

Final Report

Bethesda PLD Parking Demand Study

Assessment of Existing and Future Conditions

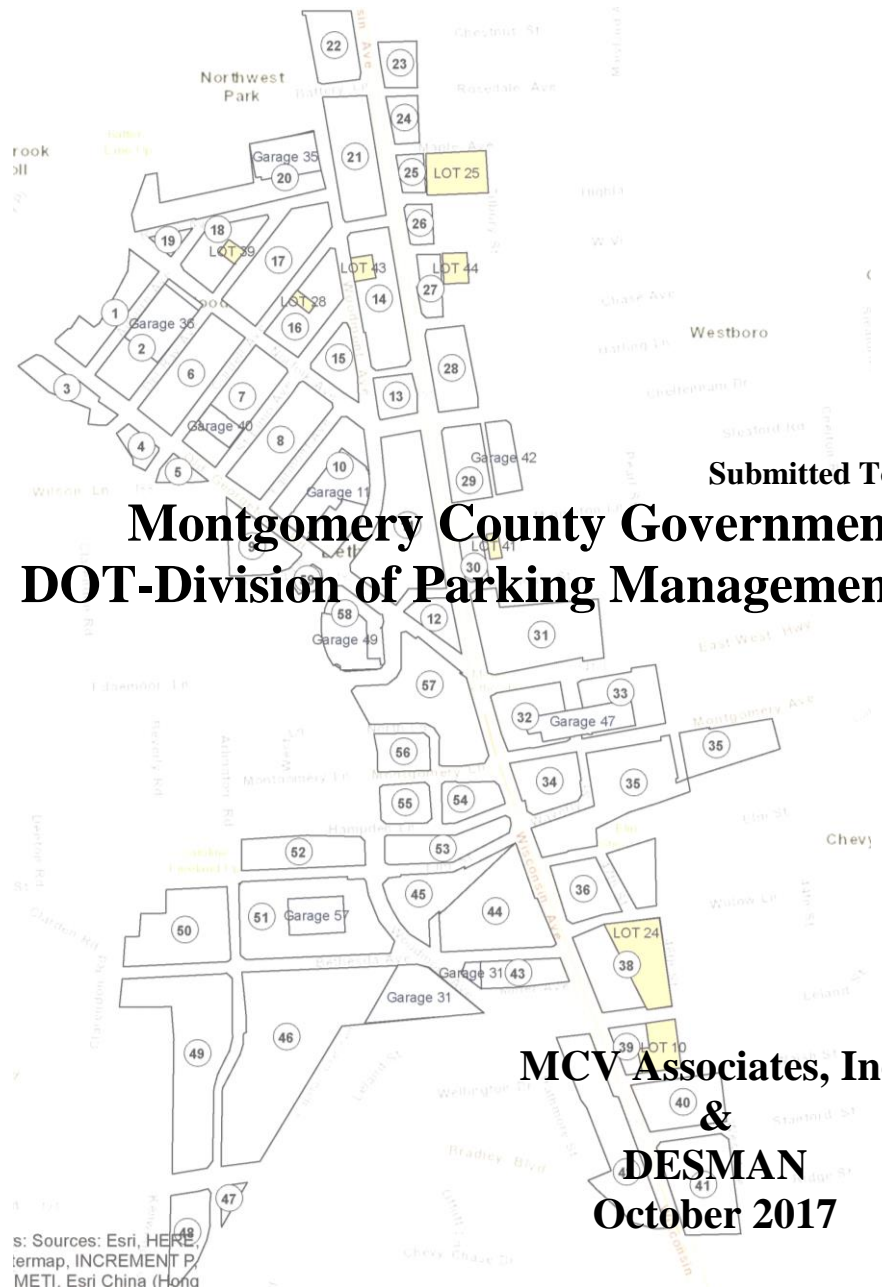


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Executive Summary

MCV and DESMAN (Project Team) have been retained by the Montgomery County Department of Transportation to assess current and future public parking supply and demand conditions within the Bethesda Parking Lot District (PLD). Given knowledge of the relationship between current parking activity and land use activity, the analysis presents a projection of future parking supply and demand to determine relative surplus or deficit conditions. The goal of the study is to determine if the supply of publicly available spaces in downtown Bethesda sufficiently meets current and future needs.

Assessment of Existing Supply and Utilization

There are 7,926 on-street and County owned/operated off-street parking spaces in the PLD, of which 6,544 spaces (83%) are located within parking structures, 576 (7%) are located within surface lots and 806 spaces (10%) are on-street spaces.

There are approximately 14,849 private owned/operated parking spaces within the PLD. Out of that total, 11,483 are available to the general public for a fee. These spaces include both monthly and transient (hourly/daily) parking. Some of the public parking facilities are exclusively monthly parking. The other 3,366 private spaces are restricted for private use only for a specific business and are unavailable to the general public. These parking inventory numbers do not include restricted private residential parking facilities. The focus of this study is on the use and availability of publicly available spaces which include County and privately owned facilities.

Overall, the County-owned on- and off-street parking system experiences peak utilization at 12 PM on a weekday when 73% of the spaces are occupied. Peak utilization occurs at 1 PM on Friday when 72% of the spaces are occupied. Peak utilization occurs at 7 PM on Saturday when 61% of the spaces are occupied. When taking into account a practical capacity factor of 90%, the County-owned off-street parking facilities currently have a surplus of 1,210 spaces and a surplus of 103 spaces on-street during the peak weekday period (12 PM).

Based on the surveys, the PLD has a practical surplus of 3,726 spaces on a weekday and 4,117 spaces on a Friday for all County and privately-owned public parking. For County-owned on- and off- street facilities there was a practical surplus of 1,313 weekday spaces, 1,402 Friday spaces, and 2,319 weekend spaces during the peak periods. Note that although the system-wide analysis identified a practical surplus of parking, certain parking facilities and curbside spaces do experience a parking deficit during peak periods. However, significant parking surpluses do exist in adjacent blocks.

Assessment of Future Supply and Demand Conditions

A future parking demand analysis was performed which considered developments in the pipeline and the lease/occupancy of existing vacant building space in the PLD. The future demand analysis did not consider Bethesda Downtown Plan development potential. Within the PLD there will be adequate parking to support demand when considering all public parking. If County parking was responsible for supporting all excess demand from pipeline developments there is a projected deficit during the peak weekday and Friday periods. As long as the existing private public parking facilities continue to offer public parking there will be adequate parking available in the PLD area. However, there are blocks and areas where deficits currently and will continue to exist in the future.

Estimate of Future Surplus/Deficit by Area

For the long-term analysis the PLD was divided into five areas: Northeast, Northwest, Central, Southeast, and Southwest. There is a substantial deficit projected in the Central area of the PLD during the peak weekday period. There are also consistent minor deficits projected in the Northeast area of the PLD which has minimal off-street parking to support the density of land uses. It is suggested that a future public parking facility would be best suited between the Central and Northern blocks of the PLD.

Bethesda Downtown Plan Impact

The recently adopted Bethesda Downtown Plan has allotted for a total of 32.4 million square feet of development in the Bethesda Overlay Zone as the full-build condition. There is currently 23.6 million square feet of building space and 4.6 million square feet of development planned in the pipeline, which were analyzed as part of the future demand analysis (Section 4, Phase III). Remaining developable space in the Overlay Zone is 4.2 million square feet. The impact on parking from 4.2 million square feet of development was analyzed. Three scenarios were analyzed to get a range of full-build parking conditions.

The Bethesda Downtown Plan calls for using four County parking lots for public park space in Bethesda. This would include displacing County lots 25, 44, 24, and 10, which would equate to a loss of 489 spaces within the PLD. Further, 130 on-street parking spaces will be lost to bike lanes proposed in the Plan. The parking deficit if only the County-owned public parking was relied upon to support future pipeline and full-build development in the Bethesda PLD ranges from a low of 2,672 spaces to a high of 3,367 spaces.

SECTION 1

Introduction

MCV and DESMAN (Project Team) have been retained by the Montgomery County Department of Transportation (County) to perform an update to the Parking Demand Assessment Study of the Bethesda Parking Lot District (PLD). The goals of the study are to document the existing parking conditions in Bethesda, assess the impact of future development, determine if the current parking system is under or over-built.

To achieve the goals of the Study, the project methodology has been designed to be completed in the following three Phases:

- Phase I – Assessment of Existing Conditions
- Phase II – Existing Land Use (GIS) Analysis
- Phase III – Development Impact Analysis

Note that given the volume of data collected and disseminated for this effort, all background information/spreadsheets are included in a separate Technical Appendix. Please refer to the Appendix for detailed information.

Study Area

The Department of Parking Management currently employs a sector and block coding system for the blocks located within the PLD. **Exhibit A** illustrates the PLD boundaries and the existing sector and block coding system.

Exhibit A: Study Area Boundary and Block Groups

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand),



SECTION 2

PHASE I: EXISTING PARKING CONDITIONS

Parking Supply

Public parking supply in the PLD consists of publicly available off-street and on-street spaces. Exhibit B identifies the location of the County-owned off-street public parking facilities located within the PLD boundaries. Overall, there are 7,926 on-street and County owned and operated off-street parking spaces in the PLD. **Figure 1** presents the breakdown of County owned parking inventory. The Bethesda PLD includes 7,120 County-owned public off-street parking spaces of which 6,544 (83%) are contained in 9 public parking structures and 576 (7%) which are located in 8 surface parking lots. There are a total of 806 on-street parking spaces within the PLD which equates to 10% of the total supply of County-owned public parking. Of that total 378 (46%) spaces are dedicated to 1-hour parking, 430 (53%) spaces to 2-hour parking and 12 (1%) spaces to 3-hour parking.

In addition to the inventory of County-owned public parking spaces, the Project Team also inventoried the supply of privately owned parking facilities. There are three types of private parking facilities in the PLD, which include: private public, private, and residential restricted. “Private public” parking facilities are privately-owned but available to the public for either monthly or hourly/daily parking. “Private” parking facilities are exclusively available to a specific user or business (i.e. business employees and customers) and not the general public. “Residential restricted” parking facilities are gated facilities in residential buildings that are only available to tenants of the building.

A comprehensive inventory of the private public and private parking facilities were conducted. Public parking includes both monthly and transient (hourly/daily) parking. The Project Team was unable to inventory all residential restricted parking. We did our best to reach out to the property managers of each residential building in the PLD to identify how much parking is provided on-site. It was determined that there are a total of 14,849 private public and private parking spaces in the PLD. The majority of the privately owned parking in the PLD is available to the general public. Approximately, 11,483 (77%) of the privately-owned parking spaces are available to the public for a fee. **Figure 2** illustrates the breakdown inventory of all parking spaces in the Bethesda PLD.

Figure 1: County Owned Parking Inventory

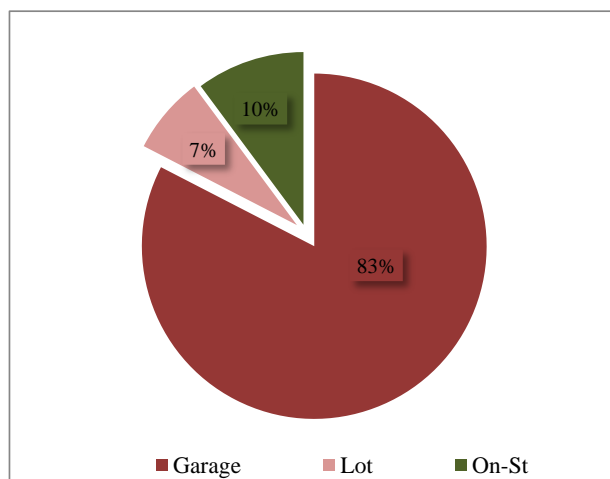


Figure 2: Breakdown of Public and Private Parking

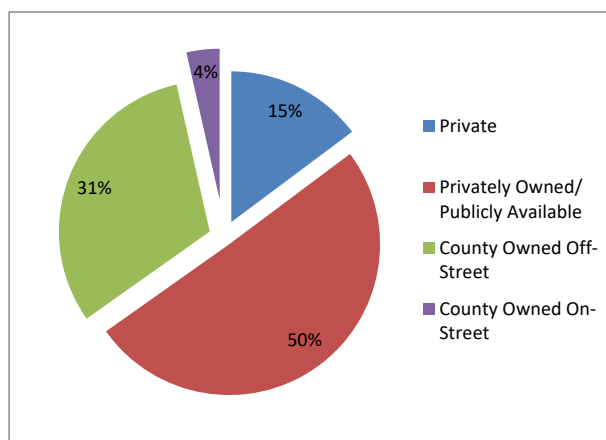
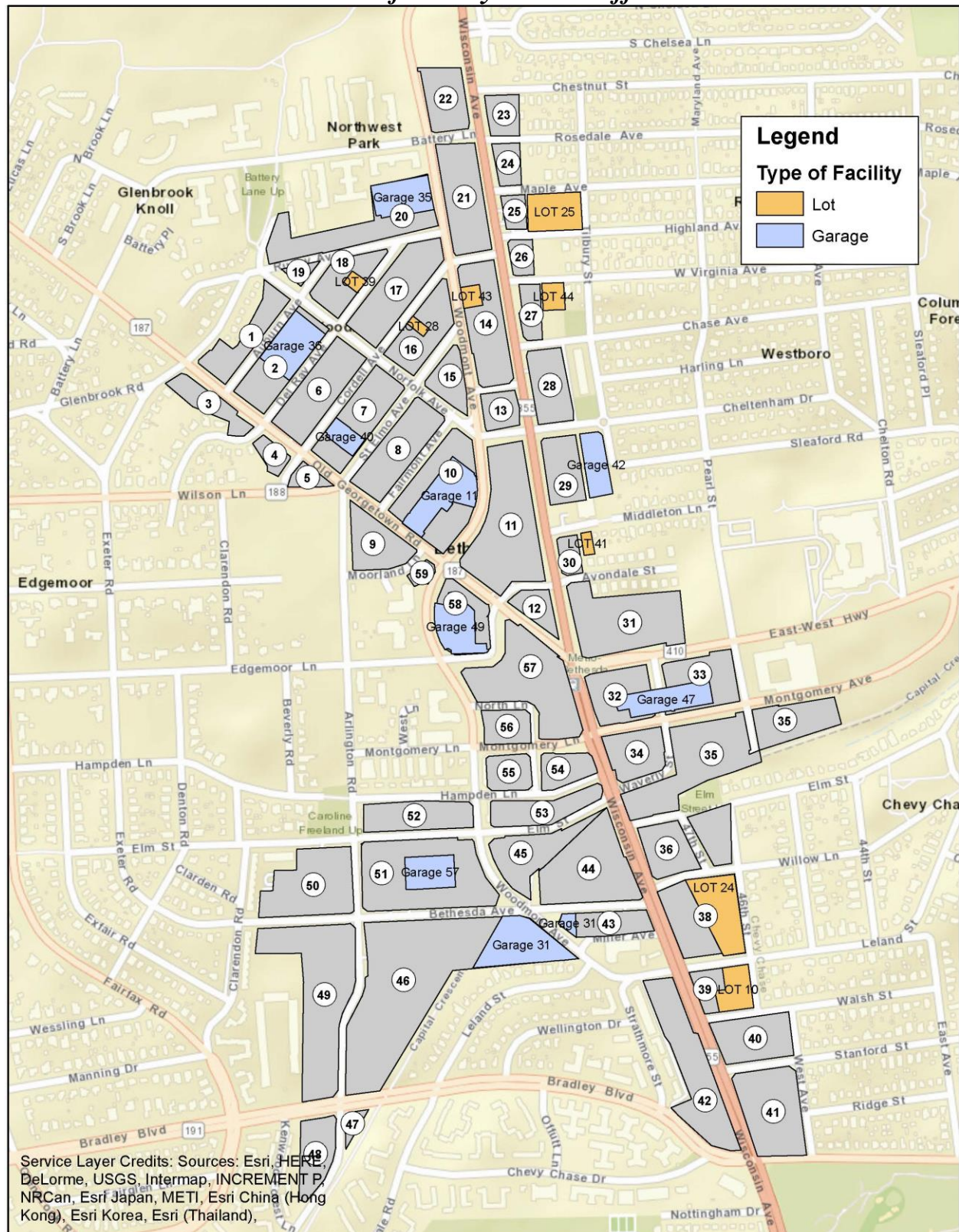


Exhibit B: Location of County-Owned Off-Street Facilities



Approximately half of the public parking in the PLD is privately owned, 30% of the parking is County-owned off-street public parking, 4% is on-street parking, and 15% is private parking available to specific business employees and patrons. This analysis does not include residential restricted parking facilities.

The first phase of the study concentrates on analyzing the occupancy and surplus/deficit of the publicly available parking, both County and privately-owned, in the PLD.

Parking Utilization

The Project Team conducted hourly parking utilization and duration of stay surveys in all County parking facilities and curbside areas within the Bethesda PLD during the course of a typical weekday, Friday and Saturday between March 23, 2017 and April 5, 2017. The typical weekday count was performed between 10 AM and 8 PM. The Friday and Saturday counts were performed between 11 AM and 9 PM.

The private parking facilities were surveyed on Thursday, April 7, 2017 and Friday, April 8, 2017. Occupancy counts were performed on Thursday during the afternoon (i.e. 11 AM to 1 PM) and on Friday during the evening (i.e. 6 PM to 8 PM). Parking occupancy information for each of the private parking facilities was also collected based on conversations with business owners, property managers, and parking operators.

In order to accurately assess the stress on the parking system in relation to parking utilization, the concept of practical capacity needs to be discussed. The level of utilization within a facility, block or study area may reach a level where potential parkers become frustrated when trying to locate an available space and therefore perceive the facility as full. This is particularly problematic for drivers who wish to remain parked only for a short period of time (shoppers, diners, etc). For the purpose of this study, a practical capacity factor of 90% was used to analyze the parking conditions in the PLD. Therefore, if a 100-space parking lot has 95 parked vehicles during the peak hour, then a practical deficit of 5 spaces would exist.

Below is a summary of the total peak utilization of the County's on- and off-street publicly available parking system on a weekday, Friday and Saturday:

Weekday at 12 PM

- 5,821 (73%) spaces of on- and off-street parking occupied
- 4,779 (73%) spaces of garage parking occupied
- 421 (73%) spaces of lot parking occupied
- 621 (77%) spaces of on-street parking occupied

Friday at 1 PM

- 5,732 (72%) spaces of on- and off-street parking occupied
- 4,693 (72%) spaces of garage parking occupied
- 427 (74%) spaces of lot parking occupied
- 612 (76%) spaces of on-street parking occupied

Saturday at 7 PM

- 4,815 (61%) spaces of on- and off-street parking occupied
- 3,779 (58%) spaces of garage parking occupied
- 442 (77%) spaces of lot parking occupied
- 594 (74%) spaces of on-street parking occupied

The peak utilization of the County's off- and on-street parking occurred at 12 PM on a typical weekday at which time 5,821 (73%) of the 7,926 County-owned publicly-available on- and off-street parking spaces were occupied. The Friday and weekday peak parking utilization were very similar. On Saturday the peak utilization dropped by almost 12%. The on-street parking consistently had the highest occupancy during the weekday. **Figures 3, 4 and 5** illustrate the weekday, Friday and Saturday peak parking occupancy in County facilities. This analysis shows that the majority of the available parking in the PLD is located in the garages, which is expected since 83% of the County-owned parking is located in garages.

Figure 3: Weekday Occupancy in County Facilities at 12 PM

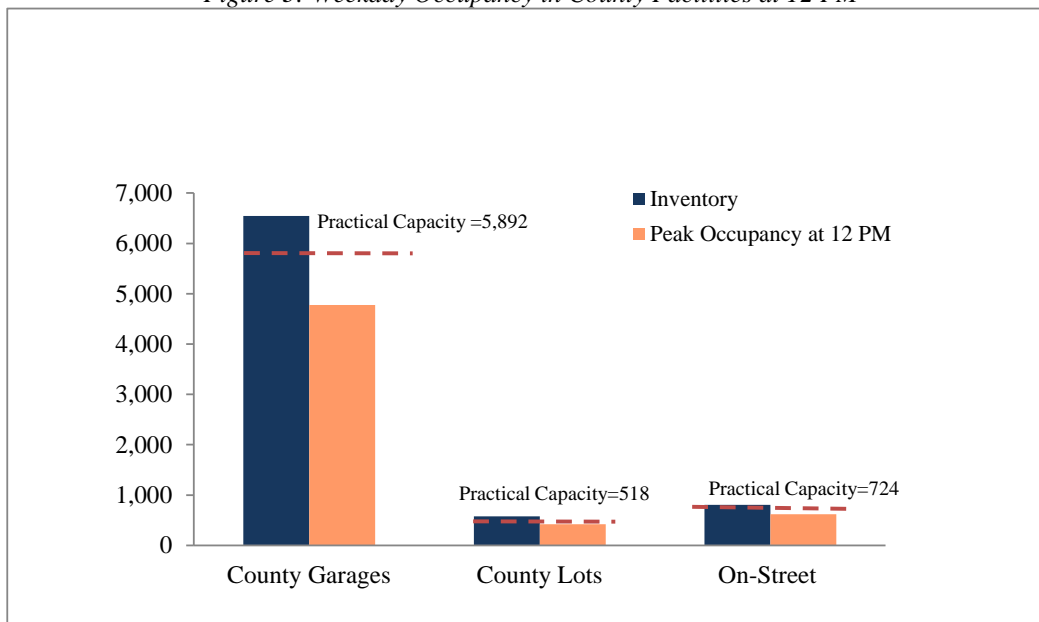


Figure 4: Friday Occupancy in County Facilities at 1 PM

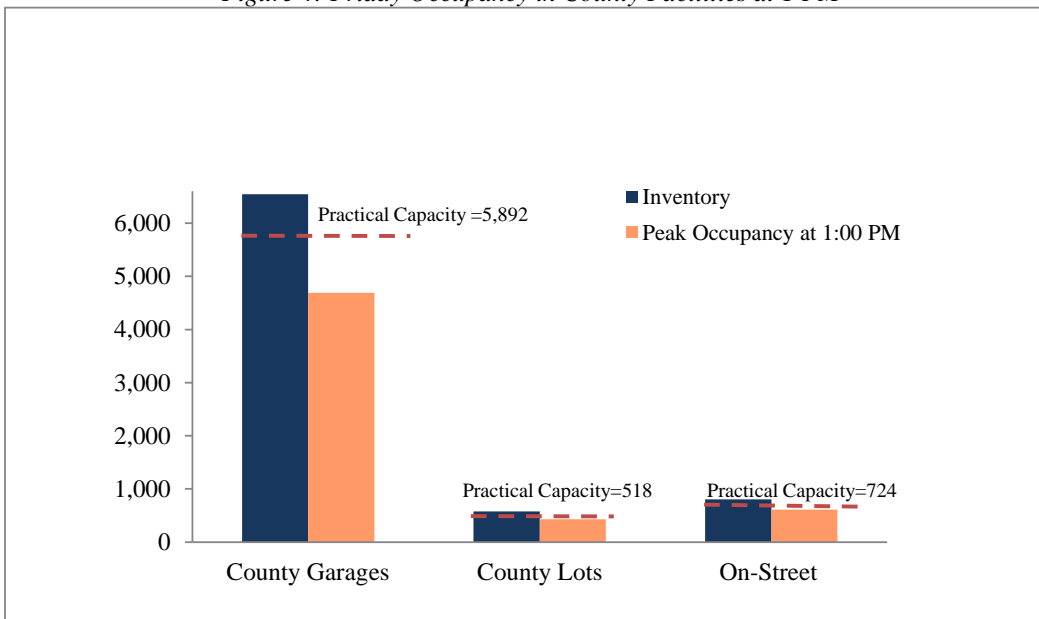
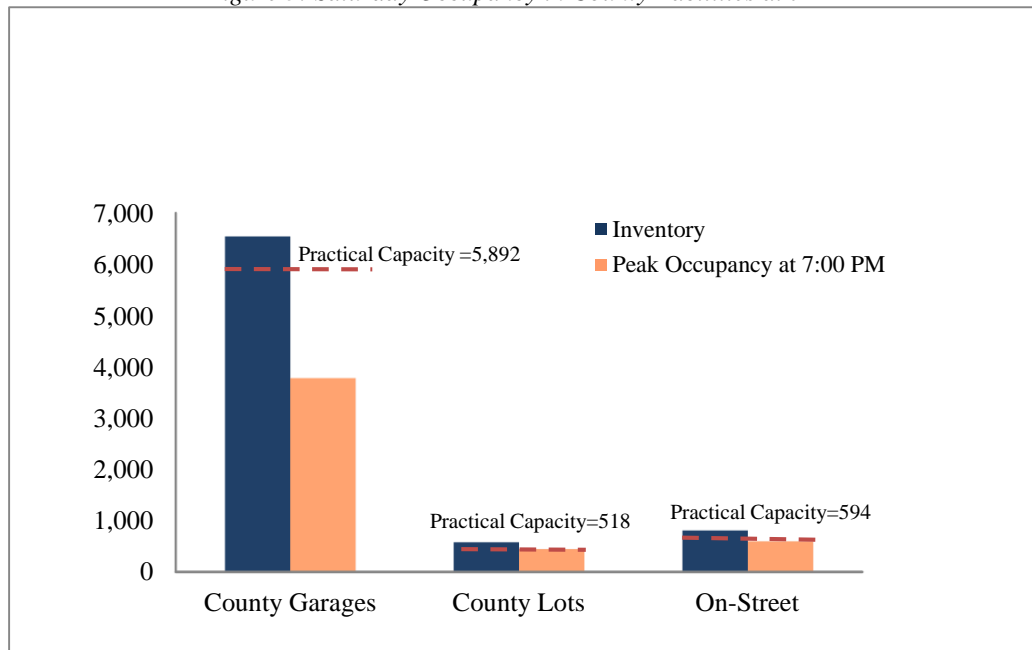


Figure 5: Saturday Occupancy in County Facilities at 7 PM



Parking Surplus/Deficit in Publicly-Available Facilities both County and Privately Owned

Apart from the County garages, some privately-owned facilities are also open to the general public. There are a total of 19,409 spaces available to the public in the PLD between County and privately-owned facilities and on-street parking. Of these publicly-available spaces approximately 60% are privately owned. **Figures 6 and 7** show the practical capacity of parking and the peak occupancy for County owned, private public, and the total of all public parking (off- and on-street) in the PLD for the weekday and Friday counts. Private parking not available to the public and only available to a specific business was not considered. Since no count was performed of the private parking areas on Saturday, only the weekday and Friday analyses were conducted. An analysis of the County parking areas for Saturday was conducted.

Below is a summary of the peak utilization of the County on- and off-street parking and private public parking facilities:

Weekday at 12 PM

- 5,821 (73%) spaces of on- and off-street County-owned parking occupied
- 7,919 (69%) spaces of the private public parking occupied
- 13,740 (71%) spaces of the County and privately owned public parking occupied
- 3,726 public spaces available during the peak parking period

Friday at 1 PM

- 5,732 (72%) spaces of on- and off-street County-owned parking occupied
- 7,618 (66%) spaces of the private public parking occupied
- 13,350 (69%) spaces of the County and privately owned public parking occupied
- 4,117 public spaces available during the peak parking period

Figure 6: Weekday Peak (12 PM) Occupancy of County Parking & Privately-Owned but Publicly Available Facilities

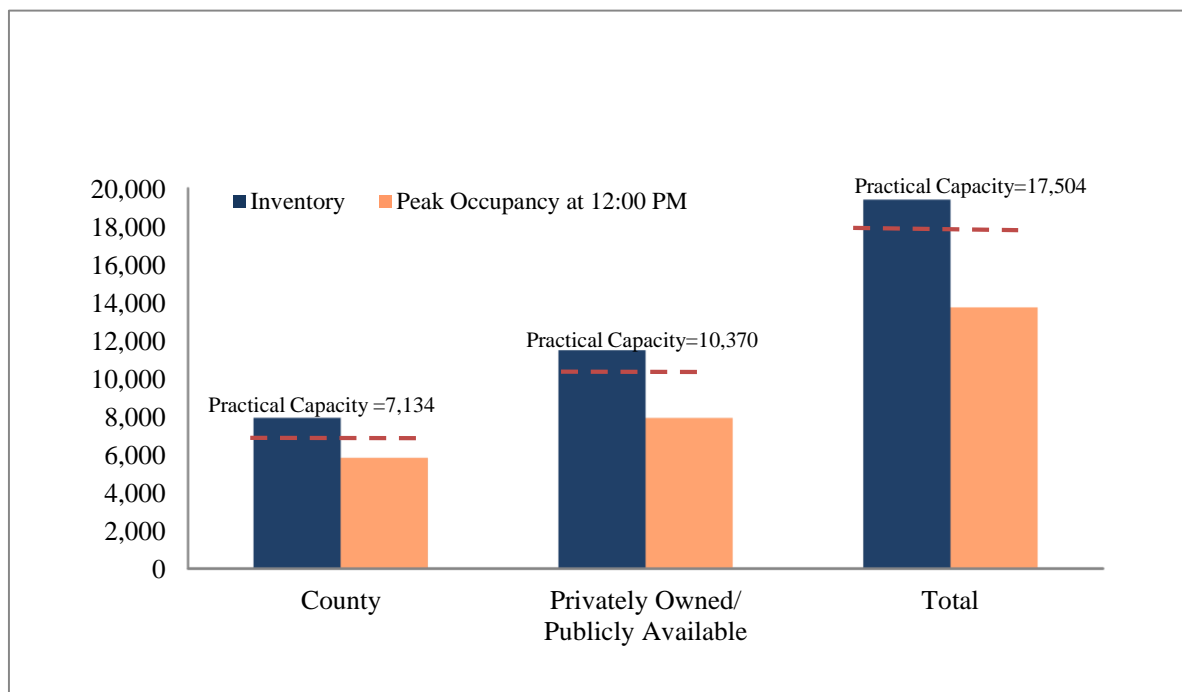
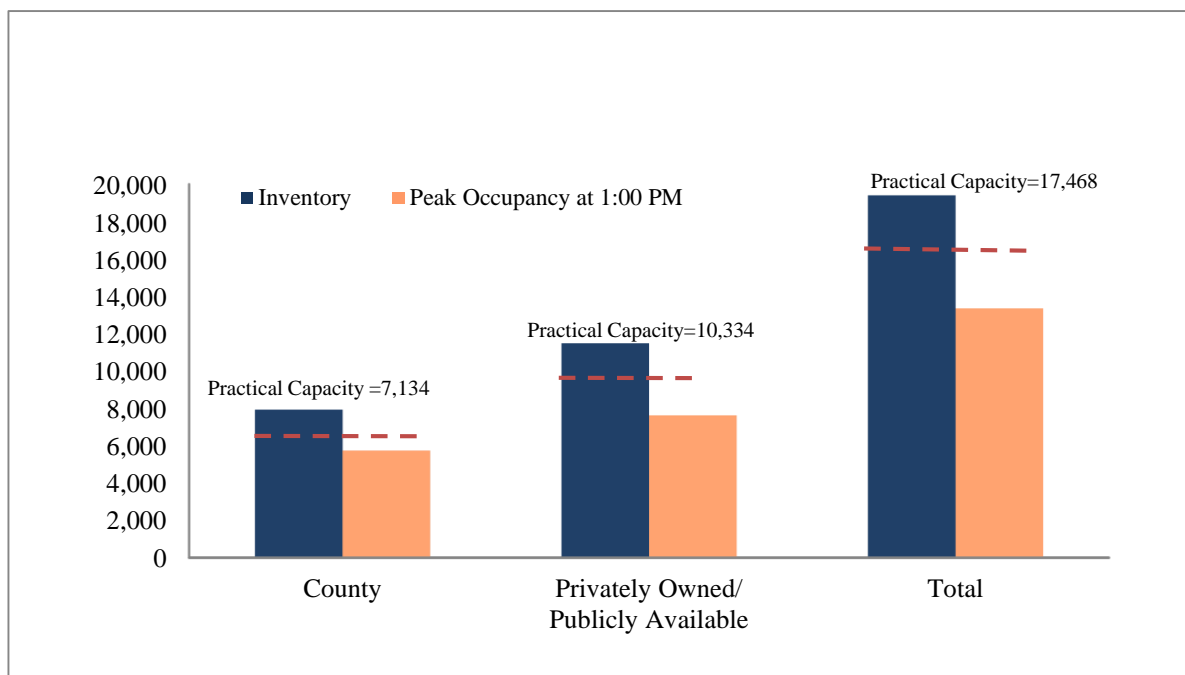


Figure 7: Friday Peak (1 PM) Occupancy of County Parking & Privately-Owned but Publicly Available Facilities



The overall peak utilization of the public parking in the PLD is during a weekday at 12 PM when approximately 71% of parking is occupied. The County-owned parking is slightly more occupied than the privately-owned public parking facilities. This analysis shows that the public parking in the PLD is well utilized, but there is approximately 3,726 public spaces available during the peak period considering the practical capacity (90% of inventory).

Exhibits C1 and C2 summarize the surplus/deficit by block of the County (on- and off-street) and privately-owned public parking in the PLD for the weekday and Friday peak periods, respectively. This analysis shows that currently most of the blocks within the PLD are operating at a surplus of 100 spaces or greater during the peak parking period. Public parking deficits were observed in the north and central areas of the PLD.

Exhibits D1, D2, and D3 summarize the surplus/deficit by block of only the County on- and off-street parking in the PLD for the weekday, Friday and Saturday peak periods, respectively. Overall, there is a surplus of 1,313 spaces during the peak weekday period among the County parking facilities, with no greater than a 5 space deficit on any one block.

Parking Turnover and Duration of Stay

In addition to the public parking utilization surveys, the Project Team also completed a license plate survey to monitor the length of time each vehicle occupied at a single County-owned public parking space and to determine how many vehicles utilized a specific parking space throughout the course of the day. The results of the turnover survey by block are summarized in Appendix tables.

Below is a summary of the parking utilization, average length of stay, and space turnover for the County-owned parking both on- and off-street during a weekday, Friday and Saturday:

Weekday (10 AM to 8 PM)

- Utilization: 8,418 vehicles in garages; 1,454 vehicles in lots; 4,112 vehicles on-street
- Average Length of Stay: 4.7 hours in garages; 2.4 hours in lots; 1.4 hours on-street
- Average Vehicle Turnover per Space: 1.29 in garages; 2.52 in lots; 5.1 on-street

Friday (11 AM to 9 PM)

- Utilization: 8,382 vehicles in garages; 1,372 vehicles in lots; 3,947 vehicles on-street
- Average Length of Stay: 4.2 hours in garages; 2.4 hours in lots; 1.5 hours on-street
- Average Vehicle Turnover per Space: 1.28 in garages; 2.38 in lots; 4.9 on-street

Saturday (11 AM to 9 PM)

- Utilization: 9,496 vehicles in garages; 1,612 vehicles in lots; 4,168 vehicles on-street
- Average Length of Stay: 3.3 hours in garages; 2.8 hours in lots; 1.5 hours on-street
- Average Vehicle Turnover per Space: 1.45 in garages; 2.8 in lots; 5.17 on-street

Based on the turnover and duration of stay analysis the garages are the most utilized, have a greater length of stay, but less turnover. On-street parking has the shortest length of stay and higher turnover. Saturday experienced the highest utilization and turnover per space compared to the weekday.

Exhibit C1: Weekday Peak Hour Surplus/Deficit of County and Privately-Owned Public Off- and On-Street Spaces by Block at 12 PM

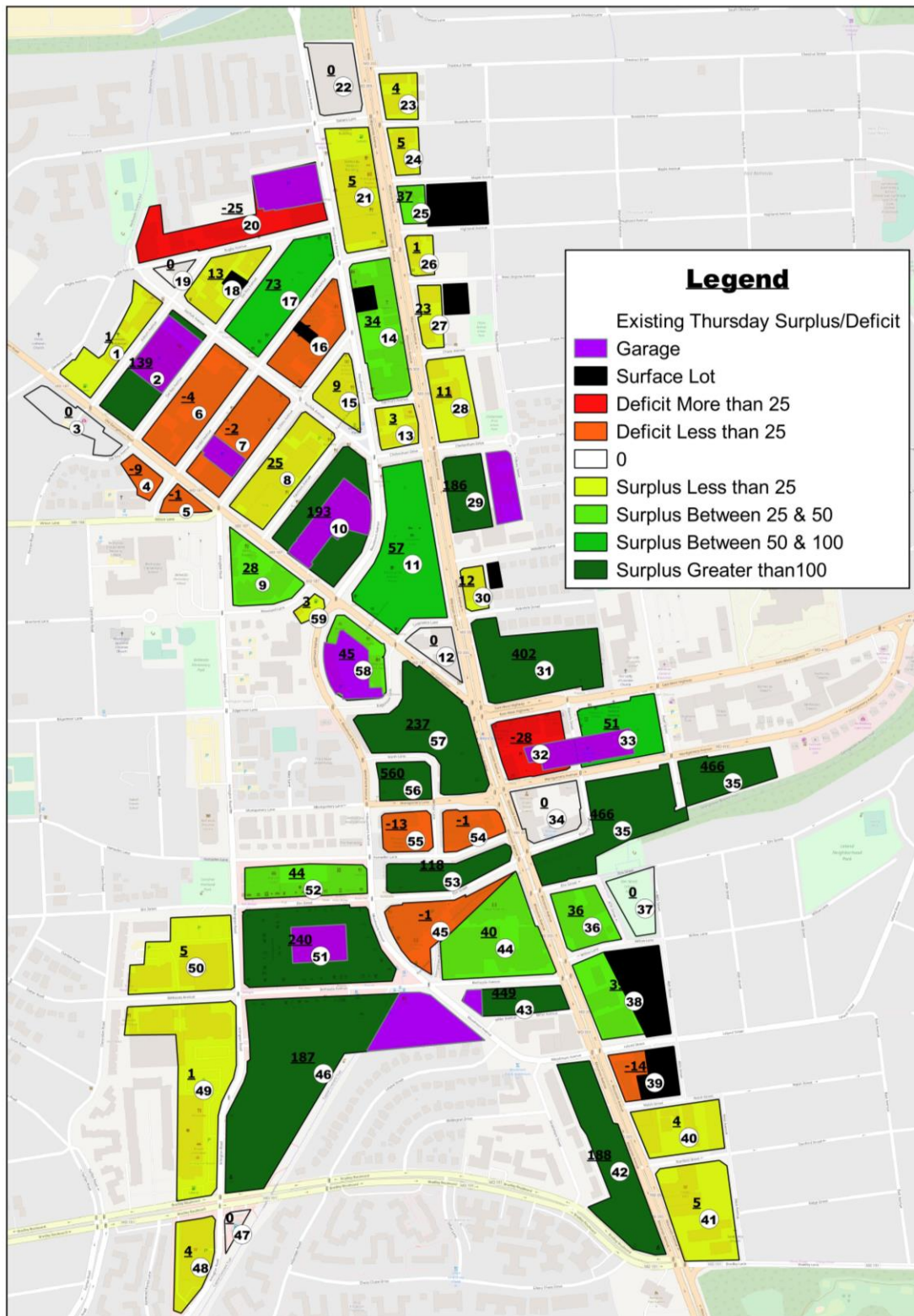


Exhibit C2: Friday Peak Hour Surplus/Deficit of County and Privately-Owned Public Off- and On-Street Spaces by Block at 1 PM

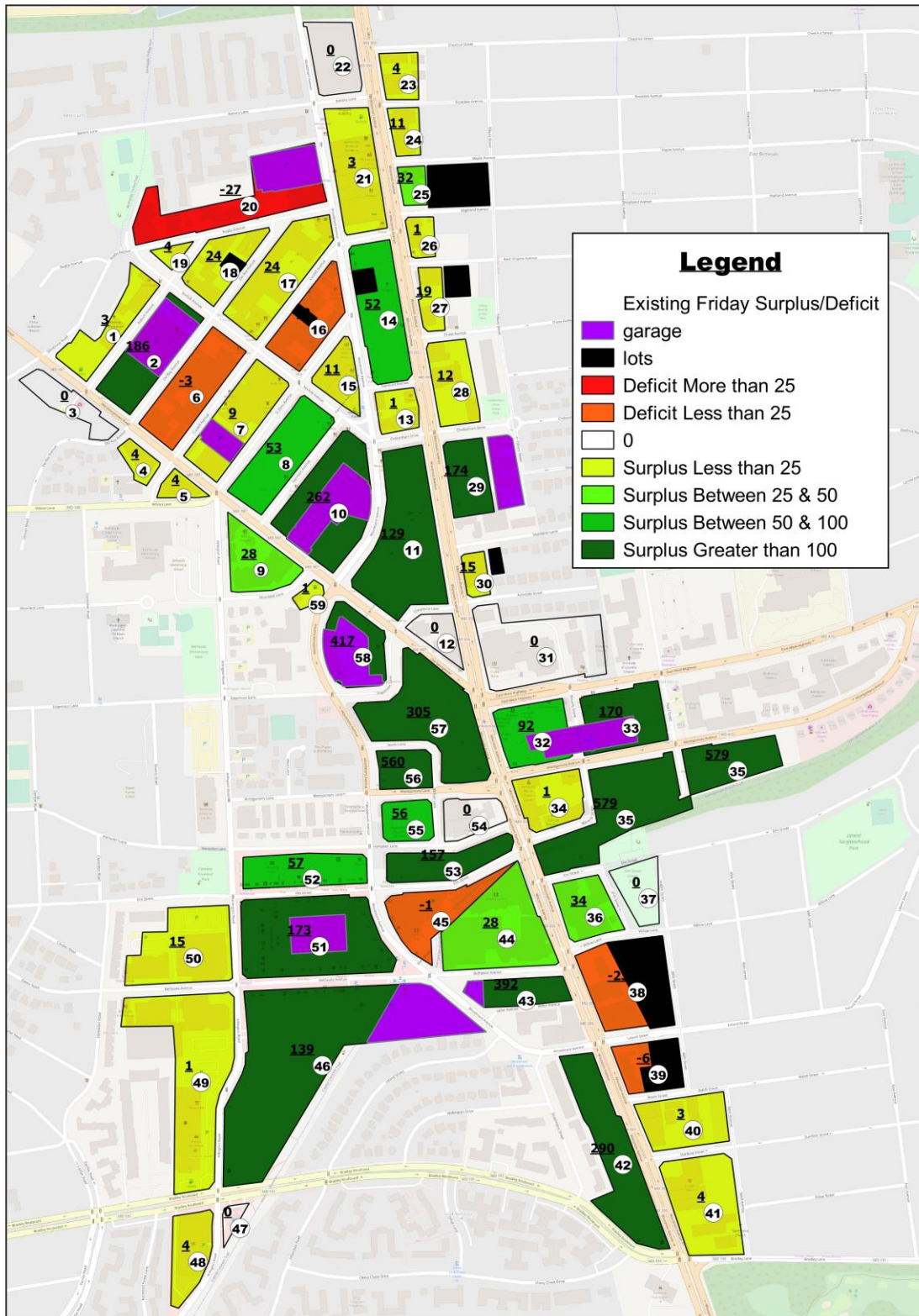


Exhibit D1: Weekday Peak Hour Surplus/Deficit of County-Owned Off- and On-Street Spaces by Block at 12 PM

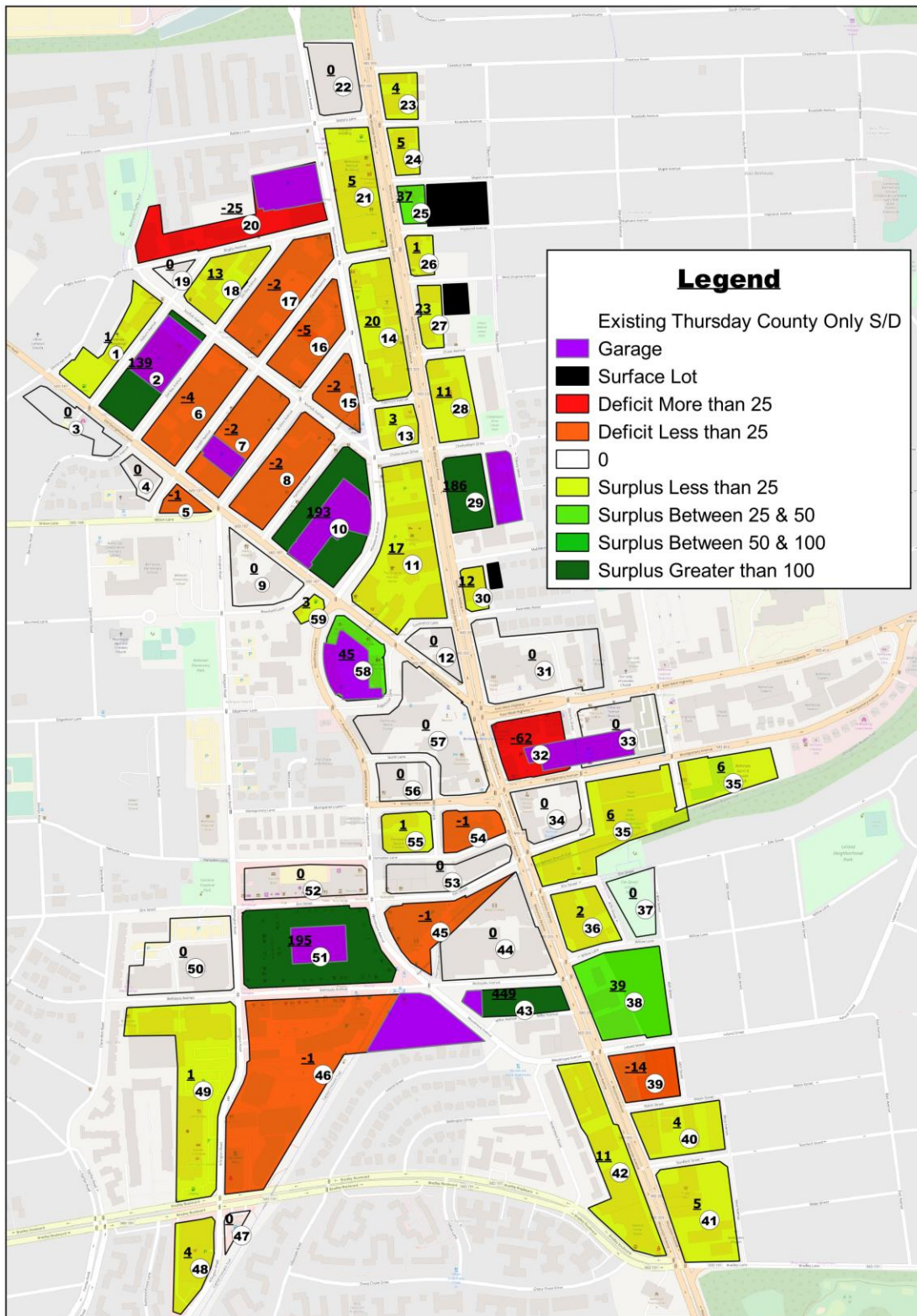


Exhibit D2: Friday Peak Hour Surplus/Deficit of County-Owned Off- and On-Street Spaces by Block at 1 PM

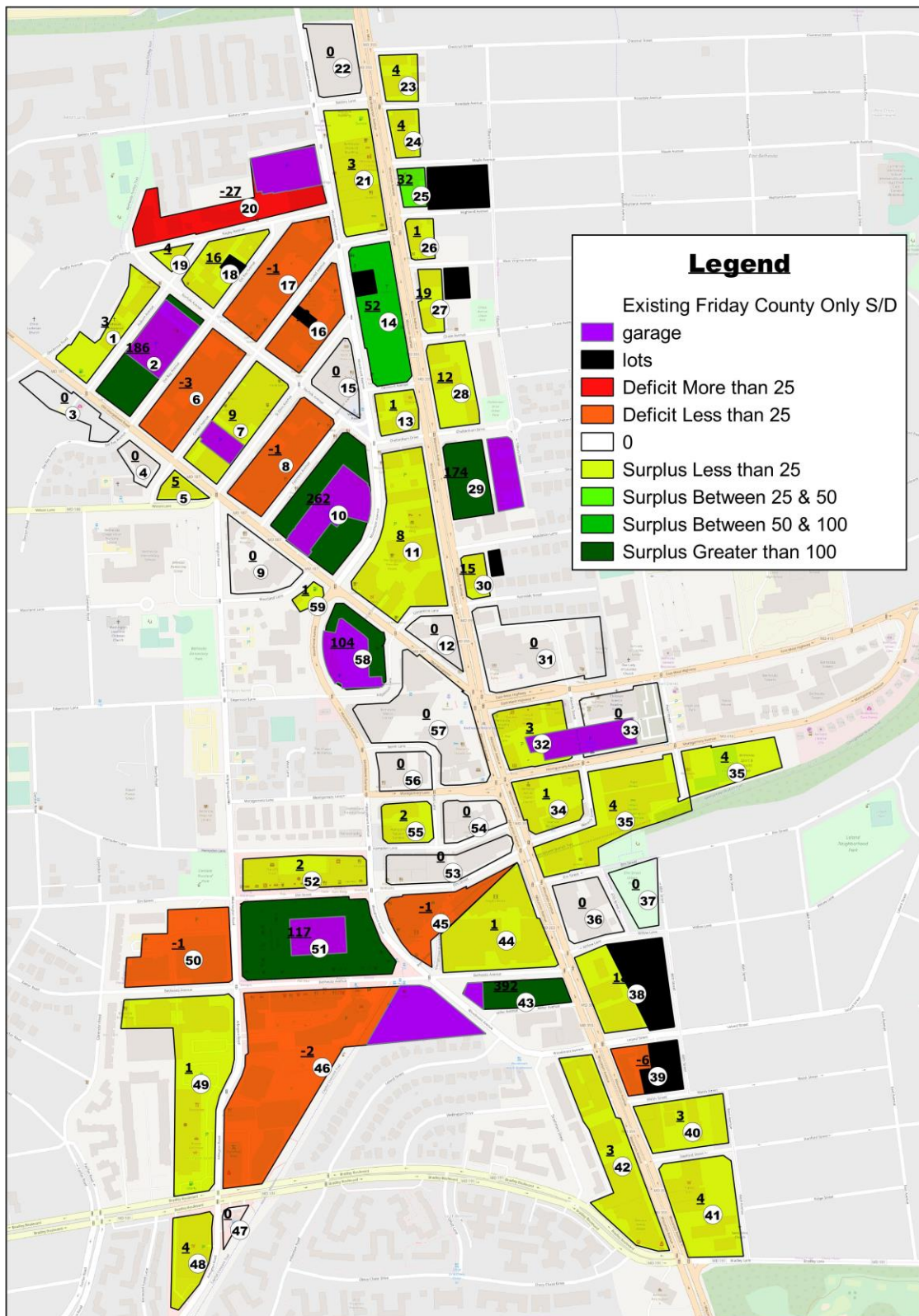
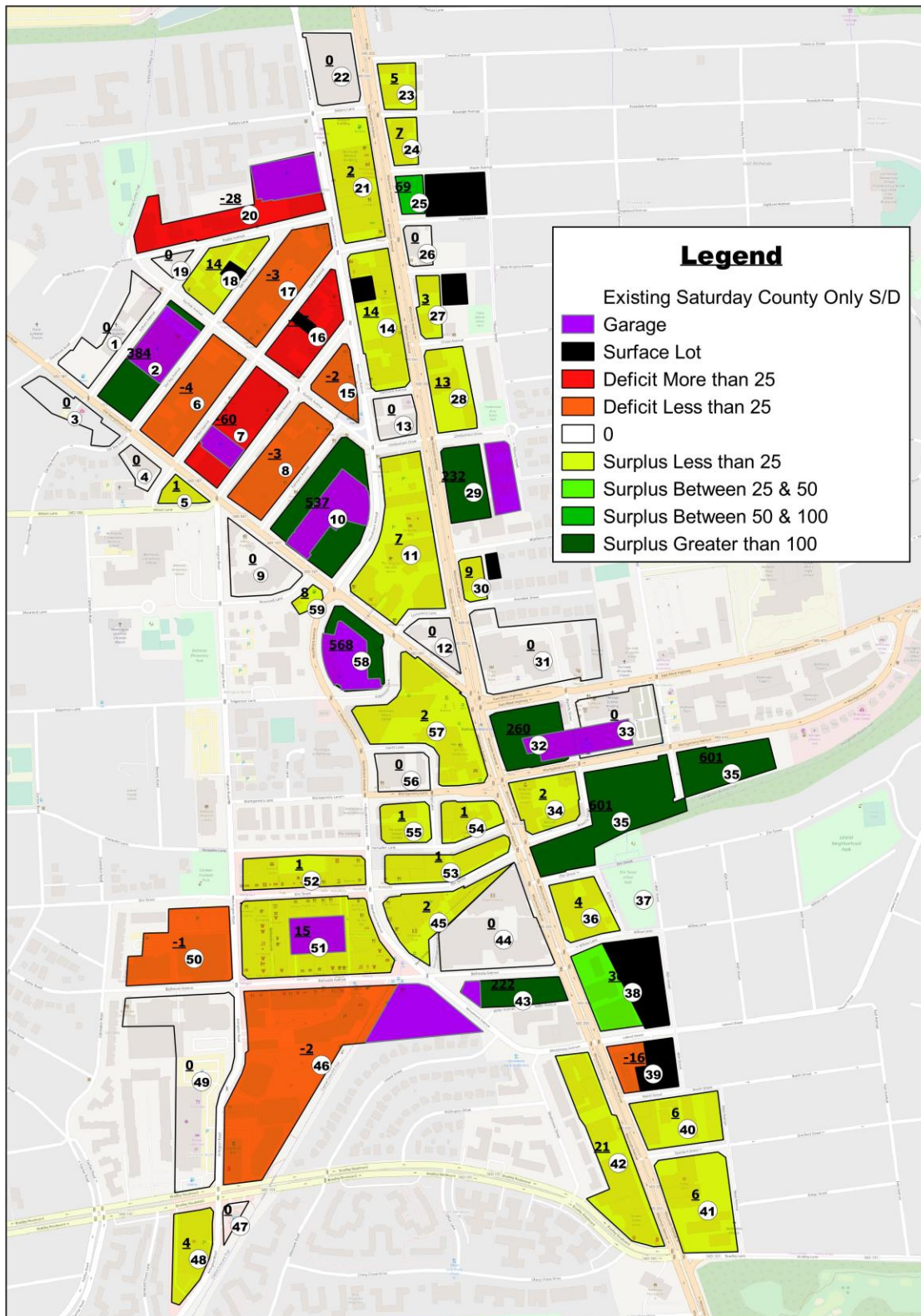


Exhibit D3: Saturday Peak Hour Surplus/Deficit of County-Owned Off- and On-Street Spaces by Block at 7 PM



SECTION 3

PHASE II – EXISTING LAND USE ANALYSIS

Field surveys of parking utilization and turnover cannot, by themselves, determine whether the PLD has an over abundance or shortage of available parking spaces. Estimating the need for parking is generated by occupied and vibrant office, retail, restaurant, and residential buildings, and without an understanding of land use activity an analysis of parking need is incomplete. The following section presents a comprehensive existing and future land use-based modeling of parking demand using parking demand ratios that are unique to Bethesda.

Land Use Based Modeling of Parking Demand

In order to determine the existing land use-based parking demand, the concept of parking demand factors needs to be introduced. Land use-based parking demand factors or ratios are per-unit measures of peak hour parking generation. By applying these factors to the density of various land uses (office, retail, residential, etc.), the weekday and Saturday parking activity associated with those developments can be estimated. **Tables 1a, 1b and 1c** show current weekday, Friday and Saturday peak parking demand factors that are believed to be relevant in Bethesda. For example, during a typical weekday peak period, for each 1,000 SF of occupied restaurant space nearly 5.04 parking spaces would be needed to satisfy the parking demand generated by this land use during a weekday. Similarly, on a Saturday, 12 parking spaces would be needed to satisfy the parking demand generated by various restaurants within the PLD.

Since no occupancy counts were conducted on Saturday for the private parking facilities they were estimated based on the occupancy of the County parking facilities. However, since the private facilities are strongly dependent on office demand, the percent occupancy was reduced based on the reduction between Thursday and Saturday plus an additional 10% reduction. These occupancy percentages were applied in calculating the parking demand factors for Saturday.

As illustrated on **Tables 1a, 1b, and 1c** the parking ratios are well below those currently published by the Urban Land Institute (ULI) and the Institute of Transportation Engineers (ITE). DESMAN's research suggests that the ratios published by ULI and ITE are derived from suburban dominated, auto dependant case studies. Bethesda is a complex mix of different land use activities and is supported by significant public transit infrastructure (Metrorail, Metro Bus, County shuttle, bike lanes, etc.). Proximity and ease of access to public transportation, shared use, and parking "synergy", defined as the relationship between land uses that result in visiting multiple land uses on the same trip, result in a lower parking demand ratio.

Refer to the Appendix for a detailed square footage breakdown of each land use category by block as provided by the County through its CoStar commercial real estate database. The dominant land uses within the Bethesda PLD are office, retail and restaurant.

The parking demand ratios were calibrated using the existing occupied land use mix and total parking occupancy of the public and private parking facilities. Only the residential properties that do not have restricted on-site parking were considered as part of the analysis, as it was assumed these residents park in public parking facilities in the PLD. By applying these demand ratios to the land use mix within the PLD on a weekday and during the peak period of utilization at 12 PM, it is estimated that there is a demand for 16,205 parking spaces associated with all uses within the PLD boundaries. On a Friday during the peak period of utilization at 1 PM, it is estimated that there is a demand for 15,789 vehicles. Similarly, on a

Saturday when office parking demand is low, the total land use-based parking demand equates to 10,610 spaces during the peak hour at 7 PM.

While **Tables 1a, 1b and 1c** illustrate peak parking ratios for various land uses, these ratios alone cannot be used to calculate the parking demand. Applying hourly adjustment factors to the parking ratios can illustrate the demand for parking by time of the day. This is particularly important since some land uses might have a different peak hour of activity than others. For instance, Theaters or Health Clubs may have a higher demand for parking during the evening hours when offices are mostly closed.

Table 1a: Existing Weekday Land Use-Based Parking Ratios

Land Use Category	ULI Demand Dependent Ratio ⁽¹⁾	Auto Use ⁽²⁾	Synergy ⁽³⁾	Auto Base - Auto Dependent Ratio ⁽⁴⁾
Retail (per 1,000 sq. ft. GFA)	3.50	70%	50%	1.23
Hotel (per Room)	1.20	60%	0%	0.72
Office (per 1,000 sq. ft. GFA)	3.50	45%	0%	1.58
Movie Theater (Per Seat)	0.33	75%	10%	0.22
Restaurant (per 1,000 sq. ft. GFA)	12.00	60%	30%	5.04
Church (per 1,000 sq. ft. GFA)	0.00	100%	0%	0.00
Residential (Per Dwelling)	1.50	60%	0%	0.90
Institutional (per 1,000 sq. ft. GFA)	1.20	70%	0%	0.84
Light Industrial (per 1,000 sq. ft. GFA)	0.75	80%	0%	0.60
Health Club	7.00	95%	10%	5.99

(1) Base Ratios were derived from ULI "Shared Parking"(2nd Edition) and ITE "Parking Generation" (3rd Edition)

(2) Percentage of people who would drive to their destination

(3) Percentage of people who would already be parking in association with other uses

(4) Vehicles per 1,000 sq. ft. GFA

Table 1b: Existing Friday Land Use-Based Parking Ratios

Land Use Category	ULI Demand Dependent Ratio ⁽¹⁾	Auto Use ⁽²⁾	Synergy ⁽³⁾	Auto Base - Auto Dependent Ratio ⁽⁴⁾
Retail (per 1,000 sq. ft. GFA)	3.50	85%	33%	1.99
Hotel (per Room)	1.20	60%	0%	0.72
Office (per 1,000 sq. ft. GFA)	3.50	39%	0%	1.37
Movie Theater (Per Seat)	0.50	75%	10%	0.34
Restaurant (per 1,000 sq. ft. GFA)	12.00	70%	25%	6.30
Church (per 1,000 sq. ft. GFA)	0.00	100%	0%	0.00
Residential (Per Dwelling)	1.50	60%	0%	0.90
Institutional (per 1,000 sq. ft. GFA)	1.20	70%	0%	0.84
Light Industrial (per 1,000 sq. ft. GFA)	0.75	80%	0%	0.60
Health Club	7.00	95%	10%	5.99

(1) Base Ratios were derived from ULI "Shared Parking"(2nd Edition) and ITE "Parking Generation" (3rd Edition)

(2) Percentage of people who would drive to their destination

(3) Percentage of people who would already be parking in association with other uses

(4) Vehicles per 1,000 sq. ft. GFA

Table 1c: Existing Saturday Land Use-Based Parking Ratios

Land Use Category	ULI Demand Dependent Ratio ⁽¹⁾	Auto Use ⁽²⁾	Synergy ⁽³⁾	Auto Base - Auto Dependent Ratio ⁽⁴⁾
Retail (per 1,000 sq. ft. GFA)	3.50	100%	0%	3.50
Hotel (per Room)	1.20	70%	0%	0.84
Office (per 1,000 sq. ft. GFA)	0.35	90%	0%	0.32
Movie Theater (Per Seat)	0.33	95%	10%	0.28
Restaurant (per 1,000 sq. ft. GFA)	12.00	100%	0%	12.00
Church (per 1,000 sq. ft. GFA) ⁽⁵⁾	7.81	100%	0%	7.81
Residential (Per Dwelling)	1.50	74%	0%	1.11
Institutional (per 1,000 sq. ft. GFA)	1.20	95%	0%	1.14
Light Industrial (per 1,000 sq. ft. GFA)	0.75	100%	0%	0.75
Health Club	6.75	100%	0%	6.75

(1) Base Ratios were derived from ULI "Shared Parking"(2nd Edition) and ITE "Parking Generation" (3rd Edition)

(2) Percentage of people who would drive to their destination

(3) Percentage of people who would already be parking in association with other uses

(4) Vehicles per 1,000 sq. ft. GFA

(5) Parking Generation- 3rd edition

Tables 2a, 2b and 2c illustrate the hourly parking demand ratios on a weekday, Friday and Saturday based on the recommended time of day factors published by the Urban Land Institute.

Table 2a: Respective Weekday Hourly Parking Demand Ratios by Land Use

Hour of Day	Office	Retail	Restaurant	Residential	Theater	Hotel	Light Industrial	Health Club	Post Office
6:00 AM	3%	1%	10%	100%	0%	95%	3%	70%	0%
7:00 AM	10%	5%	15%	90%	0%	90%	30%	40%	0%
8:00 AM	40%	10%	45%	85%	0%	80%	65%	40%	0%
9:00 AM	60%	20%	50%	75%	0%	65%	70%	50%	70%
10:00 AM	90%	25%	30%	65%	0%	60%	95%	50%	80%
11:00 AM	95%	40%	70%	60%	0%	60%	100%	70%	50%
12:00 Noon	99%	75%	100%	60%	25%	60%	96%	78%	90%
1:00 PM	98%	65%	100%	60%	40%	60%	94%	85%	100%
2:00 PM	100%	75%	75%	60%	40%	60%	90%	60%	55%
3:00 PM	99%	80%	40%	70%	40%	50%	90%	30%	50%
4:00 PM	85%	85%	45%	75%	40%	50%	90%	55%	80%
5:00 PM	65%	90%	85%	85%	50%	70%	50%	90%	100%
6:00 PM	52%	100%	100%	90%	75%	75%	25%	100%	0%
7:00 PM	35%	100%	100%	100%	96%	78%	10%	100%	0%
8:00 PM	20%	90%	100%	100%	100%	88%	7%	96%	0%
9:00 PM	3%	60%	65%	100%	100%	88%	3%	75%	0%
10:00 PM	1%	20%	55%	100%	85%	90%	1%	35%	0%
11:00 PM	0%	10%	50%	80%	45%	100%	0%	10%	0%
12:00 Midnight	0%	0%	25%	50%	10%	100%	0%	0%	0%

Table 2b: Respective Friday Hourly Parking Demand Ratios by Land Use

Hour of Day	Office	Retail	Restaurant	Residential	Theater	Hotel	Light Industrial	Health Club	Post Office
6:00 AM	3%	1%	10%	100%	0%	95%	3%	70%	0%
7:00 AM	10%	5%	15%	90%	0%	90%	30%	40%	0%
8:00 AM	40%	10%	45%	85%	0%	80%	65%	40%	0%
9:00 AM	70%	20%	50%	75%	0%	65%	85%	50%	70%
10:00 AM	80%	35%	40%	65%	0%	60%	95%	50%	80%
11:00 AM	95%	50%	75%	60%	0%	60%	100%	70%	50%
12:00 Noon	90%	65%	100%	60%	40%	55%	96%	78%	90%
1:00 PM	100%	65%	90%	60%	25%	60%	94%	85%	100%
2:00 PM	98%	70%	70%	60%	40%	60%	90%	60%	55%
3:00 PM	96%	75%	50%	70%	40%	50%	90%	30%	50%
4:00 PM	81%	80%	50%	75%	45%	60%	70%	55%	40%
5:00 PM	55%	85%	85%	85%	50%	70%	50%	90%	30%
6:00 PM	42%	100%	100%	90%	75%	75%	25%	100%	0%
7:00 PM	39%	100%	100%	100%	96%	78%	10%	100%	0%
8:00 PM	31%	90%	100%	100%	100%	88%	7%	96%	0%
9:00 PM	25%	80%	100%	100%	100%	95%	3%	75%	0%
10:00 PM	1%	20%	55%	100%	85%	90%	1%	35%	0%
11:00 PM	0%	10%	50%	80%	45%	100%	0%	10%	0%
12:00 Midnight	0%	0%	25%	50%	10%	100%	0%	0%	0%

Table 2c: Respective Saturday Hourly Parking Demand Ratios by Land Use

Hour of Day	Office	Retail	Restaurant	Residential	Theater	Hotel	Light Industrial	Health Club	Post Office
6:00 AM	0%	1%	10%	100%	0%	95%	0%	80%	0%
7:00 AM	15%	5%	25%	90%	0%	90%	20%	45%	0%
8:00 AM	45%	10%	45%	85%	0%	80%	40%	35%	25%
9:00 AM	65%	20%	45%	80%	0%	70%	60%	50%	40%
10:00 AM	80%	25%	50%	80%	5%	60%	90%	35%	75%
11:00 AM	100%	30%	55%	80%	5%	60%	100%	50%	90%
12:00 Noon	90%	50%	60%	50%	10%	50%	80%	50%	100%
1:00 PM	80%	63%	70%	50%	35%	50%	50%	30%	100%
2:00 PM	50%	80%	50%	60%	50%	60%	40%	25%	0%
3:00 PM	15%	100%	30%	70%	50%	60%	40%	25%	0%
4:00 PM	10%	85%	40%	75%	55%	65%	20%	55%	0%
5:00 PM	5%	65%	50%	75%	60%	70%	5%	100%	0%
6:00 PM	1%	60%	75%	80%	60%	70%	5%	90%	0%
7:00 PM	0%	57%	100%	80%	90%	75%	0%	65%	0%
8:00 PM	0%	33%	97%	85%	95%	85%	0%	40%	0%
9:00 PM	0%	10%	90%	90%	100%	98%	0%	27%	0%
10:00 PM	0%	5%	85%	100%	100%	98%	0%	5%	0%
11:00 PM	0%	5%	70%	100%	80%	100%	0%	1%	0%
12:00 Midnight	0%	0%	10%	100%	50%	100%	0%	0%	0%

In order to validate the appropriateness and accuracy of the recommended ratios referenced in **Tables 1a, 1b, and 1c**, the volume and pattern of parking demand generated by the land use-based analysis were compared to the volume and pattern of occupancy data recorded during the weekday, Friday and Saturday field surveys of the public and private parking areas. This occupancy data includes all parking facilities, except for restricted residential, and their peak use (public, private but publicly available, and private). **Figures 8a and 8b** exhibit the weekday land use-based parking demand and parking demand from field surveys. **Figures 9a/9b and 10a/10b** are land use-based parking demand and parking demand from field surveys for Friday and Saturday, respectively.

The land used-based graphs for the weekday, Friday and Saturday look similar to the occupancy graphs generated through field surveys. This analysis shows that during a weekday the peak is at noon and then it slowly declines throughout the day. The majority of demand is generated from office activity. The other major land uses are retail, restaurant, and residential.

During a Friday the peak is also during the afternoon at 1pm due to the high amount of office activity. The restaurant, retail and residential activity increases during the evening. However, the peak evening activity only generates approximately 12,500 vehicles, which is almost 3,500 less vehicles than during the peak afternoon period where almost 16,000 vehicles are generated.

As shown in **Figures 10a and 10b**, the peak weekend parking demand is at 7pm. There is an afternoon peak at 1pm. The majority of the parking demand is generated from restaurant and retail activity.

Figure 8a: Weekday Land Use-Based Parking Demand of Public & Private Facilities

Figure 8b: Weekday Occupancy of Public & Private facilities Based on Field Surveys

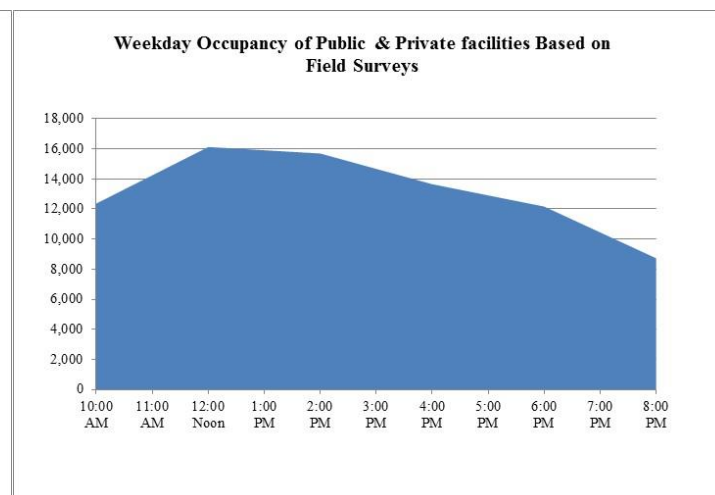
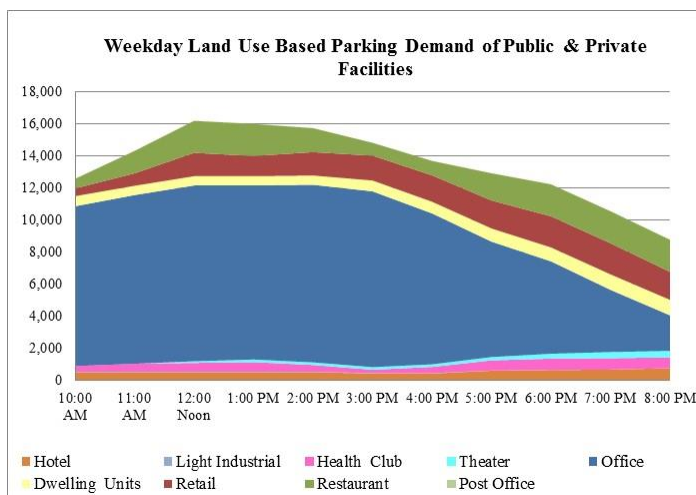


Figure 9a: Friday Land Use-Based Parking Demand of Public & Private Facilities

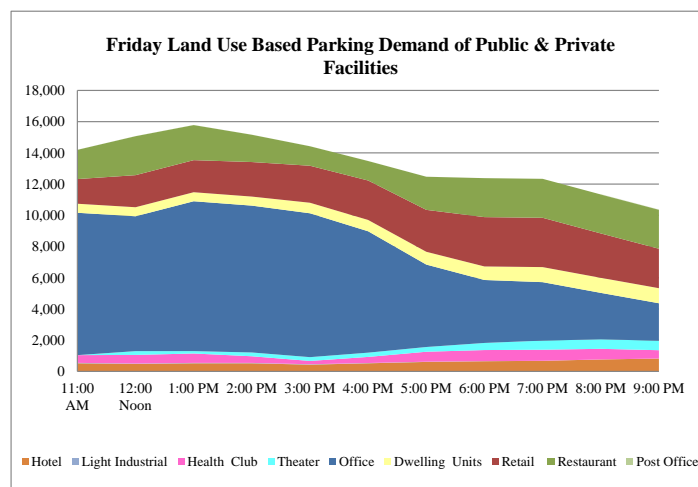


Figure 9b: Friday Occupancy of Public & Private facilities Based on Field Surveys

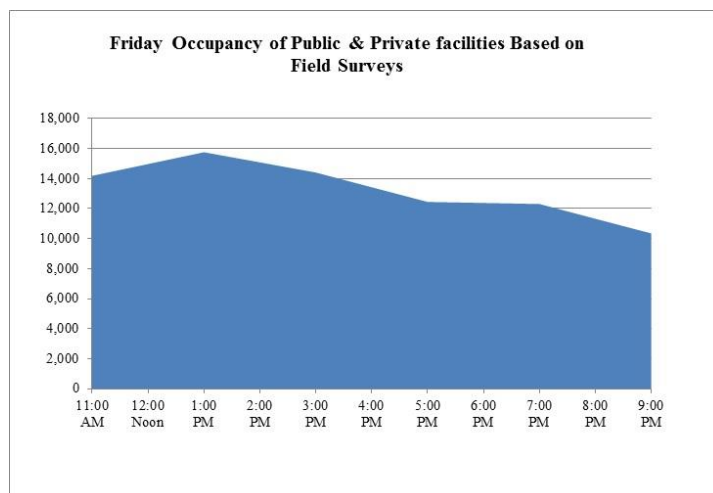


Figure 10a: Saturday Land Use-Based Parking Demand of Public & Private Facilities

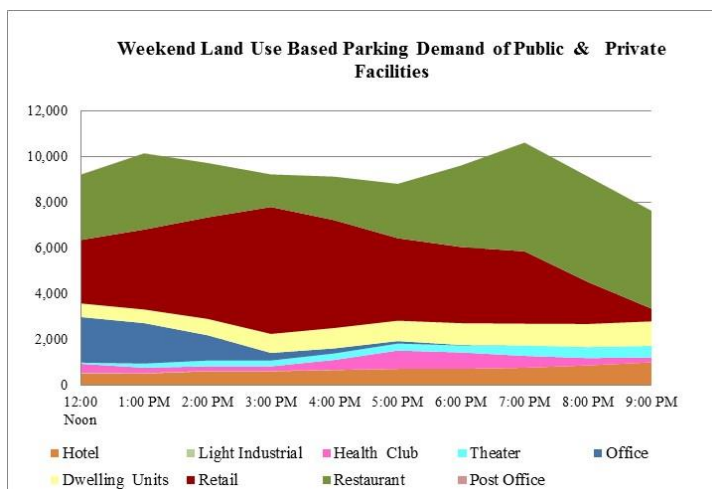
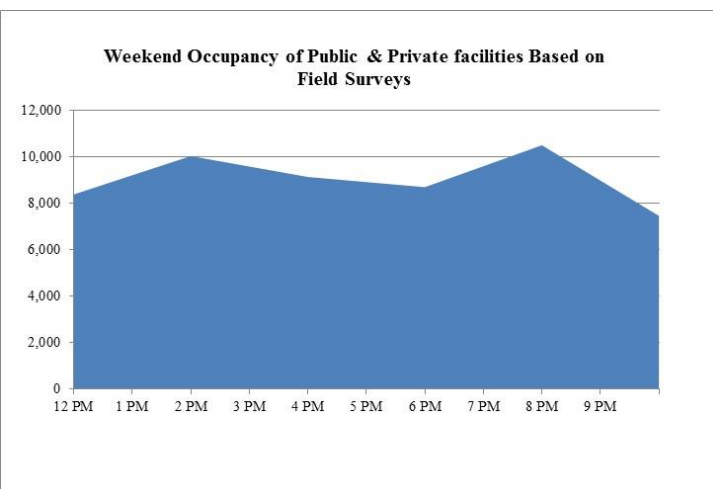


Figure 10b: Saturday Occupancy of Public & Private facilities Based on Field Surveys



Residential Parking Demand Analysis

In addition to analyzing the residential properties that do not include on-site parking, a separate analysis was conducted of residential properties with restricted parking exclusively for their tenants. The Project Team made an effort to reach out to every residential building in the PLD with on-site parking. Unfortunately, many of the property managers were either not willing to give us information regarding the properties, or were not sure of the amount of parking provided and utilized. **Table 3** shows a summary of the analysis of residential properties in the PLD with on-site parking. The average ratio of parking on-site per unit and the ratio of parking demand per units occupied was calculated for the properties where information was provided. Based on this analysis, on average there are 1.21 spaces provided per unit and a demand of 1.01 spaces per occupied unit in the PLD.

Table 3: Residential Properties Parking Demand Analysis

Block	Address	Residential Property	Residential Units	Units Occupied	Parking Spaces	Parking Permits/Leased	Ratio of Spaces per Unit	Ratio of Parking Demand per Units Occupied
Block 8	4918 St. Elmo Ave.	Bainbridge Apts.	201	188	202	190	1.00	1.01
Block 10	7770 Norfolk		200	156		123		0.79
Block 10	7710 Woodmont	Lionsgate Condominiums	158	158	275	275	1.74	1.74
Block 11	Bethesda Place	7701 Woodmont Ave.	110					
Block 12	100 Commerce Lane	Element 28 Apartments	101	25	70	25	0.69	1.00
Block 17	4853 Cordell Ave	Triangle Towers (Residential Bldg)	260	255				
Block 18	4800 auburn	Gallery Residential Building	234	206	208	134	0.89	0.65
Block 22	8300 Wisconsin Ave	Flats 8300	359	180	400		1.11	
Block 24	4720 Rosedale Ave	Rosedale Park Apartments	164	160	305		1.86	
Block 29	7707 Wisconsin Ave	Whitney Apartments ⁽¹⁾	253	233	300	200	1.19	0.86
Block 31	4521 East-West Hwy	Waverly House	158	127	10	10	0.06	0.08
Block 43	7077 Wisconsin Ave	Solaire Residential Bldg	139					
Block 43	4710 Bethesda Ave	The Seasons Residential	247					
Block 46	7001 Arlington Rd	7001 Arlington at Bethesda	141					
Block 51	7131 Arlington Rd	Bethesda Row Apts	480	456				
Block 58	7620-7626 Old Georgetown Rd	The Metropolitan Residential Bldg	308					
Average Parking Ratios							1.21	1.01

¹ Senior housing - not included in average parking ratios calculation

SECTION 4

PHASE III – FUTURE DEVELOPMENT ANALYSIS

As previously discussed, of the County-owned parking facilities there is currently a peak weekday occupancy of 73% off-street and 78% on-street. In the County-owned parking facilities there is a surplus of 1,306 spaces during the peak weekday afternoon period and a 2,891 space surplus during the peak weekend evening period. The PLD has a 70% peak weekday parking occupancy when considering both the County-owned and the privately-owned public parking. During the weekday afternoon peak period there is a surplus of 3,726 spaces among the County-owned and privately-owned public parking facilities.

Future development and redevelopment projects will have an impact on the demand for and availability of parking in Bethesda. In an attempt to quantify possible future changes in the supply of and demand for parking, the Maryland-National Capital Park and Planning Commission (M-NCPPC) was asked to provide data regarding any known, proposed and/or potential development within the Bethesda PLD. The information provided included the location, size, and proposed uses of the projects as well as the number of available parking spaces within each development. For the residential development at 7900 Wisconsin Avenue no parking information was provided, however, it was assumed that 400 spaces would be provided due to the size of the development (474 residential units). The future development information and existing land uses and parking to be displaced is provided in the Appendix. **Exhibit E** shows the approximate location of each development by block.

Similar to the existing parking demand analysis where the residential properties with restricted parking exclusive for their tenants were separated from the analysis, the Project Team decided to exclude residential developments that would provide adequate parking to support their demand from the future demand analysis. The Project Team assumed the following developments would have exclusive

residential parking for only their tenants: Rugby Condominium, 7900 Wisconsin Avenue, St. Elmo Apartments, and Holladay at Edgemoor.

The Bethesda Marriott development on Block 11 will include the Marriott Corporate Headquarters. Again, it is planned that Marriott employees will be allowed to exclusively use Garage 11, located on Block 10, during weekday business hours. Since there are some questions about the exact size and program for the Bethesda Marriott development, it was assumed that with Garage 11 and additional on-site parking the development would simply meet its peak demand and not provide additional public parking in the PLD.

It was also assumed that County-owned Lot 43 would be displaced from a future development, which would also meet its own parking demand. The 39 spaces lost from the displacement of Lot 43 will not be replaced by the County.

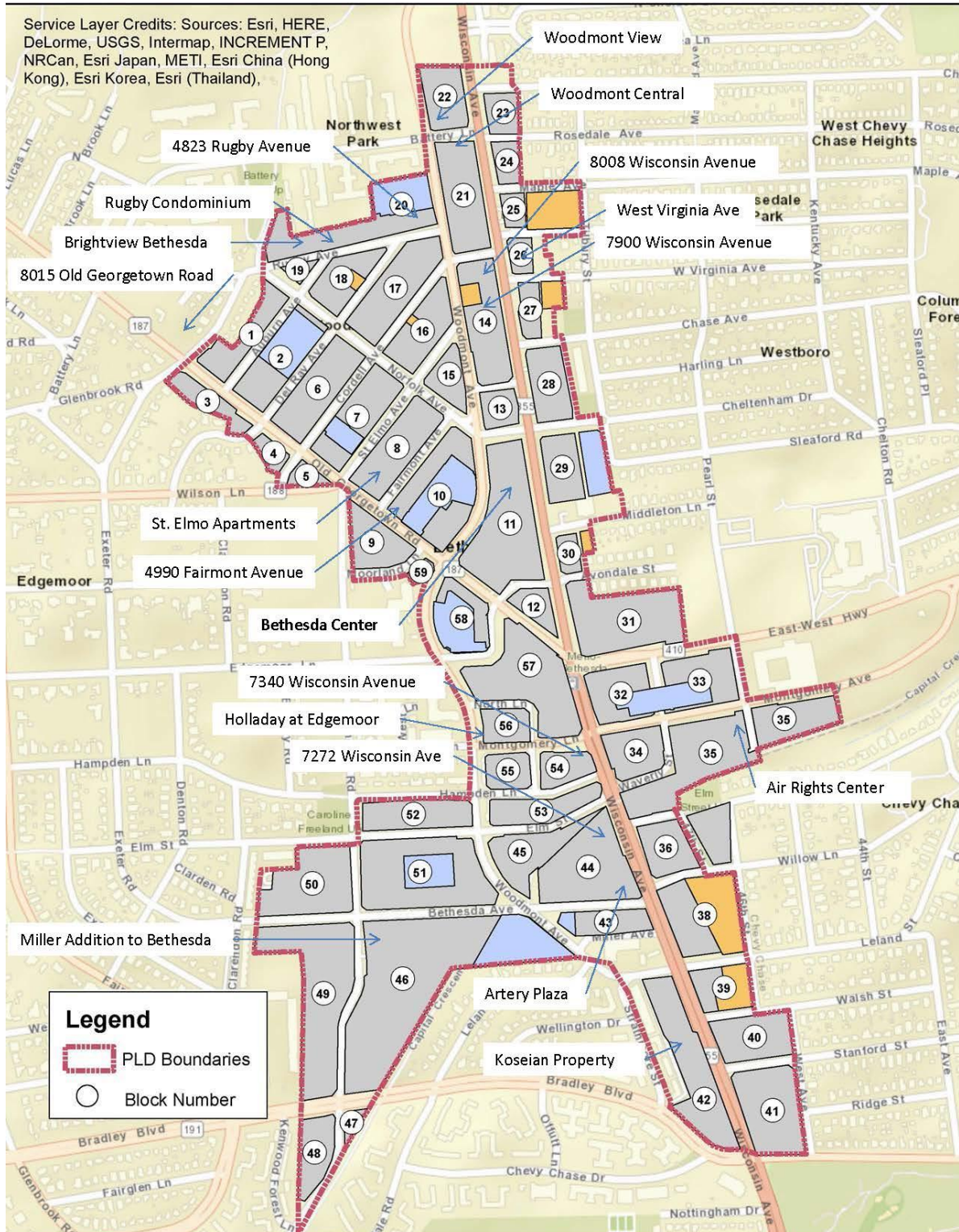
In addition to analyzing proposed developments in the PLD, an assessment of the occupancy of existing vacant space in the PLD was also conducted. It is projected that an additional 384,996 s.f. of office, 91,495 s.f. of retail, 8,404 s.f. of restaurant, and 18 residential units will become leased and occupied. This assumes full occupancy of existing building space in the PLD, which is a very conservative assumption. This analysis is based on a verification of CoStar land use data provided by the County.

The proposed future developments and leasing/occupancy of existing vacant building space will generate parking demand and displace existing properties and parking. The net impact for both proposed developments and vacant building space was calculated using the calibrated peak parking demand ratios.

Estimate of Future Surplus/Deficit by Block

The future parking surplus/deficit conditions within the PLD were calculated based on existing demand and future conditions. Future developments and existing vacant space were considered in developing an estimate of future parking demand. It was assumed that existing buildings and proposed developments would operate at 100% occupancy in order to assess the worst case scenario. It was assumed that only future developments with residential units exclusively are going to restrict parking for their tenants and not provide public parking. Unfortunately, there is no certainty how future parking will be managed.

Exhibit E: Future, Known, Proposed and Potential Developments within Bethesda PLD



Below is a summary of the surplus/deficit among all private and public parking, County and privately owned public parking, and County parking for a weekday, Friday, and Saturday peak period in the PLD: *Weekday at 12 PM*

- County and Privately Owned Public Parking: 1,867 space surplus
- County Owned Parking: 685 space deficit

Friday at 1 PM

- County and Privately Owned Public Parking: 2,243 space surplus
- County Owned Parking: 443 space deficit

Saturday at 7 PM

- County and Privately Owned Public Parking: 7,995 space surplus
- County Owned Parking: 2,059 space surplus

Exhibits F1, F2, and F3 show the surplus/deficit of County and privately-owned public parking within the PLD by block for a weekday, Friday, and Saturday peak period, respectively.

Exhibits G1, G2, and G3 show the surplus/deficit of County on- and off-street parking within the PLD by block for a weekday, Friday, and Saturday peak period, respectively. This analysis considers the impact of future developments.

This analysis shows that within the entire PLD there will be adequate parking to support future demand when considering all public parking. If County parking was responsible for supporting all excess demand from future developments there is a projected deficit during the peak weekday and Friday periods. As long as the existing private public parking facilities continue to offer public parking there will be adequate parking available in the PLD. However, there are blocks and areas where deficits currently and will continue to exist in the future.

Estimate of Future Surplus/Deficit by Area

An additional analysis was conducted to assess the parking surplus/deficit for five areas within the PLD. The five areas include the northwest, northeast, central, southeast, and southwest areas of the PLD, which are depicted in **Exhibit H**. This analysis helps to show if there are certain areas that experience a greater surplus or deficit of parking in the near-term. This will help in determining the preferred location to construct additional public parking. **Table 5** provides a summary of the surplus/deficit of parking during the peak parking periods for a typical weekday, Friday and Saturday. This shows the combination of all private and public parking (practical surplus/deficit), County and privately-owned public parking (public surplus/deficit), and County on- and off-street parking exclusively (County surplus/deficit).

There is a substantial deficit projected in the Central area of the PLD during the peak weekday period. There are also consistent minor deficits projected in the Northeast area of the PLD which has minimal off-street parking to support the density of land uses. It is suggested that a future public parking facility would be best suited between the Central and Northern blocks of the PLD.

Exhibit E1: Thursday Peak Hour Surplus/Deficit of all Publicly Available Facilities by Block

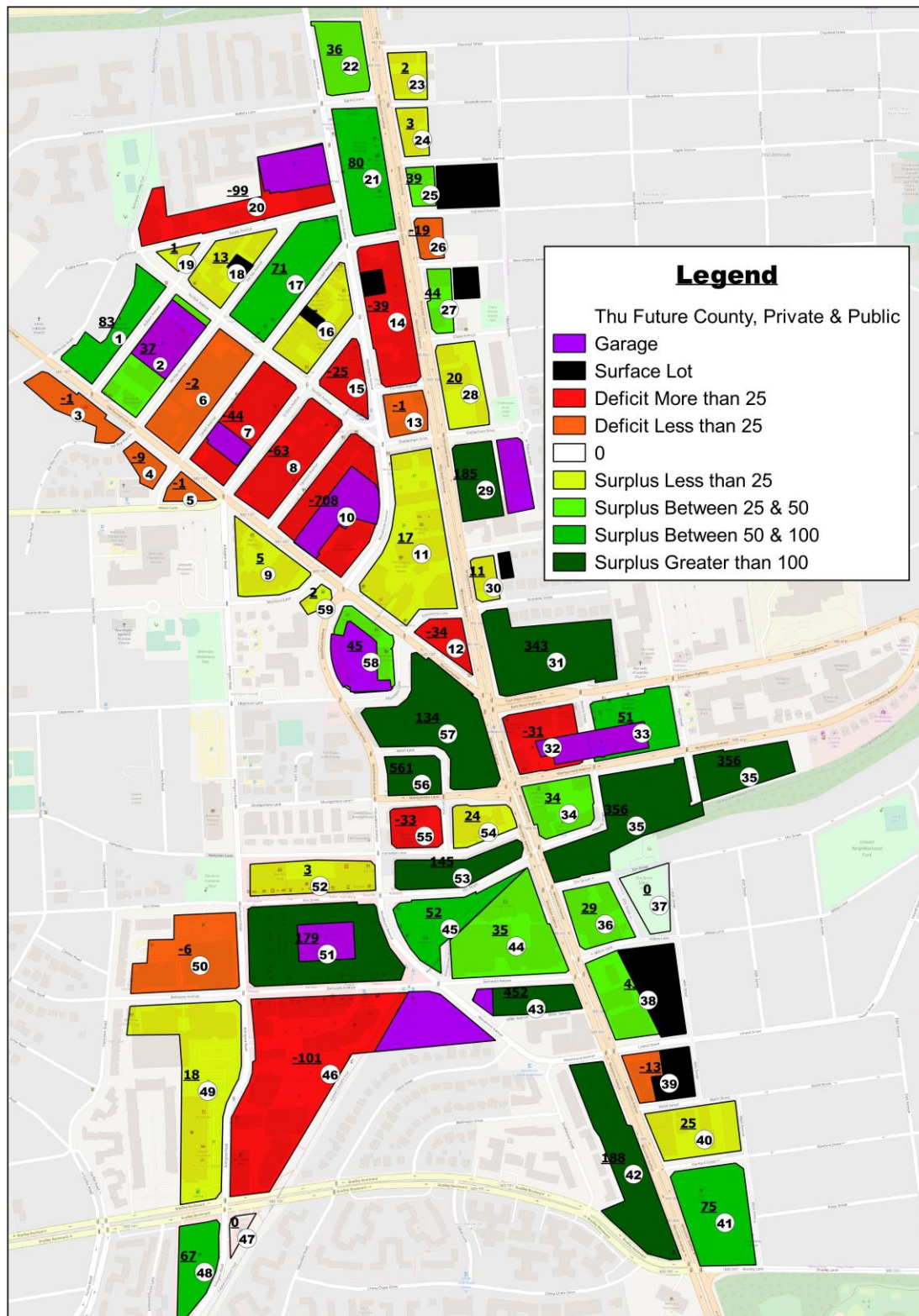


Exhibit E2: Friday Peak Hour Surplus/Deficit of all Publicly Available Facilities by Block

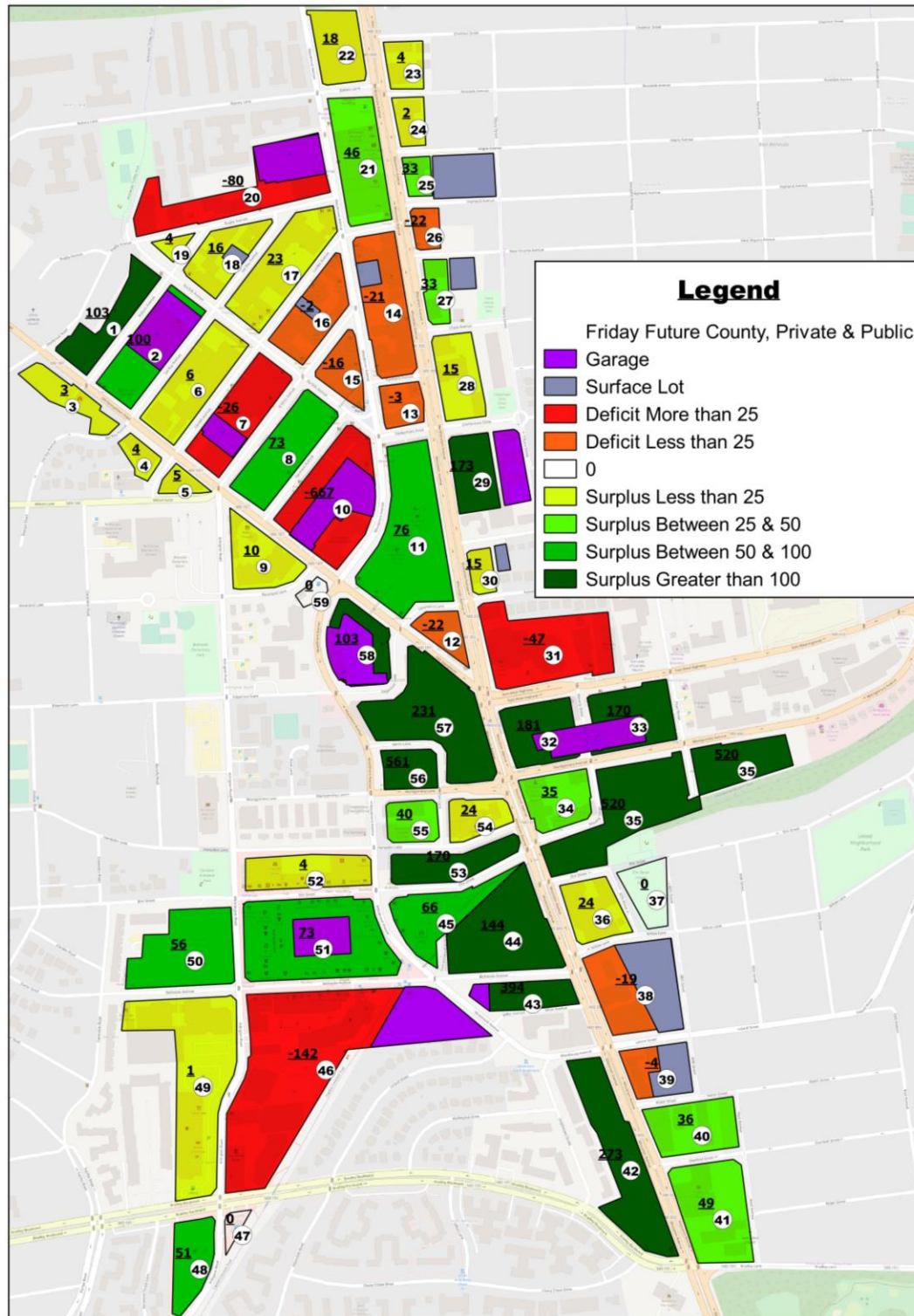


Exhibit E3: Saturday Peak Hour Surplus/Deficit of all Publicly Available Facilities by Block

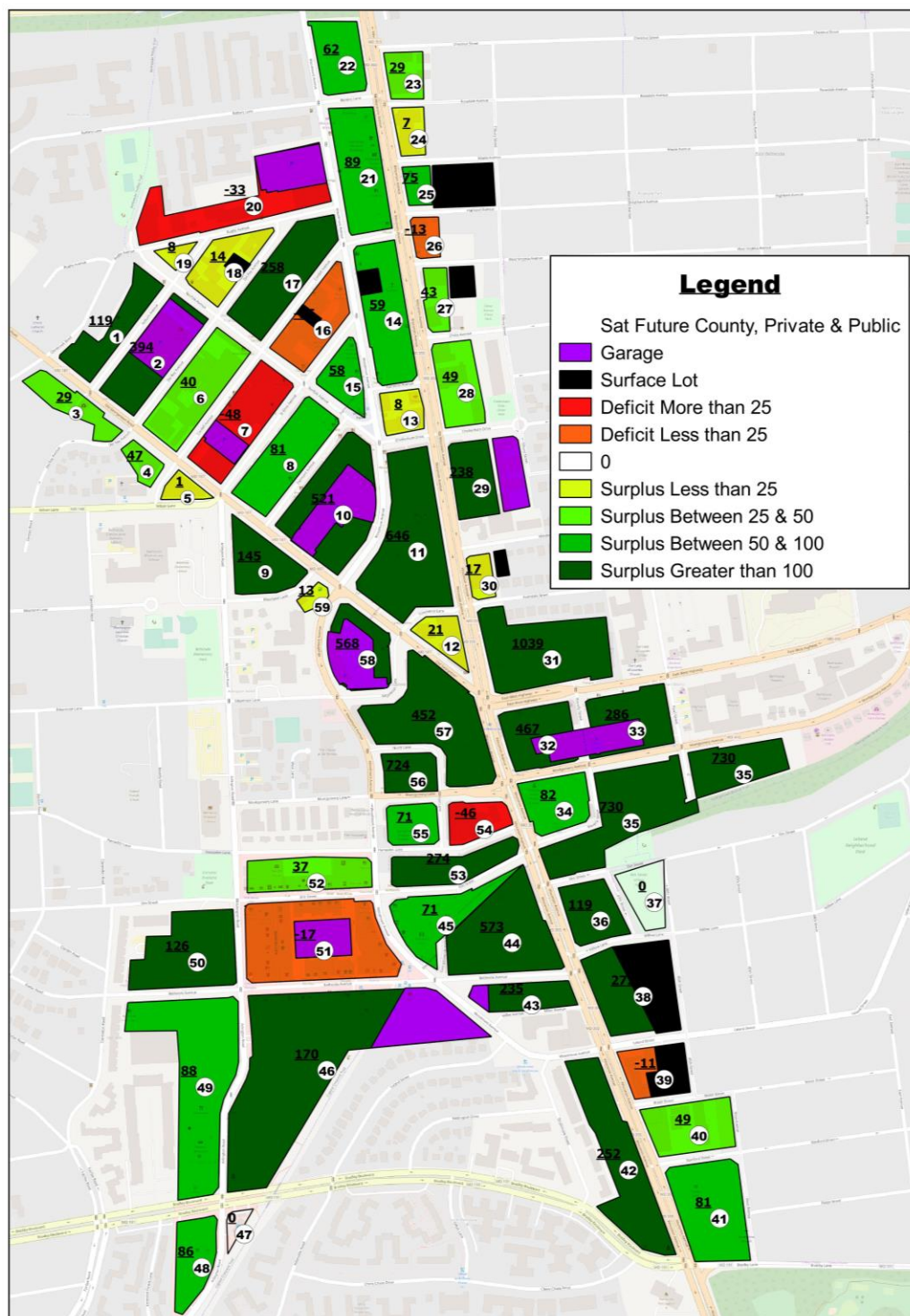


Exhibit F1: Future Thursday Peak Hour Surplus/Deficit of County and Privately-Owned Public Parking by Block

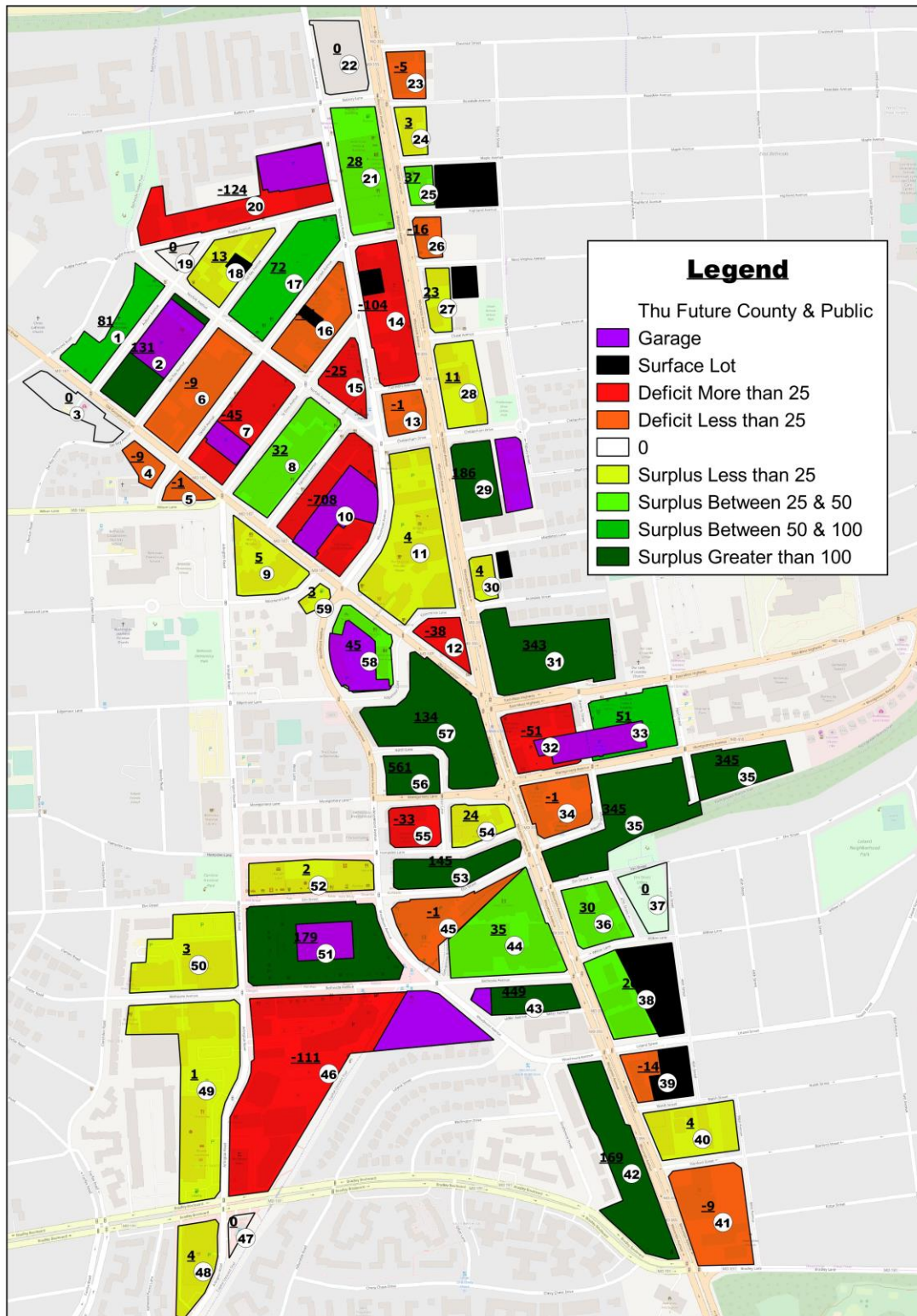


Exhibit F2: Future Friday Peak Hour Surplus/Deficit of County and Privately-Owned Public Parking by Block

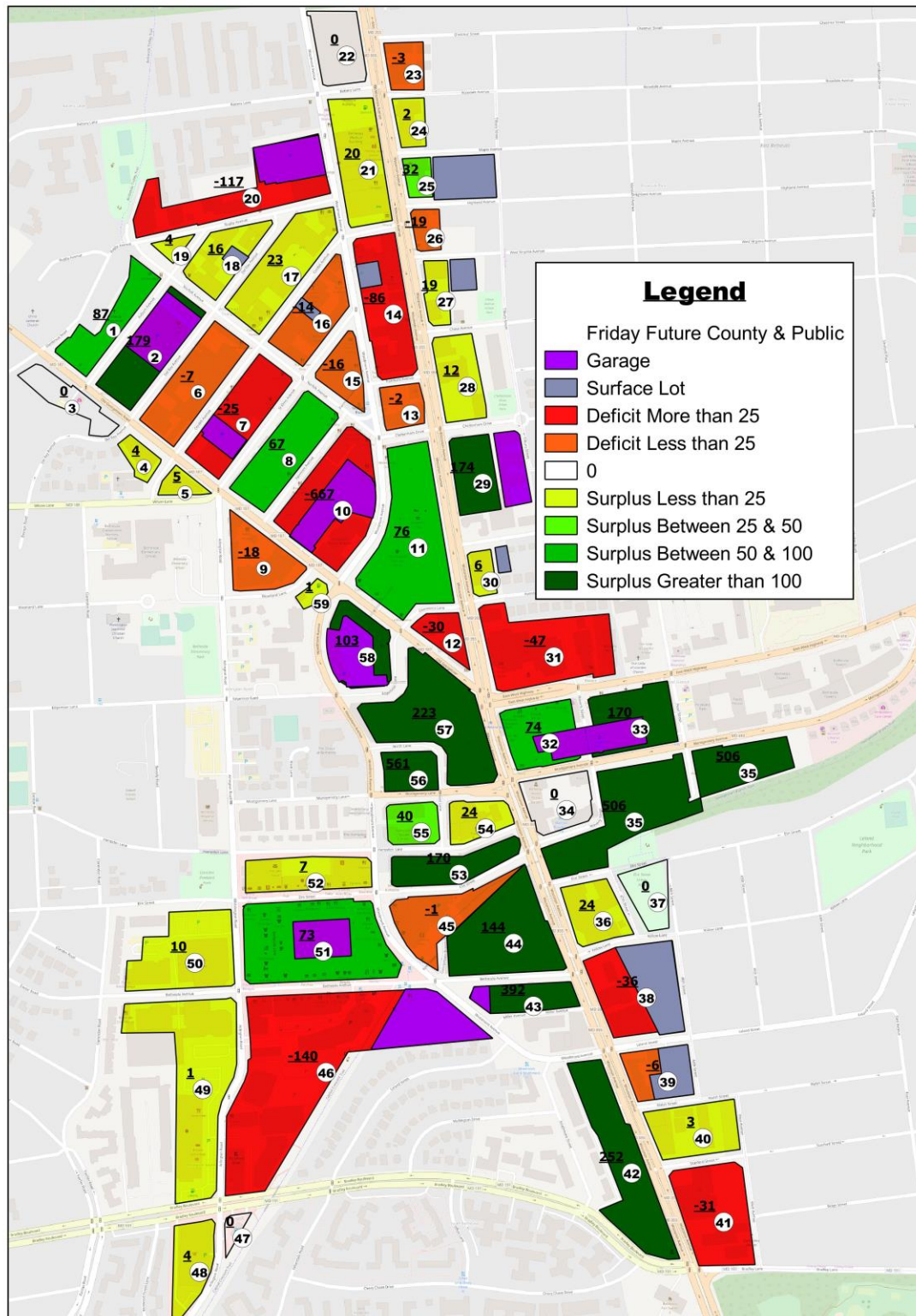


Exhibit F3: Future Saturday Peak Hour Surplus/Deficit of County and Privately-Owned Public Parking by Block

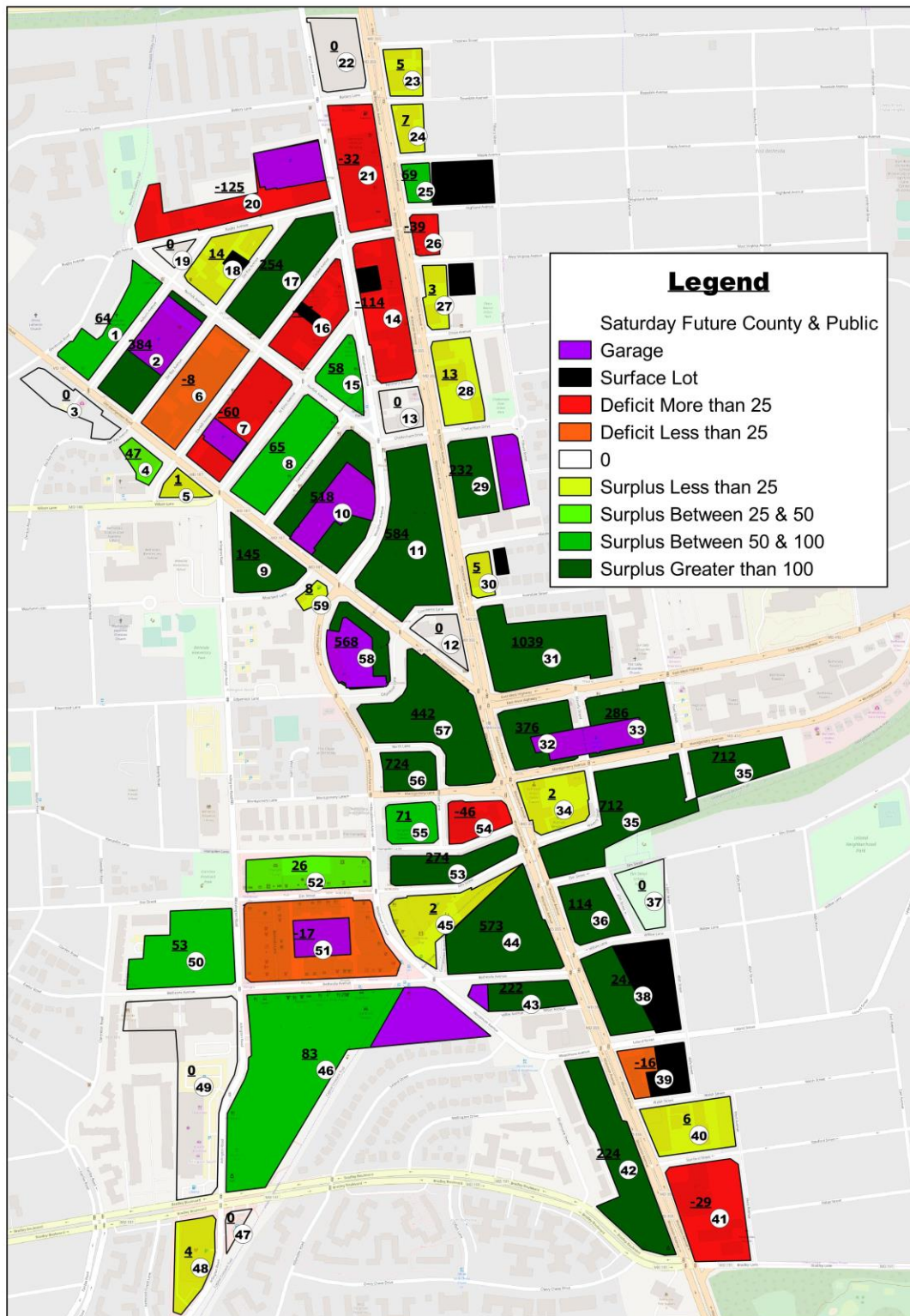


Exhibit G1: Future Thursday Peak Hour Surplus/Deficit of County-Owned On- and Off-Street Parking by Block

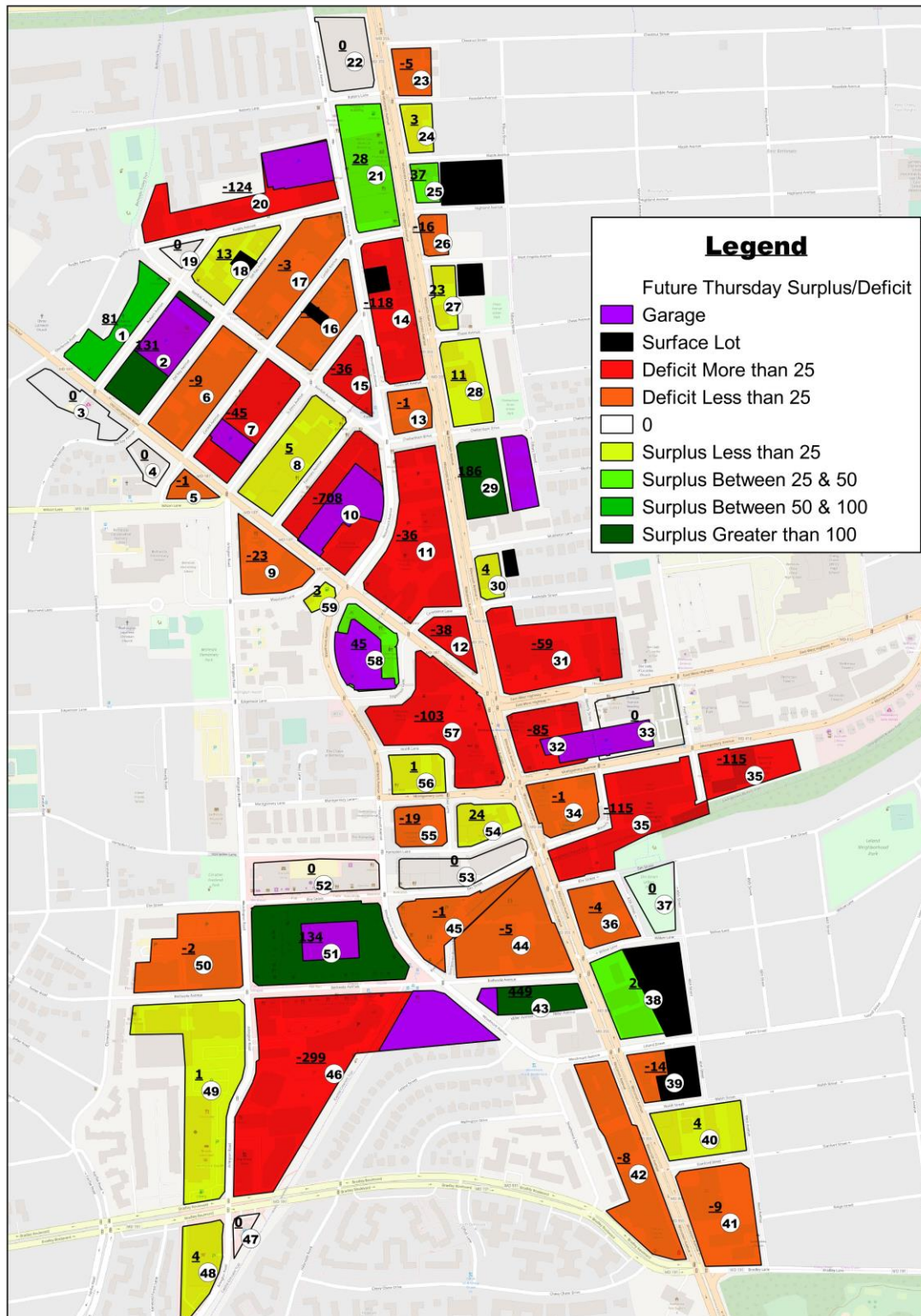


Exhibit G2: Future Friday Peak Hour Surplus/Deficit of County-Owned On- and Off-Street Parking by Block

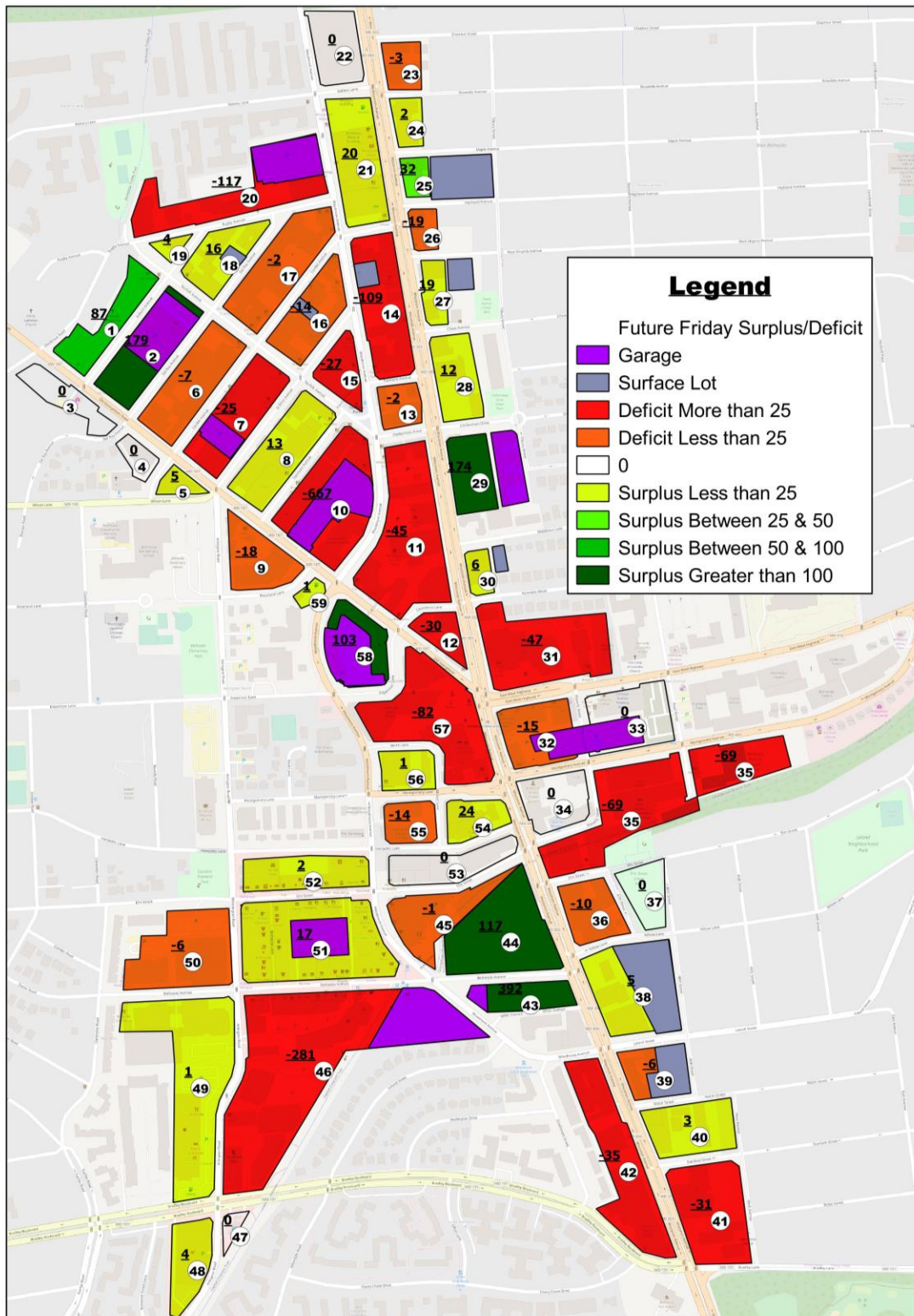


Exhibit G3: Future Saturday Peak Hour Surplus/Deficit of County-Owned On- and Off-Street Parking by Block

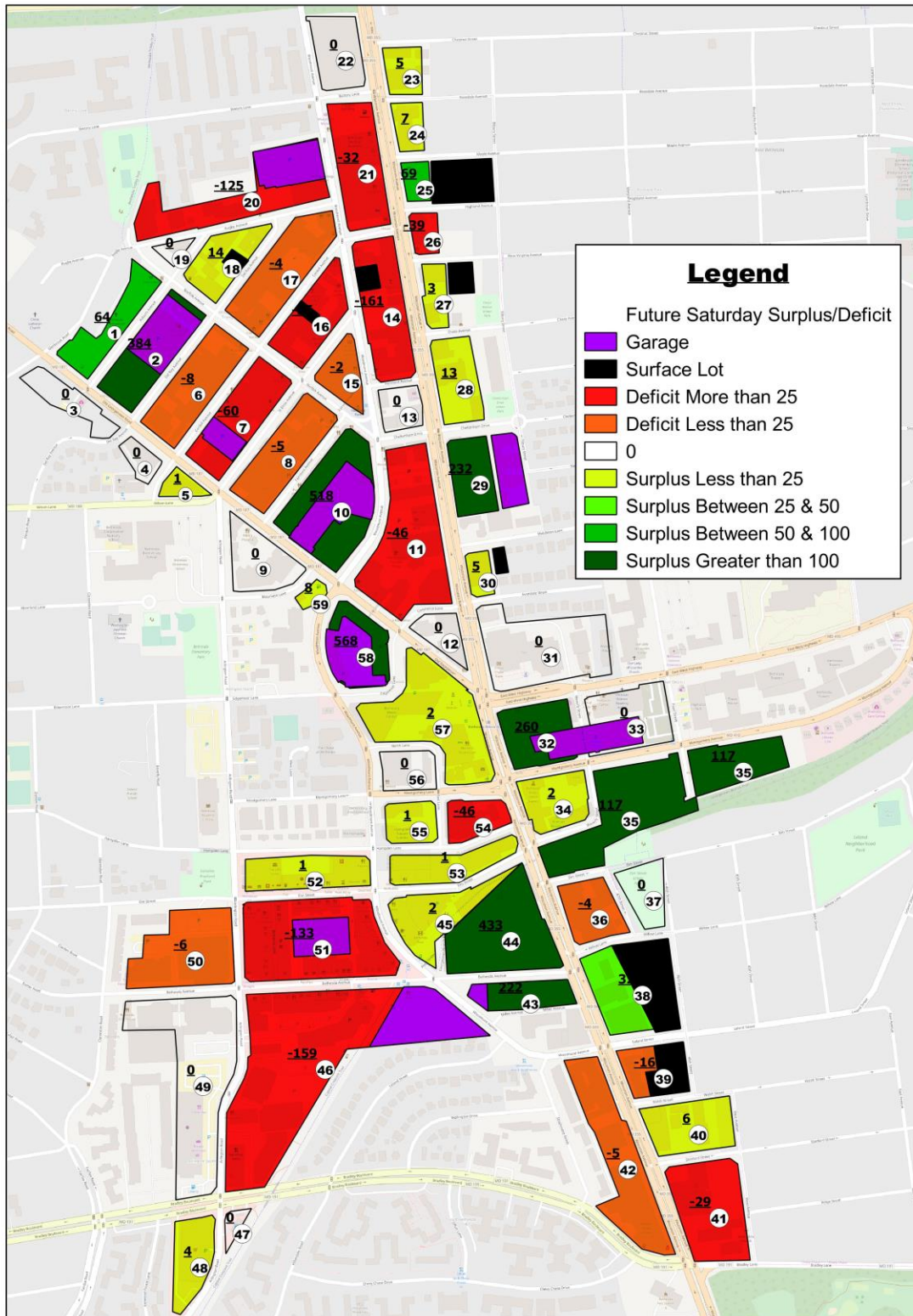


Exhibit H: Breakdown of Areas in PLD

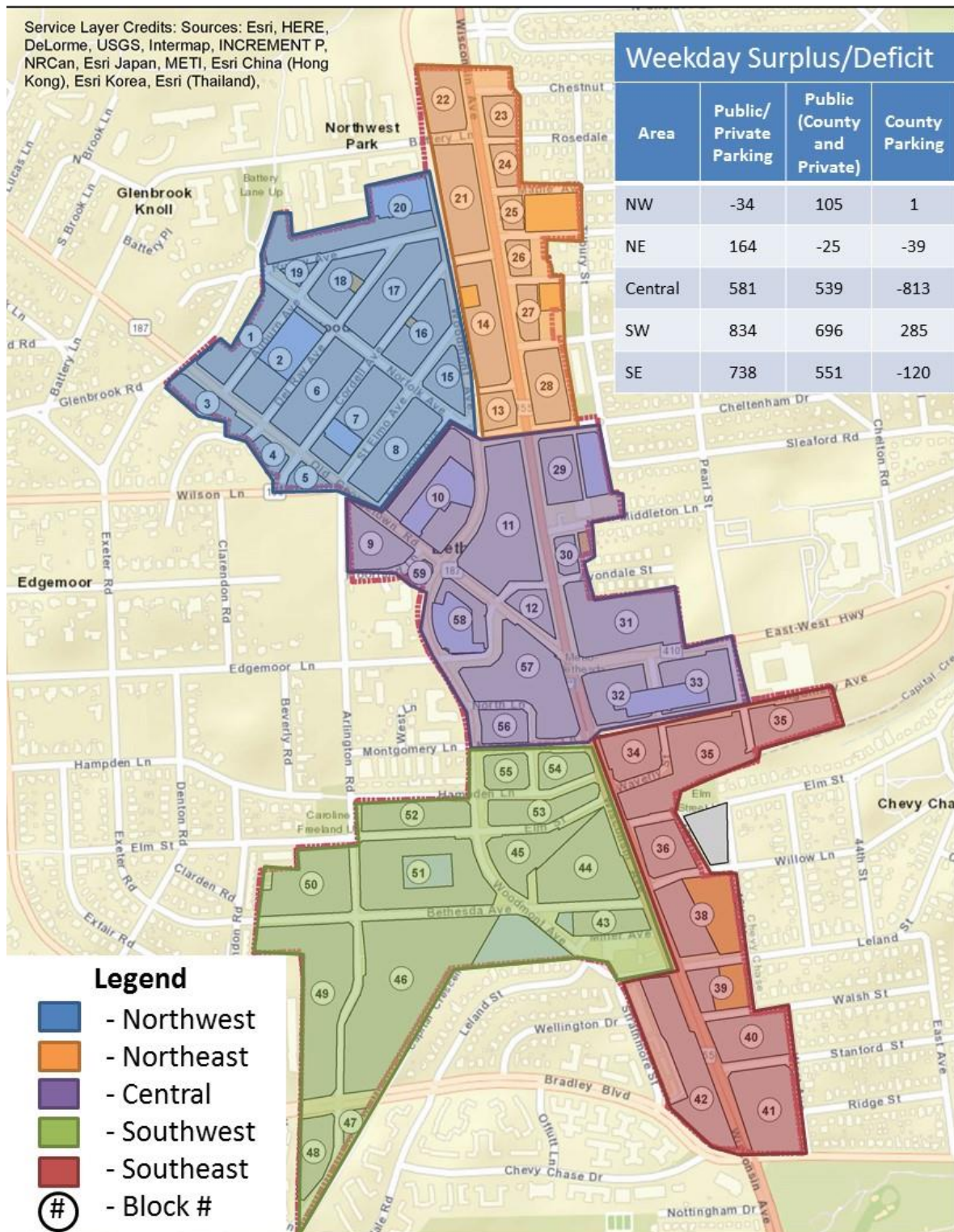


Table 5: Projected Peak Parking Surplus/Deficit by Area for a Weekday, Friday and Saturday

Area	Weekday Parking Surplus/Deficit			Friday Parking Surplus/Deficit			Saturday Parking Surplus/Deficit		
	County-owned Surplus/Deficit	Privately-owned and County-owned Surplus/Deficit	Practical Surplus/Deficit	County-owned Surplus/Deficit	Privately-owned and County-owned Surplus/Deficit	Practical Surplus/Deficit	County-owned Surplus/Deficit	Privately-owned and County-owned Surplus/Deficit	Practical Surplus/Deficit
Northwest ⁽¹⁾	1	105	(34)	111	205	212	223	657	952
Northeast ⁽²⁾	(39)	(25)	164	(49)	(26)	104	(134)	(87)	408
Central ⁽³⁾	(813)	539	581	(619)	626	784	1,547	4,926	5,137
Southwest ⁽⁴⁾	285	696	834	256	725	882	319	1,245	1,667
Southeast ⁽⁵⁾	(120)	551	738	(142)	713	915	104	1,254	1,574
TOTALS	(685)	1,867	2,284	(443)	2,243	2,897	2,059	7,995	9,737

Notes:

Practical Surplus/Deficit includes all private and County parking

¹ Includes blocks 1,2,3,4,5,6,7,8,15,16,17,18,19,20

² Includes blocks 13,14,21,22,23,24,25,26,27,28

³ Includes blocks 9,10,11,12,29,30,31,57,58,59

⁴ Includes blocks 43,44,45,46,47,48,49,50,51,52,53,54,55

⁵ Includes blocks 34,35,36,38,39,40,41,42

Bethesda Downtown Plan Build-Out Analysis

The recently adopted Bethesda Downtown Plan has allotted for a total of 32.4 million square feet of development in the Bethesda Overlay Zone as the full-build condition. There is currently 23.6 million square feet of building space and 4.6 million square feet of development planned in the pipeline, which were analyzed as part of the future demand analysis (Section 4, Phase III). Remaining developable space in the Overlay Zone is 4.2 million square feet. The impact on parking from 4.2 million square feet of development was analyzed.

Since this is a hypothetical analysis there are no definitive development projects. **Table 6** shows the percentage breakdown of existing land uses in the Bethesda PLD from CoStar data and of planned projects in the pipeline (**Exhibit E**) as provided by MNCPPC. The potential breakdown of future land uses to reach full-build was primarily based on the developments in the pipeline since this is a reflection of the types of projects being developed in Bethesda.

Table 6: Percentage Breakdown of Pipeline Developments

Land Use	Existing	Pipeline
Residential	36%	60%
Office	45%	37%
Retail	11%	1%
Restaurant	3%	1%
Hotel	5%	1%

Three scenarios were analyzed to get a range of full-build parking conditions. It was assumed that residential and hotel developments would provide on-site private parking to support its needs. Retail and restaurant developments would rely on existing public parking, and office developments would provide a percentage of the parking needed to support its demand.

Table 7 shows the proposed breakdown of 4.2 million square feet of development space for the three development scenarios at full-build. The scenario with the largest amount of residential development (Scenario 1) is the least dependent on public parking since it is assumed that residential developments would support their parking needs with on-site private parking. The scenario with the largest amount of office development (Scenario 2) would be the most dependent on public parking in the PLD since office projects would only support a percentage of demand.

Table 7: Three Development Scenarios at Full-Build

Land Use	Percentage Breakdown			Land Use Breakdown ¹		
	Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Residential ²	60%	37%	50%	1,839	1,134	1,533
Office	37%	60%	47%	1,554,000	2,520,000	1,974,000
Retail	1%	1%	1%	42,000	42,000	42,000
Restaurant	1%	1%	1%	42,000	42,000	42,000
Hotel	1%	1%	1%	42,000	42,000	42,000

¹ Breakdown of residential units and square footage for office, retail, restaurant, and hotel

² Assumed 1,370 sq. ft. per residential unit based on existing residential land use data in Bethesda

The ratio of parking planned for pipeline office projects was applied in calculating the amount of parking to be provided by office full-build developments. Based on the analysis of pipeline projects, it was determined that proposed office developments plan on providing 0.84 spaces per 1,000 square feet.

Table 8 shows an analysis of the peak weekday parking surplus/deficit at full-build in the Bethesda PLD. This analysis assumes that hotel and residential developments would support their own parking needs and not provide public parking. Retail and restaurant developments would rely on existing public parking, and office developments would provide parking similar to office projects in the pipeline (i.e. 0.84 spaces per 1,000 square feet). The amount of public parking, both County and privately-owned, available during the peak weekday period was applied in assessing the full-build surplus/deficit parking conditions for each scenario.

The Bethesda Downtown Plan calls for using four County parking lots for public park space in Bethesda. This would include displacing County lots 25, 44, 24, and 10, which would equate to a loss of 489 parking spaces within the PLD. Further, the Bethesda Downtown Plan calls for bike lanes and this would result in a loss of 130 on-street spaces within the PLD.

It was determined that there would be a projected deficit for all three scenarios within the PLD.

The last row of **Table 8** shows the parking deficit if only the County-owned public parking was relied upon to support future pipeline and full-build development in the Bethesda PLD. A substantial deficit of parking (i.e. between 2,672 and 3,367 spaces) is projected for each scenario when not considering

privately-owned public parking. This analysis shows that the Bethesda PLD is strongly dependent on privately-owned public parking facilities to support future pipeline projects and a full-build scenario.

Table 8: Full-Build Peak Weekday Parking Surplus/Deficit Analysis

Land Use	Full-Build Peak Parking Demand ¹			Parking Ratio ²	Full-Build Parking Supply			Future Parking Surplus/Deficit ³		
	Scenario 1	Scenario 2	Scenario 3		Scenario 1	Scenario 2	Scenario 3	Scenario 1	Scenario 2	Scenario 3
Residential ²	993	613	828	0.90	1,655	1,021	1,380	0	0	0
Office	2,423	3,929	3,078	0.84	1,306	2,117	1,659	(1,117)	(1,812)	(1,419)
Retail	39	39	39	0.00	0	0	0	(39)	(39)	(39)
Restaurant	212	212	212	0.00	0	0	0	(212)	(212)	(212)
Hotel	18	18	18	0.72	30	30	30	0	0	0
Totals	3,685	4,811	4,175		2,991	3,168	3,069	(1,368)	(2,063)	(1,670)
Loss of Parking Spaces to Parks								(489)	(489)	(489)
Loss of On-Street Parking								(130)	(130)	(130)
Projected Public Parking Surplus with Existing and Pipeline Projects ⁴								1,867	1,867	1,867
Full-Build Parking Surplus/Deficit with All Public Parking Considered								(120)	(815)	(422)
Projected County Parking Deficit with Existing and Pipeline Projects ⁵								(685)	(685)	(685)
Full-Build Parking Deficit with County Owned Public Parking Considered								(2,672)	(3,367)	(2,974)

¹ Projected peak weekday parking demand per land use for 4.2 million square feet of development

² Assumed residential and hotel would support own demand, office would provide parking similar to proposed developments in pipeline, and retail/restaurant would not provide parking

³ Assumes that residential and hotel parking would be private and not support other parkers

⁴ Future surplus of parking in Bethesda PLD among all publicly available parking, which does not include restricted parking

⁵ Parking deficit if only County owned public parking facilities support Pipeline projects