NELSON
NYGAARD

MEMORANDUM

To: Mike Tremblay, City of Somerville

From: Nelson\Nygaard

Date: November 13, 2017

Subject: Somerville Central Hill Campus Parking Study

Nelson\Nygaard conducted a parking study to determine the parking needs for existing employees and patrons utilizing on-site parking on the Central Hill Campus (which includes City Hall, Somerville High School, and the Somerville Library), the majority of which is proposed to be eliminated as part of the Somerville High School building project. To be conservative, this study assumes that the future Central Hill Campus will provide no on-site parking for employees and that an alternative parking strategy will be necessary to accommodate employee parking needs.

This study recommends shifting Central Hill Campus employee parking to the streets surrounding the campus. These recommendations stem from analysis of data from an extensive parking survey that took place in spring of 2017 of parking utilization on the Central Hill Campus as well as streets within walking distance from the site. The proposed parking strategy balances the need to shift employee parking off the campus with the need to ensure that sufficient on-street parking is available for residents.

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STUDY AREA

The project team determined a study area that encompassed on-site City Hall, High School, and Central Library parking as well as streets within walking distance of the campus. Figure 2 illustrate the inventory and category of parking spaces within the study area.

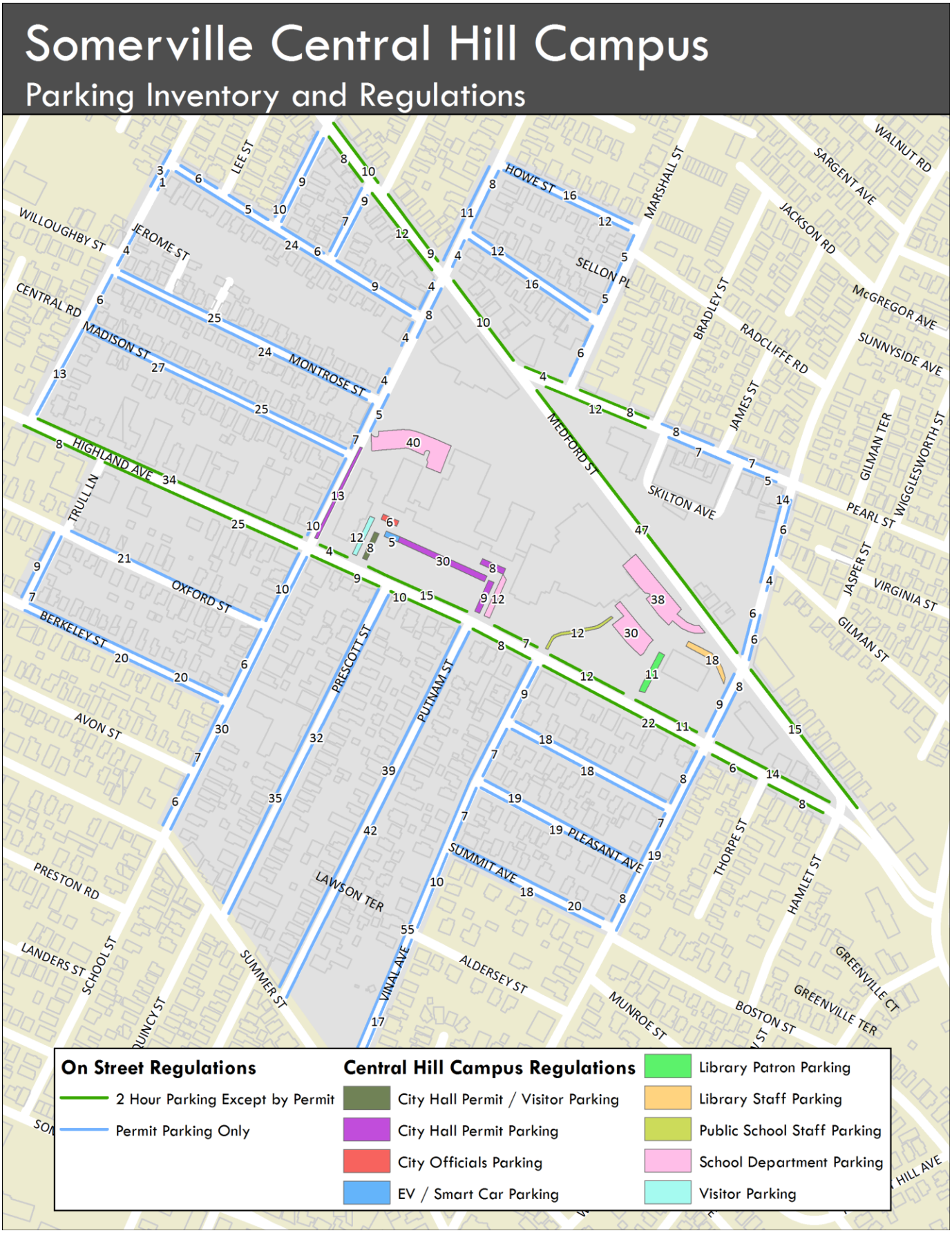
A majority of the parking within the study area is Permit Parking Only on-street parking, which is limited to residents with a residential parking permit with the exception of non-resident school employees, who are currently able to park in these spaces with a dedicated permit issued by Traffic & Parking.

During recommendation development, the original study area was expanded slightly to include a number of streets to the west of School Street in order to create sufficient on-street parking capacity during street sweeping. The expansion of the original study area will be described later on in the recommendations analysis. Figures 1 and 2 below do not include this expanded study area.

Figure 1 Parking Inventory

Regulation	Number of Parking Spaces
On-Street	**1,301**
Permit Parking Only	973
2hr Parking Except by Permit	328
Off-Street	**252**
School Department	132
City Hall Permit/ Visitor	86
Library Patrons	29
EV Parking	5

Figure 2 Study Area Parking Regulations



PARKING UTILIZATION

Data Collection Methodology

Parking utilization (also referred to as parking demand) data was collected during multiple time periods on three days in mid-June of 2017 (before the end of the school year). Street sweeping, which changes residents' parking behavior, was in place during some of these data collections periods. To be conservative, the team chose the highest utilization for on-street and off-street parking for each time period, thereby creating a worst-case scenario for each time period. The maps and key findings included in this memo are therefore a conservative estimate of parking demand in the study area on a typical day. For a complete set of utilization data from all three days, please see the appendices of this memo.

As detailed below, parking data collection generally took place during three time periods on each day: at 5am to capture residential parking demand and at 9am and 5pm to capture residential and employee parking demand. During the 9am and 5pm counts, data surveyors recorded which cars had school employee parking permits in order to differentiate residential and employee on-street parking demand. Importantly, data surveyors were not able to differentiate cars belonging to employees who are also Somerville residents and used their residential parking permit to park on-street rather than an employee parking permit. This dynamic makes the residential parking utilization data collected even more conservative, as an indeterminate amount of on-street capacity is captured in the data as residential use but is actually for employee use.

- **Wednesday, June 14th, 2017,** (street sweeping on Medford, School, and Highland)
  - 5am (Parking Utilization Survey only)
  - 9am (Parking Utilization Survey plus Permit Count)
  - 5pm (Parking Utilization Survey plus Permit Count)
- **Thursday June 15th, 2017** (street sweeping on some residential streets in study area)[1]
  - 5am (Parking Utilization Survey only)
  - 9am (Parking Utilization Survey plus Permit Count)
- **Tuesday, June 20th 2017** (no street sweeping occurred)
  - 5am (Parking Utilization Survey only on limited streets)
  - 9am (Parking Utilization Survey only on limited streets)
  - 5pm (Parking Utilization Survey plus Permit Count)

In October 2017, additional parking utilization data was collected on a number of streets west of School Street to assess opportunities to expand the initial study area. As noted above, it became clear during recommendation development that, although the original study area provided sufficient capacity for residential and employee parking on days without street sweeping, this was not the case on certain days when street sweeping was in effect, necessitating an expansion of the study area. As such, the following streets were counted at 9am on October 2, 2017. All of the segments counted are within a 10-minute (1/2 mile) walk of Somerville High School.

- Willoughby Street;
- Oxford between Trull Lane and Central Street;
- Berkeley between Hersey Street and Central Street;

- Avon Street;
- Central Road;
- Central Street between Willoughby Street and Highland Avenue;
- Central Street between Highland Avenue and Avon Street;
- School Street between Avon Street and Berkeley Street; and
- Highland Avenue between Trull Lane and Central Street.

Key Findings

- **5am**
  - This time period shows the highest utilization of on-street parking within the study area, with over 80% of parking spaces filled.
  - There is plenty of availability in the on-site parking lots.
- **9am**
  - Parking lots on campus are nearly full.
  - There is parking availability in the residential neighborhoods, where only 60% of parking spaces are filled.
  - There is a small amount of on-street parking by school employee permit holders.
  - Employee permit holders that park on-street tend to park directly south and west of the high school. All of these streets have capacity for parking by the 9am period, by which time most residents have left. Employee permit holders also park on Highland Avenue.
  - Employee permit parking is concentrated in on-campus parking lots by a nearly 3 to 1 margin over on-street parking.
- **5pm**
  - Nearly all employee permit holders have left on-street parking spaces.
  - Parking is once again generally available on-campus.
- **9am (October 2017 additional count)**
  - The expanded study area adds a supply of approximately of 322 spaces; however, only 127 cars were parked during the 9am time period (approximately 40% utilization).

Detailed Findings

Figure 3 through Figure 5 summarize the parking demand profiles for the study area as a whole, on-street parking, and on-site campus parking throughout the course of a day. These figures do not include data from the expanded study area counted in October 2017, which will be discussed later in this memo. The blue charts represent the amount of spaces occupied, the green illustrates the number of cars with observed parking permits, and the tan indicates the number of empty spaces.

Figure 3 Study Area Utilization (Original Study Area)

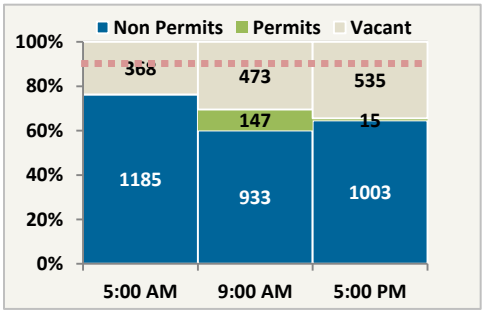


Figure 4 On-Street Utilization (Original Study Area)

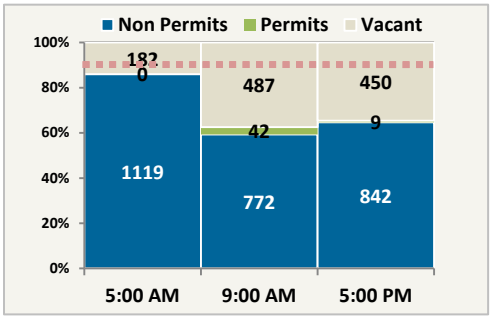


Figure 5 On-Site Campus Utilization

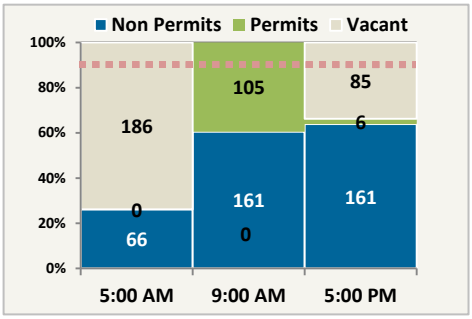
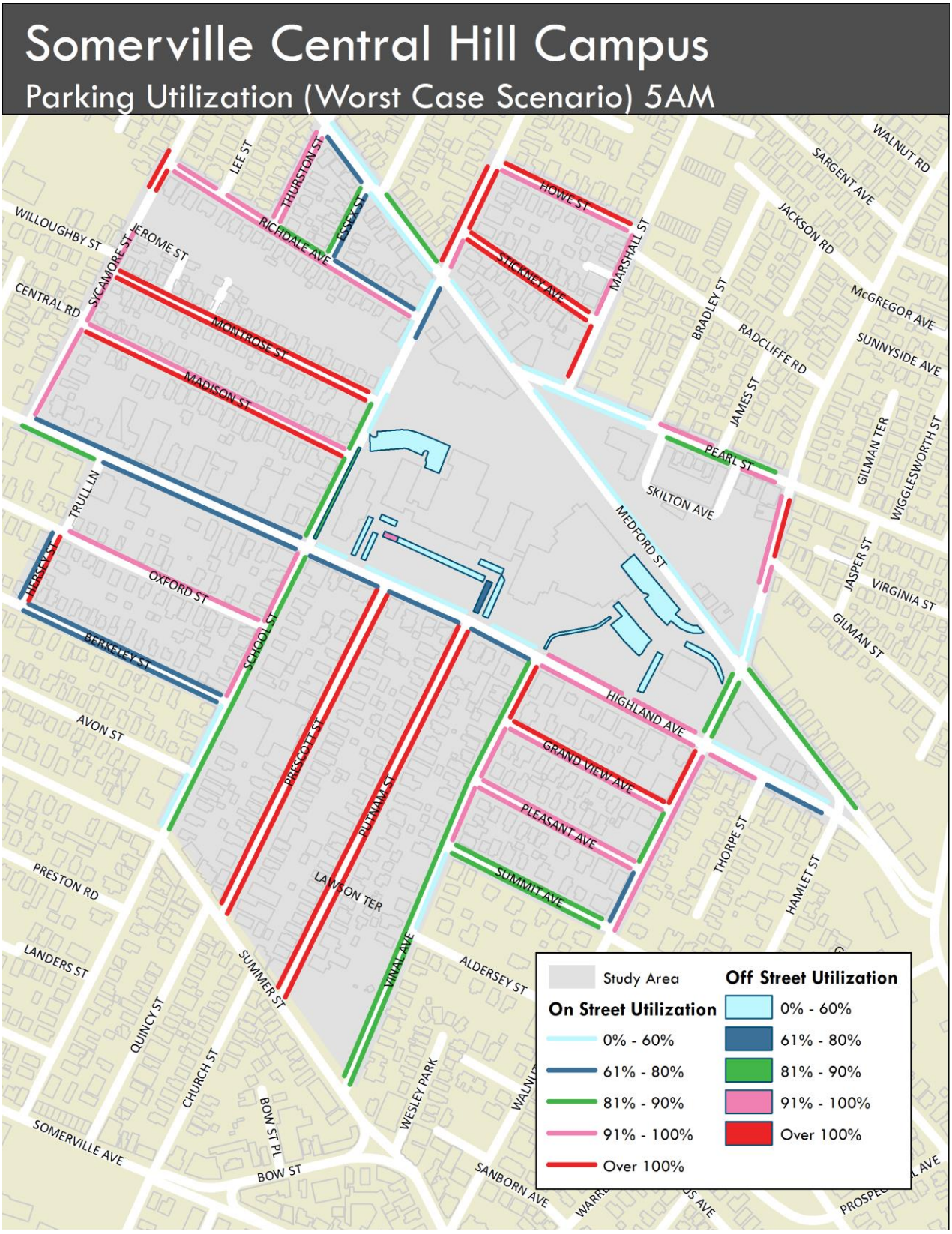
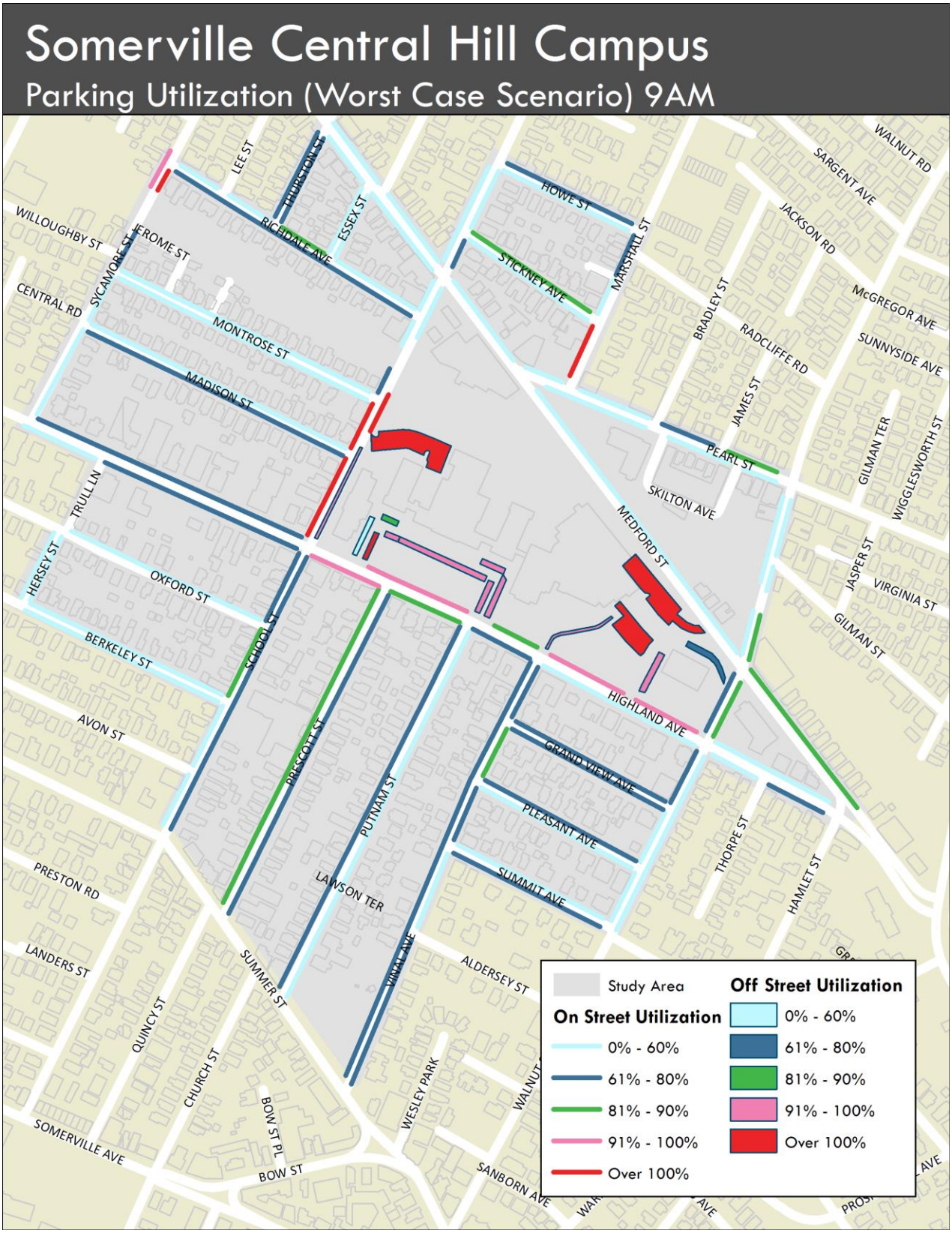


Figure 6 Parking Utilization 5AM (Worst Case Scenario)



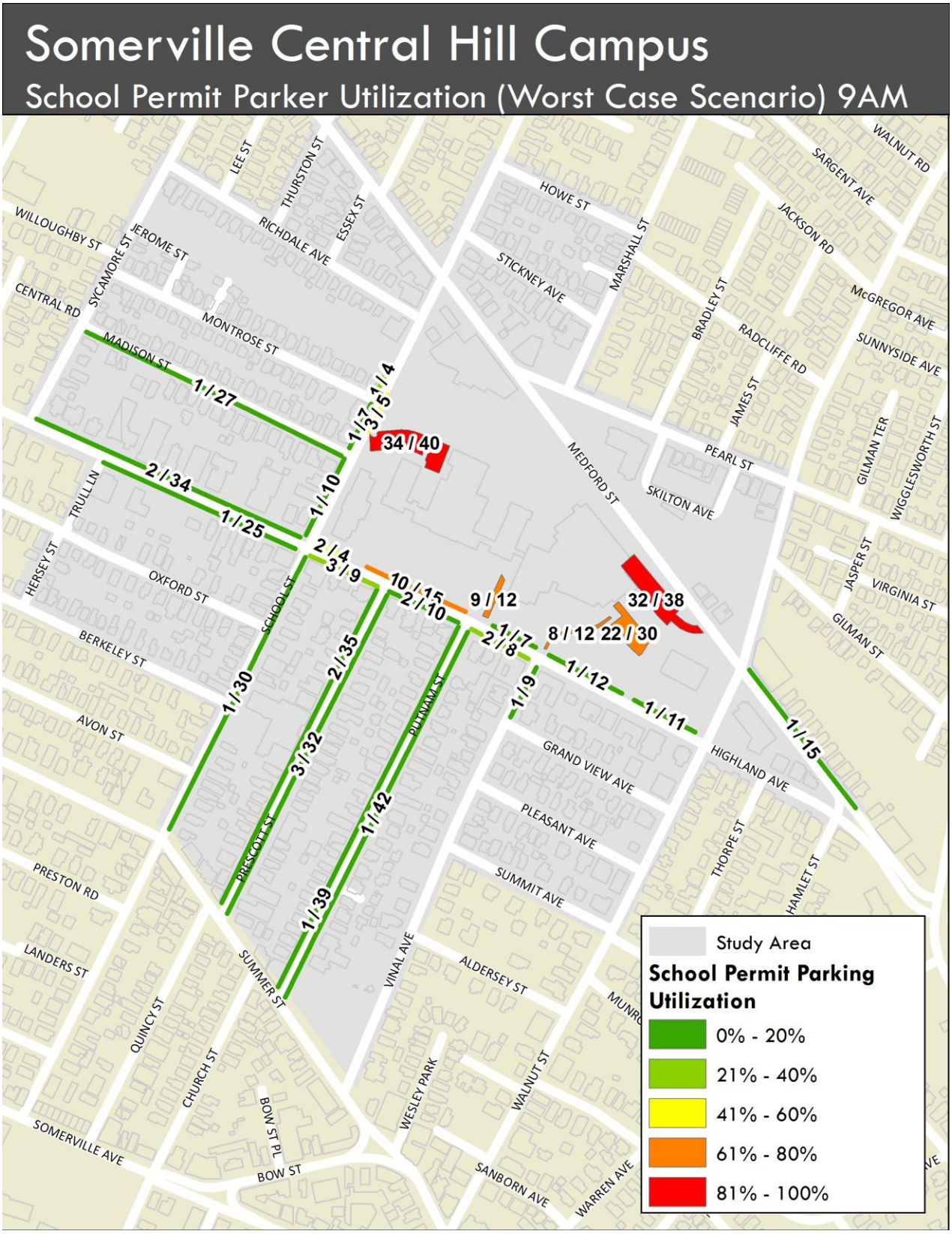
This map demonstrates the utilization of streets and lots in the study area during the 5am worst case scenario. Utilization of on-street parking spaces is very high (over 80%), but there is very low utilization in the parking lots.

Figure 7 Parking Utilization 9AM (Worst Case Scenario)



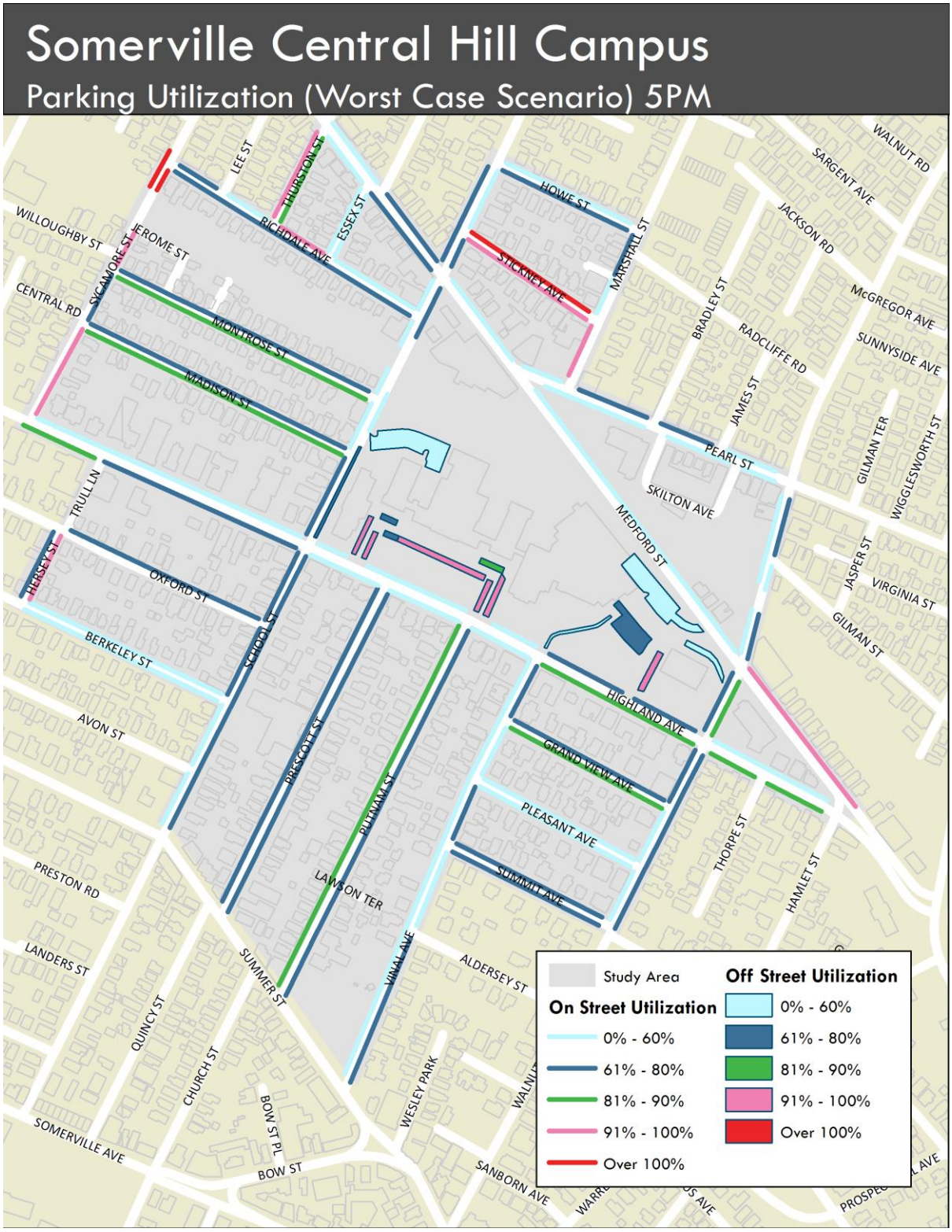
This map demonstrates the utilization of streets and lots in the study area during the 9am worst case scenario. At this time, the parking lots are almost completely utilized, but utilization of on-street parking is much lower (60%).

Figure 8 School Permit Parking Utilization 9AM (Worst Case Scenario)



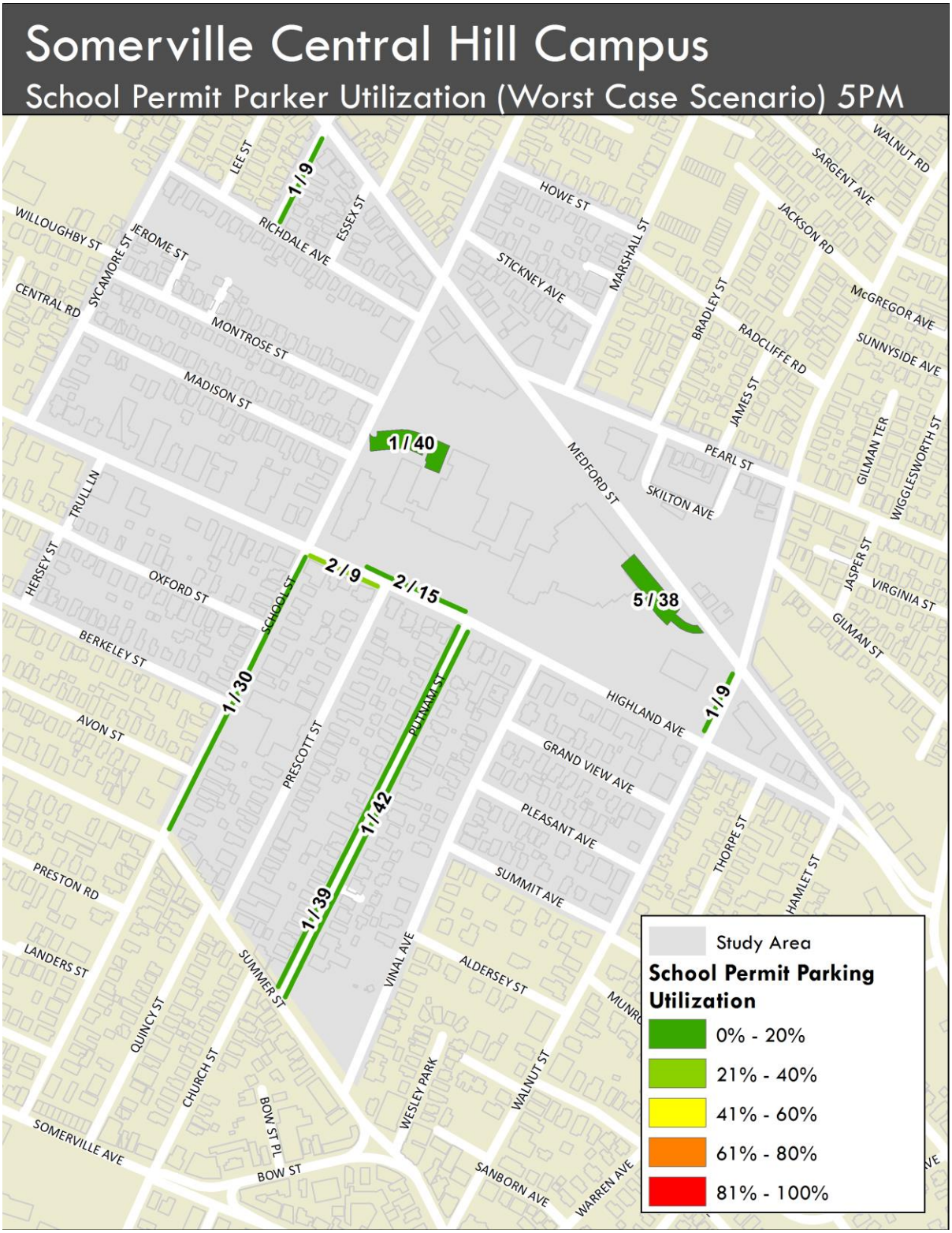
A more detailed permit count was conducted during the 9am survey to identify cars with school employee permits. This map shows the ratio of school employee parking permits compared to the number of spaces on each block (or in each lot) during the worst case 9am scenario. Permit parkers are generally confined to the lots, with very few parking on street.

Figure 9 Parking Utilization 5PM (Worst Case Scenario)



This map demonstrates the utilization of streets and lots in the study area during the 5pm worst case scenario. At this time parking is once again generally available on-campus, and utilization of on-street parking is much lower than during the 5am worst case scenario. This indicates that most employees have left work for the day, and many residents have not yet returned home and parked their cars on street.

Figure 10 School Permit Parking Utilization 5PM (Worst Case Scenario)



This map demonstrates there are very few school employee permit holders parking on street or in the lots during the 5pm worst case scenario, indicating that most school employee permit holders have left for the day.

EMPLOYEE PARKING DEMAND

Shifting On-Site Parking to Study Area Streets

The project team modeled the impact of shifting on-site campus parking to on-street parking by methodically distributing employees across the street blocks included in the study area, beginning with residential blocks nearest to the site and moving outward. To ensure a conservative analysis, the team:

- Used the 9am data as a baseline, which represents peak demand for on-site campus parking
- Assumed that no parking would be allowed on site and therefore that all 266 vehicles that can park on campus would park on street.
- Assumed that all cars with school employee permits that currently utilize on-street parking (27 in the worst-case scenario data) would continue to do so, resulting in a total of 293 employees parking on street.
- Limited utilization of each residential block to 85% to ensure availability for and minimize impacts to existing users.[2]

This analysis demonstrated that campus-related parking demand can be accommodated on-street within an approximately 1- to 2-block radius of the campus on non-street sweeping days, with an overall on-street utilization of 83%. As shown in Figure 11 through Figure 14, a majority of residential streets in the study area would be filled to a comfortable capacity of 85%, and there is significant capacity on the arterial streets (e.g., Highland Avenue and Medford Street) to accommodate fluctuations in demand.

Somerville's street sweeping program adds a layer of complication to shifting on-site parking to the streets in the study area since the street sweeping restrictions drop the available supply in the study area by over 300 spaces several days a month during the street sweeping season, which runs from April 1st through December 31st.

[2] In order to ensure that parking management systems are operating efficiently, a certain level of vacancy is preferred for on-street parking. It is ideal to have at least one empty on-street space per block free to ensure availability for and minimize impacts to existing users. This typically equates to about 1 out of 8 spaces free, or a target of 15 percent vacant per block. For arterial streets (e.g., Highland Avenue and Medford Street), the target is 90 percent.

Figure 11 Study Area Utilization (campus shift, original study area)

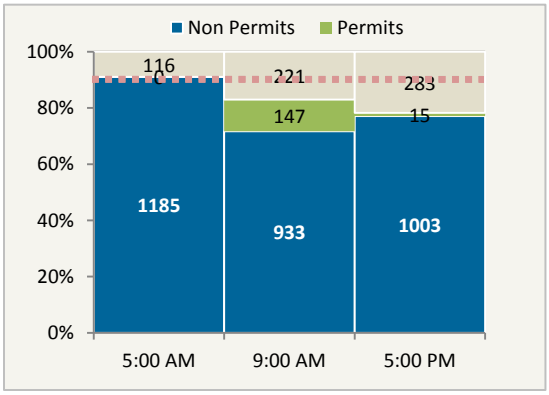


Figure 12 On-Street Utilization (campus shift, original study area)

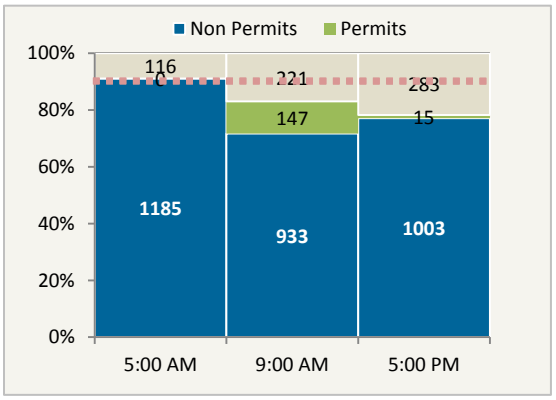


Figure 13 On-Site Campus Utilization (campus shift)

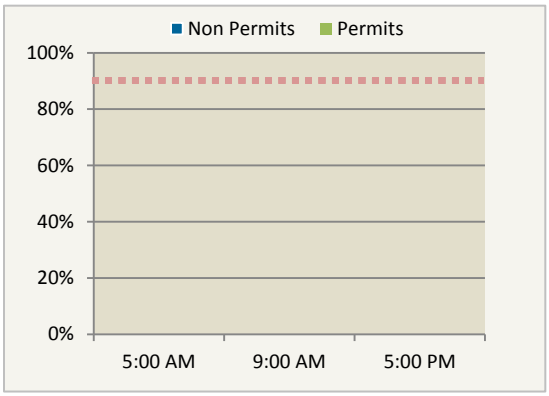
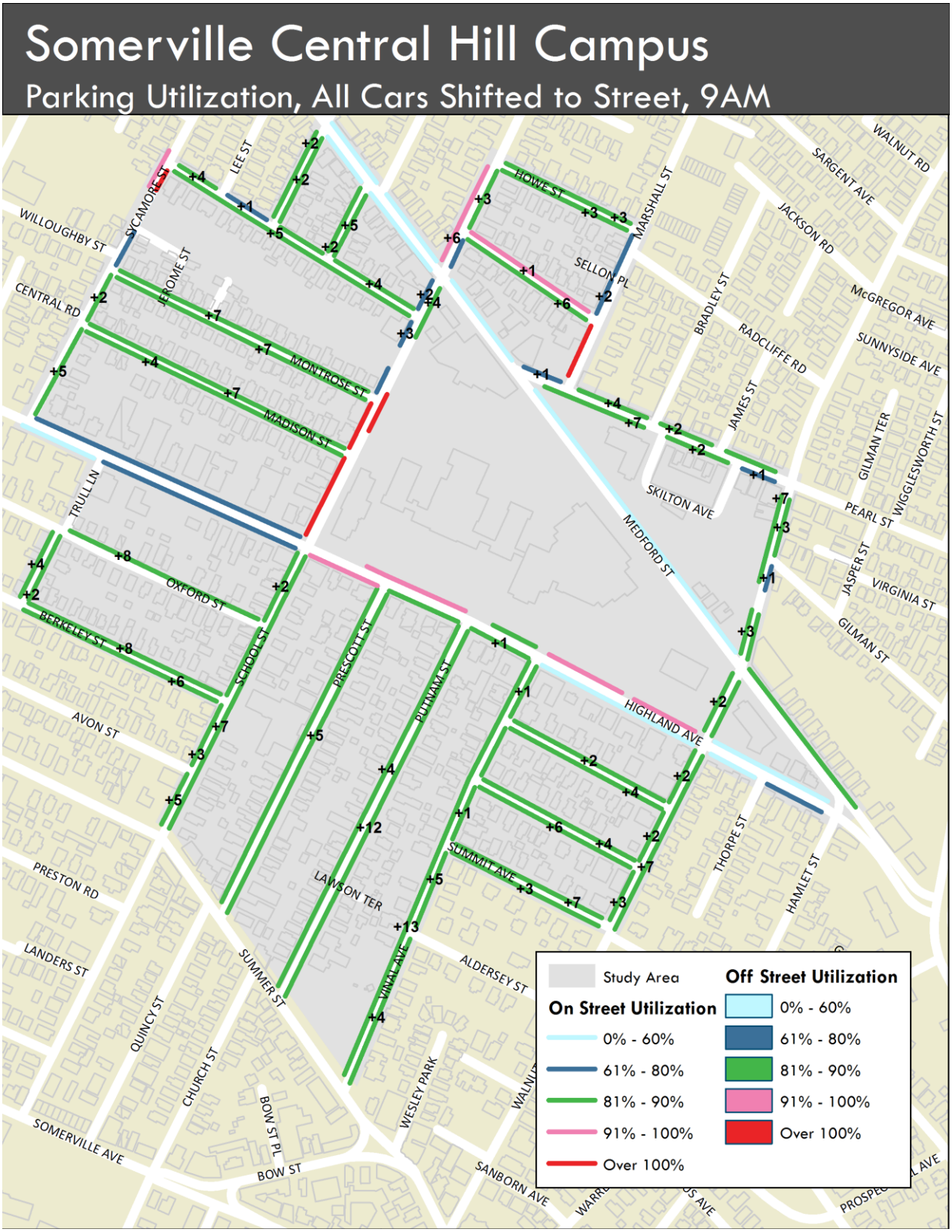


Figure 14 On-Site Campus Parking Shift to Study Area Streets



This map demonstrates the shift of all on-site campus parking to streets within the study area. The numbers on the map indicate the number of vehicles added to each side of the street in the modeling process. All streets in the original study area are able to accommodate the shift in on-site campus parking during non-street sweeping days, even when restricting utilization of each residential street to 85%. There is also availability on the arterial streets.

RECOMMENDATION: ZONAL PERMIT SYSTEM BASED ON STREET SWEEPING

To address capacity challenges created by street sweeping, the project team recommends creating an on-street permit parking program that is tied directly to the street sweeping schedule, which would allow employees flexibility to shift to nearby zones that have offset sweeping schedules. Details of the program would include the following:

- Dividing streets within the study area into parking zones based on sweeping schedules
- Assigning employees a parking permit sticker associated with a zone
  - Parking permits will direct employees to park in a primary zone on non-street sweeping days and in a secondary zone during street sweeping days
  - Assign an appropriate number of employees to each zone to achieve a target 85% utilization of on-street parking during non-street sweeping days. Utilization during street sweeping days may rise above this threshold due to reduction in overall supply, but these days only occur four times a month.

The project team mapped existing street sweeping zones and schedules within the study area, as shown in Figure 15 and Figure 16, and established two corresponding permit parking zones: Zone 1 to the west of School Street, Zone 2 to the east of School Street, and the Arterial Zone, which includes Highland Avenue, School Street, and Medford Street.

The project team then analyzed the zones to determine the number of permits that should be assigned to each and to ensure they have sufficient capacity to absorb employee parking during street sweeping. This analysis revealed that when there is street sweeping in Zone 1, Zone 2 and the Arterial Zone are able to absorb the overflow parkers from Zone 1. When there is street sweeping in Zone 2, however, Zones 1 and the Arterial Zone are unable to absorb the overflow. The project team therefore recommended expanding Zone 1 in order to accommodate overflow parkers from Zone 2 during street sweeping.

Figure 15 Street Sweeping Zones

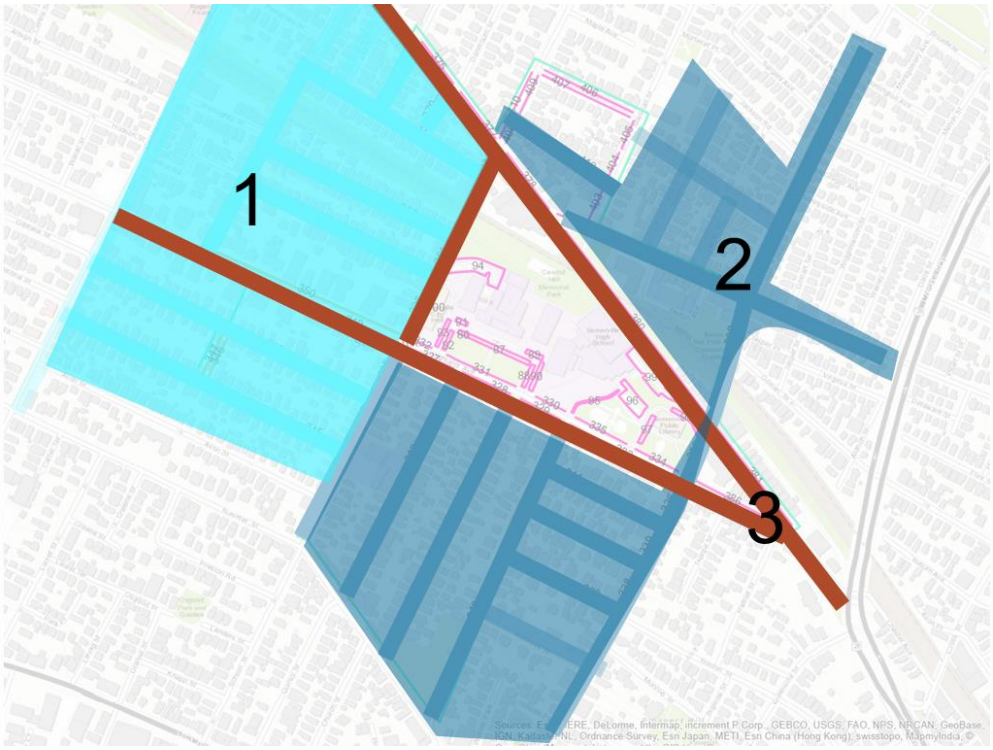


Figure 16 Illustrative Street Sweeping Schedule

Zone 1
Odd 1st and 3rd Thursday
Even 2nd and 4th Friday

Zone 2
Odd 1st and 3rd Friday
Even 2nd and 4th Monday

Zone 3
School
Odd Monday
Even Wed

Highland
Odd Wednesday
Even Monday

Medford
Odd Thursday

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
May 28	29 Zone 3	30	31 Zone 3	Jun 1 Zone 1	2 Zone 2	3
5	5 Zone 3	6	7 Zone 3	8	9 Zone 1	10
12	12 Zone 3 Zone 2	13	14 Zone 3	15 Zone 1	16 Zone 2	17
19	19 Zone 3	20	21 Zone 3	22	23 Zone 1	24
25	26 Zone 3 Zone 2	27	28 Zone 3	29	30	Jul 1

Expanded Study Area Analysis

To expand Zone 1, the project team added several streets to the west of School Street, as demonstrated in Figure 22 below, all of which are within a 10-minute (1/2 mile) walk of the Central Campus, and collected utilization data for each in October of 2017 as discussed above.

Using the updated study area, the team modeled again the impacts of shifting employee parking from the campus onto residential streets by methodically distributing employees across the street blocks, beginning with non-arterial blocks nearest to the site and moving outward as individual blocks reached 85% utilization. As in the previous analysis, the team used the 9am worst-case scenario utilization data as a baseline.

Permit Zone Assignment Recommendations

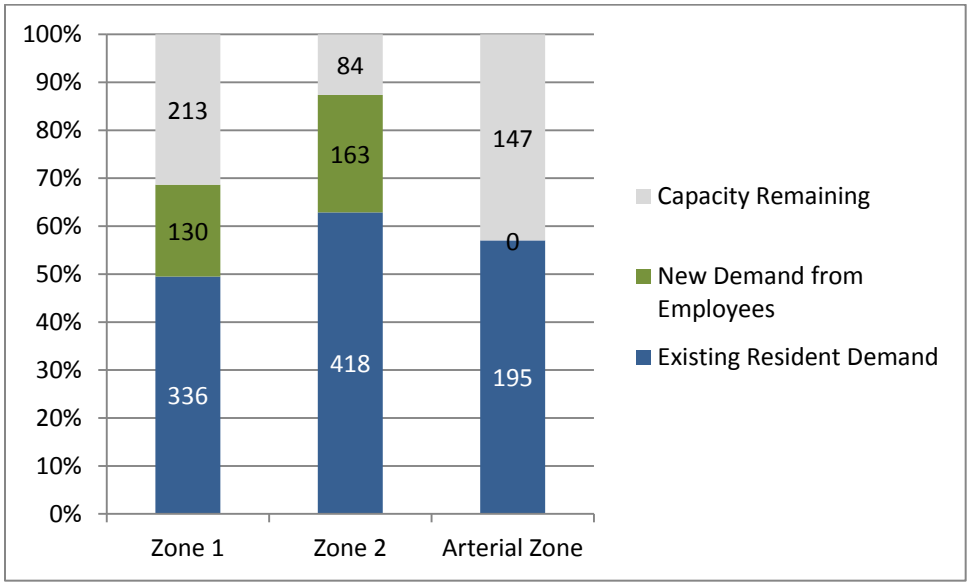
The team used this analysis to recommend the number of employees to assign per zone, which is displayed in Figure 17. The first row illustrates the total capacity of the streets within each zone. The second row indicates the existing demand during the worst case 9am scenario. The third row is the proposed number of employees assigned to each zone, and the fourth row adds the second and third rows together. The last row indicates the remaining supply or capacity within each zone after the employees are assigned within each zone.

Figure 17 Primary Permit Zone Assignments for Expanded Study Area (No Street Sweeping)

	Zone 1	Zone 2	Arterial Zone	Total
Overall Capacity	679	665	342	1,686
Existing Resident Demand[3] (% of overall capacity)	336 (49%)	418 (62%)	195 (57%)	949 (56%)
New Demand from Primary Employee Assignments	130	163	0	293
Existing + Employee Demand (% of overall capacity)	466 (69%)	581 (87%)	195 (57%)	1,242 (74%)
Capacity Remaining (% of overall capacity)	213 (31%)	84 (13%)	147 (43%)	444 (26%)

[3] Cars with employee permits are included in New Demand from Primary Employee Assignments, not in Existing Resident Demand.

Figure 18 Primary Permit Zone Capacity Analysis for Expanded Study Area (No Street Sweeping)



During street sweeping days in Zone 1 and Zone 2, on-street capacity will be extremely limited, so employee permit holders must move to alternate zones. The project team recommends the following arrangement, the results of which are shown in Figure 19, 20, and 21:

- Zone 1 permit holders are assigned Zone 2 or the Arterial Zone as their secondary parking zone to be used on street sweeping days in Zone 1
- Zone 2 permit holders are assigned Zone 1 or the Arterial Zone as their secondary parking zone to be used on sweeping days in Zone 2

Figure 19 Secondary Parking Zone Assignments & Capacity During Street Sweeping

		Zone 1	Zone 2	Arterial Zone	Total
No Street Sweeping	**Overall Capacity**	679	665	342	1,686
	Capacity Remaining (%)	213 (31%)	84 (13%)	147 (43%)	444 (26%)
Street Sweeping in Zone 1 Odd 1st and 3rd Thursday Even 2nd and 4th Friday	**New Demand from Secondary Employee Assignments (Parkers shifted from Zone 1)**	N/A (assumes no employees are able to park in Zone 1)	84	46	130
	Capacity Remaining (%)	0 (0%) (assumes 100% utilization of spots in Zone 1)	0 (0%)	101 (30%)	6%
Street Sweeping in Zone 2 Odd 1st and 3rd Friday Even 2nd and 4th Monday	**New Demand from Secondary Employee Assignments (Parkers shifted from Zone 2)**	163	N/A (assumes no employees are able to park in Zone 2)	0 (no need to shift employees into arterial zone)	163
	Capacity Remaining (%)	50 (7%)	0 (assumes 100% utilization of spots in Zone 2)	147 (43%)	197 (12%)

Figure 20 Secondary Parking Capacity During Street Sweeping in Zone 1

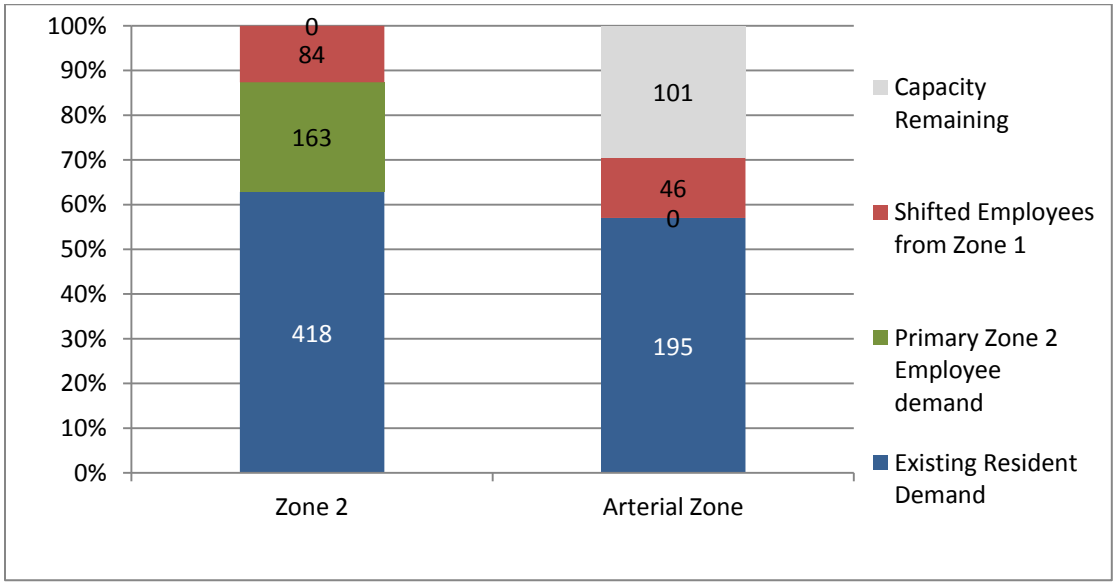
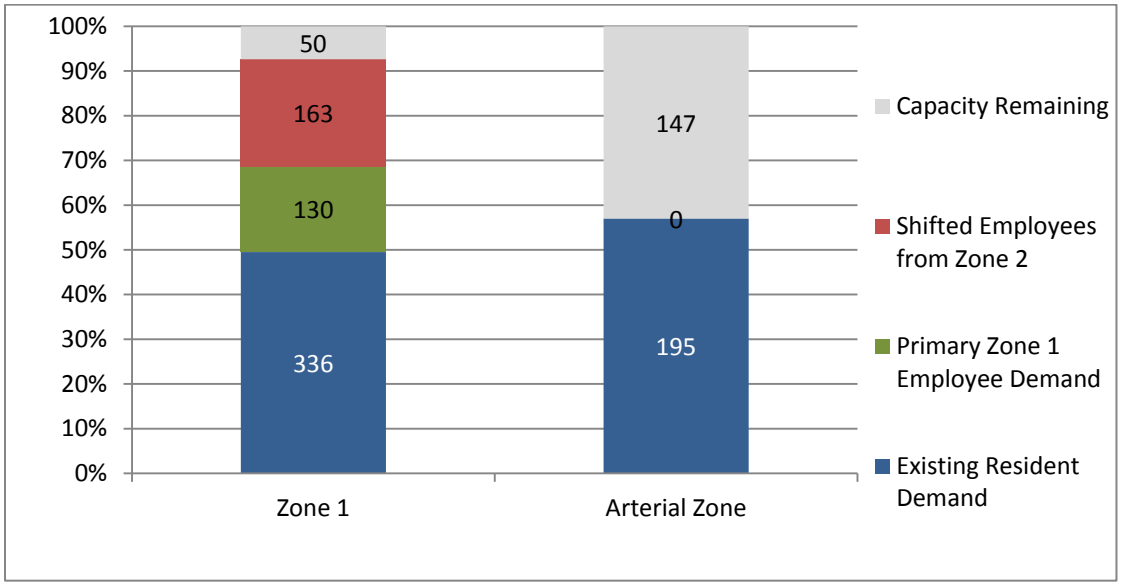


Figure 21 Secondary Parking Capacity During Street Sweeping in Zone 2



Parking Zone Recommendations

The map in Figure 22 displays the boundaries of each parking zone. The boundaries of the primary study area are within a quarter-mile (5-minute walk) of the site, while the Zone 1 Extended study area extends up to a half-mile (10-minute walk). Boundaries are based on street sweeping schedules to ensure that all parkers may shift to their secondary zone, as needed, on street sweeping days.

- Zone 1 begins west of School Street and is bounded at Central Street to the west, Medford Street to the north, and Avon Street to the south.
- Zone 2 includes all streets in the study area north of Medford Street, as well streets south of Highland Avenue, north of Summer Street, east of School Street, and west of Walnut Street.
- The Arterial Zone includes the three primary thoroughfares in the study area: Medford Street, Highland Avenue, and School Street between Medford and Highland.

These zones accommodate all employees on normal days while leaving enough capacity to accommodate fluctuations in on-street parking and therefore minimize impacts on residents. These zones also provide enough capacity for all employees to park in alternate zones on street sweeping days.

Figure 23 outlines the recommended parking zone assignments for Central Campus employees.

Figure 22: Recommended Employee Permit Parking Zones

Figure 23: Recommended Employee Permit Parking Zone Assignments

		Secondary Zone			
		Zone 1	**Zone 2**	**Arterial Zone**	**Total**
Primary Zone	**Zone 1**	n/a	84	46	130
	Zone 2	163	n/a	0	163
	Arterial Zone	0	0	n/a	0
	Total	163	84	46	293