

**An Investigation into “Seniors, Accessibility, and Parking” in UBC**  
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APRIL 7, 2016

An Investigation into “Seniors,  
Accessibility, and Parking” in UBC  
UBC SEEDS SUSTAINABILITY PROJECT

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## Abstract

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The key problem this report addresses is UBC's accessibility for new visitors, mainly for the elderly. The problem can be broken down into two parts: navigation and parking. For navigation, investigation for navigation methods and sign placements were performed. For parking, elderly accessibility and parking indicators were researched. A survey was also conducted to evaluate the satisfaction of UBC parkades. Solutions were evaluated based on the triple bottom line (Social, Economic, and Environmental).

Most of the research was focused around papers and articles pertaining to parking and location accessibility, as well as research in UBC parking policy. One of the key findings in the research is the use of Advanced Parking Management Systems (APMS) in Europe (Advanced Parking Management Systems, 2007). The concept of APMS was essential in determining one of the solutions. Another key research finding was an article describing design considerations for transportation infrastructure (EMCT, 1999). This article helped us develop a solution for UBC parkades confusing layout. A survey was also conducted, although limited to only 18 participants. The survey revealed that there was a lack of satisfaction in terms of navigation around UBC parkades and surface parking lots. The participants also feel that the North Parkade is the most accessible parking space with UBC. Based on this survey, it was deemed that surface parking was not desirable for most drivers. Using the findings from the research, five solutions were determined: Safewalk collaboration, high visibility painting sidewalk, signs on important intersection, electronic sign and senior parking sign/stall.

The Safewalk collaboration (unofficially AlumniWalk) will provide personal assistance for navigation to visitors coming out of the parkades. This will provide more opportunities for student workers and volunteers; however, the cost of potentially hiring more workers would be a key discussion point before implementation. The high visibility painting sidewalk is to be implemented in the parkades to guide the visitors and wheelchair users to the exits because newcomers can find these exits quite confusing. The paint is relatively inexpensive however can be the substance used can potentially be harmful. Setting up signs in key intersections can help guide visitors to parking locations and key routes within the UBC campus. However, setting up all these signs will be costly and disposal if corrosion occurs can have a negative impact on our environment. The electronic sign is to provide an indication of parking availability and location within parkades. This solution will be at higher implementation and operation cost as the equipment will be continuously running. The senior parking sign/stall is a simple solution to provide parking for the elderly. This will be based purely by an honour system. However, this will decrease the parking spots available for other people; thus, decreasing the revenues of the parkades even though it is a low cost implementation.

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## Glossary

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Safewalk            An UBC Program dedicated to guide students to their designated location with accompany when needed

## Abbreviations

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AMS                Alma Mater Society (UBC Student Association)  
EMCT              European Conference of Ministers of Transport  
GPS                Global Positioning System  
SEEDS             Social Ecological Economic Development Studies Sustainability Program  
TBL                Triple Bottom Line  
UBC                University of British Columbia

## 1.0 Introduction

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The University of British Columbia's Access and Diversity program addresses issues of accessibility for its students, faculty and staff by collaborating with faculties to establish diversity in conjunction with the best desirable living and learning environment for the members of UBC Vancouver community. With the phase shift of becoming the leader in sustainability, UBC has completed various infrastructure projects that has introduces some accessibility problems around seniors managing around campus and finding the appropriate parking lot.

The recent shift in developments like the Orchard Commons student housing project over surface parking lot and the redesign of main mall to strict vehicle access has assisted the university in reaching the sustainable campus by discouraging vehicle traffic to and from campus by promote sustainable alternatives like public transit, however these steps towards sustainability has introduces some problems that are the topics of our investigation for this project. UBC senior alumni's are finding themselves with new refaced campus and new challenges navigating around the campus they used to know.

This group of engineering students were given the opportunity to study the accessibility and parking problem for seniors, through research both technological and social solutions are presented for this UBC SEEDS project and using a Triple Bottom Line assessment to determine various recommendations to the Access and Diversity program at UBC. The study area for our project is the major parking lots on campus as well as key entrance roads located near the parking lot of interests as well as looking at particular services provided by Alma Master Society. By assessing the problem, we have come up with five (5) solution: Safewalk Collaboration, High Visibility Painting Sidewalks, Signs on Important Intersections, Senior Parking Stalls/Signs, and Electric Signs that is recommended and evaluated based on the Triple Bottom Line criteria.

## 2.0 Investigation

### 2.1 Secondary Research and Findings

One key article we utilized was "Advanced Parking Management Systems: A Cross-Cutting Study Taking the Stress Out of Parking" (2007). This article investigates advanced parking management systems (APMS) in three different venues: airports, central business districts and park-and-ride locations. These systems provide parking patrons information on availability and location of parking within the facility in real time. For example, the BWI Airport uses space occupancy detectors with a central computer to display the current situation of parking onto electronic signs (APMS, 2007). This article was the key influence in deciding to research more into our on electronic signs. Much of the concept for this solution is similar to the APMS described in the article.

The article by Lu W. Vandebona was essential in one of our research methodology. This article describes his experiment to evaluate the effectiveness of a Japanese handicap legislation called the "PP system" (Lu, 2014). His methodology for his experiment was useful as a blueprint for making our own research strategy. Also, it inspired us to look for similar research or statistic for the UBC parkades.

### 2.2 Primary Research and Findings

One of the objectives of the primary research is to survey students and other visitors regarding satisfaction of navigating and parking in UBC Parking locations for the team's accessibility investigation. Due to the limited time constraint of the teams' schedule, the team only managed to get 18 respondents. However, the data are still valuable to identify whether there are needs for improvement navigating the parkades. The following figures show the results of the survey questions with our interpretation.

Figure 1, and Figure 2 show that with 12 answered, the average of the navigation score is still below satisfaction (1 as urgently needs improvement and 10 as extremely satisfied).

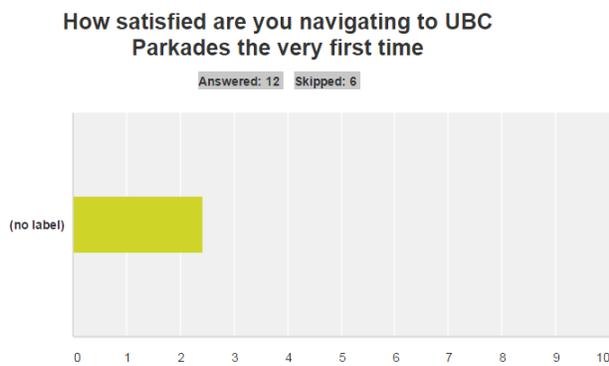


Figure 1 - Navigation Satisfaction (Parkade)

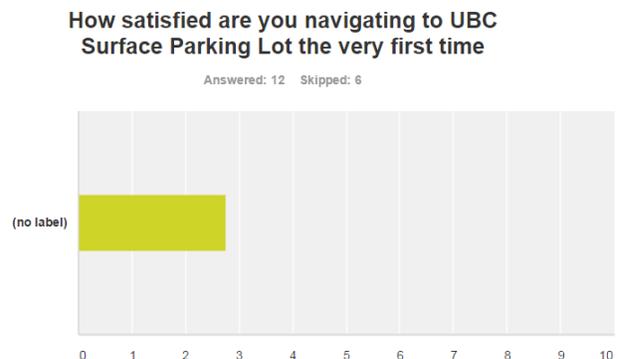


Figure 2 - Navigation Satisfaction (Surface)

Figure 3 shows how much people need road signs to help improving the navigation to UBC parking lots. Although most answered fair, the weight is shifted towards extra signs suggested by one person in a 12 answered question.



Figure 3 - Road Sign Market Survey

Figure 4 shows that out of the nine answered, North Parkade rank the highest in the accessible parking category and Fraser Parkade rank the lowest. This is a good indication for future improvement planning as budget may not be high to improve all parkades at once.

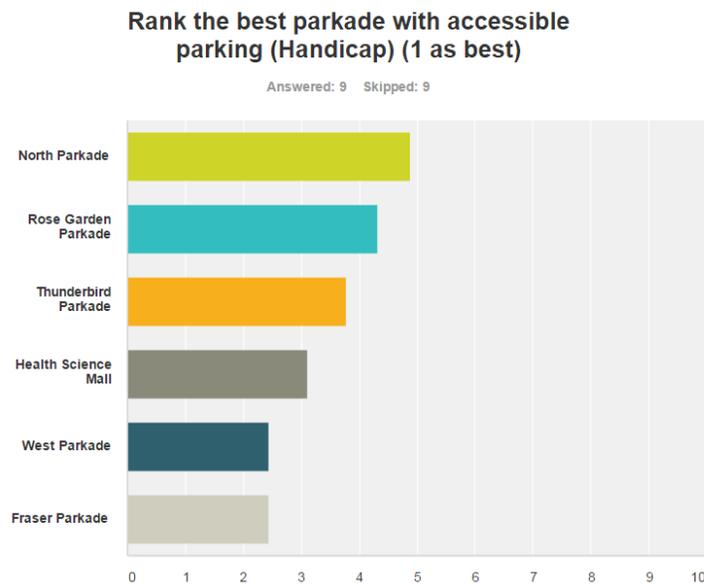


Figure 4 - Best Parkade with Accessible Parking

One of the project requirement is to investigate the need of removing surface parking for more efficient parkade parking. Although surface parking may provide higher value in accessible parking, there is a slight tendency towards the removal of the surface parking in this survey. The recommendation may be focusing on improving existing parkade's accessible parking while designing a newer and better parkade when removing surface parking lot. Figure 5 shows that 7 out of 12 people answered no need for surface parking in this survey.

**Do you think there is a need for surface parking lot instead of parkades for accessible parking?**

Answered: 12 Skipped: 6

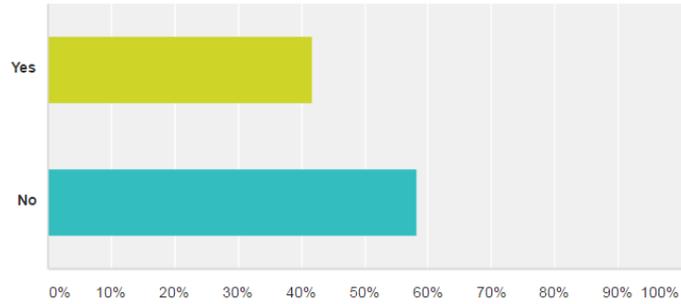


Figure 5 - Should we Remove Surface Parking?

Overall, the survey tells us that although not urgent, there can be a potential need of improvement on navigation to UBC Parking. There is also a list of ranking of which parkade we shall start improving first.

## 3.0 Recommendations

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With background data from primary and secondary research, the team come up with a few possible solution to improve the assessable parking situation in UBC. In this section, the team will provide several solutions regarding navigation in UBC during events, parking, and also parking lot improvements.

### 3.1 Solution 1: Collaboration with UBC Safewalk Program

Due to the deterministic nature of alumni events held at UBC campus, we present our first recommended solution: The Collaboration with UBC Safewalk Program. The Safewalk program is one of the existing services established and run by AMS that offers assistance to students by providing them a safe service across campus to the desired destination. The concept behind it is very beneficial when we study the accessibility problems seniors are having in navigating around campus with only a minor deviation in time of operation for the day. However since these Alumni events are predetermined the AMS Safewalk program could be proposed beforehand to prepare for the hours required.

This solution unofficially known as AlumniWalk can be implemented by providing an assistance service in accommodating the senior alumni's to the appropriate location on campus, additionally instead of walking our parties to the appropriate building we can also propose to have specific marked members to be stationary at key parking locations during scheduled times by assisting our parties with initial greetings and visual maps for buildings of interests. To gather the alumni's at a key parking location and for them to take advantage of the social solution presented more technological solutions in terms of real-time signage to be presented on key routes to UBC are detailed in the following sections.

The Safewalk Collaboration has particularly social advantages when looking at TBL criteria, It involves the current students working or volunteering for the university to engage with senior alumni's that can closely relate to their times at UBC which could ultimately provide a positive environment for the return of alumni's and increase the rates of involvements of senior alumni's back on campus. The economic aspects of the TBL would be the increase cost and personal required during the events and the investment Access and Diversity program along with AMS Safewalk program will need to consider.

### 3.2 Solution 2: High Visibility Painting Sidewalk

To allow wheelchair users and visitors to safely and easily navigate out of the parkade, the team rethinks about the design of the sidewalk inside the parkade. Taking into consideration that some side walk of the parkade have stairs while others have ramps (Figure 6), a high visibility painting like the bicycle lane located in various place in Vancouver (Figure 7), may help both drivers and pedestrian identify the walkway. From the

handbook of EMCT a different type of surface, including neoprene rubber or similar elastomeric compound, may allow visually impaired personnel to identify specific walkways (EMCT, 1999, p.26). Applying similar ideas, a high visibility painting on ground shall allow pedestrians to quickly identify and navigate around the parkade.



Figure 6 - Walkway with Stair Exit



Figure 7 - Illustration of High Visibility Bicycle Lane on Motorways

(Source: <http://www.vancitybuzz.com/2014/03/vancouver-needs-follow-dutch-way-bike-lane-design/>)

Figure 8 shows an illustration of such an idea where drivers are not impeded by an actual walkway when parking, but are still aware of the guideway where pedestrians may walk on.

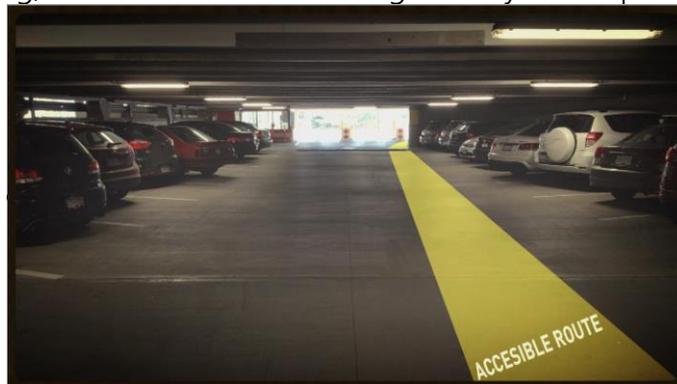


Figure 8 - Illustration of High Visibility Guildways in UBC Parkade

Finally, a TBL analysis is done and can be find in Table 1 showing the advantages and disadvantages of this solution in each TBL category. This can be a good indication and as well as comparison to other solutions.

Table 1 - TBL Analysis for Solution 2

Social	Economic	Environmental
<ul style="list-style-type: none"> <li>• Improvement of visibility of pedestrian on sidewalk</li> <li>• Initial confusion to drivers parking into the stalls</li> </ul>	<ul style="list-style-type: none"> <li>• Relative low cost implementation compare to electronic or technological solution (Home Depot, 2016)</li> </ul>	<ul style="list-style-type: none"> <li>• Paint may consist of harmful material and can wear away easily due to extensive use</li> </ul>

### 3.3 Solution 3: Traditional Road Signs on Important Intersections

Another solution regarding navigation to UBC parking lots is to improve signage at major intersections in UBC. This idea came from one the team member’s personal experience driving to UBC. What we found is that often the sign only indicate street names but no specific information regarding where the parkade is and whether there is accessible parking or not. Therefore, the team made an analysis on the UBC map and marked up the key locations. Figure 9 shows the map analysis, where green lines are the key routes to access any parkade. The orange circle are key intersection to event parking (Key event location: Alumni center, Thunderbird Parking, and Rose Garden...etc.). The yellow circle indicates other intersections where a sign will likely to help navigating to UBC.

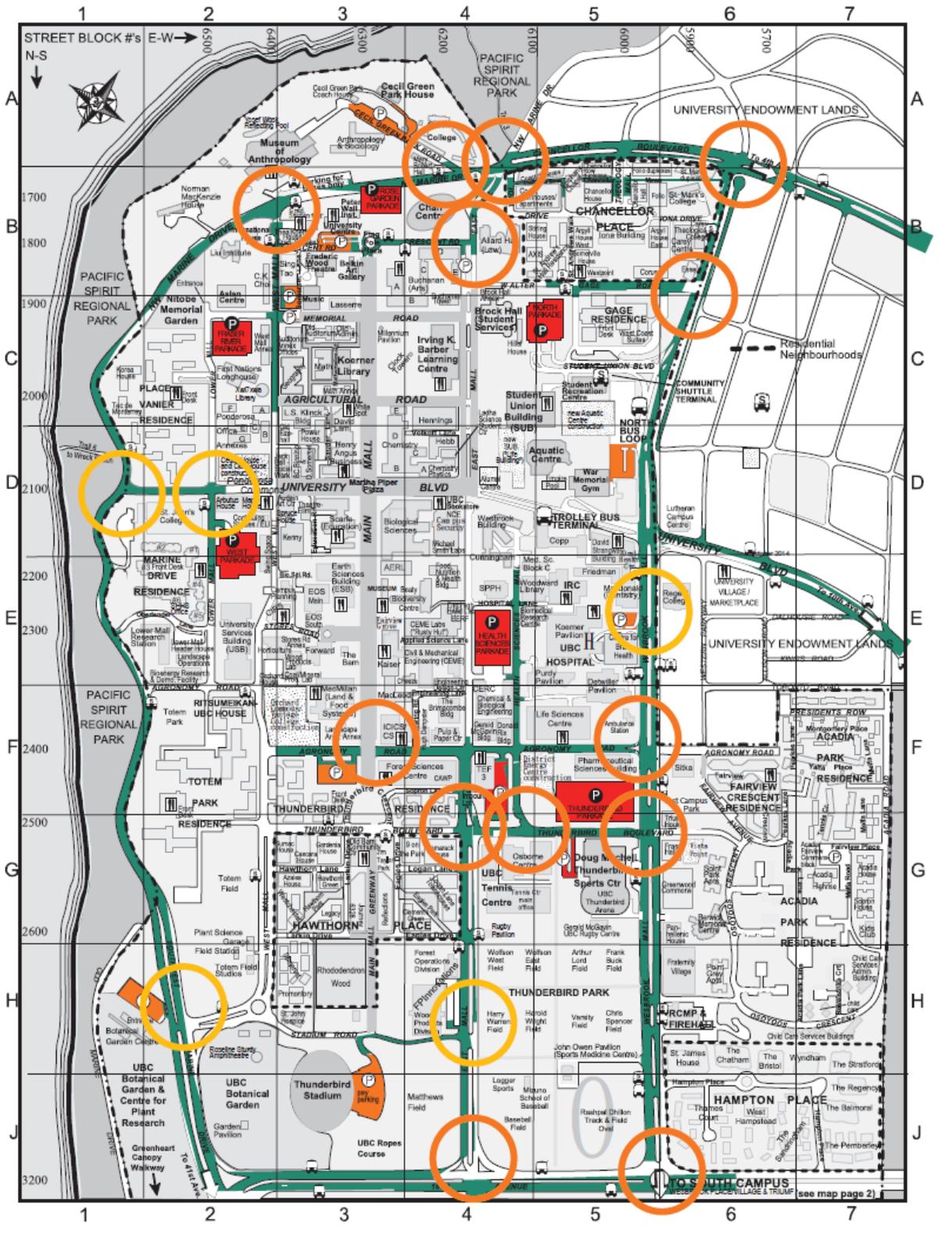


Figure 9 - UBC Key Intersection Map

Table 2 below shows the TBL analysis result for this solution for comparison to other solutions

Table 2 - TBL Analysis for Solution 3

Social	Economic	Environmental
<ul style="list-style-type: none"> <li>• High road awareness and easier to follow without staring at GPS all the time</li> <li>• Promote less distraction driving</li> <li>• Available to all people visiting UBC (Pedestrian and Driver)</li> </ul>	<ul style="list-style-type: none"> <li>• Increased cost due to higher cost per signage (Moeur, 2014)</li> <li>• Cost may be high if all intersection is implemented with this solution</li> </ul>	<ul style="list-style-type: none"> <li>• Metal and signs are long lasting materials and can sustain corrosion from bad weather</li> <li>• Signs may still need replacement causing waste when new roads are implemented</li> </ul>

### 3.4 Solution 4: Electronic Indication Sign at Intersections

Electronic Signage is a high technological solution that would be built around the UBC campus to provide information on available parking stalls at close proximity parking lots . These electronic signs would provide real-time updates on the amount of available parking stalls at the displayed parking lots providing users pre-emptive knowledge of parking availability. Comparing to traditional signage in solution 3, this solution would ensure that parking lot users know which parking lots are full and can determine which parking lots have available spaces to provide. Further implementation of these electronic signs could include information on the amount of available disability/senior parking stalls available through colour led displays providing information on the available general parking stalls, available disability parking stalls, and senior parking stalls thus increasing the accessibility to those who have mobility difficulties and seniors. Indicators that would be used to identify the impact of senior parking stalls/signs are listed in Table 3.



Figure 10 - Electronic Road Sign

Retrieved: <http://www.led-signs.com.au/images/news18.jpg>



Figure 11 - Electronic LED Sign within Parkade

Retrieved: <http://www.parking-net.com/Upload/ContentManagersPictures/indect/parkingguidance/indect-signage2.jpg>

Table 3 - TBL Analysis for Solution 4

Social	Economic	Environmental
<ul style="list-style-type: none"> <li>• Provide directional guidance for UBC patrons from parkade locations</li> <li>• Display real-time parking stall availability to allow for planned parking</li> </ul>	<ul style="list-style-type: none"> <li>• High cost implementation (Moeur, 2014)</li> <li>• Maintenance cost</li> </ul>	<ul style="list-style-type: none"> <li>• Continuous energy consumption. Higher carbon footprint</li> </ul>

### 3.5 Solution 5: Seniors Parking Sign

In addition to existing disability parking stalls, senior parking stalls can be implemented to improve accessibility for seniors (Figure 12 & Figure 13). The use of seniors parking stalls/signs would provide a low cost improvement to accessibility by ensuring a limited number of parking stalls at each of the UBC parking lots are dedicated to senior visitors who may not possess a disability parking permit. These stalls would provide support of accessibility for seniors with stalls located within closer proximity to the entrances/exits of the UBC parking lots. There would be no enforcement to ensure that only seniors would be the only users of these parking stalls and would be purely based on an “honour system” to ensure that these parking stalls are available for seniors similarly how existing parking lots around Vancouver have stalls dedicated to new/expectant mothers. Indicators that would be used to identify the impact of senior parking stalls/signs are listed in Table 4.



Figure 12 - Specific Senior Parking Sign

Retrieved:

<http://emedco.slcontent.com/media/catalog/product/reserved-parking-signs-reserved-for-seniors-81547-lg.jpg>



Figure 13 - Senior Parking Ground Painting

Retrieved:

<http://blogs.abc.net.au/.a/6a00e0097e4e6888330133ed01deb8970b-pi>

Table 4 - TBL Analysis for Solution 5

Social	Economic	Environmental
<ul style="list-style-type: none"> <li>• Improvement of parking proximity distances for seniors</li> <li>• Decrease available general parking stalls</li> </ul>	<ul style="list-style-type: none"> <li>• Low cost implementation (Moeur, 2014)</li> <li>• Long term revenue impact due to decreased general parking stalls</li> <li>• Maintenance cost</li> </ul>	<ul style="list-style-type: none"> <li>• Little impact on environment</li> <li>• Signage may not be effected too much from weather corrosion for indoor parkades</li> </ul>

## 4.0 Conclusion

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Through the use of the three key articles and TBL analysis, we determined that there are five effective solutions for senior accessibility. The Safewalk collaboration (unofficially AlumniWalk) can provide assistance with navigation to elderly visitors upon exiting parkades, which provides a great social benefit with students working or volunteering for this program. However, with more workers comes more cost which also needs to be considered before full implementation of this solution. The high visibility painting sidewalk will act as guides for wheelchair users and visitors to reduce confusion. Although the paint for this solution will be relatively low cost, it can also be harmful material and easily wear away. Adding signs to key intersection will assist visitors in locating potential parking spots and key routes around campus, but will require higher cost per sign and a potential increase in waste if they were to corrode. Even with that in mind, this solution can also provide higher road awareness and promote less distracted driving as drivers would need to keep a better eye out for the signs rather than be distracted by electronics or their GPS. The electronic signs, although high cost and energy consumption, can provide more information for visitors and better directional guidance to parking spots around campus. The senior parking stall/signs will provide a low cost method to support accessibility for the elderly. These five solutions is not an exhaustive list of all possible solutions, but is what the team believes are the best solutions based on TBL.

## 5.0 Future Research Recommendation

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Improving accessibility is a very detailed process and requires a lot of information and data. Information that we would like to have continued with would be traffic information and parking lot usage throughout the course of a year. Information relating to time of the year would allow for more information on what challenges are affecting parking at UBC during the normal school semesters and during off school semester. Additionally interviewing more individuals and surveys would improve the quality of what issues people are having with accessibility and parking at UBC. Through the understanding that there is a high regard to keep alumni satisfied when they do return for a visit, further program integration such as a UBC AlumniWalk could be integrated into the Robert H. Lee Alumni Centre. Such a program would be desirable as those who may have attended UBC a long time ago would now become unfamiliar with the campus they once attended with the recent construction developments being made at UBC.

Accessibility refers to the design of products, devices, services, or environments for people with disabilities (Harper et al., 2008). To continue improving accessibility at UBC further efforts were made to address issues for seniors and their accessibility at UBC through this report. But accessibility is not just an issue for people with disabilities or the elderly but for all individuals. Expectant/new mothers endure challenges that are associated with accessibility that would not fall within people with disabilities or seniors. Newcomers to Canada or international visitors also endure challenges that impede on their accessibility. Rankings compiled in 2015 by U.S. News and World Report, Times Higher Education, the Academic Ranking of World Universities and QS World University Rankings all ranked UBC among the 50 most reputable universities worldwide (Best Global Universities Rankings, 2015) (World University Rankings, 2015)(Academic Ranking of World Universities 2015, 2015) (QS World University Rankings® 2015/16, 2015). Given UBC is recognized internationally there are many opportunities to improve on accessibility for all individuals that would come from around the world to visit. Further investigation into how to make UBC internationally accessible would be another approach to further the goals of accessibility at UBC.

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