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Parking? Lots!

Parking Over the Minimum in City of Los Angeles

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PARKING? LOTS!

Parking Over the Minimum in the City of Los Angeles



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A comprehensive project submitted in partial satisfaction of the requirements for the degree Master of Urban and Regional Planning.

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Disclaimer

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Executive Summary

Nearly every city in the United States requires new developments to build a certain number of off-street vehicle parking spaces. Such requirements are known as “parking minimums.” Parking minimums have been criticized for requiring developers to build too much parking – they are generally set to require the maximum amount of parking that might be needed when parking is free, during periods of peak demand, in suburban, auto-oriented environments without public transit (Shoup, 2005). In any other situation, there is likely to be less demand for parking and the amount of parking built will be under-utilized. As minimums are already set too high and building parking is extremely expensive, researchers have generally presumed that developers will therefore build parking close to the parking minimums.

However, to date, few studies have explored why there might be variation in how much parking is built or why developers willingly build parking above the minimums. If cities wish to reform parking minimums, it is necessary to understand how developers make decisions about parking, what factors they consider most important, and how they use existing programs to reduce parking minimums. This study aims to address this hole in the literature by elucidating when and why developers in the City of Los Angeles build more parking than required by parking minimums.

To answer these questions, I assembled a sample of residential and mixed-use developments approved for construction in the City of Los Angeles between 2013 and 2018. I then analyzed the amount of parking built relative to the parking minimum to determine if any characteristics of each development, its neighborhood demographics, or its surrounding built form were correlated with parking above the minimum. Finally, I interviewed 11 developers and real estate professionals about how parking minimums influence new development and how developers decide how much parking to build. I found that:

- The larger reduction a development received on its parking requirements, the more it reduced its parking – but the less likely it was to take full advantage of that reduction.
- Developments were more likely to provide extra parking when located in neighborhoods where people are least likely to drive and most likely to travel by public transit or by foot.
- Market-rate developers build parking to satisfy perceived market demand as well as in response to pressure from financial investors or neighborhood opposition.
- Affordable housing developers try to minimize the amount of parking built to ensure financial efficiency and build less parking than in market-rate developers.

Specifically, within the development sample, I found that the strongest predictor of parking built was the size of the parking minimum reduction received. As developments received larger parking minimum reductions, they built less parking relative to what they would have otherwise been required to build. Developments that received no parking minimum reduction or a reduction of less than 50 percent still hewed close to their parking minimums: they built just about as much parking as they were required to build even as the amount of parking they were required to build decreased. However, developments with the largest

parking minimum reductions provided significantly more parking than required. Those developments were no longer bound by their (greatly reduced) parking minimums; instead, they frequently built extra parking. In other words, the larger reduction a development received on its parking requirements, the more it reduced its parking – but the less likely it was to take full advantage of that reduction. On average, the amount of parking appeared to be determined by the parking minimum except when the parking minimum was lowered significantly.

Per the developer interviews, market-rate developers are primarily concerned about minimizing risks when deciding how much parking to build. They (and their financial investors) believe they must provide at least some parking to ensure that residential units will be sellable or rentable, as they believe the market “demands” parking. Additionally, they fear that local communities will complain enough about parking impacts to delay or even prevent the construction of a development – developers will supply more parking to assuage that risk. In contrast, affordable housing developers are primarily concerned with the high costs of constructing parking and attempt to build as little as possible, though still providing some to minimize community opposition. Affordable housing developments, accordingly, provide less parking than market-rate developments, all else equal.

Finally, I found that the amount of parking built was associated with the built form of the surrounding area. The amount of parking built differed between “Old Urban” neighborhoods and other neighborhood types. “Old Urban” neighborhoods have higher densities, older housing stock, and better public transit access (Voulgaris, Taylor, Blumenberg, Brown, & Ralph, 2016). Residents of “Old Urban” neighborhoods take more trips by public transit and by foot and fewer trips by private vehicle than residents of any other neighborhood. However, developments located in “Old Urban” neighborhoods were likelier to provide more parking relative to their parking minimums than developments in other neighborhoods. Developers were more likely to build extra parking in neighborhoods where people are least likely to drive.

Developers likely make this choice because they believe they can profit more from building parking in these areas. In “Old Urban” neighborhoods, parking is a scarcer and therefore more valuable commodity. Developers are likely incentivized to build more parking in order to capitalize on its scarcity, as they can charge higher prices for providing parking. In contrast, in other areas of Los Angeles, parking is abundant, and developers receive no compensatory benefits from building extra parking.

These findings have several implications for parking policy in the City of Los Angeles. At the minimum, the City should eliminate its parking minimums. In Los Angeles, parking minimums generally act as a determining factor on the amount of parking built. Without parking minimums, developers will likely build less parking. Second, the City should require residential buildings to unbundle the cost of parking from the cost of housing. Developers build parking in response to their perception of “market demand”, but people demand high quantities of parking because parking is free. If the price of parking increases, the quantity demanded would decrease. Third, Los Angeles should institute parking maximums,

particularly in “Old Urban” neighborhoods where developers are incentivized to build more parking due to its scarcity. In these neighborhoods, developers’ incentives do not align with city priorities, and the City should use regulation to ensure these neighborhoods remain supportive of public transit. Alternatively, the City could instead require developers to pay a fee in-lieu of building parking, and City could directly manage the provision of (shared) parking itself. Finally, the City should reduce regulatory hurdles for development, to make it easier for developers to build the type of projects that the City ostensibly wants: higher density, transit-oriented developments that can help Los Angeles achieve its goals to increase housing stock and support sustainable forms of transportation.

1 Background

1.1 Defining parking minimums

Nearly every city in the United States requires new developments to build a certain number of off-street parking spaces. The amount of parking required generally varies by city and is calculated according to each building's land use and size. Requirements for residential uses are typically based on the building's total number of dwelling units as well as the number of bedrooms per dwelling unit (e.g., one space per studio apartment, two spaces per two-bedroom, etc.). For commercial and industrial uses, minimums are set by total floor area and vary by the intended purpose of the building (e.g., one space per every 500 square feet of retail floor area, one space per every 50 square feet of restaurant, etc.).

Such requirements are known as “parking minimums.” Parking minimums are justified under the rationale that new buildings will attract more vehicles to a site (Shoup, 2005). Those vehicles must be gotten off the street or else they will impede traffic circulation. Each new building must therefore supply enough parking to match the demand for parking generated by its use.

At the dawn of the automobile age, motorists parked their cars where they had formerly tethered their horses and carriages: the curb of the road (Shoup, 2005). However, as automobile ownership increased and driving became more ubiquitous, curb space was no longer sufficient to satisfy the need for automobile parking. Drivers began to clog the streets as they searched for parking or parked illegally in the roadways, which caused more traffic congestion. To combat that congestion, in the 1930s, cities across the United States began to introduce parking minimums to city zoning codes. Cities hoped that the provision of off-street parking would keep vehicles off the road, reduce illegal parking, and prevent cruising for vacant spaces (Shoup & Pickrell, 1978). In the United States, parking minimums became increasingly common in the years following World War II. A national survey found that in 1946, only 12 percent of cities surveyed had parking minimums, but by 1969, 95 percent of those surveyed had taken up minimums (Ferguson, 2004).

Cities in Los Angeles County began to adopt parking minimums in the 1930s (Chester, Fraser, Matute, Flower, & Pendyala, 2015). The City of Los Angeles introduced its first parking minimum for large residential multi-unit buildings in 1930 (Council of Infill Builders, 2017); by 1946, parking minimums covered all building types and sizes. The current city minimums for residential buildings were set in 1965 (See *Table 1*).¹ Currently, the Los Angeles Municipal Code (LAMC) provides at least 33 different parking minimums for different types of land use; additionally, some neighborhoods have specific

Table 1. Default LAMC code minimums

Residential Type	Spaces per Unit
One-Family Dwelling	2 spaces
Apartment or Two-Family Dwelling	
Units with fewer than 3 habitable rooms	1 space
Units with 3 habitable rooms	1.5 spaces
Units with more than 3 habitable rooms	2 spaces

Source: LAMC Section 12.21

plans with parking minimums that differ from the default city requirements.

Between 1950 and 2010, Los Angeles County gained about 12 million parking spaces (Chester et al., 2015). While the majority of that growth occurred in outlying areas, the highest density of parking spaces is still within the urban core. Chester et al. estimated that parking occupies about 14 percent of all incorporated land within Los Angeles County and that there are 3.3 parking spaces² available for each of the 5.6 million registered vehicles in the county.

1.2 Criticisms of parking minimums

By definition, parking minimums set a binding floor on the amount of parking that can be built. Developers cannot provide less parking without receiving some form of variance from the city – in Los Angeles, for example, that process is “lengthy, expensive, and uncertain” (Manville, Beata, & Shoup, 2013). Some researchers (e.g. Donald Shoup) have long denounced parking minimums for setting the floor for parking too high. Cities rarely base their parking minimums on parking demand forecasting studies; instead, they largely copy the guidelines set out by the Institute of Transportation Engineers (ITE) (Shoup, 2003). The ITE rates are based on a limited number of observations of suburban sites with ample parking and no transit service during hours of peak parking demand. These rates therefore likely overestimate the amount of parking spaces required in any other context (i.e. an urban context, in an area with good public transit, and/or during off-peak hours).

However, most crucially, parking minimums are based on the quantity of parking demanded when parking is free (Shoup, 2005). Generally, if the price of a good is higher, then people will demand a lower quantity of that good. If parking was priced instead of provided for free, the quantity of parking demanded would be lower and developers could supply less parking.

Effectively, the minimum amount of parking required is set high enough to provide at least the maximum amount of parking that could possibly be demanded. If the amount of parking required exceeds the quantity demanded, there will be an over-supply of parking built and parking spaces will largely remain unoccupied. Indeed, one case study of office buildings in Southern California found that peak parking utilization was far below parking supply – the average peak utilization rate was just 56 percent of capacity (Willson, 1995). Another case study in Seattle found that the residential parking requirements in suburban Seattle were 0.4 spaces per dwelling unit greater than the observed parking occupancy (Shoup, 2014).

Building an abundance of parking has an abundance of negative externalities. First, requiring

¹ There have been some modifications to those minimums in the years since, such as allowing a certain number of spaces to be “compact” (i.e. smaller) instead of “standard”. Additionally, in 1970, the LAMC was modified to clarify that kitchens counted as habitable rooms when determining parking requirements (Council of Infill Developers, 2017).

² This estimate combines on-street parking with residential and commercial off-street parking spaces.

that all buildings provide plentiful free parking distorts people's transportation choices. People do not pay for parking directly, so its cost does not deter them from driving or owning a vehicle. Instead, they drive and own cars as if parking was free (Shoup, 2005). When the cost of a good is held artificially low, people will demand more of it. Free parking is a subsidy that encourages driving – the belief that parking will be available and free at one's origin and destination makes driving a more attractive, convenient transportation option.

Indeed, multiple studies have found a connection between parking availability, vehicle ownership, and driving. Manville (2017) found that, nationally, households with bundled³ parking are 50 to 75 percent less likely to be vehicle-free than households without bundled parking and that bundled parking encourages driving among commuters with vehicles. Case studies in New Jersey and New York City have found that parking availability (either on-street or off-street) predicted whether a household owned a car better than other factors like rail access (Chatman, 2013) or demographic characteristics like income (Guo, 2013). Since 1975, the ratio of off-street residential parking spaces to automobiles in Los Angeles County has been close to 1.0 (Chester et al., 2015).

Additionally, building parking is extremely expensive – more parking built means higher construction costs. One 2012 study estimated that each aboveground parking space in Los Angeles costs about \$27,000 to build, and each underground space costs around \$35,000 (not accounting for the costs of acquiring land on which to build the parking) (Shoup, 2014). A parking structure consisting of just a single floor of parking therefore costs hundreds of thousands of dollars to build.

Developers are forced to shoulder a large upfront cost to construct parking, but they shift that cost onto whoever uses the building. Residents and customers are rarely charged directly for parking, so the cost of building parking is instead bundled into the cost of other goods (Shoup, 2005). For residential buildings, the cost of parking is bundled into the rent or sale price of each dwelling unit. For commercial buildings, the cost of parking is bundled into the price of goods or services sold at a building's businesses. One study found that nationally, garage parking increases residential rents by 17 percent (Gabbe & Pierce, 2017). A case study of San Francisco housing found that single family houses and condominiums were 10 percent more costly if they included off-street parking than if they did not (Jia & Wachs, 1999). Parking minimums increase the cost of goods like housing.

If the price of parking is bundled into goods like housing, then all people must pay for parking; however, not all people own a car or travel by car. Parking minimums therefore force individuals without cars to pay for parking that they do not use. In effect, individuals who do not drive are subsidizing the cost of parking for those who do. One study estimated that 71 percent of urban renter households without a car still lived in housing with a bundled parking space (Gabbe & Pierce, 2017). By forcing those households to pay for parking they

³ "Bundled parking" means that the cost of parking a parking space is packaged into the cost of housing; buyers or renters pay for parking as part of their purchase price or monthly rent.

did not use, the authors estimated that carless renters suffered an annual deadweight loss of \$440 million. As low-income people are far less likely to own or use a private vehicle (Blumenberg, 2017), parking minimums place a particularly inequitable burden on disadvantaged members of society.

Parking minimums limit the amount of new development that can happen in a city. First, developers are not always able to bear the high, upfront costs of building parking (Council of Infill Builders, 2017). If, for example, a developer intends to build a multi-unit apartment building, they must either construct a parking structure or acquire additional land for a surface parking lot. If the developer cannot afford those costs, then they must reduce the number of residential units they intend to build in order to reduce their parking requirement until the cost of building parking becomes feasible. A developer can only build as many dwelling units as they can afford to park.

Additionally, parking minimums place physical restrictions on the type of lots that can be developed. Smaller parcels might not be physically able to accommodate as much parking as required by the parking minimum (Landis, Hood, Li, Rogers, & Warren, 2006). Parcels less than 2,000 to 2,500 square feet typically cannot be developed – only when the lot is greater than 5,000 square feet in size do the constraints on designing marketable infill projects recede.

These factors limit the density of development as well as the total amount (Manville & Shoup, 2005). Parking must either take up land that might have otherwise been used for more development or it reduces the number of units that can be physically or financially built on a parcel of land. Regardless, parking minimums trade space for people for space for more cars. When comparing the New York and Los Angeles urbanized areas, for example, the differences in housing and population densities are closely correlated with differences in the share of housing units that include parking, and the share of housing units that include parking is correlated with parking requirements (Manville et al., 2013).

This reduction in density contributes to urban sprawl and the degradation of the urban form. Parking and driveways can come to occupy more land than the buildings they serve (Shoup, 2005). As buildings are encased by a layer of parking, the distances between them become greater – to enter any building, one must cross through its parking lot. It becomes more difficult to access destinations as a pedestrian. Destinations are farther apart, and the spaces one must walk through are oriented towards cars and hostile to people. Pedestrians walking on sidewalks might be forced to dodge a car as it enters or exits a parking lot or cross through “featureless terrains” when buildings are set back from the street (Manville & Shoup, 2005).

Overall, parking minimums and parking over-supply generate a host of negative externalities. However, most crucially, parking minimums exacerbate the very problem they aim to solve: parking shortages. Building large quantities of parking creates sprawling areas inhospitable to non-automotive forms of transportation, and free parking encourages driving. As parking remains free and cities become more auto-oriented, more people chose to drive, which

creates more demand for parking. The demand for parking rises to meet and then surpass the supply of parking, which leads cities to build more parking (and so the cycle continues).

1.3 Reforming parking minimums

While it can be difficult to study the effects of parking minimums directly,⁴ there is some evidence across cities that parking minimums do distort the amount of parking built. First, developments generally provide about as much parking as required by parking minimums. One study of residential developments in New York City found that about 77 percent of the sample built at or close to the exact number of parking spaces required by the zoning code, and only 7 percent of developments built more than 25 percent above their minimum (Been, Brazill, Madar, & McDonnell, 2012). However, researchers also found some cases in which developments provided parking when they were not required to build anything: 17 percent of developments eligible for a complete waiver of their parking minimum still provided some parking. Additionally, some areas of Manhattan are subject to parking maximums, but developers of luxury buildings frequently submit requests for variances to park above the maximum (Manville et al., 2013).

Some cities have reacted to the criticism of parking minimums by eliminating their parking minimums entirely. London, for example, replaced its parking minimums with parking maximums in 2004 (Guo & Ren, 2013). After the reform, developments built an average of 68 percent of the former parking minimum standard. However, researchers also found that developments located in areas with the highest residential densities and best transit service provided more parking than immediately adjacent areas. In London, the areas with the highest densities and best transit service are occupied by people with the highest household incomes. Guo and Ren (2013) hypothesized that developers built more parking in those areas because parking could bring a higher premium to the developer, as wealthy residents might be willing to pay a sufficiently high price for parking to justify its construction cost and opportunity cost.

In another example, between 2005 and 2014, San Francisco gradually eliminated most of its parking minimums (Chapin, 2016).⁵ The city chose to take an incremental approach so that at times parcels in the same neighborhood (or even on the same block) had drastically different parking minimums. One study of adjacent parcels subject to different minimums in central San Francisco found that new residential developments without parking minimums had less parking, greater housing density, a larger percentage of units offered at affordable rates, and lower construction costs (Chapin, 2016).

Finally, in 1999, the City of Los Angeles adopted an ordinance that freed old commercial and industrial buildings from parking minimum requirements if converted to residential use (Manville, 2013). Under the Adaptive Reuse Ordinance (ARO), these buildings were required

⁴ Most cities lack records on the amount of parking built or overall parking supply (Chester et al., 2015).

⁵ San Francisco eliminated all of its remaining parking minimums in December 2018 (Schmitt, 2018).

to maintain the existing parking supply but were not required to provide more. Manville (2013) found that a number of condominium and apartment developers provided less parking than what would have otherwise been required under the city's parking minimums. On average, developers provided 1.2 parking spaces per unit, when they likely would have been required to build 1.25 or 2 spaces per unit. Additionally, much of the parking that was provided was located off-site. However, Manville also noted that this parking minimum exemption was less important to luxury developers. Developers who used the ARO noted that high-end buyers wanted parking onsite, as did the large institutional lenders financing luxury housing.

Combined, these studies suggest that parking minimums do increase the amount of parking built. Developments generally build as much parking as required and are more likely to provide less parking when parking minimums are reduced. However, in some of the examples above, there were instances of developers providing more parking than required, particularly for high-end, luxury developments. In at least some situations, developers might react to market demands from certain types of consumers to build excess parking.

1.4 Current Study

Much of the past research has presumed that parking minimums mandate more parking than developers would otherwise choose to provide without directly investigating how developers make decisions about parking. To date, only one study has portrayed a nuanced and comprehensive picture of how developers decide how much parking to build. Chapin (2016) interviewed six developers about how parking minimum reforms affected housing development in central San Francisco. He found that the parking minimum was just one of many considerations influencing the amount of parking built: developers also considered what the San Francisco Planning Department and local neighborhood association would support, what could fit on the site without a large increase in costs, and what would attract buyers and renters to the site to avoid vacancies. However, this study was limited to the influences on development for a handful of specific buildings within a small area of San Francisco (2.6 square miles near downtown).

To date, no studies have examined why there might be variation in how much parking developers build relative to their minimums in the United States, or if there are situations in which developers willingly build more parking than required. If cities wish to reform parking minimums, it is necessary to understand how developers make decisions about parking and when and why they build parking above the minimums. Eliminating parking minimums will only have a significant effect on the amount of parking built if parking minimums are the primary determinant of the amount of parking built. If developers perceive parking to be widely used, necessary, or inherently valuable, then reducing parking minimums might not cause developers to build less parking after all.

How do developers in the City of Los Angeles decide how much parking to build? Los Angeles has long been characterized by the dominance of the automobile and car travel

(e.g. Banham, 1971). Indeed, Angelenos primarily travel by car – only 2 to 3 percent of residents of the Los Angeles region regularly use public transit and 73 to 78 percent never ride transit (Manville, Taylor, & Blumenberg, 2018). Transit use is disproportionately concentrated both demographically and geographically: transit riders in Los Angeles are more likely to be low-income, foreign born, and non-white; 60 percent of regular transit commuters live in less than 3 percent of the region’s land area. In a region where all but a small portion of the area’s most disadvantaged residents drive, developers might view building parking as a necessary component for new residential construction.

In recent years, Los Angeles has enacted a series of ordinances that provide parking minimum reductions. (See *Table 2* for a summary of those ordinances.) These ordinances automatically grant developments a *by right* reduction to their parking minimum if the development meets the appropriate qualifications. Additionally, several neighborhoods in Los Angeles have specific plans with parking minimums lower than the default city minimum. The Density Bonus and the Transit Oriented Communities Ordinances (see below) are generally not intended to reduce parking but rather to increase Los Angeles’ affordable housing stock (e.g. Galperin, 2017). A parking minimum reduction is just one of several incentives granted to qualifying developers in exchange for affordable housing units. As such, developers might claim a parking minimum reduction without intending to fully utilize it. These ordinances therefore provide the opportunity to study how much parking developers will build in response to a (potentially unwanted) reduction in their parking minimums.

Table 2. Sources of parking minimum reductions in the LAMC⁶

Year	Ordinance	LAMC	Description
2008	Density Bonus	Section 12.22-A.25	Residential developments qualify for a by-right density bonus if they set aside at least 5 percent of housing units as affordable for Very Low Income individuals or at least 10 percent for Low Income individuals, or if the development contains Senior Citizen Housing. Developments automatically receive an increase in the number of units they may construct and a decrease to their parking minimums; they may also receive one to three other concessions from zoning requirements.
2013	Bicycle Parking	Section 12.21-A	New developments are required to build bicycle parking, but they may substitute a certain percentage of vehicle parking with bicycle parking, at the rate of 1 automobile space per 4 bicycle spaces.
2018	Transit Oriented Communities (TOC)	Section 12.22-A.31	Increases the number of units that may be built and decreases parking minimum requirements for residential developments with at least 8 to 25 percent affordable housing within a half mile of a major transit stop.

⁶ See Appendix A for a more detailed explanation of the parking minimum reductions granted by each city ordinance.

Why might developers in the City of Los Angeles build more parking than required by parking minimums? Do developers vary the amount of parking built according to likely demand for parking and driving? How do existing policies to reduce parking minimums affect the amount of parking built? And what do developers consider important when deciding how much parking to build?

To answer these questions, I first assembled a sample of developments recently approved for construction in the City of Los Angeles between 2013 and 2018. As available parking minimum reductions differ for residential and commercial developments, I restricted my sample to developments with residential dwelling units (i.e. residential or mixed-use developments). I then analyzed the amount of parking built relative to the parking minimum to determine if any characteristics of the development, neighborhood demographics, or surrounding built form were correlated with over-parking. Finally, I interviewed 11 developers and real estate professionals about how parking minimums influence new development and how developers decide how much parking to build.

2 Quantifying over-parking

2.1 Methodology

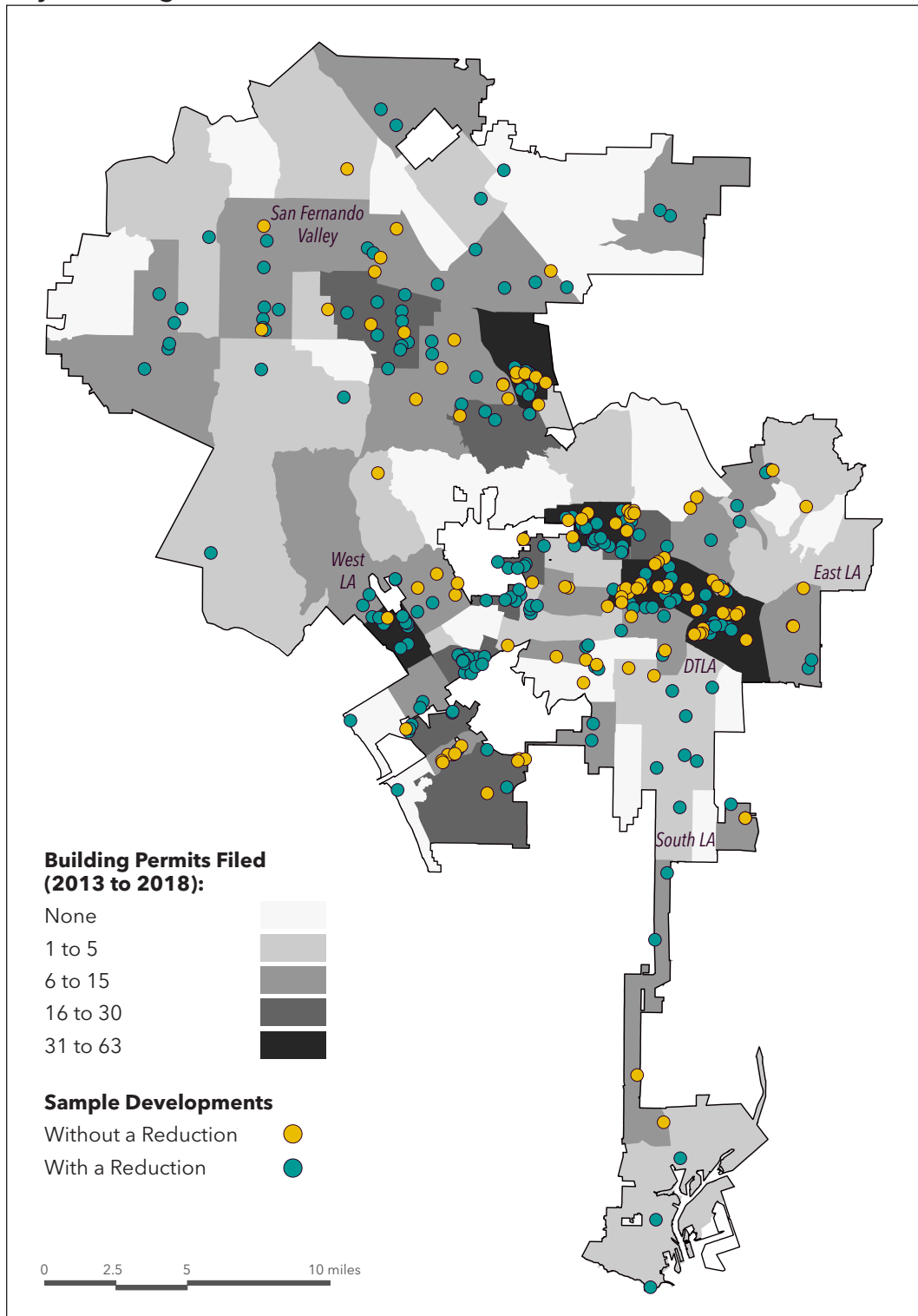
First, I assembled a sample of 300 residential and mixed-use developments located within the City of Los Angeles. Each development either received a building permit from the Los Angeles Department of Building and Safety (LADBS) or was approved by the Los Angeles Department of City Planning (DCP) after site review⁷ between 2013 and 2018.⁸ All developments contained at least ten dwelling units. To ensure that the sample was representative of Los Angeles' patterns of development, I sampled proportionally from each city neighborhood according to how many residential and mixed-use building permits for were filed in that neighborhood between 2013 and 2018. During this five-year period, 841 building permits for new construction of multi-unit residential and mixed-use developments were filed. A third of those permits were filed in just six neighborhoods: Hollywood, Downtown, North Hollywood, Koreatown, Westlake, and Sawtelle. The sample therefore draws most heavily from those neighborhoods. See *Figure 1* (right) for a comparison of the locations of developments in the sample to the number of building permits filed per neighborhood.

I used LADBS building permits and DCP case files to research the characteristics of each development, including the development's total floor area, number of residential units, and

⁷ These developments received a determination letter from DCP approving the plans for the development.

⁸ As I created this sample based on plans approved and permits issued by the City of Los Angeles, I have no record if these developments were subsequently constructed.

Figure 1. Developments sampled against neighborhood development patterns, City of Los Angeles



whether the development contained affordable housing. I also recorded the number of vehicle parking spaces built, the parking minimum, and whether each development claimed any form of parking minimum reduction.⁹ See *Table 3* for the characteristics of developments in the sample.

Table 3. Characteristics of sample developments

<i>Sample Summary</i>		<i>Median Characteristics</i>	
Sample Size	300 developments <i>Residential: 64% (191)</i> <i>Mixed-Use: 36% (109)</i>	Total Floor Area	62,210 sq. ft.
Affordable Housing	60% contained affordable housing <i>Partially Affordable:¹⁰ 43% (128)</i> <i>Fully Affordable: 17% (50)</i>	Dwelling Units	60 units
Parking Minimum Reductions	76% received a minimum reduction <i>Density Bonus: 50% (149)</i> <i>Bicycle Parking: 14% (43)¹¹</i> <i>Specific Plan: 8% (25)</i> <i>Transit Oriented Communities: 3% (10)</i>	Parking Spaces Built	84 spaces

About three quarters of developments in the sample claimed a parking minimum reduction of some form. Some sources of parking minimum reductions are only available in certain parts of the city, and the scale of reductions differ based on transit access or the amount of affordable housing provided. However, the majority of these parking minimum reductions were granted via the Density Bonus Ordinance and the Bicycle Parking Ordinance, which are available to developments in any part of Los Angeles. See *Table 4* to the right for a description of the differing situations in which each parking minimum reduction might be available (See Appendix A for more detailed descriptions of each parking minimum reduction source).

⁹ The Bicycle Parking Ordinance both requires that all developments build a certain amount of bicycle parking and grants each development an automatic parking minimum reduction in exchange for building bicycle parking. Therefore, under LAMC, all developments built after the Bicycle Parking Ordinance took effect in March 2013 should be classified as having a parking minimum reduction. However, developers and code enforcers in DCP and LADBS have interpreted the Bicycle Parking Ordinance to mean that a development would only receive a parking minimum reduction if the development built bicycle parking in excess of its requirement (David Somers, personal communication, April 3, 2019). Given the widespread confusion over how to interpret and administer the Bicycle Parking Ordinance, I chose to only classify developments as using the Bicycle Parking Ordinance as a form of parking minimum reduction if they explicitly claimed it as a reduction in their building permit or DCP case files.

¹⁰ Generally, between 5 and 15 percent of units in these developments were reserved as affordable to low-income households – i.e. the minimum amount of affordable housing required to qualify for the city Density Bonus.

¹¹ See Footnote 9 above.

Table 4. Comparison of parking minimum reductions

Reduction Source	Maximum Reduction	Median Reduction Size	Location Specific?	Share of Sample	Notes
Density Bonus	Up to 100%	24%	No	50% (149)	Developments with more affordable housing are eligible for larger reductions
Bicycle Parking	Up to 30%	10%	No	14% (43)	Reductions are 5 to 10% greater for developments near major transit stops
Specific Plan	Varies	32%	Yes	8% (25)	Central City (16), Crenshaw Corridor (2), Vermont/ Western (5), and Warner Center (2)
Transit Oriented Communities	Up to 100%	66%	Yes	3% (10)	Only developments near transit stops are eligible; reductions are greater near higher quality transit

For each development, I noted the “default minimum” and the “binding minimum”¹² (see *Table 5* below). The default minimum was the amount of parking the development would have been required to build *without* a parking minimum reduction. The binding minimum was the amount of parking the development was *actually required* to build, after taking into account any parking minimum reductions. A development that did not receive a parking minimum reduction would have the same default and binding minimums. I then quantified how much parking each development built relative to its binding and default minimums.

Table 5. Parking minimum terminology

Description		<i>Ex. In a 50-unit residential development with:</i>	
		No reduction	50% reduction
Default Minimum	The number of parking spaces required based on default, baseline city codes.	<i>The default minimum would be:</i>	
		100 spaces	100 spaces
Binding Minimum	The number of parking spaces required after applying any parking minimum reductions.	<i>The binding minimum would be:</i>	
		100 spaces	50 spaces

Finally, I matched each development to census-level data on characteristics related to its neighborhood demographics and built form (see *Section 2.2.2* below). I hypothesized that developers might be more likely to over-park in auto-centric areas where residents were more likely to drive. If so, any demographic or built-form characteristics correlated with driving would also predict over-parking.

¹² DCP case files and building permits reliably recorded the binding parking minimum. However, for developments with parking minimum reductions, DCP and LADBS files only sometimes included the original, default parking minimum. In those cases, I used the default city code and the characteristics of each development to calculate the default parking minimum myself.

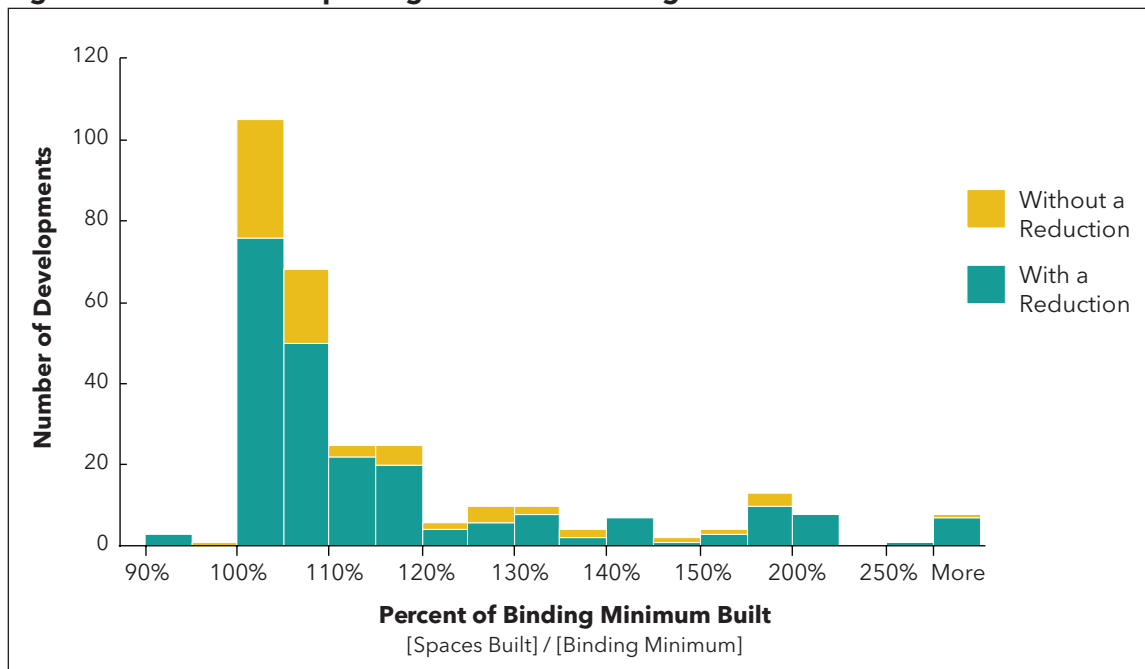
2.2 Results

2.2.1 How often do developments park over the minimum?

I began by quantifying how many developments built below, at, or above their binding and default parking minimums. To do so, I calculated what percent of the binding and default parking minimum was built for each development.¹³ A development that built 100 percent of its binding minimum would have built exactly at the minimum; a development that built 120 percent built 20 percent above the minimum; a development that built 90 percent built 10 percent below the minimum, etc.

I first graphed the distribution of parking built in relation to the binding minimum (*Figure 2* below). The majority of developments in the sample built at or just above the binding parking minimum – 58 percent of all developments built between 100 and 110 percent of their binding minimums. As developments clustered at the binding minimum, the parking minimums likely do inflate the amount of parking built by imposing an artificially high floor on the amount of parking built. However, the distribution also had a large range, as some developments built increasingly higher percentages of their binding minimums. 42 percent of the sample built more than 10 percent over their binding minimums, and about half of those developments (22 percent of the entire sample) built more than 25 percent more parking than required. Although parking minimums have a strong effect on the amount of parking built, over-parking is still a relatively frequent occurrence among new developments in Los Angeles. See *Figure 4* below for a map of sample developments classified by the amount of parking built relative to the binding minimum.

Figure 2. Distribution of parking built to the binding minimum

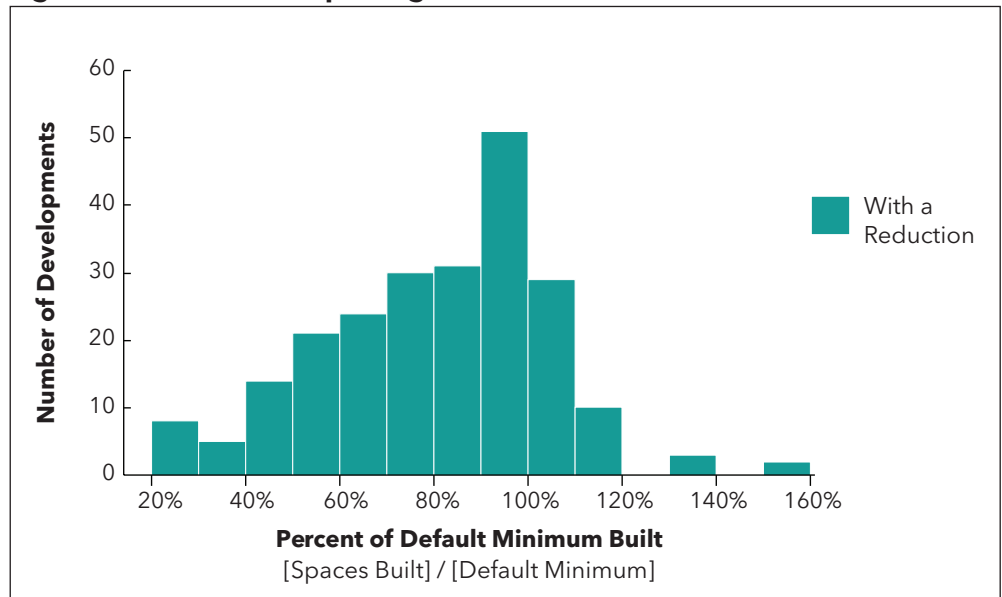


¹³ i.e., [Spaces Built]/[Binding Minimum]; [Spaces Built]/[Default Minimum]

I then graphed the distribution of parking built relative to the default parking minimum for developments that received a parking minimum reduction (See *Figure 3* below).¹⁴ Here, a development that built 100 percent of its default minimum is one that essentially ignored its reduction – such a project would have built as much parking as would have been required without its reduction. In contrast, a development that built less than 100 percent of its default minimum did utilize its reduction by building less parking than would have been required without the reduction.

The majority of developments that received parking minimum reductions did utilize them, by building less parking than they would have been required to otherwise. In total, 81 percent of the sample built less than 100 percent of their default minimum. The largest group of developments built just underneath their default minimum – 22 percent of developments built between 90 and 100 percent of their default minimum. However, 19 percent of the developments chose to not use their reduction, still building as much or more parking than they would have been required to do without the reduction. About a third of that group (7 percent of the total) built more than 10 percent above their default minimum, meaning their developers not only did not use the chance to reduce their minimum but also added more parking atop it. While the majority of developments used their parking minimum reductions to build less parking, a sizable few did not. See *Figure 5* below for a map of sample developments classified by the amount of parking built to the default minimum.

Figure 3. Distribution of parking built to the default minimum



¹⁴ Developments that did not receive a parking minimum reduction have the same binding and default minimum, so they are excluded from this graph.

Figure 4. Parking built relative to the binding minimum, by development

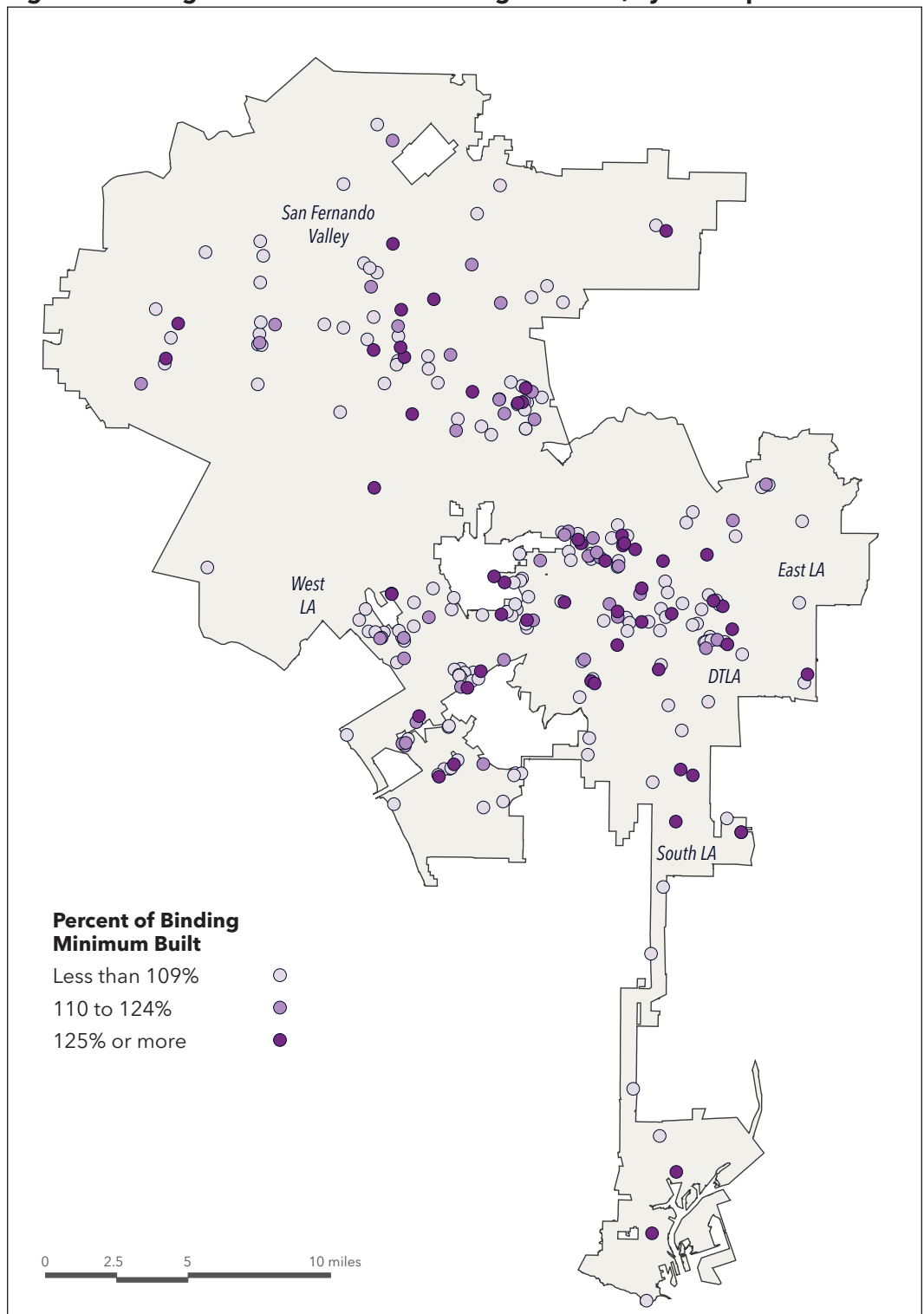
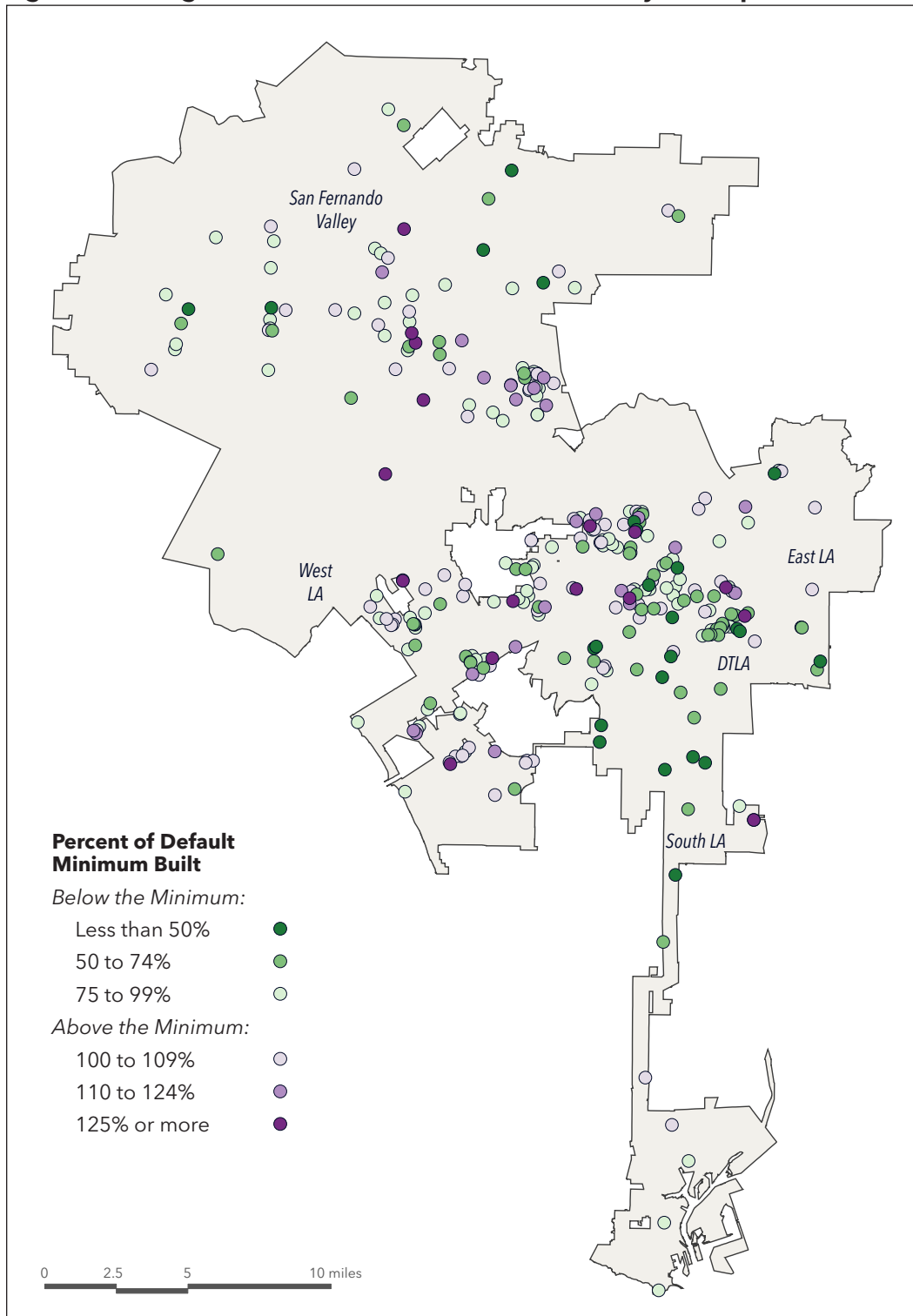


Figure 5. Parking built relative to the default minimum, by development



2.2.2 Why park above the code?

Next, I analyzed the extent to which any characteristics of the development or its surroundings would predict parking over the binding or the default minimum. I hypothesized that developments built in areas where people were more likely to drive would provide more parking. In Los Angeles, people who use public transit are more likely to be people of color, low income, and/or lack access to a private vehicle¹⁵ (Manville et al., 2018). Those residents may have less of a need for parking, whereas there could be more desire for parking in neighborhoods occupied by people who are white, high income, or have high rates of vehicle ownership. Developments in whiter, more affluent neighborhoods with high rates of vehicle ownership therefore might provide more parking than developments in other neighborhoods.

Additionally, studies of how the built environment influence transportation have found that variables such as density, diversity of land uses, street design and network connectivity, destination accessibility, and distance to transit influence travel behavior (Ewing & Cervero, 2010). In general, people have lower vehicle miles traveled (VMT) in more compact areas. To study the effect of the built environment on the amount of parking built, I used a single holistic metric¹⁶ created by Voulgaris, Taylor, Blumenberg, Brown, and Ralph (2016): whether each census tract fell within an “Old Urban” neighborhood. This metric combines 20 different measures of the built environment and land use to create a single land use typology. Voulgaris et al. found that residents of “Old Urban” neighborhoods are more likely to use public transit or walk and less likely to drive than residents of other neighborhoods (see below for a more detailed explanation of the typology). I predicted that developments located in more auto-centric built environments (i.e. not “Old Urban” neighborhoods) would build more parking relative to their parking minimums.

To test for the effects of these variables, I created two regression models in which I analyzed the extent to which these factors predicted the amount of parking built relative to the binding and default parking minimums. In the first model, the dependent variable was the percent of the binding minimum built; in the second, it was the percent of the default minimum built.¹⁷ I also included variables for the development’s total floor area, parking minimum reduction size, and the presence of affordable housing. I predicted that the size of the parking minimum reduction and inclusion of affordable housing would affect the amount of parking built. I included total floor area as a rough control for how the development’s overall size could influence parking decisions. See *Table 6* to the right for a description of all variables included in the regression models.

¹⁵ However, most people within these demographic groups still do not use public transit, i.e. a majority of public transit riders might be low income, but the majority of low-income people do not use public transit.

¹⁶ See Appendix B for an analysis of the effects of disaggregated metrics of the built environment on the amount of parking built.

¹⁷ i.e. [Spaces Built]/[Binding Minimum]; [Spaces Built]/[Default Minimum]

Table 6. Predictor variables in the regression models

Category	Variable	Notes	Source
Development Characteristics	Total Floor Area		LADBS or DCP
	Minimum Reduction Size	Percent Reduction (0 to 100%) ¹⁸	
	Affordable Housing	1 - No Affordable Units 2 - Partially Affordable 3 - Fully Affordable	
Neighborhood Demographics (by census tract)	Median Household Income		American Community Survey 2016 (2012-2016 5-Year Estimates)
	Percent White	Share of population	
	Percent Zero-Vehicle Households	Share of households	
Built Form (by census tract)	"Old Urban" Neighborhood	0 - Other Land Use 1 - "Old Urban"	Voulgaris et al. (2016)

In both models, I found two statistically significant associations: parking minimum reduction size and whether the development was located in an "Old Urban" neighborhood. Additionally, both models had a marginally significant association between parking built and affordable housing category. See *Table 7* below for the results from each regression. For each predictor, coefficients are standardized by the variable's standard deviation from the mean.

In each model, a positive coefficient indicates that a development built a higher percent of the binding or default minimum per a one-unit change in that factor (i.e. one standard deviation from the mean for that variable). With respect to the binding minimum, developments built relatively more parking when they had a larger parking minimum reduction or were in an "Old Urban" neighborhood; they built marginally less if they contained more affordable housing. With respect to the default minimum, developments built relatively more parking when they were in an "Old Urban" neighborhood; they built less if they had a larger parking minimum reduction or contained more affordable housing. Per the size of the coefficients in each model, parking minimum reduction size had the strongest relationship with the amount of parking built, followed by whether the development was in an "Old Urban" neighborhood. See below for a discussion of each significant predictor.

¹⁸ Developments that received no parking minimum reduction were quantified as having received a 0% reduction.

Table 7. Results from ordinary-least squares regression models

Predictors	Model 1. Percent of Binding Minimum Built	Model 2. Percent of Default Minimum Built
Total Floor Area	0.02	-0.01
Parking Minimum Reduction Size	0.75 ***	-0.18 ***
Affordable Housing	-0.18 •	-0.03 •
Median Household Income	0.04	0.01
Percent White	-0.01	-0.00
Percent Zero-Vehicle Households	-0.07	-0.02
“Old Urban” Neighborhood	0.34 *	0.06 *
Observations	300	300
R ²	0.20	0.48
Adjusted R ²	0.18	0.47
F statistic	10.5*** (df = 7; 292)	38.1*** (df = 7; 292)

$p < 0.10$ •, $p < 0.05$ *, $p < 0.01$ ** , $p < 0.001$ ***

Parking minimum reduction size

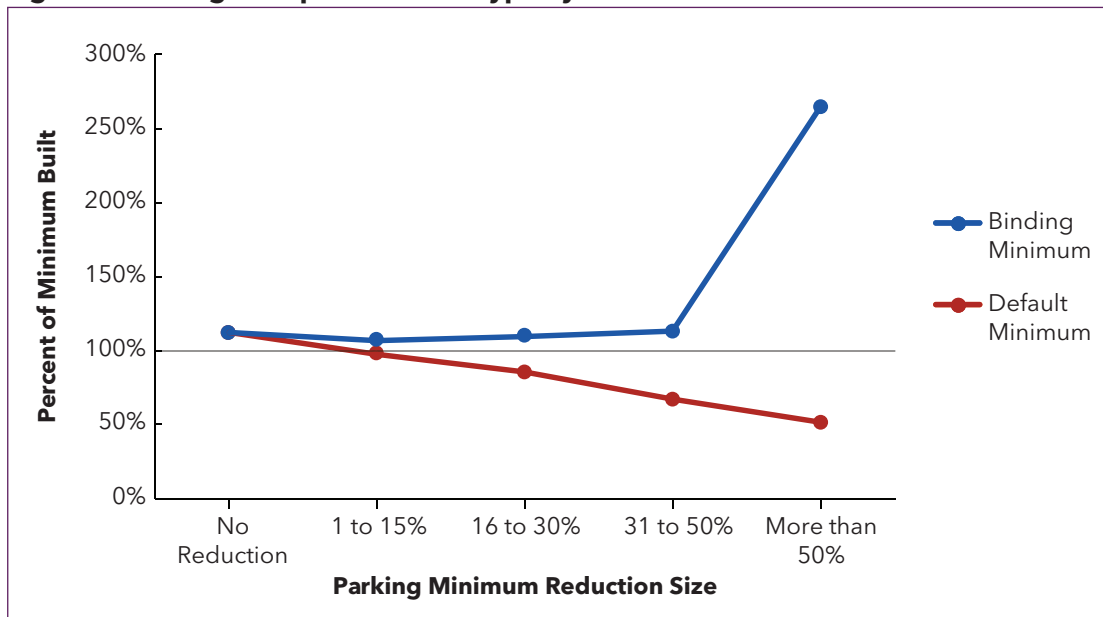
The strongest predictor of the amount of parking built relative to both the binding and default minimums was the size of the parking minimum reduction received. Developments received parking minimum reductions ranging from 0 percent (i.e., did not receive a reduction) to 100 percent (i.e., the entire default minimum was waived and no parking was required). Developments with larger parking minimum reductions were more likely to build a higher percentage of their binding minimum ($p < 0.001$) and a smaller percentage of their default minimum ($p < 0.001$). In other words, the larger reduction a development received on its parking requirements, the more it reduced its parking – but the less likely it was to take full advantage of that reduction. For each 10 percent increase in the parking minimum reduction size, the regression models predicted that a development would build 32 percent more of its binding minimum and 7.8 percent less of its default minimum, holding all else constant.

In *Figure 6* (to the right), I grouped developments from the sample into categories based on their parking minimum reduction size and then graphed the average percent of parking built per their binding and default minimums. As developments in the sample received larger and larger parking minimum reductions, they consistently built a smaller percentage of their default minimum. Developments without a parking minimum reduction built 112 percent of their minimum, whereas developments with reductions greater than 50 percent built an average of 52 percent of their default minimum. This indicates that as developers received larger parking minimum reductions, they built less parking relative to what they would have been required to do otherwise.

Table 8. Share of sample by parking minimum reduction size

Minimum Reduction Size	Share of Sample
No Reduction	28%
1 to 15%	25%
16 to 30%	16%
31 to 50%	18%
More than 50%	13%

Figure 6. Parking built per minimum type by minimum reduction size



However, developments that received larger parking minimum reductions were also more likely to build more parking relative to their binding minimum. Developments that received no parking minimum reduction or a reduction less than 50 percent all built about the same amount of parking relative to their binding minimums – an average of 10 percent above the binding minimum. This indicates that as those developments received larger parking minimum reductions (and correspondingly had smaller binding parking minimums), they still built about as much parking as required. In contrast, only the developments that received the largest parking minimum reductions (i.e. greater than 50 percent) built a much higher percentage of their binding minimum – an average of 265 percent of the binding minimum.

As developments received larger parking minimum reductions, they built less parking compared to their default minimum, indicating that developers did utilize parking minimum reductions to build less parking. Developments that received no parking minimum reduction or a reduction less than 50 percent hewed close to their parking minimum: they built just about as much parking as they were required to build, even as the amount of parking they were required to build decreased. Only developments with the largest parking minimum reductions provided significantly more parking than required. Those developments no longer took full advantage of their (greatly reduced) parking minimums. Therefore, the amount of parking built was bound by the parking minimum except when the parking minimum was the smallest.

However, this finding also indicates that developers in Los Angeles might not be willing to utilize the largest parking minimum reductions. When parking minimums start to approach zero, developers still built some parking, even if the amount built was greatly reduced from what the default minimum would have required.

Affordable Housing

In both models, there was a marginal, negative association between the affordable housing category and the amount of parking built.

Developments with more affordable housing (i.e. fully affordable > partially affordable > no affordable units) built a smaller percentage of the binding minimum ($p = 0.06$) and default minimum ($p = 0.06$). Holding all else constant, the regression models predicted that a partially affordable development would build 25 percent less of its binding

minimum and 5 percent less of its default minimum than a development with no affordable units; a fully affordable development would build 50 percent less of its binding minimum and 10 percent less of its default minimum than a development with no affordable units. Developments with no affordable housing units were most likely to have built the highest percentages of both their binding and default minimum, whereas fully affordable developments were most likely to have built the least. However, parking minimum reduction size was strongly correlated with affordable housing ($r(298) = 0.42, p < 0.001$, see *Table 9* above), so these factors likely interacted with each other to determine the amount of parking built per development.

I then calculated the average number of parking spaces built per dwelling unit¹⁹ by affordable housing category and parking minimum reduction size²⁰ for all developments in the sample (see *Figure 7* to the right). As developments received larger parking minimum reductions, they built, on average, fewer parking spaces per dwelling unit. Additionally, within each category, developments with more affordable housing built fewer spaces per unit. Overall, fully affordable developments with the largest parking minimum reductions built the fewest parking spaces per unit. Developments that did not receive a parking minimum reduction built slightly more than 2.1 spaces per unit (i.e., just above the default minimum of 2 spaces per two-bedroom apartment). In contrast, partially affordable developments with a minimum reduction greater than 50 percent built about 1.0 spaces per unit, and fully affordable developments built an average of 0.7 spaces per unit.

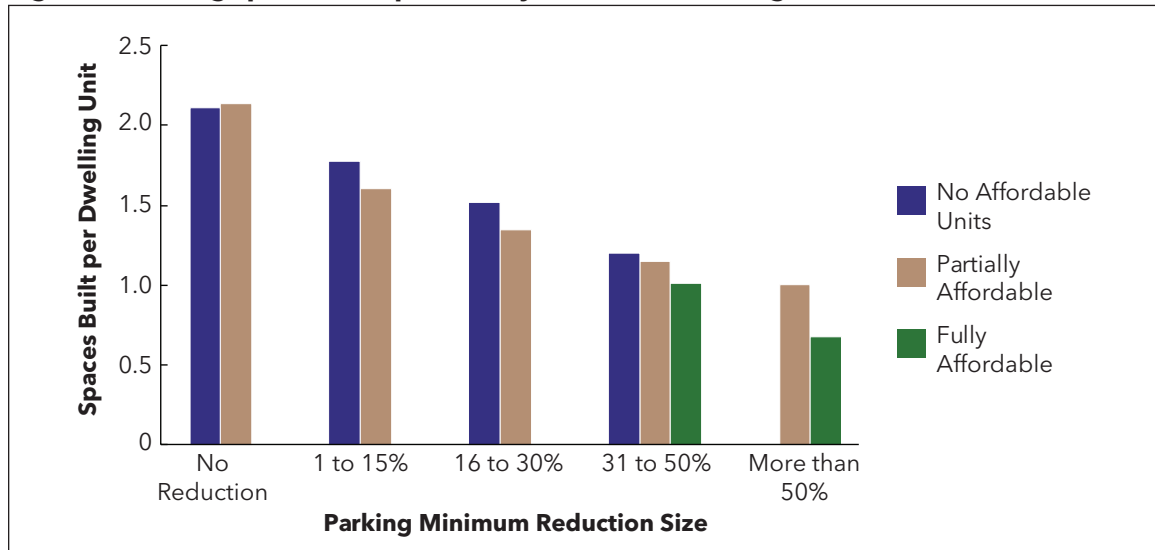
Table 9. Share of developments by affordable housing & minimum reduction size category

Minimum Reduction Size	No Affordable Units	Partially Affordable	Fully Affordable
No Reduction	23%	4%	0%
1 to 15%	9%	16%	0%
16 to 30%	3%	11%	1%
31 to 50%	5%	7%	7%
More than 50%	0%	4%	9%

¹⁹ For mixed-use buildings, DCP and LADBS records generally indicated how many parking spaces were allocated for residential use and how many for commercial use. I was able to identify the correct allocation of parking for 94 of 109 mixed-use developments. For all developments, I then divided the number of spaces allocated for residential use by the number of dwelling units. These graphs therefore do not account for the number of parking spaces built for commercial uses relative to commercial minimums in mixed-use developments.

²⁰ I excluded any categories with fewer than ten developments from the graph. This eliminated four fully affordable developments with parking minimum reductions between 16 to 30 percent, and one development with no affordable units and a parking minimum reduction greater than 50 percent.

Figure 7. Parking spaces built per unit by affordable housing & minimum reduction size



“Old Urban” neighborhoods

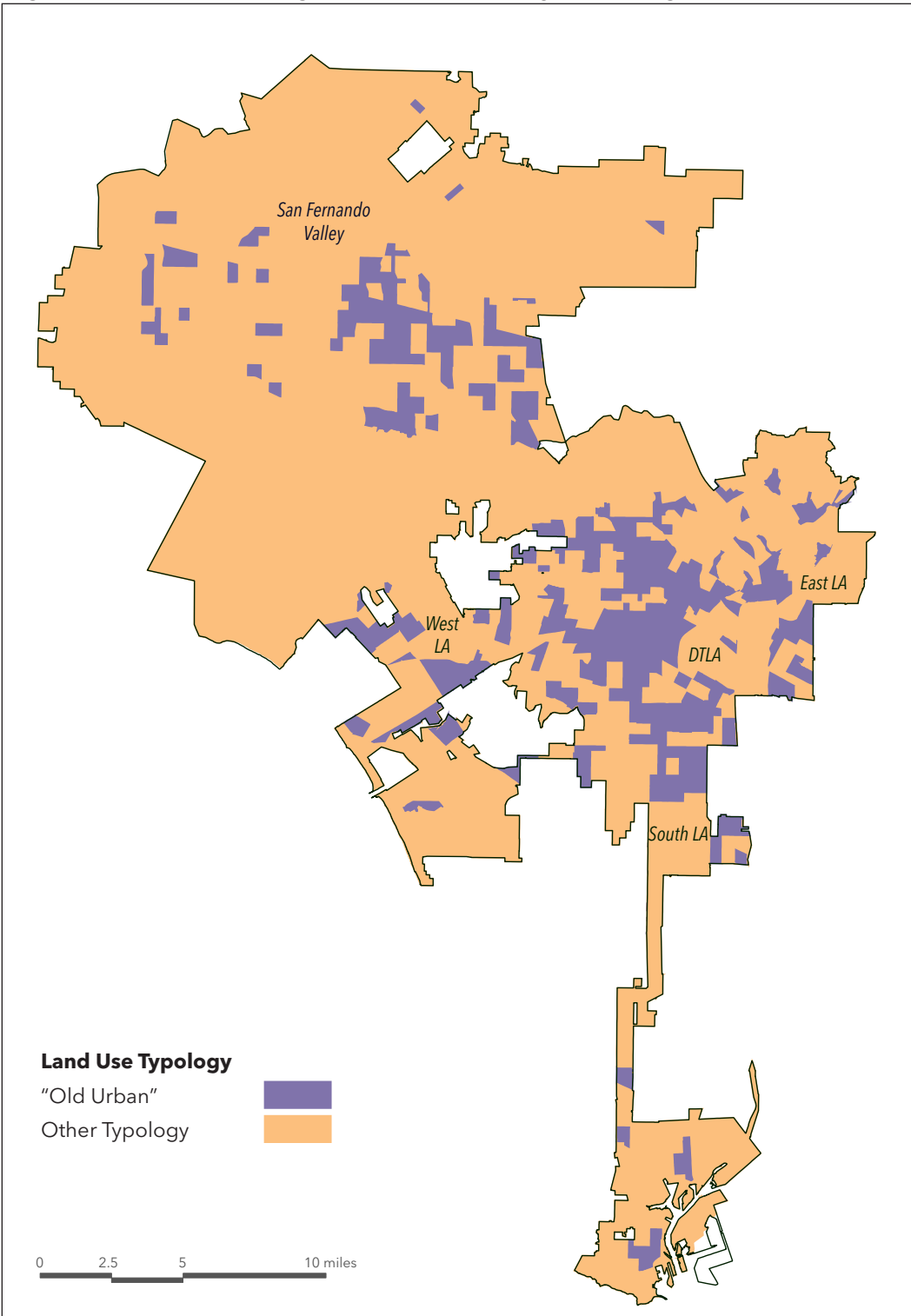
Instead of analyzing many different characteristics of land use and the built form separately, I chose to use a single, holistic measure: whether each census tract fell within the “Old Urban” typology. This typology is the product of a 2016 study from Voulgaris et al. The authors used 20 different built environment variables (see *Table 10* to the right) to categorize every census tract in the United States into seven land use typologies and then compared how travel modes used differed by typology. They found that travel patterns differed substantially in only one of the seven typologies: “Old Urban” neighborhoods. Specifically, residents of the so-called “Old Urban” neighborhoods were much less likely to take trips by private vehicle and more likely to use public transit or walk than residents of any other neighborhood type. In fact, only residents of “Old Urban” neighborhoods took less than half of their daily trips by a mode other than by single occupancy vehicle.

Figure 7. Parking spaces built per unit by affordable housing category & minimum reduction size

- | | |
|------------------------------|---|
| • Job Access | • Intersection density |
| • Job Share | • Transit supply index |
| • Percent jobs | • Percent single family homes |
| • Percent office jobs | • Percent renters |
| • Percent retail jobs | • Short-term homes |
| • Jobs-housing balance | • Long-term homes |
| • Housing density | • Percent of homes less than 10 years old |
| • Job density | • Percent of homes more than 40 years old |
| • Activity density | |
| • Total road network | |
| • Pedestrian network density | |
| • Car network density | |

“Old Urban” neighborhoods are characterized by having the highest average density of homes per acre, the largest average share of rental homes, the greatest number of jobs nearby, and the best supply of public transit. Within the United States, only 5 percent of all census tracts fall within this “Old Urban” Typology, and 80 percent of those census tracts

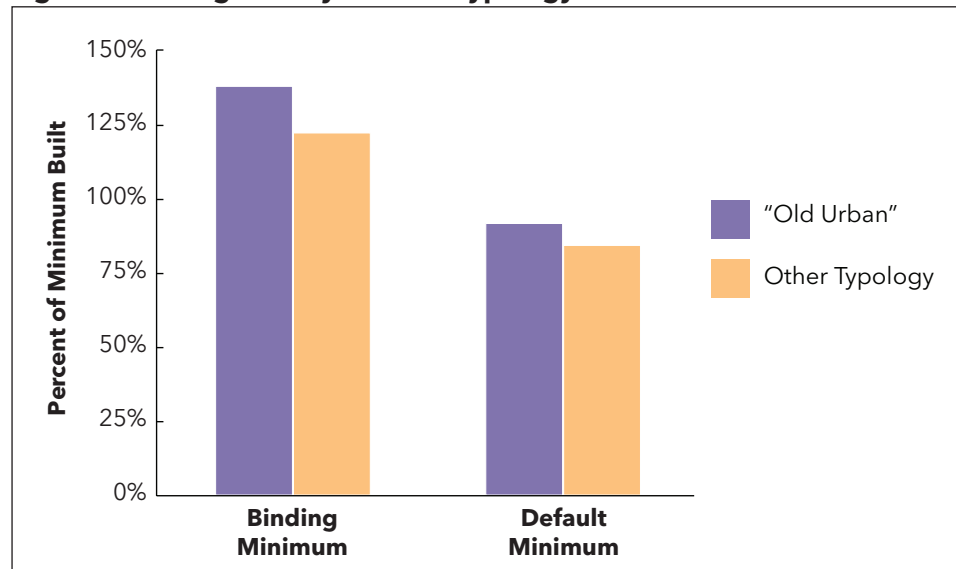
Figure 8. "Old Urban" Neighborhoods in the City of Los Angeles



are located in just three cities: New York, Chicago, and Los Angeles. While residents of “Old Urban” neighborhoods only make up 4 percent of the total population of the United States, their residents take almost a third (32 percent) of all transit trips. In Los Angeles, 17 percent of the city’s land falls within the “Old Urban” category, and those neighborhoods are concentrated in central Los Angeles, though some pop up in other regions of the city as well. See *Figure 8* to the left for a map of “Old Urban” neighborhoods in Los Angeles. Within the sample, just over half of all developments were located in “Old Urban” neighborhoods (159 in “Old Urban neighborhoods, 141 in other land use typologies).

In both regression models, I found a significant positive association between being in an “Old Urban” neighborhood and the amount of parking built. Developments located in “Old Urban” neighborhoods were more likely to build a higher percentage of both the binding minimum ($p = 0.04$) and the default minimum ($p = 0.04$). All else held constant, the regression models predicted that a development located in an “Old Urban” neighborhood would build 34 percent more of its binding minimum and 6 percent more of its default minimum than a development in another neighborhood type. Within the sample, on average, developments in “Old Urban” neighborhoods built 15 percent more of their binding minimum and 8 percent more of their default minimum than developments in other land use typologies (see *Figure 9* below). This indicates that developers were more likely to build more parking in neighborhoods where Angelenos are least likely to drive and most likely to travel by public transit or by foot.

Figure 9. Parking built by land use typology



2.3 Summary

In summary, parking minimums did have a constraining effect on the amount of parking built, although developers sometimes built more parking than required. 58 percent of developments in the sample built at or just above their binding minimum. However, this also indicates that over-parking occurred relatively frequently in Los Angeles, as 42 percent of developments built at least 10 percent above the binding minimum.

The amount of parking built was most strongly associated with the parking minimum reduction size. As developments received larger parking minimum reductions, they built a smaller amount of parking relative to their original, default parking minimum. However, on average, only developments that received the largest parking minimum reductions built significantly more parking than their binding parking minimums. While these developments provided the least amount of parking relative to their default parking minimums, they were also the only developments that were not constrained by their binding parking minimums. These developments did not fully utilize their parking minimum reductions, instead freely choosing to build above their (reduced) requirements. As parking minimums decreased to less than half of what the default minimum required, they exerted less of an influence on the amount of parking built.

Parking minimum reduction size interacted with affordable housing to determine how much parking was provided per development. Developments with more affordable housing and larger parking minimum reductions built a smaller percentage of their binding and default parking minimums and provided fewer parking spaces per dwelling unit. Overall, fully affordable developments with the largest parking minimum reductions built the fewest parking spaces per unit.

Finally, developments located in “Old Urban” neighborhoods built a higher percentage of both their default and binding minimums. “Old Urban” neighborhoods are more transit-supportive: residents of “Old Urban” neighborhoods are less likely to drive and more likely to use public transit or walk compared to residents of other neighborhoods. This means that developers were more likely to provide extra parking in neighborhoods where residents are least likely to use it.

3 The developer's perspective

3.1 Methodology

I sent email requests for interviews to a total of 17 developers and real estate professionals. Potential interviewees received a general explanation about the purpose of the study and an assurance that any insights included in the final report would be kept free of any identifying information.

In total, 11 developers and real estate professional responded to the requests. See *Table 11* for a summary of the backgrounds of individuals interviewed. I conducted semi-structured interviews with each individual over the phone. Interviews consisted of nine general questions, intended to elicit information about each individual's background, their opinions on parking minimums and parking policy, and the factors they consider when deciding about how much parking to build. Depending on how each individual responded to the initial question, I followed up with a series of probes to get specific details or clarification. See Appendix C for the complete interview instrument. Interviews were transcribed and coded for recurring themes.

Table 11. Interview subject profiles

3	Market-rate housing developers
3	Affordable housing developers
2	Luxury housing & commercial real-estate developers
2	Real estate trade association members
1	Parking consultant

3.2 Common themes

3.2.1 *The importance of parking minimums*

Parking minimums play a large role in determining both the amount of parking built and what types of developments are feasible for construction. Interviewees listed parking minimums as one of the most important components of development: as one said, parking minimums are “the dictating factor” in designing a new development.

Developers reported that parking is the first aspect of a project to be laid out on a site. Generally, the amount of parking that can fit on the site determines the type and size of development built. Per one developer: “Parking minimums filter out anything that doesn't fit the plans,” and another said, “If you can't park it, you can't build it.”

Parking minimums make smaller scale infill developments impossible. As one developer described:

"If you are going to comply with parking minimums, the only projects that work are Taco Bells, strip malls, and apartment buildings with semi-subterranean parking. These are creatures of the code that you see stamped out throughout the city."

Per one developer, the typical urban parcel in Los Angeles is 150 feet by 50 feet. It is not possible to build a subterranean parking garage on such a small lot, as there would not be sufficient space to build in ramps while allowing cars space to maneuver. On those lots, parking must be built in a surface parking lot. Unless the developer is able to assemble more land, they must choose between not developing the land or scaling down the development so that surface parking will fit on the lot – hence the prevalence of the so-called “creatures of the code.”

Some amount of parking over the code might be due to rounding up from a minimum requirement. If the parking minimum requires a developer to build a partial floor of parking, they will often instead dedicate the entire floor to parking and thereby create extra spaces. The marginal cost of dedicating a whole floor to parking instead of a partial floor can be negligible. Additionally, if part of a floor is dedicated to parking, it might not be possible to adapt any extra space on that floor to another purpose. According to one developer:

"Parking is like eggs - you can't just buy one, you have to buy a whole dozen. You can build a partial floor, but it's about as expensive as building a full floor. If you have to build one and a half floors, you'll build two floors."

However, parking minimums might not exert as strong a pressure on luxury developments. Developers of luxury housing and commercial real estate reported that they freely and frequently build more parking than what was required by parking minimums. One developer noted:

"Where the minimum was too high? I can't think of a site where that has happened for us... In the residential, you have your car when you go home. You have to have parking spaces... There are no cases where we wanted to build less [parking] and the city required us to build more."

3.2.1 *No discretionary actions*

Developers are loath undergo any discretionary processes. They viewed discretionary processes as introducing new sources of risk to a development, as there was no guarantee that the development would pass any type of discretionary review. Even for projects without any discretionary actions, interactions with city officials introduce the risk that the development might be delayed or stopped altogether. As one developer noted:

"One of the primary effects of parking requirements is to create a lot of risk during the building permitting phase. What if the Department of Building and Safety calculates your requirement different than the Planning Department or you did? That can throw your entire project into jeopardy."

While receiving variances from city regulations like parking minimums might have been beneficial for some projects, developers considered variances not worth the risk entailed. Developers were only willing to utilize parking minimum reductions that are provided by right. One developer described:

"If it's by right, there's more of a desire to reduce parking by those processes. To go through a discretionary approval to get their parking reductions introduces more uncertainty. Developers want to avoid the risk of getting their project denied."

3.2.3 *Market-rate and luxury developments*

In general, market-rate and luxury developers are averse to introducing potential sources of risk into their plans for a new development. While some might prefer to build less parking, they are most strongly concerned with ensuring the security of the financial investment in their development, particularly given the high upfront costs they must pay. Developers generally chose to build the amount of parking that will minimize risk, whether it be the risk that the development might not be approved for construction or that the completed development will not be rentable or sellable on the market. Perception of risk influences how developers react to perceived pressures from market demand, financial investors, and community opposition.

Market demand

Interviewees involved in market-rate and luxury development all noted that market demand is the most important factor when determining how much parking to build. There was a widespread perception that some level of parking is necessary to make units in a housing development rentable or sellable. If developers do not build at least at the parking minimums, they feared they would be left with an undesirable development. As one developer described:

"How can you minimize risk and maximize the certainty of your investment? Parking is one the biggest physical determinants... You can't really have a project that's feasible and not risky if you're not at least meeting the parking minimums."

One developer even suggested that marketability is more important than the parking minimums: "Regardless of the code, we also have to make sure it's going to fit the needs of our consumer – that's a huge factor."

Developers were more concerned that they would lose money by not building parking than they were about the costs of constructing parking. Developers felt that units sold without parking would be worth less money than those with parking. One described their thought process when deciding how much parking to build:

"Will I be able to lease or sell this place? People really value parking and they're not willing to pay as much for a unit that doesn't have parking... and maybe you're losing money by not building parking."

However, even if the cost of constructing parking was less than an increase in sale or rental prices, the cost of constructing parking would be justified if it eliminated the risk that units could not be sold or rented at all.

Finally, market demand might be more important for parking allocated for commercial uses. Developers perceived commercial minimums to be too low and expressed concerns about what would happen if business's customers were unable to find parking spaces at the business. As one developer described:

"Our requirements with parking are that our guests have a great experience. We wouldn't want to shortchange them. If they have a bad experience parking, they're probably never going to come back."

Some developers claimed that they use parking demand studies and market research to decide how much parking to build. They would evaluate similar developments nearby to determine how much parking other developers were providing at different price points and then attempt to provide the same amount of parking. However, other developers indicated that they make parking decisions based off their instincts and presumptions about parking demand. One developer said:

"I've done a lot of apartments. I always assume that there's going to be a certain level of parking demand, especially if you're looking at a larger family-type development."

Financial investors

Not only do developers need to satisfy their own perceptions of market demand for parking, but they must also satisfy the demands placed on them by financial investors. Many developers receive construction loans, and they must also convince those investors that the development is not a financial risk. However, market-rate developers reported that bankers have more "conservative" views on the amount of parking necessary than the views developers held themselves. According to one developer:

"They're the last people to be creative or innovative, they avoid taking a lot of risk, they're not really fans of innovations usually. They're very conservative."

However, as developers might rely on banks for financing, they must satisfy the concerns of their investors. They therefore are forced to build more parking in order to finance their developments. In general, market-rate developers held negative views of financiers. One developer emoted:

"Banks have certain expectations about how much parking to provide, [they want to] avoid risk. They're stupid."

Bankers might hold particularly conservative views about parking in Los Angeles due to stereotypical beliefs about how Angelenos travel. One interviewee noted that many lenders are located outside of California and lack personal experience with Los Angeles. Those financiers believe that Los Angeles is "a place where everyone drives", meaning it would be particularly ludicrous to fund a development in Los Angeles with little to no parking.

Community opposition & neighborhood variation

In Los Angeles, communities resistant to new development frequently resort to complaints about how a new building would negatively affect parking supply and traffic congestion. Developers generally perceived those complaints to be made in bad faith, as a pretext to stop unwanted development. However, developers were generally still willing to increase the amount of parking built if it reduced the risk that neighborhood complaints would stop or delay the construction of a development. Per one developer:

“There’s a lot of nervousness about new developments, and as a result of that people want you to make them feel better. If they’re nervous that there won’t be a lot of parking, they want you to provide a lot of parking to the point where the nervousness goes away, but it will never go away. Developers will put a little bit more parking than they think they need to satisfy nervous neighbors.”

Concerns about parking vary by neighborhood. Some developers noted that wealthier neighborhoods and neighborhoods on the West Side of Los Angeles complain the most. One interviewee thought that developers would build the least amount of parking in Downtown Los Angeles and the most on the West Side and in the San Fernando Valley. However, others noted that parking scarcity is an issue in some areas, like Downtown Los Angeles. One asked, “[In downtown], where would people park? There’s not a lot of on-street parking and the off-street is full or quite expensive.” Another noted – “people complain about street parking. There’s nowhere to overflow to.”

3.2.4 Affordable housing developments

In contrast to market-rate and luxury developers, affordable housing developers are concerned with reducing construction costs and maximizing efficiency. Satisfying market demand is less important than finding enough financing to fund a new development and building as many housing units as possible. However, like market-rate developers, affordable housing developers fear the potential consequences of community opposition to a new development.

Market demand

In general, affordable housing developers are not concerned not providing enough parking to make their units rentable. Per one developer, “We’re not worried about tenants having cars and needing to park.” In fact, affordable housing developers claimed that demand for parking was the least important consideration when they decided how much parking to build. However, they would vary the amount of parking built slightly according to who the future tenants would be. For example, developers might build less parking for a permanent supportive housing as compared to a low-income development. As one developer described:

“How much parking is appropriate for the future tenants? And who is my building serving? Vehicle ownership among formerly homeless individuals is much much lower than for low-income households. Generally speaking, vehicle ownership increases with household income. A development

with all one-bedroom units reserved for homeless households will need a lot less parking than a development with three- and four-bedroom units reserved for households earning less than 60 percent of area median income.”

Minimizing costs

Affordable housing developers are most concerned about how to maximize the number of housing units built with extremely limited funds. Developers saw parking as a trade-off with housing: the more money they spend building parking, the less money they would have to build more housing units. As one developer described:

“The less parking, the more units you can build on the site, and the more cost effective your development will be. As mission driven nonprofits, the goal of affordable housing developers is always to maximize housing production and cost efficiency to be good stewards of public money.”

The cost of constructing subterranean parking could be prohibitive. Affordable housing developers consistently noted that they could never afford to build more than a single level of underground parking. If parking minimums or site geometry required them to build a second underground level of parking, they would have to reduce the number of units proposed to eliminate the necessity of a second underground level.

Unlike for market-rate developers, the financing sources used by affordable housing developers actually pressure them to build less parking. First, public financing sources come with strict requirements which either explicitly restrict parking or that limit development costs. Affordable developers therefore are either prohibited from building above a certain level of parking or face financial pressure to minimize the amount of parking built to make their development more cost efficient.

Low income housing tax credits, for example, only allow the cost of parking up to a certain point to be eligible for tax credits. As one developer noted:

“What proportion of the project’s parking costs can be included in eligible basis to generate low-income housing tax credits? Ideally this is 100 percent. The California Tax Credit Allocation Committee has established its own parking minimums.²¹ If you provide more parking than the minimum, the cost of the additional parking cannot be included in eligible basis. Therefore, you cannot generate tax credits on the cost of parking beyond TCAC’s minimums.”

Additionally, applications for grants and public funds are likely to be successful at obtaining funds if the developer includes as little parking as possible. As one developer noted:

“Public financing is very limited, and funding rounds are competitive. Often the less public funding you request, the more competitive your funding application is... Public funders have a policy imperative to finance

²¹ See Appendix D for a description of the TCAC parking minimums.

the construction of housing, not parking. Funders like to see that you are providing as little parking as required."

Community opposition

Like market-rate developers, affordable housing developers are sensitive to community opposition. However, unlike market-rate developers, affordable housing developers also feel that community members might hold additional biases or prejudices against the tenants of an affordable housing development, particularly if the development was intended for the formerly homeless. One developer noted that during community meetings, local residents opposing an affordable housing development would voice comments like, "there are going to be bad people living near me." While affordable housing developers could not change who their tenants would be, they could provide more parking to placate some of a neighborhood's complaints. One developer explained:

"Developers of affordable and permanent supportive housing often encounter community opposition to their developments, primarily due to the tenant population (#1) and parking (#2)... Often we must strike the balance between how much parking do my tenants need and how much parking do my neighbors think my tenants need."

These concerns were more pressing when a development is subject to discretionary review, like under the California Environmental Quality Act (CEQA). More opportunities for a community to participate in planning a development mean more opportunities for the community to stop the development. As one developer explained:

"For instance, if you can build less parking under the LA City TOC, only your directly adjacent neighbors have the ability to appeal your project approvals. You have reduced legal risk and it is easier to get the community to buy off-on less parking. However if you have a project that is subject to CEQA (i.e. not categorically exempt) and the project you are proposing is especially controversial (i.e. serving homeless households), you have a lot of legal exposure during the environmental and entitlements approval process and you will do all that you can reasonably do to appease the community, and often times that is to provide more parking."

For some affordable housing developers, fear of community opposition could outweigh any other considerations when deciding how much parking to build. Indeed, one developer reported:

"But the fact is that even if zero parking spaces are required, we will always provide a healthy number of parking spaces, even if the building is over-parked and tenants do not end up using all of the parking. There is a lot of community opposition to affordable housing and permanent supportive housing developments, and parking is always one of the top two complaints."

3.2.5 *Changing parking regulations*

All developers interviewed want the City of Los Angeles to eliminate parking minimums. They felt that “for residential developments, parking minimums are often too high.” Even when they do not intend to build less parking than what the minimums require, they thought they would benefit from lower minimums, as “the more flexibility there is in relation to parking requirements... usually it is better off for a developer to make a project work.”

Affordable housing developers appreciate existing ordinances to reduce parking minimums such as the Density Bonus or TOC Ordinance, as “provid[ing] fewer parking units as long as you still have some... that’s almost always a benefit,” and reported that they frequently utilized those programs. However, market-rate and luxury developers find those programs less useful. Specifically, they felt that the Density Bonus did not provide enough benefits to justify designating some housing as affordable. It would only be useful in marginal cases, where a decrease in the parking minimum might save a developer from having to build an entire additional floor of parking. As one developer stated:

“If you’re already planning on building affordable housing, it’s nice, but it’s not an incentive in the way that the city thinks it is. If you can get away with building one less parking deck, it makes that density bonus worth something.”

However, developers generally disapprove of the idea of parking maximums, as it conflicts with their desire for more flexibility. Even those who were relatively “parking liberal” (i.e. expressed a desire to build less parking) thought that parking maximums would be unnecessary. As one developer explained:

“We should get rid of the minimums, but I’m not a big fan of maximums. There’s enough incentive for the private sector to not build something really expensive, I don’t think you actually need to prohibit it. The cost itself is enough of a prohibition.”

3.2.6 *Building without minimums*

How much parking would developers build if parking minimums did not exist? Developers generally perceive that the transportation landscape is changing in Los Angeles and predict a future with less cars or solo driving. Developers cited the introduction of new mobility services like Uber and Lyft, the continued expansion of Metro rail, and the differing preferences of millennials (i.e. that millennials do not want to drive or own a car) as evidence of change. While this was all a part of a “gradual change,” they believed that demand for parking is already lower than requirements in the parking minimums. As one developer explained:

“Demographics and things started changing. There are less people that have vehicles in certain types of developments, certain locations. It used to be one car per person. It’s taking a while for the regulations to catch up with the reality of the situation.”

While developers might have been optimistic about Los Angeles' future, they also noted that they did not believe that the city was yet at a point where a person could live without a car. They therefore perceive that a certain minimum amount of parking would still be necessary for the foreseeable future. However, the amount of parking necessary is lower than what the zoning code requires. One developer explained that without parking minimums, they would build:

"One space per unit depending on the density or the zone. It's a lot of space that you're giving up to parking. I don't think that LA is built to have a zero-car household, but I do think that a household and a family can get around fine with one car."

One affordable housing developer theorized that affordable housing developments would require fewer parking spaces per unit than market-rate developments. The developer explained:

"I think if there were no parking minimums, affordable housing developers would still build at least 0.5 to 1 space per unit. I'm not sure about market rate developers! I would think maybe 1 to 2 per unit. We are in and headed further into an era of less parking, but let's not forget it's LA and car dependency is real."

Would developers in Los Angeles ever freely build no parking spaces? For market-rate developers, that returns to the question of risk. Unless developers see other developments build no parking spaces successfully, they would be wary of building a development with no parking themselves. However, if no developer ever sees another build a development with no parking, then no developer will ever dare to be the first to build a development without parking. As one developer noted:

"If it wasn't risky to provide zero parking, since zero parking costs less, more people would do it. That would really start changing the lifestyle and landscape of Los Angeles. Until there are more examples that people can point to, more people won't do it."

3.3 Summary

In summary, while parking minimums have a large effect on the amount of parking built, developers also consider a variety of other factors. Market-rate developers make decisions about parking with the goal of minimizing risk, whether it be the risk that their final development will not be rentable or sellable (as judged by themselves or by their investors) or the risk that local communities will complain enough about parking impacts to delay or even prevent the construction of a development.

In contrast, affordable housing developers are more concerned about minimizing the costs of development, as they highly value cost efficiency. Any money spent on parking is money that cannot be spent building housing. Additionally, affordable housing developers use financing sources that pressure them to build less parking or that explicitly restrict them from building more parking. Like market-rate developers, they are concerned about

community opposition; however, unlike market-rate developers they also face increased opposition to new development due to neighbors' prejudices against their tenants.

Overall, developers largely support the idea of eliminating parking minimums as they desire to have more flexibility and freedom when making decisions about how much parking to build. On average, they would likely prefer to build less parking than what is currently mandated by city parking minimums (e.g. one space per unit instead of two).

Even if parking minimums were eliminated, developers would continue to build some parking, as they perceive Los Angeles to be a city in which one cannot get around without car access. However, within market conditions, developers are naturally risk-averse, and their perception of risk is influenced by what their competitors build. If a new building differs significantly from others on the market, then there is greater uncertainty. This leads to the perception of higher odds that the development could become a bad investment. Developers are therefore likely to imitate what they expect other developers to do. If a developer perceives that “the market” is providing less parking, then they might begin to build less parking as well. However, if a developer believes that other developers are building more parking, then they are more likely to also provide extra parking.

4 Discussion

4.1 Conclusions

Taken together, the results of the quantitative and qualitative studies discussed above shed some light onto how developers make decisions about parking and why developers might build more parking than required by parking minimums.

First, parking minimums appear to act as a binding floor on new development in Los Angeles. Developers listed parking minimums as one of the most important factors determining what types of developments are built. Per one developer, “if you can't park it, you can't build it.” Additionally, a majority of the sampled developments built about as much parking as required by their binding parking minimums.

What happens when developers are freed from the requirements of default city minimums? Developments that received parking minimum reductions built a smaller portion of their default parking minimum. The larger the parking minimum reduction, the less parking built. However, developments that received a reduction smaller than 50 percent still appeared to be constrained by their parking minimums – those developments all continued to build about as much parking as required, even as the amount of parking required decreased. In contrast, developments that received parking minimum reductions greater than 50 percent appeared to no longer be limited by their binding parking minimums. Those developments built the

least amount of parking overall but the most amount of parking relative to their binding parking minimums. Instead of utilizing the largest parking minimum reductions to build as little parking as possible, developers appeared to freely build some extra parking. There are many reasons why developers might feel compelled to provide at least some parking. Market-rate housing developers are concerned about market demand for parking – developers reported a widespread belief that units without parking might not be rentable or sellable (or only rentable or sellable at a lower price point). Developers also feel more pressure from “conservative” financiers to build more parking to ensure that the development is a non-risky investment. Finally, developers fear community opposition – they reported that they were willing to build some extra parking to placate neighborhood concerns.

Affordable housing developers try to minimize the amount of parking built to a much greater extent than market-rate developers. First, affordable housing developers have limited funds in comparison to market-rate developers; more parking might make an affordable housing development financially infeasible. Developers see parking as a tradeoff with housing: more parking built meant less money for housing. Additionally, affordable housing developers use funding sources that either directly or indirectly restrict the amount of parking built. However, affordable housing developers also fear community opposition, particularly because community members might be more biased against tenants of an affordable housing development. Affordable housing developers are willing to over-supply parking in the face of community complaints, particularly if a development was subject to any type of discretionary actions (like CEQA review), as those processes give neighbors more opportunities to stop a development.

How much parking would developers build without parking minimums? Market-rate developers hypothesized that they would build about 1 space per residential unit without parking minimums; affordable housing developers theorized that they would build between 0.5 and 1 spaces. Within the development sample, partially affordable developments that received a parking minimum reduction greater than 50 percent built 1 space per unit on average; fully affordable housing developments built 0.7 spaces per unit. Currently, default city parking minimums require 1 space per studio apartment, 1.5 spaces per one-bedroom, and 2 spaces per multi-bedroom apartment. If parking minimums were eliminated for all developments, developers might build as little as half as much parking as they are currently required to do by default parking minimums.

However, the amount of parking built was also associated with each neighborhood’s built form. Developments located in “Old Urban” neighborhoods were more likely to build a higher percentage of their binding and default parking minimum. “Old Urban” neighborhoods have a built form that is most supportive of public transit use; residents of “Old Urban” neighborhoods are least likely to travel by car and most likely to use public transit or walk compared to residents of all other neighborhood types in the United States. In effect, developers are therefore more likely to build extra parking in the neighborhoods where people are least likely to need or use it.

Why would developers provide more parking in more transit-supportive areas? Previous

studies have found that developers might be more likely to provide extra parking for luxury or high-end developments (i.e. Guo & Ren, 2013; Manville, 2013; Manville et al., 2013). However, in Los Angeles, residents of “Old Urban” neighborhoods have lower median household incomes (\$40,791 compared to \$71,007), are less likely to be white (21% white compared to 36%), and more likely to live in a zero-vehicle household (19% compared to 8%).

Developers might build more parking in “Old Urban” neighborhoods because parking is (or is perceived to be) scarcer there. “Old Urban” neighborhoods have a denser, older housing stock (about three-quarters of housing in “Old Urban” neighborhoods was built before 1940) (Voulgaris et al., 2016). Buildings in “Old Urban” neighborhoods might be less likely to have off-street parking. If off-street parking is rare, particularly in a dense neighborhood where more people live, then there would also be more competition for on-street parking.

Indeed, on average, “Old Urban” census tracts in Los Angeles have 25 percent fewer parking spaces per dwelling unit than census tracts in other neighborhood types (0.68 spaces per dwelling unit compared to 0.90 spaces).²² Due to this parking shortage, households in “Old Urban” neighborhoods likely have greater need of on-street parking spaces. However, overall, “Old Urban” neighborhoods have less than half as many on-street parking spaces as other neighborhoods (4,235 parking spaces per square mile compared to 8,841).²³ Combining the supply of residential off-street and on-street parking, there are 1.07 parking spaces available per vehicle in “Old Urban” neighborhoods compared to 1.89 spaces per vehicle in other neighborhood types.

Parking is therefore scarcer and more competitive in “Old Urban” neighborhoods in Los Angeles, which makes parking a more valuable commodity. If a developer in an “Old Urban” neighborhood chooses to build a lot of parking, then they would be in possession of a scarce resource and could charge high, monopoly rates (e.g. Manville et al., 2013). Developers are therefore incentivized to capitalize on this shortage of parking by building more of it. In contrast, in other areas of Los Angeles, parking is not scarce – there are more parking spaces available for neighborhood residents than there are vehicles. Parking is therefore not a particularly valuable commodity, and developers would not be incentivized to park above the minimum. The benefits of constructing more parking would not justify its costs.

While it might be rational for individual developers to build extra parking in “Old Urban” neighborhoods, it could have negative consequences for the City of Los Angeles overall. “Old Urban” neighborhoods currently have a built form that is more supportive of public transit and walking; residents are more likely to use transit or walk than residents of other

²² I calculated these statistics using an estimate of total on-street and off-street residential parking in Los Angeles County created by Chester et al. (2015) and census data on the total number of housing units and vehicles per census tract. As Chester et al.’s (2015) estimates were based off Los Angeles’ 2010 building stock, I used census data from 2010 for total housing units and total vehicles as well.

²³ This estimate of on-street parking spaces from Chester et al. (2015) does not account for how much curb space might not be available for long-term vehicle storage (due to factors like parking meters, time restrictions, etc). Therefore, the actual amount of street parking per square mile could be lower in both neighborhood types.

neighborhoods. That built form serves as a collective good to the inhabitants of Los Angeles, and that collective good can only be preserved if each individual developer refrains from building extra parking. However, if all developers attempt to capitalize on the parking shortage in “Old Urban” neighborhoods to increase their profits, they will undermine the very character of those neighborhoods. If more parking is built, then “Old Urban” neighborhoods will become less dense and less walkable, and increased parking availability will encourage residents to drive more.

4.2 Limitations

This study has a few key limitations that should be explored in future research. First and foremost, all developments in the sample were larger residential developments – residential developments with fewer than ten dwelling units and non-residential developments were excluded from the study. It is possible that there exist significant differences in parking provision for buildings of other sizes and uses. For example, smaller residential buildings might not show as much variation in the amount of parking built, as building extra parking might not be possible on a smaller lot or within a smaller building.

Second, the analysis of recent developments contained no metric to account for whether a development was intended for more or less affluent residents or whether residential units were intended for sale or rental. Previous studies have found some evidence that developers might build more parking in luxury developments (Guo & Ren, 2013; Manville, 2013; Manville et al., 2013). However, determining if each development was intended as luxury development or was listed as for sale or for rent would have required research into additional city documents and property records beyond the scope of this study.

Finally, this study is restricted to the determinants of parking supply in a single city: Los Angeles. Developers might make decisions about parking differently in other cities or towns, particularly in places where the land use and transportation options differ significantly. The amount of parking considered necessary might be extremely variable in a suburban area compared to a rural area compared to a denser city.

5 Policy recommendations

In 2016, the City of Los Angeles adopted the Mobility Plan 2035 into its General Plan (Los Angeles Department of City Planning, 2016). The Mobility Plan set several key goals for the city, including reducing greenhouse gas emissions by supporting a more sustainable transportation system and increasing the percentage of car-light households to 75 percent. However, as long as parking is free and abundant, the City is unlikely to achieve these goals, as people will continue to own and use private automobiles.

Additionally, California in general and Los Angeles specifically are in the midst of a severe housing crisis. The current governor of California, Gavin Newsom, announced an ambitious goal to build 3.5 million new houses in the state by 2025 (although that goal is infeasible within the current zoned capacity of Californian cities) (Monkkonen & Friedman, 2019). However, parking minimums make it more difficult to address this issue, as parking drives up the cost of constructing housing and limits how much housing can be built on a new parcel.

If the City of Los Angeles is going to become a more sustainable city with more (affordable) housing, the City must reform its current parking minimum policies. Below are a series of recommendations the City of Los Angeles should consider implementing (either together or in isolation).

1) Eliminate parking minimums

First, and most importantly, the City of Los Angeles should eliminate its parking minimums. Parking minimums distort the amount of parking built by forcing developers to build more parking than they might have otherwise. If parking minimums were eliminated – as even developers themselves want – developers would likely build (on average) much less parking than they are currently required to do. Parking minimum reductions are currently used as one cudgel to induce developers to provide affordable housing for low income residents (e.g. as in the Density Bonus, Galperin, 2017). However, reducing the amount of parking built in and of itself would provide Los Angeles with substantial benefits.

First, less parking would encourage residents of Los Angeles to use alternative modes of transportation (i.e. walking, biking, or using public transit). If residents of Los Angeles drive less frequently, the City would better be able to meet its goal of supporting a more sustainable transportation system. If parking is more difficult, households might choose to own fewer cars.

Additionally, eliminating parking minimums could significantly lower construction costs for new housing and give developers more flexibility, which would help Los Angeles address its housing crisis. Chapin (2016) found some evidence that eliminating parking minimums allowed developers to build more (affordable) housing, and Manville (2013) found that loosening minimums was crucial in allowing developers to adapt older buildings to residential uses in Downtown Los Angeles. Within the sample, developments built a median of 86 parking spaces. If each space cost \$35,000 to build, then developers spent a median of \$3,010,000 constructing parking per development. Reducing those costs could allow for more (cheaper) housing in Los Angeles.

2) Require residential developments to unbundle parking

Demand for parking is large because parking is almost always free. The cost of parking is priced into the cost of other goods (like housing), so consumers demand and use parking as if it was unpriced. To address this issue, the City of Los Angeles should require that new residential developments unbundle the cost of parking from the cost of housing. Developers would then be required to sell or rent parking spaces separately from the cost of selling or renting a housing unit.

Market-rate developers currently build parking largely because they believe that the market “demands” parking. However, pricing parking would reduce how much parking the market demands. If parking is unbundled, consumers would have to pay for parking directly. As the cost of a good increases, the quantity of the good demanded decreases. If parking were unbundled, developers would likely find that not all people are willing to pay for a parking space. This would incentivize developers to build less parking, as they would personally bear high costs for any parking spaces they failed to rent or sell.

Additionally, unbundling parking would benefit the residents of Los Angeles. Currently, people are forced to pay for parking, regardless of whether they use it. People without cars effectively subsidize the cost of parking for those with cars. As households without cars are more likely to be low-income, the distribution of the burden of parking minimums is particularly inequitable. Unbundling parking from new residential units could save car-less households thousands of dollars per year.

3) Establish parking maximums, particularly in “Old Urban” neighborhoods

Instead of providing a minimum parking requirement, the City of Los Angeles could consider instituting a parking maximum. For example, the city could turn the current minimum standards into maximums. Developers would be free to build less parking than the maximum but could not build more.

First, parking maximums might help alleviate some of the pressure developers feel to build parking to minimize the risk of losing money on their financial investment. Developers’ perception of risk is influenced by what their competitors build, and currently most developments are required to build at least some parking. A development that builds relatively less parking would be particularly unusual and therefore particularly risky. However, under a parking maximum regime, developers would be secure in the knowledge that their competitors could not build more parking, as no new development could build beyond the maximum. Building less parking would then become less risky. Parking maximums could prevent a “parking arms race”, where developers build more parking to match or one-up their competitors (Manville et al., 2013).

Parking maximums might be particularly important in areas where developers’ incentives do not align with the City’s goals. For example, in “Old Urban” neighborhoods, developers are incentivized to build extra parking because of the scarcity of existing parking. Building more

parking in these neighborhoods might make a development more profitable as parking is at such a premium – developers capitalize on the built form of “Old Urban” neighborhoods. However, building more parking in the most transit-supportive and pedestrian-friendly neighborhoods contradicts Los Angeles’ goal to support sustainable transportation. Making parking more available in “Old Urban” neighborhoods would encourage people to drive more often in the places where it is currently most feasible for residents to use public transit or walk. A completely deregulated parking market might lead developers to build less parking overall, but still allow them to build too much parking in neighborhoods where (from the City’s perspective) they should build the least.

Without a parking maximum, the collective good that is the built form in “Old Urban” neighborhoods can only be protected if developers refrain from acting in their own self-interest. In contrast, the imposition of a parking maximum would prevent developers from undermining the character of those neighborhoods through over-parking. Therefore, Los Angeles should consider setting parking maximums for “Old Urban” neighborhoods (if not for the entire city).

4) Establish in-lieu fees

Alternatively, Los Angeles could establish in-lieu fees for parking. Under such a policy, developers would pay the City of Los Angeles a fee per required parking space instead of building parking themselves (Shoup, 1999). Los Angeles could then use that revenue to construct and manage public parking garages. Such a policy would have several advantages.

First, it would allow the City to directly decide how much parking is appropriate per neighborhood and make its own trade-offs between parking and other land uses. Developers only make parking decisions in their own self-interest; the City could make value-driven decisions to improve the public good. For example, in neighborhoods that enjoy good public transit access and where land is at a premium, the City could decide that very little land should be dedicated to parking and instead allocate more land to other uses.

Second, if more parking is located in public parking lots, it can more easily be shared between different users. Different types of sites have different periods of peak parking demand. For example, there is more demand for parking in an office during the day time, whereas there is more demand in a residential building at night. When buildings provide their own parking, they attempt to supply enough parking to meet their periods of peak demand, which means most parking is empty at most times of day. However, when different types of buildings with different periods of peak parking demand share a single lot, parking can become more efficient. Fewer spaces are needed overall to meet the peak parking demand across all uses and times of day.

5) **Reduce regulatory hurdles for developers**

Finally, the City of Los Angeles should implement policies that make it easier for developers to build the type of projects that the City wants. Under the current regulatory framework, it is easier for a developer to build more parking than required than it is to build less; it is easier to build a single-family house than a multi-unit apartment building. In particular, developers are resistant to using any discretionary processes or process that require additional review by city officials. Discretionary processes or additional review introduce more risk that a development could be delayed or stopped (particularly if it provides more opportunities for anti-development communities to interject). Developers' foremost goal is to reduce and avoid risk to ensure that their project is a secure financial investment.

Any policies to reduce parking minimums must be simple to implement and available to developers by right. Any policies that extend the amount of time a development spends under review or that introduce new forms of risk are unlikely to be widely utilized. For developers, even a slight increase in the odds that a development will be denied outweighs the benefits of receiving any discretionary actions. If the City wants to encourage developers to build multi-family residential developments with very little parking, then the number of regulatory hurdles to approve such a development should reflect those goals. Developments that encourage transit-use and support density should be the simplest and easiest to approve, whereas those that promote more solo driving and sprawl should be the most difficult.

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Appendix A. Parking minimum reductions in the City of Los Angeles

Table A-1. Default Code Minimums (LAMC Section 12.21)

Use of Building	Ratio (Spaces per Unit or per Square Feet)
One Family Dwelling	2 spaces
Apartment or Two-Family Dwelling (Duplex)	
Units with less than 3 habitable rooms ²⁴ (i.e. a single unit)	1 space
Units with 3 habitable rooms (i.e. a one-bedroom unit)	1.5 spaces
Units with more than 3 habitable rooms	2 spaces
Hotel, Motel, Boarding Room, Dormitory	
First 30 guestrooms	1 spaces
Next 30 guestrooms	0.5 spaces
Remaining guestrooms	0.33 spaces
Commercial ²⁵	1 space per 500 square feet

Table A-2. Density Bonus Ordinance (LAMC Section 12.22-A.25)

Parking Option Requirements*	Ratio (Spaces per Unit)
Parking Option 1	
0-1 bedroom apartment	1 space
2-3 bedroom apartment	2 spaces
4+ bedroom apartment	2.5 spaces
Parking Option 2	
Per restricted affordable unit** **All other units shall follow Sec. 12.21 requirements	1 spaces
Restricted Low or Very Low Income Senior Citizens or Disabled Persons	0.5 spaces

*Developers may select whichever parking option results in the lower parking minimum

Table A-3. Bicycle Parking Ordinance (LAMC Section 12.21-A)

Replacement Ratio: 4 bicycle parking spaces for every 1 vehicle parking space	
Use of Building	Replacement Limit
Residential	Up to 10% of required vehicle parking
within 1,500 feet of a major transit stop	Up to 15% of required vehicle parking
Non-Residential	Up to 20% of required vehicle parking
within 1,500 feet of a major transit stop	Up to 30% of required vehicle parking

²⁴ Kitchens are counted as “habitable rooms.”

²⁵ Commercial developments have different parking minimums depending on the type of projected use – the amount of parking differs if the commercial space will be used for a restaurant, an office, a warehouse, etc.

Table A-4. Transit Oriented Communities (TOC) (Section 12.22-A.31)

TOC Tier*	Use of Building	Minimum
Tier 1	Residential Commercial	0.5 spaces per bedroom 10% reduction
Tier 2	Residential Commercial	0.5 spaces per bedroom or 1 space per unit 20% reduction
Tier 3	Residential Commercial	0.5 spaces per unit 30% reduction
*If a development in Tiers 1-3 consists of 100% affordable units (exclusive of a manager's unit), no parking spaces shall be required		
Tier 4	Residential Commercial	No parking spaces required 40% reduction

*Reductions differ based on the quality of public transit located near the development (see *Table A-5* below).

Table A-5. TOC Transit Tiers (Section 12.22-A.31)

Type of Major Transit Stop	Tier 1 (Low)	Tier 2 (Medium)	Tier 3 (High)	Tier 4 (Regional)
Two Regular Buses Intersection of 2 non-Rapid Bus lines, with at least 15 minute average peak headways	750-2,640 ft.	< 750 ft.	-	-
Regular plus Rapid Bus Intersection of a Regular Bus and a Rapid Bus line	1,500-2,640 ft.	750-1,500 ft.	< 750 ft.	-
Two Rapid Buses Intersection of two Rapid Bus lines	-	1,500-2,640 ft.	< 1,500 ft.	-
Metrolink Rail Stations	1,500-2,640 ft.	750-1,500 ft.	< 750 ft.	-
Metro Rail Stations	-	-	< 2,640 ft.	<750 ft. from an intersection with another rail line or Rapid Bus

Table A-6. Specific plans or districts with reduced parking minimums

Specific Plan/District	Use of Building	Minimum	Maximum
Central City	Residential	1 space per unit	-
	If more than 6 DUs with 3 or more habitable rooms	1.25 spaces per unit	-
	Commercial	50% of LAMC requirement	-
Crenshaw Corridor Specific Plan	Any	50% of LAMC requirement	90% of LAMC requirement
Vermont/Western Transit Oriented District Specific Plan	Residential		
	Units with less than 3 habitable rooms	1 space per unit	1 space per unit
	Units with 3 habitable rooms	1 space per unit	1.5 spaces per unit
	Units with more than 3 habitable rooms	1.5 spaces per unit	2 spaces per unit
	Guest Parking	0.25 spaces per unit	0.25 spaces per unit
Any	15% reduction if any portion of the lot is within 1,500 feet of a Metro Red Line subway station	-	-
Warner Center 2035	Residential	1 space per unit	2 spaces per unit
	Guest Parking *only required for projects with 100 or fewer units	0.25 spaces per unit	-
	Commercial	2 spaces per 1,000 sq. ft.	4 spaces per 1,000 sq. ft.

Figure A-1. Specific plan areas in the City of Los Angeles

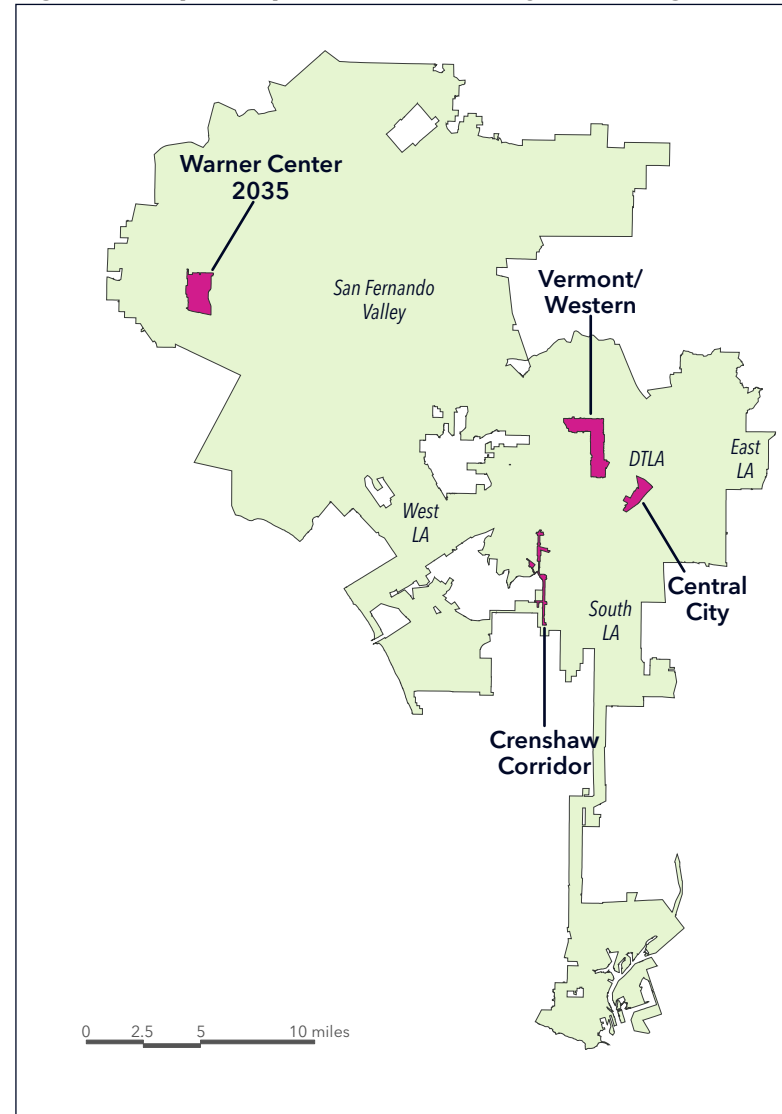


Table B-1. Results from ordinary-least-squares regression models

Predictors		Percent of Binding Minimum Built			Percent of Default Minimum Built		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Development Characteristics	Total Floor Area	0.03	0.03	0.03	-0.01	-0.01	-0.01
	Parking Minimum Reduction Size	0.75 ***	0.75 ***	0.76 ***	-0.18 ***	-0.19 ***	-0.18 ***
	Affordable Housing	-0.20 *	-0.18 •	-0.20 *	-0.04 *	-0.03 •	-0.04 *
Neighborhood Demographics	Median Household Income	0.03	-0.01	-0.01	-0.00	-0.00	-0.00
	Percent White	-0.03	-0.02	-0.01	0.00	0.00	0.00
	Percent Zero-Vehicle Households	0.04	-0.01	-0.03	-0.01	-0.01	-0.01
Built Environment	Activity Density	0.02	0.00	0.01	-0.03	0.02	0.02
	Percent Single Family Houses	-0.16	-0.12	-0.12	-0.01	-0.01	-0.01
	Total Parking Spaces per Sq. Mile	-0.12	-0.14	-0.16	-0.03	-0.03 •	-0.04 •
	Transit Access Index ²⁶	-0.17	-	-	-0.01	-	-
	Within ¼ mile of a Metro rail station	-	-0.46 •	-	-	-0.06	-
	Within ½ mile of a Metro rail station	-	-	-0.13	-	-	0.00
Observations		300	300	300	300	300	300
R ²		0.21	0.21	0.20	0.48	0.48	0.48
Adjusted R ²		0.18	0.18	0.17	0.46	0.46	0.46
F statistic		7.54*** (df = 10; 289)	7.71*** (df = 10; 289)	7.31*** (df = 10; 289)	26.5*** (df = 10; 289)	26.8*** (df = 10; 289)	26.4*** (df = 10; 289)

$p < 0.10$ •, $p < 0.05$ *, $p < 0.01$ ** , $p < 0.001$ ***

In general, the regressions above show the same pattern of results as those in Section 2.2.2. Developments with larger parking minimum reductions are more likely to build more parking relative to the binding minimum and less parking relative to the default minimum. Developments with more affordable housing build less parking compared to both the binding and default minimums.

However, few of the disaggregated land use and built form variables were correlated with the amount of parking built relative to either the binding or the default minimums. Additionally, many metrics are highly correlated with each other, which increases the difficulty of interpreting the regression results. Just one metric of transit access (being located within a quarter mile of a Metro rail station) was correlated with building a marginally higher percentage of the binding parking minimum; however, no other public transit access metrics were correlated with the amount of parking built. This is particularly notable given that some of the parking minimum reductions granted are greater if the development is located within a half mile of high-quality public transit.

Appendix C. Interview instrument

Developer background:

What is your background in real estate?

What type of developments do you typically work on (i.e. residential, commercial)?

Probes: (If residential) Do you develop market rate, mixed rate, or affordable housing? Luxury housing?

What size developments do you typically work on?

What parts of Los Angeles do you generally work in?

Parking minimums:

In what ways, if any, do parking minimum requirements in the zoning code influence plans for a new development?

Probes: How do parking minimums influence site design or financing?

What factors do you consider when deciding how much parking to build for a new development?

Probes: How big of a consideration is demand or need for parking?
 How big of a consideration is the neighborhood where the development is located?
 How big of a consideration is concern about community support or opposition?
 How big of a consideration is the cost of building parking?
 How big of a consideration is getting loans or financing from banks to build the development?
 How big of a consideration is the geometry of a project site?

Do you ever build more parking than required by the parking minimums?

Probes: If so, what factors do you consider when deciding to provide extra parking?

Do you ever utilize any aspects of the zoning code that provide reductions to parking minimums (i.e. the Bike Parking Ordinance, Density Bonus Ordinance)?

Probes: In what situations do you find those parking minimum reductions useful?
 In what situations do you find those parking minimum reductions useless?

In your professional role, how do you feel about Los Angeles' parking requirements?

Probes: Do you think the amount of parking required is necessary?
 How much parking would you build if there were no parking minimums?

Notes:

If the individual being interviewed was not or had never worked as a developer, I instead phrased the questions to ask what the individual thought about parking or what the individual thought developers think, i.e. “what factors do you think are important when developers decided how much parking to build?”.

Appendix D. Tax Credit Allocation Committee parking minimums

For 9% new construction projects of a type described in Section 65915(p)(2) or (3) of the Government Code, regardless of whether or not the developer makes a request to the city or county, and that received land use entitlements after December 31, 2016, an applicant shall exclude from basis the proportionate cost of parking spaces that exceed the following ratios:

- (A) 0.3 spaces per unit for special needs projects, except that for non-special needs units in a special needs project the applicable ratios of subparagraphs (B), (C), and (D) shall apply and, for units not referenced by subparagraphs (B), (C), or (D), 1 space per unit shall be allowed for studio and 1-bedroom non-special needs units and 2 spaces per units shall be allowed for larger non-special needs units.
- (B) 0.5 spaces per unit for senior projects within ½ mile of a major transit stop, as defined in Section 21064.3 of the Public Resources Code.
- (C) 1 space per unit for large-family projects within ½ mile of a major transit stop.
- (D) 1 space per unit for senior projects more than ½ mile from a major transit stop.