



WIDER THAN NECESSARY

ON-STREET PARKING IN
RESIDENTIAL AREAS

DAVE AMOS | 2013

TERMINAL PROJECT

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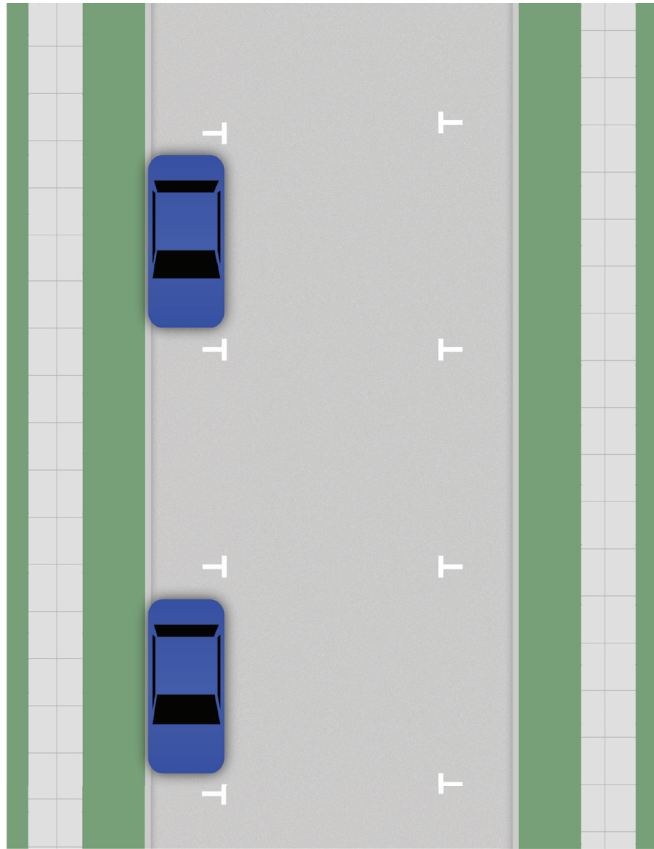


Figure 1: A typical 34 foot roadway with a 60 foot right of way.

INTRODUCTION & PURPOSE

Residential streets in the United States serve a variety of uses. First and foremost, they provide access to homes alongside the street. In terms of space allocation, a typical street gives the most space to the movement of automobiles, while pedestrians use a separate, smaller sidewalk. Within the roadway, however, a large amount of space is given to the parking of automobiles. In a typical 34-foot curb-to-curb roadway, parking constitutes 14 linear feet (41 percent) of the paved space.

If residents and their guests use all of that parking space, then the developer or the municipality designed that street to the correct dimensions. If not, if some or even most of the parking spaces remain vacant, then an opportunity exists to repurpose that space to make it more useful.

RESEARCH QUESTIONS

To better understand how many parking spaces are used and not used, I ask the question:

Does the supply of on-street parking exceed the demand in low-density residential areas?

My hypothesis, based on observation, is that most on-street parking spaces in residential areas are vacant. If my hypothesis proves true, I ask this follow up question:

If so, what could be a better use of that parking space?

PURPOSE OF THE RESEARCH

The subject of parking has not traditionally been an area of robust study, but the work of University of California, Los Angeles economics professor Donald Shoup reinvigorated this research area with his research on the supply and demand of parking, particularly in areas with parking meters like business districts. In his seminal work, “The High Cost of Free Parking,” Shoup advocates for letting the market determine parking prices in places with high parking demand. Prices should be set at a level such that 85 percent of parking

is occupied, leaving 15 percent so drivers can always find a space without searching.¹

Shoup made city planners rethink downtown parking policies, but his work does not extend to low-density residential areas, where demand is low and parking is almost always free to residents. That doesn't mean residential parking is not worth studying. Residential streets are ubiquitous, so any attempts to optimize parking or residential street design can make a huge impact, even if the changes are small. Small changes to parking on residential streets may also positively impact other drawbacks associated with wide residential streets. These negative externalities can increase the rates of accidents and adversely impact the environment. For example:

- Wide streets encourage speeding and increase the frequency and severity of accidents. A typical 36-foot-wide residential street has 1.21 collisions/mile/year, while narrower 24-foot-wide streets have 0.32.²
- According to the Institute of Transportation Engineers, 70% of all accidents on local streets involve on-street parking made possible through wide streets. Nearly all of those accidents involve collisions with stationary vehicles, not cars attempting to park or unpark.³
- Wide streets pave over more pervious surface than necessary, increasing the severity of flooding and reducing water quality downstream.⁴

Clearly, even modest changes to residential streets can make a big difference. If wasted space exists on these streets in the form of unused parking, that space can be seen as an opportunity to fix some of the problems listed above.



PART I: THE PARKING SURVEY

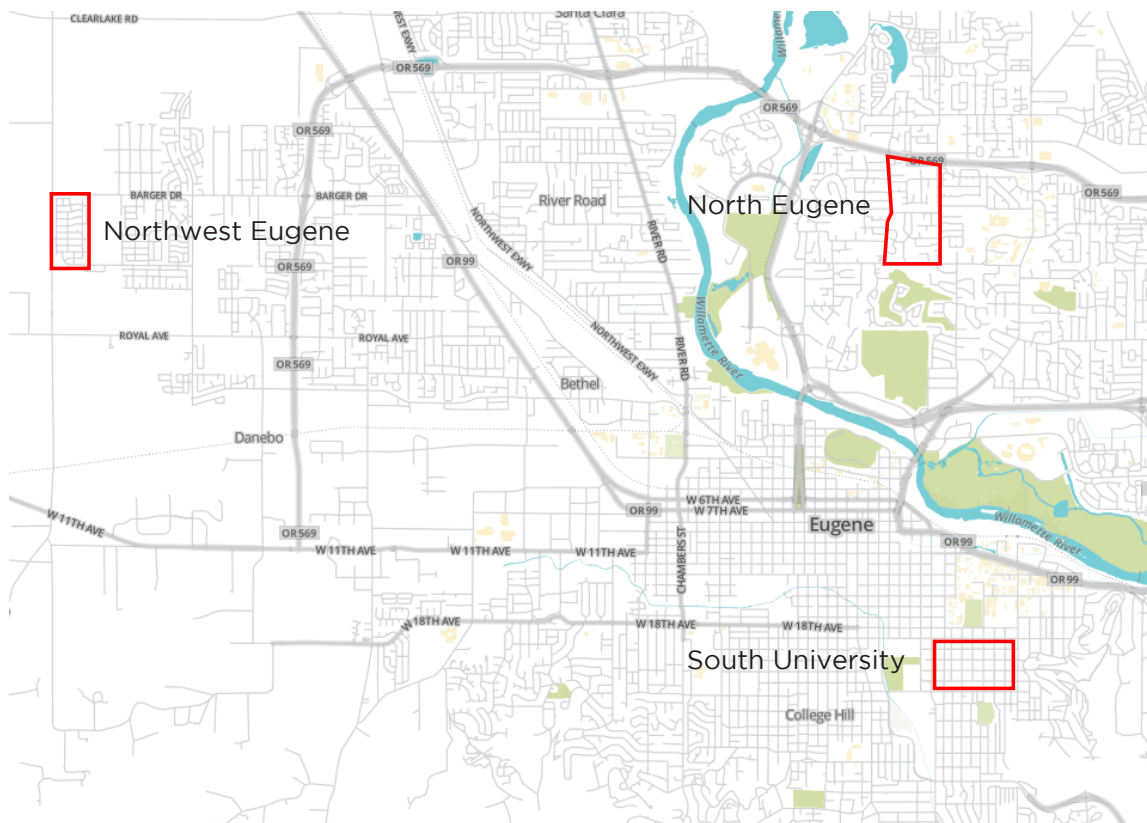


Figure 2: Map of Eugene highlighting the locations of the three studied neighborhoods.

THREE NEIGHBORHOODS

Neighborhoods across the United States, particularly those lined with detached homes, typically consist of many common elements. These elements include front yards, garages, trees, sidewalks, and the streets that tie everything together. Our cultural attitudes toward each of these elements shift throughout time, though our views on the role of residential streets remain largely unquestioned. This report analyzes the demand for parking in these neighborhoods relative to the supply of on-street parking through the lens of three neighborhoods from different decades. By analyzing the parking characteristics of these three neighborhoods (see Figure 2), this research will show how neighborhood parking design improvements can be made in almost any neighborhood in the United States.

Figure 3: View of a typical street in the South University neighborhood.



SOUTH UNIVERSITY NEIGHBORHOOD

South University neighborhood, as the name suggests, lies south of the University of Oregon's campus. Streets and parcels were drawn up before 1912⁵ and houses filled most lots by 1925.⁶ The neighborhood developed as cars became a common sight on the roads. For some context, South University neighborhood was designed and built at the same time period as the Ford Model T began driving down America's streets.⁷ The designers and surveyors of the neighborhood must have known that the automobile was more than a passing fad, as they laid out wide, 34-foot wide streets, with only a couple of exceptions both narrower and wider. The streets are laid out in a simple rectilinear grid that connects seamlessly with surrounding neighborhoods.

More recently, the neighborhood's proximity to campus, coupled with its wide streets, attracted students, faculty, and staff looking for a parking space near the university. Neighbors complained to the city about the lack of available on-street parking spaces and of drivers cruising to find a space. In 2012, the city created a permit parking zone in the area that emptied the neighborhood of most non-resident parking.



Figure 4: View of a typical street in the North Eugene neighborhood.

NORTH EUGENE NEIGHBORHOOD

In the post-war era, cars cemented their place in American society and neighborhood and street design went even farther to accommodate them. The change manifests itself in this neighborhood, built in the 1970s and located 2.3 miles north of downtown Eugene.⁸ This neighborhood's streets are typically either 28 feet or 36 feet wide, similar to that of South University neighborhood. Unlike South University neighborhood, the streets often do not include sidewalks and are not arranged in a strict grid that connects with other neighborhoods. Instead, streets bend and weave, occasionally ending in cul-de-sacs. Two streets continue through in an east-west direction, and no streets do so going north to south.

Builders placed the homes of this neighborhood farther back on the lot than the builders of South University neighborhood. Homes are much more likely to feature two-car garages, wide and long driveways, and much more space between homes. Overall, the North Eugene neighborhood prioritizes cars over pedestrians and walking can feel inconvenient at best and scary at worst.

Figure 5: View of a typical street in the Northwest Eugene neighborhood.



NORTHWEST EUGENE NEIGHBORHOOD

Real estate developers designed and built Northwest Eugene neighborhood between 1999 and 2005.⁹ This neighborhood represents more contemporary views on the role of the automobile on housing. In 1973, the Oregon legislature passed SB 100, a powerful land-use bill that required cities to create urban growth boundaries to reign in sprawl and increase density.¹⁰ Northwest Eugene neighborhood represents the goals of the legislation and is located right on the western edge of Eugene's urban growth boundary. Farms border the neighborhood immediately to the north and west. The neighborhood features smaller lots that push houses much closer together than those in North Eugene, likely a function of a developer maximizing the number of homes built inside the urban growth boundary.

The neighborhood lies six miles from downtown Eugene; a commute between the two takes 20-25 minutes by car. Despite the increase in residential density, no businesses exist within walking distance and residents rely on their cars. Three car driveways and two car garages are the norm. Eugene's street design guidelines, last updated at the same time as this neighborhood was built, recommend 21 to 27 foot curb-to-curb measurements for residential streets.¹¹ Northwest Eugene followed this guidance and streets range from 19 to 28 feet, though most measure 25 feet wide. As a result, residents typically use only one side of the street for parking. This condition, coupled with few on-street spaces due to small lots and large driveway aprons, means Northwest Eugene neighborhood provides residents with the fewest number of on-street spaces per block, on average.

RESIDENTIAL PARKING STUDY

Together, these three neighborhoods represent many of the street conditions found in residential neighborhoods across the United States. Therefore, a study of parking supply and parking use can offer insights into the design of residential streets across the country. The methods described below are simple, but require some explanation where researcher judgment was needed.

Each of the neighborhoods were chosen for the reasons described above, but also because:

- They consisted of 45-50 blocks each, where a block is defined as a street between two other streets. Think “walk three blocks west” instead of blocks as groups of parcels surrounded by streets. Forty-five to fifty blocks was chosen because it defines a large enough area to make broad conclusions about a neighborhood.
- All, or nearly all blocks are designated R-1 zoning: low density single-family housing. Any blocks with properties not designated R-1 (schools, parks, apartment buildings) were omitted for this study.

Once the neighborhoods and their corresponding blocks were identified, the blocks were surveyed. For each block, several data points were collected. They include:

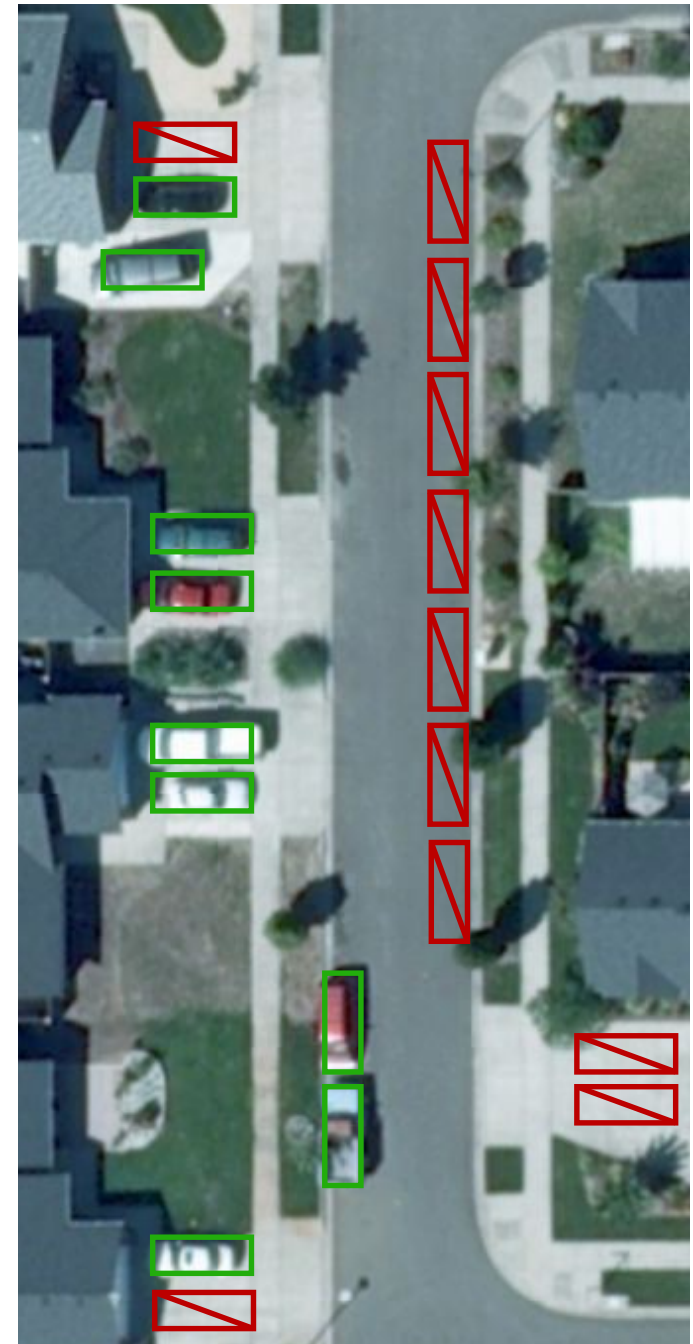
1. The name of the street and block number (e.g. 800 block of University Ave.)
2. The total number of on-street parking spaces
3. The total number of parking lanes in driveways or alleys
4. The number of vehicles parked in on-street parking spaces
5. The number of vehicles parked in driveways or alleys
6. Any parking restrictions

Parking availability and use were surveyed visually by walking down each street and recording data onto an iPad spreadsheet. Surveys were conducted between 5pm and 7pm on weeknights on weeks without any major holidays or other potentially disruptive events. This time period was chosen because many people return home from work at those times and park their car in front of their homes. The constraints of daylight prevented later surveying. Only visible vehicles were counted; garages were not counted.

Residential streets present a challenge when calculating the number of parking spaces on a block. In commercial areas, painted lines fix parking spaces into place, making them easy to count. On residential streets, no lines exist and counting available spaces becomes more difficult. For the survey, parking spaces were estimated using visual cues like the size of vehicles already parked on the street and the intuition of the researcher based on past experiences driving and looking for parking (see Figure 6 for more detail).

The lack of painted lines also made it difficult to tell if a street could accept two sides of parking or only one side of parking. In these cases, context clues like the pattern of parked cars provided the answer. In general, if a street was very narrow, the parking capacity was surveyed on only one side.

Figure 6: This diagram shows a typical block in the Northwest Eugene neighborhood. The researcher would count five driveways, 11 off-street spaces, seven off-street vehicles (in green), nine on-street spaces, and two on-street vehicles (in green). In this case, on-street parking is only possible on one side, so the parking is maximized by switching sides.



MANY SPACES, FEWER CARS

FINDINGS

The three neighborhoods were surveyed over two evenings in March of 2013 and five evenings in April of 2012. Collected data was analyzed, and the key findings are shown in Table 1 at right and summarized below:

- In total, 143 blocks; 1,019 homes with driveways; 4,356 parking spaces, and 1,189 cars were surveyed.

Differences between the neighborhoods become clear:

- South University driveways are the smallest (1.2 spaces), while Northwest driveways can accommodate 2.7 cars on average.
- North Eugene offers the most parking per house, both on-street and off-street.
- Driveway occupancy ranges from 32% in North Eugene to 63% in South University.
- On-street occupancy ranges from 6% in North Eugene to 21% in South University.

See Figures 7–9 for maps showing the high number of streets with less than 50 percent of their on-street parking spaces occupied. These streets could remove parking on one side of the street and still have enough spaces to meet the demands of the neighbors. Table 1 allows for easy comparisons between neighborhoods.

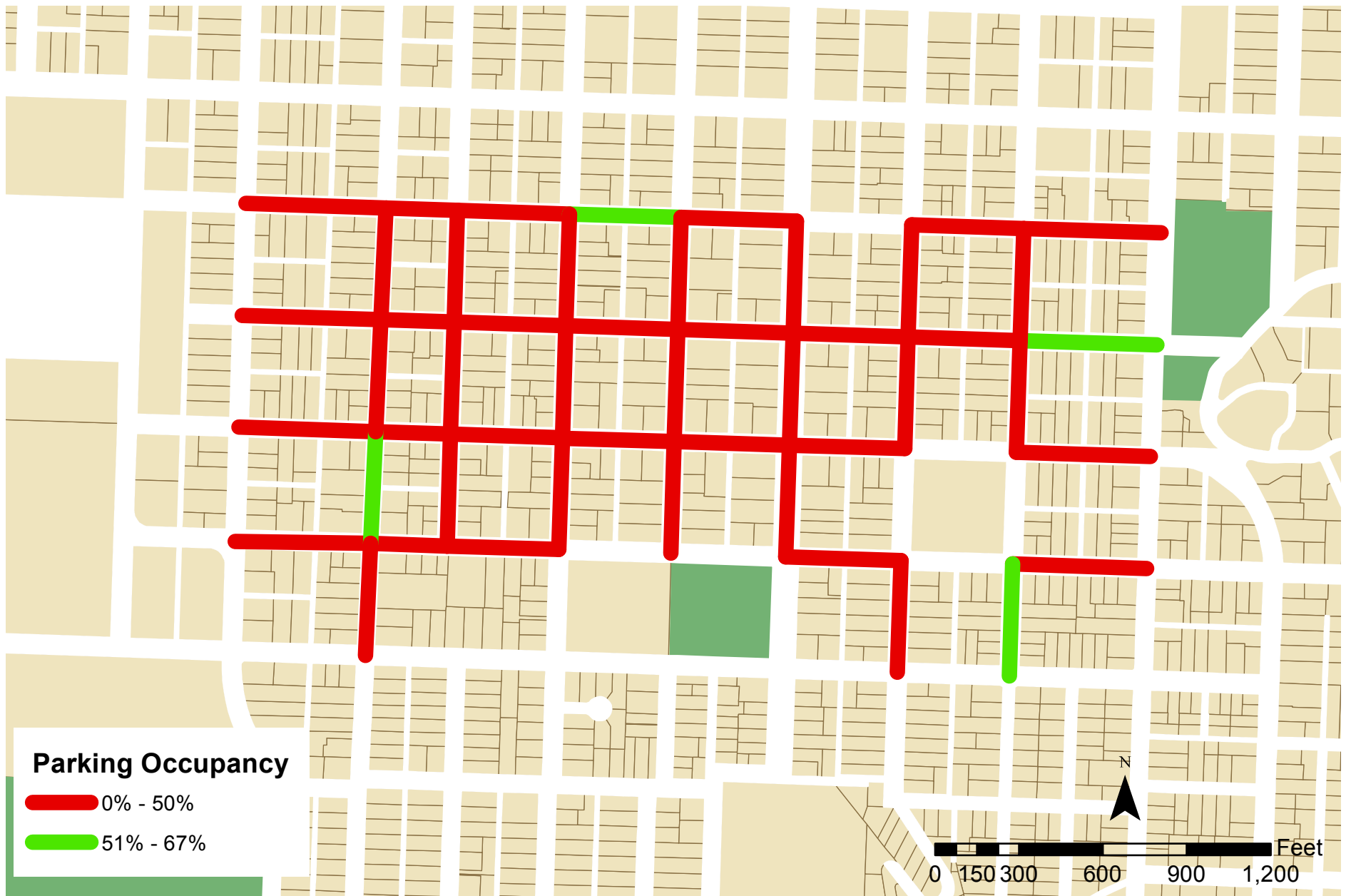


Figure 7: On-street occupancy in South University neighborhood

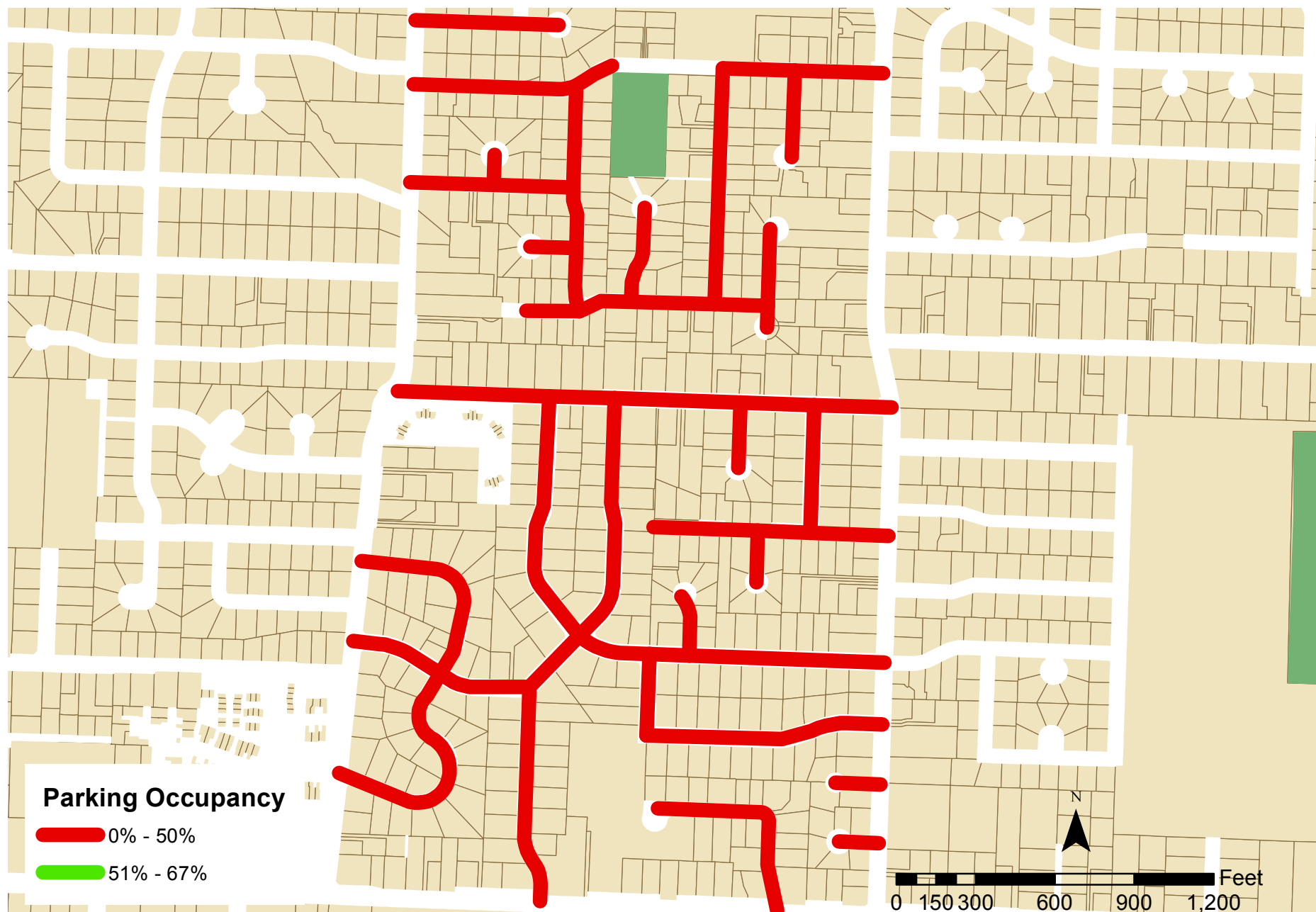


Figure 8: On-street occupancy in North Eugene neighborhood



Figure 9: On-street occupancy in Northwest Eugene neighborhood

	South University	North Eugene	Northwest Eugene
Basic Information			
Blocks surveyed:	49	46	48
Year platted/built:	1912	1960s-70s	1999
Parking restrictions:	Permit only	None	None
Distance from downtown (miles):	1.3	2.3	6.0
Average block length (ft):	405.0	425.0	366.8
Overall Capacity			
Total driveways:	298	398	323
Total driveway spaces:	361	772	887
Total on-street spaces:	965	1041	330
Total spaces:	1326	1813	1217
Spaces/driveway (avg.):	1.2	1.9	2.7
Overall Use			
Total cars parked in driveways:	226	369	286
Total cars parked on street:	204	66	38
Total cars:	430	435	324
Total driveway vacancy:	37%	52%	68%
Total street parking vacancy:	79%	94%	88%
Overall vacancy:	68%	76%	73%
Cars/driveway:	0.76	0.93	0.89

Table 1: Block survey data

**NEARLY 87 PERCENT
OF ON-STREET SPACES
WERE VACANT
ACROSS THE THREE
NEIGHBORHOODS
STUDIED.**

DISCUSSION OF FINDINGS

OFF-STREET PARKING SURPLUS

Much of the data confirms conventional wisdom around the relationship between parking and housing through time. First, the number of driveway spaces per driveway increased between South University and Northwest Eugene. Rounding, one sees about one-car-wide driveways in South University, two-car driveways in North Eugene, and three-car driveways in Northwest Eugene. In addition, typically South University homes have one-car garages, while North Eugene and Northwest Eugene homes have two-car garages. Not all this parking is necessary, however, as the total driveway occupancy number declines between South University, North Eugene, and Northwest Eugene. This indicates that while developers may market three-car driveways and garages as modern amenities, they aren't well used (See appendix A, B, C).

In the case of Northwest Eugene, less than a third of those three-car driveway spaces are used. On average, many of the neighborhood's homes could be served by one-car driveways. In Northwest Eugene, a typical home had space for at least five cars, yet only 0.12 cars were observed in Northwest Eugene driveways, on average. Even if one assumes the garage was filled with two cars, the home has two more parking spaces than necessary.

This overabundance of parking found in the data collection matches U.S. Census numbers for auto ownership. Owner-occupied households in Eugene, like most of the homes in the study area, own 1.9 cars.¹² Rounding to two cars, that would only approach the capacity of a one-car garage, one-car driveway arrangement at some South University homes. In Northwest Eugene, that leaves three empty spaces. One of the common arguments for on-street parking is so visitors can park. In North Eugene, there is ample space for visitors, except for large parties.

ON-STREET PARKING SURPLUS

The progressive increase in off-street, driveway spaces from South University to Northwest Eugene is not reflected in the trend of off-street parking (See appendix D, E, F). South University and North Eugene offer comparable amounts of parking spaces per 1000 feet (49 and 53, respectively), but Northwest Eugene only offers 19 spaces per 1000 feet. Two reasons immediately jump out as possible explanations. First, the streets of Northwest Eugene are narrower than South University's and North Eugene's, so parking

only occurs on one side of the street. Second, the wide driveway aprons take up curb space, leaving little room for parking. A more efficient driveway curb-cut layout could've accommodated more cars; often the space between driveways could accommodate 1.5 cars, but not quite two.

These two observations taken together paint a positive picture of the direction in low-density residential parking. In these three examples, built in different time periods, parking has shifted from primarily a public responsibility to primarily a private one. Caveats abound, however. Homes in South University simply were not built to park many cars, so it stands to reason that on-street parking can offer a greater capacity there. The city may not have even considered on-street parking a high priority in 1912 when the streets were platted. A North Eugene to Northwest Eugene comparison is easier to make, as both were built in the age of the automobile. Here too, caveats exist. Northwest Eugene was built long after Eugene established an urban growth boundary, a tool designed to limit sprawling suburban neighborhoods. As a result, Northwest Eugene still consists of all detached, single-family homes, but the block sizes are the smallest of the three neighborhoods and the overall design closely reflects the older, denser South University neighborhood. This densification of suburbia likely resulted due to the developers desire to get as many homes on the land as possible, knowing that there is limited availability of developable land within the urban growth boundary.

WASTED MONEY AND WASTED SPACE

The results of the parking survey show that parking supply exceeds demand. Some may say that it is better to have too much than too little, but parking is not truly free. City governments pay to construct and maintain parking. Real estate developers pay for parking in opportunity costs; land given over to parking is land they cannot sell to homebuyers. Costs are difficult to exactly measure, but by using rules of thumb and relatable data, useful and illuminating estimates can be derived.

	All parking	Unused parking
Construction	\$6.2 million	\$5.4 million
Maintenance (every 20 years)	\$1 million	\$0.9 million
Land	\$5 million	\$4.4 million
Total cost	\$12.2 million	\$10.7 million

Table 2: Costs associated with parking in the study areas

CONSTRUCTION COSTS

The low usage of on-street parking is perhaps one of the most striking findings in the parking survey results. In North Eugene, only 6% of on-street parking is used. This number represents significant waste in construction and maintenance costs for real estate developers and municipal governments. Construction costs fall to the real estate developer. Less parking means lower costs, and lower costs will help their bottom line.

Finding applicable cost estimates for new suburban streets is difficult. Each project is different and material costs and location costs can completely change the overall cost significantly. As a result, per mile estimates are rare and differ widely. An estimate from Florida's Department of Transportation (FDOT) done in 2012 places the cost per centerline mile, not including contingency, of a new two lane urban street at \$ 4,279,236.¹³ This cost includes the roadway, storm sewer system, and sidewalks. To determine the cost of additional parking, which does not affect the storm sewers or sidewalks, one can look at the cost of building a wider street. The FDOT places the cost of a four-lane roadway at \$6,040,559.¹⁴ By using the difference between these numbers, it is possible to estimate a square foot cost of just the roadway surface. By doing so, one can estimate the cost to build a standard 22 foot by 8 foot parking space is \$2668.67. In the three neighborhoods surveyed in this report, 2,336 parking spaces were counted, built at an estimated cost of just over \$6.2 million in 2013 dollars. Only 308 on-street spaces were in use (13%) during the survey, so the cost for unused spaces is \$5.4 million.

MAINTENANCE COSTS

A typical asphalt roadway on a residential street lasts between 15-20 years before resurfacing is required.¹⁵ Resurfacing occurs once patching and crack sealing fail to keep the roadway at a safe, high quality. Florida's Department of Transportation estimates the cost to mill and resurface a two lane urban street at \$425,742. Every 20 years, the city will pay \$443 per parking space for road resurfacing. That cost totals just over \$1 million, of which \$900,000 is wasted and sits empty. This analysis does not account for more routine maintenance like street sweeping and crack sealing.

LAND COSTS

Construction and maintenance costs are only one facet of the money wasted on unused

on-street parking. Land is scarce and therefore valuable, particularly in a city surrounded by an urban growth boundary. Across all three surveyed neighborhoods, 9.4 acres of public land is used for parking cars. As stated above, only 13% of that space was used, so 8.2 acres is going to waste in just those three neighborhoods. How much value is lost in converting perfectly good developable land into parking? While it is difficult to get an exact number, the existing real estate market can help provide an estimate. Vacant land is scarce within the Eugene urban growth boundary, but a vacant property exists only a few blocks from the North Eugene study area.¹⁶ The 0.11 acre property was on the market in May 2013 for \$58,000. Similar to the conditions before the study neighborhoods were built, a short road needs to be constructed before the property can be fully developed. The price of this property suggests the cost of one acre of developable residential land in Eugene is \$527,273. This means the developers of the study area passed up nearly \$5 million in land they could have sold to homebuyers to build on-street parking instead.

CITY-WIDE CONSTRUCTION AND MAINTENANCE COSTS

The City of Eugene has 341 miles of residential streets (see appendix G) and nearly 11 miles were surveyed for this report. With only 3.2% of Eugene's residential streets surveyed and a relatively small "population" of street miles, the 11 surveyed miles do not make up enough of a sample to predict total costs for the City of Eugene with high levels of confidence. That said, extrapolating costs across the entire city could still be interesting and potentially informative, even as a "ballpark" figure.

All of the on-street parking built in Eugene cost developers and the City \$194 million to construct in 2013 dollars. With 87% of that parking vacant, \$169 million of that parking is going to waste. If the City conducted resurfacing maintenance on all of those streets every 20 years, the cost for parking maintenance would be \$32.4 million. The City would save \$28.1 million every 20 years if all of the unused parking had never been built.



PART II: RETHINK STREETS

STRATEGIES FOR DESIGN AND REDESIGN

Thus far, this report showed that the supply of on-street parking in three Eugene neighborhoods far exceeds demand. This disparity leads to streets that are far too wide, and wide streets are costly to city governments and the community. What can be done to encourage the construction of narrow residential streets? What can be done to retrofit the many miles of existing local streets across the United States?

EXISTING STREETS

Unlike the blank canvas of a new subdivision, existing neighborhoods present challenges to planners, designers, and engineers with the goal of reducing street width and parking capacity. In dense, urban environments, it can make sense for a local government to narrow or reconfigure a street in the name of safety or improved access for alternative modes. These “Complete Street” redesigns can mean moving curbs or simply restriping the street to give space over to bikes or transit vehicles.

On the other end of the spectrum, improvements to urban streets can happen one parking space at a time in the form of parklets. The City of San Francisco has led the way in adding parklets, and describes them this way:

A parklet repurposes part of the street into a space for people. Parklets are intended as aesthetic enhancements to the streetscape, providing an economical solution to the need for increased public open space. They provide amenities like seating, planting, bike parking, and art. While parklets are funded and maintained by neighboring businesses, residents, and community organizations, they are publicly accessible and open to all.¹⁷

The parklet concept has not been applied to low-density residential areas yet, but the program could be adapted to work in suburban settings. Below are profiles of just three of many possible ways to retrofit residential streets. The Seattle example shows how an entire street can be rebuilt Complete Streets-style, while the Portland example takes more of a parklet approach. Finally, the last example demonstrates that the possibilities for retrofit are endless—the only limitation is what creative people can think up to replace a parking space.



Figure 10: SEA Street before and after.

SEATTLE, WASHINGTON

In cities that see significant rainfall, like those in the Pacific Northwest, officials are trying to find cost-effective and sustainable ways to deal with stormwater runoff. Much of this runoff comes from city streets, a negative externality of paving over much of the urban environment. In Seattle, Washington, city engineers are completely redesigning streets to manage nearly 100% of all stormwater to eliminate the burden rain places on expensive treatment facilities. In doing so, they also drastically reduce on-street parking and narrow the roadway.

The program began in northern Seattle, where many streets lack curb, gutter, and sidewalks common in residential areas. Instead of adding these facilities in a conventional manner, engineers completely redesigned the street and have created a template for all new streets. The first prototype was SEA Street (Street Edge Alternatives), built in 2001 (see Figure 10). The project offered these street design advantages:

- SEA Street provides 18 on-street parking spaces in an angled configuration spread throughout the street. This total is approximately half of a conventionally designed street.
- Stormwater runoff is reduced by 98% compared to nearby conventional streets.
- This approach to managing stormwater is 25% less expensive than a traditional roadside system.
- SEA Street features 11% less pervious surface than typical streets.
- The winding design of the street calms traffic and creates a welcoming shared space for pedestrians and bicyclists.
- The roadway is narrow, at 14 feet wide with 2 foot curbs on either side. The 2' flat curbs make the road wide enough for emergency vehicles but create a narrow feeling for drivers.
- Over 100 evergreen trees and 1100 shrubs add beauty to the right-of-way.¹⁸

Inspired by the success of SEA Street, Seattle officials continued the program. In a more recent project, the Broadview green grid, the streets cost \$280,000 per block, compared with costs of \$520,000 for a conventional street with traditional drainage.¹⁹

Clearly, this radical rethinking of the initial design of streets deserves serious consideration even in places without stormwater capacity issues. The lower initial cost, narrower street design, improved traffic safety, and added curb appeal are all strong selling points. If all of the streets in the study area were built to the Broadview green grid specification in the first place, real estate developers could have saved over \$18 million in infrastructure costs.

PORTLAND, OREGON

In Portland, Oregon, the city’s Bureau of Environmental Services (PBES) instituted a Green Streets program to begin to solve this problem. The program added bioswales dubbed “pocket swales” to nearly a dozen streets. Of these, three pocket swales extend into the parking space of the street and treat and slow the water before it moves into the traditional stormwater system.²⁰

The three projects were built on NE Siskiyou (2003), SE Ankeny (2004), and NE Fremont (2005), and replaced two to four parking spaces on residential streets with the bioswales. As the table above shows, the cost per displaced space varies, but the NE Fremont project included extra work that inflated the cost relative to the first two projects (see Table 3). As noted above, the cost to build a parking space on a new street is estimated at \$3,868, so these pocket swale projects are not expensive relative to the alternative traditional design technique. Of course, replacing an existing parking space with a pocket swale doubles the initial cost, but if stormwater costs are factored in then the projects save municipal governments money.

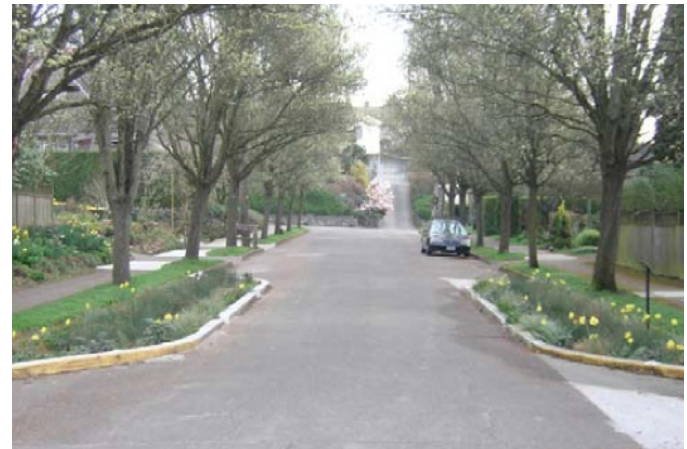


Figure 11: NE Siskiyou pocket swales.

Street	Year	Total Cost	Spaces displaced	Cost per space displaced
NE Siskiyou	2003	\$17,000	4	\$4,250
SE Ankeny	2004	\$12,000	3	\$4,000
NE Fremont	2005	\$16,400	2	\$8,200

Table 3: Cost breakdown for Portland Green Streets program projects

Portland’s Green Street pocket swales offer these advantages:

- The pocket swales can be added to both sides of the street on streets as narrow as 28 feet. Both the South University and North Eugene neighborhoods’ streets met

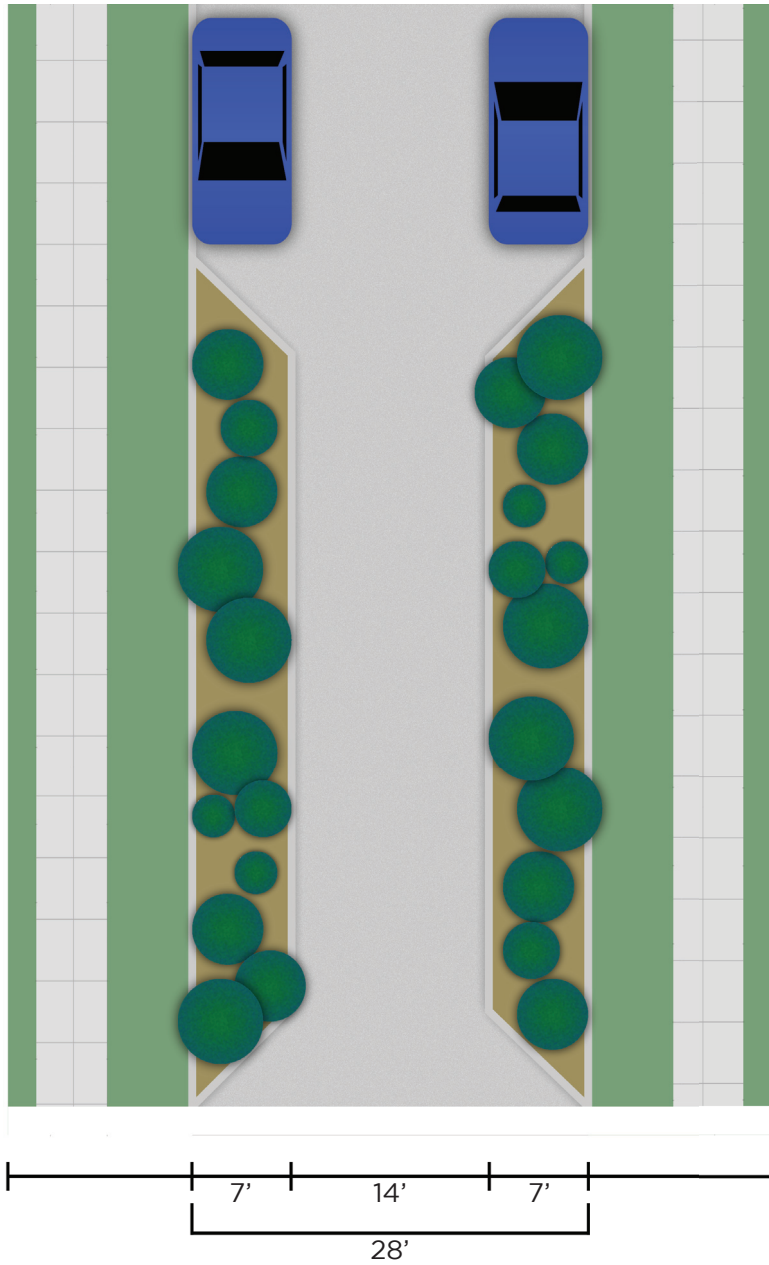


Figure 12: Portland Green Street plan diagram

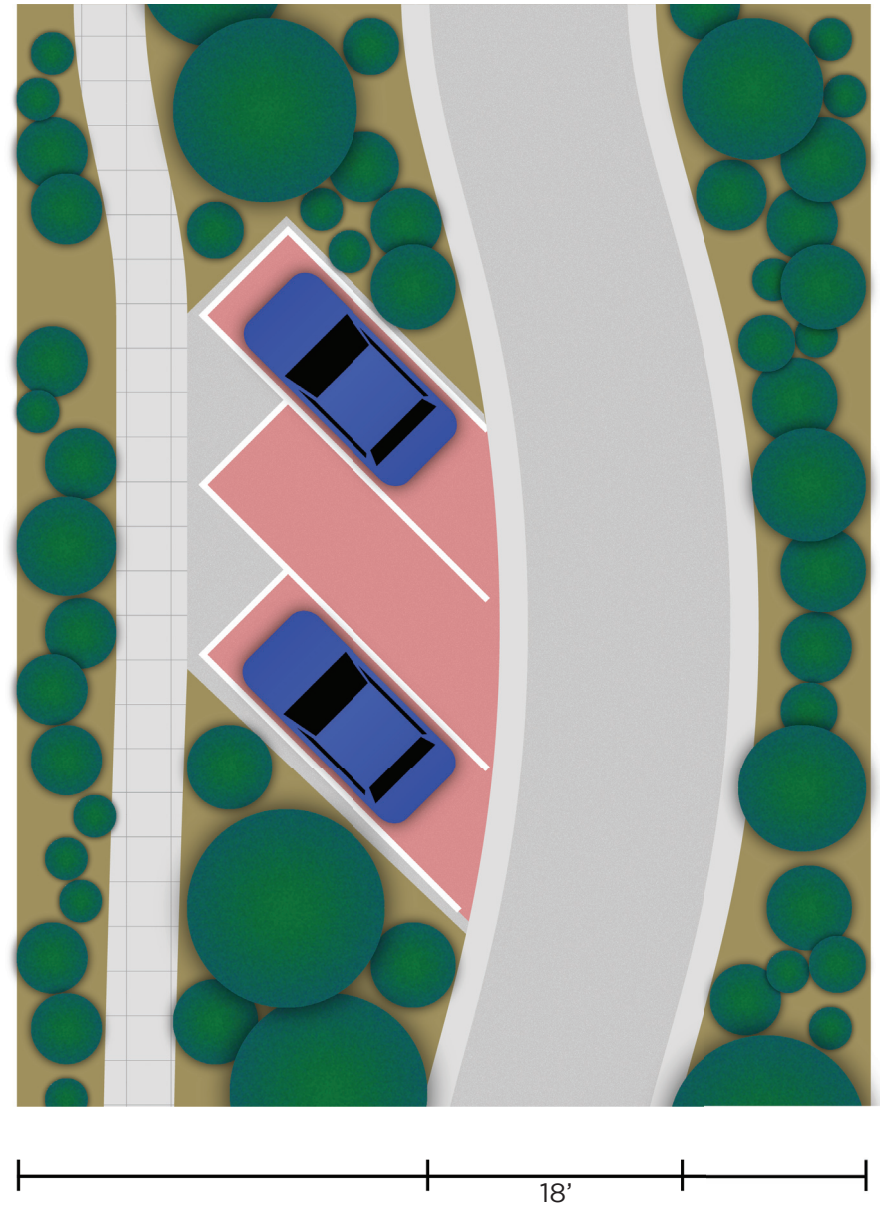


Figure 13: SEA Street plan diagram

or exceeded that width.

- Neighbors cooperated with PBES on the maintenance of the swales, reducing costs to the city.
- These projects show that replacing parking can happen without incident. Neighbors also did not mind losing 2-4 parking spaces. Residents gained an amenity in place of an unused piece of pavement.²¹
- Narrowing the roadway calms traffic.

Nearly all blocks in the three neighborhoods studied could remove four parking spaces and still meet the demands of residents (see Figures 7–9). The low cost of the projects make them an attractive retrofit for local governments looking to solve several problems associated with wide streets all at once. The fact that the projects’ primary purpose is stormwater management also opens up new funding sources. Agencies not typically associated with local streets could provide grant money, like the U.S. Environmental Protection Agency and state natural resources departments.

FARM THE PARKING

Repurposing parking for bioswales makes a lot of sense, but it’s not the only retrofit alternative. If the 8.2 acres of unused parking space in Eugene were farmed instead of left as empty asphalt, the amount of food produced would be quite large. Table 4 shows potential yields for carrots, tomatoes, and squash, three common Oregon vegetables. These numbers assume an open field with lots of sun, which may not be the case on some shady streets. Some of the efficiencies of a farm may be lost working along the side of the road. Even at half of those yields, these parking farms could provide a bountiful harvest to the adjacent homes.

Who would farm such an unorthodox field? Residents could tend to the gardens in front of their homes if they wish. The planted buffer between sidewalks and streets are already public land that residents take care of. In the Portland Green Streets program, routine maintenance is done by nearby residents. If a resident does not want to tend to a vegetable patch, the city could lease the space to a farmer. This turns a wasted resource into a small source of income for the city, all while improving the health of residents. In Portland, Oregon, a business already works in a similar manner. Farmers farm the

	Yield	Total
Carrots ²²	50,000	410,000
Tomatoes ²³	23,000- 27,000	188,600- 221,400
Squash ²⁴	15,000- 30,000	123,000- 246,000

Table 4: Yields of crops, in pounds.

yards of residents for a fee (\$1,675 in 2009) and the residents receive all of the vegetables farmed.²⁵ Instead of charging a fee, these Eugene farmers could simply pay a small land fee and keep all of the vegetables to sell.

Farming parking spaces is just one creative idea to repurpose underused public space. One can imagine a neighborhood shuffleboard court, flower garden, bike rack, bench, or storage shed for shared tools occupying an underused parking space. Each option turns a problem into a neighborhood asset and may reduce some of the negative externalities associated with wide streets.

NEW STREETS

New streets offer a huge opportunity to get residential street design right the first time without expensive and challenging retrofits. In most communities, including Eugene, planning and engineering divisions jointly develop street design and public improvements standards to create a framework for new streets.²⁶ These standards need to be met, or variances applied for and approved, before real estate developers can build their streets. Therefore, these standards are the best tool for influencing the design of residential streets.

The power of these design standards can already be seen in the results of this study. The City of Eugene's Design Standards and Guidelines for Eugene Streets, Sidewalks, Bikeways and Accessways was published in 1999, the same year the Northwest Eugene neighborhood began construction. The standards recommend 20-foot to 28-foot wide roadways on all but the widest right of ways, and most of the streets in Northwest Eugene are 25 feet wide, the narrowest studied in this report.²⁷

These standards are necessary because real estate developers, if given a choice, will likely build wider streets. They believe on-street parking is an amenity expected by homebuyers. Research on this topic gives weight to this line of thinking. In areas where residential parking is at a premium, residents are willing to pay exorbitant parking fees to park near their homes.²⁸ Potential homebuyers won't even consider a home if it does not have parking, either on-street or off.²⁹ People become so attached to their on-street parking spaces that they become perceived as a quasi-private space, despite the fact the roadway is entirely public.³⁰

For real estate developers, the question really boils down to: Is the risk of reducing on-

street parking worth the benefit of selling more land? Savvy developers will have no doubt calculated the costs in a manner similar to this study. In many places around the United States, developers were not willing to risk reducing on street parking. Design standards are imperative in the effort to reduce widths on new residential streets.

While the Northwest Eugene neighborhood can be used as an example of the current design standards working, the standards could be tightened further to eliminate loopholes and options for wider streets. Two examples:

- Figure 14 shows standards for local streets in Eugene, the city could simply eliminate the widest right of way option for each category. The 55-foot right of way option for local streets would be eliminated, for example, and developers could only assign 40-45 foot right of ways to local streets. This step would also eliminate parking on two sides of the street. The data in this study show that this would not result in parking inconvenience for almost any household living in the study area.
- The street design standards barely mention stormwater, but the Seattle example indicates that designing for stormwater management could result in innovative design options. Cities should consider adding a section detailing design options for streets that eliminate nearly all stormwater runoff. Further steps could be taken that require all local streets to manage all of their own runoff. The Portland example showed that it only takes two to four parking spaces worth of bioswales to manage an entire street's runoff.

OPPORTUNITIES FOR FUTURE RESEARCH

The data collection methodology faced several hurdles that limit the accuracy of the results. First, data collection occurred only once for each block surveyed, so no change through time analysis or accuracy verification could be done. With only one survey done for each block, the confidence in the results is lower. Future researchers on this topic could canvass a neighborhood at least three times to ensure that their initial counts represent

Local Street Standards

Type of Street	R.O.W. Width	Paving Width		
		No Parking	Parking One Side	Parking Two Sides
1-way Alley ©	20'	12'		
2-way Alley ©	20'	16'		
Access Lane ®	40'		21' (7/14)	
Access Lane ®	55'			28' (7/14/7)
Low-Volume Res. ®	45'	20'(10/10)		
Low-Volume Res. ®	45'		21'(7/14)	
Low-Volume Res. ®	55'			28'(7/14/7)
Med.-Volume Res. ®	50'	20'(10/10)		
Med.-Volume Res. ®	55'		27'(7/10/10)	
Med.-Volume Res. ®	60'			34'(7/10/10/7)

Figure 14: Excerpt from the City of Eugene's Design Standards and Guidelines for Eugene Streets, Sidewalks, Bikeways and Accessways

the true nature of parking behavior in the area. Canvassing later will give better results, as people are more likely to be home from work and have their cars parked. This research counted between 5pm and 7pm, but a summer count could allow for a later canvass time with the daylight necessary for accuracy. This research occurred on Tuesdays, Wednesdays, and Thursdays on weeks without holidays and when the University of Oregon was in session. Any future research should adhere to these standards to ensure representative results. A comparison study of weekend parking may yield a different parking pattern.

A survey of residents could complement the observation-based utilization assessment and shed light on household parking decision-making and behavior. Residents could offer their opinion on the amount and availability of on-street parking, the adequacy of their off-street parking, and the number of cars they own. This additional layer would bring more life to the parking survey and potentially offer more conclusive, useful results.

CONCLUSION

Streets in the United States are often taken for granted. Recently, local governments, urban designers, and traffic engineers have been rethinking busy arterial streets, but little attention is paid to the ubiquitous sleepy residential street. Without much thought for the real and societal costs, residential streets across the country have been built far wider than they need to be.

This report surveyed three neighborhoods built in different eras of automobile ownership. In each case, on-street parking supply exceeded demand by large margins. This indicates that streets can be designed with less parking in the future, and existing streets can be retrofitted with amenities like pocket swales that reduce parking capacity and mitigate other negative aspects of wide streets. Further, this report estimated the cost to real estate developers and local governments associated with overbuilding residential streets. In the study area, construction costs of building unused parking spaces totaled \$5.4 million.

In Seattle, Washington and Portland, Oregon, residential stormwater projects are breaking the mold and suggesting new ways to design and retrofit residential streets. The Seattle projects go well beyond the good intentions of street design guidelines and show that the status quo no longer meets our requirements for a successful street. Residential

streets are not solely meant to move and store vehicles, but clean stormwater, safely accommodate bicycles and pedestrians, and look beautiful. In addition, these street designs do not discount the need for occasional on-street parking for guests or additional vehicles. New residential streets can do all of this more cheaply than status quo streets both in terms of first costs and maintenance costs. We have the knowledge, ability, and examples necessary to reduce waste and take back public space from parked cars. Now is the time to upend the status quo.

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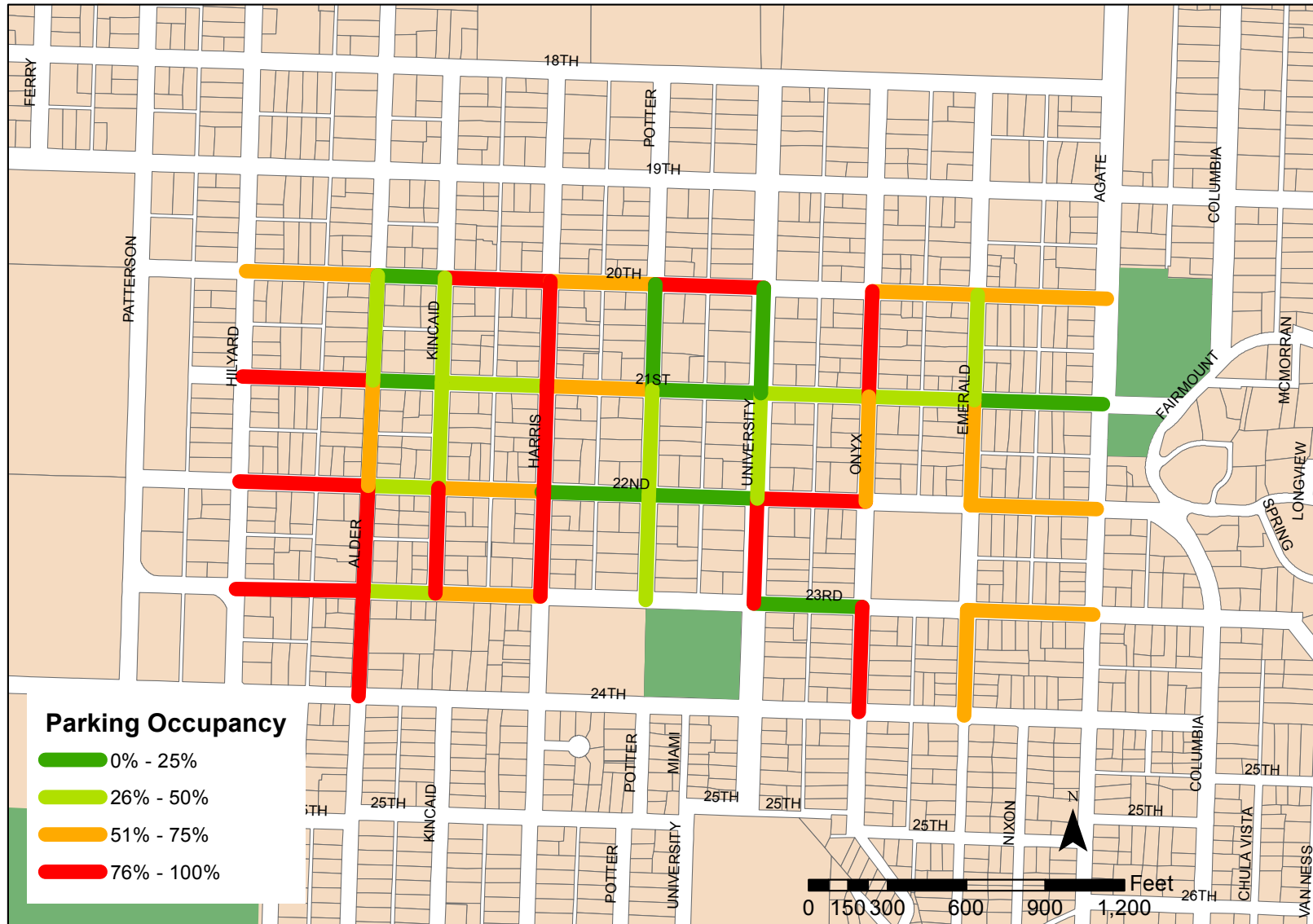
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APPENDIX A

Off-Street Parking Occupancy Rates, South University Neighborhood



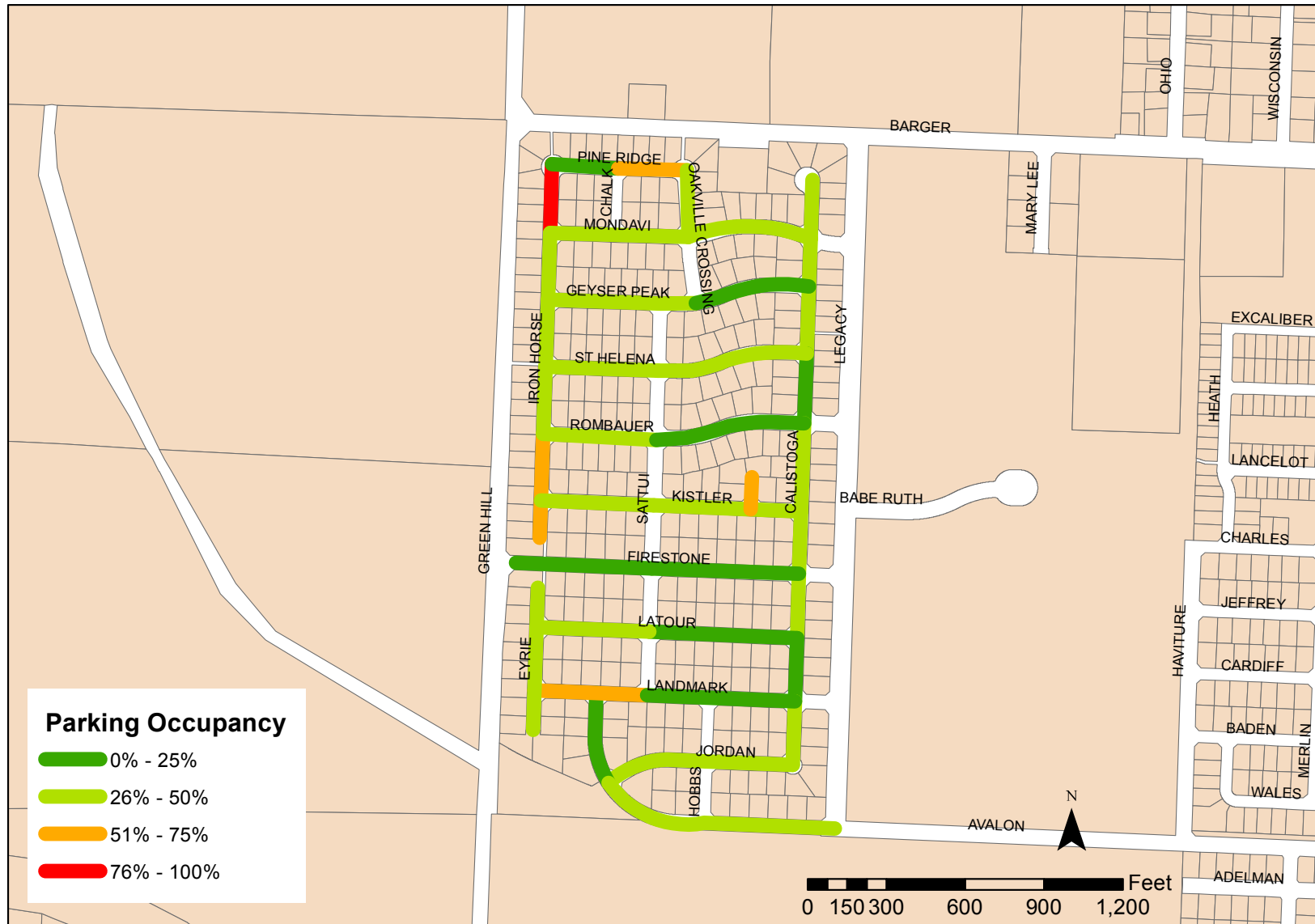
APPENDIX B

Off-Street Parking Occupancy Rates, North Eugene Neighborhood



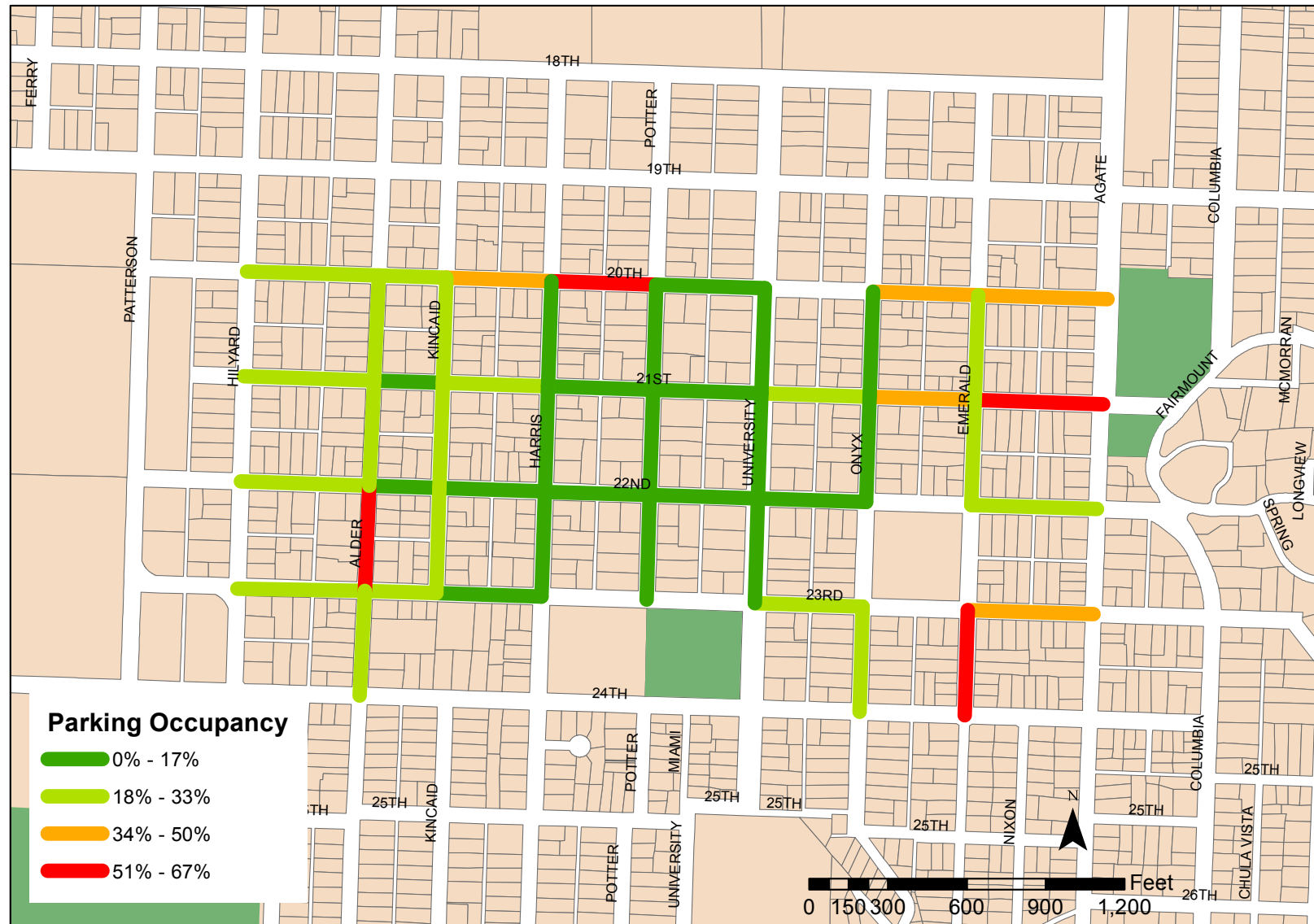
APPENDIX C

Off-Street Parking Occupancy Rates, NW Eugene Neighborhood



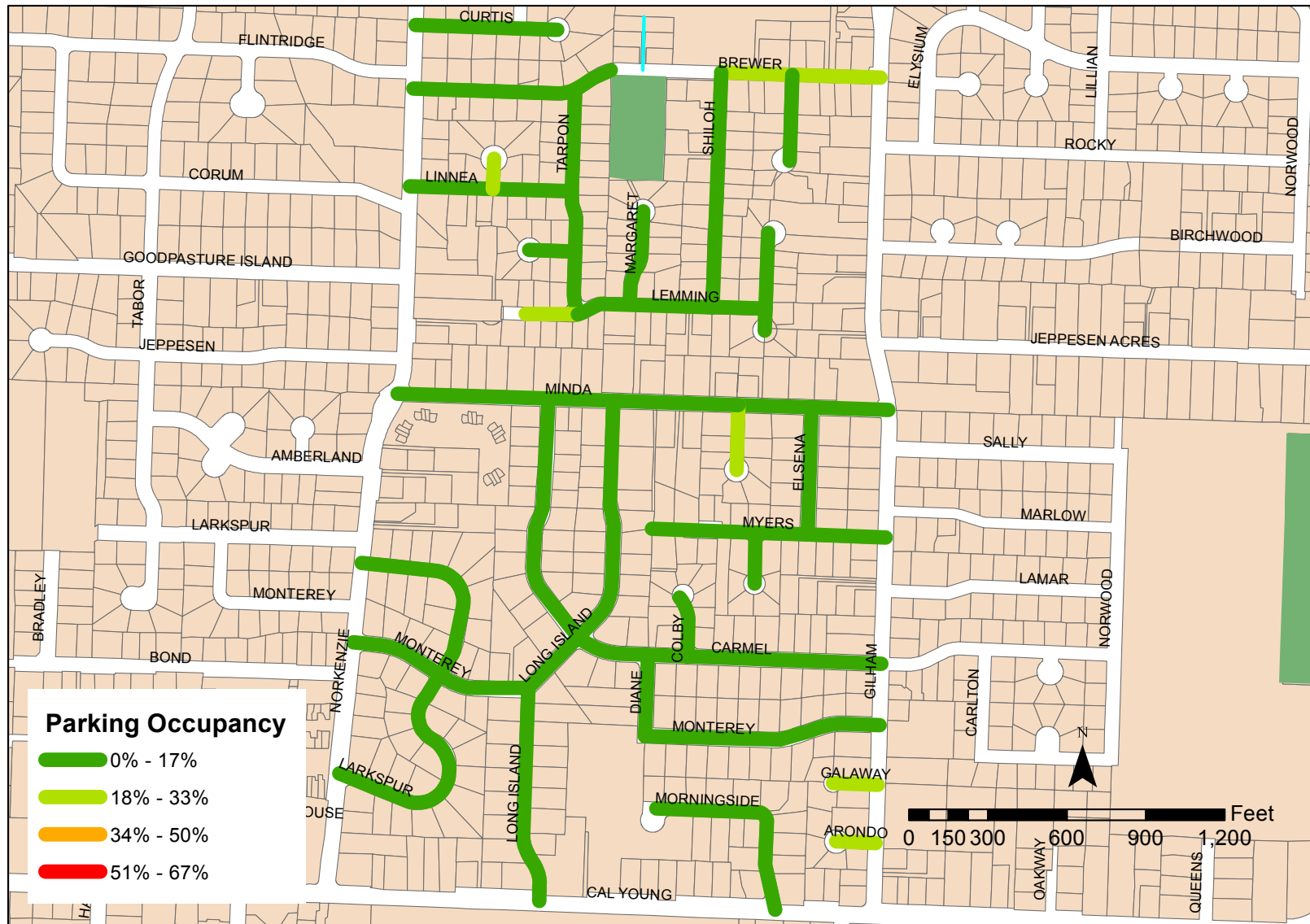
APPENDIX D

On-Street Parking Occupancy Rates, South University Neighborhood



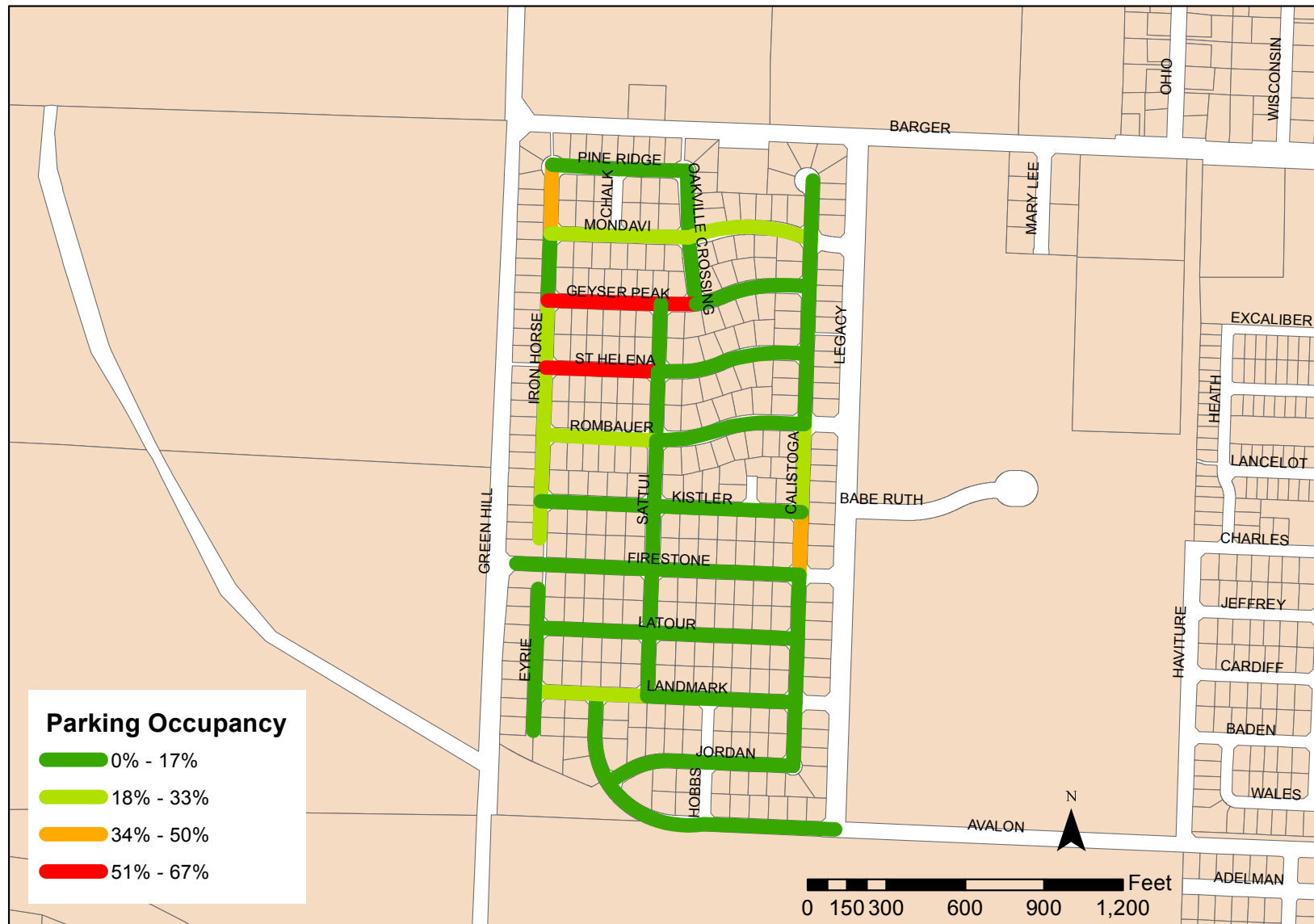
APPENDIX E

On-Street Parking Occupancy Rates, North Eugene Neighborhood



APPENDIX F

On-Street Parking Occupancy Rates, NW Eugene Neighborhood



APPENDIX G

R-1 Zones in Eugene, OR

