

UW BOTHELL COMMUTER CRISIS

Alexa Russo

ABSTRACT: This paper is a feasibility study analyzing the proposed potential solutions to the UW Bothell commuter crisis, including increased alternative transportation options, building new parking structures and lots, and a shuttle system to transport students to and from a lot off campus. By examining this important campus issue, this paper sheds light on the drawbacks to the proposed solutions that have been assessed by administration, namely environmental implications, community impacts, and cost impacts. The results of this study determined that the options on the table currently all have numerous benefits and drawbacks, and although building a parking structure might seem to be the simplest option for solving the parking issues on campus, the impacts of this action are numerous and could have many detrimental consequences, putting us further away from our climate neutrality goals.

Introduction

Problem

From 2010-2017, UW Bothell faced a population growth (in full-time equivalent, FTE) of roughly 48% (Lundquist, 2017). In this time, parking on campus became an increasingly challenging issue, as the majority of the campus community commuted to campus by car each day, which created a matter of increased volume on the parking lots. An overwhelming amount of the campus population believed that there was not adequate parking on campus to support such a large populace (Figure 1) (Sanderson, 2017). The lack of parking on campus detracted from the experience of the campus for users, and also produced negative impacts for the surrounding community. To address the problems, the campus administration considered several options to improve the parking capacity of the campus. This paper analyzes the current and future state of the alternative solutions to this issue, identifies the environmental impacts, costs, and feasibility perspectives that must be considered, and evaluates the proposed solutions to these considerations.

The deficiency of campus parking posed many issues for the campus community, including demands on time, increased stress, as well as the associated environmental impacts. Students, staff, and faculty alike have experienced being late to their on-campus commitments due to the amount of time that it took for them to find a place to park. This created a major concern for stakeholders due to the ripple effect that these impacts had on the academic environment, as it detracted from the quality of the academic experience. Faculty expressed frustration; they were unable to enforce attendance and tardiness policies while their students were consistently late to class, missing important concepts, lectures, and discussions. Students have also taken to leaving classes early to make it to job or family commitments on time, because at peak times it takes just as long to leave campus as it does to enter. Overall, the quality of the educational experience on campus is not what it could or should be, in part due to the parking problems that this campus faces.

The campus parking problem is responsible for environmental problems which include increased greenhouse gas emissions produced by circling the parking lot and idling while waiting for a parking spot to open. As the largest greenhouse gas emitting category for UW Bothell, commuting to campus puts a strain on fulfilling our climate neutrality commitment, and contributes to climate change. Particulate matter and other gasses from these emissions also create air quality concerns, which must be addressed for the overall health of our community. In addition, more cars traveling to campus has led to more leaks of hazardous fluids and shedding of heavy metals from tires and brake pads, both of which contribute to water pollution in our watershed.

Statement of Research Objectives

The objective of this study is to examine the potential solutions to the campus parking issue through analyzing the feasibility of each option, as well as their environmental impacts. The original premise behind this research project was to quantify the environmental impacts of idling in the parking lot while waiting for a parking space to open, as well as propose a campus shuttle system to offset this impact. This latter objective became outdated when the Truly Express shuttle system was put into place during the data collection process. Gathering enough data to actually quantify the environmental impacts also proved to be very difficult. Consequently, the objectives of this project have shifted. This paper looks at the current state of transportation and parking options on campus from a user perspective, addresses the constraints that the alternative transportation modes face, as well as evaluates the feasibility

of the proposed solutions through cost, community, and environment analyses. Specifically, this paper focuses on the results from the Commuter Services Survey conducted during spring 2017 and a Student Transportation Survey designed for this project.

Research Description & Methods

This paper uses two main data sources, the first of which was collected by UW Bothell Commuter Services as an online voluntary survey (Sanderson, 2007). This ten question survey was administered from March 31-April 8 to students, staff and faculty and advertised through their various communications channels by the administration at UW Bothell. The survey garnered 1,607 responses. This data was then analyzed in the Catalyst Survey software and provided by the administrator of the survey, Nicole Sanderson. A copy of the survey instrument is reproduced in Appendix 1.

The second data source was two versions of one survey, “The Student Transportation Survey” (varying in questions and format) generated for this research project. The first survey contained 7 questions, where the other was broken down by days of the week and had 4 questions per day. The survey was distributed to students in Statistics, Introduction to Sustainable Practices, as well as Environmental Monitoring Practicum taught in winter quarter 2016 and spring quarter 2017. Students completed the surveys on a voluntary basis or for course credit, and 124 responses were received in total between the two survey types. A copy of these survey instruments is reproduced in Appendix 2.

This paper also evaluates the impacts

and considerations listed in the Campus Master Plan, an official institutional document outlining the developmental goals and guidelines for both UW Bothell and Cascadia College over a 20-year span to address the future growth of this campus (Arntz, 2017).

Results

Current State of Campus Parking

The Campus Master Plan outlines in the Transportation Discipline Report, that current parking utilization on campus is roughly 90 percent during peak periods; an unsustainable amount for the projected population growth to take place in the near future (Arntz, 2017). This document also confirms that adjacent streets have faced spill-over from the campus, either due to lack of being able to find a spot to park, or potentially due to the high cost of parking on campus (Arntz, , 20172017). Consequently, the surrounding community, including neighborhoods, businesses and the downtown area have faced a shortage of available patron parking due to campus parking overflow (Arntz, 2017). The Commuter Services Survey found that the majority of respondents believed that parking on campus is inadequate (Figure 1), 13% of surveyors said that they parked off campus because of this (Sanderson, 2017). The survey also found that 61% of surveyors attributed the inability to find parking on campus as a cause of them being late to class (Sanderson, 2017).

Transportation Options To and From Campus

The most common transportation options to and from UW Bothell at its present state include driving, biking, walking, bussing, and carpooling. Of the 1,607 people who

answered the Commuter Services Survey, 14% of people claimed to take the bus to school, 3.8% either walk, bike, skateboard, or Segway, where 61% of people drive as their main means of transport. The results of the Commuter Services Survey are supported by the results of the Student Transportation Survey generated for this research project. Figure 2 demonstrates that the majority of students take personal vehicles to campus each day, as opposed to alternative transportation options.

Within the suburban setting which UW Bothell is located, it is no question that dependencies on cars become much greater than in more urban settings (Balsas, 2002); and with the increase in population that the Bothell area has seen in recent years, and the intensification of traffic on all major roads, highways, and freeways, many seek other options to get them to and from where they need to go.

Constraints on Increased Public Transportation Modes

Public transportation has been utilized at a mere 14% rate to get to campus, and according to the Student Transportation Survey, increased use of public transportation seems to be the simplest way to alleviate the parking challenges on campus. The Commuter Services Survey gathered information about why people have not chosen to use public transportation to get to campus; some believed that the current public transportation options have not adequately satisfied the needs of the typical UW Bothell student, and as a result these options have not been used to their full potential (Arntz, 2017). The main complaints of public transportation seem to be convenience, as well as various time constraints that commuters face. Over 55%

of surveyed people from the Commuter Services Survey stated that public transportation is not quick or convenient enough for use as their main means of commuting to campus; many also claimed that the distance from their residence to campus is too far for public transit to be manageable for their use (Sanderson, 2017). The Student Transportation Survey backs up these findings, concluding that 24% of people said that they need their car immediately for other varying reasons before or after class. Some of the most common reasons for this need were work and family commitments; making public transportation very inconvenient or impossible (Figure 3).

Options for Addressing Campus Parking Space Scarcity

One possibility discussed by campus administrators and seen as the most direct fix, was to build another new parking structure. However, parking structure construction costs a good deal of money and most of that cost is passed on to users via increased parking fees. Roughly one-third of those surveyed argue against this option, claiming that they might not be willing to pay increased fees (Sanderson, 2017). The other solution put into action by campus stakeholders was the creation of a shuttle system, the Truly Express, which transported commuters from a parking lot off-campus to campus and back. This option included the lease of an off-campus lot, located at the Seattle Times building, with a shuttle that ran every ten minutes during operating hours (7am-11pm Monday through Thursday). The shuttle was scheduled to run through the fall and winter quarters, but not during spring quarter when enrollment dips and parking is more available (Sanderson, 2017).

Although support has been provided to improve alternative transportation options such as biking and bussing, the constraints of time, convenience, availability, and distance associated with these other transportation sources make them insufficient to meet demand if deployed on their own. Therefore, it is imperative that UW Bothell considers options to increase parking capacity of the parking lots, particularly due to the overwhelming preference for the campus community to commute via personal cars and the anticipated growth of the campus, expected to increase by 2,900 FTE by 2021 (Office of Planning and Budgeting, 2017).

Discussion

Given the current state of campus growth and existing infrastructure, the parking situation is unsustainable as a means of supporting the campus population. The administration at UW Bothell and Cascadia College have explored options to address the predicament, all with their benefits and drawbacks. Administration from both institutions have explored the creation of a new parking garage and the implementation of the campus shuttle system. While a parking garage would create the amount of additional spaces needed to support the demand, parking structures cost a lot of money and have environmental impacts, such as ecological habitat fragmentation and surface runoff pollution. The Truly Express has also provided more parking spaces, however cost and time constraints might be a deterrence for users.

Impacts of Building a New Parking Garage

The Campus Master Plan outlines multiple scenarios to address the parking issue on

campus, which include options varying from taking no action at all, to building an additional parking garage. The proposed new parking structure would increase the amount of parking stalls from 2,272 to 4,200; an increase of 1,928 parking stalls (Arntz, 2017). There are many factors and concerns involved with the building of a new parking structure, including cost, space planning, environmental impacts, increased traffic congestion in the neighboring area and other impacts on neighboring homes.

Cost Impacts

The impacts of these actions have been noted by the Master Planning Committee in the Campus Master Plan. The cost of creating a new parking garage on campus could be roughly between \$45,000 and \$50,000 per stall, if not more, meaning that an increase in parking fees would need to be enforced to cover this cost (Guerrero, 2017). Because parking structures are supposed to be self-sustaining, state funds may not be used in order to build a new parking structure, therefore the revenue from selling parking permits at a higher premium is the only way to cover the cost of a new parking garage. The Commuter Services Survey identified that cost is a limiting factor for students, and many are not willing to front the cost for such an expense (Sanderson, 2017).

Community Impacts

Neighbors worry that a new parking garage would be a detriment to their property values due to light pollution seeping into their homes, increased pollution, increased noise, and poor aesthetics (Arntz, 2017). They also fear that the increased price of parking permits would further encourage students to park for free off-campus, creating a heightened issue of parking available on the

neighboring byways (Arntz, 2017).

Environmental Impacts

Increased impervious surfaces from the construction of a new parking structure on campus will inherently create increased surface runoff of low quality into the wetland and North Creek (Arntz, 2017). North Creek is a tributary to the greater Puget Sound; therefore, these concerns do not simply impact local conditions, but affect the larger region. As a Salmon Safe Certified campus, we must also consider the impacts that this drainage could have on salmon populations that spawn in North Creek, potentially creating challenges for the recertification of the university. Administrators, however, do not perceive this as an issue due to their plans to implement additional stormwater mitigation measures (Arntz, 2017). Depending on its placement, building a new parking structure could cause fragmentation and disruption of habitats, the displacement of native species, and destruction of ecosystem functions that are vital to the health of our region due to the tree removal that will be necessary to create enough space for the structure. Removal of these trees is an ecological disservice to this campus through loss of carbon sequestration, air filtration, water infiltration, shade, and aesthetic appeal that many in the campus community cherish.

While the construction of a new parking garage on campus would potentially have damaging impacts to the environment, it is important to note that the process of looking for a parking spot does have its own environmental costs, which may be alleviated through an increased number of parking spots or the use of the shuttle system. When cars are looking for parking

spots, they have to drive very slowly, frequently decelerate and accelerate, and oftentimes idle in place for long periods of time, from 5 minutes to upwards of 30 minutes. Studies suggest that lower speeds have higher emissions rates, due to the necessity of more gas to gain power to accelerate, and emissions from queued vehicles have a higher emissions rate than those that are free flowing. If drivers have the ability to find parking spots more quickly and efficiently, they will spend less time at low speeds, therefore the overall emissions per car should decrease (Lenner et al., 1983; Tong et al., 2000; Arntz, 2017).

Population increase on our campus is guaranteed to create an increase in overall greenhouse gasses, due to the emissions coming from the large amount of cars travelling in and out of campus. (Arntz, 2017; Levofsky et al., 2011).

This will increase the amount of air pollution on the campus, as car exhaust emits carbon monoxide (a known direct toxin), nitrogen oxide, benzene, and other toxic gasses to the air through the combustion process (Levofsky et al.; Gaffney et al. 2009).

Viability of Off-Campus Parking and Shuttle System

A majority of students from the Student Transportation survey (n = 68) claimed that they have been late to class due to issues finding parking, with 27% claiming that it has taken them 11 minutes or above to find a parking spot, which led us to question whether a shuttle system would be more time effective and eliminate this issue. The dispute that folks might have with the shuttle model is that the cost of the permit to park in this lot will be the same as parking on campus. Even though use of the shuttle

was free of cost, students would be unlikely to park in a less convenient location off-campus if they do not receive a financial break to offset the sacrifice of proximity to their vehicles (Arntz, 2017).

The other possible deterrent of this option would be the time users would spend waiting for the shuttle to transport them to and from campus, which might not actually save them much time. A study done by the University of North Dakota showed that people were unwilling to wait more than 10 minutes for a bus or shuttle to pick them up (Scott et al, 2011). The Commuter Services survey results showed that roughly 35% of surveyors claimed that they would be likely to use this service, where 50.12% said it was unlikely that they would use this option (Figure 4).

Shuttle System Case Studies

Western Washington University uses their quarterly Student Transportation Fee to provide their students with multiple alternative transportation options to get to and from campus. For a small fee of \$26.25 per quarter, students are provided bus passes and shuttle service as well as access to Zipcar service. This shuttle system only runs at night, to safely transport students to locations along the route. This shuttle runs to and from an off-campus site on Monday through Saturday from 11 pm to 3am, and Sunday from 9pm to 2am. The incentive for use of this sustainable transportation package is that for a small price to pay, students are given multiple safe alternatives to get around campus, while promoting the use of alternative transportation on campus (Western Washington University, 2017).

Universities, such as UCLA, University of North Dakota and UT at Austin also use their own shuttle system to transport

students throughout campus, as well as to off-site locations. The UT Austin shuttle system is known to be one of the oldest and most expansive shuttle systems in the nation (Juarez, 2011). After piloting a fraternity-run shuttle, their success led to a shuttle bus system implemented campus-wide, and has been immensely successful ever since (Juarez, 2011). For a \$2.00 mandatory transportation fee per semester, students are offered rides on all shuttle bus system services (Juarez, 2011). This “universal coverage” funding model has proven to be the most effective strategy for covering costs, because of the low cost-per-ride, as well as the coverage of overhead costs related to running the system (Juarez, 2011). This also creates more of an opportunity to make this system successful, because there is more incentive for students to use the shuttle system when they have already paid for it in their student fees. This funding model is something that should be considered if the Truly Express were found to be a successful solution, upon expansion of the system plans.

It is important to bear in mind that the previous shuttle system model is present on a much larger scale than the Truly Express, as the UT Austin population is thirteen times larger than UW Bothell’s (Juarez, 2011). This also differs from our own shuttle system, due to the fact that it transports users to various locations surrounding their campus, not just to their cars and back. As a successful shuttle system model, this structure can show university administrators the benefit of creating a more university-driven transportation route. This would cater to the diverse needs of commuter students, which could potentially eliminate the quantity of cars on the lots. This would also

be beneficial for the environment because it increases the frequency of high-occupancy vehicle trips, reducing the overall number of cars on the road (Juarez, 2011).

The University of North Dakota (UND) conducted a study which looked at the success of their shuttle systems, including student satisfaction. The UND shuttle system is comprised of multiple shuttle service options, each varying in their degree of success; one of these options was eliminated entirely in 2008 due to low ridership (Scott et al., 2011) Each of the options have many stops across the campus, and they also have a similar service option as Western Washington University, with a night service shuttle option. These systems have had reported challenges, including funding, ridership amounts, maintenance of vehicles, as well as scheduling (Scott et al., 2011).

UND has a high percentage of students commuting from off-campus to classes each day, therefore they found that pricing parking permits such that it incentivizes the use of the shuttle system has helped increase ridership amounts (Scott et al.). Their campus shuttle system was found to be in the top five most frequently used modes of transportation, however they saw a net decrease in ride use of 21% between 2006 and 2010 (Scott et al., 2011). Roughly half of those surveyed said they used the shuttle service; those that didn’t use this service claimed that convenience was a barrier for using the shuttle. The majority of surveyed said that 10 minutes was the longest they would wait for a shuttle, and that weather and timeliness were significant considerations when looking into this alternative transportation option (Scott et al., 2011). Although there were incentives

and benefits to riding the shuttle, this shuttle program turned out to not be a very successful model.

When considering whether or not the Truly Express shuttle will be successful, we must look at the cost-to-benefit ratio. The same University of North Dakota study found that students claimed that there was little benefit to using the shuttle system when they were still forced to pay for parking, which could be a factor in the success of the Truly Express shuttle system (Scott et al. 2011). As discovered, the time-convenience ratio is also an important factor for students when considering the success of the Truly Express.

Conclusion

With the implementation of the shuttle system starting in fall 2017, we have yet to determine whether or not the shuttle system is a feasible solution to our parking problem. There are both pros and cons to this system, including environmental and cost impacts, as well as potential time savings and decreased traffic congestion on campus. Since cost is such a strong variable to the campus community, it is fair to speculate that incentivizing the use of the shuttle system through decreasing costs could create more draw to use this option over parking on campus. We do know that the cost of a parking garage or surface lot would reach a hand into the pockets of our students, staff, and faculty, which might be a barrier to this option.

We could expect to see negative environmental implications associated with the construction of additional parking lots and structures, although the Campus Master Plan has proposed to use mitigation

and replacement measures to address the increased runoff and removal of trees that we could face.

The campus continues to grow in population year by year and the majority of the campus community commutes to campus by driving single occupancy vehicles. The survey results show that this expansion has created a strain on the amount of parking available on campus. The options that the administrators are currently exploring are not sufficient enough to properly manage this issue, due to the implications that they each might have on the environment, the space around us, and people's wallets. The simple fact that the state funds may not be spent to address this issue, even when it impacts the surrounding community is unfair. Students are frustrated, and as this study has shown, too many are unwilling to pay the high price of a new parking structure. Further investigation to determine the success of the newly implemented shuttle system is necessary to supplement this paper, as is an expansion on alternative options to this growing campus transportation crisis.

Appendix 1: Commuter Services Survey

Distributed March 31-April 8 2017 by UW Bothell Commuter Services

What institution are you primarily affiliated with?

- a. UW Bothell
- b. Cascadia College

What best describes you?

- a. Dual enrolled high school student (Running Start Student)
- b. Adult Basic Education Student
- c. Undergraduate Student
- d. Graduate Student
- e. Full Time Faculty
- f. Part Time Faculty
- g. Full Time Staff
- h. Part Time Staff
- i. Other:

Please indicate how much you agree with the following statement: "Parking availability on campus is adequate."

- a. Strongly agree
- b. Somewhat agree
- c. Neither agree nor disagree
- d. Somewhat disagree
- e. Strongly disagree

What is your primary method of commuting to and from campus?

- a. Take the bus
- b. Drive myself
- c. Drive with others
- d. Have someone drop me off
- e. Walk, bike, skateboard, or Segway
- f. Other:

If you don't take the bus to campus, what is the primary reason? Select as many that apply.

- a. Taking the bus doesn't fit into my schedule, i.e. takes too long, and doesn't run often enough.
- b. I prefer having the flexibility of my own vehicle.
- c. I don't like using public transit
- d. Not applicable – I ride the bus
- e. Other:

If you drive to campus, where do you park your car?

- a. On campus – includes UWB owned spots at UWBX and UWBB
- b. Commercial parking
- c. In the neighborhood
- d. Not applicable – I don't drive to campus

If you park off campus, what is the primary reason you do so?

- a. I can't find parking on campus
- b. Campus parking is too expensive
- c. Not applicable
- d. Other:

If you purchase your parking pass on a day-to-day basis what is the primary reason you do so?

- a. I generally don't drive myself to campus, so it's cheaper to pay on a day-to-day basis rather than buying a quarterly permit.
- b. I don't know why; it's just what I do
- c. By the time I finalized my class schedule and was comfortable committing to purchasing a quarter permit, it was cheaper to continue paying for parking day by day.
- d. I didn't realize I had the option of a quarterly permit and by the time I realized the savings potential, it was cheaper to continue paying for parking day by day.
- e. Not applicable
- f. Other:

We are considering leasing a parking lot off campus and providing a shuttle service that would take 10 minutes to get to/from campus and would run every 15 minutes from 7AM to 11PM, Monday through Thursday. You would need a regular permit to park in the lot, but the shuttle would be free. How likely would you be to park in the off campus lot and use the shuttle?

- a. Very likely
- b. Somewhat likely
- c. Neither likely nor unlikely
- d. Somewhat unlikely
- e. Very unlikely

In order to provide more parking on campus we will need to increase parking fees to pay for parking facilities. The more parking spaces we create, the more it will cost. Given this fact, which of these statements best describes your preference:

- a. Cost is most important to me: I want it to be easier to park, but minimizing parking rate increases is the most important thing to me.
- b. A balance between cost and convenience is important to me: I'd like it to be easier to find a place to park, and I am willing to pay somewhat more, but not much more.
- c. Convenience is what is important to me: I'm willing to pay more for parking if I know I will be able to find a space to park when I get to campus This would not impact me since I do not drive to campus.

Please share any additional comments you have.

Appendix 2: Student Commuter Survey "The Student Transportation Survey"

Version 1: distributed Statistics and Environmental Monitoring Practicum during winter quarter 2016.

*This survey is based off of the average day, please answer based off of what you do most often

1. Do you drive to campus? (circle one):
Yes / No

2. Do you carpool? Yes / No if so, how many people are in your carpool?

3. If you drive, why do you drive instead of taking alternative transportation?

4. If you drive, on average, how long do you think it takes you to find parking (from the time you arrive in the parking lot until you put your car in park? _____

5. If you drive, what kind of car do you drive? _____

6. If you do not drive, how do you get to campus (circle) walk / bike / bus / other

7. What days do you have class? _____

8. What times do your classes start? _____

9. Have you ever been late for a class due to parking? (Circle one) Yes / No

Version 2: distributed to Introduction to Sustainable Practices during spring quarter 2017.

1. Did you come to campus today? (Circle one): Yes / No

2. Did you Drive (circle one): Yes / No

3. What time did you enter campus?

4. What time did you park your car?

5. What kind of car do you drive?

Make of Car/Truck:

Model of Car/Truck:

Year of Car/Truck:

6. Did you carpool? Yes / No

7. If you drove, why did you drive instead of taking alternative transportation?

8. If you did not drive, how did you get to campus (circle) walk / bike / bus / other

9. If you did not drive, how long did it take you to get to campus? _____

10. What days do you have class?

11. What times do your classes start?

12. Have you ever been late for a class due to parking? (Circle one) Yes / No

13. Rate your stress level: (Circle one)

1 2 3 4 5 6 7 8 9 10

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