

## RESIDENTIAL PARKING OCCUPANCY STUDY – EXECUTIVE SUMMARY

### Consultant Charge

- Examine how parking typically functions in residential neighborhoods in Milwaukee.
- Analyze residential parking demand to inform decision making regarding parking in the context of the Comprehensive Plan, the zoning code, and current State level requirements.
- Estimate minimum residential parking demand through occupancy counts (on-site and within the public right-of-way).
- Calculate residential parking demand per residential unit.

### Study Areas

Sample areas within the following neighborhoods were selected in consultation with the City of Milwaukee and Urbsworks.

- Lake Road
- Lewelling
- Ardenwald
- Island Station

The four study areas were selected as a representative set of combinations of conditions, including different lot sizes, pre-war and post-war platted neighborhoods, on-street conditions, such as streets with sidewalks and driveway curb cuts, and unimproved streets (streets with planted or gravel edges instead of sidewalks and curbs).

### Methodology

- 2:00 AM parking counts represent highest level of residential parking demand.
- 10:00 AM parking counts to assess change against traditional peak demand (2AM).
- Measure across multiple metrics (by type of supply, peak occupancy, # of vehicles parked per unit and actual vehicle demand per residential unit).

### Implications of COVID-19

- COVID causing more vehicles to stay home but should not impact 2AM peak (most likely makes demand numbers conservative).
- Nonresidential demand (i.e. parking for shops, cafes, parks within neighborhoods) is likely lower than normal as evidenced in 10AM counts.

### Findings (see also Summary Table below)

- Total parking supply averages approximately 4.05 stalls per residential unit across all four neighborhoods. Within this average, Lewelling has the highest parking supply total of 4.93 stalls per residential unit; Ardenwald the lowest at 3.13 stalls per residential unit.
- Minimum parking demand averages approximately 1.99 vehicles per residential unit at the peak hour across all four neighborhoods; this includes both the on and off-street parking systems. Within this average, Lake Road has the highest demand for parking at 2.05 vehicles per residential unit; Lewelling the lowest at 1.89 vehicles per residential unit.
- On-site demand is approximately 1.52 vehicles per unit (1.44 in driveways, an additional 0.7 in surface lots).
  - The on-street parking system has low demand currently (about 0.48 vehicles per unit). As such, there is an abundance of on-street parking availability (likely due to COVID). Occupancies in the on-street supply

could be higher (post-COVID) but the user would be non-residential, and demand would occur during the mid-day, not at the 2AM peak demand for residential parking.

- Much of on-street parking supply is unimproved, which could reduce on-street supply if improvements were made (e.g., curbs, paving).
- There is a high percentage of residential units with multiple vehicles (3 or more) parking on-site in two neighborhoods, which was counted as part of the demand (23.5% in Ardenwald and 18.4% in Island Station). It is not assumed that this high rate of vehicle ownership would continue with new middle housing demand. That said, even with this documented vehicle per unit demand number, the current parking supplies in the study areas exceed demand. On-site parking stalls reach an average of 77% occupancy at their peak hour; the on-street system reaches a peak average of 23%.
- Data from the occupancy study suggests the City take the minimum compliance approach to meet State mandate for parking requirements for new middle housing projects. According to the new regulations, a city may not require more than a total of one off-street parking space per dwelling unit.

*Summary Table: Residential Peak Parking Demand per Unit by Neighborhood and by Combined Average*

		Lake Road	Lewelling	Ardenwald	Island Station	Total
<b>Residential Units</b>		190	154	171	131	<b>646</b>
<b>Supply</b>	<b>On-Street Stalls/Unit</b>	2.37	2.64	1.20	2.18	<b>2.09</b>
	<b>Driveway Stalls/Unit</b>	1.75	2.29	1.68	1.82	<b>1.87</b>
	<b>Surface Lot Stalls/Unit</b>	-	-	0.25	0.14	<b>0.09</b>
	<b>Total Stalls Studied/Unit</b>	4.12	4.93	3.13	4.13	<b>4.05</b>
<b>Demand*</b>	<b>On-Street Vehicles/Unit</b>	0.89	0.29	0.29	0.36	<b>0.48</b>
	<b>Driveway Vehicles/Unit</b>	1.16	1.60	1.58	1.48	<b>1.44</b>
	<b>Surface Lot Vehicles/Unit</b>	-	-	0.18	0.11	<b>0.07</b>
	<b>Total Vehicles/Unit</b>	2.05	1.89	2.05	1.95	<b>1.99</b>

\*All demand observations shown represent the 2:00 AM overnight peak hour.

<sup>1</sup> Residential parking only. "Other" and garage parking excluded from this summary.



# City of Milwaukee: Residential Parking Occupancies

## Summary of Findings

February 2021 (v1)

### 1.1 INTRODUCTION

In 2017, the City of Milwaukee adopted a 20-year vision effort, and in 2018, the City began a two-year process to update the Comprehensive Plan. The adoption of the Comprehensive Plan establishes a mandate for Milwaukee to update any lagging land use policies and practices that may be holding the City back from realizing its vision. One significant area where current policies and practices need to be updated is the zoning code. The City made it an early priority to update the zoning code in single dwelling residential areas. These areas of the zoning code will need to be amended to achieve several Comprehensive Plan goals related to increasing community diversity, preparing for population growth, protecting natural resources, and improving climate resiliency.

In support of these efforts the City of Milwaukee is interested in how parking typically functions in residential neighborhoods. A better understanding of this dynamic will help facilitate decision making regarding parking in the context of the Comprehensive Plan, the zoning code, and state level requirements.

In January 2021, a complete inventory of parking supply was compiled in four Milwaukee neighborhoods. In February, actual vehicle counts (occupancy counts) were conducted within these same neighborhoods. The purpose of this report is to summarize the findings of the occupancy study. Key findings summarize occupancies within the public right-of-way and on-site within parcels (by unit). Calculations of parking demand by unit are also provided.

The sample study zones are within the following neighborhoods, selected in consultation with the City of Milwaukee and Urbsworks (the prime consultant for the larger Comprehensive Plan Implementation Project):

- Lake Road
- Lewelling
- Ardenwald
- Island Station

### 1.2 GLOSSARY OF TERMS

- Building:** Any built structure within a parcel intended for residential use (e.g., single family households, duplexes, and apartments) or, in some cases, non-residential use (e.g., retail, restaurant, etc.). Garages are excluded from this definition.
- Capacity:** The estimated number of physical parking stalls associated with a parcel or fully inventoried supply.
- Carpport:** A roofed structure within a parcel intended for the parking of vehicles; unlike a garage, a carport does not contain walls or doors.
- Driveway:** Any area within a parcel that is legally intended for the parking of vehicles. Driveways are identified as having an associated curb cut from a street into a parcel. A driveway will have a clearly visible apron of pavement or gravel (usually in front of a garage). A driveway must be large enough in size to accommodate a vehicle without infringing on a sidewalk or street.
- Garage:** Any built structure within a parcel intended for the parking of vehicles. In the context of this study, garage capacity was estimated based on the width of the garage door (or number of doors, if multiple doors were observed).



<b>"Illegal" Parking:</b>	During the <i>inventory</i> study, numerous vehicles were parked in areas deemed unsafe or illegal. Examples were vehicles parked in front yards (not on driveways), vehicles parked in no parking areas in ways that impeded traffic flow, or across driveways. As these vehicles were not in a clear parking stall, these parking areas were not recorded as part of the legal "parking supply." However, during the <i>occupancy</i> study, these vehicles do contribute to "parking demand". As such, they were quantified and added to the demand within the inventoried supply. Thus, if 2 vehicles were parked in a front yard, 2 vehicles of demand were added to <i>driveway</i> parking demand. If 3 vehicles were parked unsafely on-street, their demand was added to the functional <i>on-street</i> parking demand total. In short, if vehicles were parked, they were accounted for as parking demand.
<b>Inventory:</b>	<p><b>Land Use</b> - A land use inventory is a catalogue of all residential dwelling units and non-residential units (e.g., retail, restaurant, industrial) in a designated study area.</p> <p><b>Parking</b> - A parking inventory is a catalogue of spaces that can be legally and safely used for parking. The catalogue of parking is separated by type of parking identified (i.e., on-street, in driveways, and garages).</p>
<b>Occupancy:</b>	The number of vehicles parked within a supply, expressed as a percentage of occupied parking supply. For instance, if 50 cars are parked within an inventoried supply, then the occupancy at the time of that count would be 50%.
<b>Parcel:</b>	A piece of real property as identified by the county assessor's parcel number (APN) that is one contiguous parcel of real property. Individual parcels are demarcated on study area maps developed for each study area. All land uses and parking within parcels are associated with that specific parcel. See <b>Figure A</b> as an example.
<b>Parcel Block:</b>	Parcel blocks are designated on data maps by number. Such blocks are generally defined as an area bounded by streets and containing unique parcels within such a block. See <b>Figure C</b> as an example.
<b>Parking stall:</b>	An area located on-street, in driveways and carports, in surface lots, or in garages that is available to park vehicles by authorized users (hourly, daily, and/or overnight). Parking stalls need to be reasonably sized to ensure appropriate access and maneuverability.
<b>Peak Occupancy:</b>	Within the parking industry, peak occupancy for residential uses is assumed to occur at midnight or later (e.g., 2:00 AM). In a residential neighborhood, this period of occupancy best captures uses only related to residential parking demand, unassociated with other non-residential demand generators (e.g., commercial visitors, employee demand/overspill, etc.). At this hour, vehicles parked can be directly correlated to residential demand, whether a vehicle is parked on-street or on-site.
<b>Ratio of stalls to units:</b>	Calculations of the relationship of the number of parking stalls to residential units are made at different levels, including in aggregate or by type of supply (e.g., on-street, in driveways, and/or garages). This ratio is useful in examining physical parking built within a supply and what a code might require.
<b>Ratio of demand to units:</b>	Calculations of the relationship of the demand for parking to residential units. For this study, calculations were made for demand per unit that aggregated on-street and on-site occupancies to establish a combined ratio of demand for each neighborhood. The combined demand per unit is also broken out to show demand generated from on-street vehicle demand and as demand generated by vehicles parked on-site. Vehicle occupancies (demand) in garages was not quantified as the overwhelming majority of observed garages had doors closed. As such, the ratios of demand to units provides <i>an estimate of the</i>



*minimum demand generated per unit*, assuming some increment above this minimum would be associated with vehicles parked in garages.

**Unit:** **Residential** - A residential unit is identified as a unique address within a parcel. This could be a single-family dwelling, or multiple units within multifamily dwellings (e.g., duplex, apartment).

**Non-residential** - A non-residential unit is identified as real property within a parcel that provides services or business within a study area. This could be individual free-standing businesses or services or multiple activity spaces within a shared building. Examples include workspaces, restaurants, retail spaces and event venues (if housed in a building).

### 1.3 METHODOLOGY

#### Study Zone Boundaries

Study area boundaries in the four neighborhoods were developed in coordination with the City of Milwaukee and the Comprehensive Plan Implementation team. The intent for establishing study zones was to develop sample areas to collect usage data from selected neighborhoods. Outputs from collected data can serve as "typical" representations of how parking is currently provided (supply)<sup>1</sup> and used (demand) in these neighborhoods.

#### Vehicle Occupancy Counts

Occupancy counts were conducted at 2:00 AM and 10:00 AM on February 3 and 4, 2021 to capture overall parking demand. Most parking in each neighborhood was associated with residential parking demand. Parking (on or off-street) associated with non-residential uses (e.g., retail, commercial) was not included in counts for residential demand and was instead tracked separately.

Within the parking industry, the 2:00 AM count in residential areas is best representative of a residential "peak hour." At this hour, it is likely that most, if not all, vehicles parked in a supply are directly associated with residential uses; assuming that non-residents (retail, employment, event, etc.) would not be in the area at this hour. Also, residents themselves, to a high degree, would be home from work and not out on trips or errands.

The 10:00 AM count was conducted to document mid-morning demand associated with residential and non-residential parking demand. The 10:00 AM count serves as a snapshot to show how each neighborhood transitions from the traditional residential peak hour (2:00 AM) to a daytime period that may include some non-residential users. For instance, if occupancies at 10:00 AM decrease compared to the 2:00 AM peak period, this is usually a reflection of residents leaving the area for work, shopping, or other daytime trips. However, if parking demand increases during the day above the 2:00 AM peak, that is a sign that non-residential users parking in the area outnumber the number of residents leaving during the day.

Vehicle counts were taken in separate supply categories, cataloguing vehicles parked in the on-street supply and on-site (within a parcel). Surveyors also made note of and accounted for vehicles parked illegally or unsafely in the different supply types. These vehicles *are included* in the overall parking demand numbers.

<sup>1</sup> A detailed summary of the entire parking inventory (supply) in each neighborhood is contained in Rick Williams Consulting: *City of Milwaukee: Residential Parking Inventory Summary of Findings - February 2021 (v3)*



## 1.4 Lake Road Neighborhood

### Inventory Overview

The sample study area for the Lake Road neighborhood is illustrated in **Figure A**. The survey area for the Lake Road neighborhood is comprised of 190 residential units, served by 783 visible parking stalls (451 on-street stalls and 332 driveway/carport stalls).<sup>2</sup> There were no surface lot stalls in this neighborhood. This is summarized in **Table 1**.

**Table 1: Lake Road Neighborhood – Breakout of observed stalls and residential units**

	Lake Road
<b>Total Parking Stalls Studied<sup>3</sup></b>	783
<b>On-Street Stalls</b>	451
<b>Driveway Stalls</b>	332
<b>Surface Lot Stalls</b>	-
<b>Residential Units</b>	190

### Summary of Parking Occupancies

#### On-Street Parking Demand

There are 451 on-street parking stalls within the Lake Road neighborhood study area. At the 2:00 AM data collection hour, 169 vehicles were observed parked in the on-street supply. This represents an occupancy of 37.5%, leaving 283 empty stalls in the usable on-street inventory.

At 10:00 AM, 142 vehicles were observed parking in the on-street supply. This represents an occupancy of 31.5%, with 309 empty stalls available within the useable on-street inventory.

**Table 2** summarizes occupancy counts associated with the on-street supply.

**Table 2: Observed Occupancies – On-street Supply**

Performance Measure	Parking Demand Observations	
	On-Street Parking Supply: 451 stalls	
Collection Hour	2:00 AM	10:00 AM
Occupancy	37.5%	31.5%
Parked Vehicles	168 <sup>4</sup>	141 <sup>5</sup>
RV/ Trailers	1	1
Construction/ Obstruction	-	-
<b>Empty stalls (unused supply)</b>	<b>283</b>	<b>309</b>

<sup>2</sup> An additional 160 stalls of "capacity" were estimated during the inventory in doored garages.

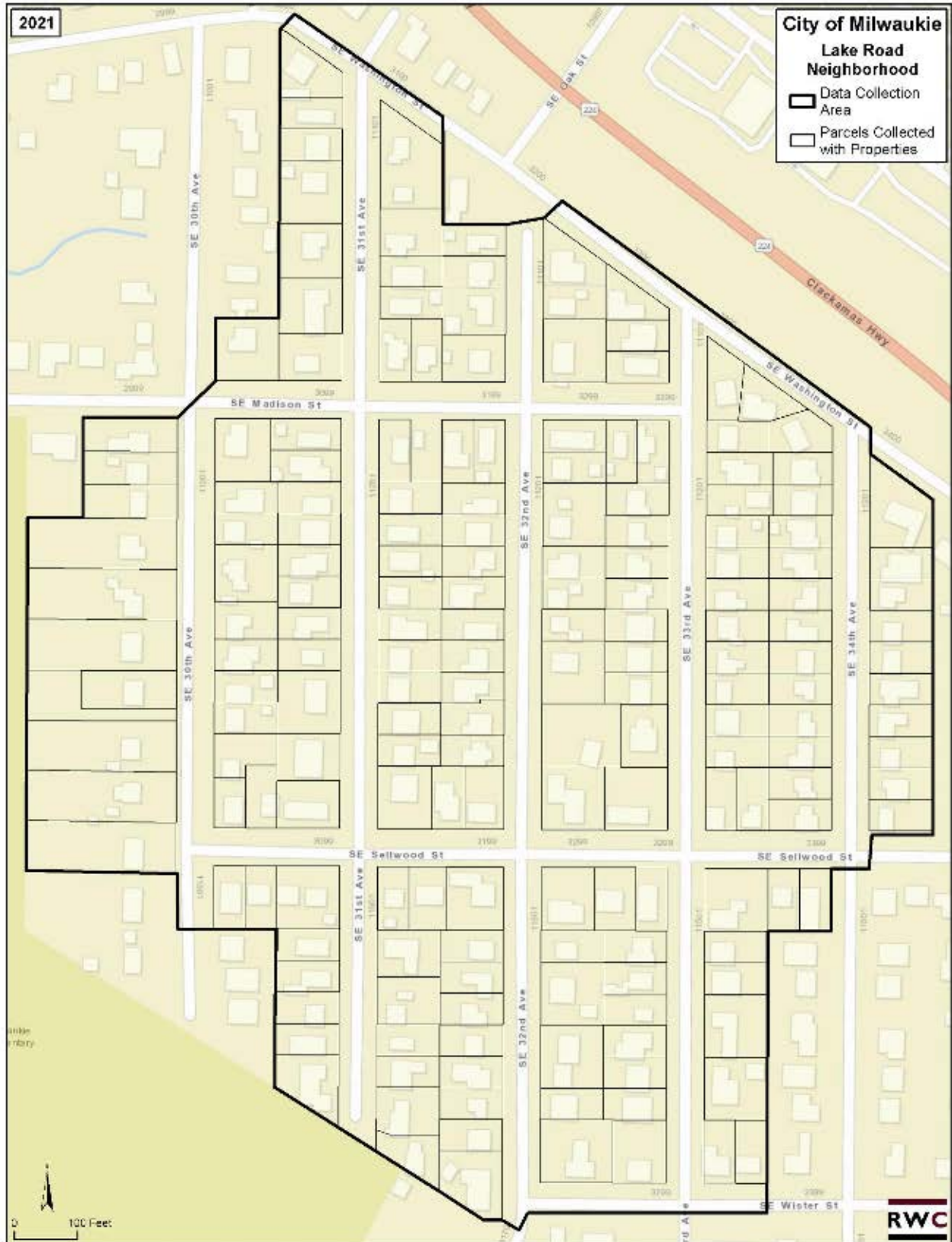
<sup>3</sup> Residential parking stalls only. "Other" and Garage uses excluded from this summary.

<sup>4</sup> Of the total vehicles parked at 2:00 AM, nine (9) were parked illegally (including the one RV/Trailer).

<sup>5</sup> Of the total vehicles parked at 10:00 AM, three (3) were parked illegally (including the one RV/Trailer).



Figure A: Lake Road Neighborhood Study Area Boundary and Parcel Map





### On-Site Parking Demand (within parcels)

Use of on-site parking in the neighborhood is summarized in **Table 3**. In the Lake Road neighborhood, there are 332 on-site parking stalls. This is all driveway capacity as there are no surface lots serving residential uses in this neighborhood.

At the 2:00 AM hour, 219 vehicles were observed parked within residential parcels, an occupancy of 66.3%. At 2:00 AM, there were 113 empty parking stalls within the on-site supply. At 10:00 AM, occupancies dropped to 52.1% with 173 vehicles parked and 159 empty stalls.

**Table 3: Observed Occupancies – On-site supply**

Performance Measure	Parking Demand Observations	
	On-Site Parking Supply: 332 stalls	
	2:00 AM	10:00 AM
Occupancy	66.3% <sup>6</sup>	52.1% <sup>7</sup>
Parked Vehicles	219	173
Empty stalls (unused supply)	113	159

### Residential Parking Demand per Unit

**Table 4** summarizes observed occupancy data per unit for the entire 783 stall supply using observed vehicle occupancy numbers provided in **Tables 2** and **3** above. The table also allocates the demand for each unit between on-street and on-site occupancies to illustrate demand by stall type.

**Table 4: Residential Parking Demand per Unit**

Performance Measure	Parking Demand per Unit	
	Residential Units: 190 Units	
	2:00 AM	10:00 AM
On-Street Vehicles/Unit (Supply: 2.37 stalls/unit)	0.89	0.75
Driveway Vehicles/Unit (Supply: 1.75 stalls/unit)	1.16	0.92
Surface Lot Vehicles/Unit (Supply: N/A)	N/A	N/A
Total Vehicles/Unit (Supply: 4.12 stalls/unit <sup>8</sup> )	2.05	1.67

As the table indicates, peak hour (2:00 AM) residential demand is 2.05 vehicles per unit. Of that total, 0.89 per unit is generated from vehicles parking on-street. Observed on-site demand is 1.16 vehicles per unit. At 10:00 AM, combined demand for parking is 1.67 vehicles per unit; with 0.75 and 0.92 of demand derived on-street and on-site, respectively. These demand ratios can be contrasted to the built supply of parking (excluding garage capacity), which combined, totals 4.12 stalls of capacity serving a demand of 2.05 and 1.67 vehicles/unit, for the 2:00 AM and 10:00 AM occupancy periods. This is illustrated in **Figure B**.

<sup>6</sup> Of the vehicles parked at 2:00 AM, seven (7) are parked somewhere on-site other than the driveway.

<sup>7</sup> Of the vehicles parked at 10:00 AM, six (6) are parked somewhere on-site other than the driveway.

<sup>8</sup> This does not include potential garage capacity, which totaled 160 stalls, which would raise the built ratio to 4.96.

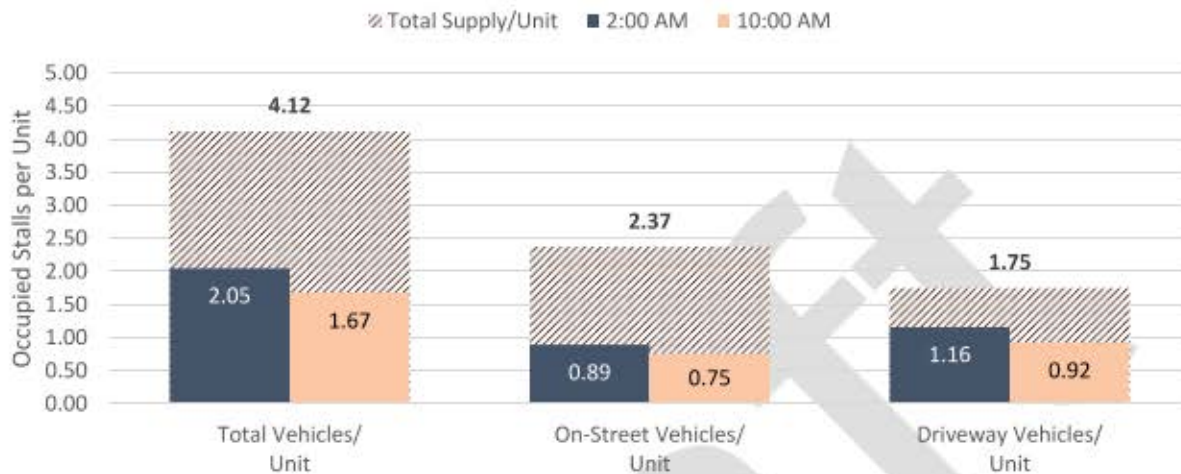




**Figure B: Summary of Parking Demand and Built Supply**

**2021 Milwaukie Parking Demand Ratios - Lake Road Neighborhood**

2:00 AM vs. 10:00 AM: Weekday parking demand per unit (783 stalls/ 190 units)



### Heat Map Summary

Figures C and D provide a graphic illustration of occupancies at 2:00 AM and 10:00 AM, respectively. Data is provided for both the on-street system and the on-site systems. Map colors define occupancy in five color bands, ranging from purple (indicating greater than 100% occupancy<sup>9</sup>), red (100% - 85%), orange (84% - 70%), yellow (69% - 55%), and green (less than 55%).

#### On-street

At the 2:00 AM hour, 34 of 36 on-street block faces fall within the yellow and green color bands. This demand range is consistent across the study area. That said, one block face on the east side of 34<sup>th</sup> Avenue paralleling the parcels on block 412 has occupancies more than 85%, though the block face on the west of the same street is green (less than 55%). One block face, the west side of SE 32<sup>nd</sup> Avenue, paralleling the parcels on block 404 is orange (85% - 70%). At this hour, the heat maps would indicate there is an abundance of on-street parking available, and access to it is convenient.

At the 10:00 AM hour, 34 of 36 on-street block faces fall within the yellow and green color bands. This demand range is consistent across the study area. There are two block faces that fall within the orange color band: the east side of 34<sup>th</sup> Avenue paralleling the parcels on block 412 and the north side of SE Sellwood Street paralleling the parcels on block 409. At this hour, the heat maps would indicate there is an abundance of on-street parking available and convenient access to it.

#### On-site

The Lake Road study area totals 13 parcel blocks serving 190 unique residential units. For purposes of this discussion, occupancy data is aggregated to the *parcel block* level. Use at the *individual parcel level* is not displayed to ensure that individual residential sites remain anonymous.

At the 2:00 AM hour, 2 of 13 parcel blocks have occupancies greater than 85%. Parking occupancy in the parcels in block 407 exceed the functional supply (greater than 100%). Also, the parcels in block 412 fall within the red band. Four parcel blocks (402, 403, 404, and 411) have occupancies between 84% and 70%

<sup>9</sup> An occupancy of greater than 100% would indicate that when illegally parked vehicles are added to a supply total (on-street or within a parcel), the demand (parked vehicles) exceeds the functional supply (safe stalls).



(orange), with the remaining seven blocks in the yellow and green bands. At this hour, the heat maps would indicate that parcels within blocks can meet their parking demand on-site. Two parcel blocks have demand that approaches or exceeds observed supply, but adequate parking is adjacent to them on-street.

At the 10:00 AM hour, one parcel block (407), falls within the red band (100% - 85%). Two parcel blocks (403 and 412) have occupancies in the orange range. The remaining ten parcel blocks are within the yellow and green bands. At this hour, the heat maps would indicate that parcels within blocks can meet their parking demand on-site. One parcel block has demand greater than 85%, but adequate parking on-street.

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Figure C: Parking Occupancy Heat Map - 2:00 AM

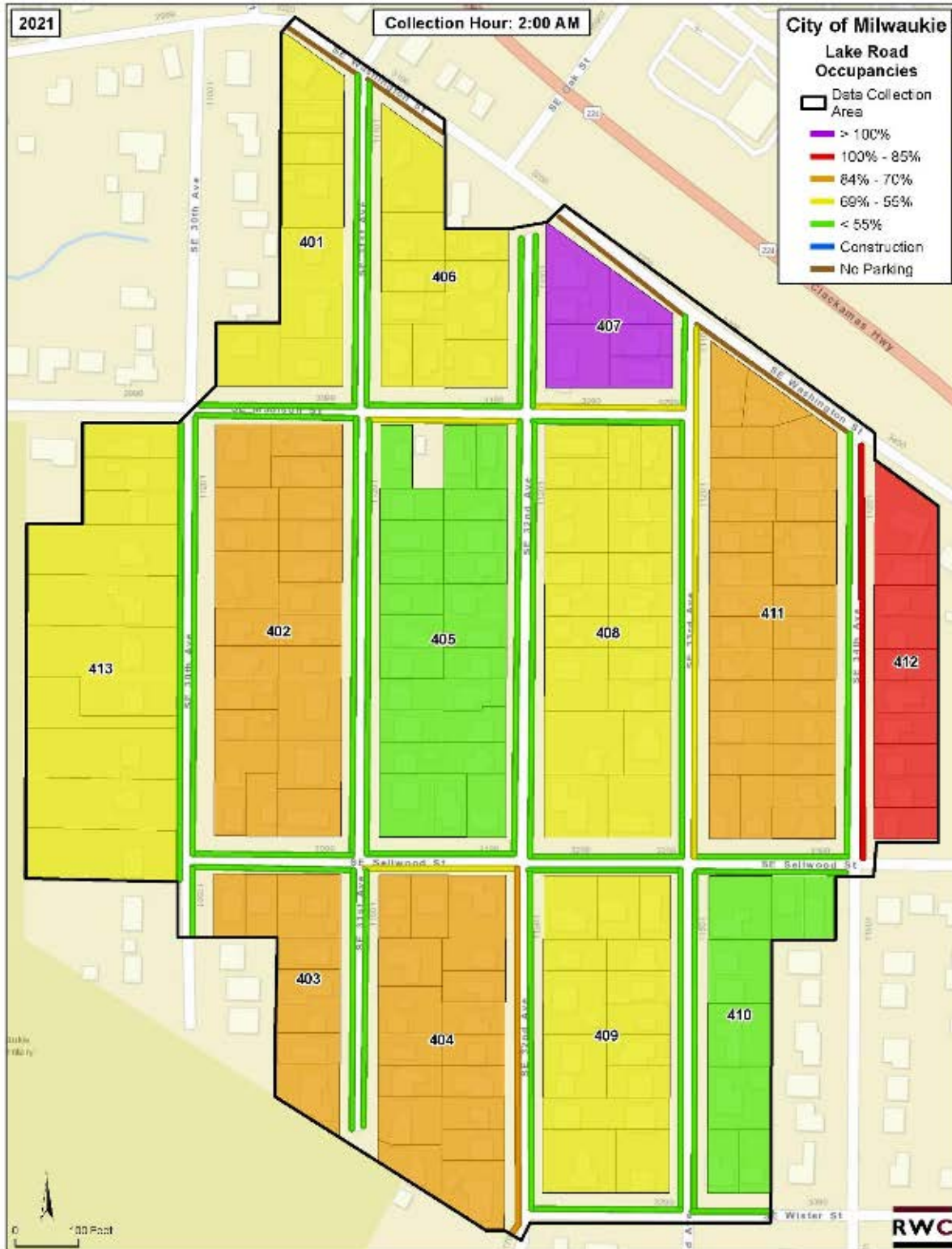
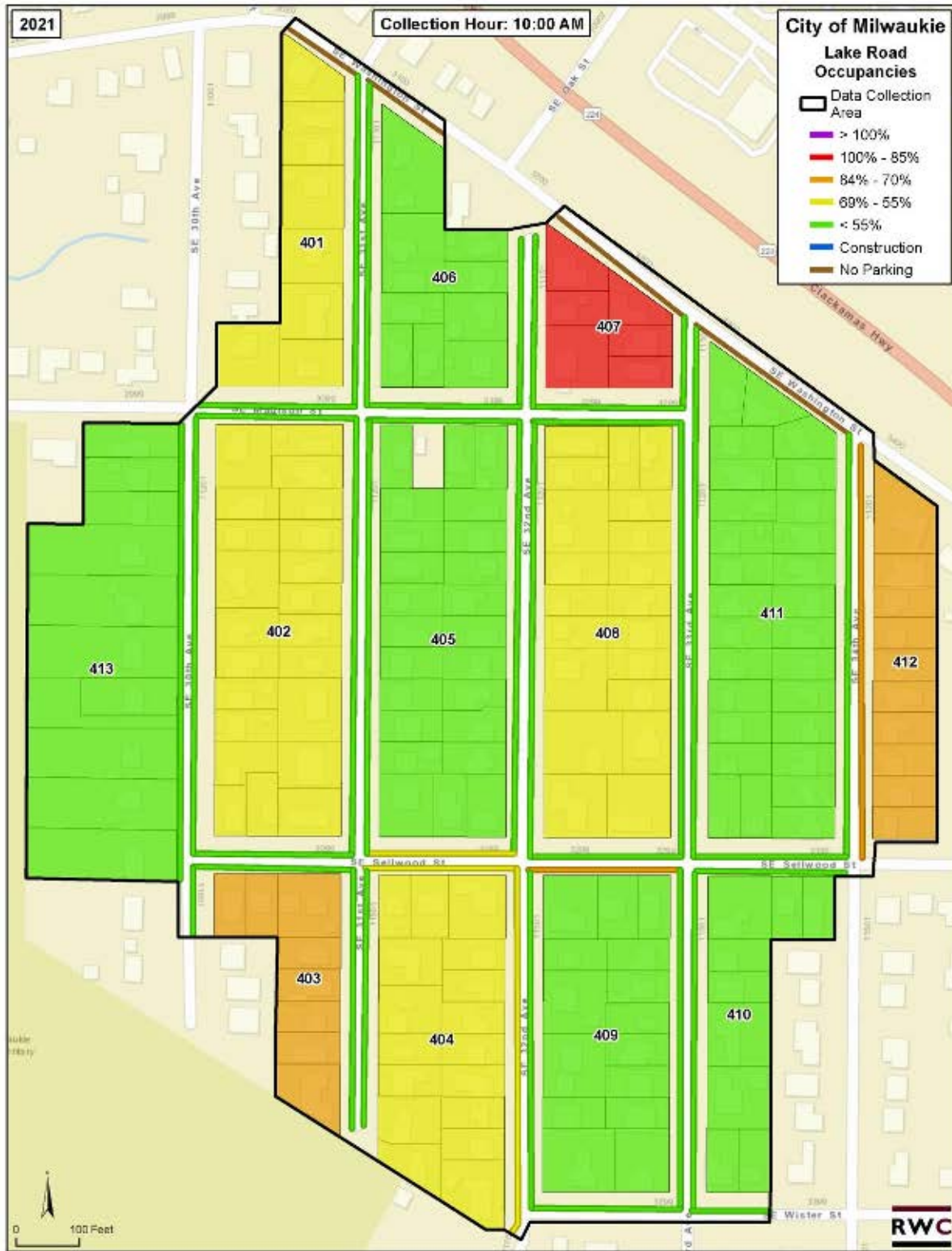




Figure D: Parking Occupancy Heat Map - 10:00 AM

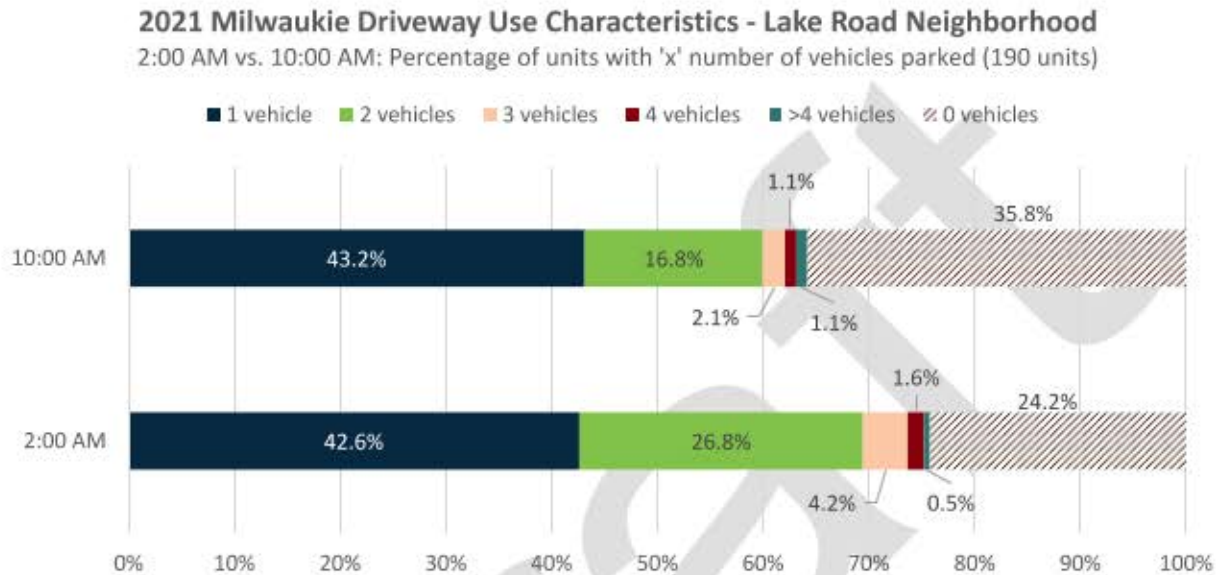




**Number of Vehicles Parked On-Site – By Individual Parcels**

Use of observed on-site capacity on individual parcels within a parcel block can influence the color band for use at an aggregated parcel block. Given this, **Figure E** provides a summary of the percentage of vehicles parked on-site at unique residential parcels within the Lake Road study area.

**Figure E: Summary of Use of Observed On-site Supply**



As the figure indicates, the majority of vehicles parked at individual residential units ranges from zero (35.8%) to one (43.2%) at 10:00 AM. Units with 2 observed vehicles represented 16.8% of vehicles parked. Only 4.3% of units were observed to park 3 or more vehicles on-site during this data collection hour.

At 2:00 AM, the majority of vehicles parked at individual residential units ranges from zero (24.2%) to one (42.6%). Units with 2 observed vehicles represented 26.8% of vehicles parked. The drop from zero at this hour as compared to 10:00 AM likely reflects vehicles returning from daytime trips (e.g., work, shopping, etc.). This is also reflected in the increase in 2 observed vehicles (26.8%) and units with 3 or more observed vehicles (raising to 6.3%).

**Summary – Lake Road**

Data collected indicates that occupancies within the study zone are higher at the 2:00 AM hour, reflecting the minimum true demand for parking per residential unit: 2.05 vehicles/unit. There is higher overnight use of the on-site supply: 1.16/unit at 2:00 AM versus 0.89/unit at 10:00 AM. In both the on-street and on-site parking supplies there is a sizable supply of empty and available capacity, both overnight and during the day.

While there are a few specific block faces (on-street) and parcel blocks (on-site) that have occupancies that exceed 85%, the number is very small, and convenient, available parking is usually immediately adjacent to these areas on-street.



1.5 LEWELLING NEIGHBORHOOD

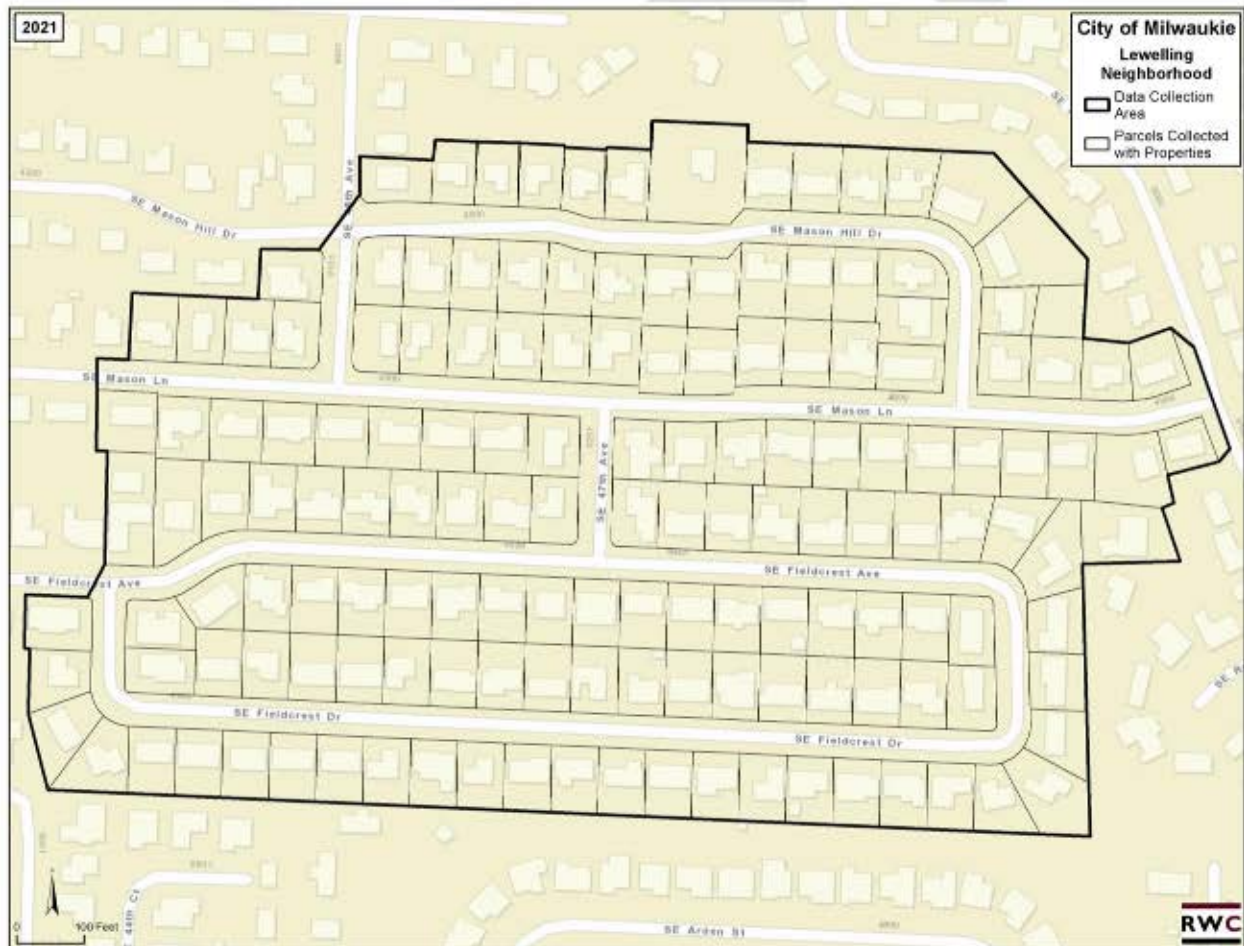
**Study Area and Occupancy Count Inventory**

The sample study area for the Lewelling neighborhood is illustrated in **Figure F**. The survey area for this neighborhood is comprised of 154 residential units, served by 759 parking stalls. Of the total stalls observed during data collection, 406 were on-street and 353 were in driveways/carport stalls.<sup>10</sup> There were no surface lot stalls in this neighborhood. This is summarized in **Table 5**.

*Table 5: Lewelling Neighborhood – Breakout of observed stalls and residential units*

	Lewelling Neighborhood
<b>Total Parking Stalls Studied<sup>11</sup></b>	759
<b>On-Street Stalls</b>	406
<b>Driveway Stalls</b>	353
<b>Surface Lot Stalls</b>	-
<b>Residential Units</b>	154

*Figure F: Lewelling Neighborhood Study Area Boundary and Parcel Map*



<sup>10</sup> An additional 242 stalls of "capacity" were estimated during the inventory in doored garages.

<sup>11</sup> Residential parking stalls only. "Other" and Garage uses excluded from this summary.



## Summary of Parking Occupancies

### On-Street Parking Demand

There are 406 on-street parking stalls within the Lewelling neighborhood study area. At the 2:00 AM data collection hour, 45 vehicles were observed parked in the on-street supply. This represents occupancy of 11.1%, leaving 361 empty stalls in the usable on-street inventory.

At 10:00 AM, 32 vehicles were observed parked in the on-street supply. This represents an occupancy of 8.0%, with 374 empty stalls available within the useable on-street inventory.

**Table 6** summarizes occupancy counts associated with the on-street supply.

**Table 6: Observed Occupancies – On-street Supply**

Performance Measure	Parking Demand Observations	
	On-Street Parking Supply: 406 stalls	
Collection Hour	2:00 AM	10:00 AM
Occupancy	11.1%	8.0%
Parked Vehicles	45 <sup>12</sup>	31 <sup>13</sup>
RV/ Trailers	0	1
Construction/ Obstruction	-	8 <sup>14</sup>
<b>Empty stalls (unused supply)</b>	<b>361</b>	<b>374</b>

### On-Site Parking Demand (within parcels)

Use of on-site parking in the neighborhood is summarized in **Table 7**. In the Lewelling neighborhood, there are 353 on-site parking stalls. This is all driveway/carport capacity as there are no surface lots serving residential uses in this neighborhood.

At the 2:00 AM hour, 247 vehicles were observed parked within residential parcels, an occupancy of 70.0%. At this hour, there were 106 empty parking stalls within the on-site supply. At 10:00 AM, occupancies dropped to 57.2%, with 202 vehicles parked and 151 stalls empty.

**Table 7: Observed Occupancies – On-site supply**

Performance Measure	Parking Demand Observations	
	On-Site Parking Supply: 353 stalls	
Collection Hour	2:00 AM	10:00 AM
Occupancy	70.0% <sup>15</sup>	57.2% <sup>16</sup>
Parked Vehicles	247	202
<b>Empty stalls (unused supply)</b>	<b>106</b>	<b>151</b>

<sup>12</sup> Of the total vehicles parked at 2:00 AM, zero are parked illegally.

<sup>13</sup> Of the total vehicles parked at 10:00 AM, two (2) are parked illegally (includes the one RV/Trailer).

<sup>14</sup> These are what would be useable stalls but have been temporarily removed from the supply since the inventory for construction.

<sup>15</sup> Of the vehicles parked at 2:00 AM, three (3) are parked somewhere on-site other than the driveway.

<sup>16</sup> Of the vehicles parked at 10:00 AM, three (3) are parked somewhere on-site other than the driveway.



**Residential Parking Demand per Unit**

**Table 8** summarizes occupancy data into per unit demand ratios using the entire 759 stall supply using observed vehicle occupancy numbers provided in **Tables 6** and **7** above. The table also allocates the demand for each unit between on-street and on-site occupancies to illustrate demand by stall type.

**Table 8: Residential Parking Demand per Unit**

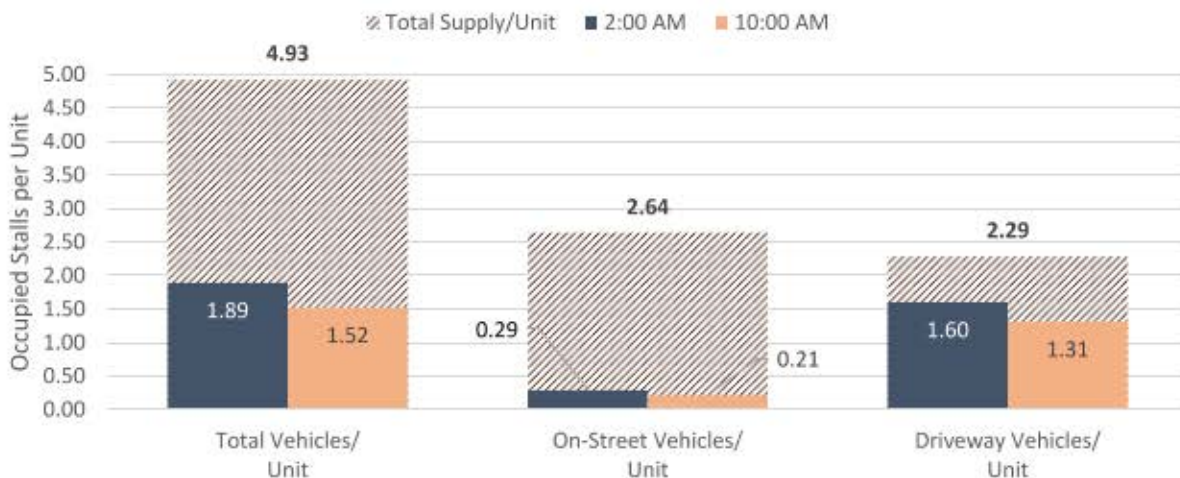
Performance Measure	Parking Demand per Unit	
	Residential Units: 154 Units	
	2:00 AM	10:00 AM
<b>On-Street Vehicles/Unit</b> (Supply: 2.64 stalls/unit)	0.29	0.21
<b>Driveway Vehicles/Unit</b> (Supply: 2.29 stalls/unit)	1.60	1.31
<b>Surface Lot Vehicles/Unit</b> (Supply: N/A)	N/A	N/A
<b>Total Vehicles/Unit</b> (Supply: 4.93 stalls/unit <sup>17</sup> )	<b>1.89</b>	<b>1.52</b>

As the table indicates, peak hour (2:00 AM) residential demand is 1.89 vehicles per unit. Of that total, 0.29 per unit is generated from vehicles parking on-street. Observed on-site demand is 1.60 vehicles per unit. At 10:00 AM, combined demand for parking is 1.52 vehicles per unit; with 0.21 and 1.31 of demand derived on-street and on-site, respectively. These demand ratios can be contrasted to the built supply of parking (excluding garage capacity), which combined, totals 4.93 stalls of capacity serving a demand of 1.89 and 1.52 vehicles/unit, for the 2:00 AM and 10:00 AM occupancy periods. This is illustrated in **Figure G**.

**Figure G: Summary of Parking Demand and Built Supply**

**2021 Milwaukie Parking Demand Ratios - Lewelling Neighborhood**

2:00 AM vs. 10:00 AM: Weekday parking demand per unit (759 stalls/ 154 units)



<sup>17</sup> This does not include potential garage capacity, which totaled 242 stalls, which would raise the built ratio to 6.50.





## Heat Map Summary

**Figures H and I** provide a graphic illustration of occupancies at 2:00 AM and 10:00 AM, respectively. Data is provided for both the on-street system and the on-site systems using the demand color band formula described in the Lake Road summary (**Page 7**).

### On-street

At the 2:00 AM hour, 18 of 20 on-street block faces fall within the green color band (less than 55% occupancy). One block face on the west side of 45<sup>th</sup> Avenue paralleling the parcels on block 201 has occupancies in the orange range (70% - 84%) though the block face on the east side of the same street is green (less than 55%). One block face, the east side of SE Mason Hill Drive Avenue, paralleling the parcels on block 203 is yellow (69% - 55%). At this hour, the heat maps would indicate there is an abundance of on-street parking available and access to it is convenient.

At the 10:00 AM hour, all on-street block faces fall within the green color band (less than 55%). At this hour, the heat maps would indicate there is an abundance of on-street parking available with convenient access.

### On-site

This study area has very large parcel blocks, totaling 10 blocks and 154 unique units. For purposes of this discussion, occupancy data is aggregated to the *parcel block* level. Use at the *individual parcel level* is not displayed to ensure that individual residential sites remain anonymous.

At the 2:00 AM hour, one of the parcel blocks (208) falls within the red band (100% - 85%). Four of 20 parcel blocks fall within the orange band (84% - 70%); this includes parcel blocks 200, 205, 207, and 209. Three parcel blocks (202, 204, and 206) have occupancies between 69% and 55%. The remaining parcel blocks (201 and 203) are green (less than 55%).

At this hour, the heat maps would indicate that parcels within blocks can meet their parking demand on-site. Only one parcel block has demand that approaches observed supply, and as stated above, there is an abundance of empty on-street parking.

At the 10:00 AM hour, one parcel block (208) falls within the red band (100% - 85%). Three parcel blocks (200, 205, and 207) have occupancies in the yellow range. The remaining six parcel blocks are within the green band. At this hour, the heat maps would indicate that parcels within blocks can meet their parking demand on-site. Only one parcel block has demand that approaches observed supply, and, as stated above, there is an abundance of empty on-street parking.



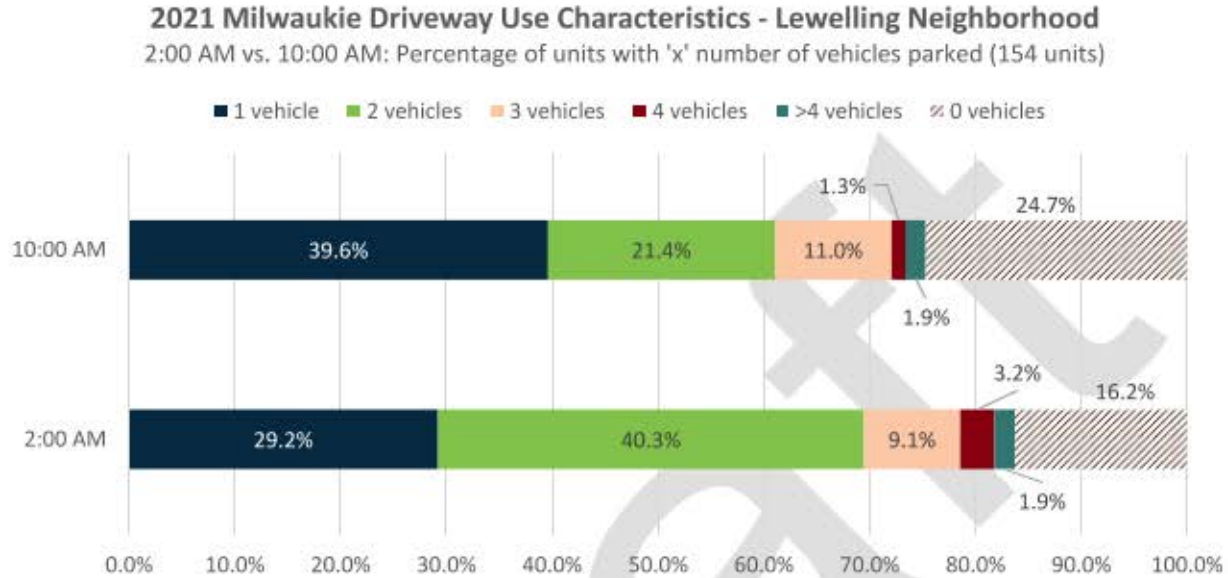




**Number of Vehicles Parked On-site – By Individual Parcels**

**Figure J** provides a summary of the percentage of vehicles parked on-site at unique residential parcels within the Lewelling study area.

*Figure J: Summary of Use of Observed On-site Supply*



As the figure indicates, most vehicles parked at individual residential units ranges from zero (24.7%) to one (39.6%) at 10:00 AM. Units with 2 observed vehicles represented 21.4% of vehicles parked. The percentage of units observed to park 3 or more vehicles on-site during this data collection hour totals 14%, a much higher percentage than the Lake Road study area.

At 2:00 AM, the percentage of vehicles parked between 0 and 1 vehicles was 16.2% and 29.2%, respectively. Units with 2 observed vehicles represented 40.3% of vehicles parked (the largest use category). As with the Lake Road data above, the drop from 0 and 1 at this hour as compared to 10:00 AM likely reflects vehicles returning from daytime trips (e.g., work, shopping, etc.). This is also reflected in the large increase in 2 observed vehicles. Units with 3 or more observed vehicles remained constant at 14.2%

**Summary – Lewelling Neighborhood**

Data collected indicates that occupancies within the study zone are higher at the 2:00 AM hour, reflecting what is likely the minimum true demand for parking per residential unit – 1.89 vehicles/unit – an hour when few (if any) non-residential vehicles are in the neighborhood. Not surprisingly, there is higher use of the on-site supply at the 2:00 AM peak; 1.60/unit versus 1.31/unit (10:00 AM). In both supplies (and at both occupancy hours), the study showed that there is a sizable supply of empty and available capacity. For the Lewelling neighborhood, it also appears that there is very low use of the on-street system to meet parking demand, with only 45 vehicles (11.1%) using the street at the 2:00 AM peak hour.



1.6 ARDENWALD NEIGHBORHOOD

**Study Area**

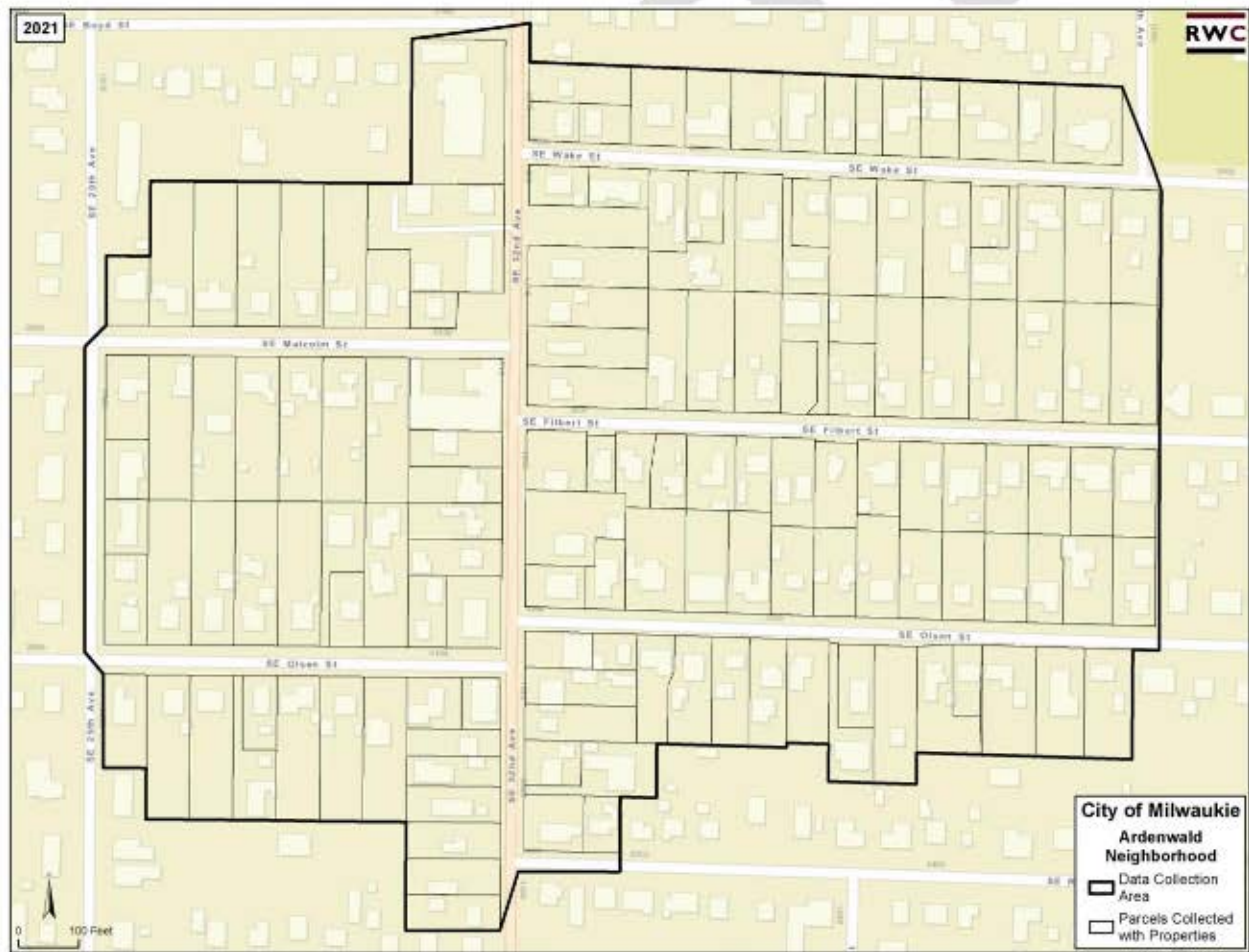
The sample study area for the Ardenwald neighborhood is illustrated in **Figure K**.

The survey area for this neighborhood is comprised of 171 residential units, served by 535 parking stalls. Of the total stalls observed during data collection, 205 were on-street, 287 were in driveways/carport stalls, and 43 were on surface lots.<sup>18</sup> This is summarized in **Table 9**.

**Table 9: Ardenwald Neighborhood – Breakout of observed stalls and residential units**

	Ardenwald Neighborhood
<b>Total Parking Stalls Studied<sup>19</sup></b>	535
<b>On-Street Stalls</b>	205
<b>Driveway Stalls</b>	287
<b>Surface Lot Stalls</b>	43
<b>Residential Units</b>	171

**Figure K: Ardenwald Neighborhood Study Area Boundary and Parcel Map**



<sup>18</sup> An additional 156 stalls of residential "capacity" were estimated during the inventory in doored garages.

<sup>19</sup> Residential parking stalls only. "Other" and Garage uses excluded from this summary.



## Summary of Parking Occupancies

### On-Street Parking Demand

There are 205 on-street parking stalls within the Ardenwald neighborhood study area that serve residential uses. At the 2:00 AM data collection hour, 50 vehicles were observed parked in the on-street supply. This represents occupancy of 24.2%, leaving 157 empty stalls in the usable on-street inventory.

At 10:00 AM, 43 vehicles were observed parking in the on-street supply. This represents an occupancy of 20.8%, with 164 empty stalls available within the useable on-street inventory.

**Table 10** summarizes occupancy counts associated with the on-street supply.

**Table 10: Observed Occupancies – On-street Supply**

Performance Measure	Parking Demand Observations	
	On-Street Parking Supply: 205 stalls	
Collection Hour	2:00 AM	10:00 AM
Occupancy	24.2%	20.8%
Parked Vehicles	49 <sup>20</sup>	43 <sup>21</sup>
RV/ Trailers	1	-
Construction/ Obstruction	-	-
<b>Empty stalls (unused supply)</b>	<b>157</b>	<b>164</b>

### On-Site Parking Demand (within parcels)

Use of on-site parking in the neighborhood is summarized in **Table 11**. In the Ardenwald neighborhood, there are 330 on-site parking stalls, 287 in driveway/carports and 43 stalls on surface lots serving residential uses in this neighborhood.

At the 2:00 AM hour, 299 vehicles were observed parked within residential parcels, an occupancy of 90.6%. At this hour, there were 31 empty parking stalls within the on-site supply. At 10:00 AM, occupancies dropped to 74.5%, with 246 vehicles parked and 84 stalls empty.

**Table 11: Observed Occupancies – On-site supply**

Performance Measure	Parking Demand Observations	
	On-Site Parking Supply: 330 stalls	
Collection Hour	2:00 AM	10:00 AM
On-site Occupancy (combined)	90.6%	74.5%
Parked Vehicles (driveway/carport)	269 <sup>22</sup>	226 <sup>23</sup>
Parked Vehicles (surface lot)	30	20
<b>Empty stalls (unused supply)</b>	<b>31</b>	<b>84</b>

### Residential Parking Demand per Unit

**Table 12** summarizes occupancy data into parking demand per residential unit. Data is based on use within the entire 535 stall supply using observed vehicle occupancy numbers provided in **Tables 10** and **11** above.

<sup>20</sup> Of the total vehicles parked at 2:00 AM, one (1) is parked illegally (includes the RV/Trailer).

<sup>21</sup> Of the total vehicles parked at 10:00 AM, one (1) is parked illegally.

<sup>22</sup> Of the vehicles parked, 24 are parked somewhere on-site other than the driveway.

<sup>23</sup> Of the vehicles parked, ten (10) are parked somewhere on-site other than the driveway.



The table also allocates the demand for each unit between on-street and on-site occupancies to illustrate demand by stall type.

**Table 12: Residential Parking Demand per Unit**

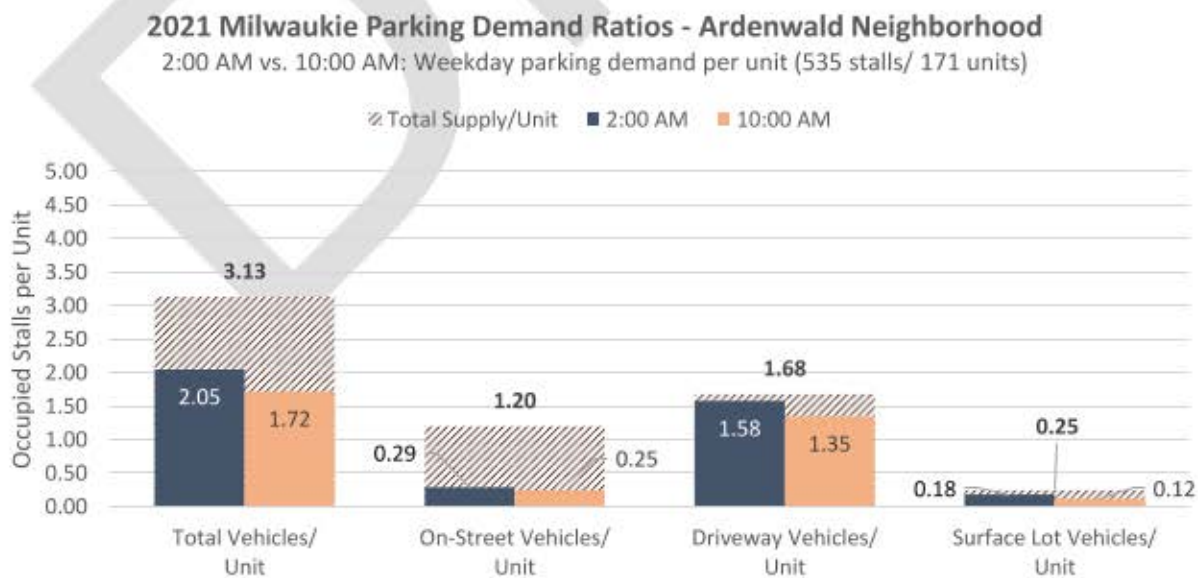
Performance Measure	Parking Demand per Unit	
	Residential Units: 171 Units	
	2:00 AM	10:00 AM
<b>On-Street Vehicles/Unit</b> (Supply: 1.20 stalls/unit)	0.29	0.25
<b>Driveway Vehicles/Unit</b> (Supply: 1.68 stalls/unit)	1.58	1.35
<b>Surface Lot Vehicles/Unit</b> (Supply: 0.25/unit)	0.18	0.12
<b>Total Vehicles/Unit</b> (Supply: 3.13 stalls/unit <sup>24</sup> )	<b>2.05</b>	<b>1.72</b>

As the table indicates, peak hour (2:00 AM) residential demand is 2.05 vehicles per unit. Of that total, 0.29 per unit is generated from vehicles parking on-street. Observed on-site demand is 1.76 vehicles per unit (1.58 in driveway/carpools and 0.18 in surface lots). Unlike Lake Road and Lewelling, demand and supply of driveway/carpool stalls are very close, particularly at the 2:00 AM hour. This underscores the occupancy numbers in **Table 11**, which show on-site (2:00 AM) occupancies of 90.6%.

At 10:00 AM, combined demand for parking is 1.72 vehicles per unit; with 0.25, 1.35, and 0.12 of demand derived on-street, in driveways/carpools, and on surface lots, respectively.

**Figure L** illustrates demand ratios when contrasted to the built supply of parking (excluding garage capacity). For Ardenwald, combined supply totals 3.13 stalls of capacity serving a demand of 2.05 and 1.72 vehicles/unit, for the 2:00 AM and 10:00 AM occupancy periods, respectively.

**Figure L: Summary of Parking Demand and Built Supply**



<sup>24</sup> This does not include potential residential garage capacity, which totaled 156 stalls, which would raise the built ratio to 4.04.



## Heat Map Summary

**Figures M and N** provide a graphic illustration of occupancies at 2:00 AM and 10:00 AM, respectively. Data is provided for both the on-street system and the on-site systems using the demand color band formula described in the Lake Road summary (**Page 7**).

### On-street

Twelve of 19 block faces in the study area allow parking; seven block faces do not allow parking.<sup>25</sup> At the 2:00 AM hour, all 12 block faces with parking fall within the green color band (less than 55% occupancy). At this hour, the heat maps would indicate there is an abundance of on-street parking available and access to it is convenient, except those seven block faces where no parking is allowed.

At the 10:00 AM hour, 11 of the 12 on-street block faces with parking fall within the green color band (less than 55%). One block face on SE Rockwood Street (paralleling parcel block 315) falls within the orange band (84% - 70%). At this hour, the heat maps would indicate there is an abundance of on-street parking available and access to it is convenient, except those seven block faces where no parking is allowed.

### On-site

As with the Lewelling study area, the Ardenwald study area has very large parcel blocks, totaling just 7 blocks and 171 unique residential units. For purposes of this discussion, occupancy data is aggregated to the *parcel block* level. Use at the *individual parcel level* is not displayed to ensure that individual residential sites remain anonymous.

At the 2:00 AM hour, one of the parcel blocks (307) has demand that falls within the purple band, with the number of parked vehicles exceeding the observed supply. Three of 7 parcel blocks fall within the red band (100% - 85%); this includes parcel blocks 308, 313, and 314. One parcel block (315) has occupancies in the orange band (84% - 70%). The remaining parcel blocks (309 and 312) are yellow (69% - 55%).

At 2:00 AM, the heat maps indicate that parcels within certain blocks contain their parking demand on-site at a level that nearly matches supply. This was particularly true on parcel blocks 307, 308, 313, and 314. The remaining parcels appear to be containing their demand on-site given the overall low use of the on-street supply in the study area.

At the 10:00 AM hour, the heat maps provide visual evidence of residential vehicles leaving the area as there are noticeable drops in on-site occupancies in five of the seven parcels blocks. Only blocks 307 and 313 remain within the red or purple bands.

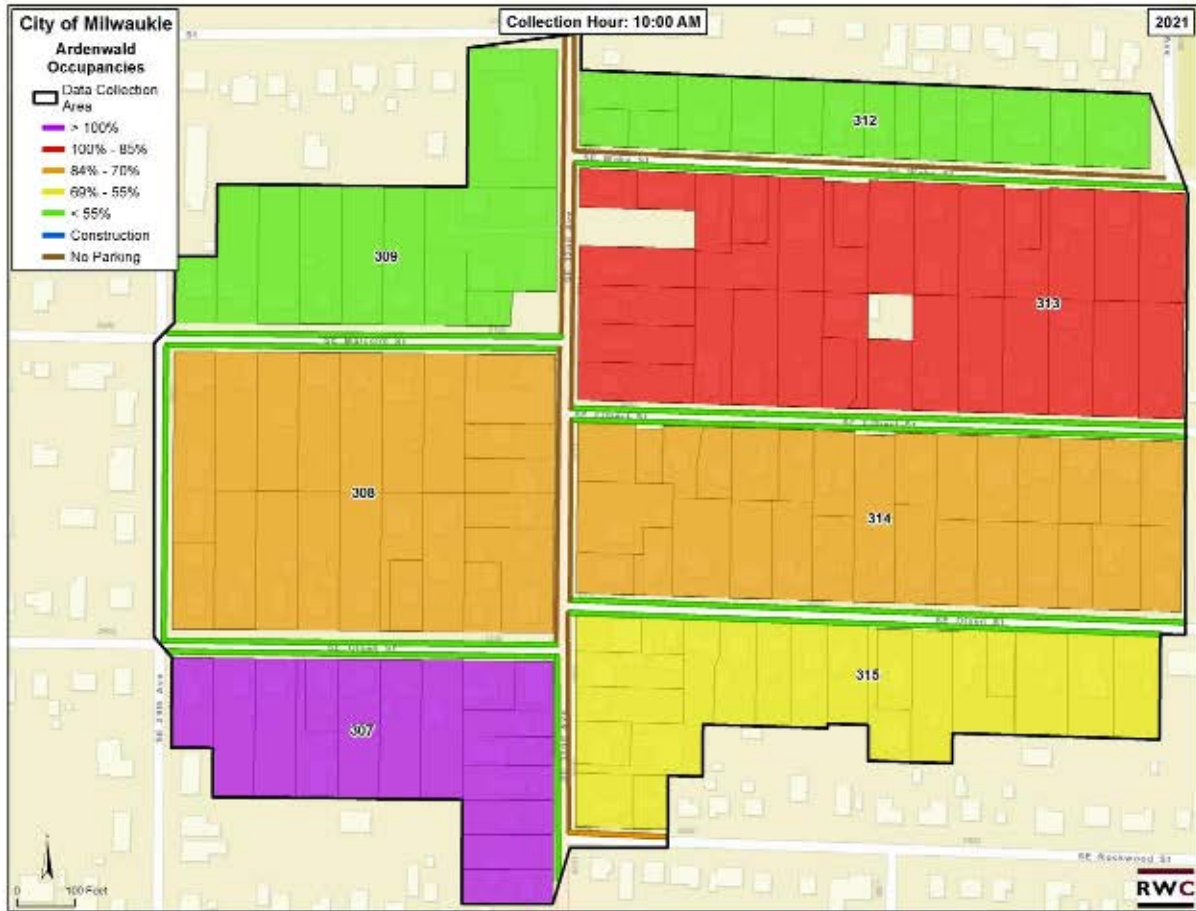
<sup>25</sup> There are 19 total block faces in the study area. Of this total, 7 block faces do not allow parking. This is for a number of reasons, which includes bus access along SE 32<sup>nd</sup> Avenue and narrow streets in other areas. We state this here as an anecdotal indicator of why on-site occupancies are higher than the other neighborhood study areas as parcel blocks abutting no-parking streets are more likely in the position of containing all their demand on-site.







Figure N: Parking Occupancy Heat Map - 10:00 AM

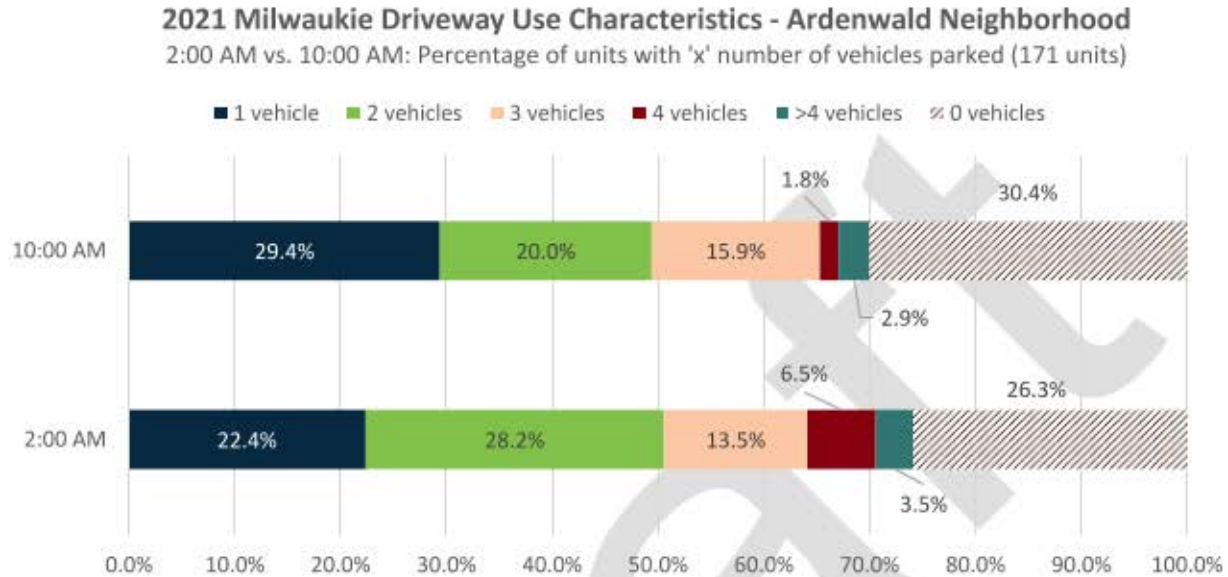




**Number of Vehicles Parked On-site – By Individual Parcels**

**Figure 0** provides a summary of the percentage of vehicles parked on-site at unique residential parcels within the Ardenwald study area.

*Figure 0: Summary of Use of Observed On-site Supply*



As the figure indicates, most vehicles parked at individual residential units ranges from zero (30.4%) to one (29.4%) at 10:00 AM. Units with 2 observed vehicles represented 20.0% of vehicles parked. The percentage of units observed to park 3 or more vehicles on-site during this data collection hour totals 20.6%, the highest percentage of all neighborhood study areas.

At 2:00 AM, the percentage of vehicles parked between 0 and 1 vehicles was 26.3% and 22.4%, respectively. As evidenced in the other study areas, the drop from 0 and 1, at this hour as compared to 10:00 AM, likely reflects residents returning from daytime trips (e.g., work, shopping, etc.). This is also reflected in the increase in 2 observed vehicles (raising to 28.2%) and units with 3 or more observed vehicles (raising to 23.5%).

**Summary – Ardenwald Neighborhood**

Data collected indicates that occupancies within the study zone are higher at the 2:00 AM hour, reflecting the minimum true demand for parking per residential unit: 2.05 vehicles/unit. There is higher overnight use of the on-site supply: 1.58/unit at 2:00 AM versus 1.35/unit at 10:00 AM. Notably, the 2:00 AM number is very near the total capacity of 1.68/unit on-site. Surveyors noted that in this study area, there was a high level of on-site vehicle storage (3 or more vehicles observed) than was evidenced in the Lake Road and Lewelling study areas.

The on-street system is not highly utilized by residential demand; there are 157 empty stalls at the 2:00 AM peak hour and 164 at 10:00 AM. Unlike other study areas, there are several block faces that do not allow parking, which may influence the high occupancy numbers on-site on several parcel blocks.



**1.7 ISLAND STATION NEIGHBORHOOD**

**Study Area**

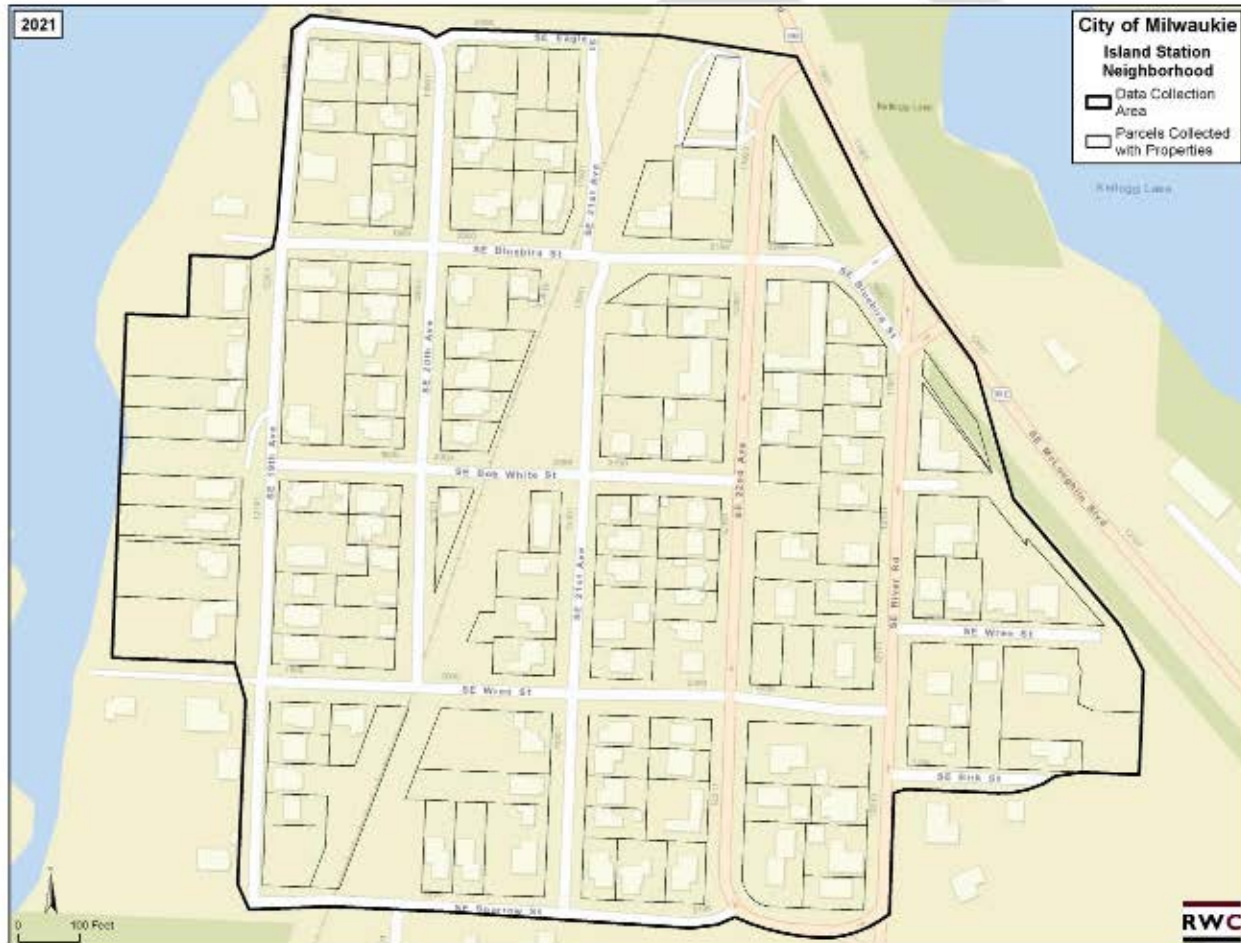
The sample study area for the Island Station neighborhood is illustrated in **Figure P**.

The survey area for this neighborhood is comprised of 131 residential units, served by 541 parking stalls. Of the total stalls observed during data collection, 285 were on-street, 238 were in driveways/carport stalls, and 18 were on surface lots.<sup>26</sup> This is summarized in **Table 13**.

**Table 13: Island Station Neighborhood – Breakout of observed stalls and residential units**

	Island Station Neighborhood
<b>Total Parking Stalls Studied<sup>27</sup></b>	541
<b>On-Street Stalls</b>	285
<b>Driveway Stalls</b>	238
<b>Surface Lot Stalls</b>	18
<b>Residential Units</b>	131

**Figure P: Island Station Neighborhood Study Area Boundary and Parcel**



<sup>26</sup> An additional 148 stalls of residential "capacity" were estimated during the inventory in doored garages.

<sup>27</sup> Residential parking stalls only. "Other" and Garage uses excluded from this summary.



## Summary of Parking Occupancies

### On-Street Parking Demand

There are 285 on-street parking stalls within the Island Station neighborhood study area that serve residential uses. At the 2:00 AM data collection hour, 42 vehicles were observed parked in the on-street supply. This represents occupancy of 16.5%, leaving 212 empty stalls in the usable on-street inventory.

At 10:00 AM, 51 vehicles were observed parked in the on-street supply. This represents an occupancy of 20.1%, with 203 empty stalls available within the useable on-street inventory.

**Table 14** summarizes occupancy counts associated with the on-street supply.

**Table 14: Observed Occupancies – On-street Supply**

Performance Measure	On-Street Supply	
	On-Street Parking Supply: 285 stalls	
Collection Hour	2:00 AM	10:00 AM
Occupancy	16.5%	20.1%
Parked Vehicles <sup>28</sup>	42	51
RV/ Trailers	-	-
Construction/ Obstruction	31	31
<b>Empty stalls (unused supply)</b>	<b>212</b>	<b>203</b>

### On-Site Parking Demand (within parcels)

Use of on-site parking in the neighborhood is summarized in **Table 15**. In the Island Station neighborhood, there are 256 on-site parking stalls, 238 in driveway/carports, and 18 stalls on surface lots serving residential uses in this neighborhood.

At the 2:00 AM hour, 209 vehicles were observed parked within residential parcels, an occupancy of 81.6%. At this hour, there were 47 empty parking stalls within the on-site supply. At 10:00 AM, occupancies dropped to 77.7%, with 199 vehicles parked and 57 stalls empty.

**Table 15: Observed Occupancies – On-site supply**

Performance Measure	Parking Demand Observations	
	On-Site Parking Supply: 256 stalls	
Collection Hour	2:00 AM	10:00 AM
On-site Occupancy (combined)	81.6%	77.7%
Parked Vehicles (driveway/carport)	195 <sup>29</sup>	182 <sup>30</sup>
Parked Vehicles (surface lot)	14	17
<b>Empty stalls (unused supply)</b>	<b>47</b>	<b>57</b>

### Residential Parking Demand per Unit

**Table 16** summarizes occupancy data into parking demand per residential unit. Data is based on use within the entire 541 stall supply using observed vehicle occupancy numbers provided in **Tables 14** and **15** above. The table also allocates the demand for each unit between on-street and on-site occupancies to illustrate demand by stall type.

<sup>28</sup> Zero vehicles parked illegally.

<sup>29</sup> Of the vehicles parked, 24 are parked somewhere on-site other than the driveway.

<sup>30</sup> Of the vehicles parked, 15 are parked somewhere on-site other than the driveway.



**Table 16: Residential Parking Demand per Unit**

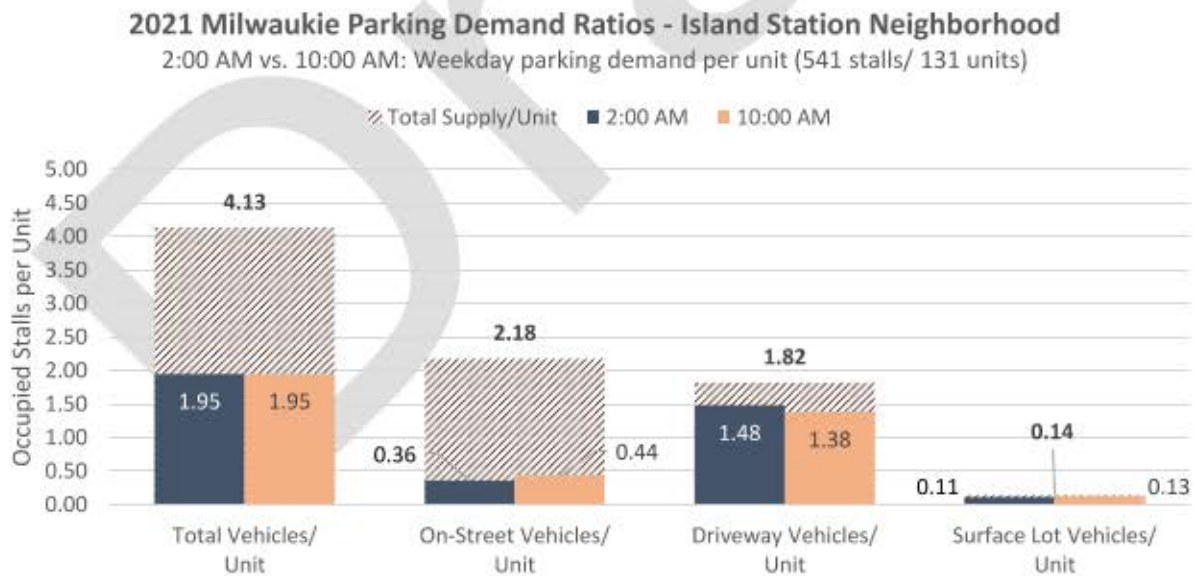
Performance Measure	Parking Demand per Unit	
	Residential Units: 131 Units	
	2:00 AM	10:00 AM
<b>On-Street Vehicles/Unit</b> (Supply: 2.18 stalls/unit)	0.36	0.44
<b>Driveway Vehicles/Unit</b> (Supply: 1.82 stalls/unit)	1.48	1.38
<b>Surface Lot Vehicles/Unit</b> (Supply: 0.14/unit)	0.11	0.13
<b>Total Vehicles/Unit</b> (Supply: 4.13 stalls/unit <sup>31</sup> )	<b>1.95</b>	<b>1.95</b>

As the table indicates, peak hour (2:00 AM) residential demand is 1.95 vehicles per unit. Of that total, 0.36 per unit is generated from vehicles parking on-street. Observed on-site demand is 1.59 vehicles per unit (1.48 in driveway/carpports and 0.11 in surface lots).

At 10:00 AM, combined demand for parking is also 1.95 vehicles per unit; with 0.44, 1.38, and 0.13 of demand derived on-street, in driveways/carpports, and on surface lots, respectively.

**Figure Q** illustrates demand ratios when contrasted to the built supply of parking (excluding garage capacity). For Island Station, combined supply totals 4.13 stalls of capacity serving a demand of 1.95 vehicles/unit for the 2:00 AM and 10:00 AM occupancy periods.

**Figure Q: Summary of Parking Demand and Built Supply**



<sup>31</sup> This does not include potential residential garage capacity, which totaled 148 stalls, which would raise the built ratio to 5.26.



## Heat Map Summary

**Figures R and S** provide a graphic illustration of occupancies at 2:00 AM and 10:00 AM, respectively. Data is provided for both the on-street system and the on-site systems using the demand color band formula described in the Lake Road summary (**Page 7**).

### On-street

There are 55 block faces in the study area. Eleven block faces do not allow parking, and at the time of the survey, 3 block faces were not available for parking because of construction (mainly on SE 22<sup>nd</sup> Avenue and SE River Road, between SE Wren and SE Bluebird Streets).

At the 2:00 AM hour, 42 of the 44 block faces that allow parking fall within the green color band (less than 55% occupancy). One block face fell within the red band (85% - 100%). This block face is located on east side of SE River Road, paralleling parcel block 122.<sup>32</sup> Another block face, on the north side of SE Bluebird Street (paralleling parcel block 103) fell into the yellow band (69% - 55%). At this hour, the heat maps indicate there is an abundance of on-street parking available. Interestingly, the parcel blocks most affected by lack of on-street parking (e.g., blocks 116 and 117) have moderate on-site parcel demand.

At the 10:00 AM hour, 41 of 44 block faces that allow parking fall within the green color band (less than 55% occupancy). Two block faces fall within the red band (85% - 100%); located on the east side of SE River Road, paralleling parcel block 122 and on the north side of SE Bluebird Street paralleling parcel block 113. One block face falls within the yellow band (69% - 55%) at the south side of SE Bluebird Street paralleling parcel block 104. As with the 2:00 AM counts, the heat maps indicate there is an abundance of on-street parking available at 10:00 AM.

### On-site

The Island Station study area totals 17 parcel blocks serving 131 unique residential units. For purposes of this discussion, occupancy data is aggregated to the *parcel block* level. Use at the *individual parcel level* is not displayed to ensure that individual residential sites remain anonymous.

At the 2:00 AM hour, three parcel blocks (108, 112, 115) fall within the purple band, with total parcel block demand in excess of observed supply (greater than 100%). This likely indicates high vehicle ownership and storage on parcels, which impact the overall parcel block demand number for those high demand blocks.<sup>33</sup>

Another five parcel blocks fall within the red band (100% - 85%); this includes parcel blocks 103, 104, 111, 118, and 123). Four parcel blocks (105, 116, 117, and 122) are yellow (69% - 55%). The remaining five parcel blocks fall within the green band (less than 55%).

At the 10:00 AM hour, three parcel blocks (112, 115, 123) fall within the purple band (greater than 100%), a slight change from the 2:00 AM count when parcel block 108 was purple and parcel block 123 was red. Two parcel blocks remain red at the 10:00 AM hour (108 and 111). Three parcel blocks (104, 117, and 118) fall within the orange band (70% - 84%), and two (105 and 116) fall within the yellow band (69% - 55%). The remaining seven parcel blocks fall within the green band (less than 55%).

The heat maps provide visual evidence of residential vehicles shifting both out of and within the study zone, based on the overall per unit demand levels for parking (1.95 vehicles/unit) staying consistent between the two occupancy counts (see **Table 16** and **Figure S**).

<sup>32</sup> Occupancy on this block face may have been influenced by the adjacent construction.

<sup>33</sup> As noted above in footnotes 29 and 30 (**Page 27**), surveyor field notes indicated a high number of vehicles parked on parcels in excess of reasonable driveway/carport capacity.



Figure R: Parking Occupancy Heat Map - 2:00 AM

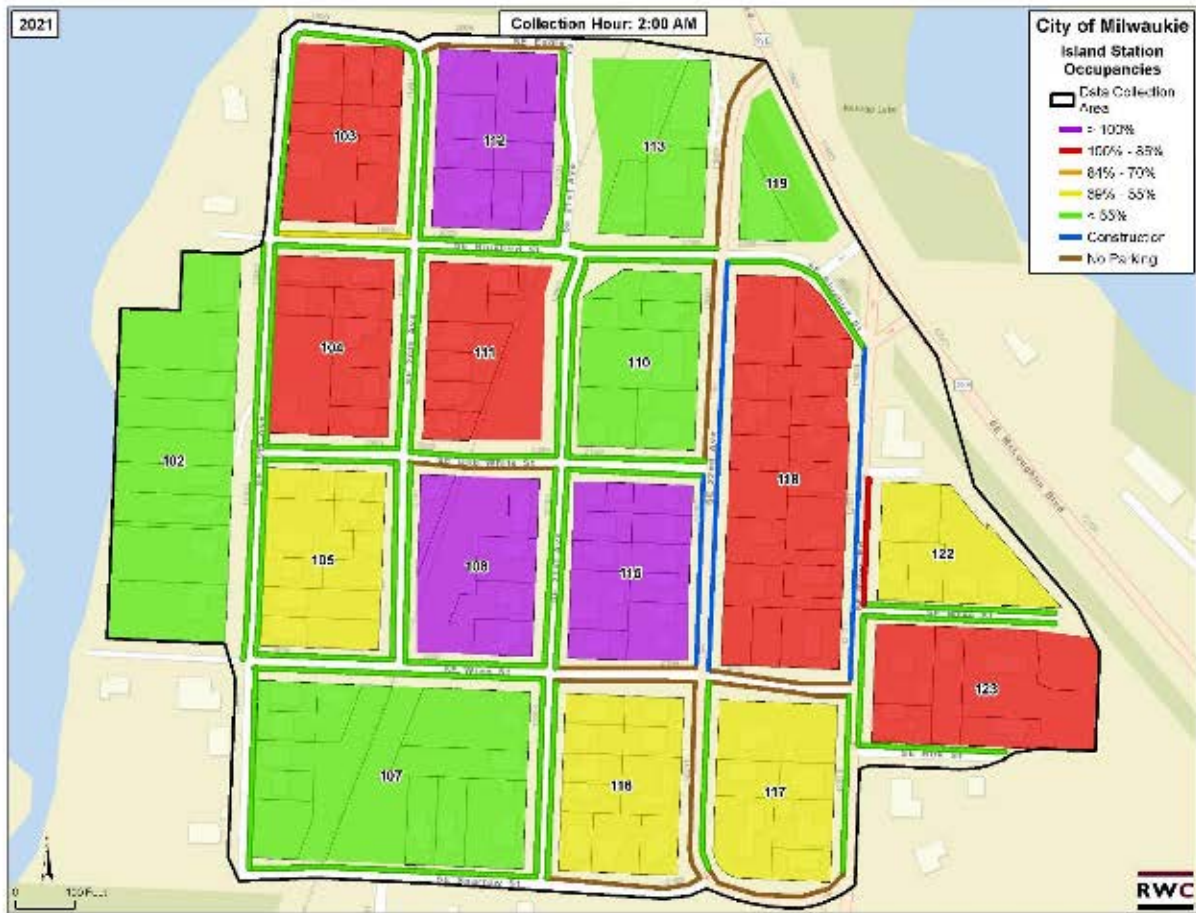






Figure S: Parking Occupancy Heat Map - 10:00 AM

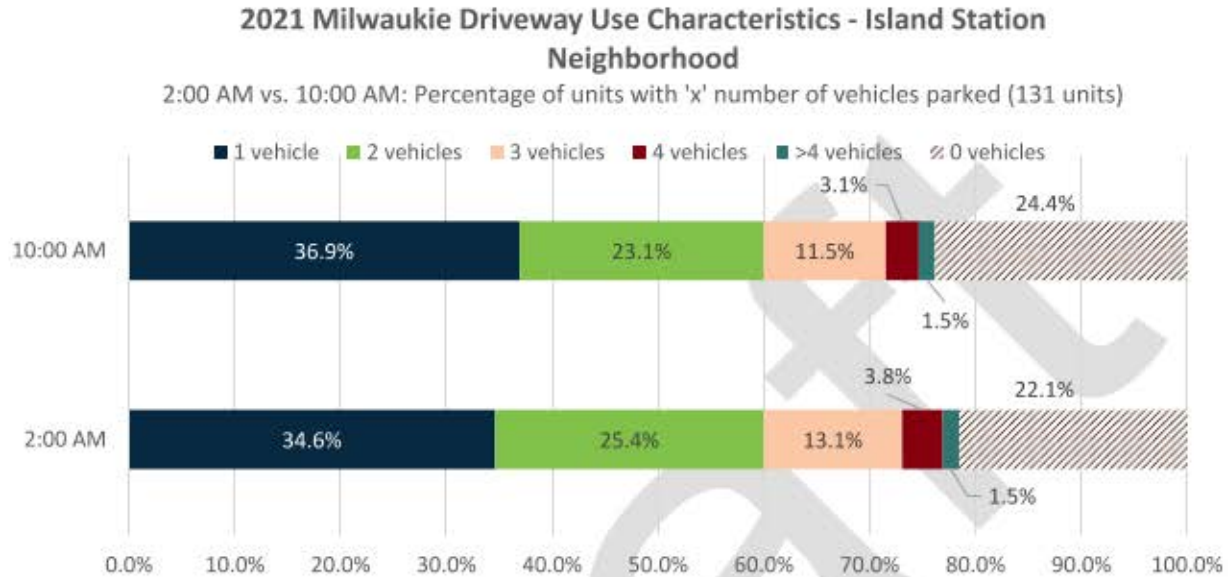




**Number of Vehicles Parked On-site – By Individual Parcels**

Figure T provides a summary of the percentage of vehicles parked on-site at unique residential parcels within the Island Station study area.

Figure T: Summary of Use of Observed On-site Supply



As the figure indicates, most vehicles parked at individual residential units ranges from zero (24.4%) to one (36.9%) at 10:00 AM. Units with 2 observed vehicles represented 23.1% of vehicles parked. The percentage of units observed to park 3 or more vehicles on-site during this data collection hour totals 16.1%.

At 2:00 AM, the percentage of vehicles parked between 0 and 1 vehicles was 22.1% and 34.6%, respectively. As evidenced in the other study areas, the drop from 0 and 1, at this hour as compared to 10:00 AM, likely reflects vehicles returning from daytime trips (e.g., work, shopping, etc.). This is also reflected in the increase in 2 observed vehicles (raising to 25.4%) and units with 3 or more observed vehicles (raising to 18.4%).

**Summary – Island Station Neighborhood**

Data collected indicates that occupancies within the study zone are constant with the minimum true demand for parking per residential unit at 1.95 vehicles/unit. At the 2:00 AM peak hour, nearly half of all parcel blocks (8 of 17) have demand in the red and purple range. Surveyors did note that like the Ardenwald study area, there was a higher level of on-site vehicle storage than was evidenced in other neighborhood study areas (i.e., Lake Road and Lewelling).

The on-street system is not highly utilized by residential demand; there are 212 empty stalls at the 2:00 AM peak hour and 203 at 10:00 AM. Like Ardenwald, there are several block faces that do not allow parking. Also, three block faces were not available for use due to construction at the time of the survey, which may be influencing the high occupancy numbers on-site on some parcel blocks. Additionally, on-street parking in the Island Station neighborhood is not well-delineated, with many areas requiring residents to park on grass or gravel; this environment likely contributes to reduced on-street demand.



## 1.8 SUMMARY

Averaged over all four study areas, the combined **minimum residential peak parking demand** during the overnight peak hour, including on-street and visible on-site parking, was found to be **1.99 vehicles per residential unit**. On-street parking contributes 0.48 vehicles per unit, and on-site parking (including driveways and surface lots) contribute the remaining 1.51 vehicles per unit. Parking demand in garages could not be observed or estimated in the field. However, it is known that additional demand in garages could contribute anywhere from 0.00 additional vehicles per residential unit (assuming no parking demand in garages) up to 1.09 additional vehicles per unit (if all garage stalls are completely occupied with vehicles).

Each neighborhood has unique characteristics, but on-site parking (excluding garage demand) makes up **at least 75% of the total residential parking demand** on average (ranging from 57% to 86% of the observed demand within each neighborhood).

Additionally, the on-site system is much more heavily utilized than the on-street parking system. On average, on-site parking stalls were found to be **77% occupied** during the peak hour, averaged over all four study areas. By contrast, the on-street system was found to be **23% occupied** during the peak hour across all four study areas. Overall, the entire observable residential parking system (excluding garages) was found to be **49% occupied** during the overnight peak hour.

The following table summarizes the supply and demand across all four neighborhoods. Demand observations shown represent the 2:00 AM overnight hour, which was found to be the peak hour for all four neighborhoods<sup>34</sup>.

**Table 17: Overall Residential Parking Demand per Unit**

		Lake Road	Lewelling	Ardenwald	Island Station	Total
<b>Residential Units</b>		190	154	171	131	646
<b>Supply</b>	<b>On-Street Stalls/Unit</b>	2.37	2.64	1.20	2.18	2.09
	<b>Driveway Stalls/Unit</b>	1.75	2.29	1.68	1.82	1.87
	<b>Surface Lot Stalls/Unit</b>	-	-	0.25	0.14	0.09
	<sup>35</sup> <b>Total Stalls Studied/Unit</b>	<sup>36</sup> 4.12	<sup>37</sup> 4.93	<sup>38</sup> 3.13	<sup>39</sup> 4.13	<sup>40</sup> 4.05
<b>Demand*</b>	<b>On-Street Vehicles/Unit</b>	0.89	0.29	0.29	0.36	0.48
	<b>Driveway Vehicles/Unit</b>	1.16	1.60	1.58	1.48	1.44
	<b>Surface Lot Vehicles/Unit</b>	-	-	0.18	0.11	0.07
	<sup>41</sup> <b>Total Vehicles/Unit</b>	2.05	1.89	2.05	1.95	1.99

\*All demand observations shown represent the 2:00 AM overnight peak hour.

<sup>34</sup> On-street and surface lot demand were slightly higher at 10:00 AM for the Island Station neighborhood, but overall demand was equivalent at both 2:00 AM and 10:00 AM so the 2:00 AM hour is used in the summary table for consistency with other neighborhoods.

<sup>35</sup> Residential parking stalls only. "Other" and garage uses excluded from this summary.

<sup>36</sup> This does not include 0.84 residential garage stalls per unit, which would raise the built ratio to 4.96.

<sup>37</sup> This does not include 1.57 residential garage stalls per unit, which would raise the built ratio to 6.50.

<sup>38</sup> This does not include 0.91 residential garage stalls per unit, which would raise the built ratio to 4.04.

<sup>39</sup> This does not include 1.13 residential garage stalls per unit, which would raise the built ratio to 5.26.

<sup>40</sup> This does not include 1.09 residential garage stalls per unit (combined average for all neighborhoods), which would raise the built ratio to 5.14.

<sup>41</sup> Residential parking only. "Other" and garage parking excluded from this summary.



# City of Milwaukie: Residential Parking Inventory

## Summary of Findings

February 2021 (v3)

### 1.1 INTRODUCTION

In 2017, the City of Milwaukie adopted a 20-year vision effort, and in 2018, the City began a two-year process to update the Comprehensive Plan. The adoption of the Comprehensive Plan establishes a mandate for Milwaukie to update any lagging land use policies and practices that may be holding the City back from realizing its vision. One significant area where current policies and practices need to be updated is the zoning code. The City made it an early priority to update the zoning code in single dwelling residential areas. These areas of the zoning code will need to be amended to achieve several Comprehensive Plan goals related to increasing community diversity, preparing for population growth, protecting natural resources, and improving climate resiliency.

In support of these efforts the City of Milwaukie is interested in how parking typically functions in residential neighborhoods. A better understanding of this dynamic will help facilitate decision making regarding parking in the context of the Comprehensive Plan, the zoning code, and state level requirements.

The purpose of this report is to summarize a recently completed assessment of parking supplies in four Milwaukie neighborhoods. Data includes the format of the parking supply (e.g., on-street, in driveways) compared against the number of residential units in the neighborhood. The inventory is a catalogue of the total number of parking spaces reasonably available for the safe and efficient parking of authorized vehicles in targeted study zones. This inventory will be used to support an actual counting of parked vehicles during two time periods in February 2021, known as a parking occupancy study. A summary report of the occupancy study will be produced at that time.

The sample study zones are within the following neighborhoods, selected in consultation with the City of Milwaukie and Urbsworks (the prime consultant for the larger Comprehensive Plan Implementation Project):

- Lake Road
- Lewelling
- Ardenwald
- Island Station

### 1.2 GLOSSARY OF TERMS

- Building:** Any built structure within a parcel intended for residential use (e.g., single family households, duplexes, and apartments) or, in some cases, non-residential use (e.g., retail, restaurant, etc.). In this case garages are excluded from this definition.
- Capacity:** The estimated number of physical parking stalls associated with a parcel or fully inventoried supply.
- Carport:** A roofed structure within a parcel intended for the parking of vehicles; unlike a garage, a carport does not contain walls or doors.
- Driveway:** Any area within a parcel that is legally intended for the parking of vehicles. Driveways are identified as having an associated curb cut from a street into a parcel. A driveway will have a clearly visible apron of pavement or gravel (usually in front of a garage). A driveway must be large enough in size to accommodate a vehicle without infringing on a sidewalk or street.
- Garage:** Any built structure within a parcel intended for the parking of vehicles. In the context of this study, garage capacity was estimated based on the width of the garage door (or number of doors, if multiple doors were observed).



- Inventory:** **Land Use** - A land use inventory is a catalogue of all residential dwelling units and non-residential units (e.g., retail, restaurant, industrial) in a designated study area.
- Parking** - A parking inventory is a catalogue of spaces that can be legally and safely used for parking. The catalogue of parking is separated by type of parking identified (i.e., on-street, in driveways, and garages)
- Parcel:** A piece of real property as identified by the county assessor's parcel number (APN) that is one contiguous parcel of real property. Individual parcels are demarcated on study area maps developed for each study area. All land uses and parking within parcels are associated with that specific parcel. See **Figure A** as an example (page 5).
- Parking stall:** An area located on-street, in driveways and carports, in surface lots, or in garages that is available to park vehicles by authorized users (hourly, daily, and/or overnight). Parking stalls need to be reasonably sized to ensure appropriate access and maneuverability.
- Ratio of stalls to units:** Calculations of the relationship of the number of parking stalls to residential units are made at different levels, including in aggregate or by type of supply (e.g., on-street, in driveways, and/or garages). This ratio is useful in examining actual physical parking built within a supply and what a code might require.
- Unit:** **Residential** - A residential unit is identified as a unique address within a parcel. This could be a single family dwelling, or multiple units within multifamily dwellings (e.g., duplex, apartment).
- Non-residential** - A non-residential unit is identified as real property within a parcel that provides services or business within a study area. This could be individual free standing businesses or services or multiple activity spaces within a shared building. Examples include workspaces, restaurants, retail spaces and event venues (if housed in a building).

### 1.3 METHODOLOGY

The inventory catalogue for residential units and parking stalls is summarized below. The inventory assembled for each neighborhood provides a large amount of data. The data has been sorted to provide metrics that are intended to inform and support future discussions regarding parking in these neighborhoods. If needed, the data can be reformatted or reorganized to assist the City and stakeholders in examining issues and developing solutions. This is the first task of a data collection effort that will soon include occupancy data, which can now be engaged with accurate inventory/supply totals.

#### Study Zone Boundaries

Study area boundaries in the four neighborhoods were developed in coordination with the City of Milwaukie and the Comprehensive Plan Implementation team. The intent for establishing study zones was to develop sample areas to collect usage data from selected neighborhoods. Outputs from collected data can serve as "typical" representations of how parking is currently provided (supply) and used (demand) in these neighborhoods. An initial consideration on boundaries for the sample areas would assume that a resident parking on-street within the center of the study zone would not have to park more than 600 feet from their primary residence (if they chose to park on-street).



## Inventory – Cataloguing Parking Supply by Type

A parking inventory is a catalogue of all parking within a study area assembled by location and type of stall. For this project, inventories were created in sample areas for each of the four selected neighborhoods. Inventory databases were established after completing the following tasks:<sup>1</sup>

- Aerial maps were used to identify all streets and potential on-street parking stalls located within study zones.
- Parcel maps were used to identify unique land parcels within each study area.
- A unique number was assigned to each city block in each study area. These unique block identifiers allowed for creation of inventory templates for use within the field by consultant crews.
- From January 11 through 16, 2021 surveyors were dispatched to each neighborhood study area to observe unique parcels and the location, type, and number of parking stalls.<sup>2</sup>
- Each parcel in the study area was visually evaluated to determine the number of buildings (properties or structures, excluding garages) and residential units located on that parcel within a numbered city block. In some cases, a single parcel had more than one building or unit.<sup>3</sup>
- Parking located within a parcel was quantified by built garage capacity and driveway capacity.<sup>4</sup>
  - **Garage capacity** was typically estimated by counting the number of garage doors located on a parcel. One door equaling the capacity to park one vehicle inside the built garage. When garage doors were wide enough to fit two cars, they were counted as such.<sup>5</sup>
  - **Driveway capacity** was estimated based on a reasonable assumption of the number of cars that could safely park on a surface that is easily identified as a driveway.
- For on-street parking, a measuring wheel was used to estimate the number of available parking stalls a vehicle could properly park on each block face. Care was taken to consider driveway curb cuts, sight lines, location of fire hydrants, and other factors in the roadway that would preclude using an area for parking. A length of 23 feet and width of 8 feet per stall guides the quantification of usable stalls. This provides for reasonable spacing, maneuverability, and safe access to and from vehicles into and out of a roadway.

<sup>1</sup> An example surveyors inventory template is attached at the end of this document.

<sup>2</sup> For on-street parking, surveyors only quantified parking stalls that were (a) reasonably usable, and (b) provided a safe and functional place to park. During the inventory collection, surveyors found numerous vehicles parked in areas that would not be considered reasonable, safe, or functional. The intent was to be conservative in cataloguing on-street stalls as these neighborhoods have large areas where curbs or sidewalks are not in place.

<sup>3</sup> Further, a few parcels had non-residential uses which were denoted.

<sup>4</sup> In some instances vehicles were parked in front lawns and other areas of a parcel. This type of parking was not included in the inventory as "capacity," as such parking is likely not allowed by code, nor would it be assumed in any time of current or future parking requirement for development. Where possible, field crews made notes in their templates to locate and describe such instances.

<sup>5</sup> As most garage doors are closed, the inventory can only estimate their potential capacity (by number of garage doors). Surveyors cannot assume whether cars are parked within the garage or not. Surveyors took care to assure that buildings identified as garages were not actually upgraded dwelling units. To this end, as they are built as garages, the inventory assumes they have capacity to serve as garages.



## 1.4 LAKE ROAD NEIGHBORHOOD

### Study Area

The sample study area for the Lake Road neighborhood is illustrated in **Figure A**.

### Public On-Street Parking

There are 451 on-street parking stalls within the study area. There are no signed time restrictions on how parking is used in the neighborhood. A user may park in a stall for an unlimited time on a typical day.

Stall Type	Stalls	% Total
<b>On-Street Supply</b>	<b>451</b>	<b>100%</b>
No Limit	451	100%

### Off-Street Parking – Parking located within a Parcel

There are 188 unique residential buildings identified in the study area accommodating 190 residential units. For parking located within these parcels, there is a combined capacity of 492 parking stalls; 160 in garages and 332 on driveways.

Two (2) buildings had more than one residential unit located within a parcel (in this case, two duplexes).

Use Type	Buildings	% Total	Units	% Total	Garage Capacity	% Total	Driveway Capacity	% Total
<b>Property Supply</b>	<b>188</b>	<b>100%</b>	<b>190</b>	<b>100%</b>	<b>160</b>	<b>100%</b>	<b>332</b>	<b>100%</b>
Single Family Household	186	98.9%	186	97.9%	157	98.1%	326	98.2%
Duplex	2	1.1%	4	2.1%	3	1.9%	6	1.8%

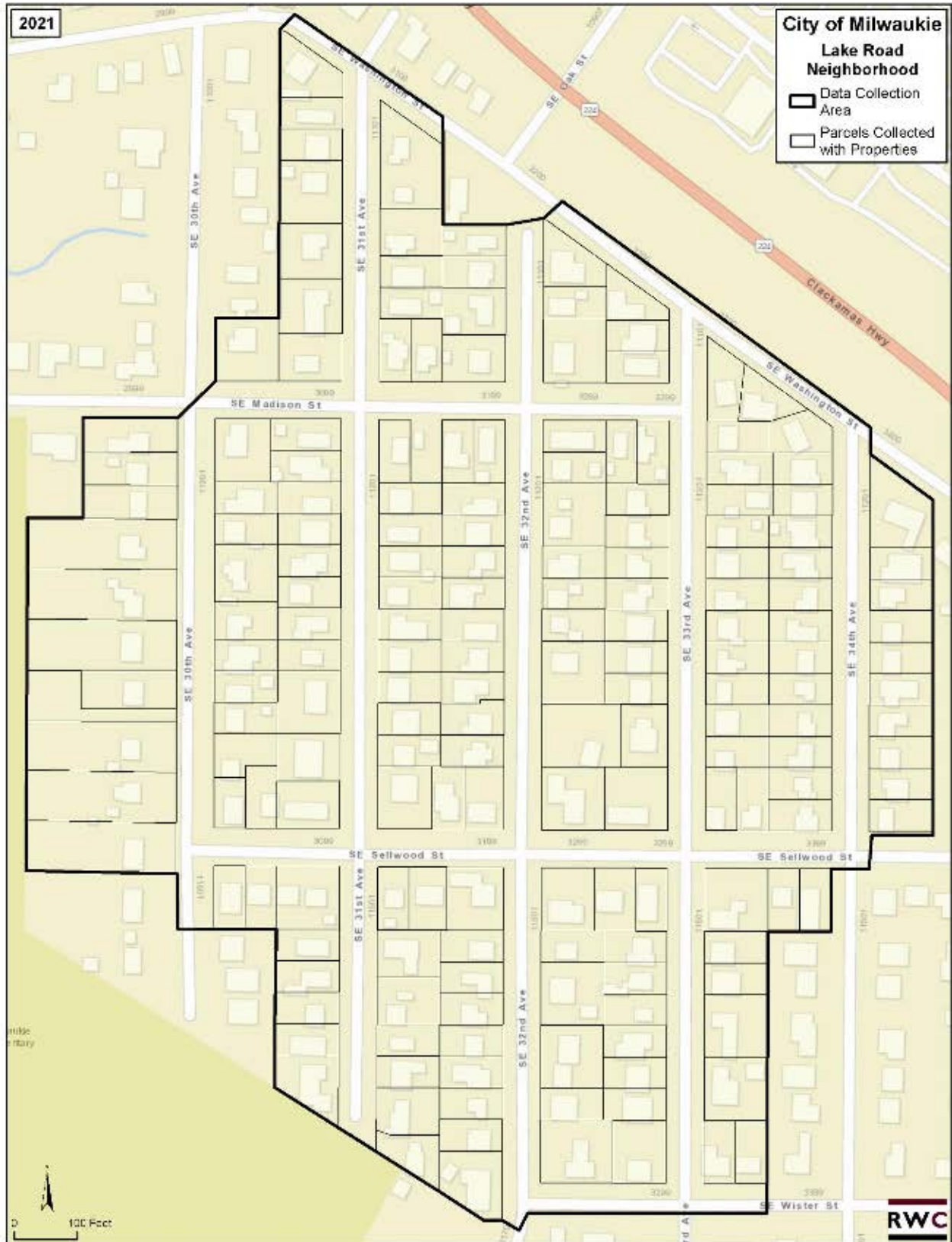
### Ratio of Usable Parking per Residential Unit – Combined Study Area

The 190 residential units within the study area are adjacent to a combined parking supply of 943 stalls. As a combined supply, the ratio of usable parking to residential units is 4.96 parking stalls per unit, which includes both on- and off-street parking. Excluding the shared on-street supply, the average parcel has 2.59 off-street parking stalls per residential unit (1.75 stalls on driveways and 0.84 stalls within garages).

	All Stalls	On-Street	Driveway	Garage
<b>Residential Uses: 190 Units</b>				
<b>Parking Stalls</b>	943	451	332	160
<b>Parking Stalls per Unit</b>	4.96	2.37	1.75	0.84
Stalls provided on-site:	<b>492</b>			
On-site stalls per unit:	<b>2.59</b>			



Figure A: Lake Road Neighborhood Study Area Boundary and Parcel Map







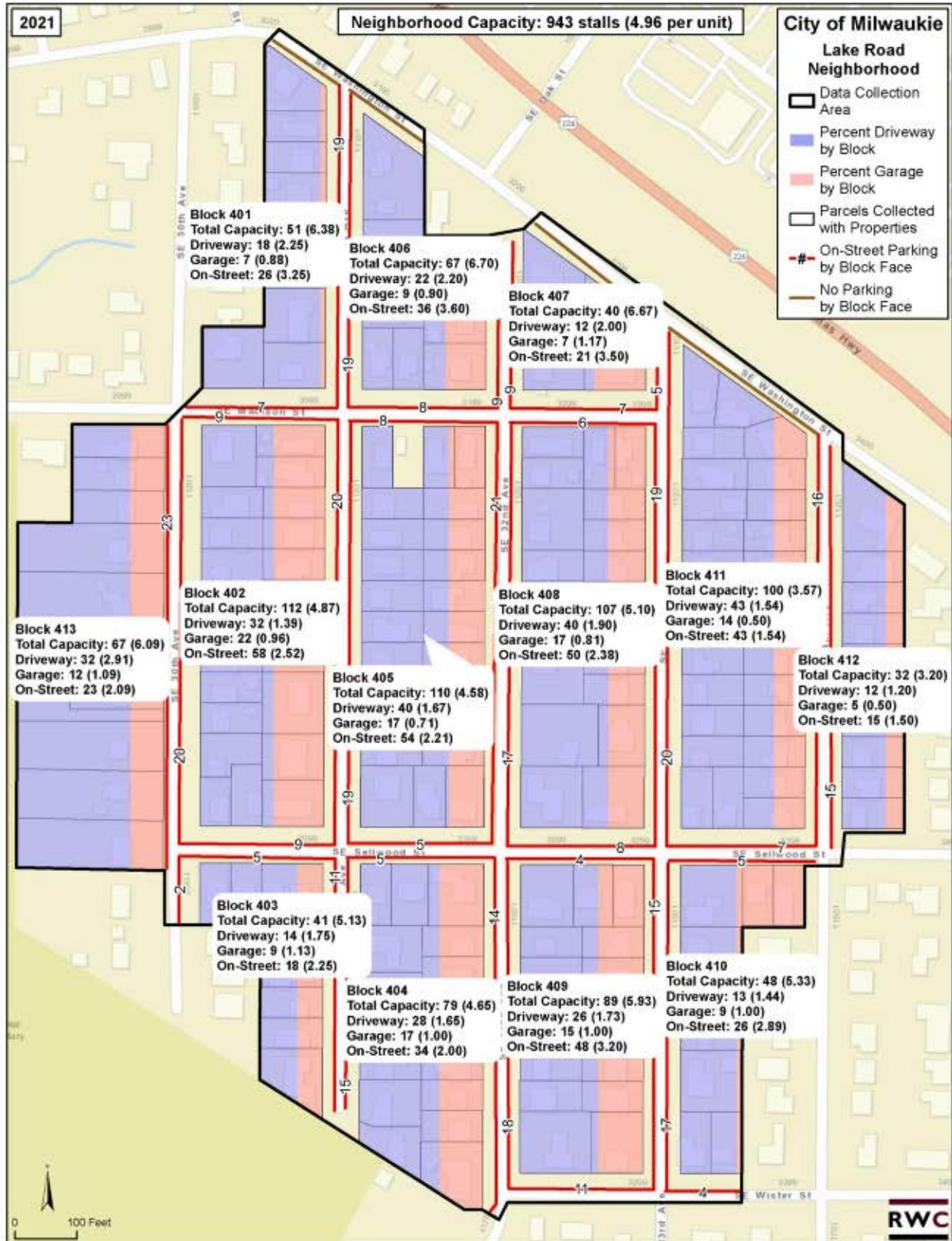
## Parking by Block

**Figure B** provides a breakout of the number of parking stalls on each city block and the ratio of parking per typical residential unit on that specific city block. For example, the city block with the highest combined number of parking stalls is Block 405 with 110 stalls. The block with the lowest combined number of stalls is Block 412 with 32 stalls. As a ratio of parking to residential units, Block 406 (at 6.70 stalls per unit) is the highest and Block 412 (at 3.12 stalls per unit) is the lowest. All unique factors that comprise the combined numbers (on-street, driveways, and garages) are provided within the Figure.

Draft



Figure B: Breakout of Parking by Numbered Block





### Field Notes - Observations

Field observation notes compiled during the inventory in this neighborhood are noted below:



- Photo at left: We found that there was a driveway/ramp (1 stall) that was turned into an ADA accessible entry that prohibits a car from parking in the garage. For this reason, the garage was not counted as capacity within the inventory.
- Middle photo: Appears as if the garage was turned into an ADU unit. The property owner has turned this property's driveway into a two-stall driveway without a garage.
- Photo at right: Found two (2) carports throughout the neighborhood that looked to be added for shelter of property owner's RV. Looks like only one (1) vehicle is reasonably parked in driveway, with one (1) garage door. Cars parked on the grass in this picture will be captured during the demand study but were not collected as part of the inventory count.
- All the on-street parking occurred on paved roads in front of mostly single-family residential houses.
- Driveways often could accommodate at least two vehicles, while many homes also had either a garage or carport for additional off-street parking.
- All the blocks had curbs for easy parking access and made it very pedestrian friendly. Observed many people out walking their dog or just enjoying a nice walk through the neighborhood.

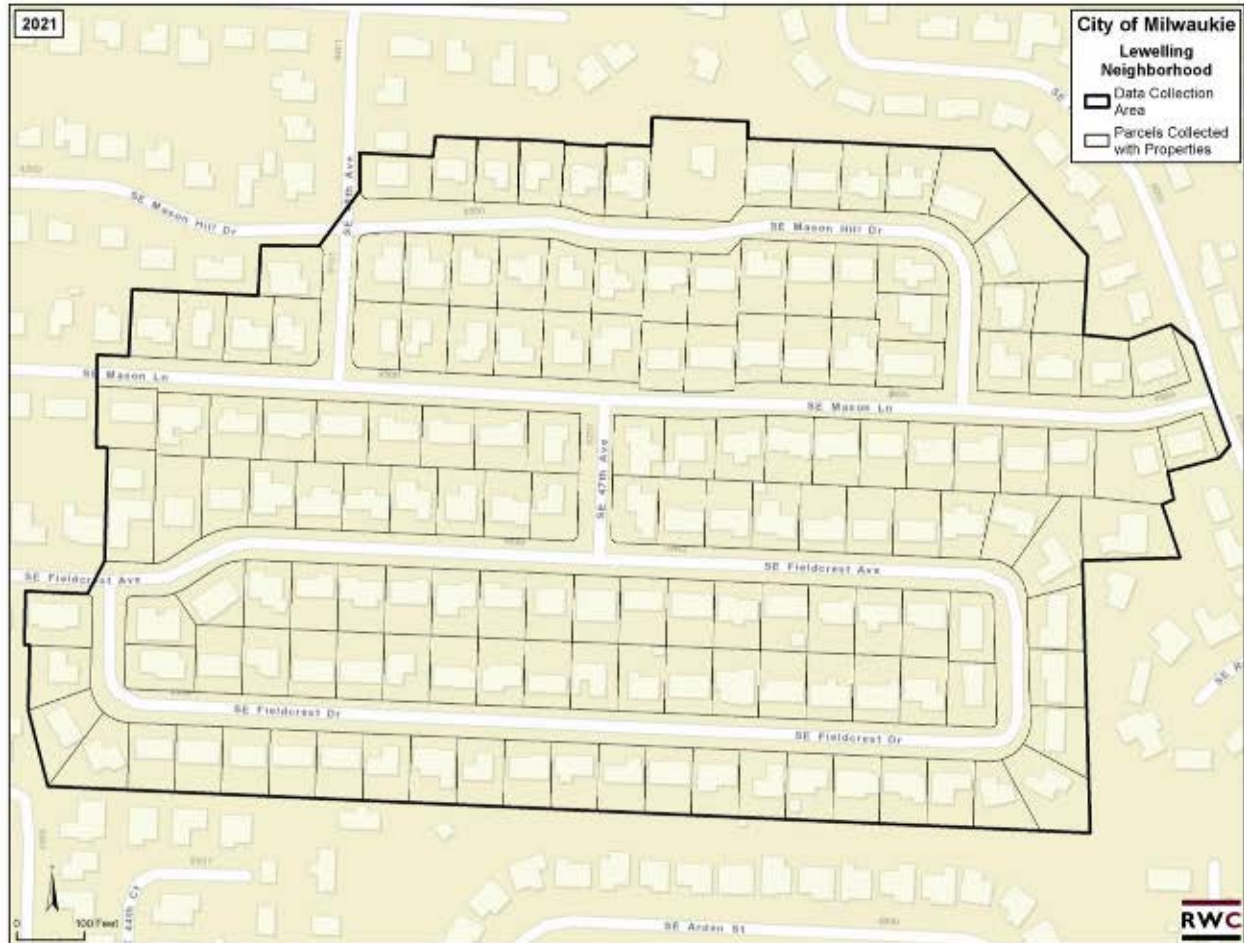


## 1.5 LEWELLING NEIGHBORHOOD

### Study Area

The sample study area for the Lewelling neighborhood is illustrated in **Figure C**.

**Figure C: Lewelling Neighborhood Study Area Boundary and Parcel Map**



### Public On-Street Parking

There are 406 on-street parking stalls within the study area. There are no signed time limits on how parking is used in the neighborhood. A user may park in a stall for an unlimited time on a typical day.

Stall Type	Stalls	% Total
<b>On-Street Supply</b>	<b>406</b>	<b>100%</b>
No Limit	406	100%

### Off-Street Parking - Parking located within a Parcel

There are 153 unique buildings identified in the study area accommodating 154 residential units. For parking located within these parcels, there is a combined capacity of 595 parking stalls; 242 in garages and 353 on driveways.



One (1) building had more than one residential unit located within a parcel (in this case, a duplex).

Use Type	Buildings	% Total	Units	% Total	Garage Capacity	% Total	Driveway Capacity	% Total
<b>Property Supply</b>	<b>153</b>	<b>100%</b>	<b>154</b>	<b>100%</b>	<b>242</b>	<b>100%</b>	<b>353</b>	<b>100%</b>
Single Family Household	152	99.3%	152	98.7%	240	99.2%	349	98.9%
Duplex	1	< 1%	2	1.3%	2	< 1%	4	1.1%

#### Ratio of Usable Parking per Residential Unit – Combined Study Area

The 154 residential units within the study area are adjacent to a combined parking supply of 1,001 stalls. As a combined supply, the ratio of usable parking to residential units is 6.50 parking stalls per unit, which includes both on- and off-street parking. Excluding the shared on-street supply, the average parcel has 3.86 off-street parking stalls per residential unit (2.29 stalls on driveways and 1.57 stalls within garages).

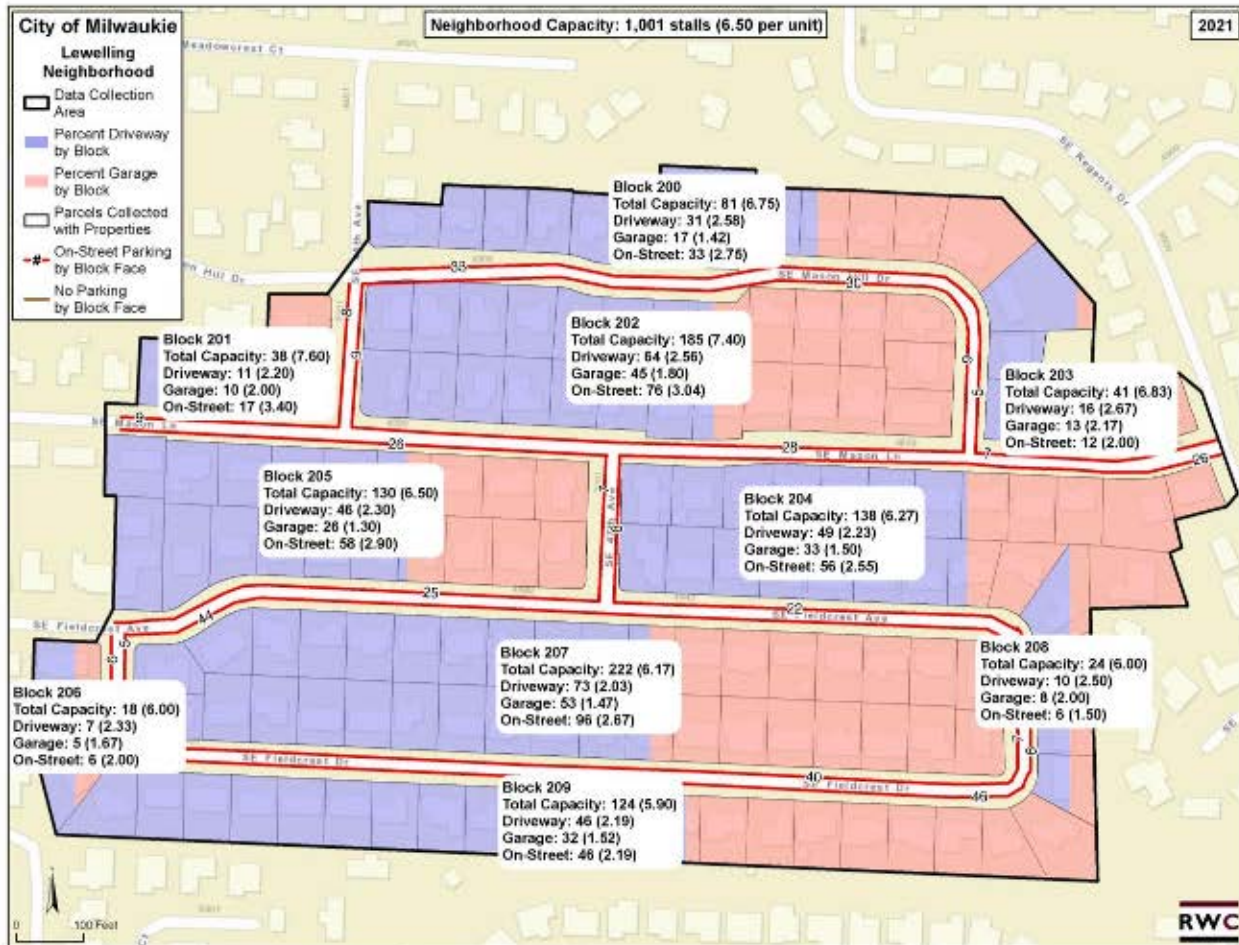
	All Stalls	On-Street	Driveway	Garage
<b>Residential Uses: 154 Units</b>				
<b>Parking Stalls</b>	1,001	406	353	242
<b>Parking Stalls per Unit</b>	6.50	2.64	2.29	1.57
Stalls provided on-site:			<b>595</b>	
On-site stalls per unit:			<b>3.86</b>	

#### Parking by Block

**Figure D** provides a breakout of the number of parking stalls in place on each city block and the ratio of parking per typical residential unit on that specific city block. For example, the city block with the highest combined number of parking stalls is Block 207 (with 222 stalls). The block with the lowest combined number of stalls is Block 206 (with 18 stalls). As a ratio of parking to residential units, Block 201 (at 7.60 stalls per unit) is the highest and Block 209 (at 5.90 stalls per unit) is the lowest. All unique factors that comprise the combined numbers (on-street, driveways, and garages) are provided within the Figure.



Figure D: Breakout of Parking by Numbered Block





### Field Notes – Observations

Field observation notes compiled during the inventory in this neighborhood are noted below:



- It was garbage collection day when we collected inventory in this neighborhood, yet there was still plenty of available parking with little to no obstructions, regardless of the several garbage and recycling cans sitting on the street.
- All blocks had curbs for easy parking access, however, only one-third of them had sidewalks (left photo).
- All the on-street parking occurred on paved roads in front of single-family residential houses, some of which seemed very new (middle photo).
- Legal on-street parking was available on every block face inventoried in the Lewelling neighborhood. However, there was little signage to indicate illegal parking. Almost all illegal parking was determined by faded yellow paint on curbs (right photo) near the ends of blocks or by the narrowing of a street, leaving legal space either for one side or neither side of the road.
- Driveways often could accommodate at least two vehicles, while many homes also had either a garage or carport for additional off-street parking.
- With few sidewalks, pedestrians are forced into the streets leading to safety concerns. Many pedestrian and vehicle close-call encounters were observed on the inventory day, primarily in low visibility areas such as street corners.

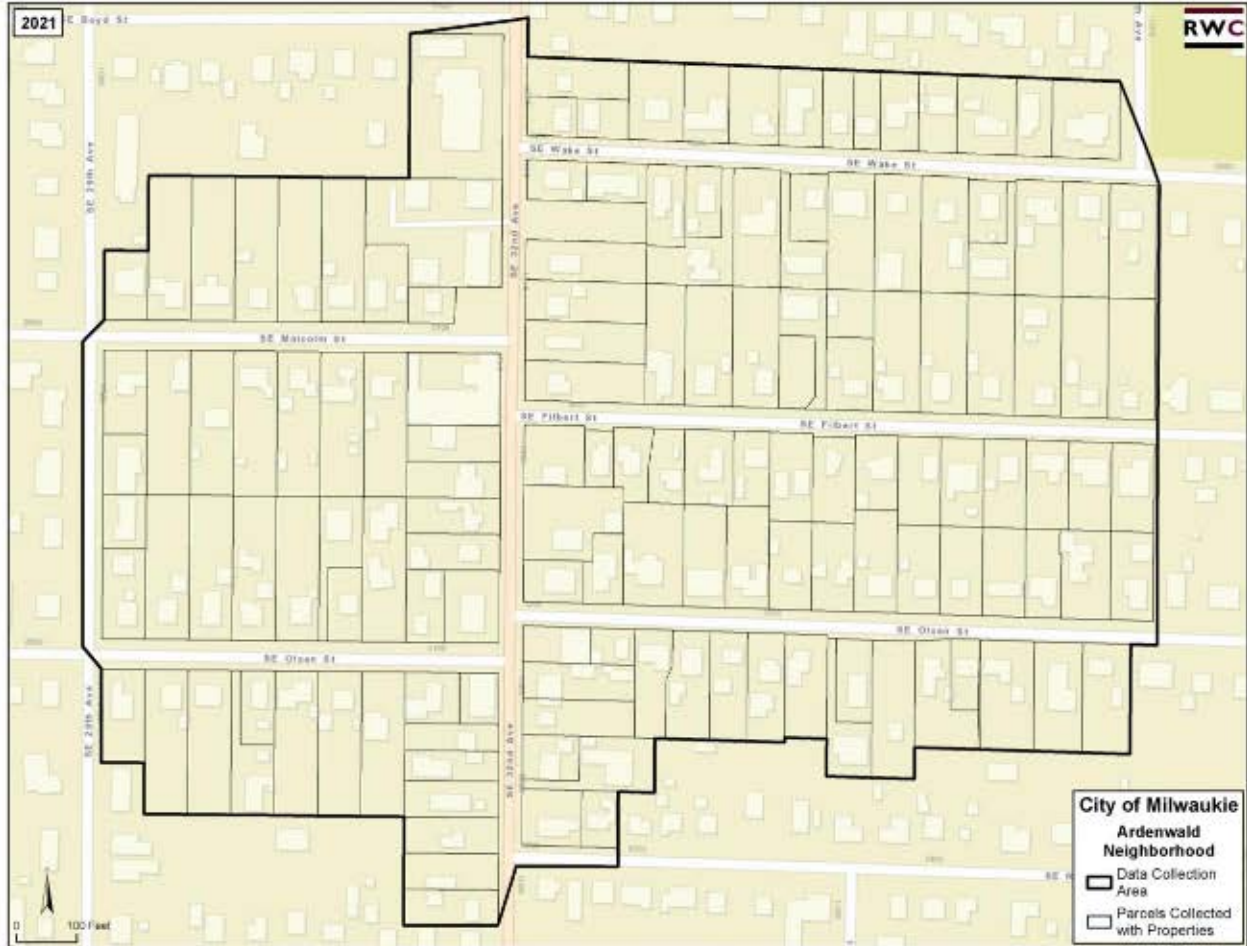


**1.6 ARDENWALD NEIGHBORHOOD**

**Study Area**

The sample study area for the Ardenwald neighborhood is illustrated in **Figure E**.

*Figure E: Ardenwald Neighborhood Study Area Boundary and Parcel Map*



**Public On-Street Parking**

There are 207 on-street parking stalls within the study area. Two (2) stalls were time limited: one 15-minute stall and a single 1-hour stall. The remaining parking has no signed time limits on how parking is used in the neighborhood. A user may park in a stall for an unlimited time on a typical day.

Stall Type	Stalls	% Total
<b>On-Street Supply</b>	<b>207</b>	<b>100%</b>
15 Minute	1	< 1%
1 Hour	1	< 1%
No Limit	205	99.0%





### Off-Street Parking – Parking located within a Parcel

Unlike the Lake Road and Lewelling neighborhoods, Ardenwald has several non-residential uses within its study area. Of the 178 total units identified in 147 buildings, there were two duplexes (4 units), three small apartment buildings (30 units), three retail buildings (with 3 business units), one industrial building (3 units), and one land use that surveyors denoted as undesignated (i.e., unable to identify specific use). Residential units total 171 of the total 178 units identified.

For parking located within these parcels, there is a combined capacity of 524 parking stalls: 163 in garages, 289 on driveways and 72 on surface lots; mostly associated with the apartment complex (43 stalls) and the retail units (20 stalls). The industrial and undesignated surface lot use maintained 5 and 4 stalls, respectively.

Use Type	Buildings	% Total	Units	% Total	Garage Capacity	% Total	Driveway Capacity	% Total	Surface Lot Capacity	% Total
<b>Property Supply</b>	<b>147</b>	<b>100%</b>	<b>178</b>	<b>100%</b>	<b>163</b>	<b>100%</b>	<b>289</b>	<b>100%</b>	<b>72</b>	<b>100%</b>
Single Family Household	137	93.2%	137	77.0%	156	95.7%	281	97.2%	0	< 1%
Duplex	2	1.4%	4	2.2%	0	< 1%	6	2.1%	0	< 1%
Apartment Complex	3	2.0%	30	16.9%	0	< 1%	0	< 1%	43	59.7%
Retail	3	2.0%	3	1.7%	0	< 1%	2	< 1%	20	27.8%
Industrial	1	< 1%	3	1.7%	2	1.2%	0	< 1%	5	6.9%
Undesignated	1	< 1%	1	< 1%	5	3.1%	0	< 1%	4	5.6%

### Ratio of Usable Parking per Residential Unit – Combined Study Area

The table below separates the total parking supply observed to better evaluate parking related to residential uses as opposed to parking serving the non-residential units in the study area.

The 171 residential units within the study area are adjacent to a combined parking supply of 691 stalls. As a combined supply, the ratio of usable parking to residential units is 4.04 parking stalls per unit, which includes both on- and off-street parking. Excluding the shared on-street supply, the average parcel has 2.84 off-street parking stalls per residential unit (1.68 stalls on driveways, 0.91 stalls in garages, and 0.25 stalls on surface lots).

Non-residential units in the study zone are served by a combined supply of 40 stalls, including 2 on-street and 38 in driveways, garages, and surface lots. As a combined supply, the ratio of usable parking to other, non-residential units is 5.71 parking stalls per "Other" unit. Excluding the shared on-street supply, the average site has 5.43 off-street parking stalls per "Other" unit, the majority (4.14 per "Other" unit) being on surface parking.



	All Stalls	On-Street	Driveway	Garage	Surface Lot
<b>Parking Stalls</b>	731	207	289	163	72
<b>Residential Uses: 171 Units</b>					
<b>Parking Stalls</b>	691	205	287	156	43
<b>Parking Stalls/Unit</b>	4.04	1.20	1.68	0.91	0.25
	Stalls provided on-site:	<b>486</b>			
	On-site stalls per unit:	<b>2.84</b>			
<b>Other Land Uses: 7 Units</b>					
<b>Parking Stalls</b>	1,001	2 <sup>6</sup>	2	7	29
<b>Parking Stalls/Unit</b>	5.71	0.29	0.29	1.00	4.14
	Stalls provided on-site:	<b>38</b>			
	On-site stalls per unit:	<b>5.43</b>			

### Parking by Block

**Figure F** provides a breakout of the number of parking stalls in place on each city block and the ratio of parking per typical unit on that specific city block.<sup>7</sup> For example, the city block with the highest combined number of parking stalls in Block 313 (with 165 stalls). The block with the lowest combined number of stalls is Block 312 (with 47 stalls). Contributing to this may be that Block 312 has no on-street parking.

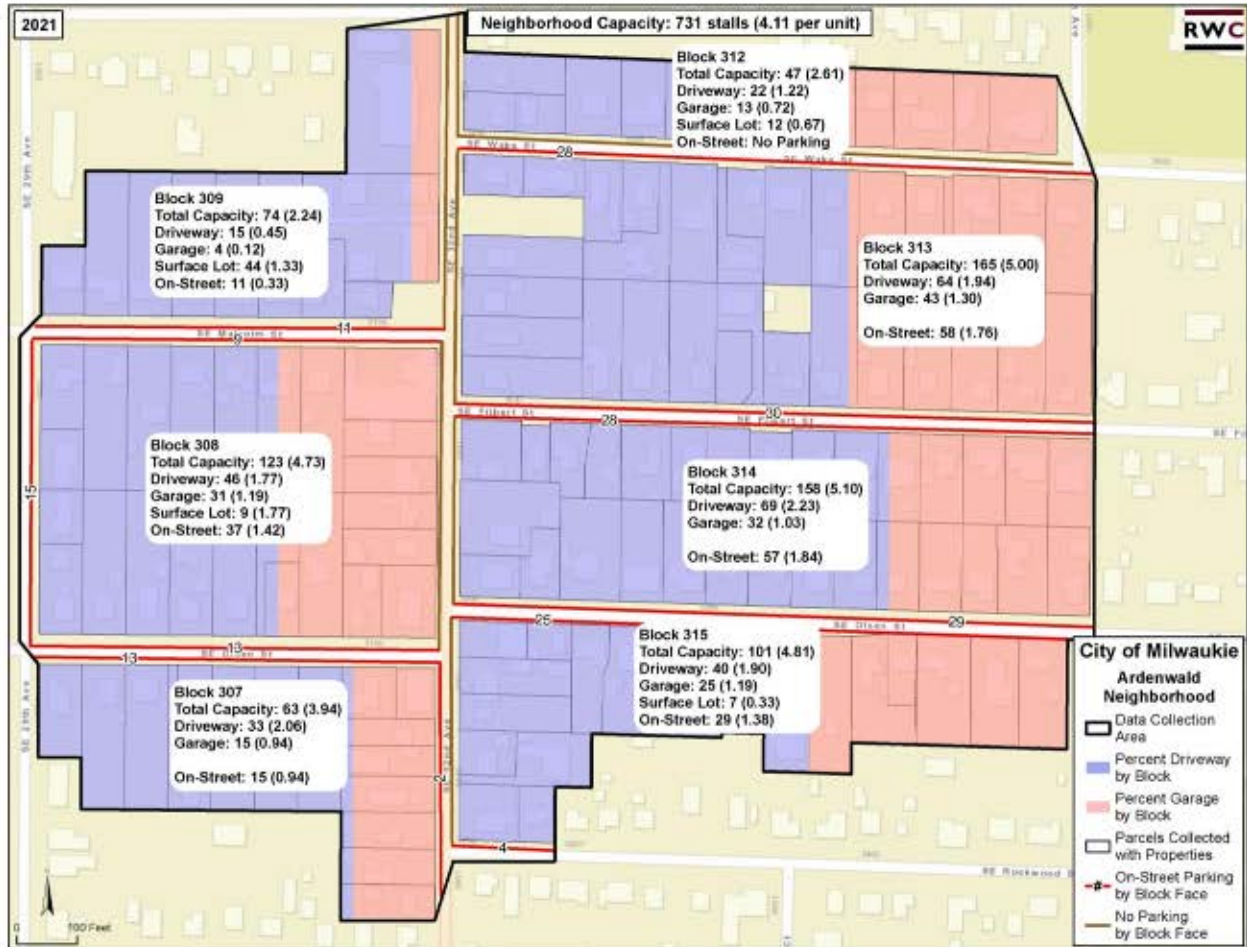
As a ratio of parking to units, Block 314 (at 5.10 stalls per unit) is the highest and Block 309 (at 2.24 stalls per unit) is the lowest. All unique factors that comprise the combined numbers (on-street, driveways, garages, and surface lots) are provided within the Figure (next page).

<sup>6</sup> The only on-street stalls assigned for Other Units were the 2 stalls with time limited signage, a 15 minute and a 1 hour stall.

<sup>7</sup> All units, both residential and non-residential, were combined by City block on the map, for the purpose of visual clarity and due to the small number of "Other" use types.



Figure F: Breakout of Parking by Numbered Block





### Field Notes – Observations

Field observation notes compiled during the inventory in this neighborhood are noted below:



- Legal on-street parking was confusing and inconsistently signed in the Ardenwald neighborhood. Photo at left: Residents tend to park on the south side of the street; no parked vehicles were observed on the north side of the street, despite no signage indicating parking on this side is prohibited. Signage was not consistently present. If on-street parking occurred on both sides of the street, emergency vehicle access would be restricted from passing.
- Photo in the middle: Example of what looks like City placed signage (again, not consistent within study area).
- Photo at right: Much of the on-street parking occurred in unimproved on-street parking stalls in front of single-family residential houses. Dirt or gravel was the on-street surface for most of the stalls.
- Driveways often could accommodate at least two vehicles, while many homes also had either a garage or carport for additional off-street parking.
- The unimproved streets did not have sidewalks, forcing pedestrians into the streets leading to safety concerns.

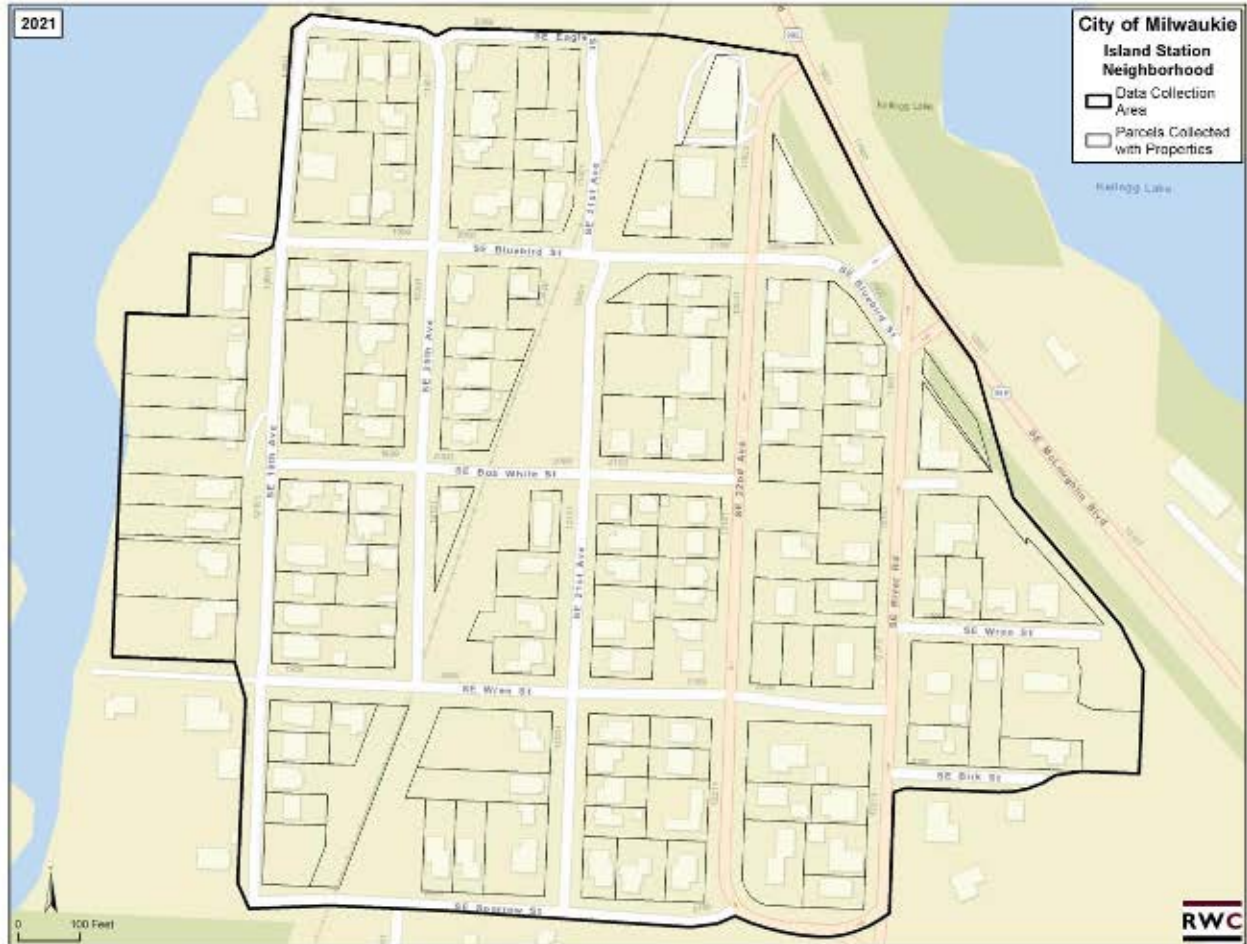


### 1.7 ISLAND STATION NEIGHBORHOOD

#### Study Area

The sample study area for the Island Station neighborhood is illustrated in **Figure G**.

**Figure G: Island Station Neighborhood Study Area Boundary and Parcel**





### Public On-Street Parking

There are 285 on-street parking stalls within the study area<sup>8</sup>. There are no signed time limits on how parking is used in the neighborhood. A user may park in a stall for an unlimited time on a typical day.

Stall Type	Stalls	% Total
<b>On-Street Supply</b>	<b>285</b>	<b>100%</b>
No Limit	285	100%

### Off-Street Parking - Parking located within a Parcel

Like the Ardenwald neighborhood study area, Island Station has several non-residential land uses within the study area. These other land uses are located in the far northeast corner of the study area, adjacent to McLoughlin Blvd. Overall, the study area is predominantly residential, with residential units making up 131 of the 137 units observed. Other uses include an apartment complex (11 units), two retail buildings (4 units), a restaurant, and an event venue.

Overall, there is a combined capacity of 469 parking stalls: 148 in garages, 238 on driveways, and 79 on surface lots. The surface lot breakout includes parking for the apartment complex (18 stalls), the retail units (26 stalls), the restaurant (25 stalls), and the event venue (10 stalls).

Use Type	Parcels	% Total	Units	% Total	Garage Capacity	% Total	Driveway Capacity	% Total	Surface Lot Capacity	% Total
<b>Property Supply</b>	<b>125</b>	<b>100%</b>	<b>137</b>	<b>100%</b>	<b>152</b>	<b>100%</b>	<b>238</b>	<b>100%</b>	<b>79</b>	<b>100%</b>
Single Family Household	120	96.0%	120	87.6%	148	97.4%	238	100%	0	< 1%
Apartment Complex	1	< 1%	11	8.0%	0	< 1%	0	< 1%	18	22.8%
Retail	2	1.6%	4	2.9%	2	1.3%	0	< 1%	26	32.9%
Restaurant	1	< 1%	1	< 1%	2	1.3%	0	< 1%	25	31.6%
Event Venue	1	< 1%	1	< 1%	0	< 1%	0	< 1%	10	12.7%

<sup>8</sup> On the date the field review was completed (January 15, 2021), much of the west side of SE 22<sup>nd</sup> Avenue (one-way southbound with a bike lane on the west side) was under construction. Based on historical images and observed field conditions, there is no on-street parking on most of the west side of SE 22<sup>nd</sup> Avenue. However, the section between SE Bob White Street and SE Wren Street has a wide gravel shoulder on the west side off the edge of the bike lane, and 10 parking spaces were included within the inventory under the assumption that this section will have adequate width for on-street parking without blocking the bike lane after construction is completed.



### Ratio of Usable Parking per Residential Unit - Combined Study Area

The table below separates the total parking supply observed to better evaluate parking related to residential uses as opposed to parking serving the non-residential units in the study area.

The 131 residential units within the study area are adjacent to a combined parking supply of 689 stalls. As a combined supply, the ratio of usable parking to residential units is 5.26 parking stalls per unit, which includes both on- and off-street parking. Excluding the shared on-street supply, the average parcel has 3.08 parking stalls per residential unit (1.82 stalls on driveways, 1.13 stalls in garages, and 0.14 stalls on surface lots).

All parking for non-residential (Other) units in the study zone is off-street for a combined supply of 65 stalls, 4 in garages and 61 in surface lot parking. The ratio of usable parking to non-residential units is 10.83 parking stalls per "Other" unit.

	All Stalls	On-Street	Driveway	Garage	Surface Lot
<b>Parking Stalls</b>	754	285	238	152	79
<b>Residential Uses: 131 Units</b>					
<b>Parking Stalls</b>	689	285	238	148	18
<b>Parking Stalls/Unit</b>	5.26	2.18	1.82	1.13	0.14
	Stalls provided on-site:	<b>404</b>			
	On-site stalls per unit:	<b>3.08</b>			
<b>Other Land Uses: 6 Units</b>					
<b>Parking Stalls</b>	65	0	0	4	61
<b>Parking Stalls/Unit</b>	10.83	0.00 <sup>9</sup>	0.00 <sup>10</sup>	0.67	10.17
	Stalls provided on-site:	<b>38</b>			
	On-site stalls per unit:	<b>10.83</b>			

<sup>9</sup> There were no signed time limited stalls on-street.

<sup>10</sup> All parking associated with Other Units were either in a garage (no usable driveway capacity) or on surface lots.

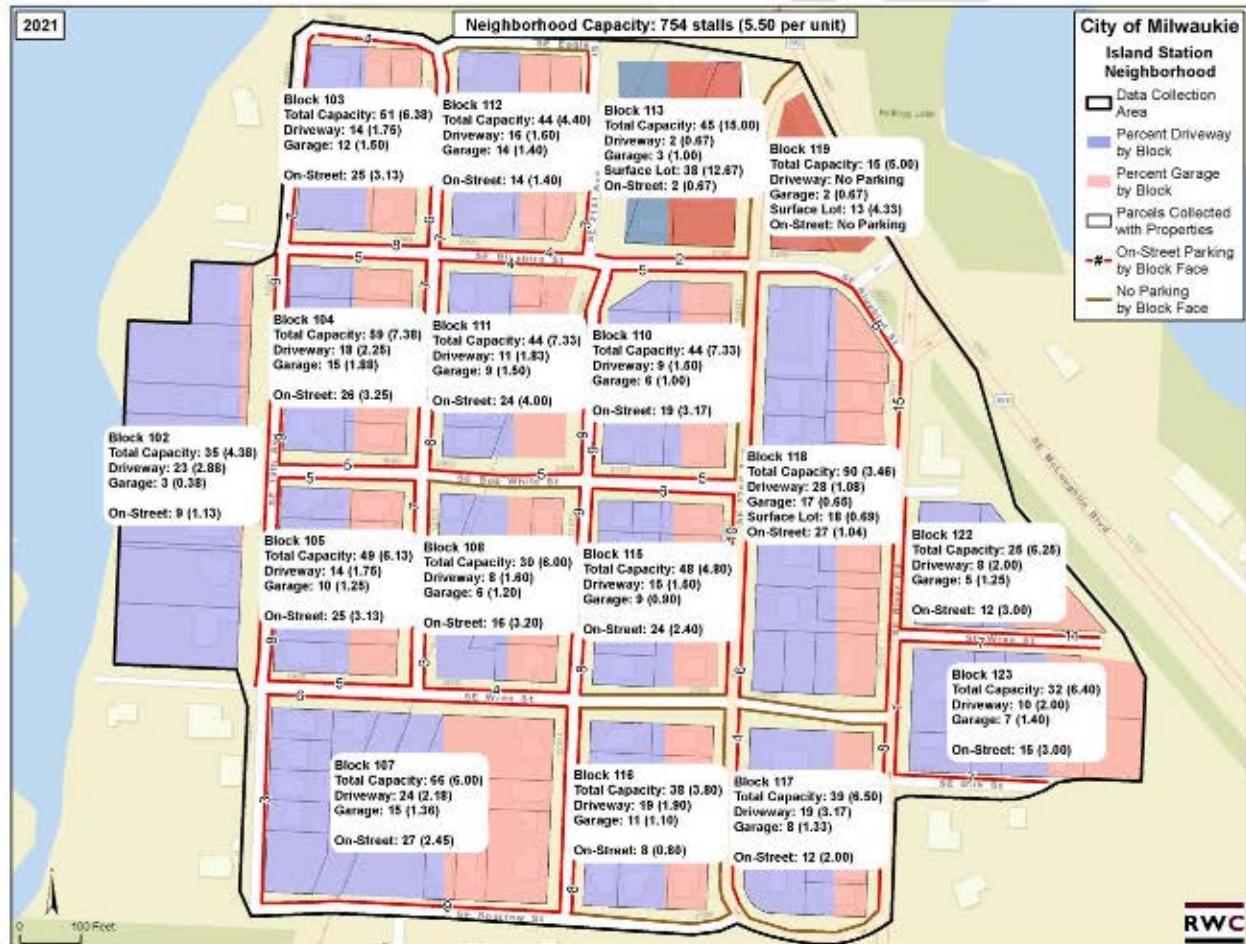


**Parking by Block**

**Figure H** provides a breakout of the number of parking stalls in place on each city block and the ratio of parking per typical unit on that specific city block.<sup>11</sup> For example, the city block with the highest combined number of parking stalls in Block 118 with 90 stalls. The block with the lowest combined number of stalls is Block 122 with 25 stalls, as this block has limited street frontage.

As a ratio of parking to units, Block 104 (at 7.38 stalls per unit) is the highest and Block 116 (at 3.80 stalls per unit) is the lowest. All unique factors that comprise the combined numbers (on-street, driveways, garages, and surface lots) are provided within the Figure.

**Figure H: Breakout of Parking by Numbered Block**



<sup>11</sup> All units, both residential and non-residential, were combined by City block on the map, for the purpose of visual clarity and due to the small number of "Other" use types.





### Field Notes - Observations

Field observation notes compiled during the inventory in this neighborhood are noted below:



- Most on-street parking within the study area requires residents to park at least partially on gravel, mud, or grass (top left).
- With very little parking signage, many residents may view the on-street parking adjacent to their homes as their personal parking (rather than shared parking). One resident was in the process of laying gravel adjacent to the road, which they considered their parking stall. Some residents have put up signage to indicate private parking, or, in some cases, put obstructions up to prevent parking by the public (top right).
- Most driveways were paved and any additional gravel sections of the yard that were observed were therefore not added to the inventory. However, in some cases, the only driveway present was gravel, and in these limited cases, the gravel driveway capacity was included within the inventory (bottom left).
- SE River Road is one-way northbound with a bike lane on the east side. While there is generally no on-street parking on the east side of SE River Road within the study area, a total of two on-street parking spaces on the east side of River Road are included in the inventory as there is adequate space to park in the shoulder area without blocking the bike lane in two small areas.
- The west side of SE 22<sup>nd</sup> Avenue was under construction at the time the field review was completed. SE 22<sup>nd</sup> Avenue is one-way southbound with a bike lane on the west side. Based on discussions with city construction staff, 10 on-street parking spaces on the west side of SE 22<sup>nd</sup> Avenue (between SE Bob White St and SE Wren St) were included within the inventory under the assumption that this section will have adequate width for on-street parking without blocking the bike lane after construction is completed.



## 1.8 SUMMARY

Averaged over all four study areas, the combined **residential parking supply**, including both on- and off-street parking, was found to be **5.15 parking stalls per residential unit**. On-street parking contributes 2.09 parking stalls per unit, and off-street parking (including driveways, garages, and surface lots) contribute the remaining 3.06 parking stalls per unit.

Each neighborhood has unique characteristics, but on-street parking makes up **at least 30% of the total residential parking supply** in each (ranging from 30% to 48% of the observed supply). The majority of the parking supply is contained within private off-street parking in all four neighborhoods.

	Lake Road	Lewelling	Ardenwald	Island Station	Total
<b>Total Parking Stalls<sup>12</sup></b>	943	1,001	691	689	<b>3,324</b>
<b>On-Street Stalls</b>	451	406	205	285	<b>1,347</b>
<b>Driveway Stalls</b>	332	353	287	238	<b>1,210</b>
<b>Garage Stalls</b>	160	242	156	148	<b>706</b>
<b>Surface Lot Stalls</b>	0	0	43	18	<b>61</b>
<b>Residential Units</b>	190	154	171	131	<b>646</b>
<b>Total Stalls/Unit</b>	4.96	6.50	4.04	5.26	<b>5.15</b>
<b>On-Street Stalls/Unit</b>	2.37	2.64	1.20	2.18	<b>2.09</b>
<b>Driveway Stalls/Unit</b>	1.75	2.29	1.68	1.82	<b>1.87</b>
<b>Garage Stalls/Unit</b>	0.84	1.57	0.91	1.13	<b>1.09</b>
<b>Surface Lot Stalls/Unit</b>	0.00	0.00	0.25	0.14	<b>0.09</b>
				Stalls provided on-site:	<b>1,977</b>
				On-site stalls per unit:	<b>3.06</b>

## 1.9 NEXT STEPS

This memo focuses exclusively on the land use characteristics and parking supply observed within each neighborhood. This data will serve as the foundation for an **occupancy study** that will document observed parking demand (over two time periods) by each parking stall type. The occupancy study will provide additional detail regarding actual usage of the system, both in terms of overall parking demand as well as how residents are using each portion of the available parking supply (e.g., the on-street system and their private off-street parking supply).

<sup>12</sup> Residential parking stalls only. "Other" uses excluded from this summary.



## Appendix A - Example Inventory Field Template

Neighborhood: Lewelling					Block Number: 202			
On-Street Parking								
Block ID	Stall Count/Type							Notes
202A	2 NL, 1 NL, 2 NL, 4 NL, 1 NL, 2 NL, 4 NL, 2 NL, 3 NL, 1 NL, MB - 2 NL, 6 NL,							
202B	3 NL, 2 NL, 4 NL							
202C	2 NP - 1 NL, 3 NL,, 2 NL, 1 NL, 3 NL, 2 NL, 3 NL, 1 NL, 2 NL, 4 NL, 3 NL, 1 NL, 2 NL							NP sign at beginning of block
202D	9 NL							
On-Site Parking by Parcel								
Parcel ID	Entry Side	Number of Properties	Number of Units	Garage Capacity	Driveway Capacity	Surface Lot Capacity	Use Type	Notes
202_1	A	1	1	2	2	0	F	
202_2	A	1	1	2	2	0	F	
202_3	A	1	1	2	2	0	F	
202_4	A	1	1	2	4	0	F	
202_5	A	1	1	2	3	0	F	
202_6	A	1	1	2	2	0	F	
202_7	A	1	1	2	2	0	F	
202_8	A	1	1	2	3	0	F	
202_9	A	1	1	1	2	0	F	
202_10	A	1	1	2	2	0	F	
202_11	A	1	1	1	3	0	F	
202_12	AB	1	1	1	5	0	F	Driveway on A and B side
202_13	B	1	1	2	2	0	F	
202_14	C	1	1	2	3	0	F	
202_15	C	1	1	2	2	0	F	
202_16	C	1	1	2	2	0	F	
202_17	C	1	1	1	3	0	F	
202_18								
202_19								
202_20								
202_21								
202_22								