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Parking to Place: Barriers and Opportunities for Adaptability in New Parking Structure Construction in Los Angeles

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Parking to Place:

Barriers and Opportunities for Adaptability in New Parking Structure Construction in Los Angeles

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CLIENT NAME	LA Department of City Planning

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

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EXECUTIVE SUMMARY

This research was completed as part of a UCLA Luskin Master of Urban and Regional Planning Capstone Client Project. The advent of autonomous vehicles (AV) has spurred much discussion as to the implication of AV technology on parking demand in the urban environment. I conducted this research with the Los Angeles Department of City Planning as my client to discover what barriers and opportunities there are for the development of adaptable parking as well as what policies the City could employ to encourage development of adaptable parking structures should parking demand decrease in the future.

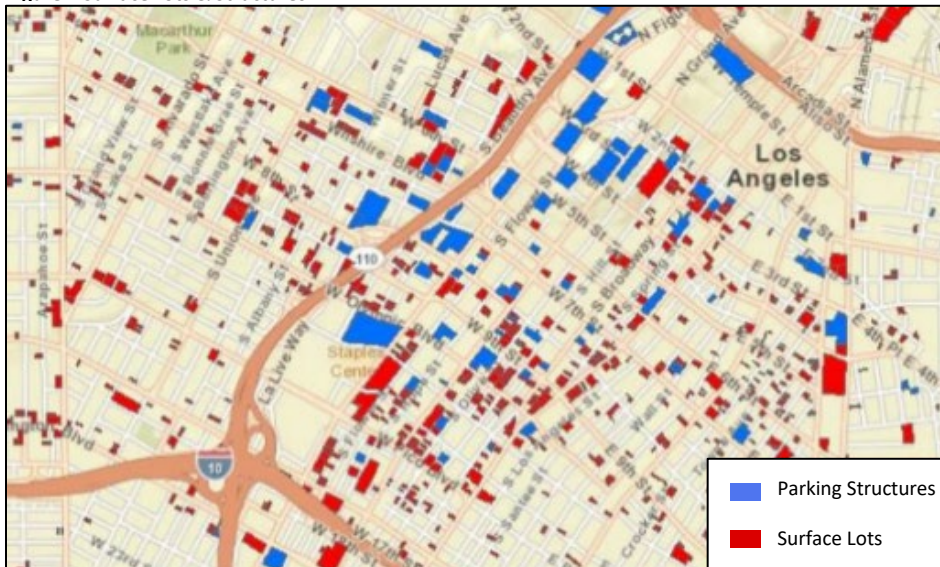
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INTRODUCTION

An increasing amount of importance is being placed on ensuring that the buildings that are built in today's cities are able to have long and sustainable lifespans within the urban fabric. As mobility trends in our urban environment continue to change, so must our approach to the sustainable and responsible development of parking structures. What do we use parking structures for? We use them to park, and as it turns out, we don't use them for much else. Cars sit in garages throughout the day and overnight. With approximately 3.3 parking spaces per car in Los Angeles, there is a significant amount of parking that lies empty even if every car was simultaneously parked all at once.¹ When you compare the total amount of parking

Figure I. Surface Lots & Structures



Source:
Mikhail, Fraser,
Matute, Flower,
Pendyala (2015)

to the land footprint to Los Angeles's urban core, there is a 1:1 ratio of spaces to land area(see figure I).² Whether the parking structure is built for residential, office,

¹ Chester, Mikhail, Andrew Fraser, Juan Matute, Carolyn Flower, and Ram Pendyala. "Parking infrastructure: A constraint on or opportunity for urban redevelopment? A study of Los Angeles County parking supply and growth." *Journal of the American Planning Association* 81, no. 4 (2015): 277.

² Chester, Mikhail, Andrew Fraser, Juan Matute, Carolyn Flower, and Ram Pendyala. "Parking infrastructure: A constraint on or opportunity for urban redevelopment? A study of Los Angeles County parking supply and growth." *Journal of the American Planning Association* 81, no. 4 (2015): 277.

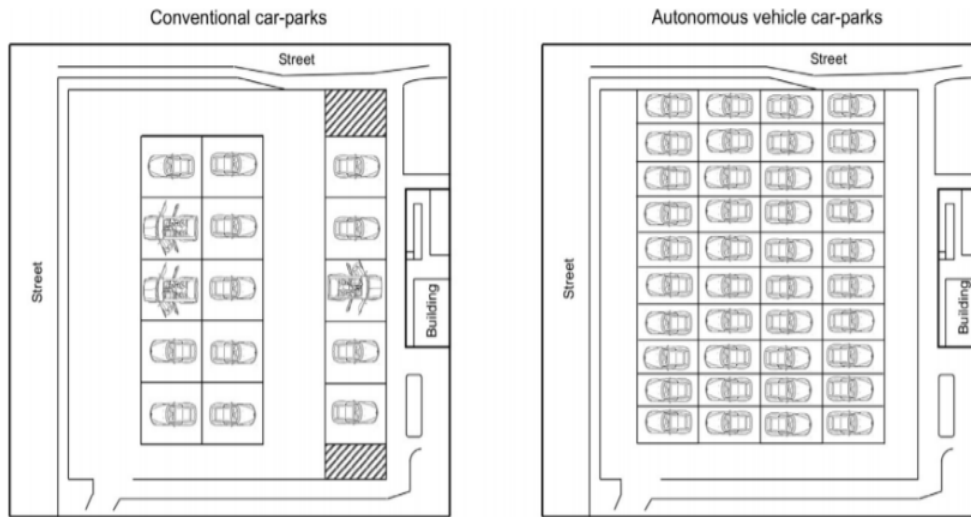
commercial, or retail purposes, people have started to question whether the valuable space that parking structures occupy in the urban landscape could be used for something else. While this study takes place at a time when Los Angeles is an auto-dependent city where parking is in high demand, this study is looking into a future where demand for parking could be drastically different due to outcomes possible with shared autonomous vehicles. The purpose of this report is to evaluate what barriers and obstacles exist for the development of adaptable parking and how the City of Los Angeles can further encourage such efforts.

The prevalence of the automobile in the 20th century was part of a great shift away from cities. The car enabled urban populations to move towards newly built suburbs and away from the historic urban core. While automobiles still persist as the primary mode of transportation for the majority of the population, the phenomenon during the late twentieth century of outward migration to the suburban periphery has begun to be reversed in the course of the last decade.³ In today's large cities, massive problems involving mobility, the provision of an adequate supply of housing, and the general scarcity of land have become pressing issues for urban planners. Declining transportation costs of the 20th century attributed to advances in automobile production and autocentric policies have been proven as major contributors to the sprawl that occurred later in the 21st century.⁴ The reign of the conventional automobile caused momentous changes to urban form. The fleeing of the middle class to the periphery, construction of new

³ Ehrenhalt, A. (2012). *The great inversion and the future of the American city*. Vintage.

⁴ Glaeser, E. L., & Kahn, M. E. (2004). *Sprawl and urban growth*. In *Handbook of regional and urban economics* (Vol. 4, pp. 2481-2527). Elsevier.

Figure II. Parking Efficiency: AVs & Conventional Vehicles



Source: Nourinejad, Bahrami, Roorda (2017)

roads and freeways that cut massive scars through the existing urban fabric, and the preference for efficient auto travel over human scale design left large cities and the people who remained with a daunting set of problems. In Los Angeles, the city that killed the streetcar in exchange for perpetually congested freeways, new trends have arisen in addition to the resurgence of the urban core that will have a drastic impact on land use.⁵ Technologies such as e-scooters, dockless bike-share, and other shared mobility devices have officially moved into the spotlight as promising mobility alternatives for the future.⁶ In academia, recent research into the benefits of autonomous-vehicle technology have estimated that demand for parking in cities could be reduced by anywhere from 62% to 87% (see figure II).⁷ With the advent of new technologies such as these, planners and urban designers

⁵ *Statement of Bradford C. Snell*, United States Senate Subcommittee on Antitrust and Monopoly Cong., 4 (1974) (testimony of Bradford C. Snell).

⁶ Nelson, L. (2018). *Los Angeles Times – L.A. approves rules for thousands of scooters, with a 15-mph speed limit and aid for low-income riders*. Retrieved from <https://www.latimes.com/local/lanow/la-me-ln-scooter-vote-20180904-story.html>

⁷ Nourinejad, Mehdi, Sina Bahrami, and Matthew J. Roorda. "Designing parking facilities for autonomous vehicles." *Transportation Research Part B: Methodological* 109 (2018): 110-127.

have the ability to significantly alter how people choose to move around the city. For cities experiencing economic deficits, land scarcity, and a lack of public open space, the physical dominance of parking in the built environment has begun to be challenged. While the use of the street parking is governed by public entities, a large portion of parking that exists in dense urban parking structures is not. The parking structure occupies valuable buildable land that could be utilized towards addressing housing affordability, park scarcity, mobility, or other current issues for the City of Los Angeles.

The prevalence of parking in Los Angeles is monumental. Studies of Los Angeles County have shown that a shocking 14%, or approximately 200 square miles of County land is occupied by parking (see figure III).⁸ In LA's urban core, where the volume of parking could be assumed to be more vertical than its footprint, studies have estimated that parking extends across some 25 square miles.⁹ When considering just how much of the built environment in cities is dedicated to parking, there are many possibilities for urban design and policy to use some of that space for more economically and socially valuable purposes. Projects to revitalize and redefine parking with public-private



Source: Mikhail, Fraser, Matute, Flower, Pendyala (2015)

⁸ Chester, Mikhail, Andrew Fraser, Juan Matute, Carolyn Flower, and Ram Pendyala. "Parking infrastructure: A constraint on or opportunity for urban redevelopment? A study of Los Angeles County parking supply and growth." *Journal of the American Planning Association* 81, no. 4 (2015): 268.

⁹ SUPERSPACE Group, "Transforming Parking to Places in Southern California", *MORE LA. Woods Bagot* (2018)

partnerships already exist. However, the public-private partnership has obstacles including, accommodating for the lost quantity of parking spaces, high costs of implementation, as well as time spent obtaining necessary permits from appropriate agencies.¹⁰

Parking as a component of the urban fabric has been studied extensively through the lens of a variety of professional fields. Economists have predicted reductions in demand, engineers have studied the optimum procedure for a new wave of autonomous parking, and architects have studied different ways in which the form of parking can be altered. But, the effects of policy, zoning regulations and building specifications written into municipal documents, have seldom been analyzed for their effect on the ability for parking structures to be adaptively constructed. In order for the discourse around parking adaptability to advance, there must be consideration for the scope of planning's influence and the context with which it operates in. In current times, many of the complex interactions between private sector interests operate within a neoliberal framework where public-sector policies often encourage or discourage private actors through economic levers. This research originates as a fulfillment of a capstone research requirement for the UCLA Luskin Urban and Regional Planning program. In what originated as a personal interest in the resilience of the built environment, the Los Angeles Department of City Planning was chosen as a client with which to work with in delivering the final product of this research. In this report, I aim to bridge the gap in

¹⁰ Littke, Hélène. "Revisiting the San Francisco parklets problematizing publicness, parks, and transferability." *Urban forestry & urban greening* 15 (2016): 172.

research between the material concerns of parking adaptability and policy implementation by collecting information from the relevant private sector entities developing structured parking and synthesizing their inputs in a way that will provide a framework for the City of Los Angeles to pursue its goals of promoting a healthy urban fabric that is prepared to adapt should the demand for vehicular parking decline.

In line with the origins of this research and the objectives of the City of Los Angeles, there are a few important research questions to be answered. What are the major obstacles and barriers that have deterred private developers from building adaptable parking? How can new policies or changes in current policies help promote the development of adaptable parking structures? These questions act as the basis for this research and any conclusions or recommendations derived therefrom. By compiling interview evidence from architects, developers, and brokers, I evaluate current obstacles and opportunities for the development of adaptable parking. Secondly, I observe the few but constantly growing number of case studies across the globe and compile a list of best practices in design strategies.

This report conveys several findings. Firstly, moderate and high intensity uses involving human occupancy are stifled by policies that encourage subterranean parking. However, lower intensity methods of adaptation can be achieved without any significant change to conventional structured parking construction methodology. Secondly, the timelines associated with development business models have a heavy impact on a developer's sensitivity to decreases in

parking demand. A third finding of this report is that increasingly shorter-term commercial leases subvert efforts from developers to produce adaptable parking. A fourth finding of this report is that the City of LA may encouraged structured parking development to be adaptable for high intensity uses by regulating parking efficiency and form rather than regulating the quantity of parking. Regulating structured parking's form and quality of spatial efficiency may be a mechanism which can push development to produce parking that is fully adaptable for the entire spectrum of potential uses while allowing development to fluidly adjust to changes in parking demand over time.

The following sections of this report go into further detail about the topic of adaptability in parking structures for new construction. In the first section of this research an initial review of the literature surrounding the topic is further reviewed. Through this review, I was interested in uncovering how ideas about parking structures have changed over time. Through this review I devised a framework that formed the basis of the next section of this report, my data collection and research methodology. This framework was also illustrated to interviewees in the form of an interview primer that can be found in the appendix of this report. The report then leads into my analysis and a discussion of my findings. Finally, I make conclusions regarding policy recommendations for the LA Department of City planning in its efforts to promote the development of adaptable parking structures.

LITERATURE REVIEW:

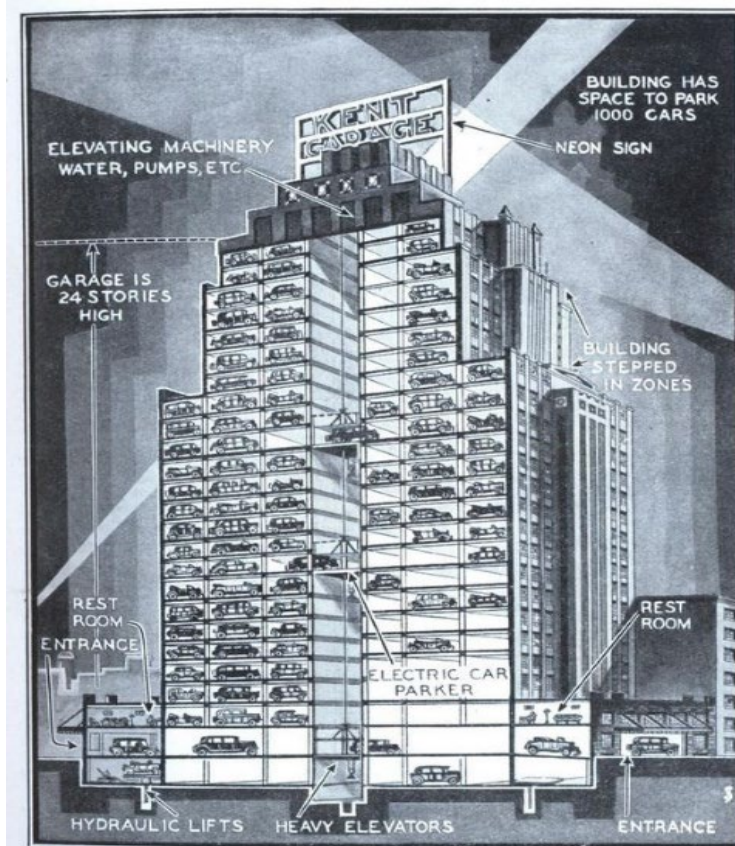
Before I point out the context with which the development of adaptable parking structures exists today, I will provide a necessary review of the parking structure's history. From then, literature consisting of professional reports and white paper documents as well as relevant academic research will be reviewed for insights as to the different strategies that have arisen for parking structure adaptability in present times. Through identifying which strategies have been proven feasible, which strategies can be debunked, and which strategies require further analysis, this study aims to guide the field along in its pursuit of a vibrant and more resilient urban fabric.

An Evolution in Conceptions About Parking and Parking Structures

The concept of utilizing adaptable design strategies and policies that support them are in their fledgling stages. However, my research shows that the parking structure has deviated from its original form into a space much more exclusive to automobile use. This section will review the trajectory that parking structures have taken in the 21st century and how it has led to the set of conditions we have today.

Observing the history of the parking structure presents some interesting observations for present day adaptability and resilience of these structures. Many early parking structures had features that accommodated adaptability and reuse. Early automobile technology, starting with the Ford Model-T gave little in the way of protection from the elements for the user. As a result, early parking garages had to utilize many of the same ventilation and heating techniques of surrounding buildings. In cities that developed pre-automobile, already dense built form necessitated the use of car lifts to avoid wasting lateral space on sloped ramps.¹¹ Many of these parking garages appeared very similar to surrounding residential and

Figure IV. Kent Parking Garage



Source: "TWENTY-FOUR-STORY GARAGE HOLDS THOUSAND CARS." Popular Mechanics, May 1929, 810.

¹¹ McDonald, A. I. A., and Shannon Sanders. *The Parking Garage. Design and Evolution of A Modern Urban Form*. 2007.

commercial buildings because they used similar construction techniques. The use of these early parking structures is a point of interest. Creating relative comfort and habitability in these early garages as a result of early automobile design provoked a variety of social uses to occur within the parking structures. In Figure (IV), the image of the first Kent Garage portrays two leisure rooms built into the parking structure at the bottom. two lounges built for customers to relax in. Less technologically advanced automobiles of the era from the 1920's to 1930's required more care and maintenance in the form of general service or full-service garages. In urban environments, individuals waiting around for their car to be serviced eventually led to other uses occurring within the parking structure such as, social gatherings, cafes, etc. The earliest parking structures were shaped by conditions of their urban context as well as the automobile

itself. As automobile technology improved and sentiments of freedom and autonomy were ingrained in the car during the 21st century, the development of parking structures became less about customer hospitality and more driven by efforts to reduce cost and an uber functionalist approach.¹²

Figure V. Denison Parking Garage

But look what's coming...

DENISON *Park-it-yourself* **GARAGE**

7 FLOORS OF
ABOVE GROUND
PARKING
650 CARS

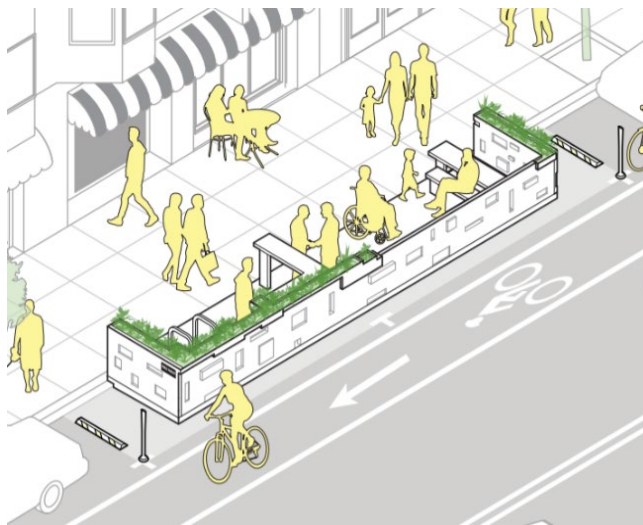
OUT ← OHIO ST. → IN
PENN. ST.

<p>PARK YOUR OWN CAR . . . no waiting, chauffeur service if desired.</p> <p>NO RAMPS . . . gradual sloped floors with only 4% grade make a continuous easy driving spiral.</p> <p>EXTRA-WIDE DRIVEWAYS and stalls make parking easier for you than on the street.</p>	<p>HIGH SPEED ELEVATORS to speed you from your car to street level.</p> <p>COMFORTABLE WAITING ROOM and attractive rest rooms for your convenience and use.</p> <p>WATCH FOR FUTURE DETAILS ABOUT THIS AMAZING NEW</p> <p style="text-align: center;"><i>Largest and Finest in the State</i></p> <p style="text-align: center;">PARKING GARAGE</p>
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Source: Jakle, John A., John A. Jakle, Keith A. Sculle, and Keith A. Sculle. *Lots of parking: Land use in a car culture*. University of Virginia Press, 2004.

¹² McDonald, A. I. A., and Shannon Sanders. *The Parking Garage. Design and Evolution of A Modern Urban Form*. 2007.

Figure VI. San Francisco Parklet Diagram



Source: San Francisco Parklet Manual (2018)

More cheaply built and stripped of all the comfort provided to early automobile users, the parking structures became husks void of any real purpose or function other than parking.

Recent examples of ways that designers have attempted to

address the adaptability and resilience of parking structure design share similarities with some of the features of the earliest garages. Level floor plates, a minimized presence of sloped sections and ramps, and generally creating a comfortable environment are concerns of both the parking garages of the past, as well as the parking structures of the future. Using these commonalities as a reference point conceptualizes adaptability as the shift in use from vehicle storage to traditional residential or commercial use.

Movements to Reclaim Parking Today

In 2005 the parklet movement was sparked in San Francisco, which evolved into a global model of reclaiming parking to provide quick solutions to urban park scarcity.¹³ Parklets have been documented in Los Angeles as well appreciated methods for reclaiming redundant space dedicated to automobiles. Formalization

¹³ Littke, Hélène. "Revisiting the San Francisco parklets problematizing publicness, parks, and transferability." *Urban forestry & urban greening* 15 (2016): 165-173.

of parklets enabled cities to utilize public-private partnership to effect change through leveraging private funding to produce an outcome that benefited both the private sector party as well as the larger urban context.

Parklets, and the portion of them that occupy street parking make up only a small part of the total stock of parking in the urban environment. Another large portion of parking in the built environment is generated off-street as a result of parking requirements for new construction. Professor Donald Shoup of UCLA was a pioneer in identifying regulatory parking minimums to be at fault for many of the urban issues related to congestion and development.¹⁴ Unlike parklets, structured off-street parking has a different interaction between public and private entities. Parking held on private property is regulated through the use of zoning parking minimums and building code requirements. In additional research conducted by Shoup and Mukhija, they observed that adapting the parking garages of single-family homes would have significant benefits. They concluded that single-family garage conversions could have the potential to potentially double the number of housing units in single-family neighborhoods and at an amount that would one fifth the cost of building conventional units.¹⁵ A complimentary part of their policy suggestion involves removing covered parking requirements and on-street permits. This led me to consider if reducing or removing parking requirements could be an effective measure for the dense urban core. If developers didn't have to build parking in the first place, perhaps there could be a halt in the construction of

¹⁴ Shoup, Donald. *The High Cost of Free Parking: Updated Edition*. Routledge, 2017.

¹⁵ Brown, Anne, Vinit Mukhija, and Donald Shoup. "Converting Garages into Housing." *Journal of Planning Education and Research*, (December 2017): 5,9.

parking structures, trivializing the concept of adaptability. However, to expect an overnight shift in the demand for parking in the urban core would ignore several factors. Through analysis of a small subset of developments that occurred under the Downtown Los Angeles Adaptive Reuse Ordinance, it was found that even with the elimination of parking minimums, the influence of the financial sector and market forces induce new development to provide significant amounts of parking.¹⁶ Although the analysis showed a significant decrease in the amount of parking provided directly on-site, the amount of parking provided per unit still remained above the minimum required threshold had parking minimums been in place. This analysis by Shoup and Manville alludes to regulatory parking requirements are not the sole driver for the development of parking in the built environment and that there are significant market-driven forces that produce conditions making the provision of parking favorable in development.

Adapting parking with programs like parklets or garage conversions represent a noteworthy opportunity for planners and urban designers to rebalance the auto-oriented dominance of the urban fabric. However, the scale and nature of parking structure development does not lend itself to the low cost and easy to implement strategies used with other types of parking. Street parking is maintained and operated by public entities. The majority of parking structures that exists in dense urban parking structures are privately held and commonly have a multitude of tenants who utilize the same structure. This presents some additional challenges

¹⁶ Manville, Michael, and Donald C. Shoup. "Parking requirements as a barrier to housing development: regulation and reform in Los Angeles." (2010).

when it comes to collaboration between private sector interests and public sector policy objectives.

The public-private partnership, and other manifestations of the resurgence of market-based incentives and regulatory levers, have become increasingly important tools for urban planners to achieve their goals for the city. Planners must be attuned to the sensitivities of the private sector by using both carrot and stick. As planners develop new strategies to create cities without vast seas of underutilized parking they may want to consider that modifying “existing regulations to improve development, without raising the cost to the developer, [may have] a far better chance of success than [seeking] to impose new controls that have not been part of the rules up to now”.¹⁷ The model of designing cities without designing buildings is an approach that has been in use in many ways. This approach requires that planners have their ear to the ground, and that they are familiar with the costs, benefits, and risks associated with the tactics they aim to employ.

Adapting parking, whether on-street or off-street, is predicated on either an actual or perceived decrease in demand for parking. Cities like San Francisco and Philadelphia have experienced some 7% to 10% decreases in on-street parking

¹⁷ Barnett, Jonathan, and John V. Lindsay. *Urban design as public policy: Practical methods for improving cities*. New York: Architectural record books, 1974.

demand with innovative pricing structures.^{18,19} These obstacles include, accommodating for the lost quantity of parking spaces, high costs of implementation, as well as time spent obtaining necessary permits from appropriate agencies.²⁰

Privately owned parking structures on the other hand, follow the ebbs and flows of the real estate market and are further outside of the direct control of municipal organizations. Could policies be put in place that work with developers to provide a carrot as well as a stick to ensure that parking structures are developed adaptably? While there is an argument to be made that the financial incentives of the future income streams of adapted spaces are benefit enough, very little research has been conducted on the effects of adaptability on development feasibility. Uncertainties about changes in parking demand have significant influence over the perception of developing adaptable parking structures as a possibility. As noted in previous research of Manville and Shoup, developers are often unable to obtain funds from financial institutions without verifying that the quantity of parking deemed acceptable by tenants markets is provided.²¹ These parameters create a peculiar set of circumstances for new development and in many cases dictate project feasibility. In situations like this, planners are often limited to broad land-use tools

¹⁸ Austin, Mason, et al. "Center City Philadelphia Parking Inventory" (2015). www.phila.gov/CityPlanning/aboutus/planningservices/Documents/2015_Parking_Study.pdf.

¹⁹ Swartz, Dorinson, et al. "San Francisco Parking Supply and Utilization Study" (2016). www.sfcta.org/sites/default/files/content/Planning/ParkingSupply_and_Utilization/Parking_Supply_summary_report_11.29.16.pdf

²⁰ Littke, Hélène. "Revisiting the San Francisco parklets problematizing publicness, parks, and transferability." *Urban forestry & urban greening* 15 (2016): 165-173.

²¹ Manville, Michael, and Donald C. Shoup. "Parking requirements as a barrier to housing development: regulation and reform in Los Angeles." 2010.

like zoning and building code to encourage good urban design in cities. To date, little research has been done on applying the tools at planner's disposal to the issue of structured parking adaptability.

This lack of research points towards a need for planners and policy makers to understand the dynamics of zoning and building code on the private sectors ability to produce structured parking in a way that can be repurposed for future use. This research will serve to inform planners and urban designers about the way that they can use the tools at their disposal to encourage adaptably built parking. Designing parking structures that can be used to accommodate the demand of today, while being adaptable to the changes our cities experience in the future is essential in facilitating the evolution of the city of tomorrow. The intersection of inefficient land use, tactical urbanism, and mobility, the parking structure represents a new opportunity to abolish parking's occupation of our urban fabric.

METHODOLOGY

Parking structures have evolved to become lean, level-of-service driven objects that occupy valuable space in the urban landscape. Recent urban trends in recent times have caused us to rethink the definition of parking structures and their contribution to the functions of the city. In light of the new narrative on the urban parking structure, how can the City of Los Angeles better support efforts to construct parking garages in a manner that enables them to be repurposed for some use other than parking in the future?

In order to analyze the current conditions and provide recommendations, this study will draw on structured interviews as a means of acquiring data on the subject. The topic of adapting parking for some other use has begun to be discussed and researched in the last few years. Studies have analyzed the potential for existing surface lots, and potential for eliminating parking minimums. Studies such as those performed by SUPERSPACE Group or other academics have utilized geospatial analyses to analyze quantities of surface parking that may be repurposed.^{22,23} Research on parklets has been conducted through case study research and survey research.²⁴ With regard to parking structures with adaptable features, there are a limited number of data points available to study in comparison to research conducted on other varieties of parking. In lieu of other types of data, structured interviews of key stakeholders were selected as the method of analysis. Structured interviews were a valuable tool for analyzing how the City of Los Angeles may be able to facilitate the construction of adaptable parking structures. The 11 structured interviews were conducted to help deepen the understanding of the issue, inform future research, and can clarify which specific obstacles or opportunities there are for the City of Los Angeles. A detail of the interviewees who agreed to participate can be seen in Table (I). While the structured interview format was able to provide a rich source of information for this research, there were several limitations. These

²² SUPERSPACE Group, "Transforming Parking to Places in Southern California", MORE LA. Woods Bagot (2018)

²³ Chester, Mikhail, Andrew Fraser, Juan Matute, Carolyn Flower, and Ram Pendyala. "Parking infrastructure: A constraint on or opportunity for urban redevelopment? A study of Los Angeles County parking supply and growth." *Journal of the American Planning Association* 81, no. 4 (2015): 268-286.

²⁴ Littke, Hélène. "Revisiting the San Francisco parklets problematizing publicness, parks, and transferability." *Urban forestry & urban greening* 15 (2016): 165-173.

difficulties included identifying individuals with an adequate amount of responsibility for project level decisions, the interviewee's willingness to speak in-depth about their internal strategy, as well as finding a reasonable quantity interviewee who were willing to lend their time and expertise to discussing the topic of this research.

Secondary sources of information on possible design techniques for adaptable structured parking have also been compiled and synthesized. This was done to illustrate for interviewees the wide variety of strategies that exist for developing structured parking to be adaptable for future use. When reviewing the literature of the few examples of adaptable parking that have been designed or developed, it was observed that the only cases where developers attempted to build parking adaptably were by developers of commercial office space. For this reason, the interviewee pool was restricted to developers and designers of commercial office space. Other sorts of development could have been considered. However, because the concept is incredibly new in other markets, there are minimal cases in other types of markets to refer to.

Table I. Interviewee List

Interviewee	Affiliation
Richard Choate	Choate Parking Consultants
James Robbins	Colliers International
Chris Pearson	Hudson Pacific Properties
Michael Phillips	Hudson Pacific Properties
Matt Howell	Lincoln Property Company
Rob Kane	Lincoln Property Company
Shylesh Viswanathan	NMS Properties
Megan Moloughney	The Ratkovich Company
Kevin Conway	Skidmore Owings & Merrill
Paul Danna	Skidmore Owings & Merrill
Christian Derix	Woods Bagot// Superspace Group
Vince Perrillo	Woods Bagot

FINDINGS

Prior to interviewing developers, designers, and other parties of interest, I conducted a review of secondary sources to identify key trends and observations about the subject of building adaptable structured parking. Through this review, I gathered information that helps to define the term ‘adaptable’ as it pertains to parking structures. The findings from the collected information are as follows.

One key difference between old parking structures and new efforts to build adaptable parking structures is the end use. Today, an emphasis on space that can be converted for traditional uses such as an apartment or office space has become the *golden egg* for adaptability. These uses ultimately require the necessary mechanical, electric, and plumbing systems, circulation, light and air, and structural

standards that are shared by conventional construction. However, as is the case with structured parking at the beginning of its history, there are new examples of parking using innovative techniques with outcomes that require less intense interventions.

Low Level Interventions

Architect Sergio Lopez-Pineiro has expressed that the current perception of parking structures is of a place characterized by standardized dimensions, and strict traffic-flow guidelines.²⁵ In an adaptation that is just as conceptual as it is physical, Lopez-Pineiro emphasizes that breaking the rigidity of the floorplan can be enough to spur new kinds of use. Making spaces more appealing through the use of colors or more pedestrian friendly flooring materials can breathe new life into a parking structure without having to drastically change the architectural form of the building. There are however some concerns with the concept. Lopez-Pineiro admits that the ability of a multi-use, flexible space such as this is contingent on the density of surrounding uses. In an urban context, differentials between daytime and nighttime population, or a general lack of density within a walkable distance of this parking concept could leave the space void with potential concerns for safety. This along with questions over whom may have access to these spaces should be considered with similar lower intensity interventions.

In addition to these techniques for creating new space out of structured parking, some professional parking consultants have suggested that perhaps utilizing the

²⁵ Cooke, Julia. "From Parking Garage to Community Space." Curbed. December 13, 2016. Accessed April, 2019. <https://www.curbed.com/2016/12/13/13902916/parking-garage-reuse-sergio-lopez-pineiro>.

space dedicated to parking as a way to facilitate future mobility trends would be a more effective approach. Parking structures acting as part of multi-nodal micro-transit networks could provide even more flexibility in the way we think about the adaptability of parking in the future.²⁶ This method of adapting structured parking space could very well be an important part of a future filled with mobility alternatives. Coordination of such a transit network among a multitude of privately held properties could be a complex task.

Medium Level Interventions

With the exception of integrating parking structures into a city-scale micro-mobility network, the low-cost interventions mentioned above might offer little in terms of cost to value created.

With a more intensive approach than just resurfacing existing parking structures, architecture students have created a model case for the implementation of modular units in existing parking structures. Students at the Savannah College of Art and Design have created an award-winning design in the form of modular housing units capable of being

Figure VII SCAD-PAD



Source: AIA Georgia (2014)

structures. Students at the Savannah College of Art and Design have created an award-winning design in the form of modular housing units capable of being

²⁶ Brass, Kevin *Parking Garages Will Evolve For Adaptive Use and As Multimodal Transit Hubs* Urban Land Magazine 2016 <https://urbanland.uli.org/industry-sectors/infrastructure-transit/evolving-off-street-parking-garages-adaptive-use-multimodal-transit-hubs/>

installed in urban parking structures with minimal modifications to the existing structure (see figure VII).²⁷ There are several benefits to this strategy such as low costs of implementation as well as flexibility to return use back to parking in the event that parking demand fluctuates. The project was an academic exercise that was achieved with the funding, labor, and technical resources of the Savannah College of Art and Design. There remains much to be desired from this project in terms of its applicability and potential for conformance with the development environment in the real world. This modular approach as demonstrated by the students of the Savannah College of Art and Design has been further elaborated on by professional architecture firms. International Architecture firm KTG Y has proposed to take an existing 5-story parking structure and retrofit it with shipping container modules that would serve to create 119 student housing units.²⁸ The concept fleshes out the concept developed by SCAD students in 2005 and brings it to a significant scale. One concern brought to attention by this concept is the structural integrity of the stand-alone parking structure that KTG Y has proposed to retrofit. The KTG Y proposal has advocated using steel tube reinforcing to overcome structural limitations of the stand-alone parking structure identified for the project. This adaptability strategy can provide a great value to the urban fabric with the addition of many new units of residential house. However, there are several drawbacks. In my interview correspondence with parking structure engineers, they cited several reasons why retrofitting existing stand-alone parking structures would

²⁷ "SCADpad." AIA Georgia. September 04, 2014. Accessed March 22, 2019. <https://www.aiaga.org/design-award/scadpad/>

²⁸ "Park House | Parking Garage Conversions." *PARK HOUSE A Housing Solution for Repurposed Parking Structures*. Accessed May 25, 2019. <http://ktgy.com/work/park-house/>.

be problematic. The biggest concerns with constructing a stand-alone parking garage are the structural loading differences between parking structures and habitable space, vibrations experienced by inhabitants as a result of continued automobile use on other floors, and a typical 1% drainage grading that would leave habitable space in a slight but noticeable tilt. A full list of concerns for adapting stand-alone parking structures with techniques similar to SCADPAD and the KTGYP proposal can be found in Table (II).

Table II Stand-alone Parking Structure Adaptability Concerns

Occupancy Issues	Practical Use Issues	Systems Issues
Increased emergency exit frequency	Vibration control	Sealing the exterior skin for water tightness
Fire separation of exits and ADA compliance	Structural settlement tolerated	Additional electrical power necessary for systems and emergency conditions
Fire suppression systems	Grade sloping of >1%	Increased ramping lengths due to increased floor-ceiling heights.
Elevator capacity and use	Interstitial space between floors	
Structural loading differences	HVAC and Thermal protection	
Structural lateral capacity	Shafts for mechanical and electric	
Floor heights		

Source: Interview Choate Parking Consultants

A project that functions in real world conditions was completed in Miami by developer Robert Wennett. He constructed a parking garage that facilitated alternative use without any intention of a conversion to residential or commercial use. Instead, the project took the elements of what made early structured parking habitable and took the concept to the extreme. Level floor plates, minimized ramps, and incredibly high floor-ceiling clearances were accompanied by small scale retail

and commercial uses, and an impressive amount of detail paid to the programming of the project.²⁹ Without creating more habitable or leasable space, the multi-use parking structure utilized the space that it had with programming and amenitization. This case study exemplifies an adventurous approach to building adaptable parking. This parking structure takes extra care to allow in light and air to create visually appealing spaces where alternative programming such as parties, concerts, and other social events are possible. Key to the strategy of this development was the intermingling of residential, retail, and office space throughout the different floors of the parking structure. When put into context alongside other uses, the space dedicated to parking becomes easier to program for other uses during non-peak hours for parking, resulting in vibrant and active spaces on multiple levels of the structure. The 1111 Lincoln Road is a successful case study of this model. In order to attract tenants and users of the ancillary commercial space, special attention had to be paid to pedestrian circulation, natural lighting, and finishes that enhanced the human-scale design of the structure.

High Level Interventions:

When viewing the concept of adaptability with a wider lens, there are a multitude of examples of adaptability that have been proposed and executed within the built environment. The observation that can be made by comparing all of these different methods is that adaptability lies on a spectrum of varying intensity and sophistication. Utilizing these different levels of adaptability can allow for flexibility

²⁹ Barbaro, Michael *High-end Miami Beach Parking Garage Evokes Awe and Admiration* 2011
<https://www.nytimes.com/2011/01/24/us/24garage.html>

and ultimately more organic attempts to increase the resilience of structured parking through adaptability.

The parking structures of tomorrow aim to be converted to wholly new and exclusive uses aside from parking. The available literature on adaptable parking focuses primarily on habitable uses as the end goal for adaptation. Architecture firms like Gensler have conceptualized methods with strategies such as knock out walls, utility hookups, and ventilation screens that can be replaced with windows.³⁰ This form of adaptability demands the biggest shift away from the minimalist and barebones construction techniques used in parking structures in present times.

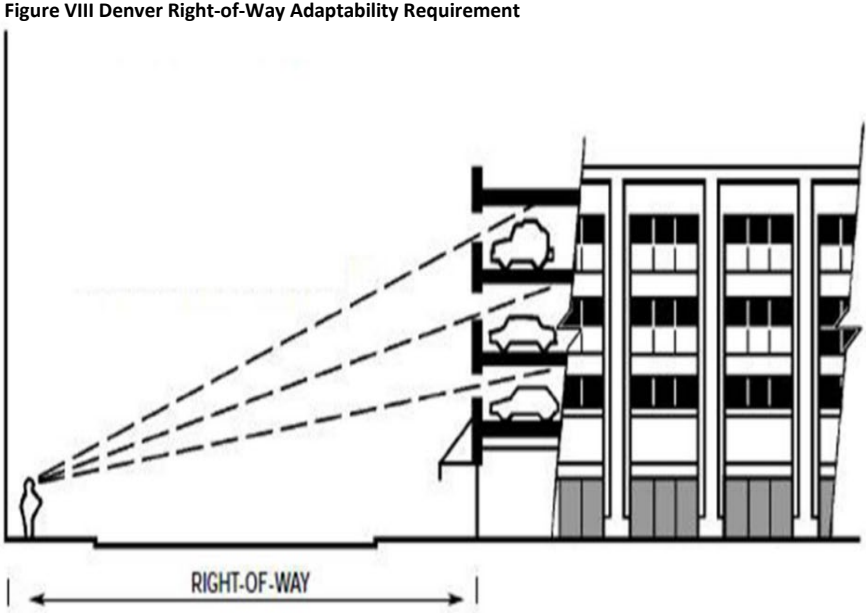
In 2018, the City of Denver, Colorado adopted an amendment to their downtown plan that encourages adaptability in their transit adjacent urban core. Their code requires that all structured parking that face any public right-of-way have level floor plates, and that all street-facing ground floor stand-alone structured parking be constructed to facilitate conversion to an active non-parking use (see figure VIII).³¹ This policy resulted in the development of 730 above ground parking stalls have been constructed with the intent to allow adaptability to residential, office, or retail space.³² These code requirements focused on the form of structured parking as it related to visibility from street level. The Denver code allows parking to be

³⁰ Walker, Alissa *Parking Garages Are Getting a Second Life As Places For People* 2017 Curbed <https://www.curbed.com/2017/4/26/15421594/parking-garages-driverless-cars-gensler>

³¹ Denver Zoning Code: Section 10.4.6.5, *A Parking Structure Design Standards* 2018 https://www.denvergov.org/content/dam/denvergov/Portals/646/documents/Zoning/DZC/Complete_Denver_Zoning_Code.pdf

³² Rusch, Emilie, and Emilie Rusch. "Denver Developers Have Seen the Future of Parking, and It Is No Parking at All." *The Denver Post*. January 31, 2017. Accessed March 22, 2019. <https://www.denverpost.com/2016/10/15/denver-developers-future-parking-self-driving-cars/>.

visible to the street as long as its floor-to-ceiling heights are at least 10ft. and other pedestrian oriented aesthetic requirements are followed. Achieving new residential, retail, or commercial space through converting parking is a valuable asset for cities looking for ways to accommodate increasing densification. Adaptability of this nature does call for additional resources and results in higher construction costs. In



Source: Denver Parking Structure Design Standards (2018)

order to discern how to encourage developers in Los Angeles to produce parking structures that are adaptable, I deemed it necessary for my research to pursue interviewing developers and related stakeholders in Los Angeles.

Stakeholder Interviews

In practice, there are very few developers making efforts to produce parking structures that are adaptable in today's market. Through much of my initial research, I observed a few organizations based in and around Los Angeles who were thinking about adaptable parking structures actively. The following section

outlines findings that were deduced from interviews with these developers, architects, and other stake holders involved with development in the Los Angeles area. My findings for obstacles and barriers for the production of adaptable parking structures that require high levels of intensity are as follows. In brief, market conditions leading developers to hold their properties only in the short-term as well as an increasing propensity for tenants to demand shorter-term leases discourages any personal incentive to develop adaptable parking structures. Parking adaptability and present-day trends in development of parking structures can persist if focus is moved away from regulating parking quantities and instead placed on quality and form. Clarifying the entitlement process may give developers a better sense of the risks associated with building adaptable parking structures and allow them to dispel any concerns that future adaptation may illicit. The perception of commercial tenants about parking demand is changing slower than that of their employees. Areas where adaptability makes the most sense today have high land costs, low vacancy, and a low supply of comparable projects. I will elaborate on each of these individual findings in the section below.

“We really want to build less parking and build parking in a way that’s adaptable”.

- 1. Development timelines and developer business models dictate a developer’s sensitivity to parking demand decreases, and by association their propensity to build their parking adaptably.**

Interviewees from development firms who indicated some effort to build their parking shared the commonality of a business model that prioritized holding properties as long term investments as opposed to putting their projects on the market for other entities to purchase.³³ If developers are aiming to sell their projects immediately after their construction, they have no incentive to produce projects that are adaptable as they will see no direct benefit for doing so. This is also due to individual project timelines. Developers perceive change in trends for parking demand to be much slower than the typical project timeline. The development firm that was interviewed that was not considering adaptability expressed that demand shifts of magnitude would only influence in their decision making if they were within a 5-year timeline³⁴. This is also related to tenant preferences which will be discussed further.

2. Short-term tenant preferences and tenant turnover reduces incentive to produce adaptable parking

Commercial tenant preference for high parking ratios and shorter term leases disincentivizes developers from thinking about adaptability³⁵ While owners and operators of commercial space typically prefer longer leases from tenants, the tenants will often negotiate for shorter and shorter terms. In the past, commercial leases have been around 5-year terms. However, recently the tenant market is

³³ Lincoln: Matt, Rob Hudson: Chris, Amy Michael

³⁴ NMS: Shylesh

³⁵ Colliers: James

trending towards 3-year leases or less. This coupled with a demand for high parking ratios between 2 stalls per thousand square feet to 4 stalls per thousand square feet means that developer interests and tenant interests are not aligned to promote the longevity of projects.

The exceptions to this pattern in tenant preferences is when tenants who have a geographic preference for locations where there is a supply constrained market. Netflix's choice to locate in Hollywood is an example of this.³⁶ The Hollywood sub-market has relatively low vacancy rates in comparison to comparable product in markets that are more traditionally oriented towards commercial office space.³⁷ The supply of spaces available to Netflix in Hollywood are very limited. Because of this, Netflix as a tenant is willing to accept premium rents to offset the additional costs of developing parking that is capable of being adapted. Most tenants don't share as strong of a geographic preference as Netflix being an entertainment company so closely tied to Hollywood. If tenant preferences could begin to trend away from short-term leases, then their interests might align more with efforts of developers to produce adaptable structured parking. This could take the form of rent stabilization or some other tax-based incentive.

Emphasizing efficiency and form together can help meet both immediate needs and long term

There is a strong general sentiment that overall demand for parking is persistent. The challenge for developers is to continue to provide the parking ratios consistent

³⁶ *Hudson: Michael*

³⁷ *Colliers: James*

with their demand today and ensure that their parking will be adaptable, all while minimizing cost. One way some developers are minimizing financial burdens of parking is by increasing the spatial efficiency of their parking layouts by utilizing parking stackers. This requires floor-ceiling heights that exceed what is conventionally considered to be standard for habitable use, however, it is minimizing the effect of increased construction costs. This strategy illustrates that parking efficiency may be the mechanism by which adaptability can be encouraged.³⁸ If development standards for parking structures originated from the perspective of human oriented design over auto-oriented, then leave it to developers to figure out how to provide the amounts of parking they think necessary.

Entitlement Process Needs Clarification.

One concern with adaptability is with the conformance of future adapted parking with present day density requirements. In the City of Los Angeles, parking is currently not counted towards allowable FAR. This presents an issue when projects with adaptable parking start converting to uses that do count towards a projects FAR. Developers indicated that in most projects, an attempt is made to achieve at as close to 100% of the allowable density of the project as is allowed. Where density restrictions are applicable, there is currently no way to accommodate the underlying density restrictions into an adapted use. Most interviewees agreed that it would be beneficial to have entitlements clarified with respect to adaptability and

³⁸ Lincoln Properties: Matt, Rob

conversion. Concerns that came up about a discretionary review for future conversions and leaving the initial investment on the table. Interviewees would find a by-right entitlement process favorable to one that opens up the possibility that they will not be guaranteed the ability to convert in the future.

“Zoning is slow to change and adapt to realities, but then you have this private sector element that’s entirely driven by subjectivity...”

“Do you find that you are able to negotiate with clients/tenants?... No”

A common theme across all parties interviewed was the sensitivity of potential tenants to decreases in the amount of parking spaces provided. Developers and the brokers that represent them indicated in interviews that tenants are often unwilling to accept lower parking ratios. In fact, one interviewee mentioned that tenants often want to over-build parking for the “Easter Sunday” scenario in reference to the term Professor Donald Shoup coined in his publication, *The High Cost of Free Parking*. Although the commercial tenants that developers cater to seem resistant to reducing the amount of parking they utilize, developers feel as if employees in class A office space are ready to shift away from auto-dependency. Developers note comments by employees from companies like Google, Netflix, and other tech companies calling for things like bike lockers, AV curbs-cuts, and access to e-scooters as creative ways to commute to the office.

Supply constrained markets give adaptability merit

Market supply and the depth of the tenant market are the foundation of the decision-making process when it comes to building adaptable parking. Comments made by a broker representing commercial office tenants emphasized the disconnect between tenants and the consequences of future underutilized parking. Tenants look first for a desirable geographic area and then seek out the product that best fits their needs within the sub-market. An example given by an interviewee explained that a tenant who might need to expand in the next 10-20 years would hard pressed to pay a premium rent for adaptability in a sub-market with multiple other options to up-size at the same price per square foot. The exception, as is the case with tenants occupying properties that have adaptable features like 84.51° in Cincinnati and Netflix in Hollywood, is a situation where supply restricts a tenant's ability to find alternatives in the market. Netflix, being in the entertainment industry, has a geographic preference for the Hollywood sub-market. In areas with high development costs, low vacancy, and a supply-constrained market, it is to the advantage of the tenant to ensure the viability of their location as their business grows into the future. In markets like Downtown Los Angeles with high vacancy rates around 20%, there is no leverage over tenants to command higher rents associated with adaptability.

RECOMMENDATIONS

First and foremost, the concept of adaptable parking structures is predicated on a future shift in demand from conventional single-occupancy vehicles. In this research I identify that uncertainties around the timing and implementation of fully autonomous vehicles are underlying questions for many in the development world. The LA Department of City Planning should continue its efforts to guide this transition and shift away from conventional single-occupancy vehicles.

Concurrently, planners should expect that developer sensitivities and timelines will be reactionary with regard to shifts in parking demand. Policies promoting the development of adaptable parking structures should proceed regardless of the current perceptions of developers.

Another recommendation from my research is potential future pilot studies for adaptable parking policies look into factors such as low vacancy, high land cost, and high tenant demand as indicators of area suitable for special adaptable districts or zones.

Additionally, development standards for parking structures should originate from the perspective of human oriented design. This research has identified a historical shift away from the more human-centered parking structure design of the 1930's to one that's devoid of consideration for human habitation. There are several things that the LA Department of City Planning could require to promote adaptability. Structural capacity and floor-ceiling heights should be adequate to sustain habitable uses.

Lastly, my research has shown that developers have figured out how to maintain typical parking-ratios demanded today while simultaneously using higher ceiling heights and appropriate structural specifications. By regulating spatial efficiency of parking structures, the city can encourage developers to use some sort of stacker or elevator technology. This would ideally push the development of parking structures to focus both on being adaptable as well mitigate permit projects to be flexible in transitioning to a time with potentially much lower demand for parking.

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Appendix

Structured Interview Question Prompt

DEVELOPING PARKING FOR THE FUTURE

Adaptability in Structured Parking for New Development

1. Do you feel as if zoning code has prevented or encouraged you from incorporating low levels of adaptability? To what degree does this impact your decision to pursue adaptability in your parking programming. Any specifics?
2. Do you feel as if zoning code has prevented or encouraged you from incorporating medium levels of adaptability? To what degree does this impact your decision to pursue adaptability in your parking programming? Any specifics?
3. Do you feel as if zoning code has prevented or encouraged you from incorporating high levels of adaptability? To what degree does this impact your decision to pursue adaptability in your parking programming? Any specifics?
4. Have you considered future additional cash-flow provided by new adapted units/space? If not, what prevents you most from doing so?
5. Do you feel as if lending institutions have prevented or encouraged you from building adaptable parking? To what degree does this impact your decision to pursue adaptable parking. Any specifics?
6. Do you feel as if tenant market demand for parking has prevented or encouraged you from incorporating this level of adaptability? To what degree does this impact your decision to build adaptable parking. Any specifics?
7. What policies or regulations could the City of Los Angeles amend to further encourage developers to make sure the parking they develop is adaptable for alternative future uses.
8. On a scale from 1 to 10, where 10 Means “very likely” and 1 means “very unlikely” what number represents how likely you are to pursue adaptable parking design strategies at some point in the future?

DEVELOPING PARKING FOR THE FUTURE

Adaptability in Structured Parking for Commercial Office

Adaptability as a spectrum

Integrated above ground podium parking

Event space / programming

Minimal adjustments to finishes/lighting

Minimal/temporary commercial use

Additional circulation

Increased MEP provision

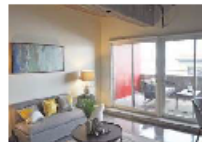
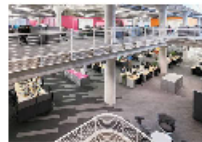
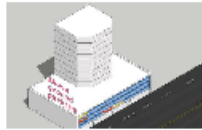
Floor-ceiling height adjustments

Adequate MEP for habitable use

Insulation and finishes

partition of units

Low Level Interventions



High Level Interventions

Interviewees

Chris Pearson – Hudson Pacific Properties – 4.10.2019

Christian Derix – Woods Bagot / Superspace Group – 11.16.2018

James Robbins – Colliers International – 3.4.2019

Kevin Conway – Skidmore Owings & Merrill – 11.2.2018

Matt Howell – Lincoln Property Company – 4.11.2019

Megan Moloughney – The Ratkovich Company – 3.15.2019

Michael Phillips – Hudson Pacific Properties – 2.28.2019

Paul Danna – Skidmore Owings & Merrill – 11.20.2018

Richard Choate – Choate Parking Consultants – 10.27.2018

Rob Kane – Lincoln Property Company – 4.8.2019

Shylesh Viswanathan – NMS Properties – 3.4.2019

Vince Perrillo – Woods Bagot – 11.16.2018

