6 COST ANALYSIS OF PARKING INFRASTRUCTURE AT CHAPMAN

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6.1 INTRODUCTION

Many people in the world today have a great attachment to a personal vehicle, and along with this attachment, comes an inherent belief that parking is an individual right as an automobile driver. Many drivers are not aware of the costs associated with the infrastructure that they park in every day, largely due to the fact that these are sunk costs, and have no real impact on the drivers. These costs vary widely depending on the size, location, and amenities the structure provides. Typically, parking structures are located in prime locations to make them convenient, and in turn, the value of the land that is covered in the structure drops to considerably lower levels. Shoup cites Cutter and Franco (2012, p. 919) to conclude, “minimum parking requirements lower site density, increase land consumption, oversupply parking and reduce profits per unit of covered land.” Thus, land is devalued and sunk costs are being poured into an infrastructure that inadvertently contributes to global carbon emissions, while losing money that could contribute to sustainable transportation at Chapman University.

Funneling funding away from the construction of parking structures could create the chance to invest in transportation alternatives. Despite the fact that sustainable vehicles utilize the parking structures as well, the general progression towards a decrease in the number of parking structures would contribute to reversing the trend of a car driven campus. This chapter of the Chapman University 2017 Environmental Audit explores the costs associated with parking infrastructure, and addresses the issues with this positive feedback loop, where negative externalities continue to create larger negative externalities, thereby magnifying the problem.

The goals of this chapter are:

- Assess student behavior in regards to commuting to and from Chapman
- Analyze the costs associated with the construction, maintenance, and land value of parking infrastructure
- Identify ways in which the money that goes towards the above can be used towards sustainable transportation
- Identify what sustainable alternatives are feasible and would most likely be used
- Assess the difference between below grade and above grade parking structures and their individual impacts
6.2 HISTORY OF TRANSPORTATION

6.2.1 Overview

As Chapman University becomes more well-established, its merit is constantly increasing, creating a wider pool of students to attend the university. From 2008 to 2016, the undergraduate student population alone increased by almost 70% (Chapman University). This influx of students fills the campus sidewalks, bike racks, and ultimately parking structures. As illustrated in the 2015 Transportation Survey, the majority of students who live more than a mile away use a personal vehicle as their primary source of transportation, to and from Chapman. This calculates out to 91.01% of students living 2-10 miles from campus that drive individual vehicles (Chapman University). Many students find parking to be a stressful component of the day due to its limited availability during peak hours, and have long resorted to street parking, which incidentally, has strained Chapman's relations with the City of Orange. As a result, Chapman implemented an opt-out option for a parking permit, in which, if a student does not fill out the opt-out parking waiver, they are automatically billed for a parking pass, and will subsequently receive one, regardless of the need for this pass. Thus, this chapter is centered around the analysis of parking infrastructure costs, and evaluating the total economic cost attached to the land itself, its excavation, as well as the ongoing maintenance costs and the capacity towards funding alternative transportation options with the costs incurred.

6.2.2 Past Accomplishments

Despite the fact that it might not be widely known, Chapman does offer many incentives that attempt to curb single-passenger vehicle transportation and replace it with more sustainable options.

- Chapman offers a carpool program for staff, faculty, and students; whereby a group of students, staff and/or faculty can carpool to school, and each receive a parking pass at a discounted rate of $175 per person. The group receives a carpool tag that can be hung from the rearview mirror, and can be swapped between drivers on various days, depending on the agreement within each group. Not only does this decrease the number of cars in the parking lot, but it also reduces the number of cars on the road, furthering the goal of reducing Chapman's carbon footprint.

- If carpooling isn't an option, Chapman also offers discounted public transit passes. Chapman's U-pass plan with OCTA allows faculty, staff, and students to receive a discount on all OCTA transportation up to a maximum cost of $69 for faculty, and $45 for students. According to the 2013 transportation Audit, Orange County’s local train service, The Metrolink, offers a Corporate Quick Card program that provides commuter students, staff and faculty with a monthly subsidy of $50 to the first 60 people.

- Zipcar is another alternative being offered at Chapman, where anyone can rent a car for a limited amount of time. This offer includes, gas, insurance, and up to 180 miles a day, all for a rate discounted for students, faculty, and staff. There are two memberships offered: the occasional driving plan, which costs $70 a year, with driving rates of $8.50 an hour or $69 a day, or the monthly plan, which is $7 a month, with the same rate as the one prior.
The bike voucher is another program that can encourage more students to look to alternative transit. Those who wish to do so can fill out an application and if they qualify, will receive $350 to use at one of the local bike shops to cover the cost of a bike, helmet, lock, and any other bike accessories. Once receiving the voucher, the student must relinquish their right to a parking permit for the next two years.

Additionally, everyone is eligible for one raffle ticket for every school day they forgo driving their car to school in exchange for walking, biking, etc.

6.3 Current Status of Transportation

6.3.1 The Costs of Parking Infrastructure

Many people tend to overlook the costs associated with the infrastructure that houses their cars throughout the day, but it can become increasingly costly, depending on the complexity of the structure, as well as the location. Generally speaking, below grade infrastructure tends to be costlier, while above grade construction runs slightly cheaper. According to Gary Cudney, C.E.O. and president of Carl Walker parking consultants, "The median construction cost for a new parking structure is $18,599 per space," around $1,000 more for cities like San Diego and Los Angeles," and $55.66 per square foot." Additional features that drive up the cost are brick exterior parking structures, enclosed stair towers, deep foundations, WiFi and cellular service, LED variable message, etc. Building these structures is a timely, costly process that continues to be expensive as each structure requires ongoing maintenance.

Chapman University has five parking structures throughout its campus, and this chapter will be comparing two of them. The West Campus structure was built in 2015 costing $6,247,165, containing 357 spaces, and 5 floors. Despite the fact that this parking structure is slightly below grade, it will be used as the comparison for an above-grade parking structure. The majority of the space that is taken up is primarily above-ground, and nothing additionally can be built on top of it, rendering the 119,392 square feet unusable for anything other than parking. In contrast, the Lastinger parking structure was built in 2006, and the total cost of constructing it was $18,000,000. Within this completely below-grade parking structure, there are two floors, containing 892 parking spaces. Unlike the West Campus structure, the entire area that Lastinger encompasses can still be utilized as additional land. According to Jaymee Miller, the project coordinator for Chapman's parking structures, "Within this cost is a $1.4M premium for the field turf and running track. There was also an included premium for the entire structure being subterranean," but this amount was not available.

Additionally, it would still be nice to have a breakdown of the cost-incurred services that can increase the total of a parking structure's construction costs, which is currently being working on. A report by the Victoria Transit Policy Institute titled 5.4 Parking Costs, identifies possible cost incurred services as, "Higher quality construction/design and materials, storm water management including on-site retention, below grade construction, enclosed stair towers due to local code requirements, enclosed parking structure with mechanical ventilation and fire sprinklers, and user amenities such as way finding." The Chapman Structures contain:
- Both structures contain higher quality construction, design and materials
- Storm water management with bioswale in the West Campus Structure
- Below grade construction- 2 floors for Lastinger, 1 floor for West Campus
- Enclosed stair towers
- Enclosed parking structure with mechanical ventilation and fire sprinklers
- Car counting systems

In summary, "Most structured parking spaces (all the ones on the Chapman campus) cost more than the cars that occupy them." The cost per parking space in the West Campus structure is roughly $17,500 a space and the cost per space in Lastinger is $20,179 per space. According to CarGuru, a current and up to date pricing site, the average used sedan costs roughly $15,000 (Used Car Price Trends). This is used with the assumption that most college students do not own a brand new car, and there are more students than faculty. Clearly, it is not possible to go back and unbuild parking structures, but with these numbers, it is possible to move forward in a direction away from parking structures.

6.3.1.a The Costs of Maintaining a Parking Structure

Admittedly, building the parking structure is most likely the most expensive part of creating parking infrastructure, but there are continual costs. Chapman University utilizes the Whitestone Facility Maintenance and Repair Cost Reference 2013-2014 as a guide of the ongoing costs. Ongoing costs of the Lastinger and West Campus structure are outlined in Figure 6.1. The costs total up to roughly $10.61 a square foot per year. Maintenance costs vary from structure to structure depending on what features it contains. For example, the West Campus structure has planters and grounds all around it that must be continually maintained, and that maintenance goes into the cost of the parking structure, as well security required for monitoring on a regular basis. Daggett and Gutkowsk, both transportation and engineering professionals at Colorado Universities, assert that, "The primary mission of all colleges and universities is academics. It is arguably not maintaining surface parking," and it is therefore something that is not only costly, but quite possibly a waste of time. As Chapman continues to meet the growing needs of the its student population, its parking infrastructure continues to be costly to upkeep, and remains inconvenient all the while.

![Figure 6.1 - Annual cost breakdown per square feet](image-url)
### 6.3.1.b Below Grade vs. Above Grade

Another assessment that needed further investigation was whether a below-grade or above grade parking structure would be more ideal. While an above-grade parking structure is much less costly, it further devalues the land because, as previously mentioned, the land is rendered unusable. Conversely, a completely below grade parking structure such as Lastinger, is roughly triple the cost of an above grade one, but that might just be the cost of maintaining the availability of viable land, while still assembling a parking structure. The cost per space in the West Campus structure is $17,499.06, while the cost per space in the Lastinger parking structure is $20,179.37. That is per per parking space, creating a $2,676.00 difference, just for the use of the land above the parking structure. Whether the almost 3 million is worth it though, that is debatable. A breakdown of the difference is outlined in **Figure 6.2**, statistics courtesy of the Victoria Transport Policy Institute.

![Figure 6.2 - Comparison of above ground and below ground cost breakdown of constructing a parking structure. This is the total cost in 1997 dollars. (5.4 Parking Costs)](image)

### 6.3.1.c Land Value

Along with the costs included in building parking infrastructure, are the costs of the land that is being taken up by these structures. According to Daggett and Gutkowski, parking is viewed as an intrinsic right of the vehicle driver, creating the need for prime locations of land in desirable areas. By turning these prime locations into parking locations, the value of the land drops considerably in value, which can hardly ever be recovered, regardless of parking pass fees. This leads to the assessment and differentiating between below-ground and above-ground parking structures. The former create a much larger bill, but provides usable land, while the latter is much cheaper, but removes any possibility of utilizing the land where the parking structure sits. This poses the question, how much is the land, where these parking structures are built, worth, both intrinsically and financially?

Data available is the square feet of each of the parking structures minus the underground parking structure portion of the Sandhu dorms, as well as the cost of a land parcel that Chapman University purchased. One of the land parcels is North West of Rampart St. and North East of I-5...
Freeway near Panther Village. The other is an empty lot in Irvine located at 9750 Jeronimo, which is the Rinker Campus. The reason being for obtaining two land parcel costs is due to the fact that the first one, though it is located in Orange not far from Chapman University, is right next to the freeway, which could devalue the land costs, as well as it being near the block, while the other, though it is located in Irvine, is generally more suburban and is not close to a large mall and the land is closer in likeness to the parcels of land that make up Lastinger and West Campus. Table 6.1 illustrates the square footage of each of the five parking structures, as well as the cost of the land parcel. That is $57,999,015.99 spent on the land alone for parking structures, and only one of them has viable land for something other than a structure.

Table 6.1 - Square footage of each parking structure and the calculated costs of the land parcels purchased for these structures

<table>
<thead>
<tr>
<th>Structure</th>
<th>Square Feet</th>
<th>Land Parcel Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>West Campus</td>
<td>119,392</td>
<td>$7,187,107.52</td>
</tr>
<tr>
<td>Jim Miller</td>
<td>190,574</td>
<td>$11,469,696.19</td>
</tr>
<tr>
<td>Barrera</td>
<td>219,688</td>
<td>$13,221,922.28</td>
</tr>
<tr>
<td>Lastinger</td>
<td>434,000</td>
<td>$26,120,290</td>
</tr>
</tbody>
</table>

6.3.2 Chapman Opinion

When surveying the Chapman community, these questions were found to be insightful when considering plausible solutions. Not surprisingly, the majority of those polled park in Lastinger, the largest parking structure on campus, as you can see in Figure 6.3. Not only is it the biggest, it is the most centrally located, and therefore appeals to many people. Despite the fact that it is the largest, Lastinger is constantly filled with parking congestion. This is interesting, because there are three parking structures on campus available to those who drive to campus, totaling roughly 2,000 parking spaces. Regardless of the fact that there are many more students than this, not every single student is on campus all day every day. Chapman follows the requirements of enough parking per building capacity due to its additional parking lots as well. According to Chapter 7.34 Off-Street Parking and Loading of the City of Orange Parking Requirements, the requirements for parking per at a university are, "1 space/employee, plus 4 spaces/10 students based on maximum classroom capacity, and for student housing it is 0.5 space/student resident, plus 1 space/each resident staff person." Yet, somehow, the majority of students say there is not enough parking. Figure 6.4 shows the opinions of those surveyed.
6.4 CONCLUDING ASSESSMENTS ABOUT ….

6.4.1 Where Chapman is Doing Well

Chapman University's population has increased considerably over the past few years, and has done a respectable job at trying to meet the growing demands of transport, while keeping sustainability in mind. Chapman built the Lastinger parking structure in 2006, and then the West Campus Parking Structure in 2013, which has five floors of parking, complete with automatically updating LED signage advertising parking availability. Additionally, Chapman has bike servicing stations on campus, to promote the use of bicycles by creating this convenience.

6.4.2 Areas to Improve

Though the university has made great strides towards increasing transportation options and availability, there seems to be a lack of awareness that many of these incentives exist. The Panther Shuttle, though an excellent idea, does not go very far off campus, nor nearly as often as students would like it to, to be a viable source of transportation. While students can venture off campus periodically on Saturdays and Sundays, there is no option for this to be done during the week, and provides a great inconvenience for those whose schedules are more available on weekdays. Being a small campus, Chapman doesn't lend itself to the usage of bicycles as freely as larger campuses, but also being situated in a moderately-sized suburb that is spread out, the implementation of bicycle use to and from campus would create a better solution.

6.4.3 Existing Gaps in Knowledge

Gaps in knowledge suspected to be present, are the differences between students who say they feel a certain way about something/claim they would act in this manner towards a hypothetical scenario, versus how they would react, and gaging survey participant responses' legitimacy. Additionally, intrinsic land value of where the parking structures are land value method that is yet to be determined. Another major problem is awareness. Even though most
students feel there is not enough parking, there is. Even with campus, color coded maps and constant emails from public safety and parking, everyone continues to parking Lastinger, leaving many spaces open in the West Campus Structure.

6.5 RECOMMENDATIONS ABOUT TRANSPORTATION

6.5.1 Best Practice Examples

In locations that are not highly urbanized, it is important to make transportation convenience for students to use. At the University of Washington they are discussing a bundle package strategy, "SDOT(Seattle Dept. of Transportation) Director Scott Kubly called the “Holy Grail” of a “mobility bundle” – a collection of transportation modes that could seamlessly interact to move people efficiently to where they need to go...with a few swipes of your thumb, pay to jump in a car to a transit station, take a train ride, then hop in another car to your ultimate destination – all in one transaction...one card could pay for all your transportation needs, ranging from transit to car-sharing to bike-sharing," (Matt). Other schools have implemented alternative transportation initiatives as well. At Occidental College, they provide a service called the Bengal Bus and, "("Green Business, Green Values, and Sustainability). The Bengal Bus shuttle will take students anywhere within a 10 mile radius of campus," not to mention, it is open seven days a week, every evening. In addition, Occidental provides a Free for a Week bike share program that includes free repair, helmet, and a lock. Additionally, the employees will teach you how to use everything, and inform you about group rides that they organize, along with great bike trails around the city. They help students learn to navigate the busy streets of Los Angeles.

6.5.2 Low Cost/Effort

One way to easily expand sustainable transportation at Chapman would be to expand the shuttle routes further down Glassel. This would enable commuters who don't live too far to take advantage of the Panther Shuttle, while allowing on-campus students to get to the store during the week, as well as on the weekends. An initial map of a 3 mile radius around the center of Chapman University as a rough estimate of shuttle route expansion might serve as a guide for where to increase routes (Figure 1.7). With this expansion, it should cover much of the area that encompasses students' residences.

6.5.3 Medium Cost/Effort

A bundle package for commuter and on campus students- different types. It could include, but is not limited to, Zipcar credit, voucher to purchase bike and supplies, passes for public transit, map of public transit around school, and a few parking passes for those rainy days.

6.5.4 High Cost/Effort

A bike share program would be a worthwhile investment for Chapman University-one that allows students to rent bikes for extended periods of time, and take them off campus, while being able to easily return them to various locations that are conveniently located around Chapman. (Sean's Bike Chapter) This could be a partnership with the City of Orange that could ultimately improve our relations with the city. Places that they could be
located would be: The circle, panther village, Angels stadium, the train stations, one at La Veta and Grand, one at Glassel and Katella, etc.

6.6 CONTACTS

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6.6.2 Future Areas of Research
  ❖ Parking lots- their impact on space and land development, as well as the costs associated with these.
  ❖ Driving culture in Orange, California- how to change community perceptions about transportation.
  ❖ Alternative energy for transportation- Solar energy for electric vehicles, biodiesel fuel, etc.
  ❖ Advertising alternative forms of transportation- increasing awareness of the alternatives at Chapman University and in Orange.

6.7 REFERENCES

6.7.1 References


