



Studley Campus Walkability Assessment

EVNS 3502: Final Report

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Abstract

The Greening the Campus Movement at Dalhousie University aims to improve sustainability and increase environmental awareness and action on the university's campuses. Since walking is the major mode of transportation on Dalhousie's campus, our project aimed to promote walking by providing a map of safe and danger zones on campus. This study also offered suggestions for maintaining and improving sidewalks and crosswalks, controlling traffic and locating amenities. Results were collected through surveys administered to students living in three major residences on Studley campus. Three hundred and twelve surveys were completed. The results showed that 20% of students felt that there was not enough room for walking on campus. Fifty five percent of these students complained of broken or cracked sidewalks and 40.5% found that sidewalks started then abruptly stopped. Results also showed that 70.19% of all the students surveyed passed construction zones on their daily walk. Based on the survey results, a map was designed which indicated areas on Studley campus that needed improvements.

Acknowledgments

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1.0 Introduction

1.1 Research Problem

Walkability is a key factor in having a sustainable transportation network. It measures the friendliness of an area and considers many subjective factors in the process. Walkable areas help promote sustainable transportation, which is a concept that promotes fuel efficient transport systems that have a low impact on our environment as well as increasing physical health and safety of the community. The Alberta Association Canadian Institute of Planners provides this detailed definition for walkability:

“Walkability is the foundation and the key to an urban area transportation network. A walkable Community transportation network is the most affordable system any new neighbourhood and community can design, build and preserve. Walkable communities allow urban environments to promote sustainability of natural and economic resources. Additionally, neighbourhood walkability provides a very important social component, promoting human interaction, physical health/fitness and increased safety” (Alberta Association Canadian Institute of Planners, 2010).

Walkability is an important assessment that is and has been essential to improve individual and community health benefits as well as to promote sustainable transport. To have a viable source of understanding for the walkability of an area, a survey must include many different aspects ranging from the state of sidewalks to the volume of traffic. Many factors affect walkability and include, but are not limited to: the quality of sidewalks, proper lighting, street furniture, safety, traffic volume, presence and quality of crosswalks and residential density.

1.2 Objective

The objective of this project is to assess the Walkability of Dalhousie University's Studley Campus. In doing this, an assessment of the Studley campus was done to see which areas need improvements. Such improvements include the presence or absence and quality of sidewalks, the existence of garbage and recycling bins, and other amenities.

1.3 Background

Worldwide concern has been increased greatly towards the betterment of our environment. Recently, Dalhousie University has started to focus more on becoming a sustainable campus by incorporating the concept of green living into many of its programs. In January 2008, Dalhousie University formed The Office of Sustainability which focuses on solutions that support and create positive changes in University operations. It works to incorporate sustainable concepts into all of its major planning. Dalhousie has also incorporated the "Greening the Campus Movement" into some of its programs. This movement is defined as increasing environmental awareness and/or action on campus in the operational and academic facilities and processes of the campus as well as in the human communities of the campus and surrounding areas (Dalhousie University, 2010). Environmental Science 3502 is an environmental problem solving class that deals with different issues on how to make the University become more sustainable. The problem being looked at here is the Walkability conditions of Dalhousie University's Studley Campus and how they can be improved.

Walkability assessments in the past have helped to give a better understanding as to how an area can improve its health and environment. One previous Walkability survey assessment in 2001 was put together for school children of grade primary to grade 6. Surveys were passed out

to over 78 elementary schools in Ontario, Canada for a total of 6369 valid surveys completed. Survey questions focused on how children were getting to and from school, and if they had any difficulty with doing so. Their results showed that 57.7 percent of students walked, 27.5 percent were driven, and the rest fell into categories such as car-pooling, bike, school bus and community bus. Other results showed that 72.2 percent of those students would prefer to bike or walk to school. And finally, 18.2 percent found that there was not enough room to walk on sidewalks and 24.6 percent responded that it was not easy to cross roads. The purpose of the study was to gather results from students and propose solutions for future plans on such things like construction and maintenance of roads and sidewalks, landscape and suggestions for further studies (Ontario Walkability Study, 2001).

The Halifax Urban greenway project has been ongoing since 2004. It is a project that aims to create a multi-purpose trail that would stretch from Armdale Rotary to Point Pleasant Park. The trail would pass by Dalhousie and Saint Mary's. The project began construction last year and currently covers South Street south to Marlborough Woods. This is a promoter for active transportation that can be used by students at Dalhousie and/or by locals.

In 2005, Dalhousie students working on a similar project to ours conducted a green map for Studley campus. The purpose of their project was give the opportunity for university students and general public to learn more about Dalhousie's campus, become aware of the current environmental plan and changes and issues on campus. The map used standard legends from the Green Map System which is a universal wide system that sets guidelines and gives tips for how to design a green map. Saint Mary's University has also become a member of the Green Map System, using standard legends for creating a green map on campus (Eirikson, Wood, & Wickramanayake, 2005).

The TRAX projects are part of the Ecology Action Centre and have been ongoing since 1999. The projects aim to make it easier for Nova Scotians to walk, bike, car pool, or use public transit. Past projects have been the U-Pass project, MetroLink, Bicycle Blueprint and many more. Dalhousie introduced the U-PASS in 2006 to full-time university students. The students receive a Metro Transit bus pass from September to April. Current TRAX projects include the Green Mobility Capital Grant Program, Senior's Bus Training, Canadians Idleless, and the Association of Doctors for Advancing Physically-active (Ecology Action Centre, n.d.).

1.4 Rationale

1.4.1 Walkability Importance

Walkability is highly important because most of us walk every single day. Walking can be seen as the corner stone of human life. Walking is a physical activity which helps to increase both physical and mental health and increase social interaction. Walking is the link between dwellings and mass transit, carpooling areas and work. Often increasing Walkability increases the productivity of mass transit and other methods of transportation. Walking is very affordable often economically and socially disadvantaged people rely heavily on walking as their main form of transport. Urban areas often benefit from reducing the volume of automobiles which allows for a higher capacity of pedestrian and bicycle transportation.

1.4.2 Undervalue

Conventional traffic surveys tend to ignore many types of pedestrian activity. For example, they often ignore people who are sitting or waiting on sidewalks, inline skaters, skateboarders, and people walking from cars or buses to buildings (Haze, 2000). Statistics Canada found that in 1995 the 5% of personal trips were walking only. A more recent and more in-depth study conducted by National Household Travel Survey (BTS, 2001) found that 8.6% of personal trips were solely walking. One study found that the actual number of non-motorized trips is six times

greater than indicated by conventional surveys such as Statistics Canada's survey (Rietveld, 2000). By undervaluing the total quantity of walking that is happening in urban areas tradeoffs could potentially be made in an automobile-centric way. For example instead of increasing sidewalk width, the width of the road would be increased to allow for more automobiles rather than pedestrians. Wide roads, high traffic speeds and large parking facilities create barriers to walking, so evaluation practices that undervalue walking tend to create automobile dependent communities (VTPI, 2008).

Walkability tends to be undervalued in a few key ways. As stated before Walkability is very hard to measure, there have been many surveys on this subject each of which revealed different results. To collect an accurate number the total population needs to be surveyed however this is never the case. Low status is associated with walking because it is very low cost and does not contribute to the economy directly. There are very few walking organizations in comparison to organizations associated with other modes of transport such as automobiles and air.

1.4.3 Economic Impact

There are many savings associated with shifting dependence from automobiles to walking. Automobiles are known to cause environmental damage due to greenhouse gas emissions along with the potential for personal injury and property damage. Walking substitutes for short distance travel which if done in a vehicle would produce a high amount of emissions. This is due to the fact that vehicles when "cold started" require a higher energy consumption and pollution emissions are several times higher than average for short trips when engines are cold and parking costs are high when measured per vehicle-mile (VTPI, 2008). A short walk could result into a longer drive if one had to find parking.

1.4.4 Land use Efficiency

Land use has varying economic, social and environmental implications associated with it. According to the USEPA, low density development coupled with vast amount of land paved for automobile use and parking causes the greatest detriment to the total Walkability of a given area. To increase the Walkability of an area, the promotion of clustered developments and clustered land use will help centralize new developments by shifting them away from an automobile dependant to cycle or walk dependant area (VTPI, 2008). Also coupled with walking are the added benefits of not needing to have a designated buffer area to reduce the traffic noise. Walking reduces the total pavement needed for urban roads which in turn increases the population density allowing for a snowballing effect of increased Walkability. Some economic benefits associated with land use are; increase local business activity, decrease in health cost from overall improvement of health and reduced transportation costs (Burchell *et al.*, 1998). Some social advantages of increasing land use efficiency are; improved accessibility for people who are transport disadvantaged, reduced external transportation, increased neighbourhood interaction and community cohesion (Burchell *et al.*, 1998). Finally there are the environmental benefits of land use efficiency; reduced “heat island” effects, reduced land needed for roads and parking facilities, reduced energy consumption and pollution emissions (Burchell *et al.*, 1998).

1.4.5 Community Livability and Cohesion

Community livability refers to the environmental and social quality of an area as perceived by residents, employers, employees and visitors (Weissman & Corbett, 1992). Cohesion is simply the smooth interaction between the different populations and the environment. When measuring the amount of community cohesion researchers look at frequency of community events and turn out and the positive social interactions of those within different social or economical groups. These aspects are also contributing to an increase in safety and health, and increased property

values and economic development (CTE, 2007). Walkability has large effects on the community livability, because the increase of access to different areas of the community allows individuals to indulge in their magnificent environmental surrounding.

1.4.6 Health

Health Canada (2010) recommends at least 30 minutes of moderate exercise a day, at least 5 days a week. There have been many health issues that appear when an individual has not been partaking in physical activity on a regular basis. It can be seen in western society that the rate of obesity has been increasing rather drastically. Walking is an excellent method to increase overall fitness because it is a low impact method of exercise. Walking is very popular among the elderly and those of a lower economic bracket, for they may not be able to afford fitness memberships or to participate in organized sporting events. Health experts believe that more balanced transportation systems can contribute to improved public health by accommodating and encouraging active transport (Sallis *et al.*, 2004; Bassett *et al.*, 2008). One way to achieve a more balanced transportation system is to increase the Walkability of urban centers which would allow individuals to walk to and from areas of interest while getting physical activity at the same time.

2.0 Methods

The research methods for our study included a self-administered survey and an observational analysis of walking infrastructure and habits on the Studley campus of Dalhousie University to enable the creation of a Campus Walkability Map.

2.1 Survey

Due to time constraints, we have delimited our study population to students living in residence on the Studley campus of Dalhousie University. These students are easier to access, and

therefore data could be collected in a more time effective manner. In addition, residence students are an appropriate section of the population because most residence students walk on campus every day and are very familiar with their campus. A survey was chosen as the method to collect this information because it is an efficient way to collect information about the prevailing opinions of a rather large population. In addition, the data return period on a self-administered survey is short, which is a necessity due to the limited timeline of our research project.

The population surveyed included all students living in residence on the Studley campus, a total of 2000-2100 students (Robinson, 2010). Confidence intervals were then developed to ensure we had a large enough sample size to ensure representativeness. To obtain the 95% confidence interval we desired, a sample size of 312 was required. In order to ensure that the differences in general walking patterns that may result from the particular areas on campus students lived were reflected, we chose to proportionally stratify the population so that the percentage of the total sample that was surveyed in each residence reflected the percentage of the total residence population that resides in each of the three main residences (Risley Hall, Shirreff Hall, and Howe Hall). This resulted in 93 surveys being conducted at Risley Hall, 85 surveys being conducted at Shirreff Hall, and 134 surveys being conducted at Howe Hall. The survey (Appendix B) asked students their year of study in Question 1, indicating that first and second year students were the most common participants, although students from a variety of years of study responded. The researchers made the assumption that the participants were likely to represent a variety of programs of study. The survey was cross-sectional in nature, the researchers asked each participant for data on a single occasion.

The researchers desired results that would be representative of the residence population, and therefore employed probabilistic sampling. A complete sample frame could not be made

available. Randomness (a required condition for probabilistic sampling) requires that each individual in the population has an equal chance of being selected (Creswell, 2003). Researchers fulfilled this condition by conducting surveys and both lunch and dinner so the schedule of most students was likely to be accommodated. In addition, each of the cafeterias on Studley campus was used as a survey location, making it very likely that all residence students had a chance to be chosen. At each location, 2-3 surveys were handed out to randomly selected students per table, and they were asked if they would complete the survey and given the information letter featured in the ethics form (Appendix C).

A pilot test of the survey was conducted by a few participants in Howe Hall. The survey instrument attached (Appendix B) reflects the changes made in response to comments participants in the pilot study made when filling out the previous version. The main source of confusion for participants in the pilot test was that they were unsure whether it was acceptable to select more than one choice for each question. In response, the researchers added the specification that participants should select all choices that apply. There was also some concern that the Question 6 of the survey “Do you plan to walk regularly on campus in the future?” was unnecessary for our chosen population because residence students often have no choice but to walk on campus. The researchers chose not to remove the questions, in the interest of determining any specific reasons why students might deviate from this trend. However, once the results were calculated, no such deviations emerged.

Some potential sources of bias associated with our choice of methods include the weather on the days the survey were conducted and, more generally the season in which the surveys were conducted. The amount of students who reported enough room to walk safely (Question 5), ease of crossing streets (Question 6), good driver behaviour (Question 7), and a pleasant walk

(Question 8) may have been different had the survey been conducted in fall or winter, or depending on whether it was rainy or sunny on the day participants answered the survey. In addition, the chosen method of sampling students sitting at tables, while effective in terms of time efficiency, may have resulted in students sharing answers or influencing each other's answers, because students sitting together at tables often know each other.

The dependent variable in this study was students' opinions about Walkability on campus, and the researchers chose to study how four categories of independent variables affected students' opinions on Walkability. These four categories of independent variables are: street crossing information, driver behaviour, aesthetics, and safety issues. The instrument asks specific questions that provide information about these variables and how they affect opinions about Walkability. The following table shows how these variables cross-reference with items in the survey instrument.

Once the data were collected, they were aggregated in an Excel spreadsheet. First, the number and percentage of students who selected each answer was calculated for each residence separately. Then, these data were totalled and the numbers and percentages for the total sample were calculated. The trends were then determined and represented graphically, as seen in the Results section of this report. For example for Question 1: "What year of study are you currently in?" we will total the number of respondents in each year of study, calculate the percentage of the total sample that are in each year of study, and present the data in graphs. Once the percentages of how students who selected each option for each question were calculated, the researchers compiled a list of the top overall concerns that people have which affect Walkability on Studley Campus.

2.2 Observational Data Collection

The second portion of the Walkability survey will involve collection of observational data by means of a group walkabout around Dalhousie's Studley campus. The group walkabout will involve a cataloguing of various Walkability issues around the campus and marking each location using a global positioning system. The Walkability issues to be catalogued will be taken from the four independent variables tested in the Dalhousie Studley Campus Walkability Survey. As mentioned above, these variables will include street crossings (i.e., crosswalks), driver behaviour, aesthetics, and safety issues.

To analyze the street crossing independent variable, the walkabout will involve looking into the quality of the crosswalks, including both marking visibility and crosswalk condition. Any observations involving need for repair or overall poor crosswalk quality will be noted and recorded for inclusion in the final map. Driver behaviour will encompass the visual observation of pedestrian-unfriendly behaviour expressed by drivers while on the walkabout portion of the survey. Aesthetics will involve the quality of sidewalks, crosswalks, and surrounding areas in an aesthetic nature. For example, this will include observations on the number of cracks within a sidewalk, and the prevalence of litter on walkways. Safety issues will regard the overall safety risk of the campus grounds on pedestrians. This will include things such as damaged sidewalks, ice/snow, and poor signage or street lights.

Once this data was collected from the independent variables, was compiled into a Walkability map which will outlined the best and worst areas and routes to take when travelling on foot around the Studley campus. This map can also be used as a starting point for addressing different areas on campus which require maintenance or repair. The program used to create the

map was ArcGIS by ESRI. This program was used to take the GPS coordinates of noted issues and incorporate them onto a map of the Dalhousie University's Studley campus.

The second method of collecting data was by conducting an observational walkabout around Studley campus. The walkabout involved cataloguing Walkability items around campus on a GIS map. The Walkability items were defined by a previous study, PEAT, which explained all Walkability aspects and helped speed up cataloguing. The items that were catalogued in this study were as follows; Waste recepticals, bike racks, marked crosswalks, seating, green spaces and parking. All trails, paths and sidewalks were given a ranking from 1 to 5 in accordance to the PEAT path assessment rating scale.

The PEAT scale as stated above is a logical ranking system designed to thoroughly examine the issues of a specific path. The description of each level can be found below. A five denotes an excellent and a one denotes a very poor.

- **Very poor condition (1)** is a surface with lots of cracks, bumps, holes, or weeds growing in the surface or between the cracks. A path or trail surface in “very poor” condition would make traveling along the segment very difficult or not possible for someone bicycling, in-line skating, or in a wheelchair. For dirt or gravel segments, rate the surface condition as “very poor” if the surface is uneven and there are numerous or severe holes and irregularities in the surface.
- **Poor condition (2)** is a surface with lots of cracks, bumps, holes, or weeds growing in the surface or between the cracks. A path or trail surface in poor condition would make traveling along the segment difficult for someone bicycling, in-line skating, or in a wheelchair. For dirt or gravel segments, rate the surface condition as poor if the surface is uneven and there are several holes and irregularities in the surface.
- **Moderate condition (3)** is a surface with some cracks, bumps, holes, or weeds growing in the surface or between the cracks, but not as many as a path in poor condition. For dirt or gravel segments, rate the surface condition as “moderate” if the surface is only moderately uneven and there are only a few or minor holes and irregularities in the surface.
- **Good condition (4)** is a surface with no or few bumps, cracks, holes and weeds growing in the surface or between the cracks. A fairly new surface would be

categorized as “good.” For dirt or gravel segments, classify the segment as “good,” if the surface condition is even and compact, with very few irregularities or holes.

- **Excellent condition (5)** is a surface with no or few bumps, cracks, holes and weeds growing in the surface or between the cracks. A brand new surface would be categorized as “excellent.” If the surface is dirt or gravel, to be classified as “excellent,” the surface condition must be even and compact, with no irregularities or holes. (PEAT, 2004)

2.3 Limitations and Delimitations

Time for completing the research, data and analysis were limited to the duration of the semester, which influenced the methods of investigation chosen and the level of analysis afforded to the results. We were also limited in that a complete sample frame of the residence population could not be made available for privacy reasons, and that we were not allowed to conduct surveys door to door (which may have reduced some biases) because of Dalhousie rules concerning solicitation in residence buildings.

Time constraints affected the delimitations imposed on the study by the researchers. The research was limited to Studley Campus. Although there was originally discussion of investigating the Walkability of the corridors of transportation between Studley and Sexton campuses, it was determined that time would not allow for reliable research of this scale to be conducted. The population to be studied was also delimited to Studley campus residence students rather than the total population of students in the interest of being able to conduct enough surveys to get a probabilistic sample with the desired confidence interval in the allotted research time.

3.0 Results

3.1 Survey Results

In total, 312 surveys were completed by residence students of Dalhousie University for this survey, in order to obtain a confidence interval of 95%. The majority of the survey participants were in their first year of study, which the researchers expected as a result of the fact that residence students only were surveyed. Of the 312 surveys completed, 61.86% of students indicated they were in first year, 23.08% were in second year, 10.90% in third year, 2.56% in fourth year, 0.32% in fifth year, and 1.28% indicated otherwise (Figure 1).

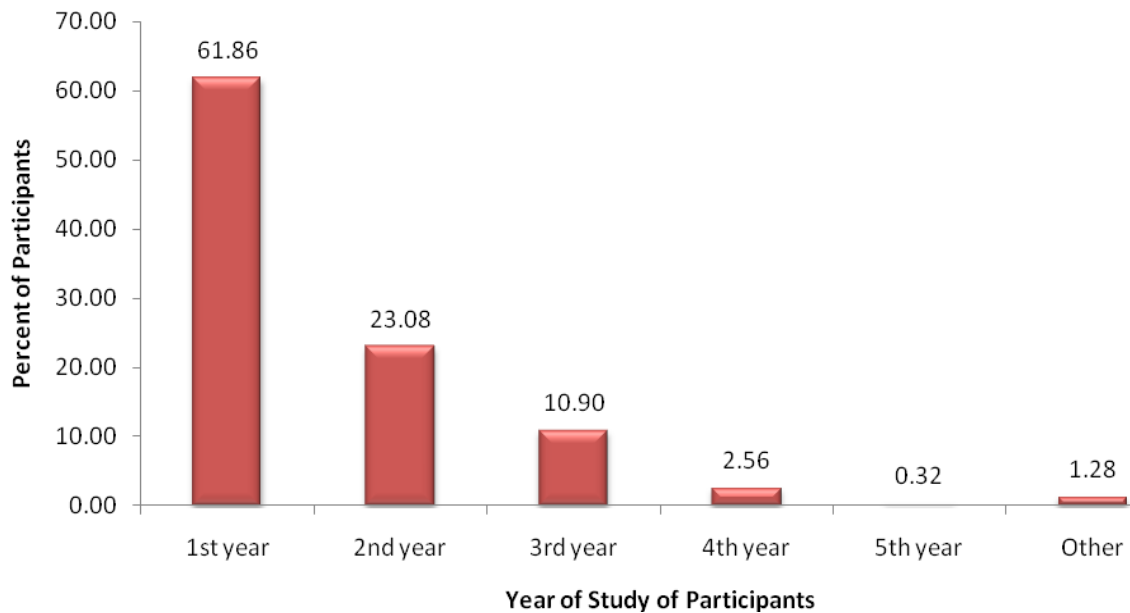


Figure 1- Percentage of participants in each year of study.

Of the 312 participants, 69.55% walk with friends, 74.36% walk alone, 19.55% use the city bus, 3.21% drive a car, 1.92% ride a bicycle, 1.60% skateboard, and 0.64% use some other form of transportation to get around campus. Participants were advised to check all answers that applied for each question, so the percentages do not sum to 100%. The results show that walking is the most preferred mode of transportation (Figure 2).

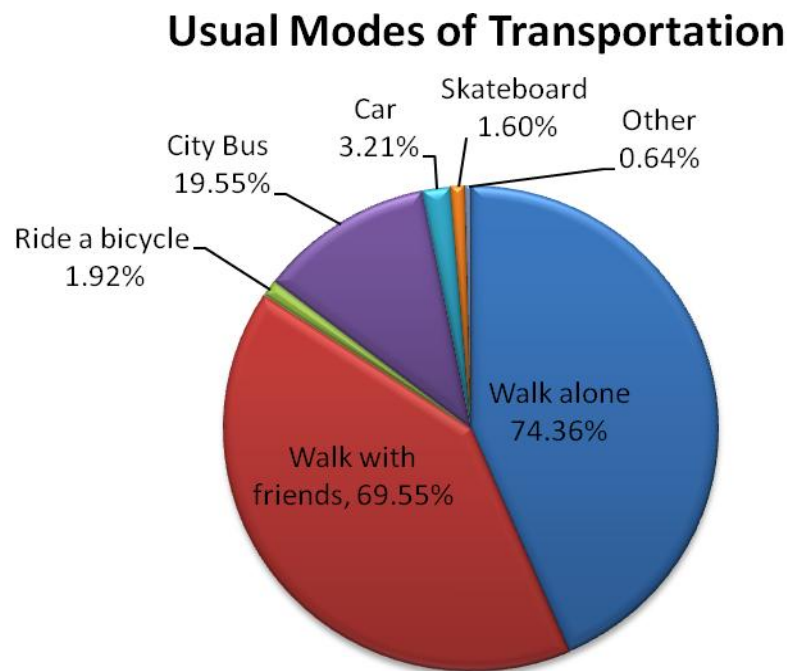


Figure 2- Modes of transportation participants usually use to get around campus, and percent of participants who usually use each mode of transportation.

Figure 3 compares the actual modes of transportation usually used by participants as indicated in question 2 of the survey and preferred modes of transportation as selected by participants in question 3 of the survey. One result trend that emerged was that only 1.92% of participants said that they usually ride a bicycle to get around campus, but 24.04% stated that riding a bicycle would be a preferred method of transportation. The results also show that out of the 96.15% of participants that are walking, only 75.96% indicate that this is their preferred mode of transportation. In addition, 19.55% of the sampled students are using the city bus, however only 5.77% state that this is their preferred mode of transportation. Comparisons for the percentage of participants who actually use and would prefer to use each of the other methods of transportation featured in the survey are shown below.

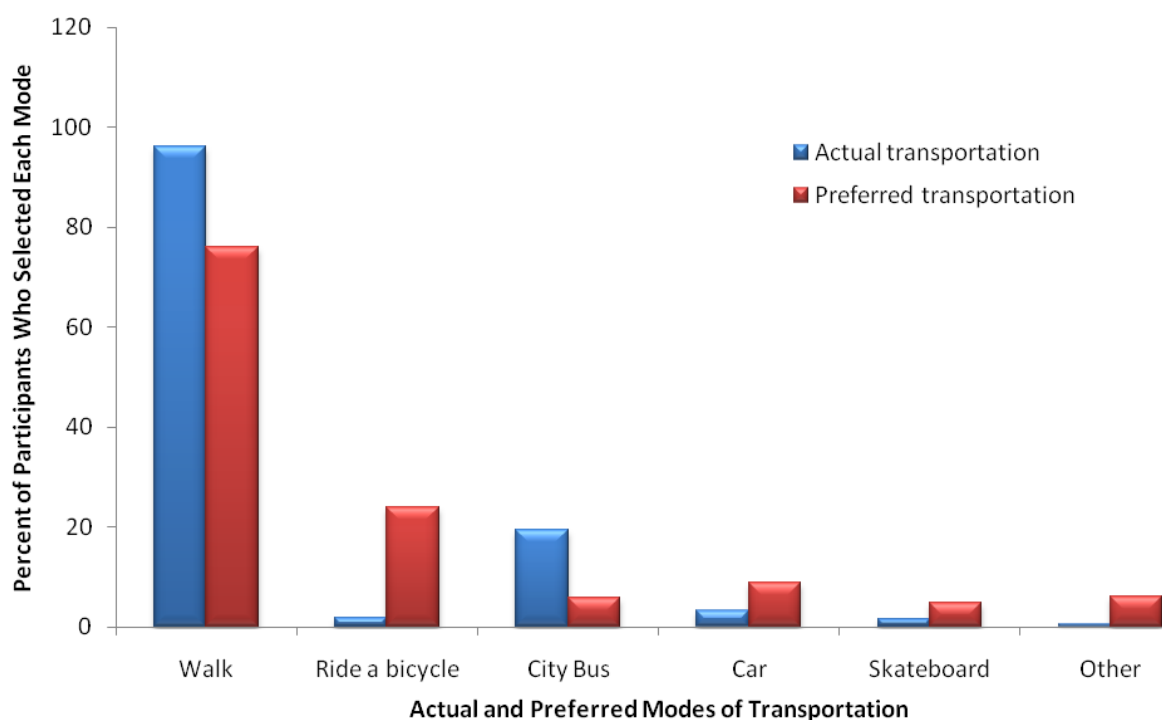


Figure 3- Percentage of participants who usually use and who would prefer to use each modes of transportation around campus.

Question 4 asked participants what kinds of areas they saw during their daily walk, some of which might affect their opinions of walkability on campus. The results showed that parking lots were the most common area to be found (89.42%). Construction areas were also a very common sight for participants, and were selected by 70.19% of students surveyed. Following this were shops (40.06%), parks (29.17%), and other (8.33%), as shown in Figure 4 below.

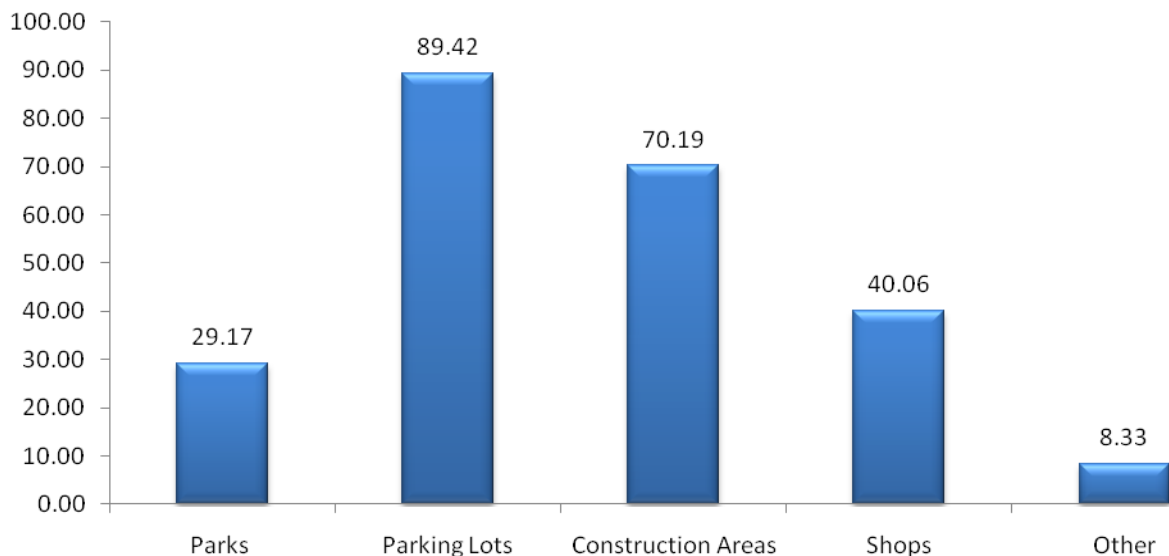


Figure 4-Landscape items seen by participants on their walk, and percent of participants who reported seeing each.

Of the 312 students surveyed, 76.28% of participants found they had enough room to walk safely on their walk. For those who said they did not, the most common problem stated was that sidewalks were broken or cracked (55.41%). The second most common reason was that 40.54% of students claimed they did not have enough room to walk safely due to sidewalks or paths that started and stopped intermittently. From there on, 17.57% claimed that sidewalks were blocked with poles etc., 12.16% indicated that sidewalks were blocked with parked cars, 18.92% said there were no sidewalks, paths, or shoulders, and 10.81% indicated that there was something other than these options that affected their ability to walk safely (Figure 5).

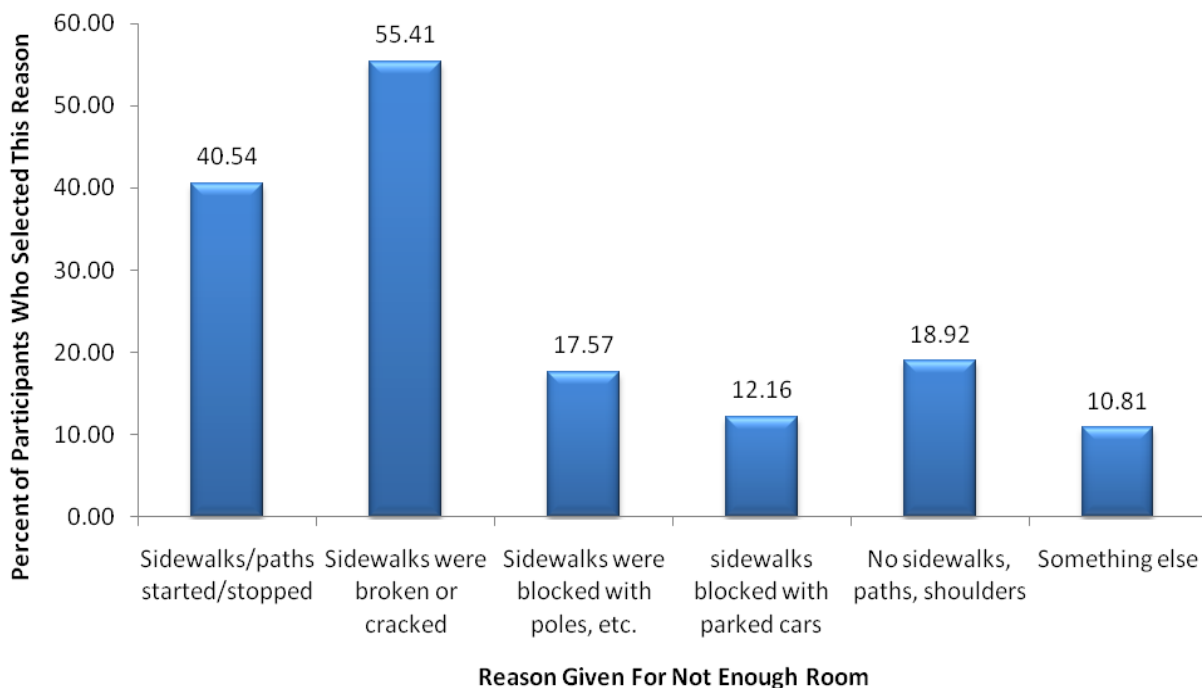


Figure 5-Reasons participants did not have enough room to walk safely, and percentage of participants who did not have enough room to walk safely who selected each reason.

Problems participants saw with driver behaviour were also included in the survey. 70.83% of participants found that drivers behaved well. Of those who reported having problems with driver behaviour, the most commonly stated problem was that drivers did not yield to pedestrians (63.74%), followed by driving too fast (58.24%). Following these were 18.68% of students who indicated that drivers sped up to make it through yellow lights, 14.29% backed out of driveways without looking, 10.99% drove through red lights and/or stop signs, and 2.20% indicated otherwise (Figure 6).

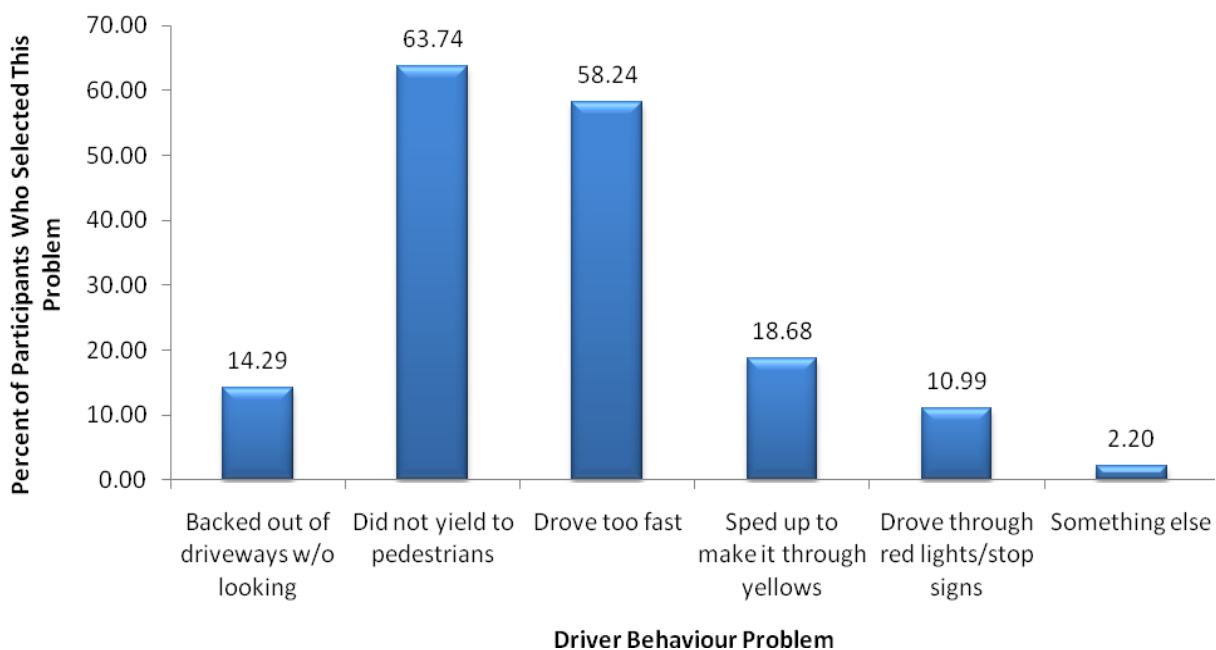


Figure 6-Problems participants noted with driver behaviour and percent of those participants who claimed to have problems with driver behaviour who selected each reason.

The survey questioned participants about street crossings. The results indicated that 77.88% of participants found it easy to cross streets. Of those who said they sometimes had problems crossing streets, the most common issues were lack of crosswalks (36.23%) and too much traffic (33.33%). Other reasons examined were: parked cars blocking the view of traffic, traffic signals making patrons wait too long or not giving them enough time to cross streets, and issues with the curbs, as shown in Figure 7.

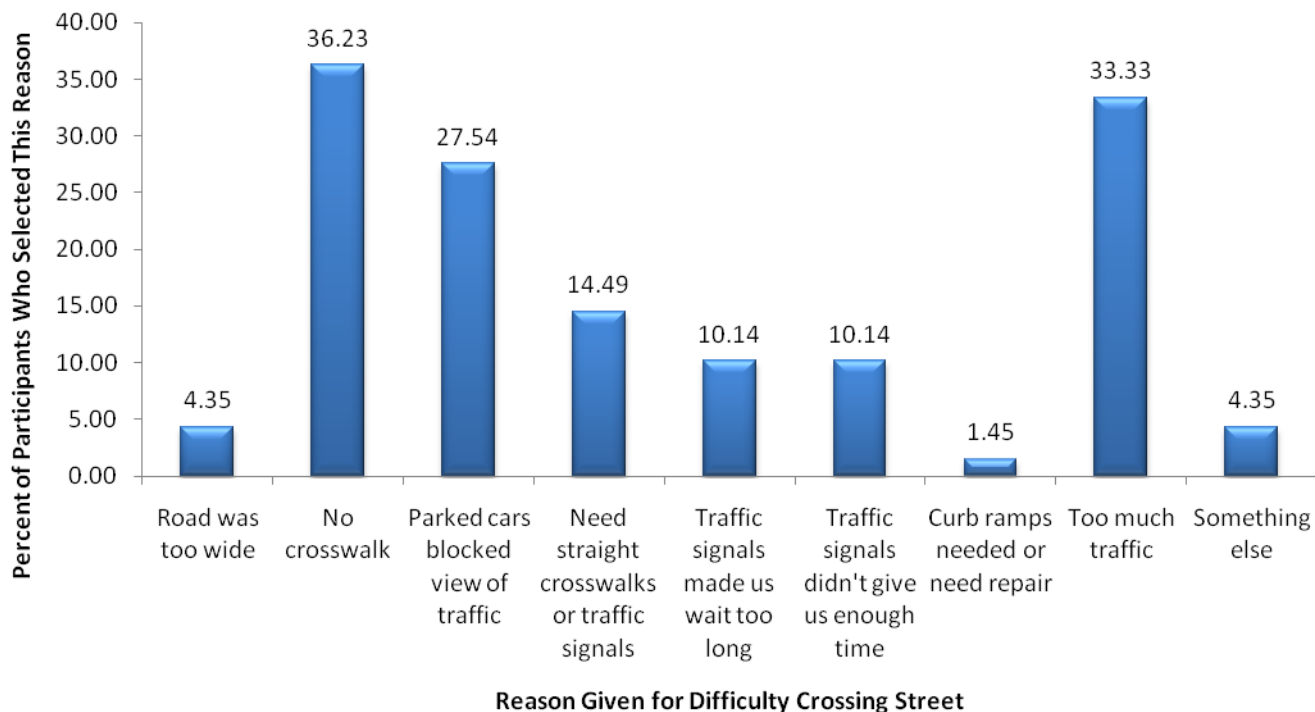


Figure 7-Reasons participants had difficulty crossing streets, and percentage of those who stated they had difficulty who selected each reason given.

Out of the 312 students surveyed, 86.54% of participants found their daily walk pleasant, indicating that the students surveyed already have a relatively high opinion of walkability on Studley campus. Of those who found their walk unpleasant, 38.10% cited litter and trash on the street as a reason. Some others were steep hills, as selected by 14.29% of students who said their walk was unpleasant. Other reasons cited by students who found their walk unpleasant were excessive noise (16.67%), and bad smells in the air (19.05%). 21.43% indicated other reasons for their walk being unpleasant (Figure 8).

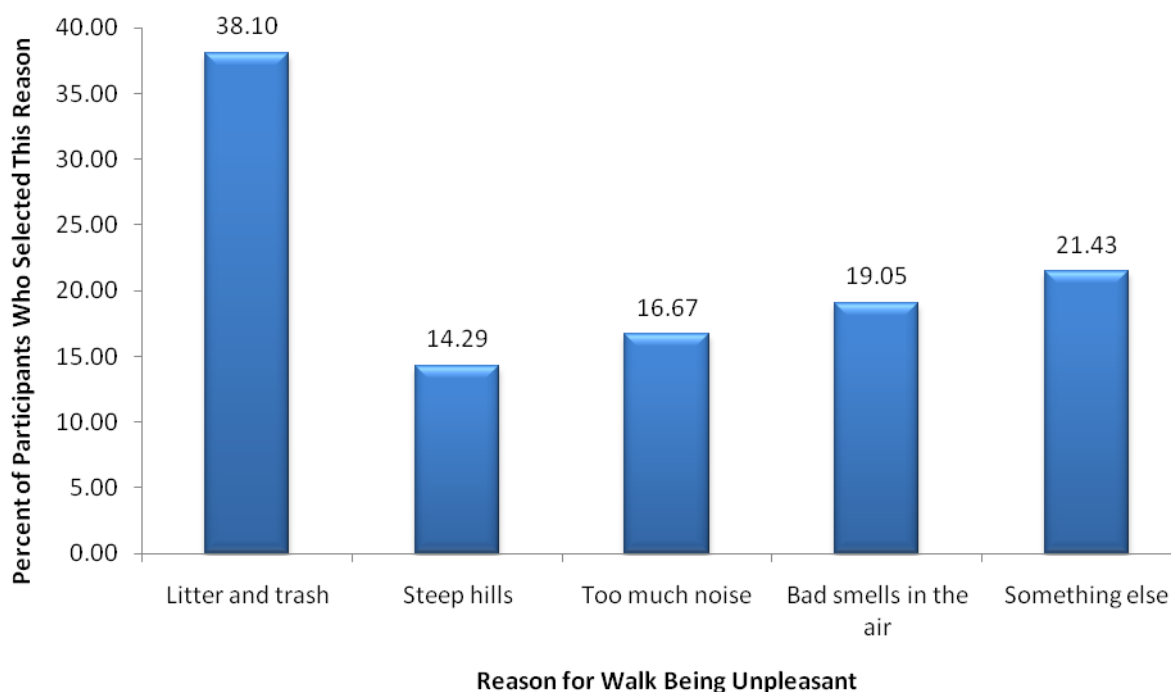


Figure 8-Reasons listed by participants who found their walk unpleasant and percentage of those who found their walk unpleasant who selected each reason.

4.0 Discussion

4.1 Survey

The survey is to understand the opinions of residence students that are living on Studley campus. With the data collected it can help identify common problems that many students encounter on a day to day basis. The survey does not however identify the specific location this problem is encountered. The survey was chosen for it provides a vast amount of statistical information in a very short amount of time.

On average the survey required less than one minute to complete. Originally the survey was very lengthy however after a few pilot tests at common areas on campus, it was quickly understood the percent of students willing to fill out a long survey was very low. Thus, a short six question survey was devised with many possible answers which allows for many inferences among the population. With the short survey, there was 100% return of surveys that were administered to students

The residence population was specifically targeted for a few reasons. Most importantly, they lived on campus so they would have to walk more so then students that live off campus. Secondly, it was assumed that residence students would not own a motor vehicle for they are often from other parts of Canada or international students. Finally, residence students were assumed to spend more time on or around campus which would give them a better understanding of problem areas and issues that need addressing. Due to the size of Studley Campus and the position of many classrooms are located on campus it was predicted that most if not all residence students walk around campus.

The typical mode of transportation around campus was in fact walking which accounted for well over half of the total transportation methods. This was asked in question 2 of our survey. One problem with this is that there are no real options for residence students to get around on campus.

Question 3 asked how one would prefer to get around campus. The most common method of preferred transport is walking followed by riding the bus. Comparing preferred methods of transport to actual it can be seen that riding a bicycle, driving a car and riding a skateboard are higher than actual. One possible reason why the preferred method is higher than actual could be due to unseasonably warm weather for the season which could lead individuals to seek the outdoors rather than staying indoors.

For question 4, we wanted to know what most people saw on their walk. Most individuals saw parking lots accounting for 89.42% of respondents. This was followed by 70.19% of individuals reporting seeing/walking around construction sites. There is little that can be fixed by this problem for construction is required for the progress of the economy. Parking lots on the other hand could be moved off campus to provide a more aesthetic look, increasing the natural wooded sites on campus.

The response for question 5 was rather interesting due to the fact that it was comprised of sub questions; the question 5a asked ‘on your walk today: did you have enough room to walk safely?’ The most common safety infraction for individuals while on their walk was ‘broken/damaged sidewalks’, and this accounted for 55.41% of respondents. The second most reported safety infraction was ‘sidewalks starting and stopping’ this accounted for 40.54% of all respondents. Both of these infractions can be fixed by regular maintenance to damaged areas.

Possible reasons for damaging of sidewalks and paths could be due to heavy equipment used to remove snow during winter months. Another potential cause of path damage could be due to planting trees too close to paths which cause upheaval of sidewalk pads and ash fault.

Question 5b asked; ‘Was it easy to cross streets?’ the results for this question can be seen in figure 2. The most common answer for not being able to cross the street was ‘no crosswalk’ accounting for 36.23% closely followed by ‘too much traffic’ which was 33.33%. If you refer to our map in Appendix A, there are very few painted crosswalks on or around Studley campus. This problem could easily be addressed for there are many individuals that cross the streets near Studley campus which is more than enough to warrant a crosswalk. One of the highest traveled areas on Studley campus that lacks a painted cross walk is in between the Student Union Building and the McCain Arts building. Some students wrote in comments stating that the traffic encountered on University Ave was making it difficult and dangerous to cross. Potentially reducing traffic on University Ave and adjoining side streets could improve feasibility of crossing streets.

Lastly the survey asked ‘was your walk pleasant?’ from this question there where a list of possible answers associated with it. The most common answer provided was an excess of trash found on campus most notably near entrance/exits of buildings. 38.10% of respondents mentioned that there was an excess of trash, many mentioned in comments that the trash was in fact cigarette butts. This strikes the researchers as an oxymoron for smoking is not permitted on Studley campus especially around entrances/exits for it allows others to be subjected to second hand smoke.

4.2 Walkabout

To analysis each specific Walkability item our group actively took note of conditions on a series of walking and biking ventures. To analyze the street crossing independent variable the quality of the crosswalks including both marking visibility and crosswalk condition were noted. Any observations involving need for repair or overall poor crosswalk quality was noted and recorded in the final map. Green spaces were noted to be located throughout the campus in small pockets wherever possible. Some areas could see an increase in natural green areas such as the area surrounding the Life Science Center. The prevalence of litter on walkways and near exits was noted both in the surveys and found on multiple walkabouts. Safety issues noted in the survey were believed to be in regards to the lack of marked sidewalks on University Ave for there are very few actual streets on campus that students would come in contact with.

The data collected from both the survey and series of walkabouts was compiled into a map which outlined the best and worst areas and routes to take when travelling on foot around the Studley campus. This map can also be used as a starting point for addressing different areas on campus which require maintenance or repair. The program used to create the map will be ArcGIS by ESRI. This program will be used to take the GPS coordinates of noted issues and incorporate them onto a map of the Dalhousie University's Studley campus.

5.0 Conclusion

The objective of this project was to assess Walkability on Studley campus. Our research project is able to locate and identify the problems involved with walking with the help our map and results from our survey. As we predicted, the main form of transportation is walking, and the most notable problem is damaged sidewalks.

5.1 Recommendations for the future

Some recommendations for the future include a better survey and more pilot studies. Some of the questions on our survey did not apply to the research problem ex: ‘what year of study are you in’. Other questions on our survey did not apply to our campus environment ex: ‘was your walk pleasant’ one of the options for not being pleasant is ‘steep hills’ but there are not any hills on the major part of Studley campus.

Another recommendation is to use a more efficient method of collecting surveys. We chose to ask every 5th person to make sure our data was randomly collected. We later found out that it was very hard get feedback from every 5th person and took large amounts of time.

5.2 Recommendations for action

From collecting data from our surveys our research project was able to identify key problems related to walk on campus and with our map the location of these problems are easily pointed out. We hope that the information our research provides, it can be put into action, helping improve those locations that need work.

The most common found answer for not being able to cross the streets is due to the absence of crosswalks. Many of the crosswalks on Studley Campus did not have marked crosswalks, or the paint was worn down. This is a simple touch up that can be made. By just repainting crosswalk lines we can reduce 36% of the problem ‘why it’s difficult to cross the street’.

A more difficult and costly improvement would be to remove all cars off University Ave. Large amounts of traffic was the second highest reason for not being able to cross the streets on campus. Some individuals that completed our survey even gave specific reference to reduce the traffic on University Ave.

Improvements can start with just re-painting crosswalks and by doing this we can ensure that students, staff and faculty can feel safe and at ease when walking on Dalhousie's campus.

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7.0 Appendices

Appendix A



Appendix B

The Dalhousie Studley Campus Walkability Survey

1. What year of study are you currently in? (please circle):

1 2 3 4 5 Other

2. How do you usually get around campus? (check all that apply)

- walk (by myself)
 walk (with friends)
 ride a bicycle
 city bus
 in a car
 skateboard
 other: Please explain: _____

3. If you had any choice, how would you most like to get around campus each day? (check all that apply)

- walk
 ride a bicycle
 city bus
 car
 skateboard
 other. Please explain: _____

4. On your walk today did you see (check all that apply):

- parks (government regulated parks)
 parking lots
 construction areas
 shops
 other (please explain) _____

5. On your walk today:

a. Did you have enough room to walk safely?

- Yes
 Not always, because:
 sidewalks or paths started and stopped
 sidewalks were broken or cracked
 sidewalks were blocked with poles, signs, dumpsters, etc.
 sidewalks were blocked with parked cars
 no sidewalks, paths or shoulders
 something else? _____

Location of the problem(s) _____

b. Was it easy to cross streets?

- Yes
 Not always, because:
 road was too wide
 no cross walk

- parked cars blocked our view of traffic
 need straight crosswalks or traffic signals
 traffic signals made us wait too long
 traffic signals did not give us long enough to cross
 need curb ramps or ramps need repair
 too much traffic
 something else? _____

Location of the problem(s) _____

c. Did drivers behave well?

- Yes
 Not always, because:
 backed out of driveways without looking
 did not yield to people crossing the street
 drove too fast
 sped up to make it through yellow lights
 drove through red lights / stop signs
 something else? _____

Location of the problem(s) _____

d. Was your walk pleasant?

- Yes
 Not always, because:
 litter and trash on the street
 steep hills
 too much noise
 bad smells in the air
 something else? _____

Location of the problem(s) _____

6. Do you plan to walk regularly on campus in the future?

- Yes Not always, because: _____

Appendix C