

An Investigation into Creating Accessibility on Campus for Disabled and Seniors

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AN INVESTIGATION INTO CREATING ACCESSIBILITY ON CAMPUS FOR DISABLED AND SENIORS

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ABSTRACT

The University of British Columbia is a major hub for pedestrian travel with thousands of people arriving to and from the campus on a daily basis. Many of these individuals who park on the university grounds are people with disabilities or the elderly, who struggle to travel from one location to another. There is no vehicle access or bus routes to many of these locations.

With a campus area of 400 hectares (UBC Vancouver Campus, 2016), UBC needs a program that can assist these individuals with travel once they have already reached the university. The goal was to develop a solution using a small budget (relative to a new parking lot), to target seniors and the disabled, and to ensure ease of use. Using existing programs as a reference and estimating costs based on the products and services needed, the idea of a shuttle service was developed.

The service is planned to use mainly golf carts for cost and navigation purposes as well as a few hybrid vehicles to ensure service during all weather conditions. The goal is to have volunteers to drive the golf carts and cars in order to minimize cost. To ensure ease of use, users will be able to call for a pickup or use automated buttons located across campus if they are not technologically proficient.

This plan will allow for accessibility around campus, while maintaining budget goals and promoting sustainable solutions.

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1.0 SUSTAINABILITY PRINCIPLES

INTRODUCTION

We engage the project with the triple bottom line principle, meaning the proposed solution takes the economy, environment, and society into consideration.

1.1 ECONOMICAL

Economical impact on UBC is not of the highest concern due to the limited budget we have to begin with. While plans such as building more parkades were thought of, it was clear that it was not possible with the amount of money that we have to spend, and we believe it would not be the best use of money regardless.

1.2 ENVIRONMENTAL

The environmental impact is of large concern for this project, especially since we will be adding more vehicles around campus, in high pedestrian traffic areas. The first thing that was evident is that a standard car cannot be used for this project. The pollution it will cause in these dense areas is simply unacceptable, and does not follow UBC's sustainability goals. While the choice of vehicle will be discussed in detail further down the report, it can be said with no doubt that a low or zero pollution vehicle must be used to ensure full environmental sustainability.

1.3 SOCIAL

The social impact is the crux of this project, and the reason it is being considered in the first place. Every single person who comes to UBC deserves to be able to freely and easily travel across its large area, and that is the goal of this project. Other social impacts that will be considered are students feeling on small vehicles (such as golf carts) joining them on main mall, and what must be done to ensure there are no collision, or congestion problems (Mafatlane, 2015).

1.4 CONCLUSIONS AND RECOMMENDATIONS

In order to maintain the limitations and expectations mentioned above, the project had to be designed around them. There has to be a balance of economical, environmental and social factors in order to create a successful and sustainable project. The details of this will be outlined in the next sections.

2.0 VANCOUVER AIRPORT CASE STUDY

INTRODUCTION

The Vancouver International Airport (YVR) has a sophisticated system that enables seniors and people with disabilities to access the facility with ease. The system features include supporting people with mobility and agility loss, hearing loss, vision loss, and developmental disabilities. The system uses shuttles to get to airport terminals and uses carts to get people to their gates.

2.1 RELEVANCE TO UBC CAMPUS

YVR offers a variety of features that help those with mobility and agility loss, included but not limited to: designated parking for people with disabilities in all parking lots with accessible shuttle bus service to long-term parking, terminal flooring outfitted with low resistance carpeting for easier movement of wheeled mobility devices and greater stability for people using walking aids (“Accessibility at YVR”,n.d.). The shuttle bus service was the main focus of our research of the YVR system, as the parking lots have a high cost and are out of the scope of our design and the flooring would not assist in moving outdoors around campus.

2.2 CONCLUSIONS AND RECOMMENDATIONS

The convenience created for those who need assistance has been greatly increased through these airport services, and influenced the search for a similar system at UBC. Although YVR has a bigger budget for this service, it is still possible to achieve results with the budget for this project. The details of this will be outlined later in the report.

3.0 UBC SAFEWALK

INTRODUCTION

SafeWalk is an Alma Mater Society service that upon a user’s request, a phone call through a personal cell phone or UBC Blue Phone, will send a team of walkers to help the caller reach his/her destination (“Safewalk”, n.d.). This service is not limited to UBC students, but also allows staff, faculty and visitors to call (“AMS Safewalk”, 2015) if they feel uncomfortable walking around campus alone (“Safewalk”, n.d.). Prior to April 2014 this service, as the name implies, only walked with a user from his/her pick up location to his/her final destination (Law, 2015). However, after April 2014 the program began to acquire hybrid vehicles transitioning the program from a walking service into shuttle service by April 2015 (Law, 2015).

3.1 BUDGET

All funding for SafeWalk comes from the Alma Mater Society. In the 2013/2014 school year a budget of \$88,148 was given to this service (Acevedo, 2013). A break down the budget in detail can be seen below in Figure S.1.

Safewalk 2013-2014 Budget

Categories	2013/2014 allocated budget in \$
Salaries & Wages (Coordinators)	17,136
Salaries & Wages (Staff)	57,460
Benefits and Payroll Fees	5,222
Telephone/Fax	1,080
Office Supplies/Postage	200
Miscellaneous	0
Photocopying & Administrative	150
Advertising & Promotion	0
Furniture & Equipment	5000
Equipment Maintenance	400
Staff Training	1000
Volunteer/Staff Appreciation	0
Special Projects	500
Total	88,148

This table was adapted from Acevedo (2013) budget report.

Figure 3.1: Breakdown of Safewalk 2013-2014 budget

As seen in the figure above (Figure 3.1) \$74,596 or 84.6% of the total budget was allocated to support the salaries and wages of SafeWalk’s coordinators and staff. SafeWalk operated on a

volunteer basis until 2000 ("Safewalk: the AMS' most", 2009), from this we can conclude that if all other conditions stay unchanged, SafeWalk likely had a smaller budget prior to 2000. However working for SafeWalk can be grueling, walking for long periods regardless of weather conditions, justifying the switch to a paycheck system ("Safewalk: the AMS' most", 2009). Further, the budget listed in the table above does not account for vehicles and thus we can conclude that if all other conditions stay constant that today's budget is larger.

3.2 PROBLEMS

A large problem encountered by SafeWalk is having unanticipated spikes in the usage of services. We believe that unexpected threats to safety, like incidents of assaults, contribute to these spikes of usage. In 2013, after several sexual assaults around campus SafeWalk was receiving about 30 calls a night, when in 2012 the Service averaged 3 calls a night (Bigam, 2013). Further, it took SafeWalk more than 30 minutes to respond to a user's request in 2013 because there was only one team of walkers working (Chang, 2013).

3.3 CONCLUSIONS AND RECOMMENDATIONS

From SafeWalk we have gathered that there are two potential problems that can have a large impact on our solution. These two problems are budget, and handling spikes in usage.

Through working on this project we have continuously aimed to come to a solution with a sustainable and small starting budget. From SafeWalk we have seen that a large percentage of their budget is allocated to the wages of their personnel. With this in mind and our continued goal of budget reduction we believe that like in SafeWalk's beginning our solution should be volunteer based.

Studying SafeWalk's operations we have seen that when an unexpectedly large number of requests come in for the service, problems such as long wait times occur. We want to ensure that our program runs with as little wait time as possible. Keeping our goal in mind and the problems SafeWalk our solution must have a way to keep track of when it will be needed that most and allocate an according number of needed resources, like drivers and phone operators.

4.0 TAXI OPTIONS

INTRODUCTION

The chosen method of transportation has to meet the following criteria: sustainable development (environmental impact), cost efficiency, ability to perform in a variety of weather conditions and ability to travel around campus. Golf carts and hybrid cars are the main contenders that meet these criteria. An analysis of their benefits and limitations is outlined below.

4.1 CARS

Environmental Analysis

Hybrid and electric cars have lower emissions than conventional gas cars, but their total carbon emissions are dependent on how much electricity they use and the carbon emissions produced from the method of electricity generation (Nanaki, 2013). In a scenario where electricity is produced mostly through renewable sources, it is seen that electric cars produce far fewer carbon emissions than hybrid or gas cars and produce the least amount of emissions of all possible scenarios listed by Nanaki (2013) for electricity production. Further, when all electricity is produced through using non-renewable sources hybrid and electric cars produce approximately equal amounts of carbon emissions, which is still significantly less than gas cars (Nanaki, 2013). Whilst gas cars produce the most emission they allow a driver to get further on one tank of gas than hybrid and electric cars (Nanaki, 2013).

Economic Analysis

Through comparing three cars using gas, hybrid or electric power we have found that the gas car cost significantly less than hybrid or electric options. We compared the 2016 Volkswagen Jetta, which costs about \$20,395 (“Trendline+”, n.d.), the 2015 Toyota Prius, which costs about \$25,995 (“Prius”, n.d.) and the 2016 Ford Focus Electric that costs about \$31,999 (“Focus Electric”, n.d.).

Keeping in mind both the environmental and economic constrictions of gas, hybrid and electric cars, it is clear that there isn't a car that can be used in every situation. For this reason, we believe that there is no “universal best” option and the choice must be tailored to a situation.

4.2 GOLF CARTS

Types of Golf Carts Available

To adequately transport groups of people, we believe that we should be able to transport minimally 3 people at once and thus must look into golf carts with seating for at least 4 people. Through our preliminary research we realized that most golf carts sold have seating for only 2 people and resultantly started looking into customizable options. Through doing so we found

Recreation Sports Carts, a local company who has the capability of adding more seating to golf carts. Browsing through their past creations on their website we saw that a four person custom cart will cost about \$8575 (“Forrest Gump”, n.d.) and a custom cart with seating for six will cost about \$10395 (“Wasabi”, n.d.). Both carts described above are for the electric powered option. Drawing from our research with cars, we believe that like with cars, gas golf carts tend to cost less than similar electric ones. Similarly drawing from our car research we believe that electric golf carts produce less carbon emissions than similar gas carts.

Permits Required to Operate Golf Cart

Golf carts are considered to be off road vehicles in British Columbia and accordingly must have proper registration, through ICBC, with number plates (“Off-road”, n.d.). However, if golf carts are to be used solely on private property no registration is required (“Off-road”, n.d.). In order to operate a golf card on public roads, the driver must have a driver’s license (“Off-road”, n.d.).

4.3 GOLF CARTS VS. CARS

For the purpose of this plan, both golf carts and regular cars have their pros and cons. In this section, we will be thoroughly analyzing which will work better and under what circumstances.

Travel Abilities

The main purpose of the vehicle is to transport an individual from one destination to another, however given UBC’s abundance of pedestrian only areas, it will be difficult for a vehicle to accomplish this. UBC’s pedestrian core project was completed in 2012 (Walking, 2016) and significantly increased pedestrian promenades across the campus, including main mall. For this reason, cars pose a significant challenge in bringing a client directly to their area of choosing. Golf carts however have the benefit of being much smaller, lighter, and slower. These three things ensure that no collision would occur with other pedestrian/cyclists/etc, and that there would be minimal congestion because of them. However, while golf carts excel in travel in pedestrian areas, they suffer greatly in long distances. As can be seen in Figure 4.1 to the right, the UBC campus is very large in size, and far locations would take a golf cart 15 to 20 minutes to reach, which would not be acceptable. Hence, it is in this area which cars excel over golf carts.



Weather

While Vancouver is known for its generally mild climate, its winters do reach as far down as -8 degrees celsius, and averages at around 7 degrees celsius in the month of January (Vancouver Temperatures, 2016). There is also an abundance of rain and wind through all 4 seasons of the year. For this reason, golf carts will be less than ideal on many occasions, especially for seniors.

While some can brave the cold and stormy weather, many cannot. This is why hooded vehicles such as cars must be available for these circumstances.

Seating

We must be mindful of all possible restrictions that we may encounter with the potential users of this service. As this is meant for the elderly and disabled, many may require larger amounts of space, in which a golf cart cannot provide (ECMT, 2006). For this reason, a dependency on golf carts is simply not possible. However, the fraction of amount of people who would require a full vehicle is very small, and a vehicle should only be used in dire circumstances. This is due to the inability of cars to travel in pedestrian only areas around campus.

Outcome

Through this analysis, it is obvious that it is not possible to form an ultimatum on this issue where we pick one or the other. Instead, a mix of both must be used in order to serve the needs of all our users. It would seem to be the best path to have about 75% of the fleet to be golf carts, and about 25% cars. This is because while golf carts have more restrictions, it is more rare to face them, and the ease of travel in pedestrian areas and cost affordability of golf carts trumps its limitations (Litman, 2011). In order to compensate for the lower number of cars, two sizes of golf carts should be considered, with one being larger than the other to not only accommodate more people, but to allow people with more significant disabilities to use them.

4.4 CONCLUSIONS AND RECOMMENDATIONS

Golf carts are more cost efficient, environmentally friendly and are able to travel around campus easier, therefore they should be the main method of transportation for this program. Yet they are not as safe in harsh weather conditions and are slower if the location is along a car accessible road. We strongly believe for these reasons that having a vehicle fleet comprised mainly of golf carts, with a few hybrid vehicles is the best choice. Different vendors may be used, the information given about the golf carts is only a recommendation based on our research.

5.0 COMMUNICATION

INTRODUCTION

Our project is mainly designed for seniors and people with traveling difficulties, therefore the ease of access is the most important factor that we considered. The methods of interaction between users and our project have to be efficient and will take only one step to complete in order to deliver the best user experience. The various methods are listed below.

5.1 SIGNS

Located at every parking area, and all major university hubs will be extensive signage to inform the users of this program, and to give the phone number to request a vehicle. These signs will be very large, and very apparent to ensure they cannot be missed. Once the user calls the program, a vehicle will be sent directly to them at the marked point outside the building/parkade. Each sign will also have the name of the location to ensure the user can tell the operator and not cause confusion.

5.2 THE YELLOW BUTTON

Due to the nature of our user base, it is expected that some will not have cell phones to request a vehicle. Due to this, we introduce the yellow button, which is similar to the UBC blue button program. The yellow button will be placed in the major parkades, and can simply be clicked and an immediate call will be placed, and the operator will begin talking on the speaker. Due to budget constraints, these buttons will only be placed in the major parkades.

5.3 PICKUP REQUESTS

Once the user has been picked up, a request for a pickup can be made. For example, if a dropoff is made at the UBC Alumni Center, it can be requested that a pickup be made three hours later, and it will be put into the schedule. This will allow for very easy travelling, and negate the need for 'yellow buttons' in areas other than the parkades.

CONCLUSIONS AND RECOMMENDATIONS

Due to many seniors having limited access to phone applications, a cheap and effective alternative method is presented while still maintain functionality. Due to our current budget, the yellow buttons are constrained to major parkades but could easily be expanded if the budget was to increase.

6.0 COST ESTIMATIONS

INTRODUCTION

Due to the limited budget we are given, cost must be estimated carefully before the actual implementation of the project. Our cost estimation will revolve around two major factors, employees and vehicles. Golf carts are purchased from a vendor that provides safe and affordable vehicles. The same standards will apply for the purchase of a hybrid car. The goal is to minimize the reliance on employees, and focus more on volunteers to provide the service.

6.1 VOLUNTEERS

The task of navigating around the campus in golf cart will be carried out by volunteers, therefore eliminating the cost of hiring employees. At the initial stage of the project, the chance of all golf carts being deployed at the same time is extremely low considering the number of people that require assistance is not high, so two volunteers during every shift is enough to cover all clients. As the project progresses, if the popularity rises, we will increase the number of volunteers and the number of golf carts.

However, there will be times where more than two volunteers will be needed, even at the beginning. These times include graduation ceremonies, concerts, and other major events. During these occasions, depending on the event, up to five volunteers may be needed to fulfill demand. Extra volunteers will be requested during these times, however should they not be found, temporary paid worker will be hired in order to ensure the demand is met.

6.2 GOLF CARTS

As our research suggested, the top choices for our vehicles are “Forrest Gump”, a four person custom cart that costs around \$8575 (“Forrest Gump”, n.d.) and “Wasabi”, a six person custom cart that cost around \$10395 (“Wasabi”, n.d.). Considering the rarity of occurrences of taking more than three people at once, we recommend purchasing five of model “Forrest Gump” and one of model “Wasabi”, adding up to a total \$53,270. Like any other vehicles, golf carts require maintenances. We plan to maintain the golf carts every four months at Recreation Sports Carts for a total cost of \$1890 annually (“service” n.d.). Every golf cart will come with its own charging station, so the cost of which is negligible.



Figure 6.2.1 Model “Wasabi”
Wasabi- Custom Stretch 6-Seater Golf Cart. (n.d.).
<http://www.rscustomgolfcarts.com/golf-carts-for-sale/sale/>
Little-green-machine-custom-green-golf-cart



Figure 6.2.2 Model “Forest Gump”
Forrest Gump-2009 Electric Golf Cart. (n.d.).
<http://www.rscustomgolfcarts.com/golf-carts-for-sale/>
little-green-machine-custom-green-golf-cart

6.3 CARS

For our cars, we will purchase 2 Toyota Priuses. A new Toyota Prius comes at a cost of \$25,995 (“Prius”, n.d.), which would cost \$51,990, without tax and fees. This is a large amount of money, and hence the recommendation would be made to purchase used vehicles instead, and lower this amount. To ensure safety, safety checks and examinations will be undertaken to ensure the safety of the vehicle.



Figure 6.2.3 Toyota Prius
2015 Toyota Prius. (n.d.). Retrieved
April 07, 2016, from http://www.thecarconnection.com/overview/toyota_prius_2015

6.4 CONCLUSIONS AND RECOMMENDATIONS

Volunteers are an integral part of our plan, and we hope to find 15 to 20 people who are willing to join the team. Only two drivers will be required to be available at a time, and one phone operator. Having 15-20 people will ensure that no volunteer is over-worked, and that shifts remain relatively short.

These are only recommendations and the system can be modified to fit the needs. If there are not enough volunteers at the beginning of the project, less golf carts and cars can be purchased and employees can be hired instead. As the scale of the project grows, more vehicles can always be purchased.

Vancouver Temperatures: Averages by Month. (n.d.). Retrieved April 07, 2016, from <https://www.currentresults.com/Weather/Canada/British-Columbia/Places/vancouver-temperatures-by-month-average.php>

Walking. (n.d.). Retrieved April 07, 2016, from <http://planning.ubc.ca/vancouver/transportation-planning/transportation-options/walking>

Wasabi- Custom Stretch 6-Seater Golf Cart. (n.d.). Retrieved from <http://www.rscustomgolfcarts.com/golf-carts-for-sale/little-green-machine-custom-green-golf-cart>