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PARKING BY DESIGN

A comprehensive study on the adaptive reuse
of parking structures



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Parking by Design

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1.0 Project Scope

Our project is a dynamic exploration of urban parking structures, with an emphasis on re-adaptive and secondary uses for existing structures. The goal of the research project is to establish a complimentary matrix that can be utilized by cities with varying characteristics to decide the best practice for their existing parking structures. It is important to emphasize that other political, social, and economic factors can have a strong influence on the decision-making process. Similarly, not all cities have exceeded minimal parking requirements for their urban areas, and the best practice may often prove to be using the structure for its intended purpose, though we will further explore this in a later chapter.

The first step in creating a matrix to collect, analyze, and decide best practices for adaptive re-use of parking structures is understanding how each parking structure, or parking garage differs. Questions we have had to ask include: How did they construct the garage? What is the structure's ELT, or estimated lifetime? Are there current design characteristics that lend themselves to a secondary use? Is the structure under or over utilized? When are peak parking hours for the area? By starting with these types of questions, our research began with the basics, and understanding how people turned to building these massive, quasi-permanent parking structures in the first place.

The next step in our project was identifying relevant case studies of urban parking structures and utilizing these cases to form our matrix. By identifying opportunities and constraints that past projects encountered it was time to form our own criteria for deciding secondary uses and re-adapting these structures to their best form. In doing this research we were able to cross-examine the pros and cons of various designs, uses, and built environments which had successful parking structures for varying reasons. We diligently considered factors such as urban density, peak parking demand, existing infrastructure, environmental and geographic conditions.

With a dependable matrix in place it was our goal to test our research against a City like San Luis Obispo. With a modest climate, population, political atmosphere, and access to funding for their downtown infrastructure, the city of San Luis Obispo proved to be a perfect fit for our

project matrix. By using our established criteria, we were able to do a thorough example of how the matrix could be used as a planning tool in various places.

2.0 Project Goals

The main objective of the project is to present clear and concise research material, analyze this material from a number of converging perspectives, and to finally create the basis for a planning document that can guide professionals and decision makers in making future decisions about parking structures in urban settings. This final product will be known as the project matrix.

Another project goal is to incorporate a number of documents to complement our matrix, and the decisions that go into it. These documents included case studies, existing conditions, and a section on planning literature. In doing these documents the goals were clear for each. The case studies and existing conditions highlighted successful and unsuccessful practices that cities had taken on before, and further explored the circumstances that led to the success or failure of these projects. By reviewing these cases, and using analytical techniques to figure out pertinent information, the goal is that multiple cases, perspectives, and differing attempts at the same solution will all provide for a diverse and beneficial set of best practices as a guideline. This guideline obviously being a key part in creating the project matrix.

3.0 Introduction

3.1 Parking structures history and background

Cars have long been seen as a symbol of American culture. As early as 1929, there were an estimated 23 million cars on the roads in the United States, and people quickly realized that this many vehicles would require additional infrastructure. Thus, the parking structure was born, and gained in popularity during the 1950's when American families enjoyed an economic boom and purchased more cars than ever before. (Engelhard, 2010)



Early parking garages were staffed with professional parking attendants, but by the end of the decade self-parking gained popularity. Parking garages were touted as an economic investment that encouraged people to visit city centers and spend money downtown-- something beneficial for the local businesses. Parking structures were often built in downtown areas in order to compete with shopping malls and curb the effects of suburban sprawl on downtown vitality. As shopping malls have recently lost the mass appeal that they attained in the 1990's, many of the massive parking structures built to serve these malls now stand vacant a large majority of the time (Quain, 2019).

Recently, many cities have shifted their focus from creating infrastructure made to accommodate vehicles, to infrastructure that supports pedestrians and cyclists. Cities like Seattle, Denver, and San Francisco are on the cutting-edge of sustainable practices, seeking a solution to the issue of high land value and demand for housing close to the city center (Engelhard, 2010). Transit-oriented development and an emerging pattern of declining rates of personal car ownership in these metropolitan cities has raised questions of what to do with the remaining car infrastructure that might no longer serve the long-term vision of the city.



3.2 Parking Structure Typology

Types of parking structures, as used in this report.



SURFACE PARKING--Can be in the form of street parking or a separate, designated area with multiple spaces. This type of parking is usually adequate for residential and some mixed-use areas.



SINGLE-LEVEL PARKING GARAGE--Structure with only one level of designated parking spaces. Can be either completely or partially enclosed by an exterior structure.



MULTI LEVEL PARKING GARAGE--Structure with two or more stories of designated parking spaces enclosed in an exterior structure.



UNDERGROUND GARAGE--Parking is located beneath the street-level. Can be single or multi-level. Can be attached or detached.



ATTACHED VS DETACHED GARAGE--An attached garage is one that is physically connected to the business that it serves, such as a mall with an attached parking garage. Detached garages are designed to serve multiple businesses or an entire downtown area, for example.

Within each of the categories of multilevel structures there are additional defining features such as the ramp-type. Ramp-type will significantly affect the potential and direction a structure has for adaptive reuse in the future.

Some of these ramp types include:

INTERIOR (MOST COMMON)

EXTERIOR

VEHICLE LIFTS/ELEVATORS

AUTOMATED ROBOT SYSTEMS (combination of ramp and elevator)

3.3 Fundamentals of Adaptive Reuse

The basic premise of adaptive reuse is the repurposing of an existing building or structure for a new use, or one that is different from the originally intended use of the building. This is an important concept of design within architecture, historical preservation, and urban planning. Adaptive reuse can be a cost-effective and eco-conscious tool for planners that are tasked with establishing effective land use practices that are most productive and useful for the community which they aim to serve (Hickman, 2017) (Lee, 2017).

An adaptive reuse model can prolong a building's life by retaining some or all of the building materials, including the structure, shell, and even occasionally interior features. While there is some question as to the true economic and environmental benefits associated with adaptive reuse, the overwhelming conclusion is that limiting waste in both the construction and demolition of structures is something that is better for people and better for the planet.

It is important to note that the process of adaptive reuse is very different from that of new construction and must be planned and managed differently. While adaptive reuse is most commonly employed as a means of preserving a historically or architecturally significant building, it is also an effective tool in revitalizing any structure that is underutilized, vacant, dilapidated, or functionally obsolete. A building that is not otherwise aesthetically pleasing or historically significant might still be a potential candidate for adaptive reuse if there is a different

use that would be more beneficial to the community (Nettler, Replacing Parking with People: The Next Wave of Adaptive Reuse, 2013).

3.4 Positive and Negative Effects

Positive Effects

The primary benefit of adaptive reuse is the reestablishment of a building that serves a community need where it otherwise did not. Adaptive reuse is only beneficial if an otherwise defunct or vacant structure is converted into a community-asset that fulfills a specific purpose without displacing or otherwise disenfranchising the community and area it is intended to serve.

Community Character:

Adaptive reuse can give new life to historic and cultural sites while maintaining the integrity and sense of place in the community. New construction is often controversial and can seem out of place or sterile in otherwise culturally rich areas. By adapting an existing structure, adaptive reuse can serve as a symbol of progress in a community while still being deeply rooted in the area's past (Newman, 2019).

Sustainability:

Neighborhood and community sustainability is crucial to avoid the effects of suburban sprawl and to better allocate resources. Existing buildings are typically located in populated, well-established areas that would ultimately benefit from the revitalization of an otherwise defunct or vacant building.

Energy Conservation: Adaptive reuse generally conserves energy when compared to a traditional new build of approximately the same size. This is achieved because structures and materials are repurposed and existing infrastructure such as roads and utilities are already in place.

Market Value: Older buildings often retain architectural characteristics that are considered aesthetically pleasing, unique, or otherwise too time-consuming or expensive to replicate today. This means that retaining these features through adaptive reuse will add value through quality materials and construction without requiring additional investment.

Time: Adaptive reuse could offer significant time savings, as some of the most time and labor-intensive aspects of a new build involve site preparation, establishing road and infrastructure connectivity, and creating the building's foundation. These crucial first steps in building construction may be greatly reduced or eliminated altogether if the existing structure is in good condition.

Environmental: Environmental and public-health benefits have been associated with adaptive reuse. This is because adaptive reuse is able to significantly reduce the production of contaminants and hazardous materials associated with both demolition and new development.

Investment: Adaptive reuse encourages investment, development, and revitalization. By giving new life to a building that is otherwise defunct or vacant, adaptive reuse has the potential to encourage further investment in the community through tax generation and new employment opportunities (Lee, 2017).

Negative Effects

Adaptive reuse can negatively impact a community if it is not executed with a great deal of cultural awareness and community involvement. When done incorrectly, adaptive reuse can highlight socioeconomic discrepancies and increase tension within a community. These projects should always be approached through a lens of contextual understanding--who is this building important to as it currently stands? How can the building be made functional while still honoring the history that surrounds it? Will an adaptive reuse project displace residents or make this neighborhood unattainable to the current demographic?

Regulatory Limitations: An existing building is likely zoned for a specific activity that may not be the same as the zoning required for the building's new intended use. For example, if a building is zoned as residential but it is to be converted into a community center, it might be a lengthy or difficult process to go through rezoning or gain a project exemption through channels of local government. Furthermore, very old or dilapidated buildings might prove challenging to renovate because they might predate modern building codes or materials which would necessitate additional, costly work in order to meet current safety standards. There are also constraints enforced by historic preservation programs that limit the kinds of changes that can be made to a structure that has been declared historically significant.

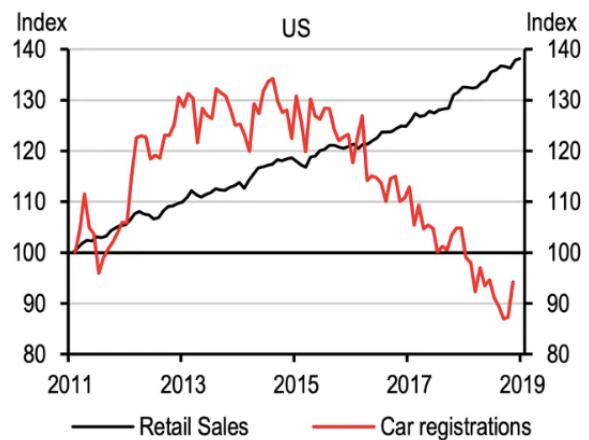
Physical Constraints: A great deal of creativity and flexibility is required in an adaptive reuse project because there are often unforeseen challenges structurally, electrically, or otherwise when dealing with an old or vacant structure. If the building's new use veers greatly from the original intended use, it might prove challenging to retain some of the most aesthetically or historically significant features while fulfilling the building's new purpose. Some adaptive reuse projects that

have encountered such constraints are ultimately unable to retain these features or do so only by making costly design compromises.

Environmental Consequences: Some materials used in the construction of older buildings may contain environmental contaminants such as lead or asbestos which have negative environmental implications. It is also expensive and time consuming to safely remove these materials, which can have an overall negative impact on the adaptive reuse project. There are also some arguments to be made for the environmental benefits of green technology and infrastructure that can be incorporated into new development.

3.5 Parking, Land-Use, & Urban Planning

The height of personal vehicle usage might be behind us. Personal vehicles have long-been a symbol of American culture; the image of wide-open roads and a gas-guzzling car practically ingrained into our collective memories. However, with climate change at the forefront of global concerns, younger people have slowly begun to question whether personal vehicle usage is congruent with a more forward-thinking, sustainable society.



Source: Refinitiv Datastream
This data represents total US car registrations, meaning the entire population of cars in the US, not just new sales. HSBC

Declining personal vehicle ownership paired with the growing popularity of ride-sharing services might soon render some of the costly infrastructure, erected to support more and more cars on the road, underutilized eyesores. A glaring example of such infrastructure is the ever-popular parking structure. Although some economic benefits can be argued in favor of creating more accessible parking--especially around a downtown core, where many people work and shop--parking structures are not an environmentally or aesthetically satisfactory solution to the parking problem many cities are faced with today.

According to Planetizen, “A typical surface parking space costs \$5,000-10,000, and structured and underground parking spaces cost \$20,000 to \$80,000 in construction costs” This means that

in order to recover the price of a single urban parking spot accounting for land, construction, and maintenance costs approximately \$800 to \$3,000, annually. It is also important to note that most of these structures are at least partially subsidized, “paid indirectly through taxes and building rents, which adds to the costs of goods and services.” That is to say, lower income households that own the average number of vehicles (1.9) or less, are paying proportionately more money to subsidize this infrastructure than their wealthier counterpart with more vehicles than the national average (University of Delaware, n.d.).

Because expensive, massive parking garages have been regarded as improving the convenience and frequency of trips made, there has been a general overestimation of how necessary and beneficial these structures truly are.

“Most parking generation studies are performed in automobile-dependent locations, based on 85th percentile demand curves (which means that 85 out of 100 sites will have unoccupied parking spaces even during peak periods), use an 85th occupancy rate (a parking facility is considered full if 85% of spaces are occupied), and a 10th design hour (parking facilities are sized to fill only ten hours per year).”

This means that parking structures are designed to be underutilized, despite the costly and environmentally destructive methods of construction. This also means that communities that are actively moving towards sustainability and away from personal vehicle usage are still receiving professional recommendations to increase the amount of parking available, regardless of whether doing so is in-line with their long-term community goals. An abundance of inexpensive parking provides an incentive to travel by car and renders alternative forms of transportation inconvenient in comparison. That is to say, in a day and age when planners, scientists, policy-makers and other professionals verify that encouraging people to walk, bike, or utilize transportation falls under best practices, minimum parking requirements are ultimately not conducive to this end-goal (Roth, 2020).

As costly as it is to create these behemoth structures, it is considerably more expensive and arguably counterproductive to tear down such permanent, sturdy structures that are primarily

made out of concrete. Despite an overall downward trend in the demand for parking structures, many cities are still in the process of approving or overseeing their construction. This means that there are certain policies and standards that should be enforced to ensure structures are more efficient and aesthetically pleasing. Some of these adjustments and policies include factoring in geographic location and regional statistics, residential density, employment density, and examining the mix of land-uses in the area to analyze how each of these variables affects trip generation (Newman, 2019).

The issue of parking can be examined from numerous angles and at many scales, however, in terms of policy development and for the purposes of this report, it is imperative to analyze the topic at a state-level. The State of California faces many unique challenges in the realm of land-use and capacity planning in the upcoming years that warrant further research and corresponding analysis. The so-called housing crisis California is facing is prevalent up and down the state, including the Central Coast. At a time when the jobs-housing balance is severely disproportionate and land in California's metropolitan areas has become increasingly unaffordable, solutions that incorporate adaptive reuse, creative retrofitting, and sustainable designs are at the forefront of the planning conversation. Underutilized parking structures may present an unconventional solution to the state's housing crisis, or at least present options for people who are in dire need of basic shelter from the elements. Transforming parking structures into temporary shelter facilities is a form of adaptive reuse or repurposing that takes advantage of public infrastructure that is already in place.

The housing crisis is nowhere more apparent than in the Los Angeles metropolitan area. The area's mounting homeless population is cited as a noteworthy area of concern for residents across the economic spectrum, and there doesn't seem to be an end in sight. A creative approach to the problem endorsed by Los Angeles Mayor Eric Garcetti is the conversion of a city-owned parking lot located in Koreatown into a temporary shelter. The concept behind this project is clear; any form of shelter from the elements and more structured temporary facilities are preferable to the tents and unofficial encampments that many homeless find themselves in. These encampments quickly deteriorate due to poor sanitary and safety conditions, and are

especially detrimental to certain sects of particularly vulnerable homeless people who suffer with disabilities, including mental illness and substance abuse issues.

An even simpler solution is currently being modeled in Santa Barbara and the neighboring city of Goleta, wherein the Safe Parking Program designates certain parking areas as being safe for overnight parking for individuals who live in their vehicles.

Table 2 Old and New Parking Paradigms Compared

Old Paradigm	New Paradigm
<i>Parking problem</i> means inadequate parking supply.	There can be many types of parking problems, including inadequate or excessive supply, too low or high prices, inadequate user information, and inefficient management.
<i>Transportation</i> means driving.	Travelers may use various modes. Not everybody drives.
Abundant parking supply is always desirable.	Too much supply is as harmful as too little.
All parking demand should be satisfied on-site. Motorists should not be forced to walk to their cars.	Parking can often be provided off-site, allowing sharing of parking facilities among various destinations.
Parking should generally be provided free, funded indirectly, through rents and taxes.	As much as possible, users should pay directly for parking facilities.
Parking should be available on a first-come basis.	Parking should be regulated to favor higher priority uses and encourage efficiency.
Parking requirements should be applied rigidly, without exception or variation.	Parking requirements should reflect each particular situation, and should be applied flexibly.
Innovation faces a high burden of proof and should only be applied if proven and widely accepted.	Innovations should be encouraged, since even unsuccessful experiments can provide useful information.
Parking management is a last resort, to be applied only if increasing supply is infeasible.	Parking management programs should be widely applied to prevent parking problems.
Land use dispersion (sprawl) is acceptable or even desirable.	Dispersed, automobile-dependent development can be harmful.

Parking management changes the way parking problems are defined and solutions evaluated.

4.0 Planning Literature Review

In order to efficiently integrate tried and proven theories and practices of repurposing existing urban parking garages into our project matrix, it was important we studied planning documents that suitably explore multiple dimensions and perspectives of alternative ideas. Creating the basis for a planning document that guides municipalities who seek to revitalize or re-establish their urban parking structures requires an array of converging ideas, and clear circumstantial guidance. The following planning literature sources were what we used in order to form conclusions for the project matrix.

In the 2019 article, “Resilience through Regeneration: The economics of repurposing vacant land with green infrastructure” authors Newman, Dongying, Dingding, and Rui explore multiple levels of repurposing vacant urban land, or unused structures, as in the case of many parking garages. The article looks specifically at three marginalized neighborhoods in Houston, Texas, USA. As mentioned in the article, vacant land rates are significant indicators of growth, or decline of a city, or more specifically they can indicate how a specific sector may be performing. For the case of our project with parking garages this is a key element, as consistently underutilized parking spaces are clear indications of a need to repurpose existing infrastructure. A stifling statistic, that nearly 17% of each large U.S. city’s land area is considered vacant, with an average of 4% of city structures unoccupied, shows just how much revitalization is required in some places (Newman, 2016).

The research team provided three major findings from their research when using green infrastructure, such as green rooftops, to regenerate vacant properties: 1) flood risks continually decreased 2) upfront economic costs increase in the short term 3) the long-term economic return on investment is much higher. With these three findings it is also important to establish the context of the vacant land rates in America. The ratio of vacant land to city size has increased by 1.3% since 1998, indicating a growing problem (Newman, 2016). While regional variations exist in both the amount and type of urban vacancies, many vacant parcels are small, odd-shaped, and disconnected, making them difficult to regenerate or repurpose. The authors discuss that, “disinvestment, suburbanization, and annexation are reported as the primary causes of increases in vacant land, while growing local economies, population immigration, and city policies tend to help reduce the amount of vacant land” (Newman, 2018). When comparing these decisive factors against the reasons for urban parking garages becoming under-utilized, or even abandoned, we find a major similarity in the complications from things like disinvestment, and benefits seen by growing economies and positive city policy.

In conclusion, this article allowed us to form important determinations based upon criteria such as the ones mentioned above from disinvestment, to city policy, which may deem an urban structure, such as a parking garage as an ideal candidate for either a secondary use, or for repurposing.

Another piece of planning literature that guided our project was an article shared during the 24th ISUF International Conference for City and territory in the Globalization age, held in Valencia, 2017. The article, “Second life of great American parking garages: Exploring the potential of adaptive reuse of urban parking structures in the American cities” by Ming-Chun Lee, explored a multitude of basic and advanced theories of adaptive reuse of parking garages. Building off of the previously reviewed article, about land vacancy and integrating green infrastructure, Lee’s article provided us with valuable insight into the types of repurposing of parking garages that can be explored, and positive and negative connections to these decisions (Quain, 2019).

A major influence on the work that Lee did was the assumption that current future models are correctly identifying a, “transition in the building industry, which aims toward the new trend of going car-less” (Lee, pp. 830) Lee explains that this trend is clearly driven by three major pillars. First, better public transit options in downtown cores means less need for urban parking spaces. Second, a public awareness movement in sustainability means residents are trying to reduce personal automobile dependency more than ever before. Lastly, the advancements in autonomous vehicles, and smart infrastructure are all contributing to making parking garages obsolete.

“The era of designing cities as if car access alone was sufficient appears to have ended. An opportunity lies where the existing underused parking garages can be repurposed into residential, entertainment, or workspaces rather than paying up for demolition and construction costs of an altogether new structure” (Lee, pp 823).

With a clear understanding of why parking garages are becoming available for repurposing efforts as underutilized structures, it is important to find proven designs and ideas that provide nearby communities with the best alternative use plan. As in the statement above, Lee discusses multiple types of land uses that could be incorporated into the repurposed design. It is very important that opportunity costs, and alternative measures are considered thoroughly and without bias before any decision is made, because every community will have different economic, social and geographic factors to calculate in. A case the author, Lee, chose to analyze was a large exterior parking garage set in the east part of the Kreuzberg in Berlin. Previously, the garage

was used to provide parking for a large commercial development which was never constructed. The city allowed the large vacant structure to sit for roughly six years before deciding the abandoned structure attributed to blight in the neighborhood (Nettler, 2013).

Eventually two contracted architects were allowed to redesign the existing structure into a kindergarten. Key elements in this case were that the neighborhood was an up and coming area, which had a significant concentration of young families with children. The architects saw reusing this garage as a powerful statement, taking an abandoned waste of space, and creating an exciting, and unique building. For context the existing parking garage was not in any way built with repurposing in mind. Lee explains the dimensions, “The existing garage was approximately 40 feet tall, and contained 7 staggered half floors. The staggered floors were likely to reduce the vertical distance that needed to be spanned by ramps between each level. There was a ramp at each end of the building connecting the floors. The garage had a steel frame structure that was infilled, both floors and exterior cladding with precast concrete panels. The footprint of the building was approximately 125 FT by 115 FT, giving it around 50,000 square feet of enclosed space” (Lee pp 826).

Because of the existing layout, for parking cars, design elements that architects Frown, and Spangenberg used to convert the building were determining factors of how this project turned out. The first design element was converting the roof and upper three floors to a greenhouse like structure, essentially creating a double high ceiling, and a central point for natural light to flood the rest of the structure. As for the structural integrity of the building Lee shares, “The building’s steel frame structure and infilled precast concrete system made this intervention manageable without the need of new structural interventions and is an excellent example of a desirable system when considering the reuse of an existing garage (Strasse, 1984).

In conclusion, this article provided detailed analysis of the specific types of repurposing that can take place. Our project matrix uses direct influences from this article in order to guide the planning decisions of concern. Building upon the last article, which discussed when cities may need to determine areas which are vacant, abandoned, or underutilized, based upon vacancy

rates; Lee's article picked up at the next phase. A key decision in the repurposing process is determining a use, and with that established, picking a complimentary design.

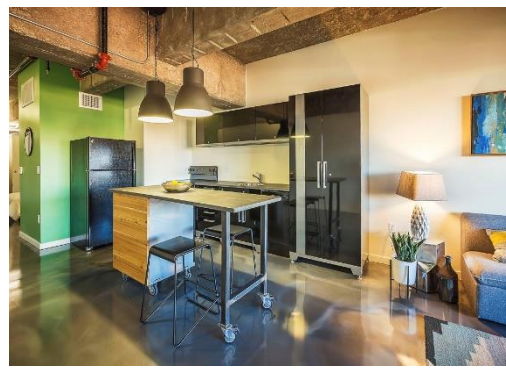
5.0 Case Studies

CASE 1: BROADWAY AUTOPARK // KNIGHTLEY'S PARKING GARAGE

Old and obsolete, a former concrete parking structure in Wichita, Kansas was given new purpose through adaptive reuse. The parking structure was originally erected in 1949, had the capacity to hold 500 cars, and was considered a civic and commercial asset to the Wichita area. Privately owned, the Knightley Parking Garage, as it was known then, was attendant-operated and also served as offices for a local oil corporation for a number of years. The structure functioned as intended until 1980 when the popularity of self-parking garages grew, and the valet parking service was no longer in high demand. As a result of changing technology and parking preferences, the Knightley's Parking Garage sat vacant and in a state of disrepair until it was purchased by the Bokeh Development company in 2016 (Riedl, 2018).

One of the first things Bokeh Development did after acquiring the structure was get the structure approved and listed on both the State and National Register of Historic Places. These two institutions enforce specific, strict preservation and renovation requirements that influenced how this adaptive reuse project would progress. Another obstacle the developers encountered surrounded zoning restrictions; specifically, the building had to be converted from an open-air parking structure to a residential, medium-density occupancy building. This change in zoning required compliance with the International Building Code, as well as the approval of local governing bodies. Despite these obstacles, the developers were able to create a unique and appealing 44-unit apartment building that consists of one-bedroom apartments with a unique front-door parking amenity. The architects were able to repurpose the garage in a way that capitalized on the structure's existing features in order to create innovative residential perks such as balconies for each unit and a trash-chute. Although it is unclear whether this was an economically effective model for retrofitting, it is clear that the overall environmental and cultural impact associated with demolishing a prominent concrete structure is no small pill to swallow. Providing needed housing by repurposing an existing structure has, in this case, proven

effective and popular in the instance of the Broadway Auto park apartment building (Riedl, 2018) (Nettler, 2013).



CASE 2: SCADpad, ATLANTA GEORGIA

Located in Atlanta, Georgia, SCADpad is an innovative housing solution introduced to the Savannah College of Art and Design (SCAD) campus parking structure in 2014. The SCADpad project is an experiment in adaptive reuse through the creation of several 135-square-foot micro apartments designed to fit into the tiny footprint of a standard parking space. These micro apartments are designed with a particular renter in-mind--namely, a single student or young professional looking to live directly in the city center who would

81% of the U.S. population resides in urban areas

SCADpad is a solution

to the growing need for suitable, sustainable, efficient housing in cities worldwide.



105 million:

Parking spaces in the U.S. That's **5 spaces** for every car.



50%:

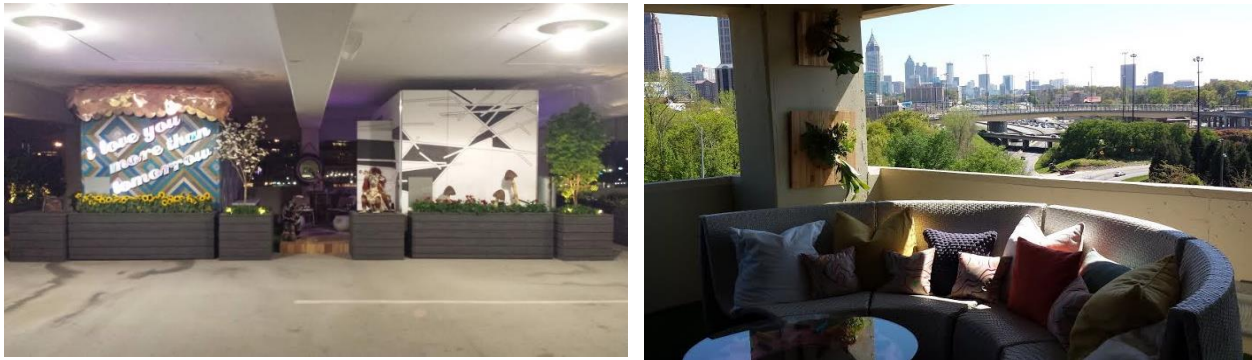
At least half of all available parking spaces are vacant **40%** of the time.

CULTIVATING A NEW VISION FOR AN URBAN COMMUNITY
"THE GREENEST BUILDING IS ONE THAT'S ALREADY BUILT."

— NATIONAL TRUST FOR HISTORIC PRESERVATION

otherwise be unable to afford the cost of renting a typical apartment in the area. Atlanta is a sprawling metropolis that, up until recently, has been dominated by completely car-oriented infrastructure. However, as is the case in many college-areas, students and faculty at the Savannah College of Art and Design had begun to embrace car sharing, cycling, and other forms of alternate transportation. People soon began to realize how underutilized the behemoth five-story midcentury parking structure on campus had become. This led to a huge collaborative effort involving over 100 SCAD students, alumni, and faculty members across multiple disciplines (Hickman, 2017) (Riedl, 2018).

The forward-thinking approach of this project is truly captured by the artistic and community-based design of the site, which includes a park, community garden, workstation and recreational areas. Rather than creating large, nondescript sleeping areas, the SCADpad project infused each tiny living space with vibrant personality and colors to meet the needs of the future creative tenants. Community spaces were emphasized in the design process because students and staff wanted to encourage residents to get out of their personal living area and interact on a community-level (Hickman, 2017).



The views enjoyed by SCADpad residents are typical Atlanta views that feature nearly 360 degrees of freeway and skyline scenes.

The SCADpad project is inundated with several innovations that define the community as being dedicated to the spirit of urban renewal. One of these features includes the filtered greywater system that provides the community garden with 12-15 gallons of water daily. Also, within SCADpad's living units and communal areas the furniture has been designed and created by SCAD students, contributing to the feeling of a living community that is culturally integrated and unique to the university. Finally, the SCADpad idea space is a creative and collaborative zone

that encourages residents and their guests to work together to generate ideas and solutions for the future--this might even be where the next great project like SCADpad will be born. Overall, SCADpad is an exploration of urban design and renewal principles that demonstrate just how much room for exploration exists as we move away from car-oriented development and towards designs created for people (Hickman, 2017).

6.0 Project Matrix

The next chapter will introduce, and explain our project matrix. The following matrix was created using a three-prong approach to project development, with each step more specific and detailed than the last. This tool was made with the intention of guiding decision-makers to the best possible solution for a given parking structure with certain fundamental characteristics outlined in the matrix. The first prong seeks to help the project manager or planner determine whether or not a specific parking structure is a candidate for potential adaptive reuse.

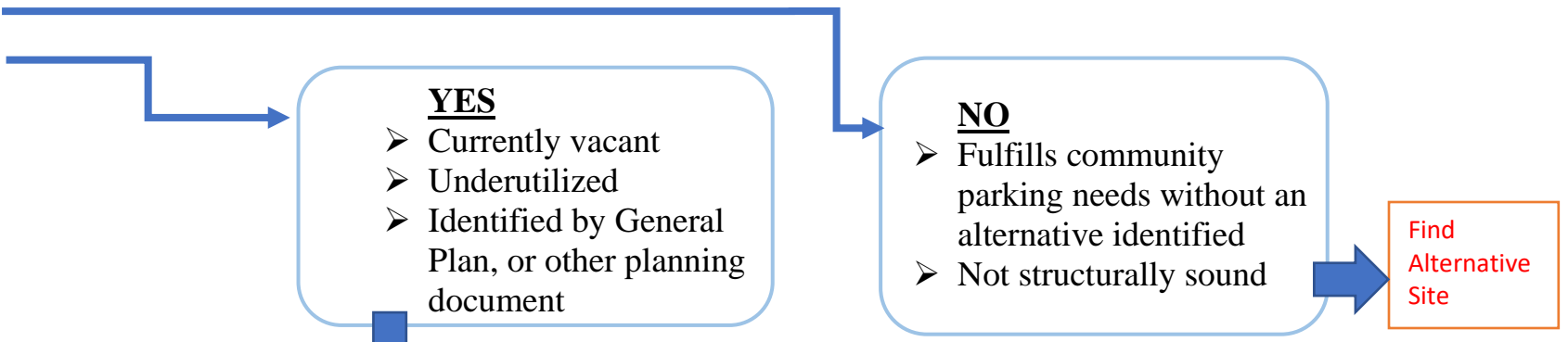
If a project fits the criteria, the second prong then leads the planner to consider potential land-use designations that would be best suited for their project. When considering a land-use, we have chosen to analyze a project site along the parameters of community, location, and building condition. When it comes to community, adaptive reuse projects can be some of the most widely supported or contested project types that exist. This is because many communities feel strongly about the character of their community and the existing structures that have come to define it. It is important to emphasize that there is a difference between what a community lacks and what a community actively wants, as these two things don't always align. Furthermore, it is critical that any project is developed with a great deal of community input and engagement--especially in the initial design process--as adaptive reuse can be met with criticism if not handled with a high degree of sensitivity and respect.

The final prong of our matrix further narrows this by cataloging desirable building characteristics that serve as opportunities for a certain type of land development. The use-types include: residential, office, retail, recreation, and mixed-use. By focusing on finding the right project-type for a particular site, the matrix enables decision-makers to address concerns along measured criteria in order to reach the best decision possible.

Is it a candidate for reuse?

Exploring a land use:

Determining a land use:



<u>Community</u>	<u>Location</u>	<u>Building Condition</u>
Is a specific use identified as a priority in the community?	Nearby amenities Proximity to downtown core	Does it require structural modifications?
Does the community lack a specific resource or facility?	Proximity to existing uses i.e.- residential, office/retail, public facility, recreational	Is the building to be partially or completely repurposed?

Land Use

Opportunities for Residential uses: open or enclosed design, garage has interior access ramp, reinforced structure, non-sloped interior levels, nearby amenities (market, gym, etc.), surrounding views.

Opportunities for Office uses: open or enclosed structure, exterior access ramp, non-sloped levels, reinforced structure, nearby restaurants and open space.

Opportunities for Retail uses: enclosed structure, exterior access ramp, reinforced structure, non-sloped interior levels, preferably multiple levels for storage reasons.

Opportunities for Recreational uses: open or enclosed structure, exterior or interior access ramp, sloped or non-sloped levels, structure doesn't require reinforced support, flexible option.

Opportunities for Mixed uses: open or enclosed structure, exterior or interior access ramp, sloped or non-sloped levels, structure doesn't require reinforced support, part-time secondary use is possible, most flexible option.

6.1 Land-uses explained

Residential: There are two main types of housing opportunities to consider in the adaptive reuse of a parking structure. Temporary or transitional shelter is most necessary in higher density urban centers with large homeless populations or areas that have recently encountered a natural disaster. Either open or closed parking structures can be adapted to serve this purpose, however, open parking structures are better suited to accommodate individuals or families in cars that need a safe spot to park overnight. A structure might be converted into permanent housing through the creative use of shipping containers or other mobile homes that can be installed directly into the garage with little need for structural modification. Parking structures have been modified to varying degrees throughout numerous case studies to provide housing or shelter for people from all different backgrounds (Engelhard, 2010).

Mixed-use: If a parking structure is still being used to park cars at least some of the time, but is being phased out of use or is only ever partially used, it might be a candidate for a mixed-use project. By keeping the bottom floor of a structure as parking, adaptive reuse can be implemented to part of a structure in order to meet some other community need. Mixed and adaptive reuse might also apply to temporary uses during a certain time of day. For example, if a parking structure is empty most nights, a city might choose to hold a farmer's market or other community event in this space during the evening. Cities that are short on green spaces might opt to convert the roof of a parking structure into a unique public area with ample greenery and a 360-degree view of the city (Newman G, 2016).

Office: For cities that are looking to attract more businesses to a certain area, converting a parking garage into office space might be an ideal solution. With built in character, a converted garage is a great opportunity for new or established businesses to invest in the community in a way that acknowledges the history behind the structure. A parking garage might accommodate a variety of businesses due to features such as the sturdy structure, included parking, and potential for large collaborative spaces.

Retail: By converting a parking structure into retail space, an important community need such as a grocery store or space for local businesses might be met. Furthermore, introducing retail into an area that used to be dominated by cars brings new life and economic opportunities to an area where there otherwise was none.

Recreational: Many urban centers provide more spaces for cars than they do for people. By converting a parking structure into recreational space, there are more opportunities for community activity and resources that contribute to public health. Many communities would benefit from having a greater diversity of activities and programming in their neighborhood that meets the needs of specific groups such as the elderly or teens. Recreational centers are community assets that provide opportunities for physical and social activities beyond the typical green space or park (Nettler, Study Confirms Environmental Benefits of Adaptive Reuse, 2012).

7.0 Applying the matrix: San Luis Obispo

7.1 Background of Slo

Located along the Central Coast of California, San Luis Obispo is a smaller college town with a population of around 45,000. Nestled approximately 190 miles north of Los Angeles and 230 miles south of San Francisco, San Luis Obispo maintains a small-town feel despite being the county seat of the greater San Luis Obispo County area. Due to the influence of the large state university, California Polytechnic State University, San Luis Obispo attracts many young people from across the state, as well as being known as an ideal place to retire from faster-paced city life found in the Bay or Los Angeles Metropolitan area.

Demographically, the City is primarily white (84.5%), followed by the Hispanic population (14.7%), and the Asian population (5.2%). This is slightly different from the overall demographic breakdown of the County, which has a 20.8% Hispanic population and a 82.6% white population. Despite the median family income of \$87,635, a reported 32.4% of the population lives below the poverty line.

Downtown San Luis Obispo is centered around the Mission San Luis Obispo de Tolosa, and is defined by a lively atmosphere and culture that is influenced by the area’s rich history. There are currently more than 180 historic buildings that have been identified with the City of San Luis Obispo Historic Resources. Of these resources, three have received additional recognition at the state-level and have been designated California Historic Landmarks, and eight have been listed on the National Register of Historic Places. Further, there are currently five designated historic districts in San Luis Obispo: Chinatown, Old Town, Mill Street, and Railroad. These districts also happen to cluster around the most heavily populated and centrally located downtown areas in San Luis Obispo.

7.2 Existing conditions

In order to apply our matrix to San Luis Obispo, it was important to first create an existing conditions report on the garages in the downtown area. By researching the general background and specific characteristics of each garage in the context of the greater city of San Luis Obispo, one is able to understand the context behind our application of the project matrix.



As seen in the parking rate zones map; the city of Slo offers an abundance of parking options in the downtown area. In addition to coin and credit card parking meters, and surface lots around the perimeter of the downtown, there are three large parking garages.

871 Marsh St. Garage



The Marsh St. Garage is a multi-story car park with a 360-degree view of the downtown area, including breathtaking views of several of the local seven sisters' mountains. The garage takes up nearly an entire city block with access from either Marsh or Pacific. This garage is clearly the most efficient garage, sitting right in the heart of downtown, and reaching close to full capacity not only during peak parking times such as Thursdays for the downtown farmers market, but during regular business hours as well. Nearby amenities are abundant, as the structure exists as a large mixed-use structure already. The characteristics of the garage are as follows: semi-open structure, interior ramp, 5-stories and additional rooftop parking, non-sloped levels, reinforced concrete structure.

842 Palm St. Garage



Next is the Palm St. Garage, located on the northern end of downtown. This garage is much smaller in comparison to the other two existing structures, offering considerably less spots than the larger Marsh St. Garage. During regular hours this garage can be found mostly vacant, rarely reaching capacity. With a low building height, the garage does not have surrounding views of the city. Because of the distance from the downtown center this garage does not have many amenities nearby, although the area has recently developed a large mixed-use building with office/residential spaces on the adjacent city block. The garage characteristics are as follows: 3 stories with additional rooftop parking, interior ramp with alternative exterior ramp used as handicap access at this point, open structure design, reinforced structure, first 2 levels are non-sloped, third level is sloped.

919 Palm St. Garage



The third garage is located at 919 Palm St. known as the City of San Luis Obispo parking garage. For multiple reasons this garage is a moderation between the central Marsh St. Garage, and the outwardly located 842 Palm St. Garage. Another mixed-use structure, this building serves as a municipal building for the City Public Works Department. The additional 4 stories and rooftop are used exclusively for public parking. Located one block from the urban center there are nearby amenities such as restaurants and small businesses. The structure has the following building characteristics: 5 stories total, interior access ramp, non-sloped levels, closed structure, reinforced steel support.

7.3 Applying the Matrix

Applying the principles of our matrix to San Luis Obispo immediately leads to the elimination of two of the three central parking structures from being a candidate for adaptive reuse. These two parking structures, located on Marsh Street and 919 Palm Street respectively, are not yet candidates for adaptive reuse because they currently fulfil their intended purpose. These two parking structures provide much-needed parking to the bustling downtown area that attracts tourists, students, and people from across the County to shop, work, and visit.

While these structures serve an important function in the City, it might be beneficial to concentrate public parking in two of these buildings rather than further distributing parking availability to the third garage located at 842 Palm Street. These three parking garages are located within one square mile of one another which means that the least popular of the structures frequently sits completely vacant. Despite their close proximity, the 842 Palm Street structure is less popular than the other two because it is furthest from the downtown core with few nearby attractions that would cause a need for additional parking. The 842 Palm Street parking structure has been identified using the criteria from the first prong of our matrix as being the best candidate for an adaptive reuse project.

The second step in the matrix provides guidance on designating a general land-use for the adaptive reuse project selected. Based on the fact that there are very few shops or attractions located within walking distance of 842 Palm Street, this structure would probably not be an ideal candidate for a residential development, despite there being a perceived lack of housing in the area. Of the resources that are available in and around the area, there are not many amenities the community lacks outright. It is at this point that we would recommend a project manager do extensive community outreach in order to gauge the needs and desires of the community that would be most directly affected by the adaptive reuse of this structure.

Based on the popularity of San Luis Obispo's downtown farmers market, it might be a good opportunity to create an indoor vendor station for local businesses or restaurants in the form of a public market with semi-permanent booths. Another option for adaptive reuse could involve creating a green roof or public space on top of the structure to serve as a community resource which differs from the typical park. San Luis Obispo has a strict building height restriction that does not apply to parking structures. Because of this, there is a unique opportunity to capture some of the most breathtaking views the city has to offer from these rooftops, instead of wasting them as places for cars. With a few adaptive reuse options in mind, it is time to further narrow down a designated use based on the final prong of the matrix.

Based upon the design characteristics of the structure, we are able to apply the matrix and determine the best option for adaptive reuse. The interior ramp and sloped levels of the garage lend the structure to be a potential candidate for a mixed-use project with ground-level parking. The external (secondary) access ramp allows for multiple possible uses on the second and third stories, including office, retail, or recreational uses. Based upon the open design of the structure, the aforementioned features, along with the proximity to the downtown core, the matrix suggests office space is most suitable for the second level, which has non-sloped floors. Because of the high peak demand for parking during Thursday farmers markets, we have come to the conclusion that the first floor best remains open to overflow parking during peak demand, while the second story would best serve as converted office spaces, with a green roof on top, using the external service ramp as public access.

While the criteria used in the matrix takes a considerable amount of contextual knowledge, and the ability to solve local planning issues that extend beyond the scope of such a tool, the project matrix is a unique planning tool we've developed to help guide professionals who may not have any previous experience adapting a city parking structure.

8.0 Conclusion

The planning community has long dealt with the problems of the past, carefully working towards applying modern day solutions to age old problems. Parking structures are one of many of these “problems” that urban planners are beginning to deal with, and as the current personal vehicle usage trends continue to change, it is up to quick thinkers to create efficient, duplicable, adaptive reuse strategies that will enhance the existing environment of our urban fabrics. After months of research, drafting, and sharing our findings, there are two clear conclusions to be drawn from our project.

The first major conclusion is that most U.S. cities could seriously benefit from adaptive reuse of their underutilized parking garages. After thorough and thoughtful analysis of the pros and cons that cities may experience because of adaptive reuse, it is clear that financially, socially, and even politically cities can benefit from the unique spin that adaptive reuse serves to the community. While it could take millions of dollars to tear down an existing parking garage, it

would require a fraction of that money to readapt the existing structure for something that meets the community's needs immediately. This alone is a major victory for planners working toward sustainability, and efficiency.

Second, in 2020 we are currently at a point where we can choose now to change how we see the standard parking garage. While we are forced to deal with the outdated structures of the past, this is an opportunity to apply our knowledge and begin constructing parking garages with a secondary use already specified and designed for in the approval and development process. Some cities may be torn between investing in serving current parking needs, because they fear in ten years those needs will have changed. Because this is the truth, that the needs of citizens and communities change, we need to design parking structures that can serve people, once their duty to serving cars is up.

Exploring the merits and downfalls associated with adaptive reuse has taught us more about the planning discipline than we would have thought possible. The main influence on our project concept of adaptive reuse was established when we realized that these buildings are massive capital investments, and largely serve a utilitarian function rather than accommodating people, as modern planning strives to address. Parking garages are designed for cars but that doesn't mean they will always support this function, especially as transportation changes over time.

Adaptive reuse is a tool that should be taught to planners because it represents the intersection of design, function, context, and sustainability. Because planning is a multidisciplinary profession, it is rare that one approach to problem-solving can address each of these areas. While adaptive reuse is not the perfect solution for every situation, as personal vehicle ownership declines across the nation there will be environmental and economic ramifications if the remaining infrastructure is not managed and adapted to suit the changing needs of the community. This project was established with a simple question in mind; how can we change what no longer works for us? Furthermore, how do we make progress without further exploiting our finite resources? Adaptive reuse is just one of many answers to these crucial questions.

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