Arlington County tasked a contractor with collecting data about street parking to help inform the Residential Permit Parking (RPP) program review. These data include the location of RPP restrictions throughout the County and estimated the number of spaces with RPP restrictions. Also included are counts of the number of vehicles parked around Columbia Pike, Virginia Hospital Center, in areas along the Rosslyn-Ballston Corridor near Clarendon and Virginia Square, as well as neighborhoods around Richmond Highway.

Introduction

Arlington County is reviewing the purpose and function of Arlington’s residential permit parking (RPP) program. The program manages on-street parking for approximately 600 blocks in 24 areas throughout the County. Approximately, 9,300 households participated in the program in FY2018 by purchasing one or more permit materials.

The program is a valued tool for managing parking demand and traffic in low-density residential areas. This review is the first in 14 years and is an opportunity to consider changes that help improve the program’s efficiency and effectiveness, user experience and fairness.

Parking demand and the number of spaces is one of the major factors in granting RPP restrictions. To have a better and up-to-date understanding of parking demand, the County tasked a contractor with collecting data about parking to support the review. Data included:

- The exact locations of street curbs with RPP-restricted parking around the County and the number of parking spaces on these curbs.
- The number of vehicles parked along the curb with RPP restrictions, parking meters, and other kinds of restrictions in four areas of the County on weekdays and Saturdays, as well as how long those cars were parked there.

This summary document:

1. Explores what is meant by the term parking “occupancy.”
2. Explains how the data were collected.
3. Highlights certain findings from the data collection.
4. Describes the data collected through a set of maps and graphs.

What is Parking “Occupancy”?  

Parking “occupancy” is defined as the number of parking spaces on a given block that are taken up by parked cars. Blocks are not all the same length and the arrangement of driveways, fire hydrants, bus stops, on each block—or the two sides of the same block—affects the number of parking spaces that can fit on a length of curb. Therefore, occupancy is often described as a percentage where the number
of cars parked on one side of a block (or “block face”) is divided by the number of parking spaces on that block face. Arlington County uses 20 feet as the common length of one parallel parking space. 1

The “Parking and Curb Space Management Element” of Arlington County’s Master Transportation Plan sets a goal between 60% to 85% for on-street parking occupancy on streets without RPP restrictions. 2 The County Ordinance enabling the RPP program sets parking occupancy at 75% or greater as a key criterion for determining whether a block qualifies for RPP restrictions. 3

If one was looking for parking on a block face that can fit 11 parking spaces (the average for blocks with RPP restrictions), then:

- At 60% occupancy, 7 of 11 parking spaces on one block face (or 14 of 22 for both sides of the street, together) would be taken up by parked cars, and 4 parking spaces (8 for both sides) would be left for someone seeking a space.
- At 75% occupancy, 9 of 11 parking spaces (18 of 22 for both sides) would be taken and 2 (4 for both sides) would be available.
- At 85% occupancy, 10 of 11 parking spaces (20 of 22) would be taken and 1 (2 for both sides) would be available.

It is possible for parking-count data to show occupancy above 100% and still be valid for two reasons:

1. Small vehicles on a given block allow more cars to park safely and legally on the street than the 20-foot assumption for a parking space implies.
2. Vehicles are parked illegally, perhaps blocking a bus stop, meaning that more vehicles are parked than the number of legal spaces.

How Data Were Collected

Data collection included two main categories:

1. Developing an updated map all RPP restrictions throughout Arlington County
2. Counting the number of vehicles parked on a street in certain sample areas of the County, including the length of time parked

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1 Arlington County does not mark individual parking spaces. To calculate the number of spaces, the consultant divided the distance between RPP-restriction signs by 20 feet; 20 feet is the mid-point within the range of the County’s on-street parking standards. See Section H-3.5, “On Street Parking” of Arlington County’s Infrastructure Design Standards.

2 Policy 3 (“Promote on-street parking within residential neighborhoods and on commercial streets to calm traffic, support retail activity, and efficiently use public resources”) calls for the County to “[e]ncourage the voluntary removal of off-street surface parking in excess of zoning requirements in those residential areas where on-street parking is utilized at 60 percent or less” and Policy 5 calls for the County to “[e]stablish 85% as an ideal on-street occupancy rate in areas of high demand outside the RPP zones so that the curb space is operating as efficiently as possible” (p. 8, 9).

3 Arlington County Code, Section 14.2-99.
Mapping All RPP Restrictions

Although the parking team maintains an up-to-date list, construction and other variables (e.g. fire hydrant installation, curb and gutter work) may have impacted the number of original spots on blocks with RPP restrictions. To ensure the list is accurate, the contractor sent data collectors into the field to:

1. Find where RPP-restriction signs were located
2. Record the hours of restriction on these signs
3. Record the RPP zone number on each sign

Using this location data and mapping software, the contractors created a map of the areas within the County that has RPP restrictions and estimated the number of parking spaces that fit between these signs. Figure 1 describes where RPP-restricted parking can currently be found around the County based on this data (clicking on the map will take you to a larger version online).

**Figure 1: Map of RPP-Restricted Streets in Arlington County**

Contractors mapped the restrictions around Columbia Pike in spring 2017; mapping of all other restrictions took place in spring 2018. No additional restrictions have been put in place since spring 2017. In January 2019, the County Board voted to request that the Manager remove RPP restrictions in place within the boundaries of the Forest Glen Civic Association. These restrictions are not included in Figure 1.
Parking Counts
Because RPP restrictions can be found throughout Arlington, counts of parked vehicles needed to occur across the County. Vehicle counts on nearby non-RPP zoned streets, with meters, time limits, and those streets without parking restrictions (other than those for fire hydrants, driveways, and visibility at intersections), provide context for parking on RPP-restricted streets.

County staff laid out parking-count data collection areas that incorporated streets with four types of parking management

1. **RPP-restricted** parking, which allow only parkers with RPP permits and passes to park during hours of enforcement.
2. **Metered** parking, where parkers must pay for parking during certain hours to promote efficient use of the spaces, and where parkers may not stay longer than the maximum time posted (usually 2 hours or 4 hours).
3. **Time-limited** parking, where parkers may not stay longer than the maximum time posted (usually 2 hours or 4 hours) during certain hours to promote efficient use of the spaces, but where no payment is required
4. **Unmanaged** parking, where parkers may stay up to 10 days, the point at which a vehicle is considered abandoned and may be towed.

Resources allowed staff to task a contractor with studying four areas that provided a mix of characteristics. Budget limitations required that data collection take place over time instead of all at once. The contractor collected data at points during the period between April 2017 and May 2019.

Table 1 describes some distinguishing characteristics of each study area and when data collection took place in each.

**TABLE 1: CHARACTERISTICS OF FOUR ON-STREET PARKING COUNT AREAS AND DATA COLLECTION TIMING**

<table>
<thead>
<tr>
<th>Area</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| **Columbia Pike Data collected April 2017**| • Residents have requested RPP to manage demand from residents on neighboring streets.  
• Includes Douglas Park and Columbia Forest, the County’s first night-time RPP zones.  
• Low-density housing around mixed-use corridor with housing construction.  
• Includes a major employer (the Foreign Service Institute/National Guard Readiness Center) without Metro access. |
| **Virginia Hospital Center Area May 2018** | Low-density housing surrounding a major employer without Metro access.          |
| **Clarendon and Virginia Square May and October 2018** | • Low-density housing around one of two dense, mixed-use Metro Corridors.  
• Includes streets with late-evening RPP restrictions near entertainment and nightlife businesses. |
| **Richmond Hwy/Aurora Highlands/Arlington Ridge April 2019** | • Low-density housing near one of two dense, mixed-use Metro Corridors.  
• Includes County’s first RPP zones. |
In each study area, data-collectors verified where parking was located. The contractor counted the number of vehicles on both sides of each block using license-plate-recognition (LPR) technology.

Counting took place on one mid-week day (Tuesday, Wednesday, or Thursday) and on one Saturday for each block face since parking patterns vary between the middle of the work week and the weekend. The County requested data collection between 8 AM and 1 AM. Counts took place on each block face once per hour between these hours, except for the data from 2018, when budget limitations forced the project to save money by reducing counts to once every two hours.

The County tasked the contractor with collecting data in the spring. The contractor avoided spring break, Federal holidays, inclement weather and special events that closed streets and may change normal driving behavior. Repeating data collection in the same season minimized the chance the differences in parking between study areas would be due to changes in the season. Unfortunately, equipment problems during the May 2018 data collection required a repeat around Clarendon and Virginia Square in October. Again, staff worked with the contractor to create a schedule that avoided holidays and major events. Similar equipment problems occurred during Saturday evening data collection in one portion of the Virginia Hospital Center Area, but that data was not re-collected.

In the spring 2018 and 2019 data collection, the County also tasked the contractor with collecting hourly counts for seven days between 8 AM and 1 AM. These counts were taken so that staff could compare data from a longer data-collection period with the LPR-based data to see how well the LPR-based data reflects parking patterns over a longer period of days. Since comparison was important, the contractors collected hourly manual counts for seven days during the same weeks as the LPR data collection or within a few weeks of each other.

In July 2018, parking-meter rates increased by $0.25 and hours of enforcement were extended from 6PM to 8PM. Staff compared the data collected in spring and then fall from the Clarendon and Virginia Square areas. While occupancy did decline slightly at metered spaces in the time between 6 PM and 8 PM, the County found no statistically significant change in occupancy on un-metered streets.

The contractor then used these data to calculate three metrics: (1) occupancy; (2) duration; and (3) turnover. This summary presents the occupancy, since that is the criterion used for granting RPP restrictions.

**Summary of Findings**

These studies found that Arlington County has 14,600 RPP-restricted parking spaces. Table 2 breaks that number down by RPP zone.

<table>
<thead>
<tr>
<th>RPP Zone</th>
<th>Number of Restricted Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>822</td>
</tr>
<tr>
<td>1A</td>
<td>211</td>
</tr>
<tr>
<td>1B</td>
<td>823</td>
</tr>
<tr>
<td>1C</td>
<td>835</td>
</tr>
<tr>
<td>2</td>
<td>521</td>
</tr>
<tr>
<td>3</td>
<td>566</td>
</tr>
<tr>
<td>4</td>
<td>721</td>
</tr>
<tr>
<td>5</td>
<td>177</td>
</tr>
<tr>
<td>6</td>
<td>3,525</td>
</tr>
<tr>
<td>7</td>
<td>149</td>
</tr>
</tbody>
</table>
Across the four detailed study areas, there were approximately 29,500 parking spaces studied, broken out by parking management type in Table 3.

**TABLE 3: BLOCK FACES AND PARKING SPACES STUDIED IN DETAILED STUDY AREAS**

<table>
<thead>
<tr>
<th>Study Areas and Parking Management Types</th>
<th>Block Faces</th>
<th>Parking Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Columbia Pike</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RPP-Restricted</td>
<td>210</td>
<td>2,620</td>
</tr>
<tr>
<td>Metered</td>
<td>40</td>
<td>291</td>
</tr>
<tr>
<td>Time-Limited</td>
<td>64</td>
<td>859</td>
</tr>
<tr>
<td>Unmanaged</td>
<td>828</td>
<td>10,335</td>
</tr>
<tr>
<td><strong>Virginia Hospital Center Area</strong></td>
<td>372</td>
<td>4,615</td>
</tr>
<tr>
<td>RPP-Restricted</td>
<td>82</td>
<td>902</td>
</tr>
<tr>
<td>Metered</td>
<td>4</td>
<td>68</td>
</tr>
<tr>
<td>Time-Limited</td>
<td>3</td>
<td>18</td>
</tr>
<tr>
<td>Unmanaged</td>
<td>283</td>
<td>3,627</td>
</tr>
<tr>
<td><strong>Clarendon and Virginia Square</strong></td>
<td>672</td>
<td>6,263</td>
</tr>
<tr>
<td>RPP-Restricted</td>
<td>277</td>
<td>3,007</td>
</tr>
<tr>
<td>Metered</td>
<td>149</td>
<td>1,073</td>
</tr>
<tr>
<td>Time-Limited</td>
<td>45</td>
<td>383</td>
</tr>
<tr>
<td>Unmanaged</td>
<td>201</td>
<td>1,800</td>
</tr>
<tr>
<td><strong>Richmond Hwy./Aurora Highlands/Arlington Ridge</strong></td>
<td>367</td>
<td>4,550</td>
</tr>
<tr>
<td>RPP-Restricted</td>
<td>184</td>
<td>2,291</td>
</tr>
<tr>
<td>Metered</td>
<td>101</td>
<td>1,136</td>
</tr>
<tr>
<td>Time-Limited</td>
<td>22</td>
<td>183</td>
</tr>
<tr>
<td>Unmanaged</td>
<td>60</td>
<td>940</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td>2,553</td>
<td>29,533</td>
</tr>
</tbody>
</table>

*NOTE: DOES NOT INCLUDE BLOCK FACES ON PRIVATE STREETS, BLOCK FACES WITH NO PARKING, OR BLOCK FACES WHERE CONSTRUCTION PREVENTED PARKING.*

Some findings are:

- Streets with RPP restrictions were, on average, 50%-or-less occupied throughout the day, even when restrictions were not enforced.
However, within the set of streets that have RPP restrictions, occupancy varied considerably, and a small number of streets had occupancy rates over 85%.

RPP streets were usually most full in the evening and at night, which is when most residents would be at home. Average occupancy in the day time was as low as 20% on weekdays, and around 30% on weekends.

Metered parking spaces usually had higher occupancy than other types of spaces, and occupancy peaks in the evening between 6 PM and 8 PM on weekdays between 60% and 80%.

Most streets with parking but without RPP restrictions, meters, or time limits were also residential streets, and they were most full in the evening, just like streets with RPP restrictions.

Streets without meters, RPP, or time restrictions were usually less occupied than streets with RPP restrictions.

**Occupancy Maps**

The following maps show the block-by-block parking occupancy for all streets at 8 AM, 12 PM, 4 PM, 8 PM, and 10 PM to display the variation in occupancy in greater detail. The data presented here included a variety of streets, some with RPP restrictions and some without. For that reason, the maps use both 60% occupancy and 85% occupancy as break points for the map legend, rather than 60% and 75%.
Map of RPP-Restricted Streets in Arlington County
As of February 2019
Detailed Study Areas
Parking Management Type
Study Area: Columbia Pike
Study Period: May 2017

See page 4 for the definitions of these management types.
Parking Management Type
Study Area: Virginia Hospital Center Area
Study Period: May 2018

See page 4 for the definitions of these management types.
Parking Management Type
Study Area: Clarendon/Virginia Square
Study Period: October 2018

See page 4 for the definitions of these management types.
Parking Management Type
Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019

See page 4 for the definitions of these management types.
Share of Parking Spaces Used by Vehicles

Study Area: Columbia Pike
Study Period: May 2017

Note: Hours and days of RPP enforcement vary. For simplicity, these charts group streets with RPP restrictions at any time as “RPP Restricted.” Refer to occupancy maps below to see when RPP restrictions are enforced by block.

Weekday and Saturday parking demand stayed below 65% at all types of spaces.

See page 4 for the definitions of these management types.
Share of Parking Spaces Used by Vehicles

Study Area: Virginia Hospital Center Area Area
Study Period: May 2018

There are few time-limited spaces in this area, which is why occupancy in those spaces changed drastically, hour-by-hour.

Note 1: Hours and days of RPP enforcement vary. For simplicity, these charts group streets with RPP restrictions at any time as “RPP Restricted.” Refer to occupancy maps below to see when RPP restrictions are enforced by block.

Note 2: Due to equipment malfunction, data was not accurately collected after 4 pm on Saturday in the “West” portion of the study area and has been removed. Refer to occupancy maps below for “East” occupancy by block.
Share of Parking Spaces Used by Vehicles

Study Area: Clarendon/Virginia Square
Study Period: October 2018

Note: Hours and days of RPP enforcement vary. For simplicity, these charts group streets with RPP restrictions at any time as “RPP Restricted.” Refer to occupancy maps below to see when RPP restrictions are enforced by block.

Parking demand stayed below 80% in metered and time-limited spaces, and below 50% in RPP and unmanaged locations.
Share of Parking spaces Used by Vehicles

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019

Note: Hours and days of RPP enforcement vary. For simplicity, these charts group streets with RPP restrictions at any time as “RPP Restricted.” Refer to occupancy maps below to see when RPP restrictions are enforced by block.

Occupancy on RPP-restricted streets peaked in the evening, just below 40%. Occupancy on metered streets peaked between 11am and 2pm with another slight increase between 6pm and 8pm.

Parking demand was more equally distributed on Saturday. Though most streets in this area do not have weekend RPP restrictions, overall occupancy was low for those streets with weekday restrictions. Occupancy in metered spaces stayed at about 60% between 12pm and 10pm.
Share of Parking Spaces Used by Vehicles Based on Time of Day and Street Facility
Study Area: Columbia Pike
Share of Parking Spaces Used by Vehicles at 8am on a Weekday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 12pm on a Weekday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 4pm on a Weekday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 8pm on a Weekday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 10pm on a Weekday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 8am on a Saturday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 12pm on a Saturday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 4pm on a Saturday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 8pm on a Saturday

Study Area: Columbia Pike
Study Period: May 2017
Share of Parking Spaces Used by Vehicles at 10pm on a Saturday

Study Area: Columbia Pike
Study Period: May 2017
Study Area:
Virginia Hospital Center Area
Share of Parking Spaces Used by Vehicles at 8am on a Weekday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 12pm on a Weekday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 4pm on a Weekday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 8pm on a Weekday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 10pm on a Weekday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 8am on a Saturday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 12pm on a Saturday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 4pm on a Saturday

Study Area: Virginia Hospital Center Area
Study Period: May 2018
Share of Parking Spaces Used by Vehicles at 8pm on a Saturday

Study Area: Virginia Hospital Center Area
Study Period: May 2018

Note: Due to equipment malfunction, data was not accurately collected in the grey zone and has been removed.
Share of Parking Spaces Used by Vehicles at 10pm on a Saturday

Study Area: Virginia Hospital Center Area
Study Period: May 2018

Note: Due to equipment malfunction, data was not accurately collected in the grey zone and has been removed.
Study Area: Clarendon/Virginia Square
Share of Parking Spaces Used by Vehicles at 8am on a Weekday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 12pm on a Weekday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 4pm on a Weekday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 8pm on a Weekday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 10pm on a Weekday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 8am on a Saturday

Study Area: Clarendon/Virginia Square

Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 12pm on a Saturday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 4pm on a Saturday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 8pm on a Saturday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Share of Parking Spaces Used by Vehicles at 10pm on a Saturday

Study Area: Clarendon/Virginia Square
Study Period: October 2018
Study Area:
Richmond Hwy/Aurora Highlands/
Arlington Ridge
Share of Parking Spaces Used by Vehicles at 8am on a Weekday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge

Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 12pm on a Weekday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 4pm on a Weekday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 8pm on a Weekday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 10pm on a Weekday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 8am on a Saturday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 12pm on a Saturday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 4pm on a Saturday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 8pm on a Saturday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019
Share of Parking Spaces Used by Vehicles at 10pm on a Saturday

Study Area: Richmond Hwy/Aurora Highlands/Arlington Ridge
Study Period: April 2019