 7pm Tuesday February 8

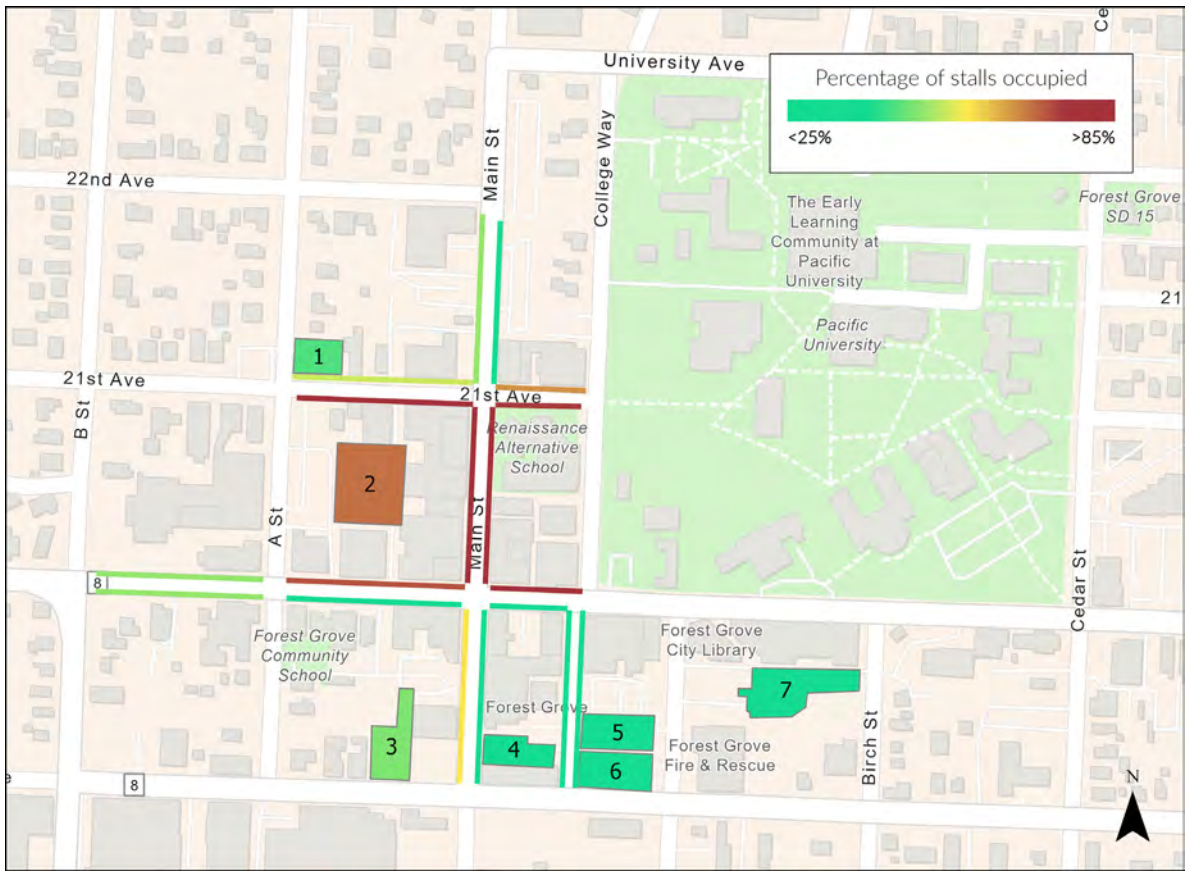


Figure A11: Occupancy map for 10am Saturday February 5

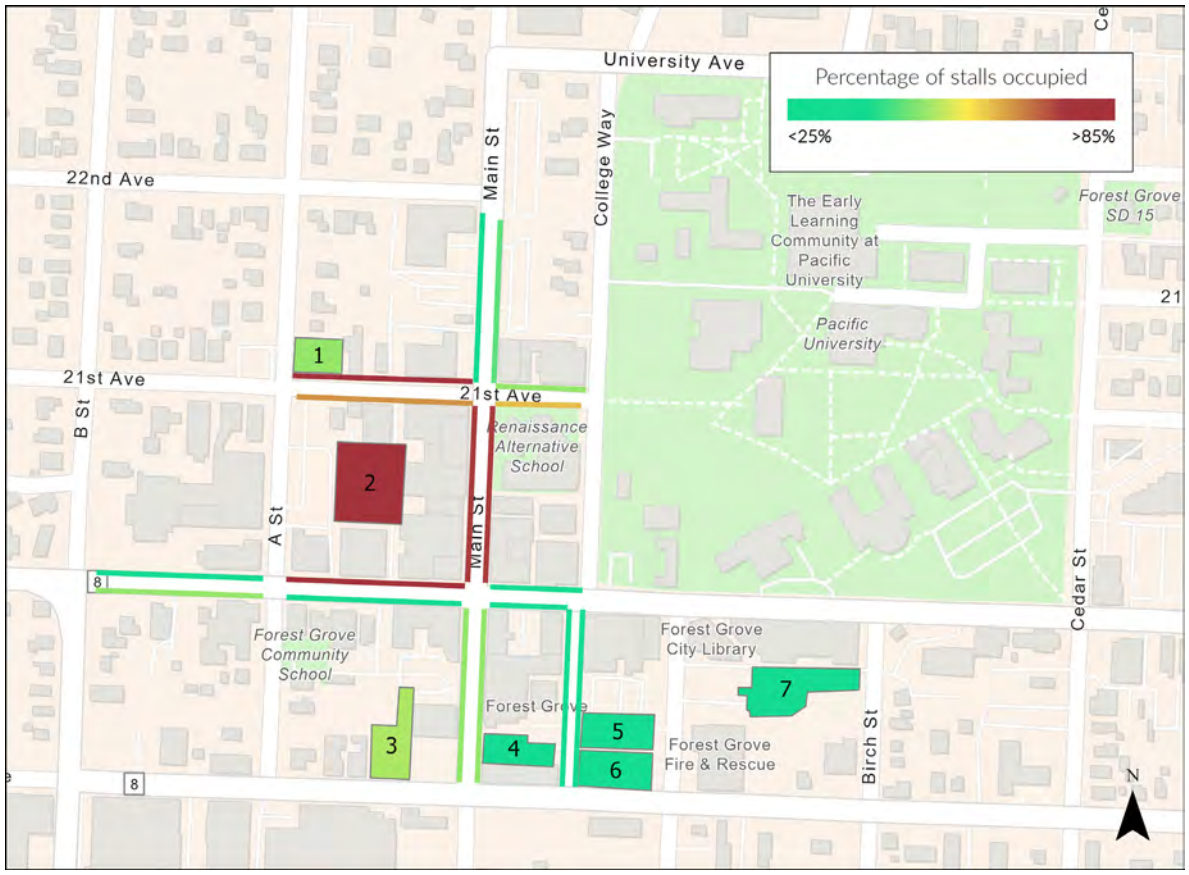


Figure A12: Occupancy map for 11am Saturday February 5

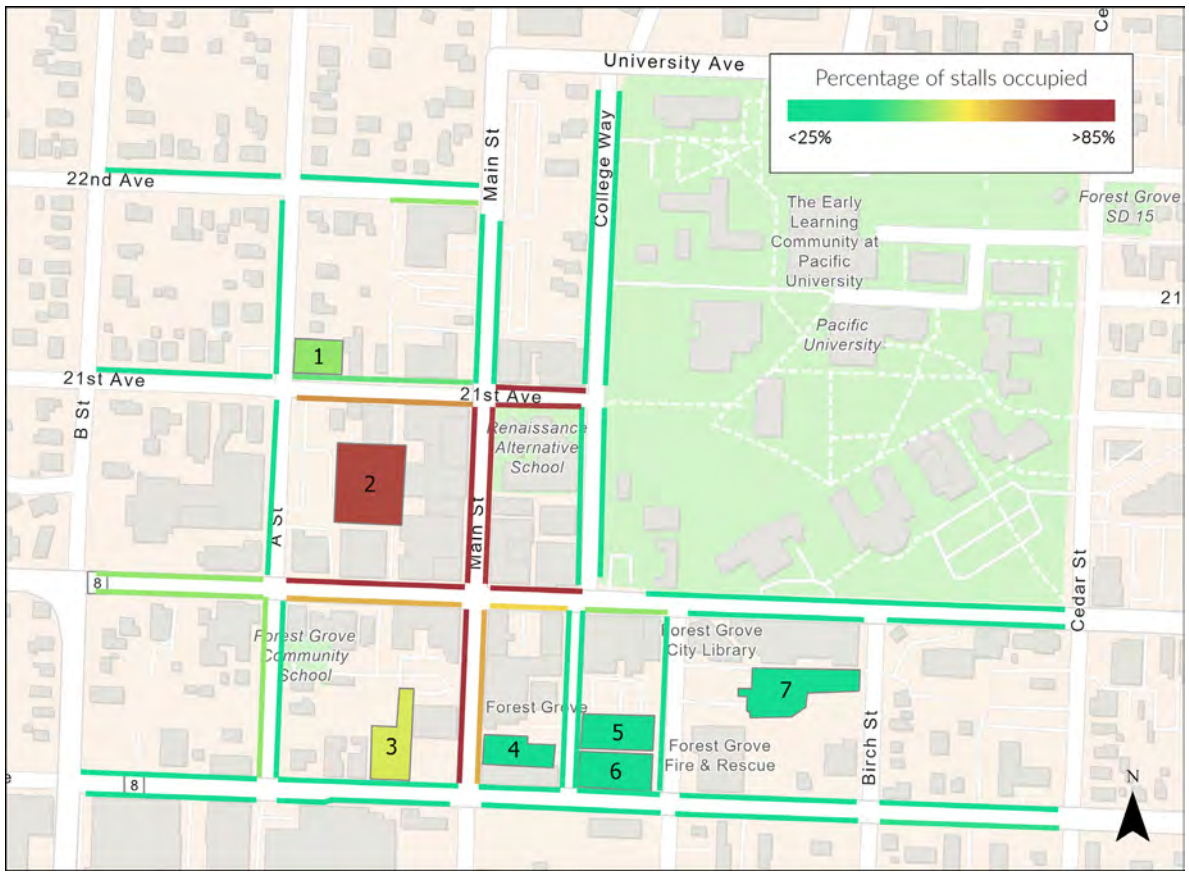


Figure A13: Occupancy map for 12pm Saturday February 5

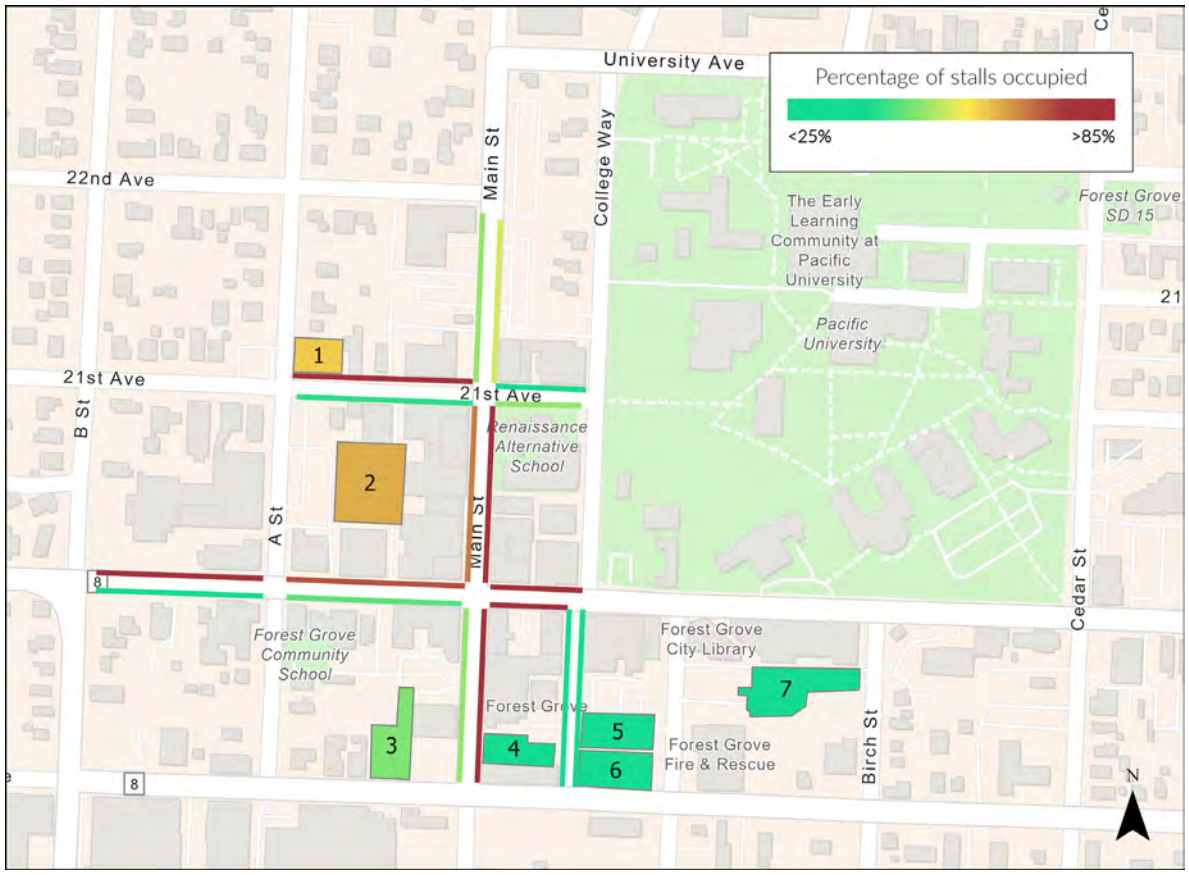


Figure A14: Occupancy map for 1pm Saturday February 5

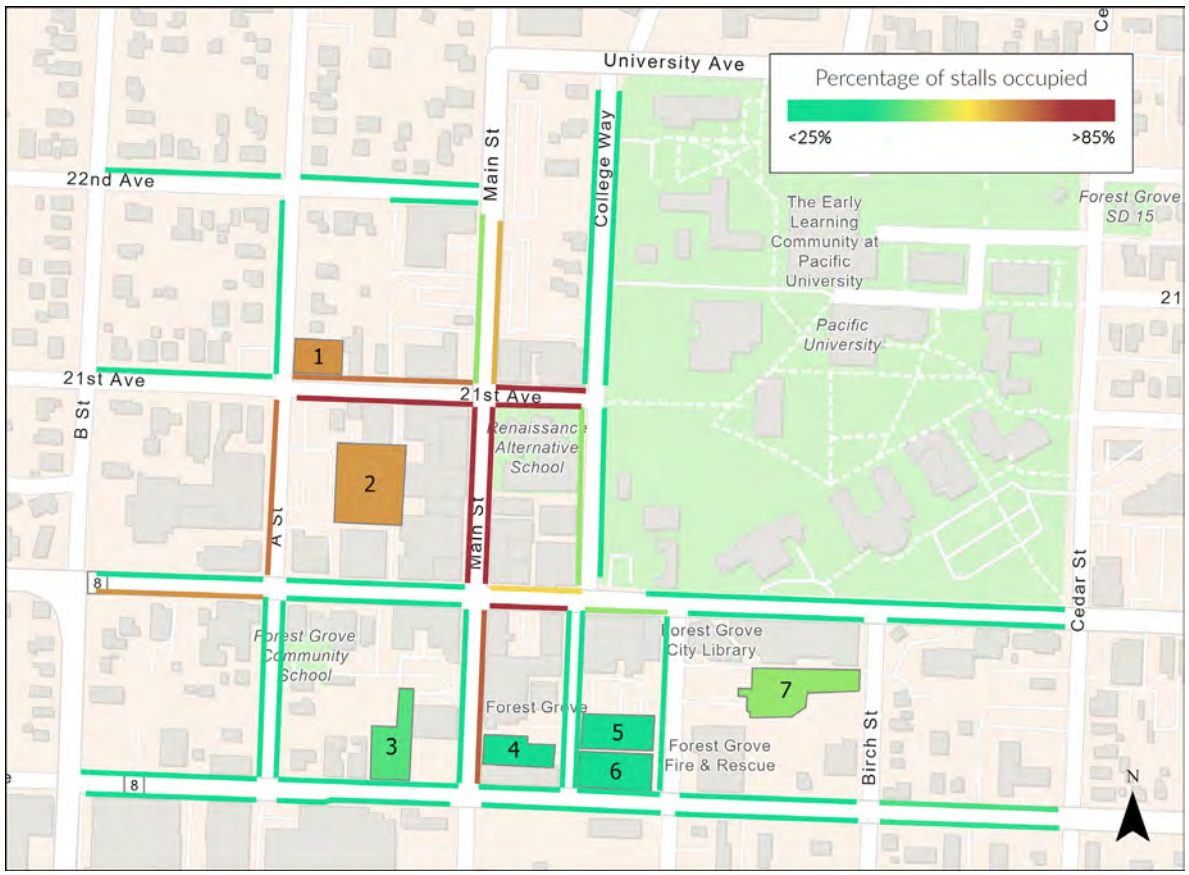


Figure A15: Occupancy map for 2pm Saturday February 5

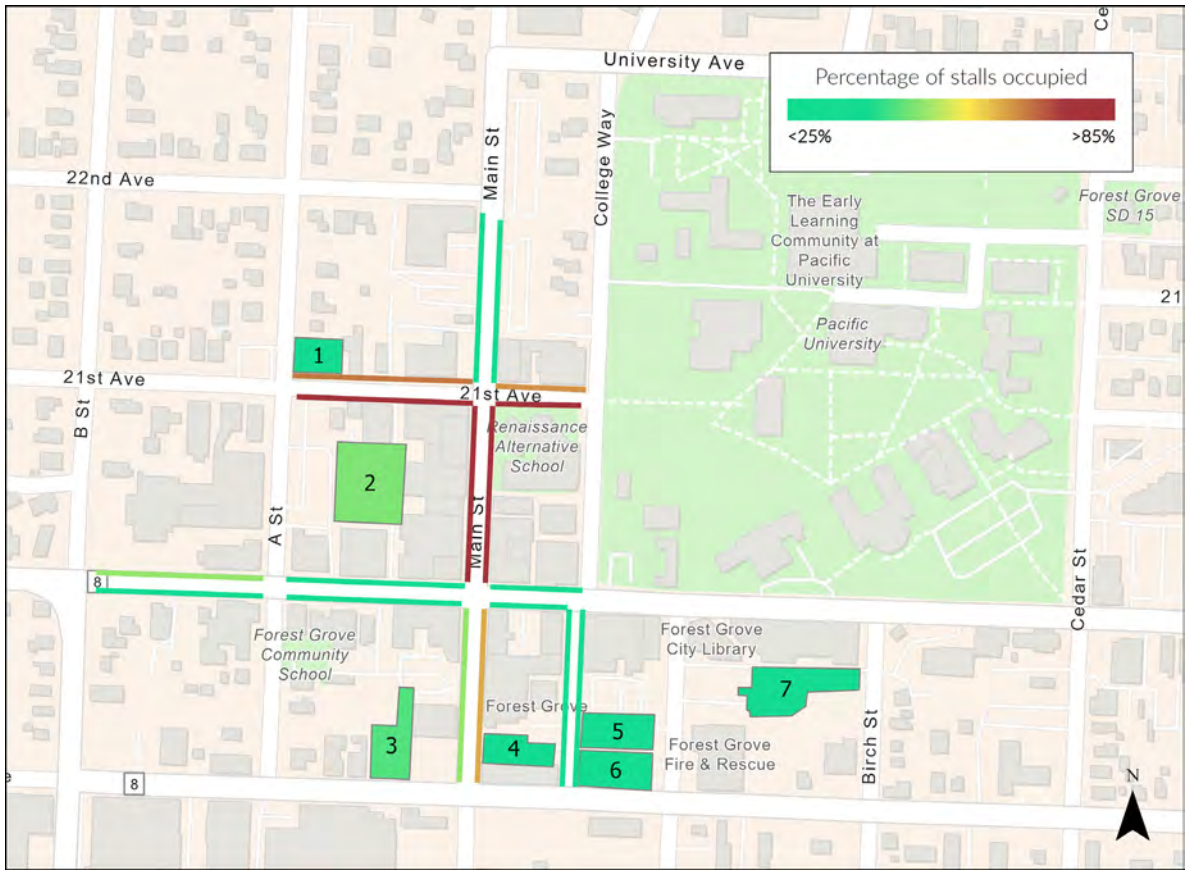


Figure A16: Occupancy map for 3pm Saturday February 5

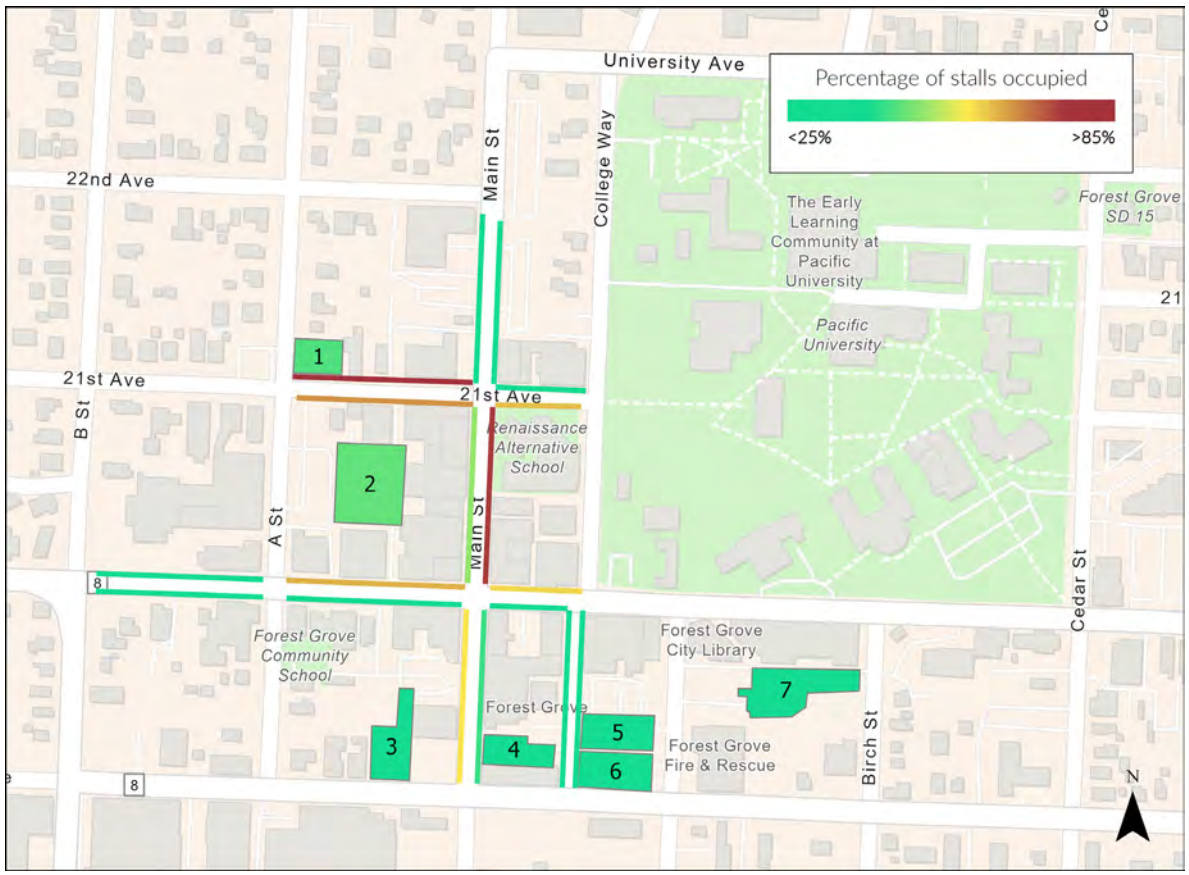


Figure A17: Occupancy map for 4pm Saturday February 5

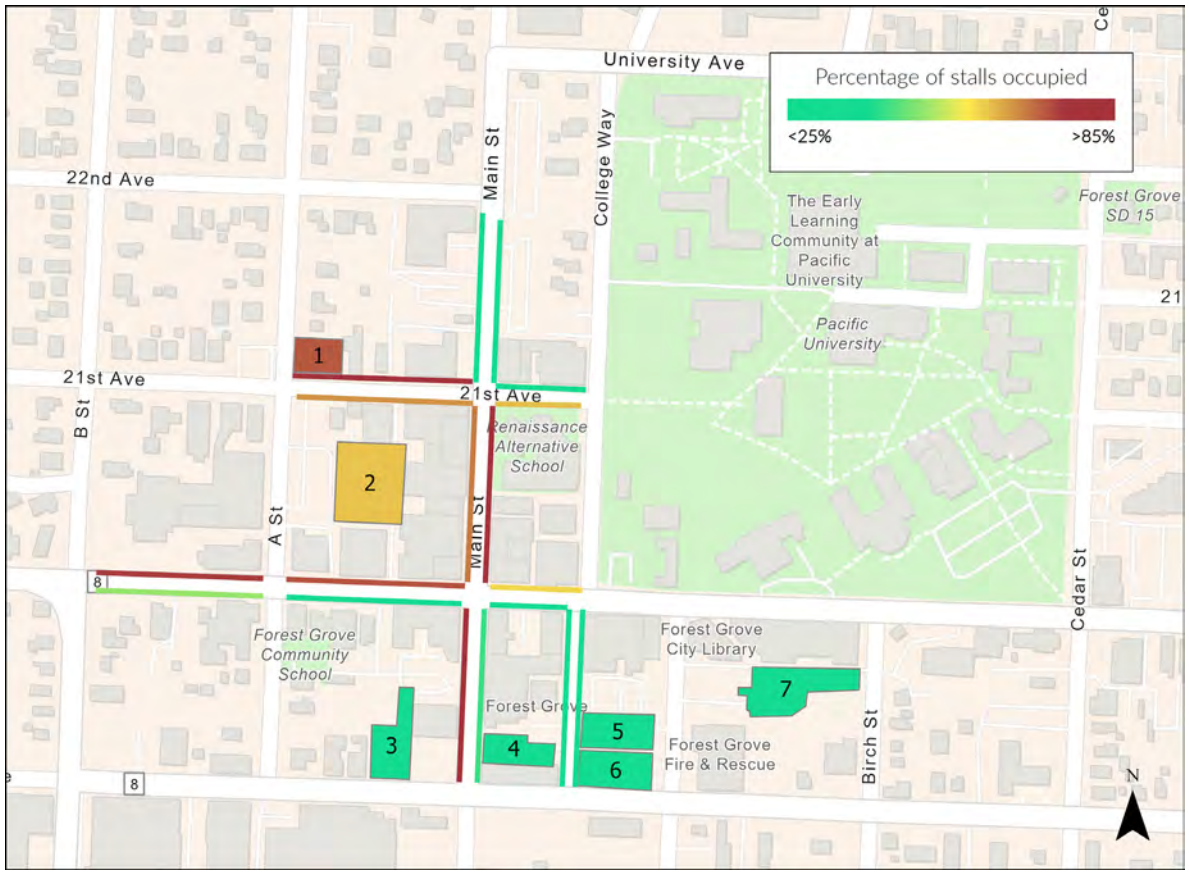


Figure A18: Occupancy map for 5pm Saturday February 5

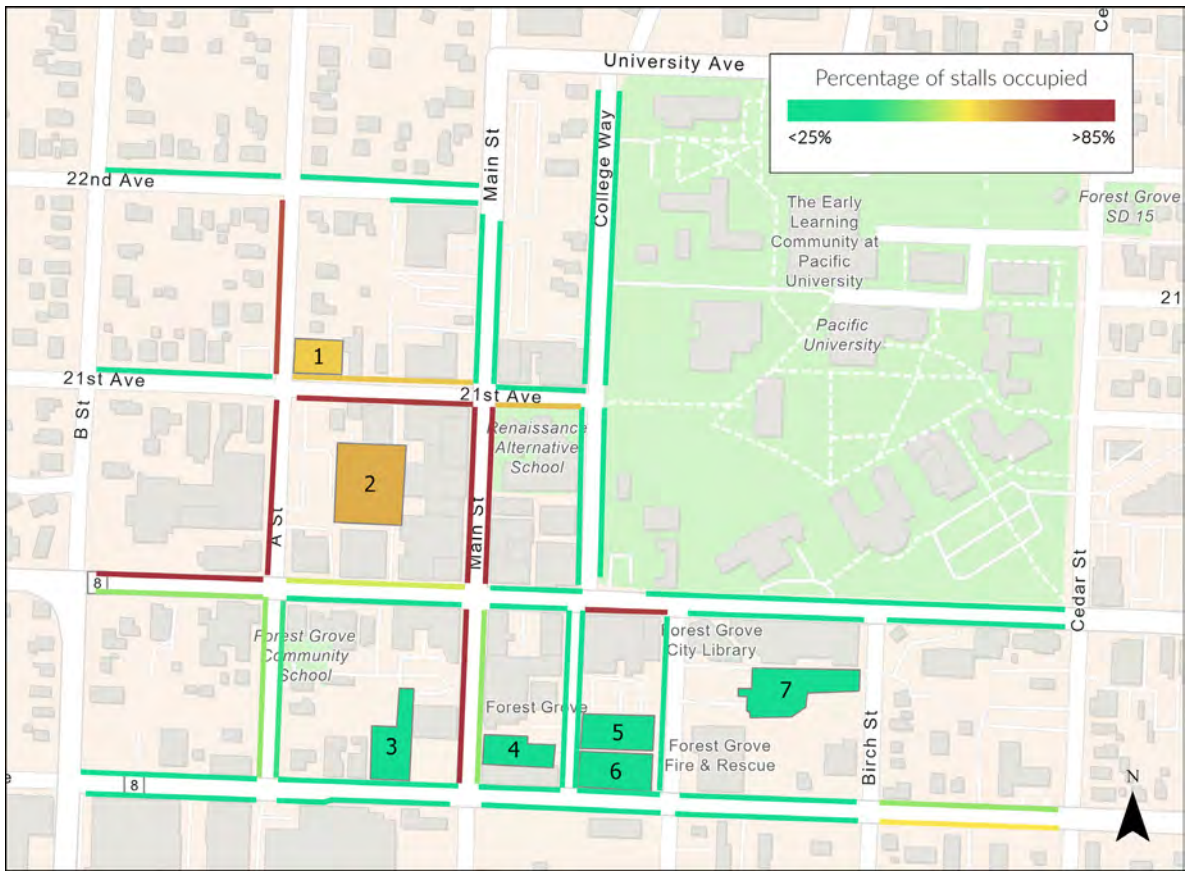


Figure A19: Occupancy map for 6pm Tuesday February 8

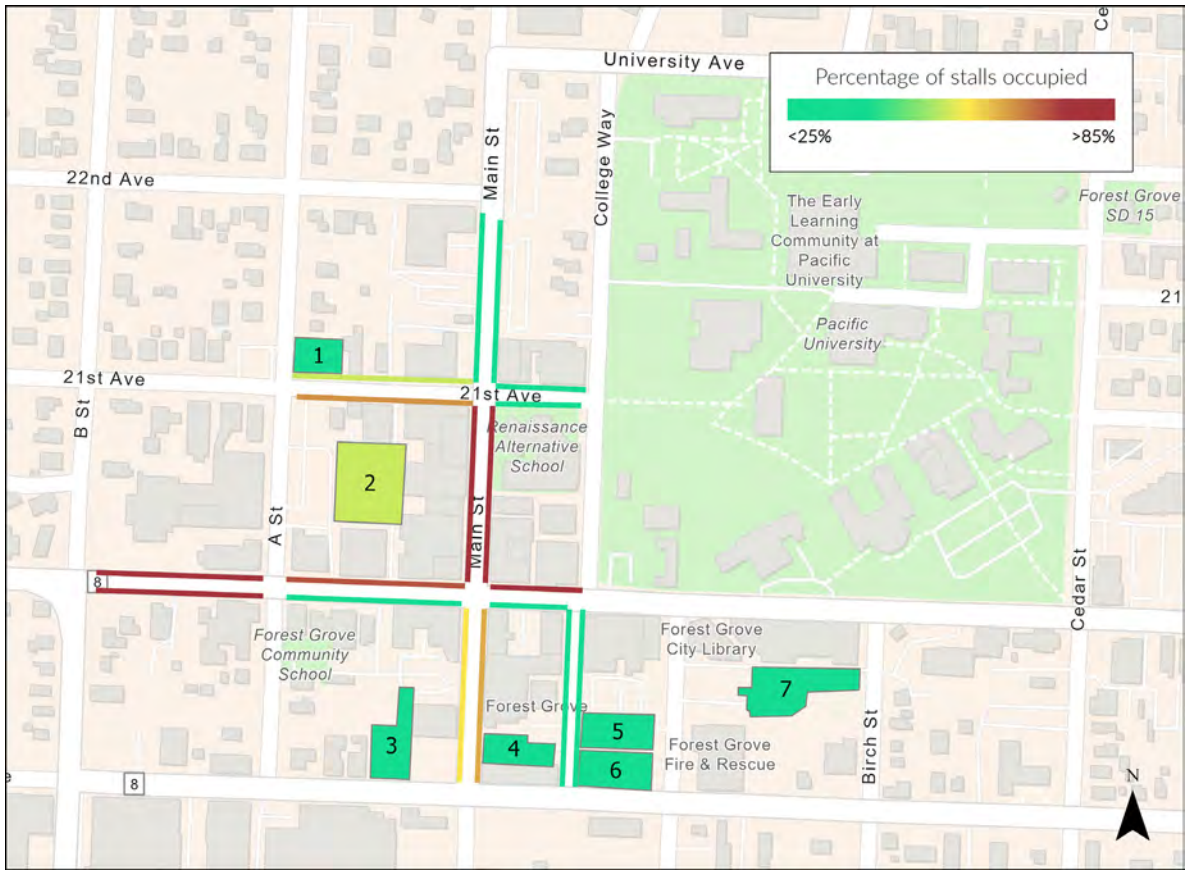


Figure A20: Occupancy map for 7pm Tuesday February 8

Appendix B:
Festival Street Outreach Sheet

21st Avenue Festival Street: Parking Management Plan

Summary:

A Festival Street is proposed for 21st Avenue, which would feature numerous elements to enhance the vibrancy of the street and create a destination for events and activities. The proposed redesign reduces the on-street parking supply by four stalls.

Concurrently, the City is developing a comprehensive parking management plan for the downtown core. A key element of this plan is to identify and address any potential impacts from the Festival Street.

Fig 1.Public Lot at 21st & A

Current Parking Conditions:

Figures 3 and 4 below show the hourly parking demand for on-street parking along the proposed Festival Street on a recent Saturday and Tuesday. For most of the day, there is ample parking supply along 21st Avenue to accommodate observed demand. It is noted that even during the busiest periods (dinnertime/early evening on weekdays and midday on weekends), five or more vacant stalls were observed along 21st Avenue.

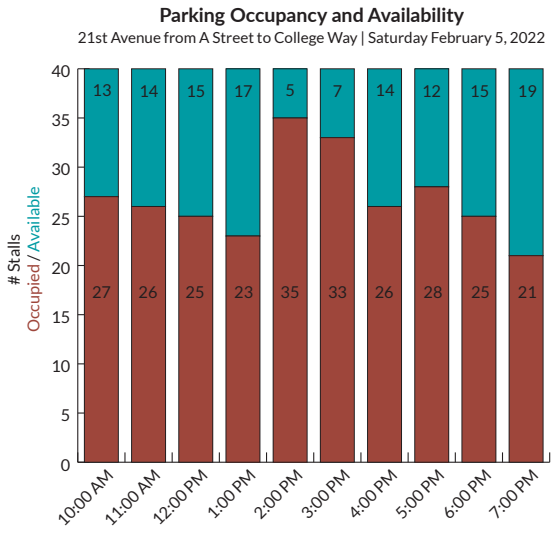
While parking is somewhat tight during these peak periods throughout downtown, there are numerous empty stalls, particularly within the public parking lots like the lot at the western end of the Festival Street pictured in Figure 1. Thus even without mitigations, typical demand can be met with available supply within one block of the Festival Street.

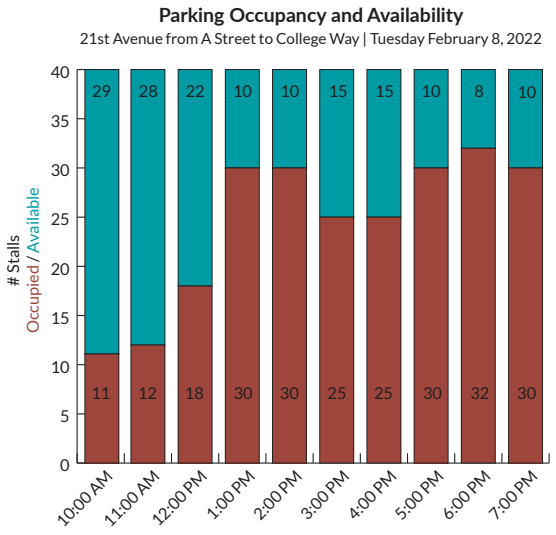
Fig 2.Proposed new striping on Main

Mitigations:

While parking supply in the downtown area was found to be sufficient to accommodate typical demand as-is, several measures are proposed to ensure continued ease-of-access and to accommodate demand from busier-than-average days and events. A key measure will be adding striping for 19 total stalls—an increase of 16 from the three striped currently—to the segment of Main Street north of 21st Avenue. This proposal is shown in Figure 2.

Striping to provide five additional stalls within a block of the 21st Avenue is also proposed, with four stalls to be installed along the North Side of Pacific Avenue between Main and A Streets and one along College Way between Pacific and 21st. Additional wayfinding and other elements to increase utilization of the public lots are also proposed, and several elements to manage parking around events will be included in the final plan.





Figs 3 & 4.Parking demand patterns observed during a typical Saturday (left) and Tuesday (right)

Appendix C:
2019 Analysis

Technical Memorandum

LANCASTER ENGINEERING

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To: Dan Riordan, City of Forest Grove

From: Brian Davis, Jessica Hijar, & Gregory Mallon

Date: November 13, 2019

Subject: Forest Grove Parking Study Preliminary Analysis

Overview

In order to gain an understanding of parking operations within downtown Forest Grove, a detailed study of parking supply, demand, and utilization patterns was conducted. The primary study days were Saturday, August 17th, 2019 and Thursday, August 22nd, 2019. These days were selected to provide a picture of parking demand during a typical weekday, and a busy weekend which featured an event downtown (the *Forest Grove UnCorked* festival). The results of this analysis will inform management recommendations as this plan evolves, and can be used to project potential revenues and maintenance needs.

Study Area and Methodology

The study area entails the downtown area of Forest Grove, which includes 48 block faces and 7 public parking lots. The study area is bounded by A street to the west, 19th Avenue to the south, Cedar Street to the east, and University Avenue to the north. A variety of land uses are present in this area, including residential, retail, restaurant, office, and school. To evaluate how parking usage varies between the different contexts, the study area was initially divided into four subareas:

City Center: The City Center subarea encompasses Main Street, 21st Avenue, and Pacific Avenue which front many different types of retail and restaurant uses. Because of the central location and the mix of nearby land uses, it is expected that this subarea will generally be the busiest and may also display the most complex demand patterns. The subarea consists of 18 block faces.

Northwest: The Northwest subarea is comprised of block-faces along 21st Avenue, 22nd Avenue, and A Street. Land uses within this subarea are primarily residential in nature, and it is expected that residential uses drive parking demand within the subarea. The subarea consists of 10 block faces, with four blocks designated as no parking.

Northeast: The Northeast subarea is comprised of 8 block-faces along College Way and Pacific Avenue, including two long "superblock" faces, directly in front of Pacific University. While these blocks do not encompass all available parking for Pacific University, it is assumed that demand for these blocks is generally driven by the University.

South: The South subarea encompasses 14 block-faces along 19th Avenue, Ash Street, and A Street. There are a number of uses within the subarea including retail uses, the police department, fire department, and some city offices and other employment uses. The mix of uses is somewhat similar to the City Center subarea, albeit with employment uses expected to generate more of the demand observed within the subarea than within the City Center subarea.

The study area and districts are shown in Figure 1; the data collection methodologies of each study area are described in the following section.

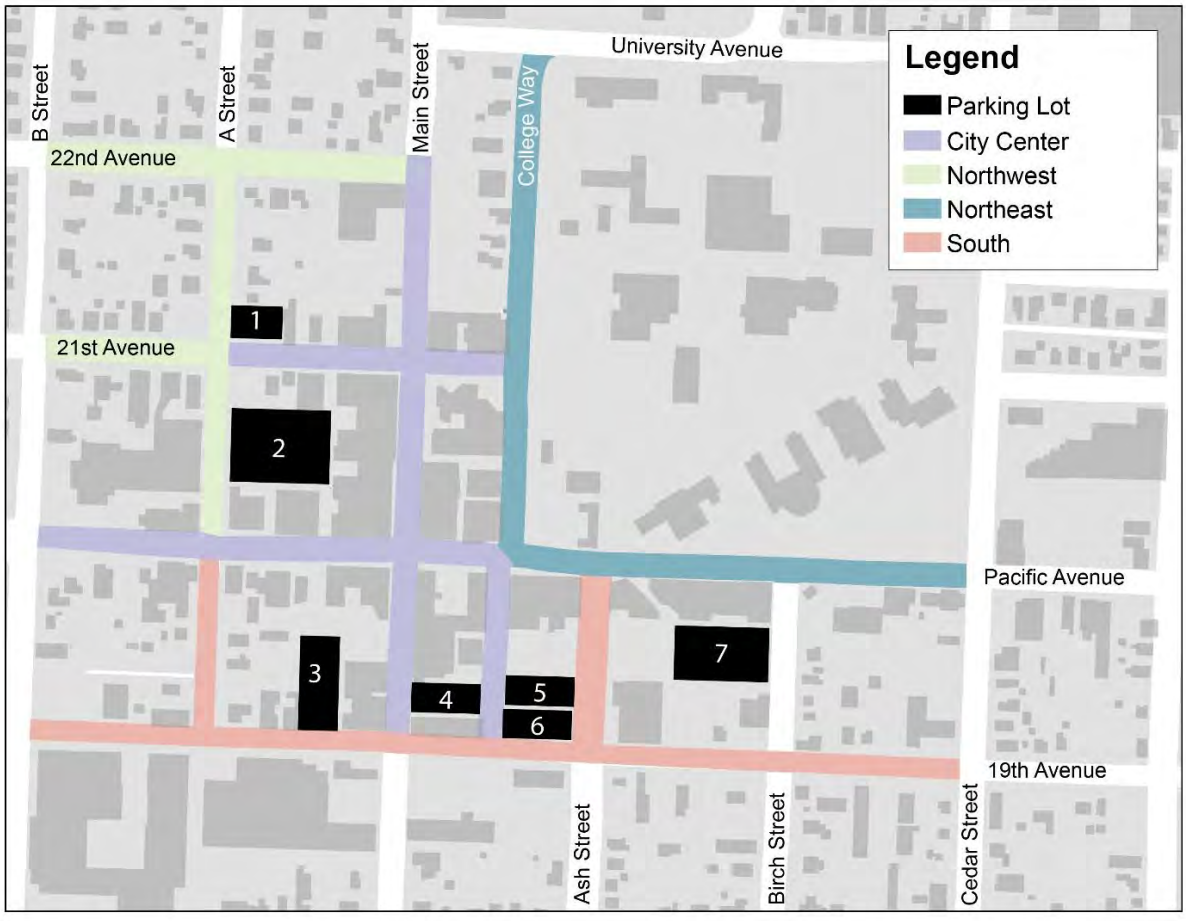

Figure 1: Forest Grove Downtown Parking Study Area

Parking Supply Inventory

The methodology employed for this analysis consisted of two steps: an inventory of parking supply, including the number and types of stalls, followed by occupancy and demand observations intended to identify the peak demand periods as well as less busy times.

To complete the first step, an inventory of the supply of parking stalls was conducted, tracking the number and location of parking spaces along each block face in the study area, as well as designated users, maximum time stays, and other pertinent information as possible. Locations and capacities of parking lots were recorded. The inventory was conducted utilizing a tablet PC. The data collected in this step were used to set up data collection tools in the form of spreadsheets, to be used during the parking demand data collection.

The study area includes the following types of parking stalls:

- **2-Hour:** Spaces that allow for time stays up to two hours between 8:00 am to 5:00 pm.
- **4-Hour:** Spaces that allow for time stays up to four hours and residential permit zone.
- **Unregulated:** Spaces that have no restrictions on the amount of time a vehicle stays
- **Disabled:** Spaces reserved for use by those displaying a disabled placard, license plate, or other legal permit
- **Electric Vehicle:** Spaces that have charging stations for electric vehicles
- **School Parking:** Spaces that are reserved for school/university traffic during certain times of the day
- **Unregulated:** Stalls that do not have time limits or use restrictions. Like the 3-hour stalls, these stalls were re-signed as 2-hour stalls after data collection occurred.

The breakdown of parking stall types within the study area is shown in Table 1.

Table 1: Study Area Parking Stall Breakdown

Parking Stall Location	Timed Stalls	ADA Stalls	EV Stalls	School Stalls	Unregulated Stalls	Total
On-Street	450	3	4	0	118	575
Parking Lot	57	12	4	7	122	202
Total	629	15	8	7	240	777

Demand Observations

Following the inventory step, parking demand data were collected. Two data collection routes were established that encompass all four study areas and seven public parking lots. Since detailed information is required for the City Center subarea in order to calculate the number of unique vehicles and percent overstays, all blocks within the City Center subarea were included in one route. Route 1 consists of all 18 block faces located in the City Center subarea and five public parking lots. The length of Route 1 measured approximately one and a half miles. The length and configuration of this route was designed such that the data collector was able to walk and collect data over the entire route once per hour without needing to work excessively quick. Each parking space within the study area was thus visited once per hour during the study periods.

The second route included all remaining block faces in the Northwest, Northeast, and South subareas and two public parking lots. Route 2 consists of approximately 28 block faces and two public parking lots. The length of Route 2 measured approximately three miles. The length and configuration of this route was designed such that the data collector was able to walk and collect data at times corresponding to the peak hours for the specific land uses in each subarea. The subareas are defined in Figure 1 on page 2; Figure 2 on the following page shows Route 1 highlighted in red and Route 2 highlighted in blue.

The data for both routes were collected on tablet PCs utilizing the route-optimized spreadsheets created during the inventory phase. For Route 1, the first four digits of the license plate of each vehicle parked in a stall along the route were recorded each hour to allow for analysis of both occupancy and duration of stay. For Route 2, the number of vehicles parked in each stall were recorded to allow for analysis of percent occupancy.

It is noted that the 3-hour stalls and unregulated stalls that were re-signed following data collection were analyzed based on how they were regulated when data collection occurred. For example, a stay length of between two and three hours within a 3-hour stall would *not* be recorded as an "overstay" since it was compliant with regulations that were in place when data were collected.

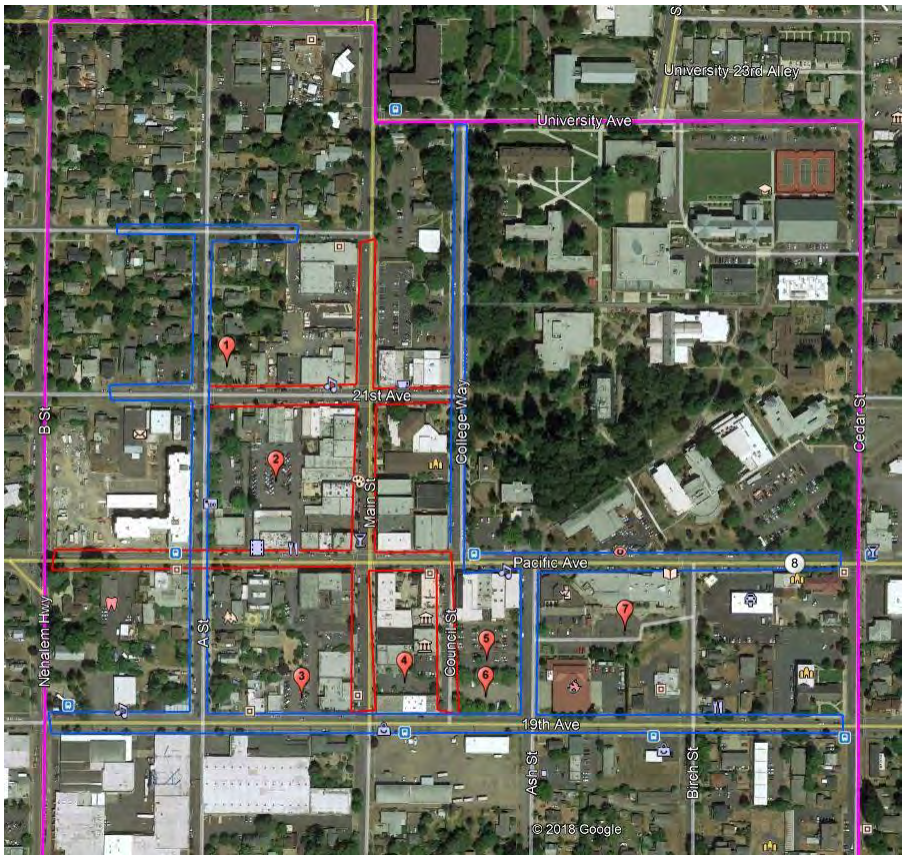

Figure 2: Data Collection Routes

Metrics

The key metrics employed in this analysis are described below:

- **Stalls** indicate number of parking spaces available on a block face, in a lot, or within a subarea. Most of the parking stalls within the study area were marked; however, where stalls were unmarked, an average stall length of 22 feet was assumed.

- **Occupancy** is a measure of how much of the parking supply of a given area is utilized, expressed as a percentage of the total parking supply. For on-street parking, parking is considered "functionally full" when occupancy levels exceed 85%; this is often indicative of a need for a change in management. The term 'peak hour' is used in this report to indicate the hour of the day when occupancy was observed to be the highest. The timing of the peak hour and the occupancy level

during the peak hour relative to other times of the day reveal important information about drivers of demand.

- **Duration of stay** (or stay length) is the length of time that a particular vehicle was observed to occupy a particular parking space. Stay lengths of more than three to four hours likely indicate residential or commuter demand, while shorter stay lengths are likely to indicate demand for retail, restaurant, entertainment, or commercial uses. Since each parking space was observed once every hour, this measure has some level of uncertainty for shorter stays.

- **Unique vehicles served** refers to the number of different vehicles (based on the recorded license plate numbers) observed on a per-stall basis. This metric complements duration of stay in providing an understanding of the turnover of parking stalls. Along commercial corridors, it is desirable for parking to serve as many unique vehicles as is practical, as it indicates a high turnover of customers. A parking stall serving fewer than three unique vehicles over the study day is likely serving residential demand or a lower demand area, while three or more unique vehicles served is more likely indicative of a parking space serving commercial uses or a mix of uses. Since data were collected once per hour, the number of unique vehicles served reported therein is likely lower than the actual number of unique vehicles that utilize stalls with short time limits.

- **Percentage of overstays** is reported for stalls that have a signed maximum stay length, and refers to the percentage of vehicle that were observed to exceed the time limit. High percentage of overstays could indicate that time limits are not adequate to serve demand; conversely, they could also represent the need for more robust enforcement. As with other turnover metric, the percentage of overstays reported herein are affected by the one-hour resolution of data, and thus entail uncertainty for spaces with time limits of one hour or less.

Demand Observations and Analysis

Overall Study Area Demand: Saturday, August 17th

Data were collected between 12:00 pm and 9:00 pm on Saturday, August 17th, 2019. A graph showing the Saturday hourly percent occupancy for the entire study area is shown in Figure 3. It should be noted that while data for the City Center route were collected hourly, the times shown in the graph represent the times at which data are available for all blocks and lots within the study area.

As described previously, data collection occurred during the annual *Forest Grove UnCorked* beer and wine festival. While it is expected that this leads to demand patterns busier than a non-event Saturday, events of this sort are relatively common in downtown Forest Grove throughout the summer months and thus these results can lend insights around managing parking for events as well as typical weekend demand patterns.

It is noted that the block of Main Street between Pacific Avenue and 21st Avenue was closed to car traffic for the event; parking along this stretch was unavailable and is thus not included as available supply within the analysis that follows.

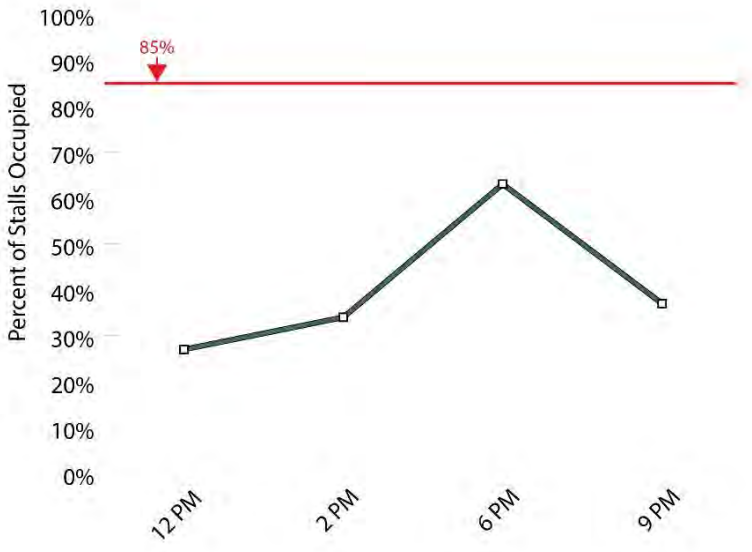

Figure 3: Saturday Percent Occupancy (Entire Study Area)

Data indicate that the peak hour for parking demand occurred at 6:00 pm. A map showing the percent occupancy of each on-street parking block and parking lot during the peak hour for Saturday is shown in Figure 4.

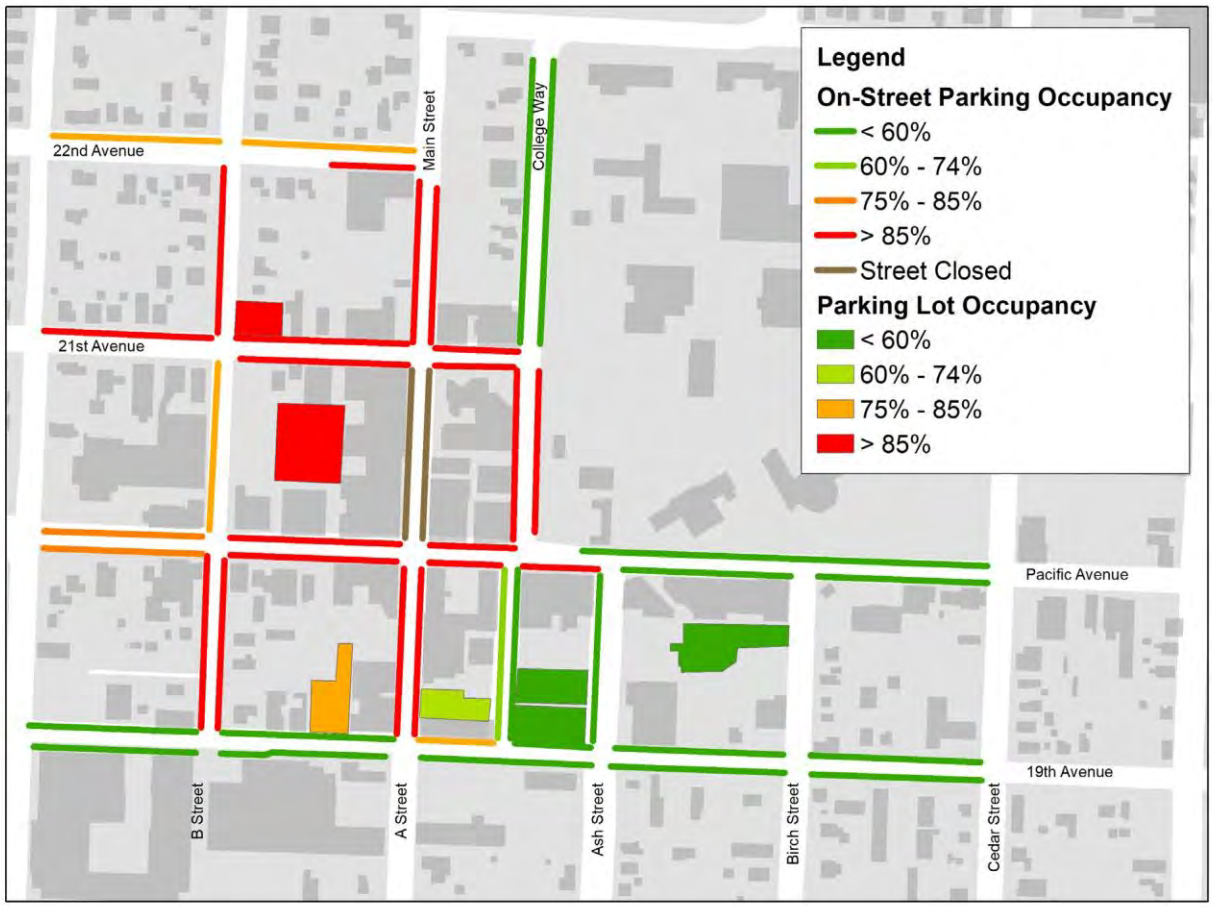

Figure 4: Saturday Peak Hour - 6:00 pm

Key Observations

- In aggregate, parking demand within downtown Forest Grove was observed to vary between about 30% and 70% over the course of the day. This indicates that there is generally enough parking supply within downtown to accommodate all current demand. However, localized shortages of parking were observed in the central parts of the study area nearest the event.

- On this day, the 11th annual Uncorked festival occurred in downtown Forest Grove, which closed two block faces of parking on Main Street. Since two blocks within the study area were closed, the parking supply for this day is lower than on Thursday.

- From the demand patterns, it is evident that the event was a key driver of demand during the study day. The observed peak hour for the study area in aggregate occurred at 6:00 pm, when a combination of festival demand and other activities within downtown including restaurant and retail uses combine. This is most noticeable within the central parts of the study area. However, there is reasonably light demand from the employment and institutional uses on the outskirts of the study area at this time, so overall demand within the study area is within reasonable levels.

- As shown in Figure 4, 20 block faces within the study area are shown to exceed 85 percent occupancy during the peak hour. These block faces are largely contiguous and lie toward the center of the study area. Similarly, the two most centrally located parking lots were observed to be full to near capacity during this peak period while the less central parking lots had remaining capacity.

City Center (Saturday)

Data were collected hourly between 12:00 pm and 9:00 pm for each parking stall. A graph showing the Saturday hourly percent occupancy for the City Center is shown in Figure 5.

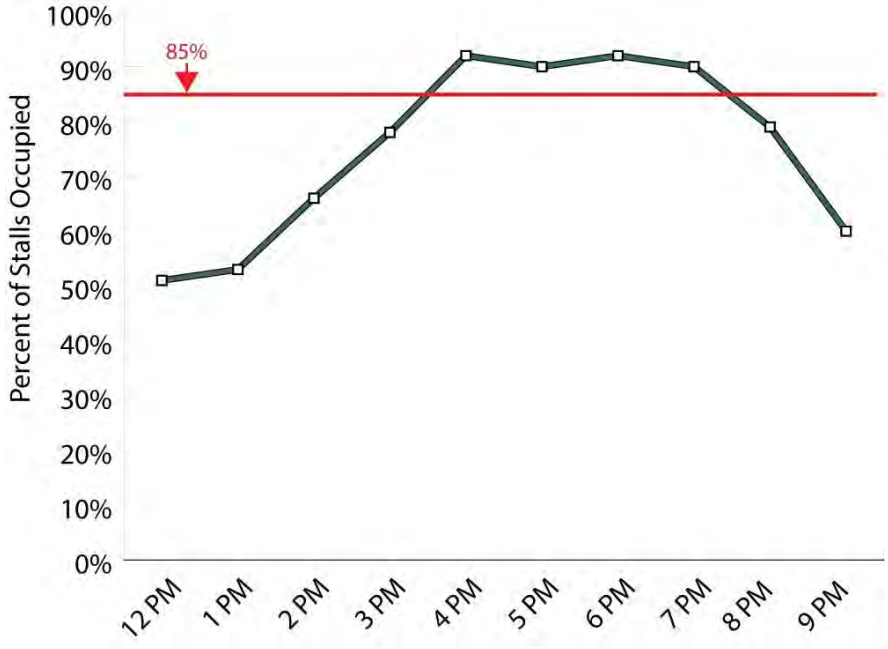

Figure 5: Saturday City Center Subarea Percent Occupancy

The data collected in the City Center subarea show more specific data regarding parking turnover. Three metrics were calculated from the hourly recorded data. Duration of vehicle stay, the number of unique vehicles, and the percentage of overstays provide information to analyze how the existing parking is functioning. A summary of these values is shown in Table 2.

Table 2: City Center Timed Stall Data Summary (Saturday)

Total Vehicles Served	Total Vehicles Exceeding Time Limit	Percent Overstay	Average Time Stay by Stall	Unique Vehicles
412	136	33%	2 hours 57 minutes	2.3 vehicles

Key Observations

- The peak demand hours for the City Center subarea were 4:00 pm and 6:00 pm. During these hours, 92% of available on-street parking was occupied. Demand was consistently high from the 4:00 pm through 7:00 pm hours, with occupancy rates above 90% for the entire period. This demand is largely driven by the event, which was open to the public between 4:00 pm and 9:00 pm.

- Average time stays were observed to be 2 hours 57 minutes over the course of the study day. Most parking within this subarea is signed as 2 hour parking; accordingly, 33% of vehicles were observed to stay longer than the signed time limits. Each stall served an average of 2.3 vehicles over the course of the study day. These metrics indicate somewhat limited turnover relative to the high demand within the subarea.

- The event closed two blockfaces that include on-street parking: both sides of Main Street between Pacific Avenue and 21st Avenue. These parking spaces were unavailable for the duration of the study day, as vendors began setting up before the study commenced at noon. It was observed that several parking stalls along 21st Avenue, Pacific Avenue, and Council Street served vehicles belonging to festival vendors. In tandem with other event traffic, it is anticipated that this observation date had a lower number of unique vehicles served and a higher percent overstays than a typical Saturday. This is a potential explanation for the relatively high stay times and percentage of vehicles exceeding the time limit for each stall, and the relatively low number of unique vehicles per stall. This is not necessarily indicative of inadequate time limits since this is most likely due to the parking demand of the special event.

Northwest Subarea (Saturday)

A graph showing the Saturday percent occupancy for the Northwest study area is shown in Figure 6.

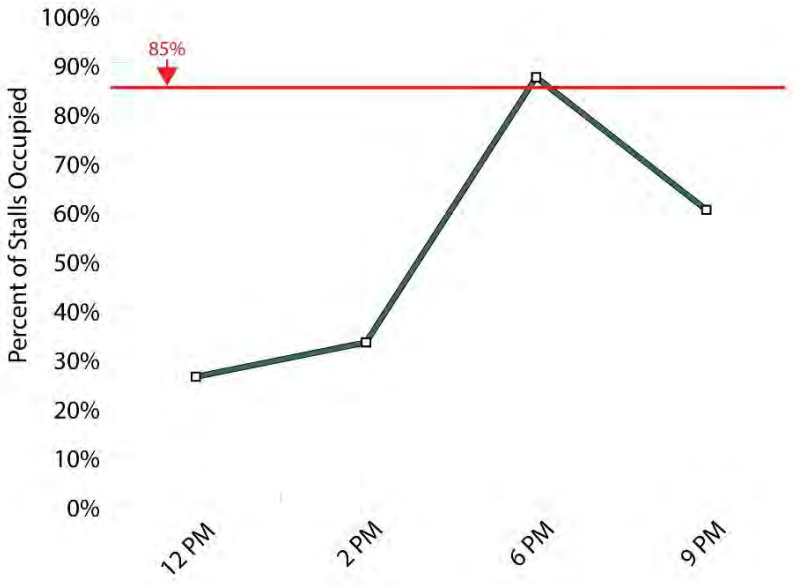

Figure 6: Saturday Northwest Subarea Percent Occupancy

Key Observations

- The peak hour this subarea occurred at 6:00 pm with 87 percent occupancy. During other observation periods, particularly those occurring before the start of the event, occupancy is much lower. This is likely indicative of event demand driving parking demand within this subarea. Based upon the proximity of the on-street parking in this subarea to the event site, it is likely that this parking fills from event traffic, or potentially other downtown uses, before the public lots south of Pacific Avenue and on-street parking in other subareas.

Northeast Subarea (Saturday)

A graph showing the Saturday percent occupancy in the Northeast subarea is shown in Figure 7.

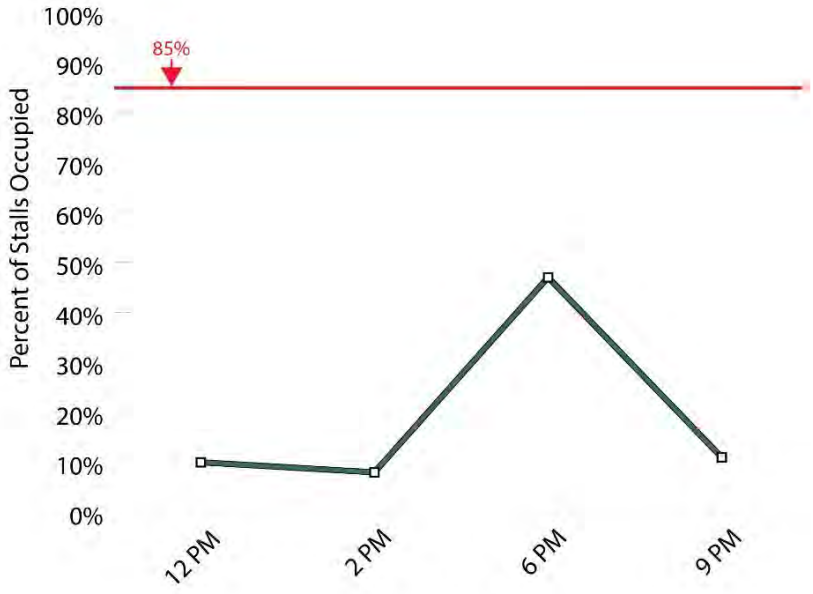

Figure 7: Saturday Northeast Subarea Percent Occupancy

Key Observations

- The peak for this subarea was at 6:00 pm with 47 percent occupancy. Like the northwest subarea, it is likely that this spike in demand is due to the event, as closer on-street parking was largely occupied during this observation period. Because relatively little activity was occurring at Pacific University during the study day, demand overall is relatively low, particularly for spaces father away from Main Street and the event site.

South Subarea (Saturday)

A graph showing the Saturday percent occupancy in the South subarea is shown in Figure 8.

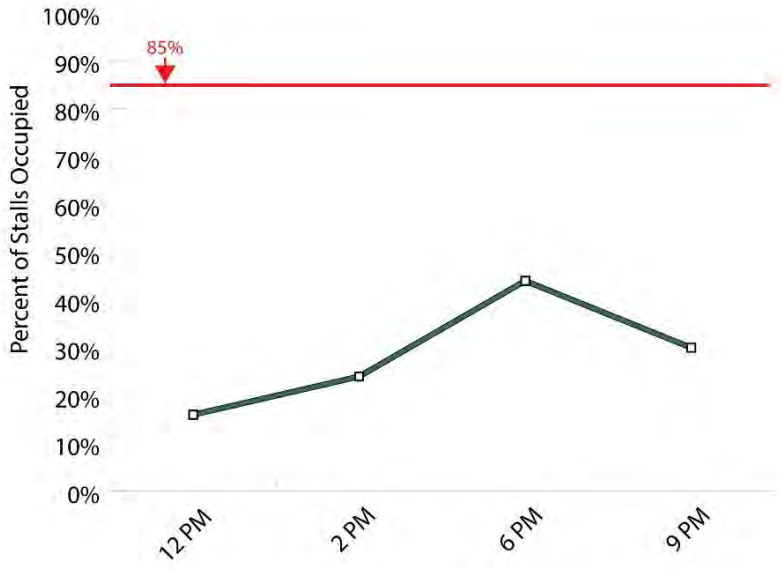

Figure 8: Saturday South Subarea Percent Occupancy

Key Observations

- The peak for this subarea was at 6:00 pm with 44 percent occupancy. The spike in demand during the peak hour is likely due to the event and other demand for downtown uses, however it is less pronounced than the spike in other outlying subareas. This is likely because other subareas include parking that is more convenient to the event, and there are few significant generators in this subarea during Saturdays.

Thursday, August 22nd

Data were collected between 10:00 am and 7:00 pm on Thursday August 22nd, 2019. A graph showing the Thursday hourly percent occupancy for the entire study area is shown in Figure 9. Again, the times shown in the graph represent the times at which data are available for all blocks and lots within the study area.

The data collected here was intended to lend insights around parking demand on a typical weekday, although it is relatively common to have special events or other non-recurring factors influence parking demand during weekdays. In this case, though classes were not yet in session at Pacific University during data collection, the study day occurred on the day of an all-day orientation for new students at the University. It is noted that this was also the first day for students to move into on-campus housing at the University. Thus, some demand from the school is captured within the analysis, although it may or may not be as intense as normal demand from the school when classes are in session.

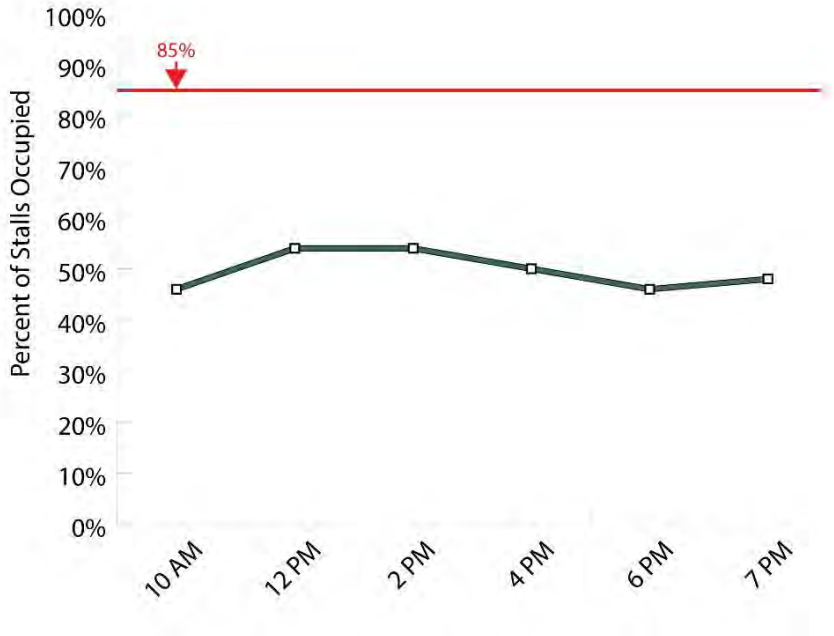

Figure 9: Thursday Percent Occupancy (Entire Study Area)

Data shows the peak hour for parking demand occurred at 12:00 pm and 7:00 pm. Maps showing the percent occupancy of each on-street parking block and parking lot during the afternoon and evening peak hours are shown in Figure 10 and Figure 11, respectively.

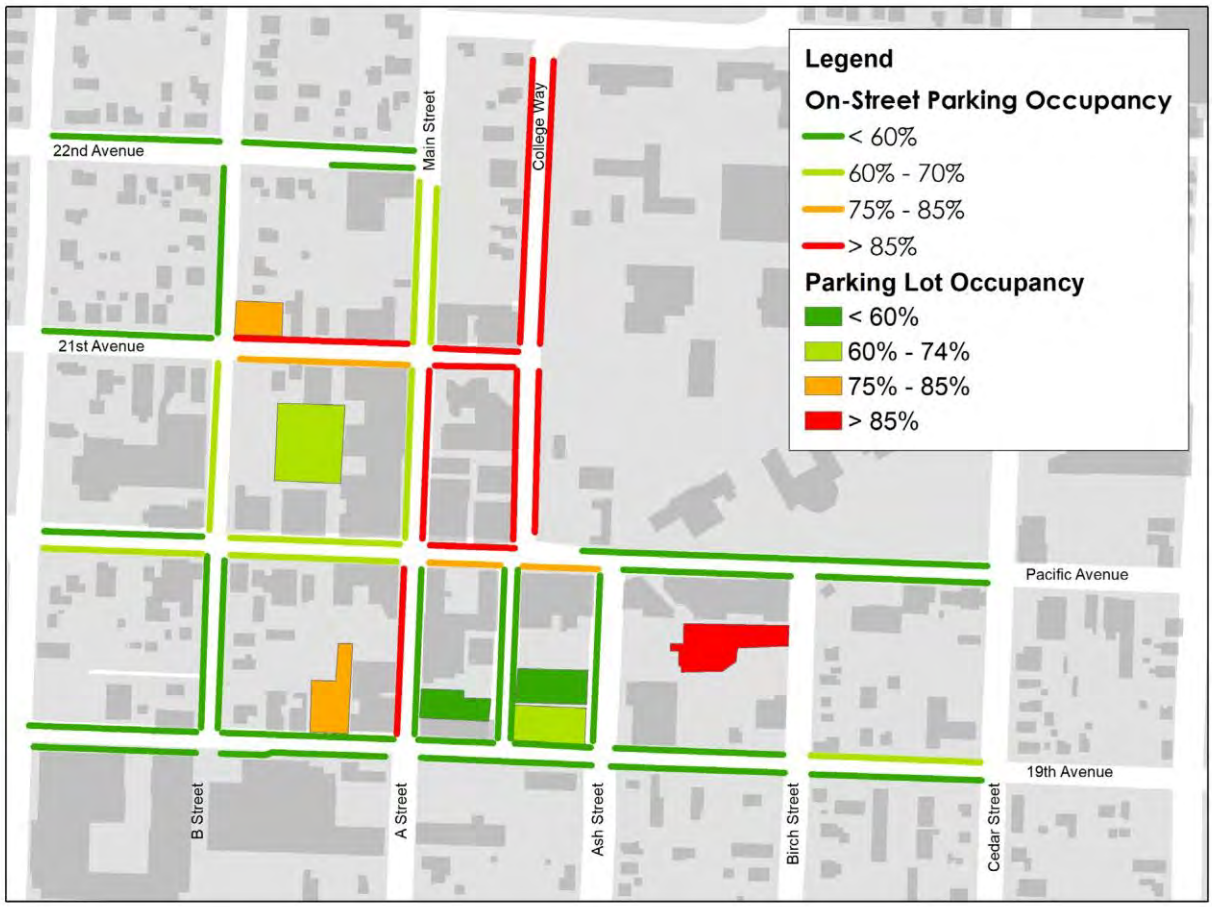

Figure 10: Thursday Peak Hour - 12:00 pm

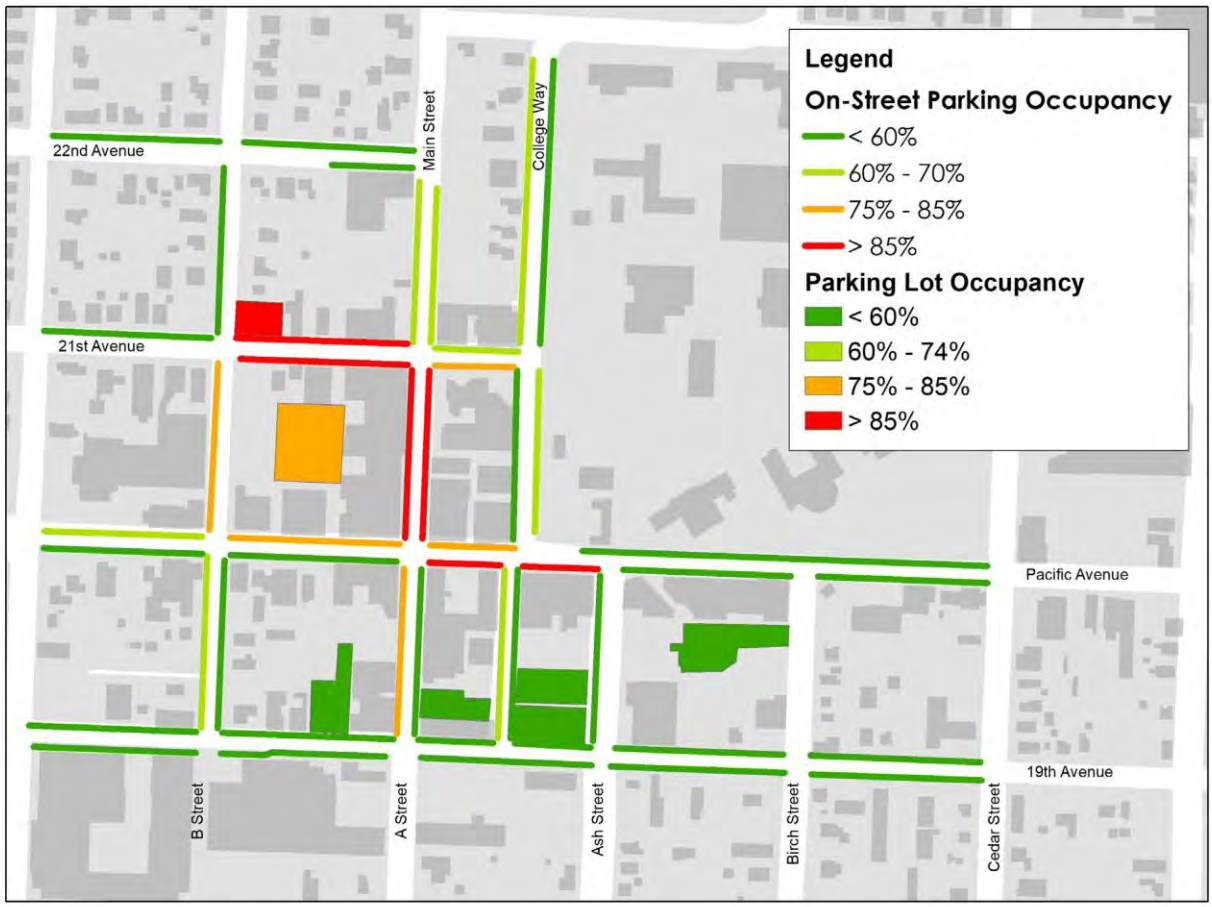

Figure 11: Thursday Peak Hour - 7:00 pm

Key Observations

- The peak hours for this day were at 12:00 pm and 7:00 pm. As shown in Figure 10 and Figure 11, the afternoon peak hour was highest in the northeast subarea and the evening peak hour was highest within the City Center subarea. Area-wide, parking demand was observed to be relatively stable throughout the study day, varying between about 45% and 60%, with only small spikes during peak hours. As with Saturday, this indicates that there is generally adequate parking supply within the downtown study area to support activities, however localized congestion is often apparent.

- During this study day, an orientation at Pacific University was taking place, and a number of people were observed to be moving into college housing. This is likely a key driver of demand for parking congestion along College Way and at the southeastern parking lot ("Parking Lot 7"), particularly

during the noon peak hour, however it is expected that typical activity explains the balance of demand observed.

- The highest demand within downtown appears to generally occur along Main Street between Pacific and 21st Avenues (along the blockfaces that were closed to traffic on the Saturday study day; the same area is closed on Wednesdays from May through October for the Farmers Market). This suggests that the centrally located retail and restaurant uses are the key factors driving most of the non-university parking demand. Outlying areas tend to see demand only once the more centrally located parking is filled, and there is ample capacity available within these outlying areas during all times of day.

City Center Subarea (Thursday)

A graph showing the Thursday percent occupancy in the City Center is shown in Figure 12.

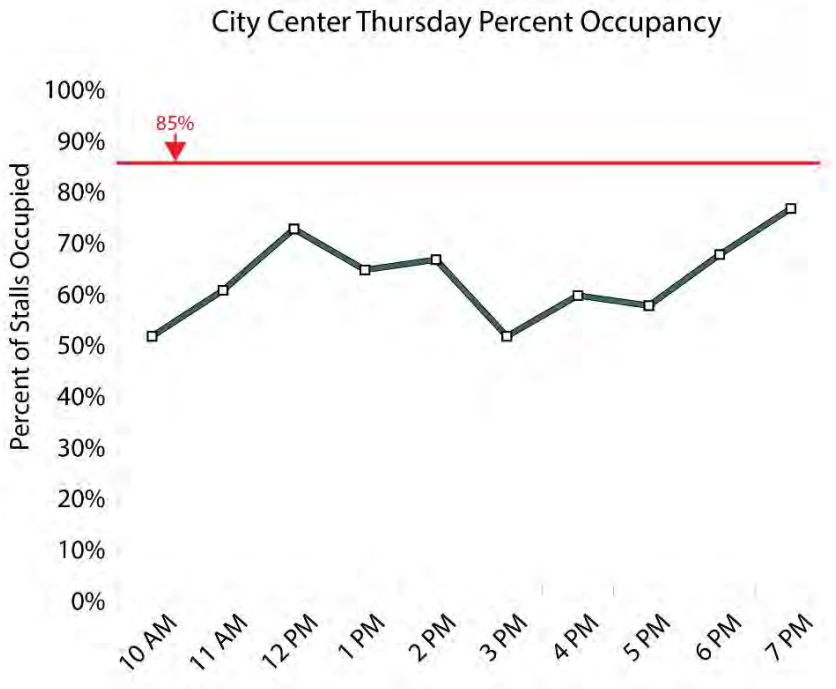

Figure 12: Thursday City Center Subarea Percent Occupancy

The calculated duration of vehicle stays, the number of unique vehicles, and the percentage of overstays for the City Center subarea on Thursday is shown below.

Table 3: City Center Timed Stall Data Summary (Thursday)

Total Vehicles Served	Total Vehicles Exceeding Time Limit	Percent Overstay	Average Time Stay by Stall	Unique Vehicles
666	85	13%	1 hour 41 minutes	3.74 vehicles

Key Observations

- The peak hours for this subarea occurred at 12:00 pm and 7:00 pm, with occupancy rates just under 80%. However, as with the study area as a whole, the centrally located blocks within City Center, particularly those along Main Street between Pacific and 21st Avenues, see greater demand than other blocks. The demand patterns indicate that the retail and restaurant uses along Main Street are driving demand patterns within the City Center subarea, however some impact from the University event is also evident.

- The average time stay within the subarea was calculated to be approximately 1 hour 41 minutes. This is below the 2-hour time limit typical of most stalls within the subarea, and accordingly, the percentage of vehicles observed to overstay the signed time limit was relatively small at 13%.

- An average of 3.74 unique vehicles per stall were served over the course of the study day. When considered in tandem with occupancy percentages, this indicates a relatively robust turnover pattern, with centrally located spaces especially offering utility throughout the study day.

Northwest Subarea (Thursday)

A graph showing the Thursday percent occupancy in the Northwest subarea is shown in Figure 13.

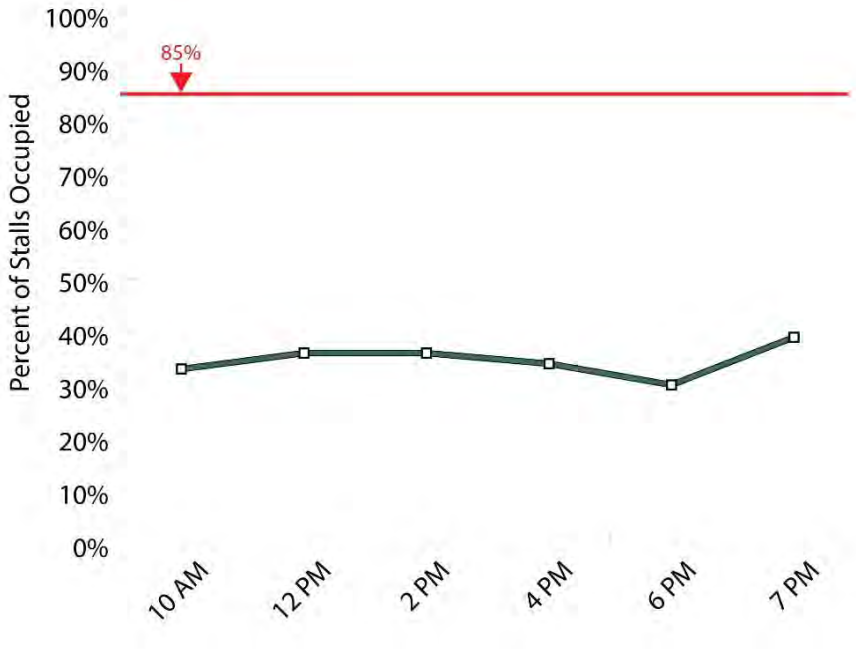

Figure 13: Thursday Northwest Subarea Percent Occupancy

Key Observations

- Demand within this subarea was observed to be relatively flat over the course of the study day, with occupancy percentages between about 30% and 45%. The peak hour occurs at 7:00 pm, immediately following the lowest observed hour at 6 pm. This is consistent with the expectation that residential uses drive demand within this subarea, however the late spike may be due to a combination of local residential demand and commercial demand from nearby uses on Main Street.

Northeast Subarea (Thursday)

A graph showing the Thursday percent occupancy in the Northeast subarea is shown in Figure 14.

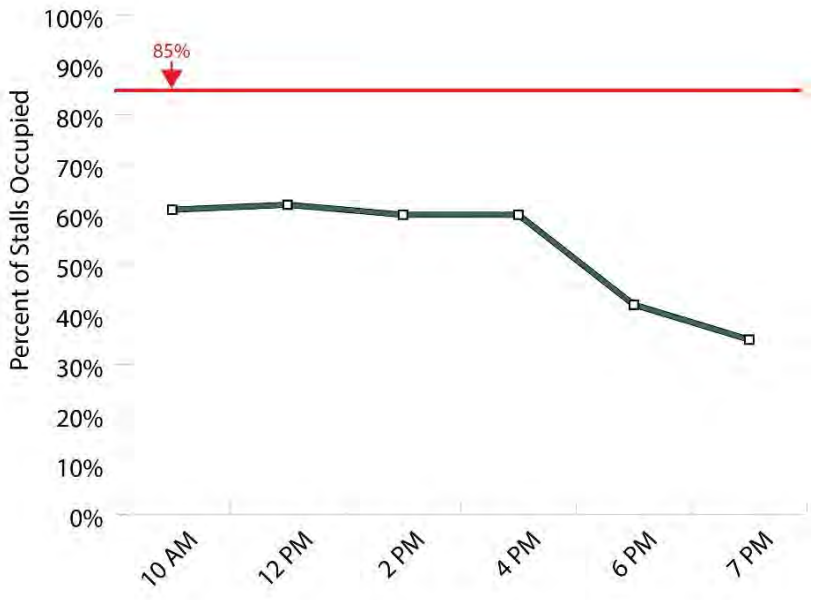

Figure 14: Thursday Northeast Subarea Percent Occupancy

Key Observations

- Demand within this subarea is relatively flat between 10:00 am and 4:00 pm at approximately 65% before falling off at 6:00 pm. This is consistent with the expectation that demand here was driven largely by the event at Pacific University. Similar demand patterns (albeit at different levels) are likely to be observed when school is in full session. Demand was concentrated within along the northwestern edge of the campus, with the parking along the southern edge showing somewhat lower occupancies. It is expected that this parking may be more in demand during the school year, generally raising occupancies within the subarea.

South Subarea (Thursday)

A graph showing the Thursday percent occupancy in the South subarea is shown in Figure 15.

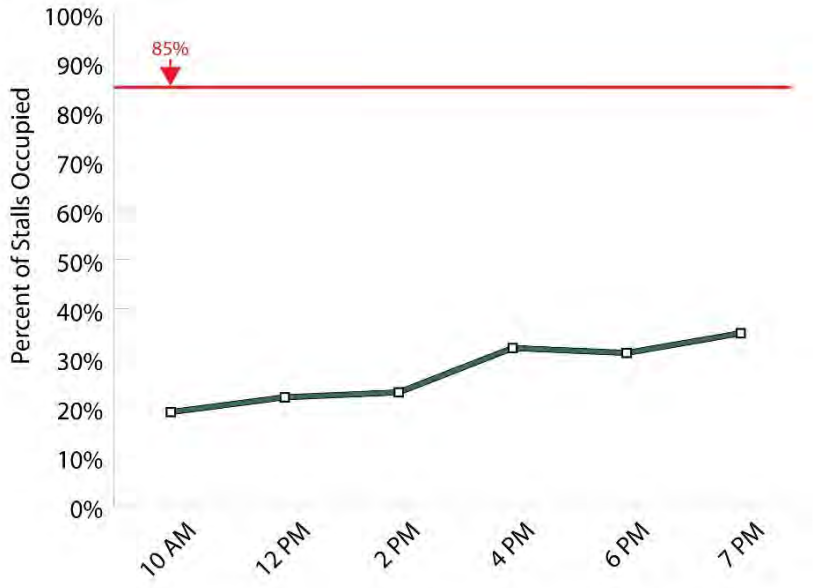

Figure 15: Thursday Employment Percent Occupancy

Key Observations

- Demand within the South subarea was relatively low throughout the study, with the peak hour occurring at 7:00 pm with just under 40% of spaces filled. While several office and employment uses lie within this district, it appears that most employees are utilizing off-street parking. Demand for on-street parking within the district is more likely driven by the handful of adjacent commercial uses, or by commercial uses within the City Center subarea as this subarea fills to near capacity.

Parking Lots

In addition to the on-street parking demand within the study area, occupancy was observed at seven public parking lots in Forest Grove. The locations of the studied lots are shown in Figure 16. It should be noted that while 85% is considered functionally full for on-street parking, that is not the case for parking lots.

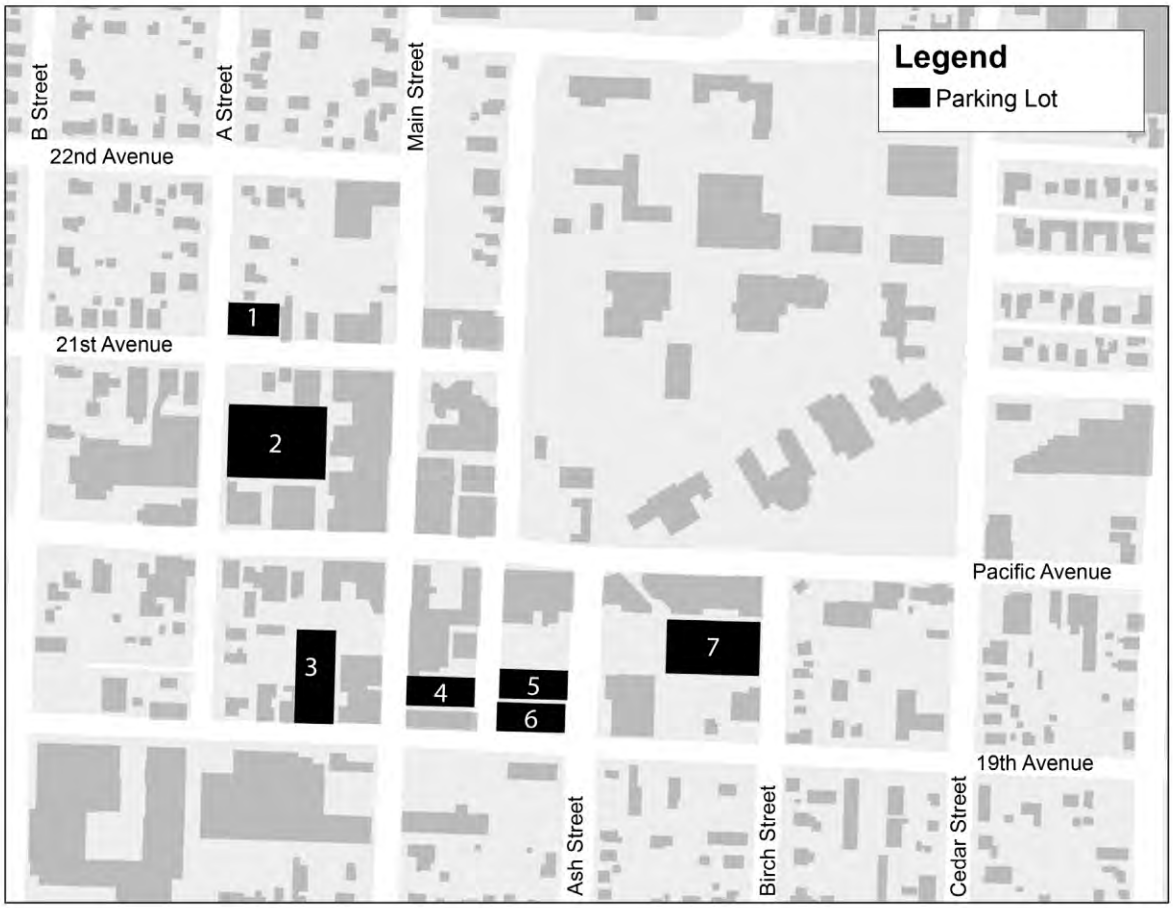

Figure 16: Public Parking Lots within Downtown Forest Grove

Parking Lot 1

Parking Lot 1 is located in the northeastern corner of the intersection of 21st Avenue at A Street. There is a total of 19 parking stalls. Parking Lot 1 was observed to be 100% full during the 4:00 pm observation and 5:00 pm observation periods on Saturday, and had significant demand at other times of both study days. This centrally located lot thus appears to be heavily utilized by both event patrons and other downtown patrons. Occupancy curves for this lot are shown in Figure 17.

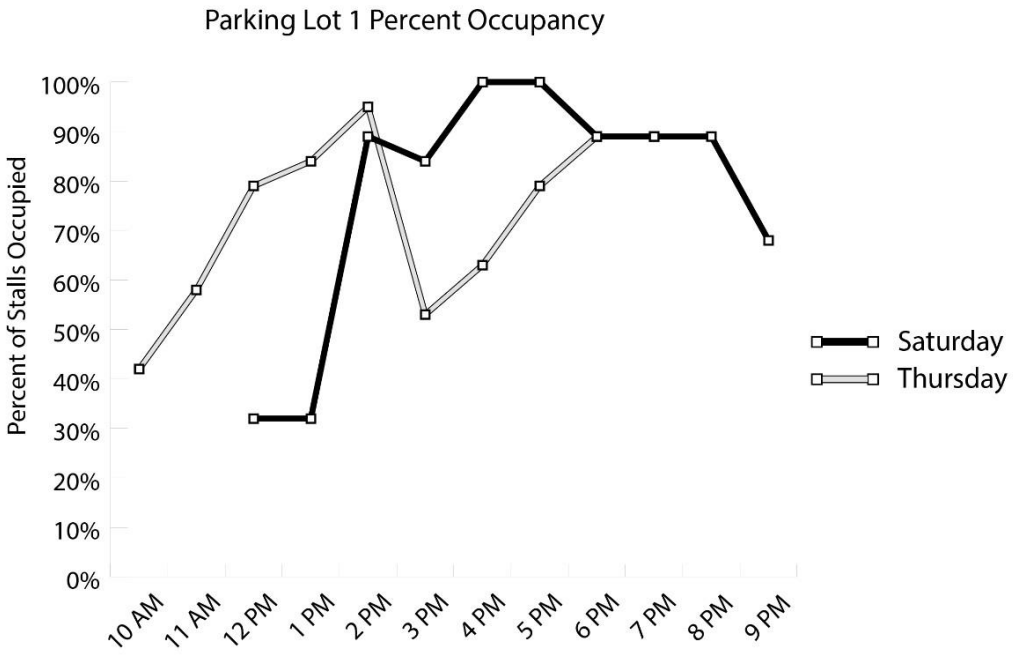

Figure 17: Parking Lot 1 Occupancy

Parking Lot 2

Parking Lot 2 is located on the eastern side of A Street, between 21st Avenue and Pacific Avenue. This parking lot has the largest amount of parking supply with 57 marked spaces. It was observed that several vehicles park in unmarked areas within the lot as well. The peak hours of demand occurred Saturday at 6:00 pm and Thursday at 7:00 pm. Parking lot 2 was observed to be 100% full on Saturday at 6:00 pm. Like Parking Lot #1, this lot served significant demand from the Saturday event. The utility for other downtown uses is also evident during the Thursday study day. Occupancy curves for this lot are shown in Figure 18.

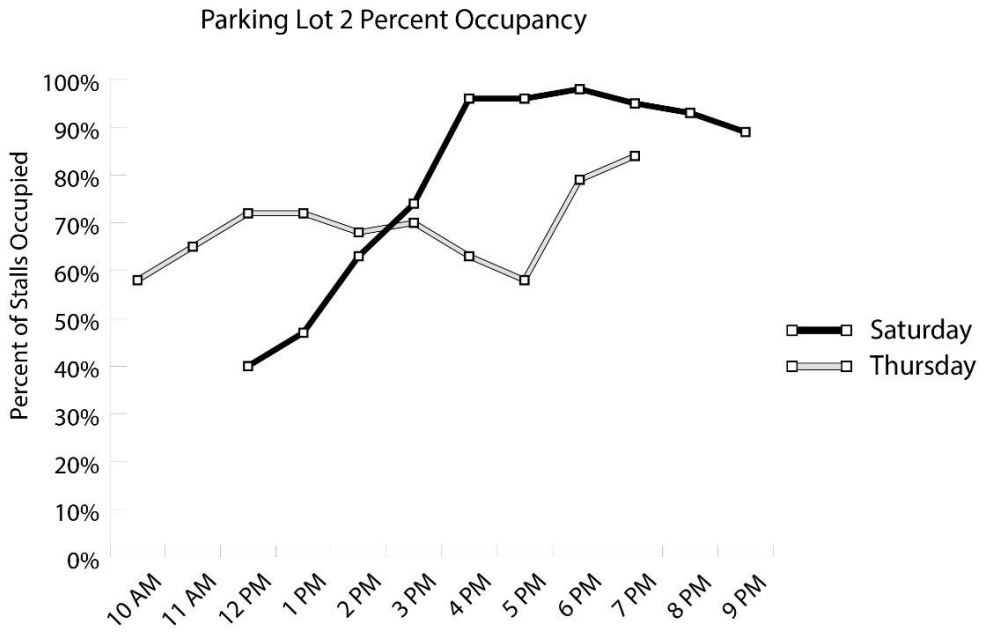

Figure 18: Parking Lot 2 Occupancy

Parking Lot 3

Parking Lot 3 is located on the northern side of 19th Avenue, between A Street and Main Street. There is a total of 31 parking stalls. The peak hours of demand occurred on Saturday at 6:00 pm and on Thursday at 12:00 pm. The utilization patterns appear to be consistent with the expectations that demand is driven by school and employment uses during the week. Occupancy curves for this lot are shown in Figure 19.

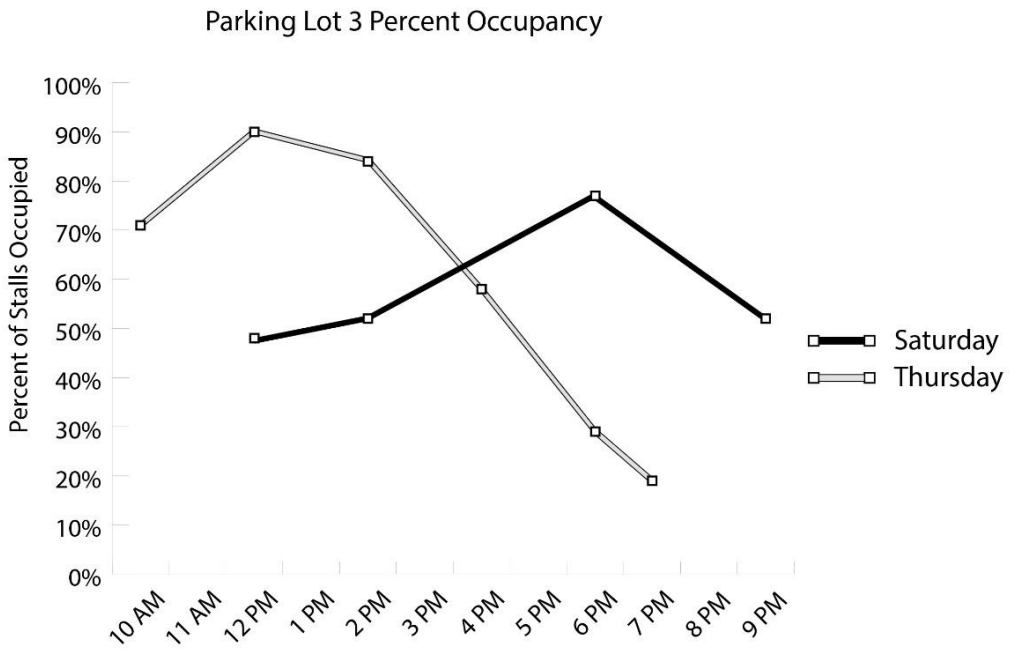

Figure 19: Parking Lot 3 Occupancy

Parking Lot 4

Parking Lot 4 is located between Main Street and Council Street. There is a total of 23 parking stalls. The peak hours occurred on Saturday at 4:00 pm and 7:00 pm and on Thursday at 2:00 pm. This lot had relatively low demand overall, but appeared to serve as spillover parking during the event on Saturday as closer parking filled. Occupancy curves for this lot are shown in Figure 20.

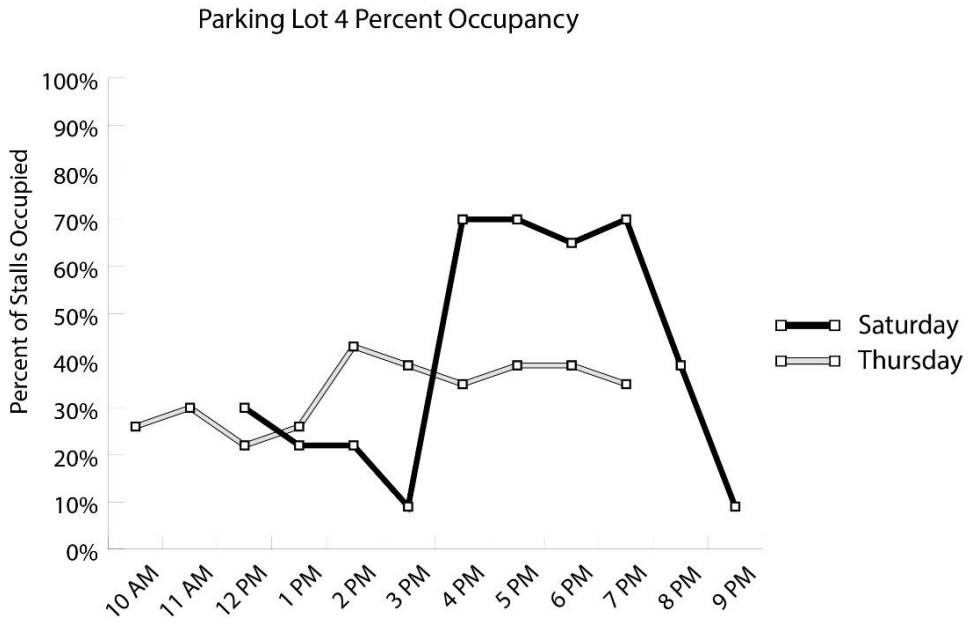

Figure 20: Parking Lot 4 Occupancy

Parking Lot 5

Parking Lot 5 is located across from Parking Lot 4 on the eastern side of Ash Street. There is a total of 16 parking stalls. The peak hour of demand occurred at 7:00 pm on Saturday and 4:00 pm on Thursday. It is not anticipated that parking for retail and restaurant uses utilize this public parking area. Demand in this parking lot was relatively low during all study periods. Occupancy curves for this lot are shown in Figure 21.

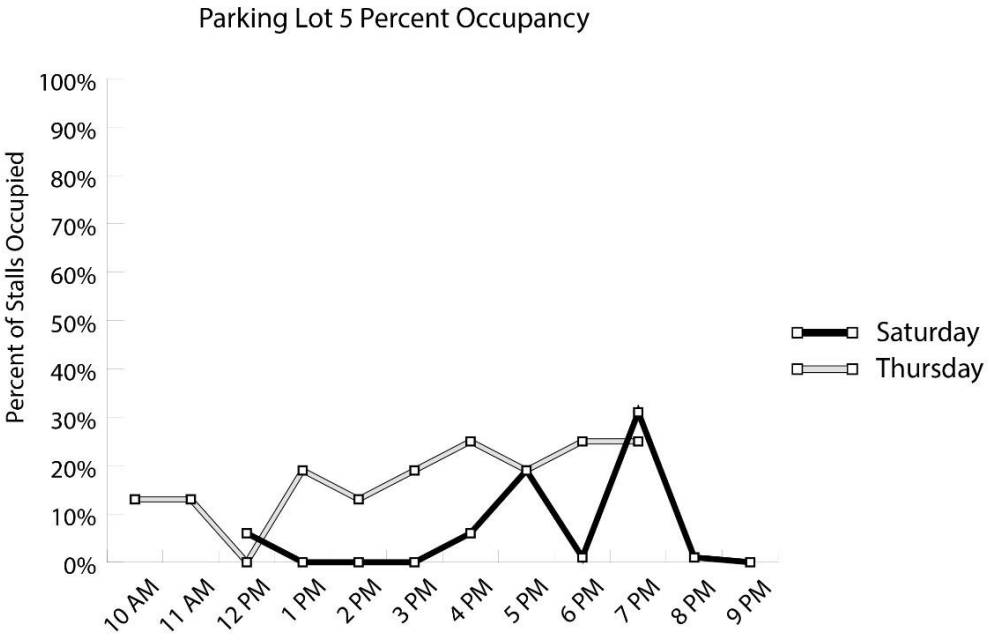

Figure 21: Parking Lot 5 Occupancy

Parking Lot 6

Parking Lot 6 is a gravel parking located on the northern side of 19th Avenue between Council Street and Ash Street, just south of Parking Lot 5. This parking lot has 33 parking stalls. Peak hours occurred at 6:00 pm on Saturday and 11:00 am on Thursday. Demand was relatively low during the entire study day on Saturday. During the Thursday study day, demand was between 70% and 80% before 5:00 pm. This is consistent with the expectation that this lot is often utilized by city employees. Occupancy curves are shown for this lot in Figure 22.

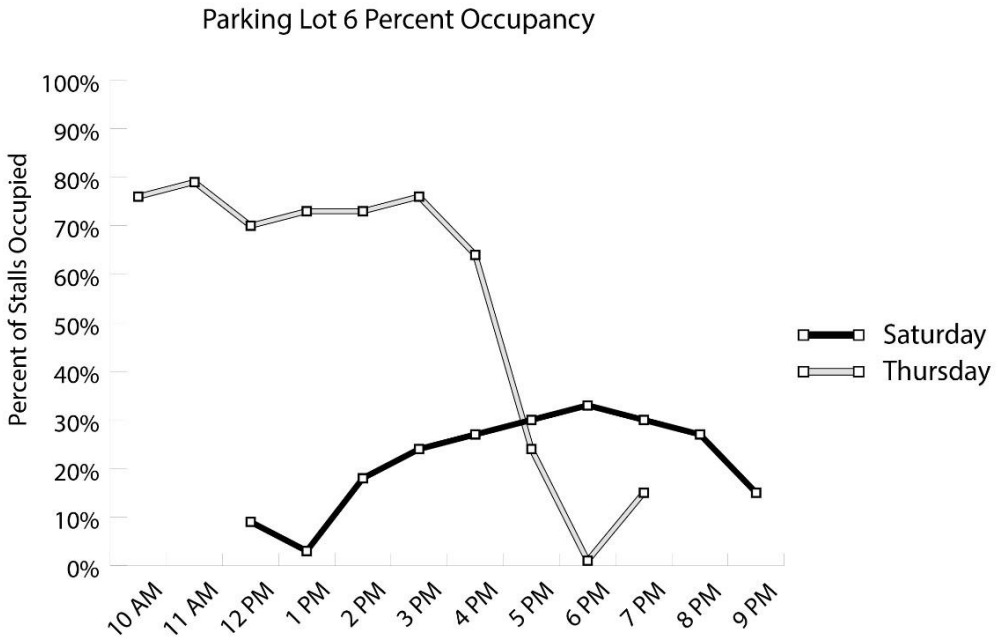

Figure 22: Parking Lot 6 Occupancy

Parking Lot 7

Parking Lot 7 is the library parking lot located on the western side of Birch Street between Pacific Avenue and 19th Avenue, adjacent to the Forest Grove Public Library. This parking lot has approximately 25 parking stalls. Peak hours occurred at 12:00 pm on both Thursday and Saturday. Demand was observed to be much higher on Thursday than on Saturday, which could be due to increased library patronage on weekdays but also likely owes to demand related to Pacific University. Demand for the lot Occupancy curves for this lot are shown Figure 23.

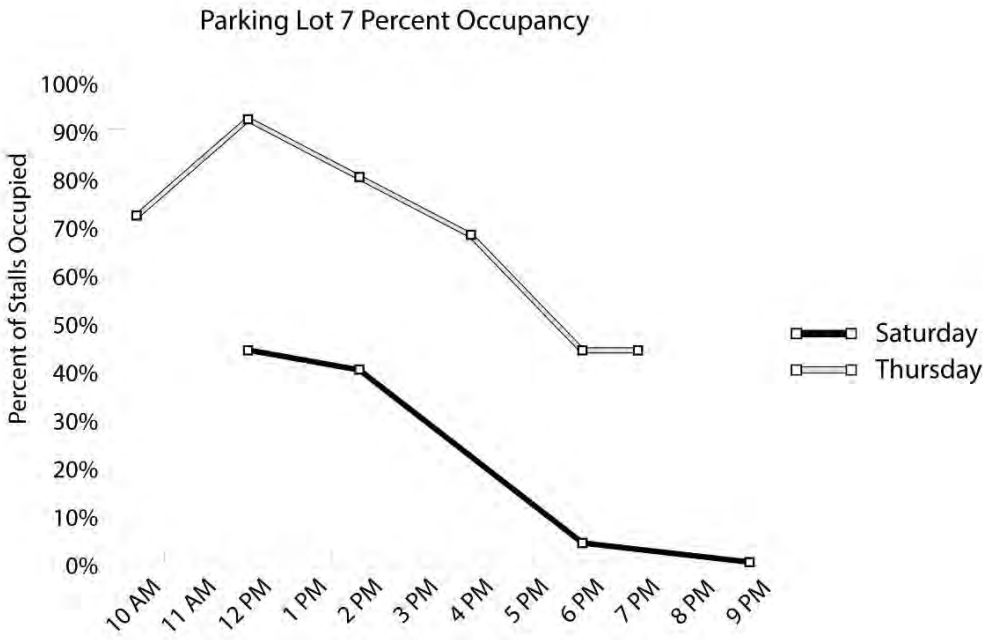

Figure 23: Parking Lot 7 Occupancy

Final Observations and Next Steps

- During both study days, there was sufficient parking within downtown Forest Grove to accommodate all demand during all hours. However there are often localized shortages of parking during the peak hours, where several contiguous blocks are "functionally full" with more than 85% of available parking occupied. The busiest areas generally on or near Main Street, and appear to occur both on typical days and more acutely due to events.

- Existing management measures appear to be producing the desired turnover patterns during typical weekdays; however during the downtown event on Saturday many vehicles were observed to exceed signed time limits and accordingly turnover was relatively light.

- While Pacific University has a large number of off-street spaces that were not considered as part of this study, it appears to be a significant generator of parking demand for publicly available parking within downtown. While parking adjacent to the campus along Pacific Avenue is otherwise lightly utilized, University demand may compete with other downtown demand in other locations including along College Way and within Parking Lot #7 (adjacent to the library).

- The results presented herein point to a number of potential management measures that could help parking within the downtown area function better. Generally, the City should consider a strategy that that helps guide longer-term demand toward the parking lots and on-street parking toward the edges of the downtown area, freeing the most centrally located parking for robust turnover. A number of potential measures can help with this, including wayfinding, better regulation of parking for employees of commercial businesses downtown, increased enforcement (particularly around events), and other placemaking measures (particularly related to the ease and comfort of crossing Pacific Avenue). Moving forward, a detailed set of complementary management initiatives should be developed in consult with the City and stakeholder groups toward this end.

Appendix: Hourly maps of demand observations

Figure A1: Parking Occupancy - Thursday, 10:00 a.m.

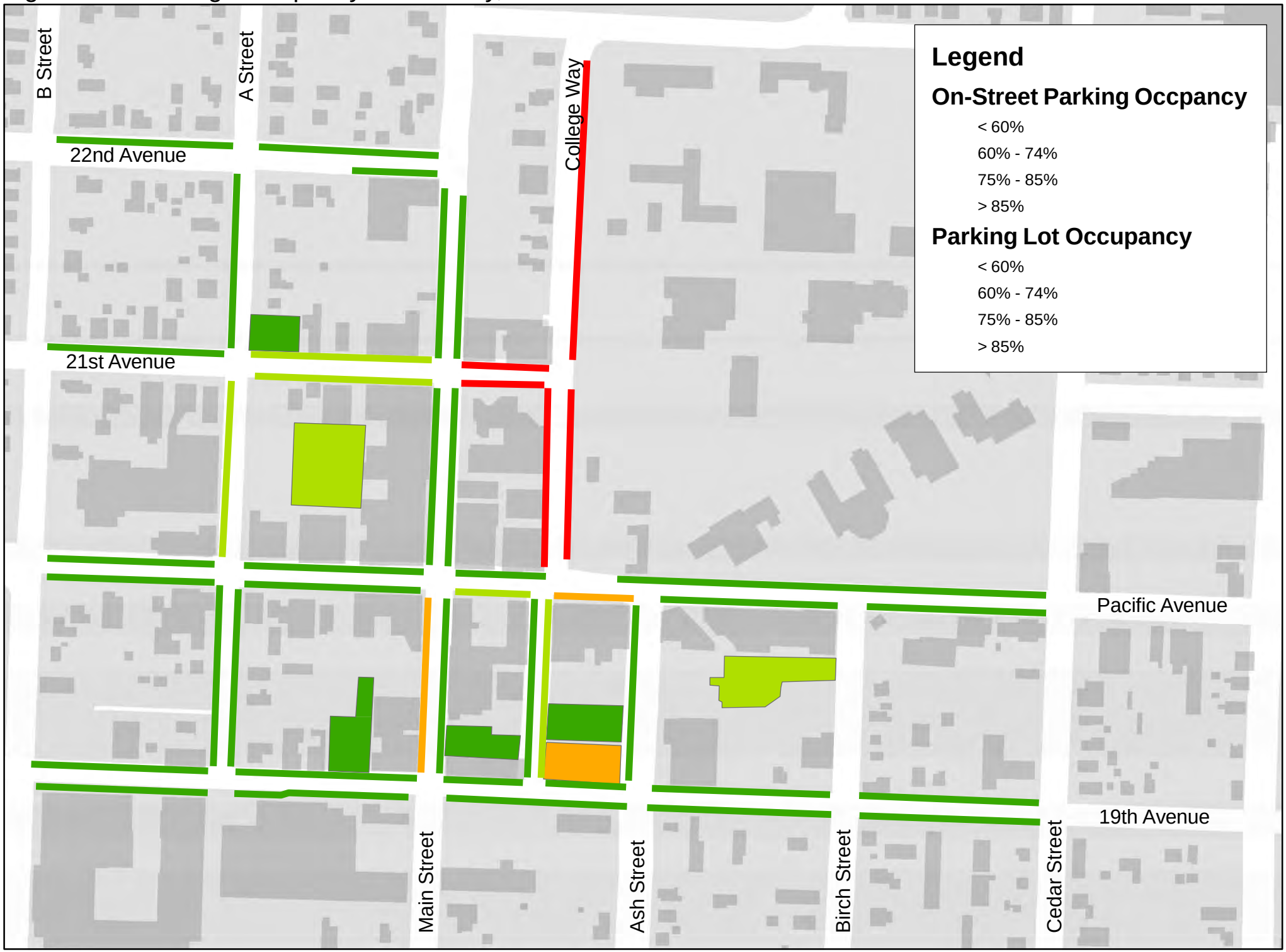

Figure A2: Parking Occupancy - Thursday, 12:00 p.m.

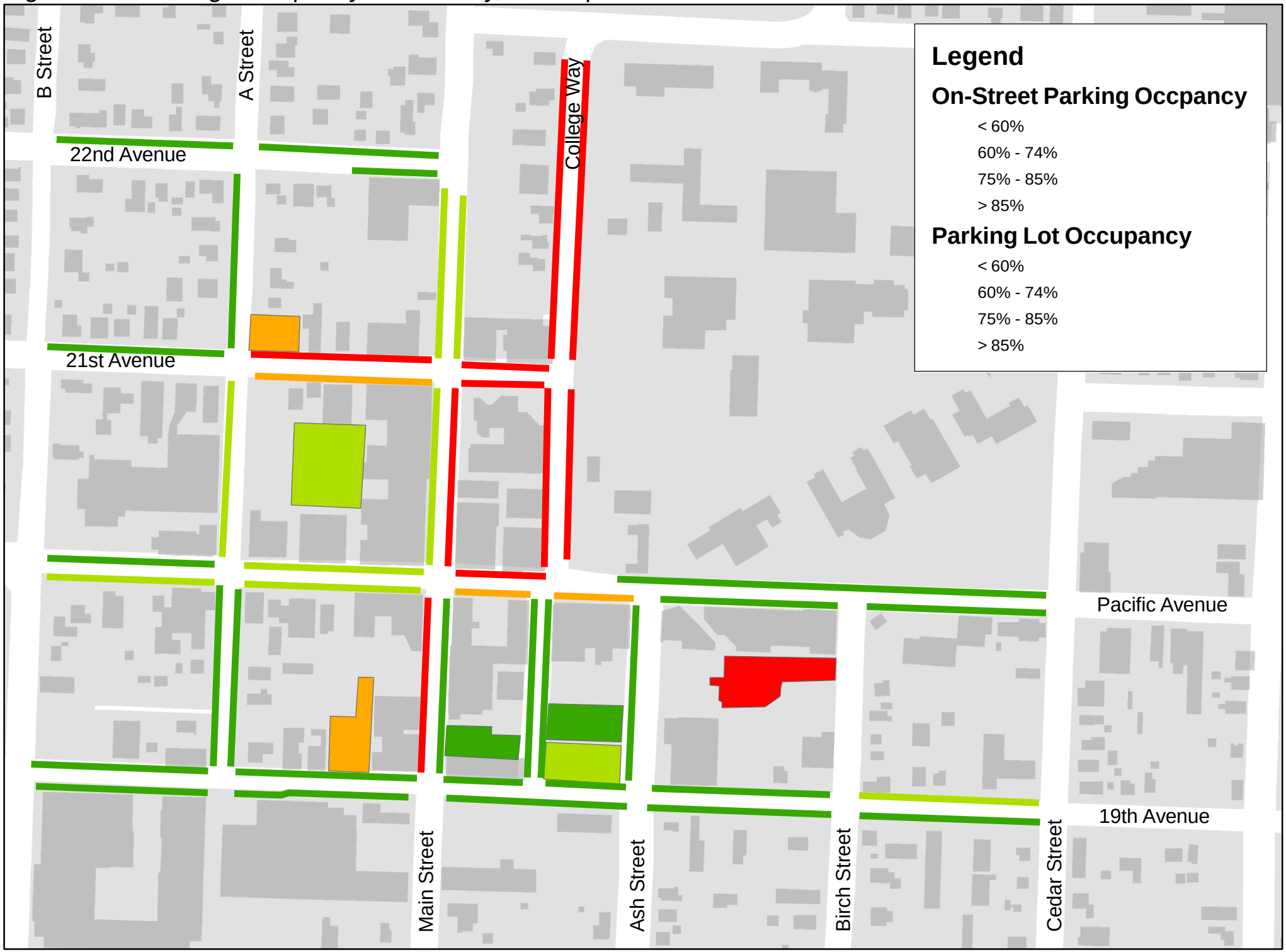

Figure A3: Parking Occupancy - Thursday, 2:00 p.m.

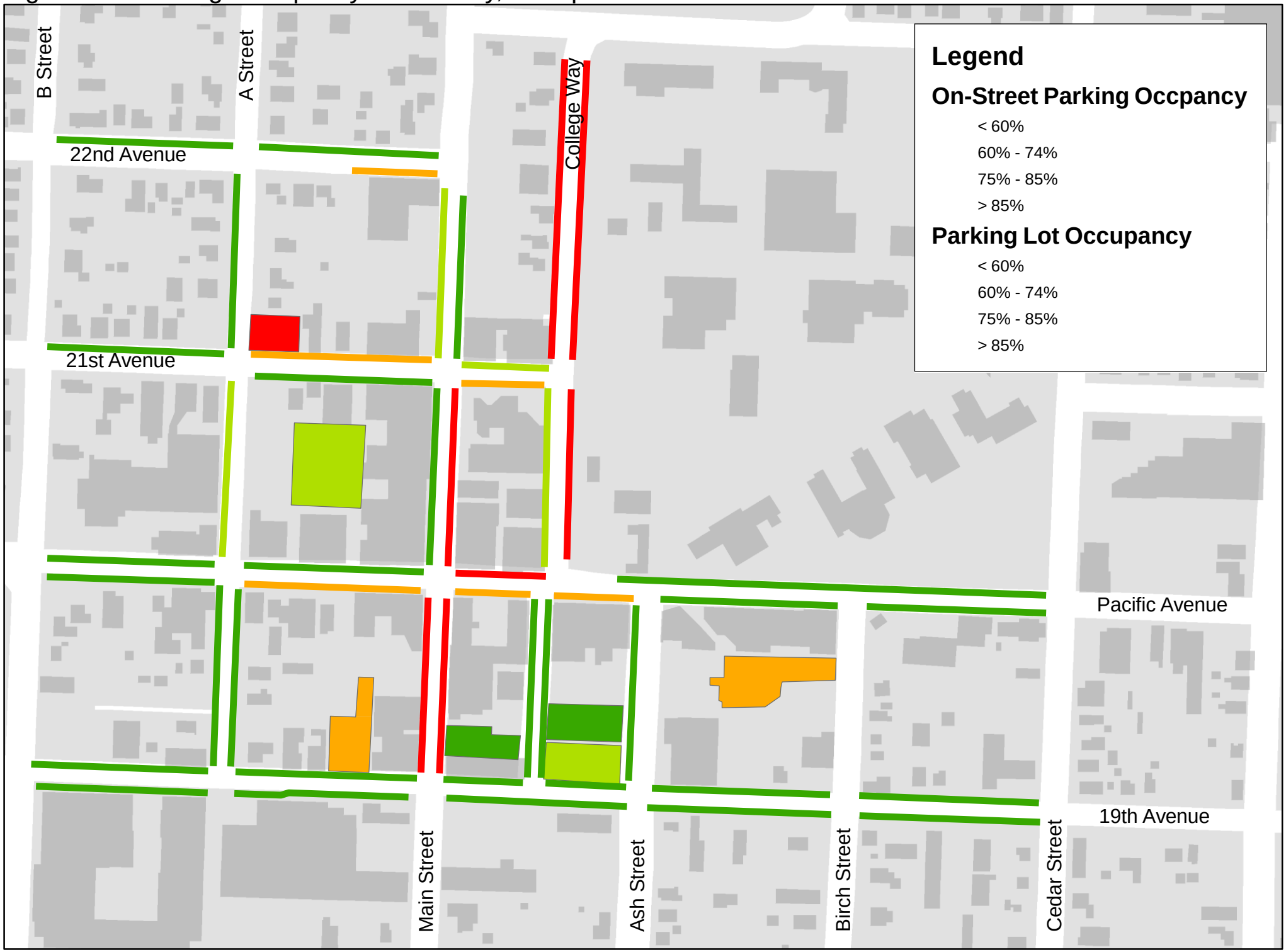

Figure A4: Parking Occupancy - Thursday, 4:00 p.m.

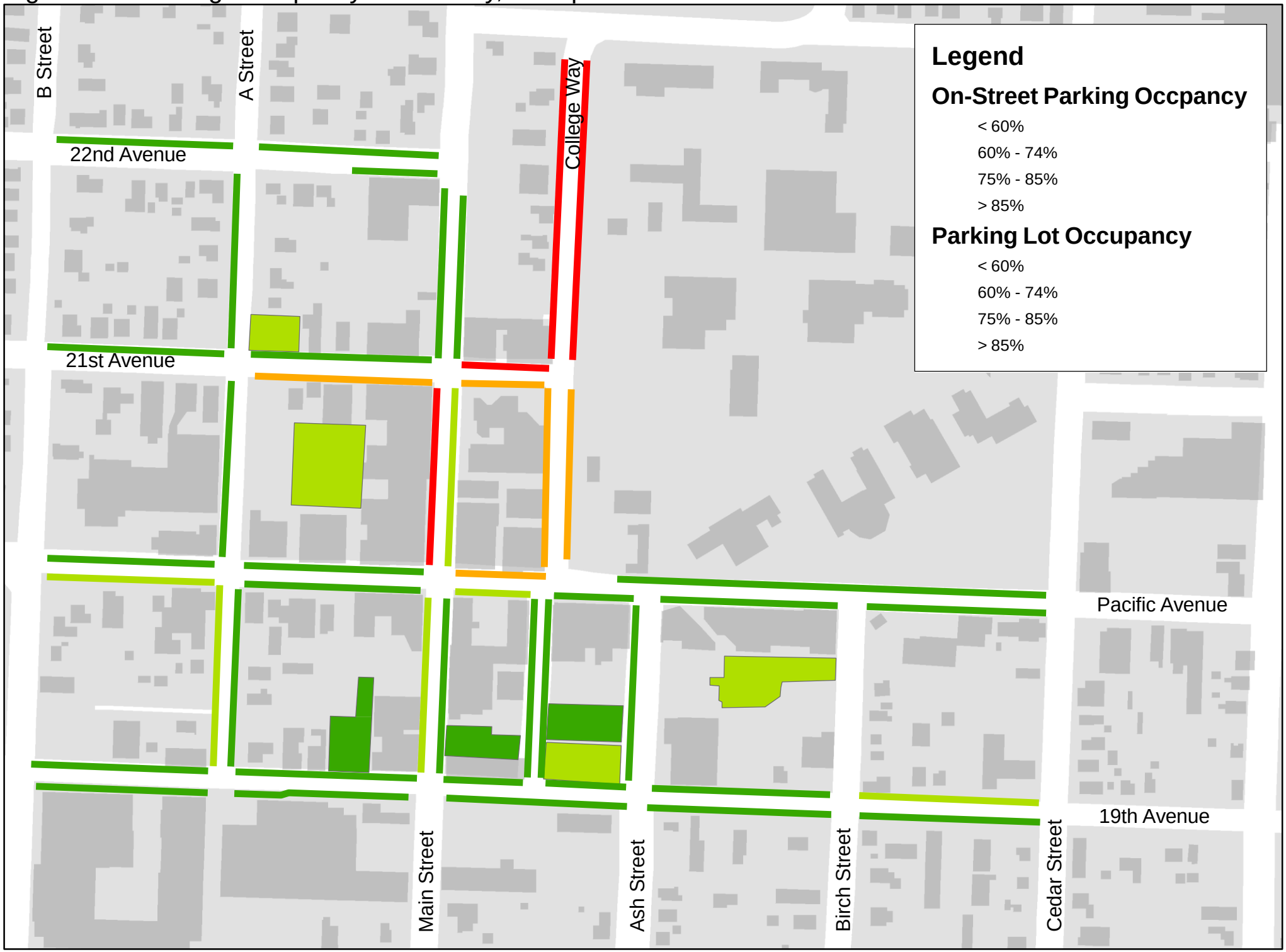

Figure A5: Parking Occupancy - Thursday, 6:00 p.m.

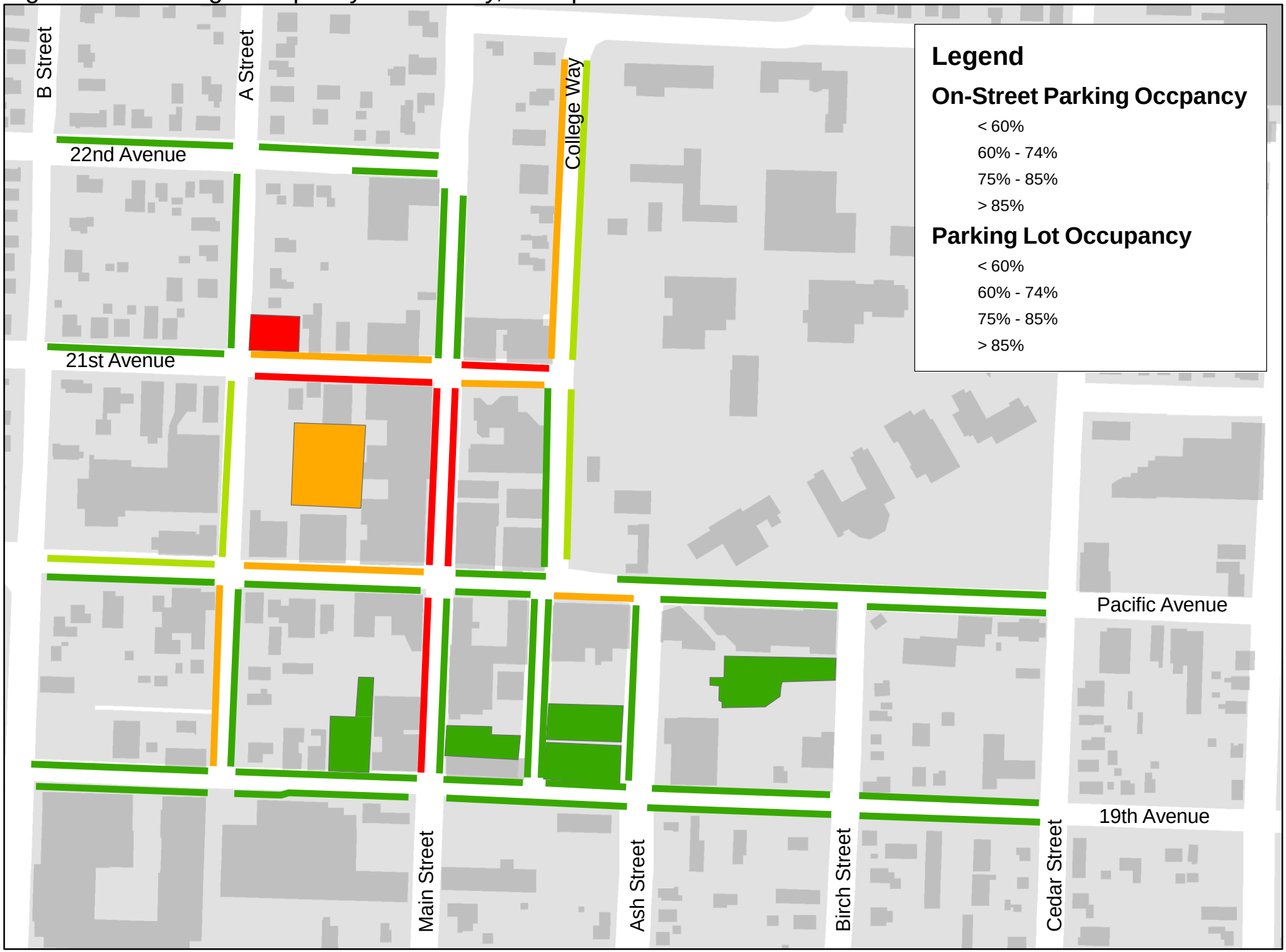

Figure A6: Parking Occupancy - Thursday, 7:00 p.m.

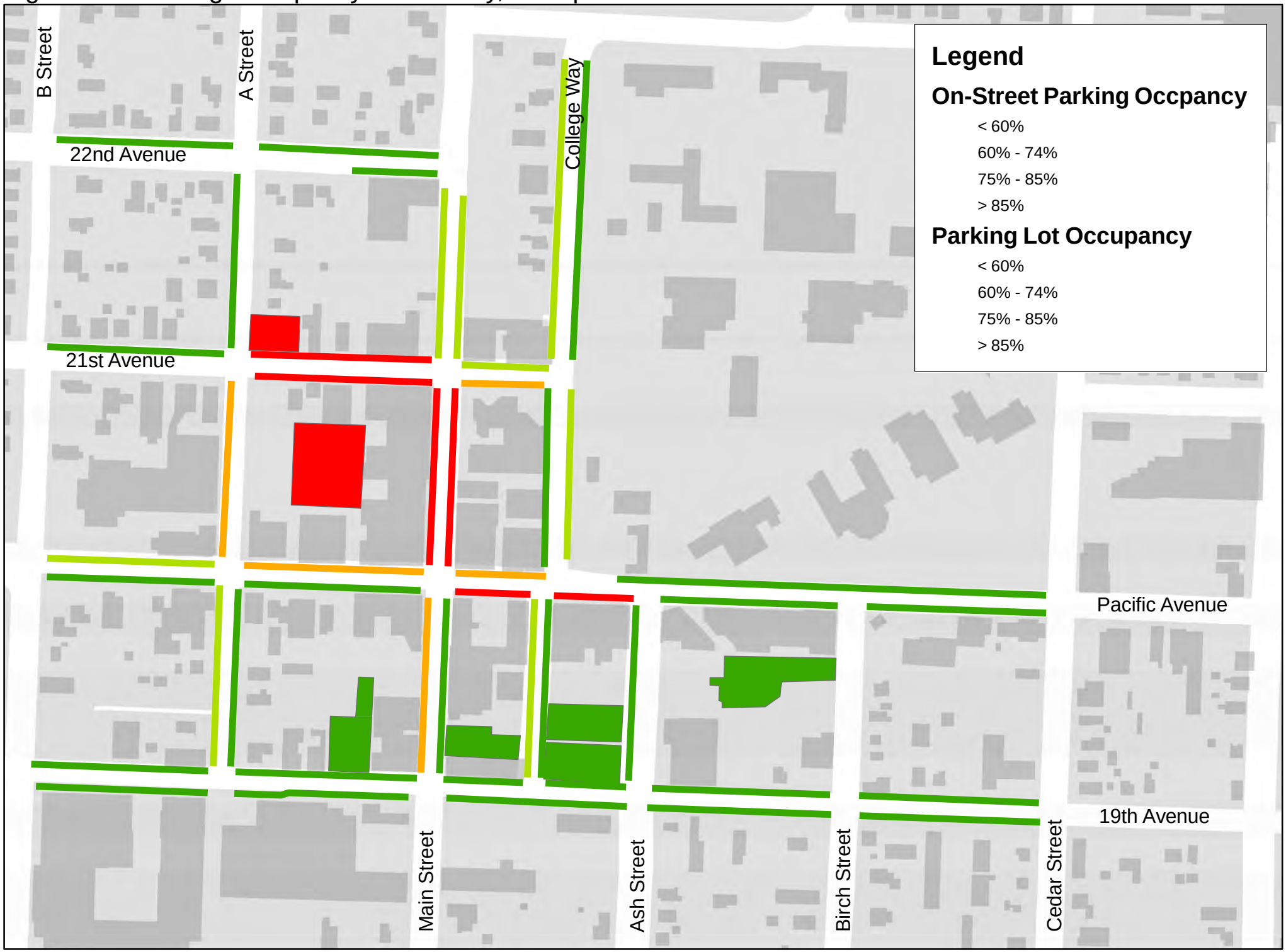

Figure A7: Parking Occupancy - Saturday, 12:00 p.m.

Figure A8: Parking Occupancy - Saturday, 2:00 p.m.

Figure A9: Parking Occupancy - Saturday, 6:00 p.m.

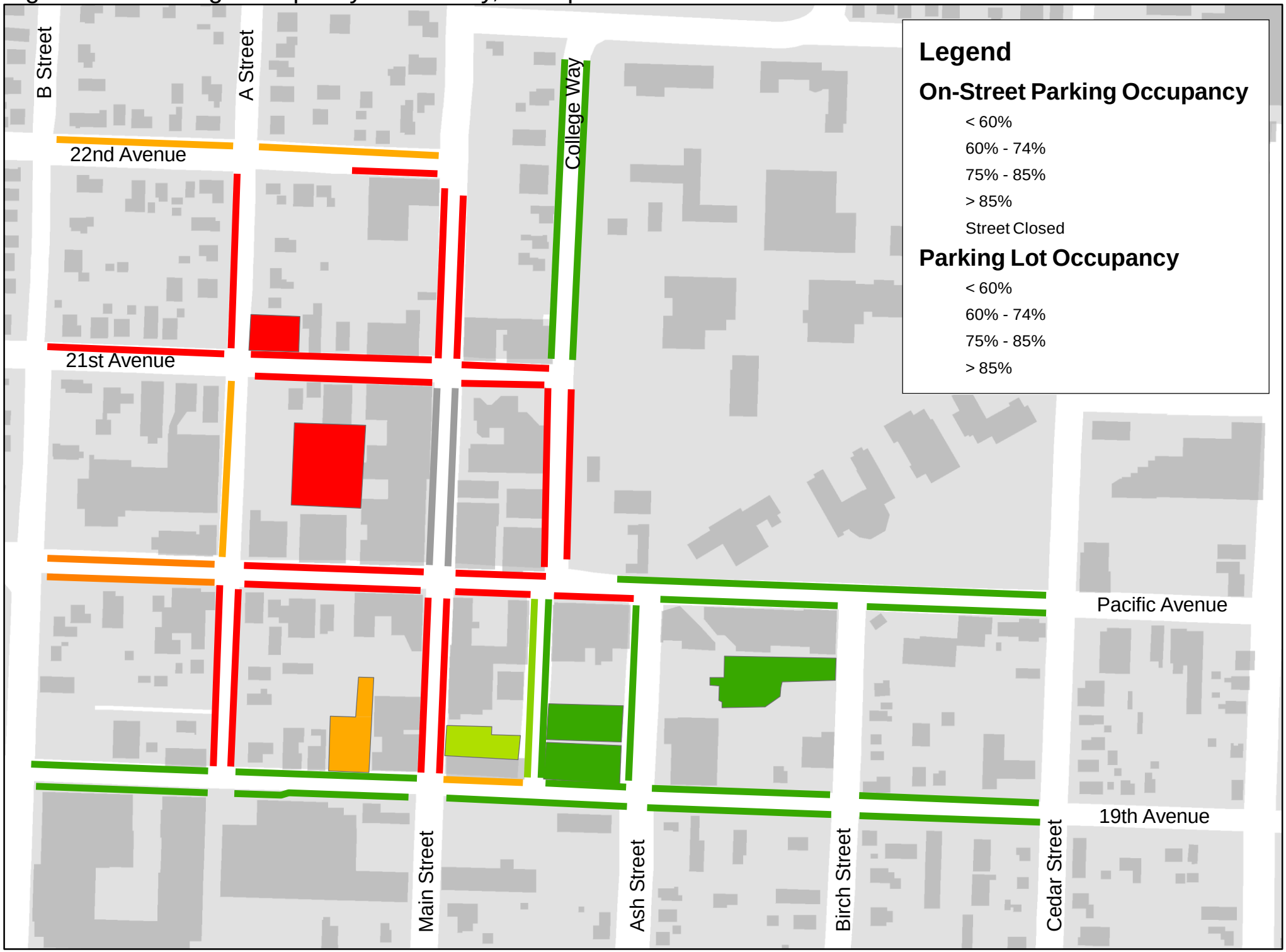

Figure A10: Parking Occupancy - Saturday, 9:00 p.m.