

Feasibility of Making University Avenue Car-Free

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ABSTRACT

University Avenue at Dalhousie University is a space that was designed for motor vehicles, but is used primarily by pedestrians. As a part of the Greening the Campus movement, the group has evaluated the feasibility of turning University Avenue into a car-free space. The group used surveys, observational studies, and interviews to collect data regarding the issues. The group found that there are more pedestrians that use University Avenue than motor vehicles. The group also learned about issues that needed to be taken into consideration when determining what changes could be made to the boulevard. The group took this information and designed two proposals for making portions of University Avenue into car-free spaces, for use as additional green space on campus. Should the group's proposals be considered, the additional green space on Dalhousie University's Studley Campus will enhance the urban, natural, and social capital at Dalhousie University, as well as providing a safer environment for students and residents to enjoy.

1.0 INTRODUCTION

Currently, University Avenue is a space that is shared by pedestrians, cyclists, and motorists alike. But, it is shared in conflict. The problem with University Avenue is that it was originally designed for motor vehicles, but with Dalhousie University's Studley Campus student population higher than 14,000 (Dalhousie University Data Requests), observations have shown that this space is now used primarily by pedestrians (see Figure 2). The major parking facilities on campus are not accessed through University Avenue, but from the streets surrounding, including Coburg Road and South Street. In fact, most of the motor vehicles that enter campus at any point do not enter University Avenue (Barry et al., 2004).

Another issue within this problem is that often times it is difficult for motor vehicles to manoeuvre onto University Avenue because of the high density of pedestrians, especially at times when classes begin and end. This conflict between motor vehicles and pedestrians needs to be rectified. Since pedestrians are the primary users of University Avenue (see Figure 2), and since most students commute to University on foot (Barry et al., 2004, p. 12), and because everyone becomes a pedestrian as soon as they step off their bicycle or out of their vehicle, this project proposes that portions of University Avenue be made car-free from the end of University Avenue, by the Killam Library, to Robie Street.

There are many reasons why University Avenue should be made car-free. There are environmental, and health and safety reasons, as well as historical reasons.

1.1 *Historical Background*

The grounds of Dalhousie University at its present site began with a vision. At the centre of the 1912 campus design was, "a 55 x 200 foot Great Grass Court," positioned at the, "heart of the oval" which surrounded the inner core of the University (Dalhousie Art Gallery, 1986), which was comprised of the Chemistry Building, the Macdonald Library, and the University Club buildings. This Great Grass Court led "down to a boulevard extension of Morris Street (now University Avenue)" (Dalhousie

Art Gallery, 1986). Architects Andrew Cobb and Frank Darling, and University president MacKenzie designed this vision of Dalhousie (Waite, 1994).

When Dalhousie was establishing itself on the Studley Campus, it was contained within the old stone wall that still encircles it today. In the 1960s, Dalhousie began expanding outside of the Studley walls, and down University Avenue. The Weldon Law Building and the Student Union Building were the first two buildings to be built during this expansion, in 1967 and 1968 respectively. One thing that wasn't included in this expansion was the Great Grass Court that Cobb, Darling, and MacKenzie had envisioned and designed.

1.2 *Environment, Health, and Safety*

By making portions of University Avenue car-free and more pedestrian-friendly people will reap the health, environmental, social, and safety benefits of having less motor vehicles and additional green space on campus.

A recent study by the Canada West Foundation describes the benefits of urban natural capital, which include health benefits, social benefits, aesthetic benefits, ecological value, and economic benefits (Wilkie and Roach 2004). If University Avenue was comprised of more green space, then Dalhousie University and its students would be able to reap these benefits. The study says that, "People with access to nearby natural settings are healthier than individuals who have limited or no access to natural capital" (Wilkie and Roach 2004).

Arguably, students would do better academically if they had the opportunity to participate in more physical activity on campus. Wilkie and Roach (2004) state that,

In the short-term, an active person looks and feels healthier, has higher daily energy levels, maintains a healthy body more easily, is better able to manage stress, sleeps better, has stronger bones and muscles, and has better posture and balance...Also, the emotional benefits of physical activity include better self-esteem and reduced likelihood of depressions, anxiety and tension.

With additional green space on campus, students would have more of an opportunity to participate at their will in physical activity on campus.

The study also describes the economic benefits that can be gained from having urban natural capital. Wilkie and Roach (2004) say that, “Urban natural capital contributes to the vitality of the urban economy...[by] attracting residents and skilled labour, attracting business, attracting tourists, increasing property values, and reducing public spending.” Both Dalhousie University and the Halifax Regional Municipality (HRM) would be able to benefit economically from turning portions of University Avenue into green space.

The ecological benefits of urban natural capital are also outlined in the Canada West Foundation study. It states that, “Urban natural capital plays a vital ecological role in cities. It absorbs atmospheric pollutants and improves air quality, reduced the ‘urban heat island effect,’ protects water quality, captures precipitation and improves draining, provides habitat for urban wildlife, and reduces soil erosion” (Wilkie and Roach 2004).

On the aspects of health and safety, the views of David Engwicht should also be considered. David Engwicht, one of the world’s most innovative thinkers in the area of transport and urban design, has a theory that determines that traffic is controlled by the degree to which residents have psychologically retreated from their street. The more of a retreat, the faster the traffic and the more dangerous the traffic becomes for pedestrians. He believes that by reversing this trend, traffic automatically slows down (Engwicht, www.lesstraffic.com). This is significant to University Avenue, where pedestrians have inadvertently been reversing this psychological retreat from the street, therefore, causing traffic to slow and in some cases become precarious. The problem now stands that an infrastructure constructed mainly for motor vehicles is being used primarily by pedestrians, which is something which should be dealt with for the health and safety of individuals on University Avenue.

In 1991, while overseeing the creation of Dalhousie’s new Campus Plan, architect Brian Mackay-Lyons understood that community was an important part of a university campus. Community members were involved the creation of the campus plan, and MacKay-Lyons envisioned a residential-type feel for the university (MacKay-Lyons, 1991). Dalhousie University has not had all the resources

necessary to follow through with many of the recommendations made in the Campus Plan. The university has followed some of the recommendations in the plan, mainly the idea of reinforcing the campus spine, University Avenue, with buildings, but have not been able to implement the green space and community design aspects (Lamb, 2005).

In determining the feasibility of a car-free University Avenue, the group has completed the following project objectives: The group has gauged student opinion and has observed pedestrian and vehicle traffic on University Avenue. The group has taken into account the opinions of Halifax Regional Municipality officials, including Traffic and Transportation Services, Planning, Metro Transit, Fire and Emergency, and Police, as well as the views of Dalhousie University Facilities Management.

2.0 DEFINITION OF KEY TERMS

Pedestrian: any walker, wheelchair user, motorized wheelchair user, runner, jogger

University Avenue: the section of University Avenue from the end of University Avenue by the Killam Library to Robie Street.

Car-Free: no motorized vehicle traffic permitted.

3.0 LIMITATIONS AND DELIMITATIONS

In this project, the biggest limitation experienced by the group was time, as the group only had three months in which to complete the project. The group was also limited by time in the sense that there were only certain times when all group members could meet to complete the observational study. The observational study was also limited by certain uncontrollable conditions, such as the weather, which could have affected the number of pedestrian and/or vehicle traffic.

The group delimited research to Dalhousie University's Studley Campus. The group also delimited the feasibility study to the portion of University Avenue between Robie Street and the end of

University Avenue by the Killam Library. For the observational study, the group also delimited itself to Monday and Tuesday, between the hours of 11:35 a.m., and 12:45 p.m., due to the availability of group. Also for the observational study, the group delimited the observations to the University Avenue and LeMarchant Street intersection, on the North side of the boulevard, and the section of University Avenue between LeMarchant Street and Seymour Street.

4.0 METHODS

4.1 *Observational Study*

Each day that the observational study took place, the group divided the time span of 11:35 a.m. to 12:45 p.m. into ten minute increments. This way, the group could determine patterns of pedestrian and vehicle traffic based on specific times. This was especially important for comparing most of the time intervals with the class-change time of 12:25 p.m. to 12:35 p.m. This is the normal class-change time for Monday classes. As for Tuesday classes, class change times differ. The class change time is of much importance to the group's study because it was suspected that it is during this time when pedestrian traffic greatly increases.

On Monday, March 14, 2005, all five members of our group conducted the observational study. Each member was assigned a specific task in counting individual pedestrians and vehicles for each ten minute increment. One member counted all the pedestrians that crossed LeMarchant Street (along University Avenue) from the FASS building side of LeMarchant Street to the Killam Library side of LeMarchant Street. Another member counted all the pedestrians who crossed in the same place, but walking in the opposite direction. The third member counted all pedestrians who crossed University Avenue, walking in both directions (along LeMarchant Street), from the corner closest to the FASS building, to the University Avenue median. Another member counted all pedestrians who crossed University Avenue (along LeMarchant Street) from the corner closest to the Killam Library, to the University Avenue median. The fifth member counted all the vehicles that traversed the North side of

the University Avenue and LeMarchant Street intersection. This member also recorded the street direction that each vehicle was coming from and entering. The directions were recorded as North (N), South (S), West (W), and East (E).

On Tuesday, March 15, 2005, four members of the group conducted the observational study. Again, each member was assigned a specific task in counting individual pedestrians and vehicles for each ten minute increment. The first member counted all the pedestrians that crossed University Avenue (in both directions) through the path in the middle of the median. Another member counted all the pedestrians crossing University Avenue (in both directions) along the LeMarchant Street side of the median. The third member counted all the pedestrians crossing University Avenue (in both directions) along the Seymour Street side of the median. The last member counted all the vehicles that were traveling on both sides of University Avenue between LeMarchant Street and Seymour Street.

After the observational study was finished, the data was transferred to an electronic spreadsheet. Here, the data was analyzed statistically and graphically to determine if there were any trends in traffic for specific time intervals. This was done to determine any major differences in the degree of traffic between class-change times and in-class times. Eventually, this data was compiled onto a master spreadsheet.

4.2 Survey

The survey was distributed around Dalhousie University's Studley Campus using the simple random probabilistic sampling method. The group chose to use simple random sampling, because the group wished to gather a sample of Studley Campus student opinion. The group's sampling frame was the 14,261 Studley Campus students. The group ensured that the sampling was done randomly by distributing the survey to students congregated in general student areas, with the exception of the surveys that were distributed in two biology class and one sociology and social anthropology class. The choice distributing the surveys in these classes was also random, and the decision to do so was based on the convenience of accessing these classes, as group members were students in these classes.

Distributing the survey in classes may introduce some systematic error, which Palys describes as occurring, “when aspects of your sampling procedure act in a consistent, systematic way to make some sampling elements more likely to be chosen for participation than others” (Palys, 2003) Because the group distributed the surveys in two biology classes and one sociology and social anthropology class, the opinions of biology students and sociology and social anthropology students may be overrepresented in our results.

That being said, the group was just looking to gather the opinions of Studley Campus students, regardless of their program of study. Also, as can be seen in the survey results, the demographic of students who did complete the survey was in general, heterogeneous.

The survey was entitled “Experiences While Traveling on University Avenue” (See Appendix A). The survey itself is confidential and was distributed to students in the SUB, Killam Library atrium, and several classrooms, along with an information letter about the survey (See Appendix C). In areas such as the SUB and the Killam Library, the surveys were distributed between the times of 11:30 a.m. and 3:00 p.m. The surveys were distributed from March 9-18, 2005. Considering that each questionnaire was conducted in person, each participant had the chance to clarify with the group any questions that they didn’t understand. In total 429 completed surveys were received.

The survey asked a total of 18 questions pertaining to “Experiences While Traveling on University Avenue”. The first five questions asked participants about demographics such as age, sex, program of study, etc. Questions six to 15 asked for students’ perceptions about traveling and crossing University Avenue, either as a pedestrian or driver. Questions 10 to 15 were only designed for students who currently drive on University Avenue. The last three questions, 16, 17, and 18, were open ended to allow participants to explain their answers. Question 16 asked participants “Do you feel that accessibility for motorized vehicles is necessary on University Avenue?” Question 17 asked participants “Do you feel that University Avenue should be car-free?” Both 16 and 17 offered a choice

of a “No”, “Yes”, or “No opinion” answers and gave space for explanation for that answer. Question 18 asked “If University Avenue were made car-free, how would you see the space being used?”

After the surveys were conducted, the results were transferred to an electronic spreadsheet. Here, the data was analyzed statistically and graphically to determine if the information could provide explanations as to why certain responses were favoured and whether or not links between responses could be established. Eventually all the data was compiled on a master spreadsheet. Questions 16 to 18 were given more importance statistically for the purposes of this study. Determining whether or not students believe University Avenue should be open to vehicle traffic is one of the group’s main concerns.

4.3 Interviews

The group conducted a total of seven interviews throughout the course of the project. The interviews took place in the following order: Kenny Silver, Metro Transit’s Manager of Transit Planning and Development; Stephanie Sodero, the Ecology Action Centre’s TRAX Program Coordinator; Roxane MacInnis, an Active Transportation Planner with the HRM; Roy Hollett, District Fire Chief with Halifax Regional Fire and Emergency; Ken Reashor, Manager of Traffic and Transportation Services with the HRM; Constable Regan Fong with the Halifax Regional Police; Jeff Lamb, Director of Facilities Management at Dalhousie University.

All interview participants received an information letter which included the purpose for the interview, consent to be interviewed, and permission for the interview to be audio recorded. Constable Regan Fong was the exception to this as the interview was done by phone. This information letter can be viewed in Appendix B. These same interview participants all gave consent to be interviewed and permission to be audio recorded.

The main type of questions asked of each interview participant had to do with whether it was possible to make University Avenue car-free, what benefits would come of a car-free University Avenue, what complications would arise, whether access, such as delivery and emergency access, to

buildings would be affected, and how feasible this project actually is. The questions asked of each participant did differ to a certain degree, therefore to have an actual idea of what was asked of each participant, see Appendix D.

5.0 RESULTS

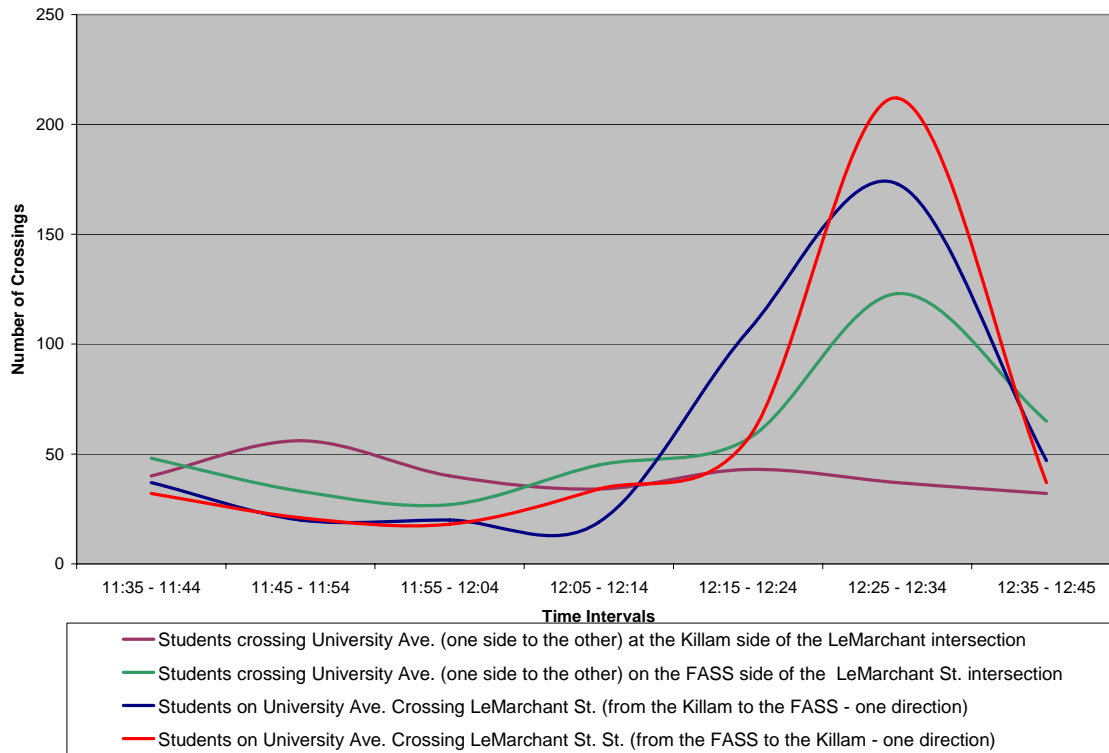
Results from this study were broken down into three sections, each summarizing the appropriate information relevant to that section. Chronologically speaking, the study methods were completed in the following order; observational study, survey completion, and interview completion. In turn, the results portion of this report shall follow the same format.

5.1 *Observational Study*

The first day of the observational study was Monday March 14, 2005. The data collected on this day was from the intersection of University Avenue and LeMarchant Street, on the North side of the boulevard, from 11:35 a.m. until 12:45 p.m. Both motorized vehicle and pedestrian traffic numbers at this intersection were counted during this time. Pedestrians walking along University Avenue across the LeMarchant Street intersection from the FASS to the Killam were counted, and vice-versa. Pedestrians crossing University Avenue along LeMarchant Street were also counted, both on the FASS side and the Killam side of LeMarchant.

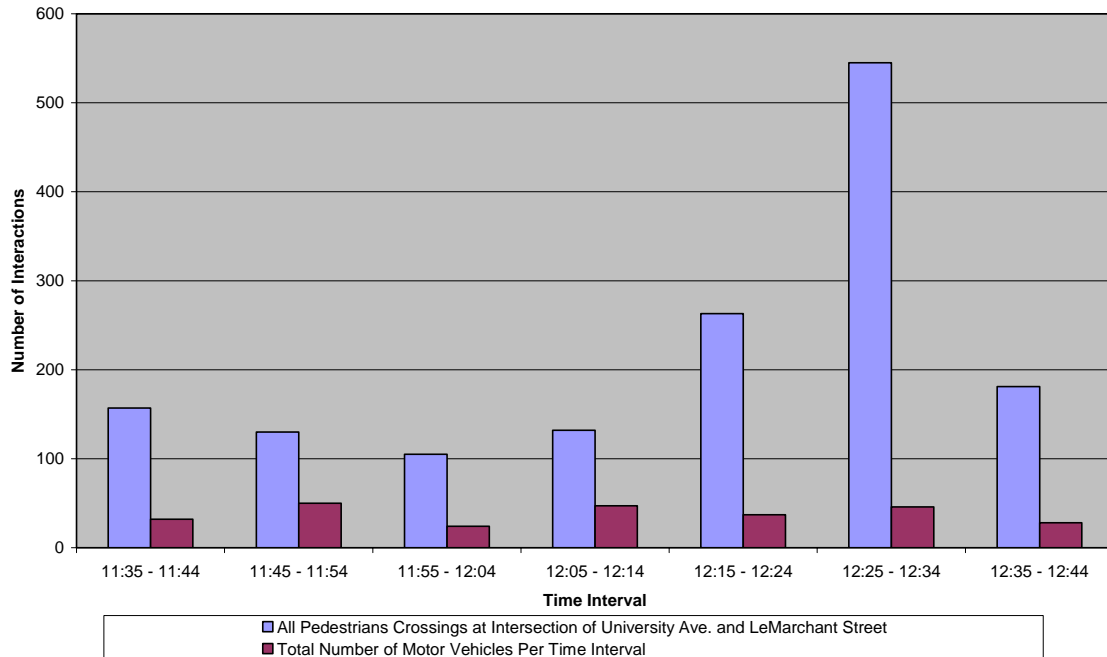
The pooled results from pedestrian traffic at this intersection were analyzed graphically and can be seen in Figure 1. Pedestrian traffic on this day at this intersection peaked at the time interval of 12:25 p.m.-12:35 p.m. for every recorded crossing path. Further more, Figure 1 illustrates that pedestrian crossings at this intersection are the most frequent on the paths crossing LeMarchant Street along University Avenue, from the FASS to the Killam or vice-versa.

Figure 1. A relationship showing comparisons in pedestrian crossing trends at the intersection of University Ave. and LeMarchant St. on Monday March 14th, 2005



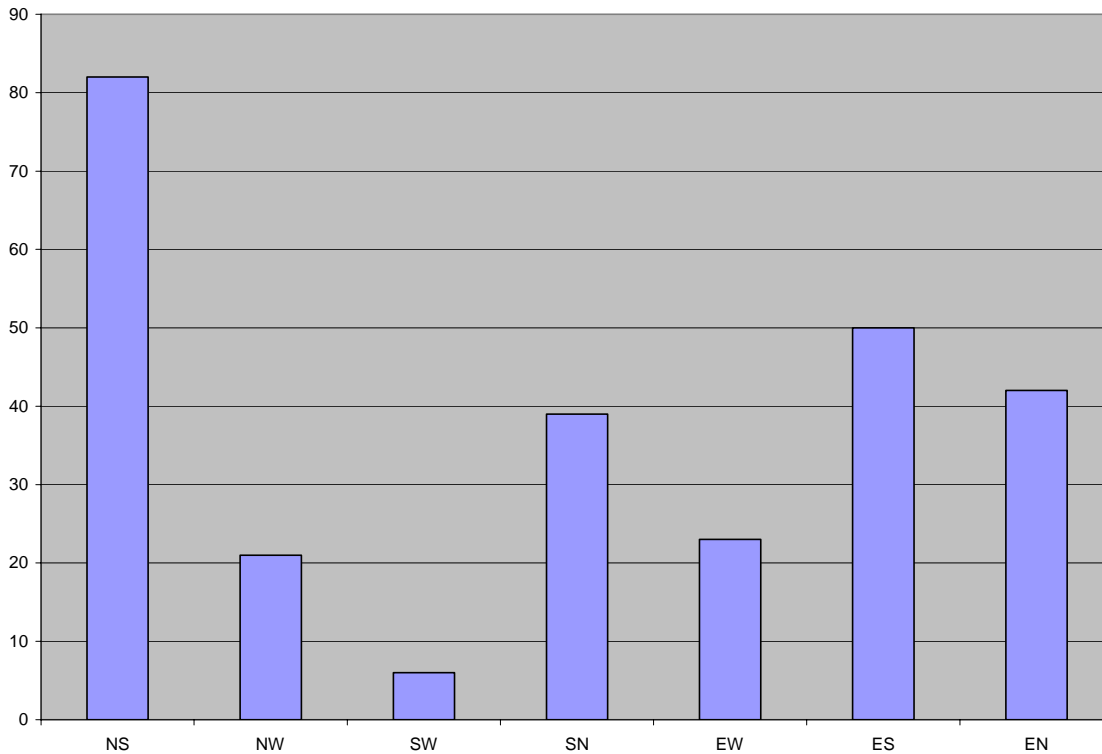
As well as pedestrian traffic, motorized vehicle traffic was counted in this location. Apart from merely counting the numbers of motorized vehicles that drove through this intersection, the points of entry and exit were recorded. Figure 2 shows the number of motor vehicles passing through this intersection in each time slot, compared with the number of pedestrians. Figure 2 depicts rather clearly that during the time of this observational study, motorized vehicle traffic patterns do not show any trends, and remain fairly consistent throughout the study. It can also be seen in Figure 2 that far more pedestrians enter the intersection than motorized vehicles.

Figure 2. A bar graph showing motor vehicle trips vs. pedestrian crossing at the intersection of University Ave. and LeMarchant St., North side of the boulevard, on Monday March 14th, 2005.



With regards to the various points of entry and exit for motorized vehicles for the March 14 observational study, the results were summed up and are shown in Figure 3. As can be seen in Figure 3, the majority of the motorized vehicle traffic passing through this intersection goes from and North entry point to a South exit point. In more practical terms, entering from the North and exiting to the South would be the same as traveling down LeMarchant Street and through University Avenue. The group does not know, however, whether these vehicles continued down LeMarchant after exiting the North intersection, or if they turned left onto University Avenue, so as to drive down University Avenue by the SUB.

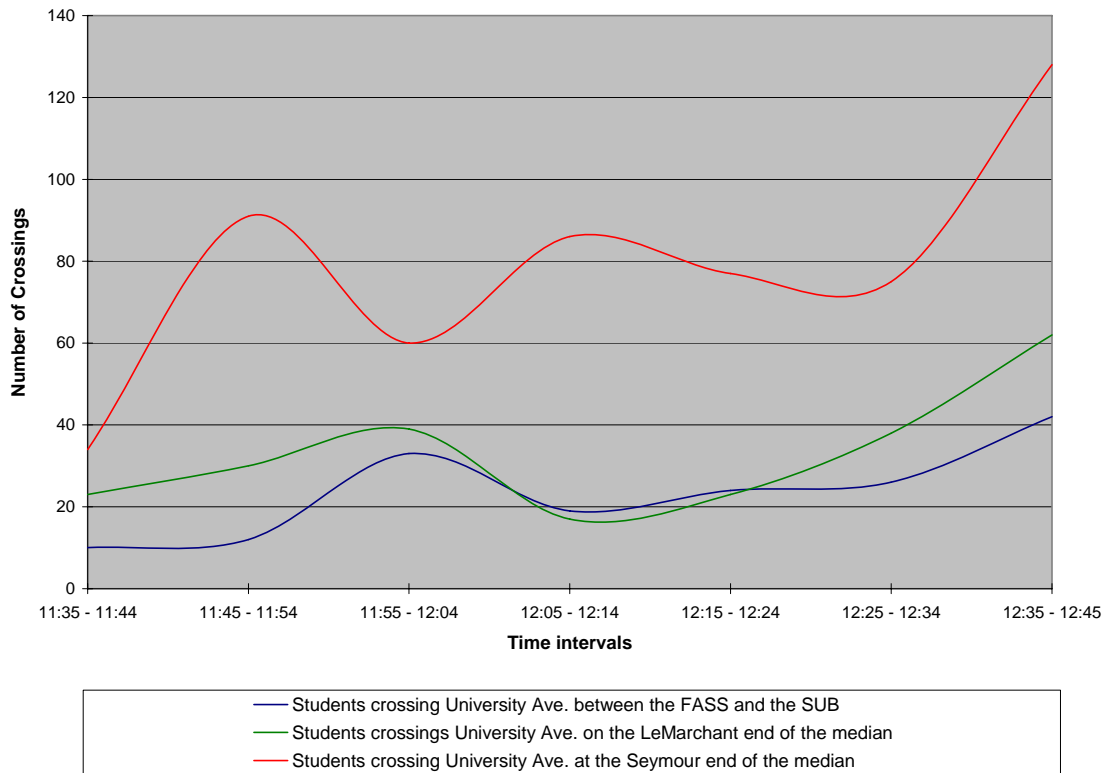
Figure 3. A bar graph showing intersection index totals, for every possible mode of entry/exit at the intersection of University Ave. and LeMarchant St. on Monday March 14th, 2005



The second day of the observational study took place on Tuesday March 15, 2005. The data collected on this day was from the area between the FASS and SUB building from 11:35 a.m. until 12:45 p.m. Both motorized vehicle and pedestrian traffic numbers were recorded on this day. With regards to pedestrian crossings, those crossing from the FASS to the SUB and vice-versa were recorded. As well, the pedestrian crossings were counted at the East, Seymour Street, and West, LeMarchant Street, ends of the median in between the SUB and the FASS. With regards to motorized vehicle traffic, the numbers were recorded, as well as the direction the vehicles were going.

Figure 4 displays this data in a similar fashion as in Figure 1, this time showing no real trends, but sporadic patterns that have little in common.

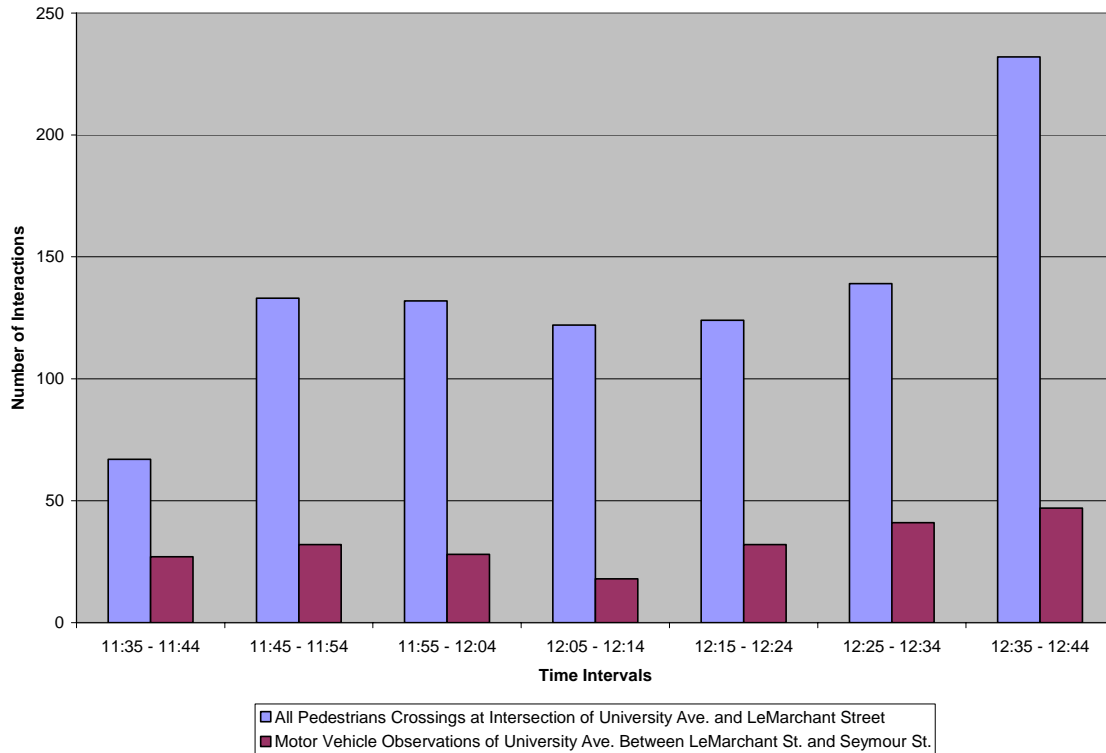
Figure 4. A relationship showing comparisons in pedestrian crossing trends along the median in front of the FASS/SUB buildings, on Tuesday March 15th, 2005



As can be seen by looking at Figure 4, pedestrian crossings were more frequent on average at the Seymour end of the median. Pedestrian crossings at the LeMarchant end of the median, and across the median, traveling from the FASS to the SUB, seemed to be somewhat similar. However, Figure 4 does not indicate the presence of a peak or down time for pedestrian crossing, as was shown in Figure 1.

Figure 5 shows a bar graph with the total number of pedestrians and the total number of motorized vehicles for each time slot.

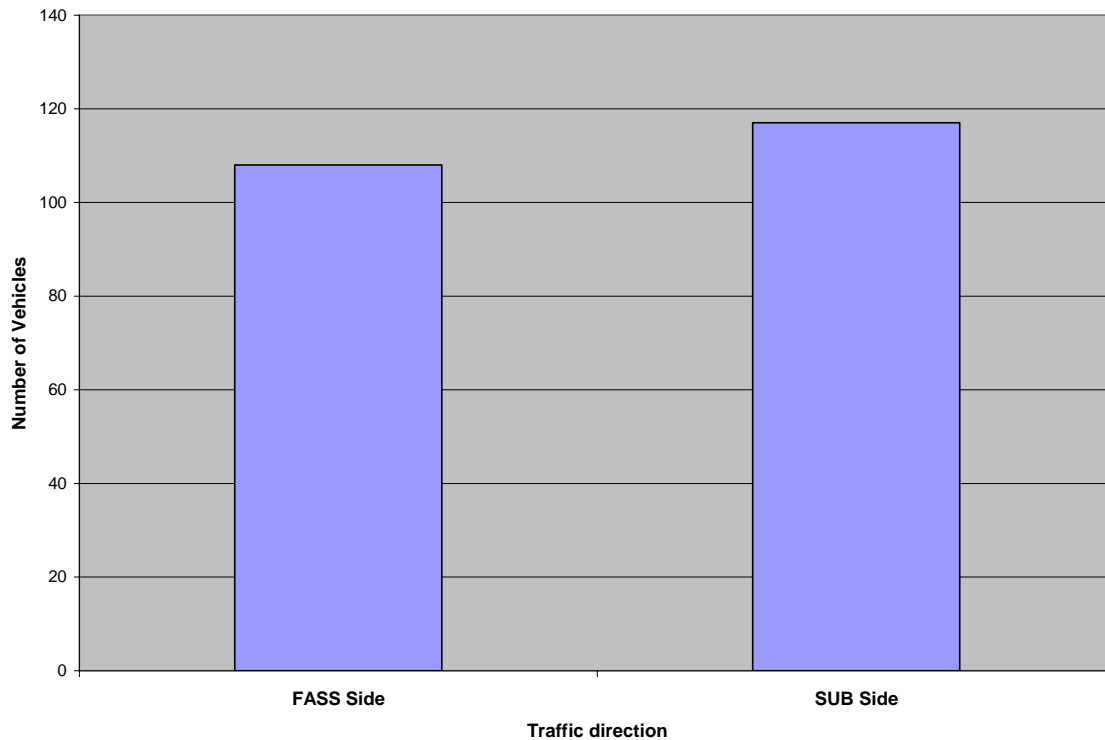
Figure 5. A bar graph showing motor vehicle trips vs. pedestrian crossing: In the area between LeMarchant St. and Seymour St. on University Ave. - Tuesday March 15th, 2005



Looking at this bar graph, in conjunction with Figure 2, it can be seen that the motorized vehicle traffic follows no set trends on either day. Pedestrian traffic peaks in the 12:35 p.m.-12:45 p.m. time interval in Figure 5, while in Figure 2, it peaks in the 12:25 p.m.-12:35 p.m. time intervals. Once more, similar to Figure 2, pedestrian traffic far outnumbers motorized vehicle traffic in each time slot.

Figure 5 displays the motorized vehicle traffic tendencies along the portion of University Avenue from the Seymour Street intersection to the LeMarchant Street intersection.

Figure 6. Motorized vehicle traffic tendencies along University Avenue, taken from the observational study preformed Tuesday March 15th, 2005



On this small portion of University Avenue, only two possible routes for motorized vehicles existed; vehicles traveling on the FASS side of the street, going East to West, and vehicles traveling on the SUB side of the street, going West to East. As can be seen by Figure 6, motorized vehicle traffic tended to be very similar, slightly busier on the SUB side of the street.

From the observational study, the group was able to determine that there is a greater number of pedestrians that travel on University Avenue than motorized vehicles, and that the number of pedestrians crossing the road peaks during class change times.

5.2 Survey

In total, the survey was administered to 429 students. The surveying locations included the Killam atrium, the SUB, classes. Figures 5-9 deal with demographic information regarding the survey respondents. This information was asked of the survey participants in the first section of the survey.

Figure 7. Demographic information on the year of study for survey participants shown in a pie graph

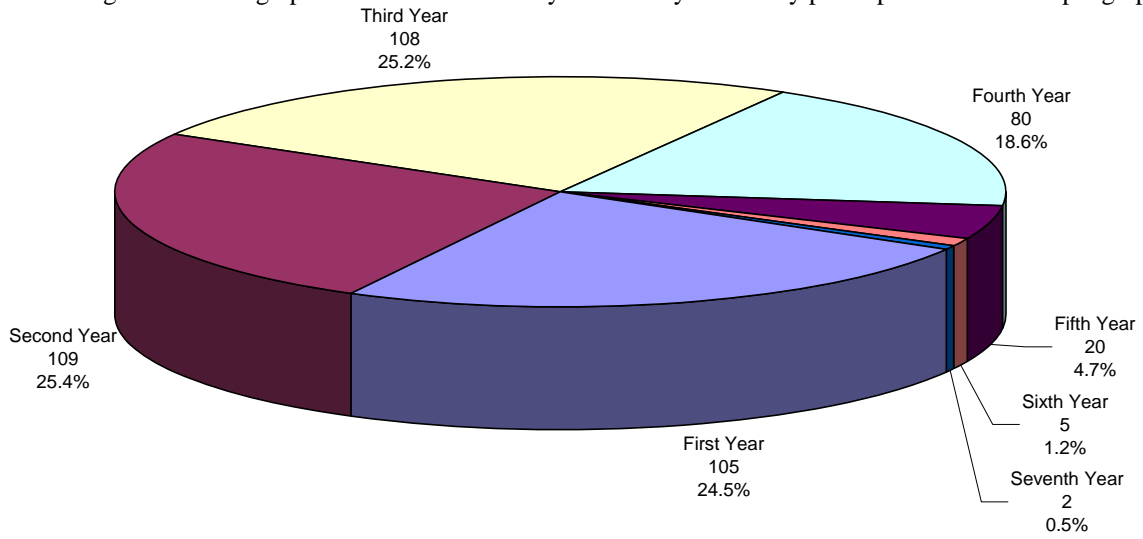


Figure 8. Demographic information on the age distribution for survey participants shown in a pie graph

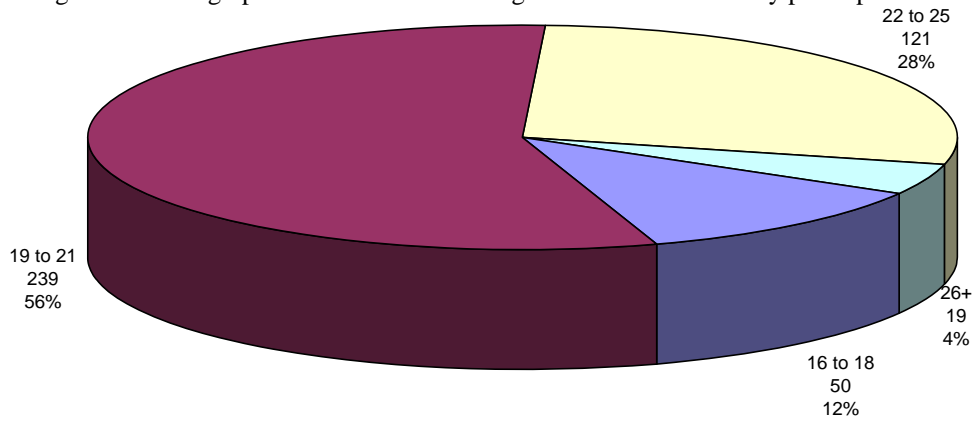


Figure 9. Demographic information on the gender distribution for survey participants shown in a pie graph

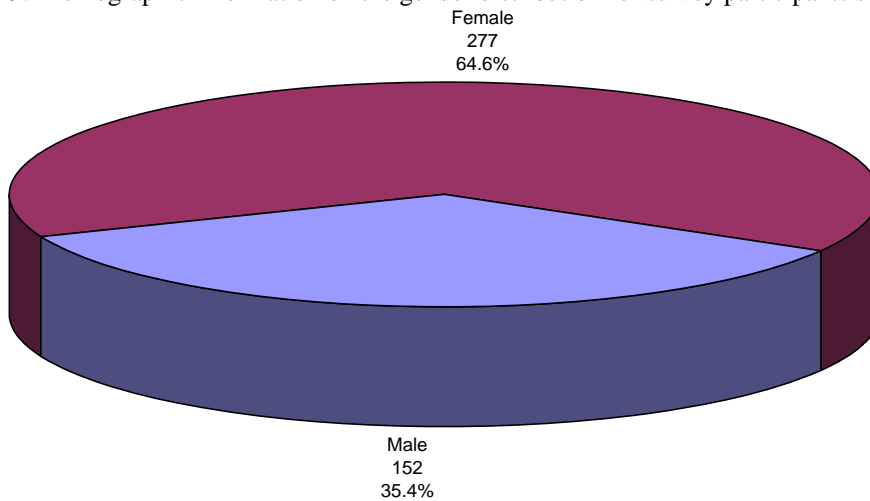
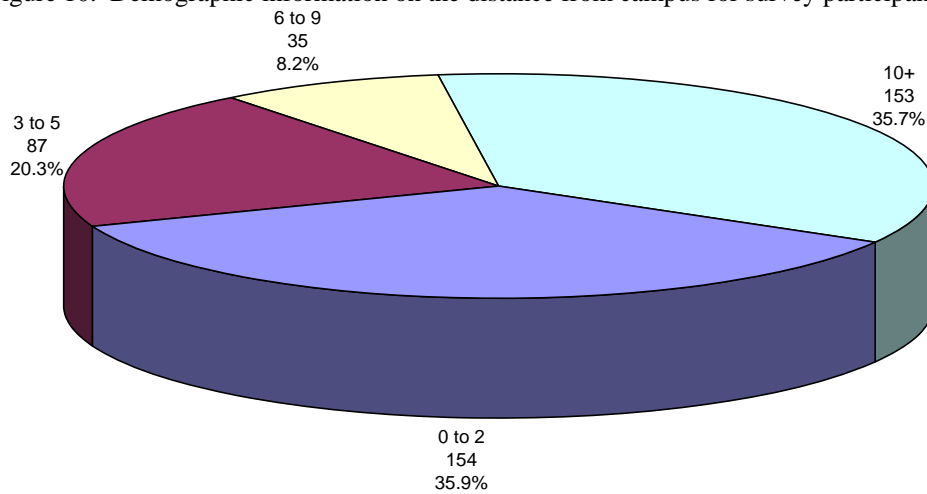


Figure 10. Demographic information on the distance from campus for survey participants shown in a pie graph

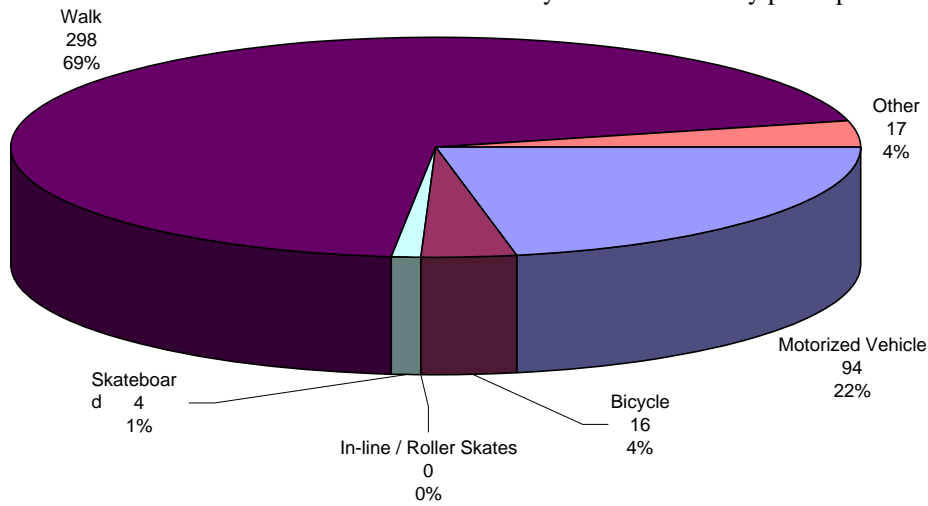


The demographic data indicates that fairly equal proportions of first, second, third, and fourth year students were surveyed, as can be seen in Figure 7. Along with those respondents, small proportions of fifth, sixth, and seventh year students were surveyed as well. Figure 8 shows the age distribution of the surveyed respondents. As can be seen in this pie graph, the majority of the respondents were between the ages of 19–21. The next largest age bracket was 22–25 age group, the third largest was the 16–18 age bracket, and the smallest age bracket was the 26 + age group. Figure 9 shows the gender distribution of survey respondents. As can be seen here, nearly two-thirds of the survey respondents were female, making up the majority. Finally, Figure 10 shows the distance from campus of survey respondents. Looking at Figure 10, it can be seen that slightly over one-third of the respondents live within 2 km of University Avenue, and nearly the same portion of respondents live over 10 km away, and nearly one third live between 2 km and 10 km away.

Another important set of data was collected, asking participants what their most common mode of transportation was on University Avenue. Several alternatives were provided to the respondents as shown in Figure 11. Figure 11 displays the results, indicating that the vast majority of survey respondents, approximately 69 percent, indicated that their most common mode of travel on University Avenue is walking. The next largest stratum in this figure makes up those who most commonly drive

on University Avenue, about 22 percent. Although driving is the second largest stratum, over three times the number of survey respondents walk regularly.

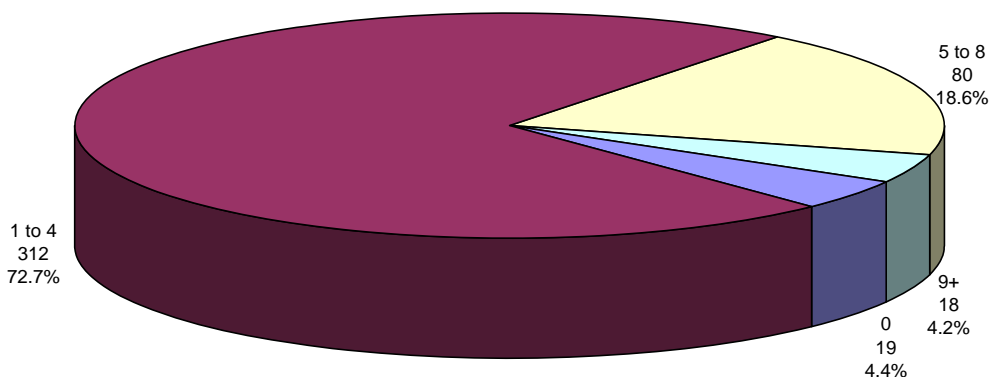
Figure 11. The most common mode of travel on University Avenue for survey participants shown in a pie graph



Apart from the demographic data collected, the participants were also asked to quantitatively rate various relevant aspects of their experiences while walking on University Avenue on a typical day of classes. One such aspect refers to the number of times the respondent crosses, as seen in Figure 12.

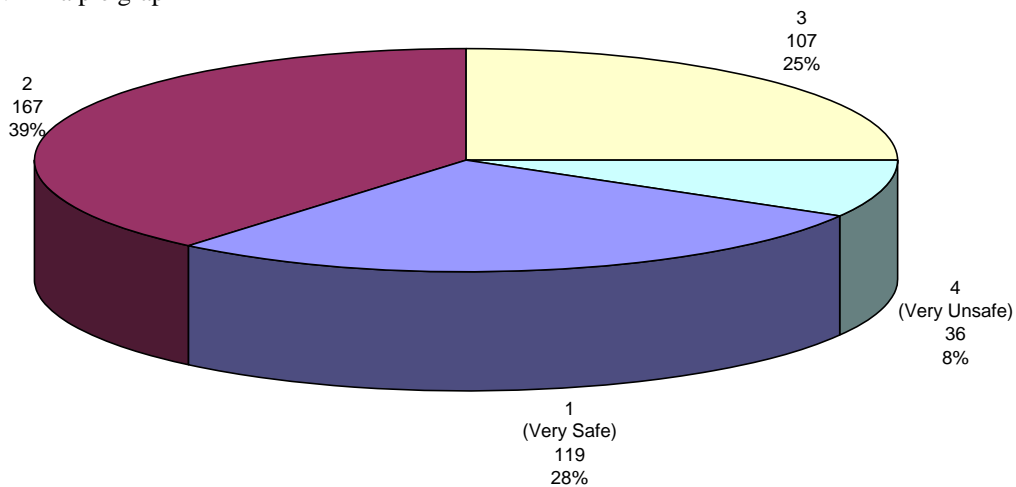
Nearly three quarters of surveyed respondents said that they crossed University Avenue one to four times a day. Only about 5 percent of the surveyed respondents said that they do not cross University Avenue at all on a typical day of classes, leaving 95 percent of the survey respondents as regular University Avenue-crossing students.

Figure 12. The pooled results of how many times surveyed participants walk across University Avenue on a typical day of classes, shown in a pie graph



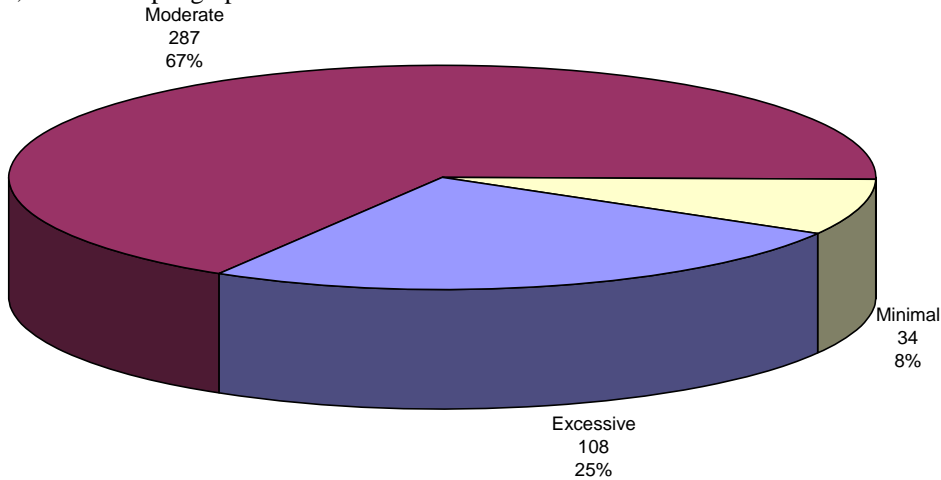
To complement the Figure 12 data, an additional question on the survey asked respondents to rate how safe they felt while crossing University Avenue on a Likert scale of one to four. Figure 13 displays the results of this question in pie graph form. As can be seen from Figure 13, 39 percent of surveyed students, the largest stratum, circled the number 2. This indicates that the largest portion of surveyed respondents felt more so safe than not while crossing University Avenue. Nearly equal fractions of students answered that they felt very safe, about 28 percent, and reasonably unsafe, about 25 percent. Only about 8 percent of surveyed students felt very unsafe.

Figure 13. Results from the Likert scale question concerning pedestrian safety while crossing University Avenue, shown in a pie graph



To further complement the Figure 12 and 13 data, a third question was asked of the participants, making inquiry into the general level of traffic on University Avenue. Respondents were asked to choose from three alternatives; minimal, moderate, and excessive. Looking at Figure 14, nearly two-thirds of surveyed students thought that motorized vehicle traffic was moderate on University Avenue. More important is the distinction between those who thought traffic was minimal, and those who thought traffic was excessive. Twenty-five percent of surveyed students felt that traffic was excessive, which is over three times as many as those who thought traffic was minimal.

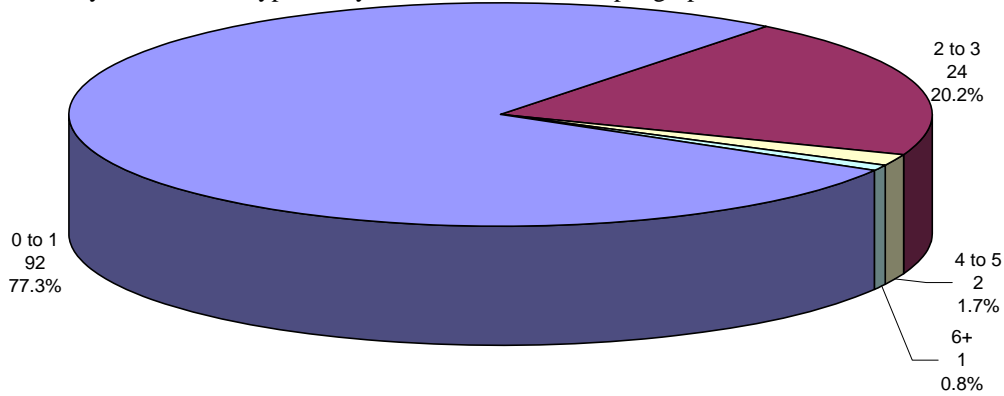
Figure 14. Results from the opinion based traffic level question, concerning motorized vehicle traffic on University Avenue, shown in a pie graph



The above data was collected from pedestrians and drivers alike, geared towards pedestrian experiences on University Avenue. A section of the survey was specifically targeted drivers, asking about their experiences while driving on, or through University Avenue. Similar to the pedestrian data shown in Figure 12, Figure 15 displays the data from a similar question asked of drivers on University Avenue.

As can be seen from Figure 15, most of those surveyed drivers, about 78 percent, said that they drove on or through University Avenue only zero to one times on a typical day of classes. Only about 20 percent answered that they drove on or through University Avenue two to three times a day, leaving only 2.5 percent of surveyed respondents stating that they had driven on University Avenue four or more times on a typical day of classes.

Figure 15. The pooled results of how many times surveyed participants (Drivers Only) drove along/through University Avenue on a typical day of classes, shown in a pie graph



Drivers were also asked about how long they tended to wait at the various intersections on University Avenue, until they were clear of pedestrians and safe to drive through. Various time interval alternatives were provided to respondents, in seconds. Figure 16 displays this data.

Figure 16. A bar graph showing the frequencies of driver intersection wait times both during class time, and during class change time

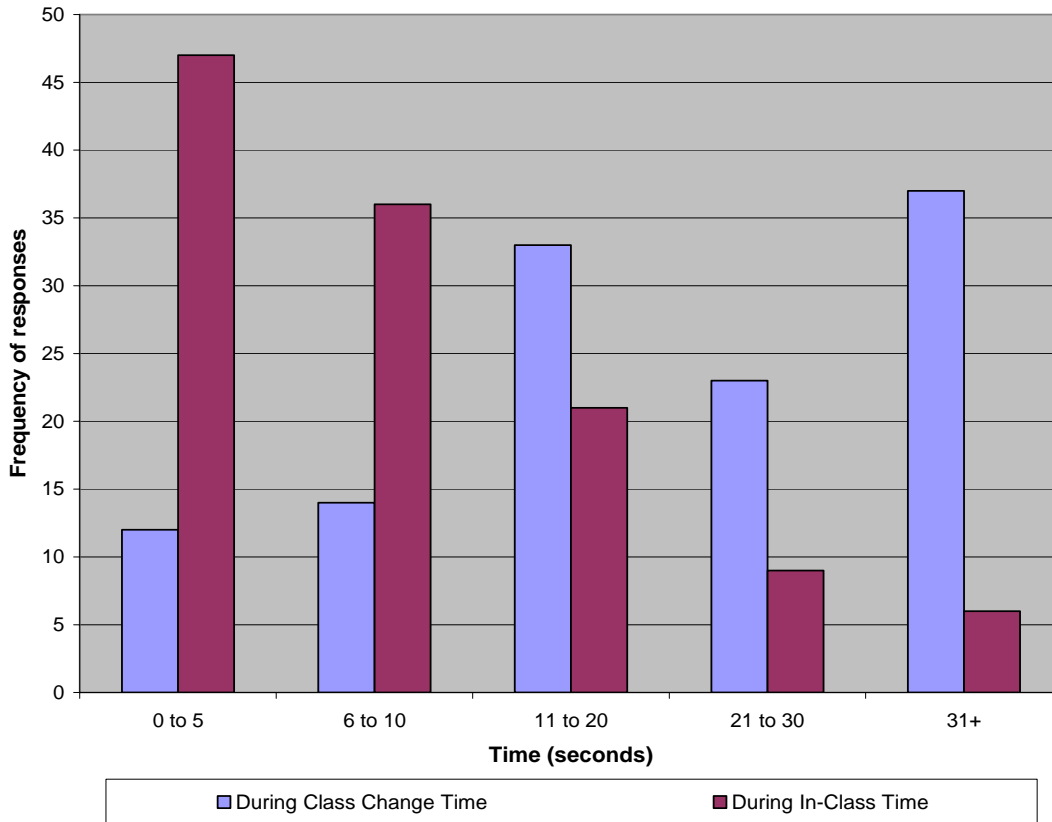
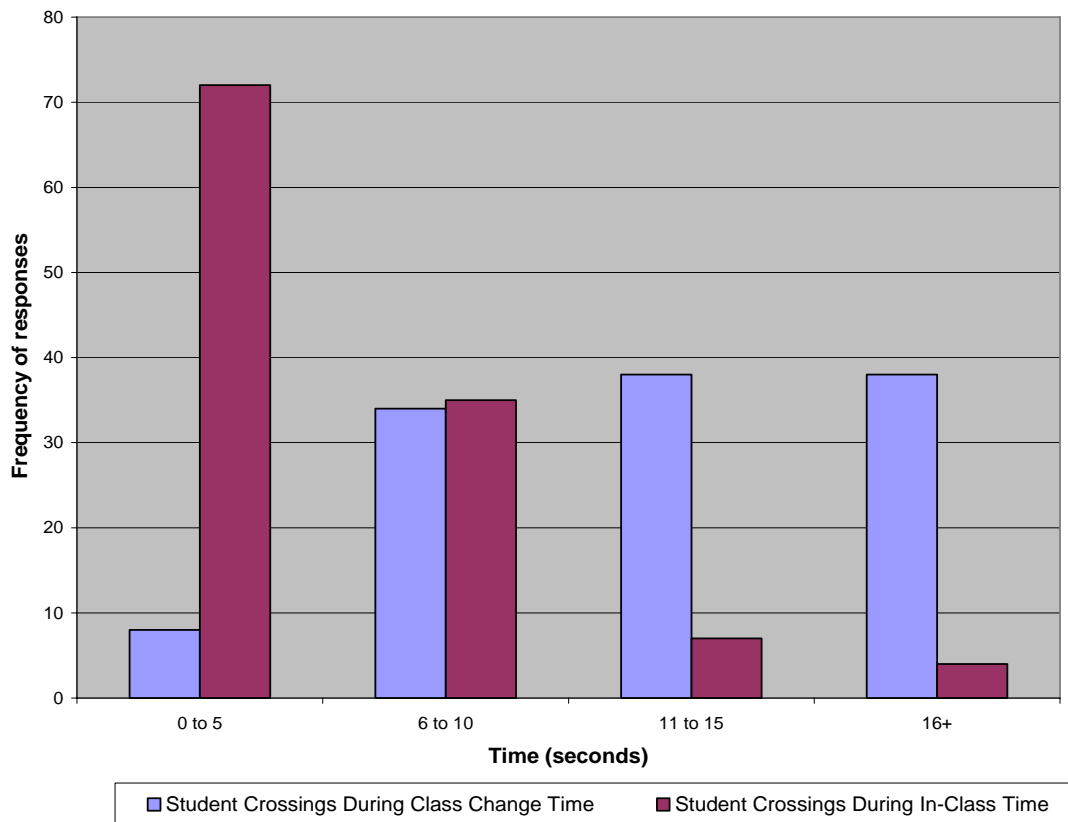


Figure 16 displays somewhat of an inverse relationship between driver’s intersection wait times, and whether or not class is in session. Looking at Figure 16, it can be seen that a trend of increasing frequencies exists, as the driver waiting times increase during class-change times. Inversely, it can also be seen that a trend of decreasing frequencies exists as driver wait times decrease during in-class times. Simply put, surveyed drivers tend to feel that they wait longer periods of time to cross intersections during class change times, and wait shorter periods of time to cross intersections during in-class times. To further investigate this trend, drivers were also asked about the number of pedestrians crossing the street in front of their vehicles while they waited at the intersections. Figure 17 shows these results in bar graph form.

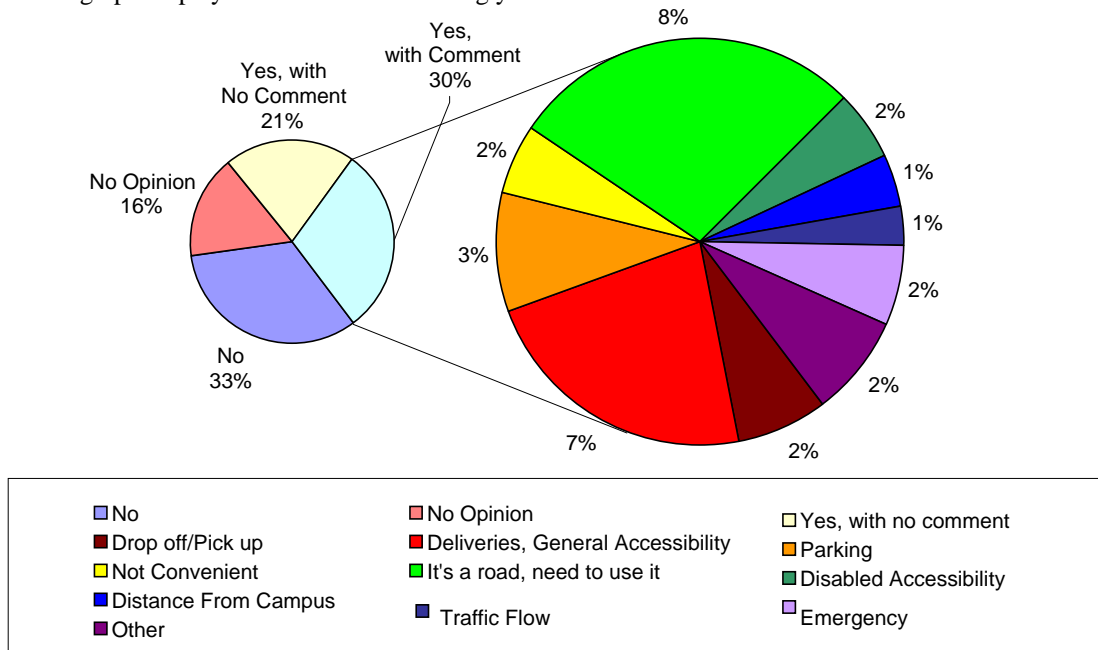
Figure 17. A bar graph showing the frequencies of pedestrians crossing University Avenue in front of vehicles waiting at intersections both during in-class time, and during class-change time



Looking at Figure 17, the same trend as in Figure 16 can be seen. A similar inverse relationship exists, showing that more students cross University Avenue intersections in front of waiting vehicles during class-change than do during in-class time.

The final portion of the survey asked for qualitative responses from respondents. Upon pooling all the surveys, responses were grouped into strata, and analyzed accordingly. Figure 18 shows the responses to the first qualitative question, asking respondents whether or not they felt motorized vehicle accessibility was necessary on University Avenue, and why.

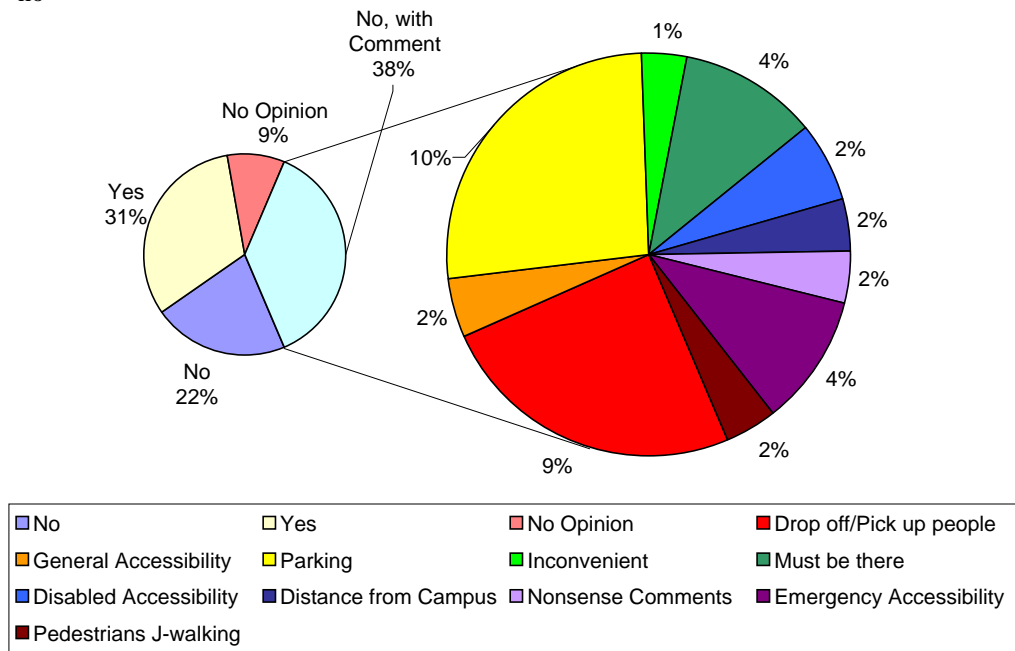
Figure 18. A pie of pie graph, displaying respondents answers as to whether or not accessibility for motorized vehicles was necessary on University Avenue. The first pie graph displays simple answers, were the second pie graph displays rationale for answering yes



Looking at Figure 18, it can be seen that the majority, 51 percent, of surveyed respondents answered yes, but only 30 percent of that 51 percent gave a reason for their choice. For the purposes of this study, only the reasons for an answer of yes to this question were examined. Looking at the second pie graph, the top two reasons given by respondents for answering yes were: motorized vehicle access is necessary for deliveries, and University Avenue is a road and needs to be used as a road.

A second qualitative question was asked of the respondents, involving the inquiry of whether or not University Avenue should be car-free, and why. Figure 19 displays this data in a similar fashion as Figure 18, dividing up first the basic responses in the first pie graph, then grouping the various reasons into strata for further analysis.

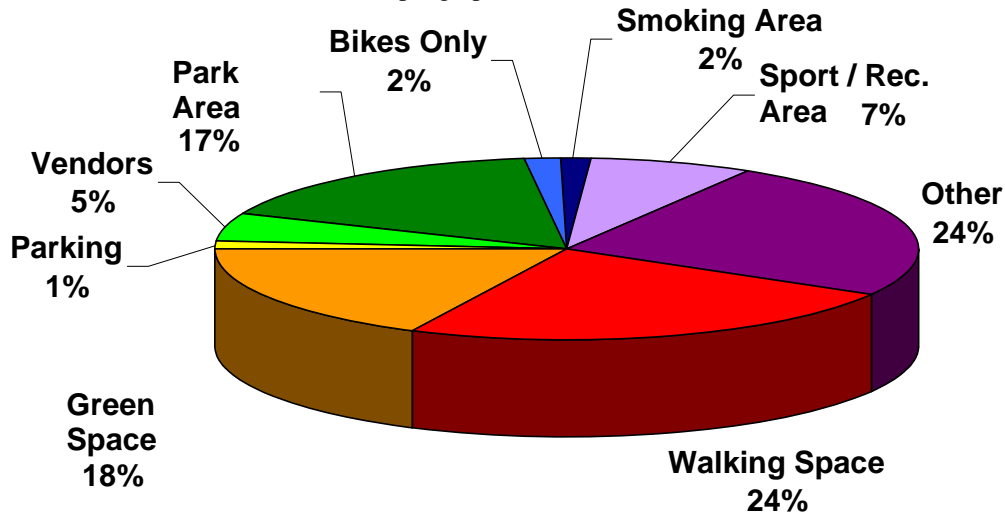
Figure 19. A pie of pie graph, displaying respondents answers as to whether or not University Avenue should be car-free. The first pie graph displays simple answers, were the second pie graph displays rationale for answering no



Looking at Figure 19, the majority, 60 percent, of surveyed respondents felt as though University Avenue should not be car-free, but only 38 percent of that 60 percent gave a reason for their choice. For the purposes of this study, only reasons for an answer of no to this particular question were examined. Looking at the second pie graph, the two most common reasons that respondents answered no to this question were: to drop off/pick up people, and because University Avenue is needed for parking purposes.

A final qualitative question was posed to respondents, asking participants what the best use of space would be, if University Avenue were made car-free. After the responses had each been individually examined, a set of strata were established. Each response was then assigned to the appropriate stratum. Figure 20 displays a pie graph of the grouped responses to the final qualitative question on the survey.

Figure 20. The grouped results of how respondents felt the free-space on University Avenue should be used if it were made car-free, shown in a pie graph



Looking at Figure 20, it can be seen that the largest two legitimate groups of responses came from those respondents who felt that University Avenue’s imagined free-space would best be used to create walking space, with 24 percent, and green space, with 18 percent.

5.3 Interviews

The best insight on determining the feasibility of the making University Avenue car-free was gained from the interviews the group conducted.

The first interviewee was Kenny Silver, Metro Transit’s Manager of Transit Planning and Development, who explained to the group that some motor vehicle access is necessary on University Avenue to accommodate Metro Transit buses. As Mr. Silver pointed out there are three main uses for University Avenue: car traffic, delivery vehicles, and the transit service that comes up LeMarchant Street, around the Student Union Building (SUB), and back down Seymour Street to South Street. The main concerns that Mr. Silver had were making sure that the public transit is still an attractive transportation option for students, meaning that it has to be within convenient walking distance.

When asked if it would be possible for the current number 10 bus that services Dalhousie to loop on another street instead of looping on University Avenue, Mr. Silver thought that it could be possible, although much research would need to go into determining if that would in fact be the best way to handle the route. Mr. Silver also said that Metro Transit is working with Dalhousie to build an enhanced stop area between the Gradhouse Café and Risley Hall, where there will be room for about three buses to stop. Mr. Silver's main point was that the bus system still has to run in a way so that the service is attractive and readily available to the public.

The second interview was with Stephanie Sodero, the TRAX Coordinator at the Ecology Action Centre. From Ms. Sodero, the group was able to obtain some beneficial information concerning transportation issues. Ms. Sodero told the group about the thesis she wrote while she was a graduate student at Dalhousie. Her thesis is called *Current Commuting Habits and Possible Alternatives at Dalhousie University*.

The third person interviewed was Roxane MacInnis, an Active Transportation Planner with HRM. Ms. MacInnis gave the group great input on the aspects of feasibility that must be considered before this project can be implemented. She said that saying whether turning University Avenue into a car-free space is feasible cannot be answered simply with a "yes" or a "no". She said there are several things to consider when determining feasibility, such as side street access and uses, gauging the local residents' opinion on the issue, and making sure that emergency access be maintained.

Ms. MacInnis said that one of the main considerations would be the opinions of the residents who live in the neighborhood around Dalhousie University, and how they would be affected by a change to University Avenue. She also said that bus access is important to University Avenue, as Dalhousie University has recently decided to offer the U-Pass program to students, which will draw larger numbers of public transportation users.

The next interview that was conducted was with Roy Hollett, District Fire Chief with Halifax Regional Fire and Emergency. Mr. Hollett made suggestions regarding the group's proposed changes

to University Avenue. His main concerns were that emergency access would be hindered if University Avenue was completely blocked off. He stated that as long as there is a route for emergency access, then it would be feasible to make portions of University Avenue car-free. He also stated that while emergency vehicles do not like to break traffic laws, for example driving down a one-way street the wrong way, emergency vehicles will if they have to. Mr. Hollett also made it evident that a fire truck is very long and heavy, so any quick manoeuvres that are made may cause the truck to overturn.

One group member spoke briefly on the phone with Constable Regan Fong, of the Halifax Regional Police, who stated that as long as there is adequate emergency access for fire trucks, then a police car would also be able to access the same locations, since a fire truck is the largest type of emergency vehicle. Constable Fong stated that the Police's interaction with University Avenue would not change if University Avenue were made car-free, because a police car would still have easy access to all areas of Dalhousie. In general, Constable Fong supported the idea of making portions of University Avenue car-free.

The group next spoke to Ken Reashor, Manager of Traffic and Transportation Services with HRM, to see how the groups proposed changes would affect traffic flow. Mr. Reashor highlighted a lot of the things that other interviewees had also mentioned, such as the Metro Transit bus route, emergency access, and parking. Mr. Reashor said that one of the main problems with the groups proposed changes would be the parking issue. Mr. Reashor stated how his department gets many complaints about the current parking situation, so with restricted vehicle access to University Avenue, these complaints would potentially increase. Mr. Reashor gave the group some very realistic suggestions for the next steps in making University Avenue car-free. He said the next step in determining if it is feasible to make University Avenue car-free would be to conduct a traffic impact study. This would be done by an independent firm, and Dalhousie University and HRM would have to initiate this if they decided to go ahead with the steps to making University Avenue car-free.

Mr. Reashor also stated that consultation with the surrounding community to see how they feel about the proposed changes and convincing the community to accept the changes will be a key thing.

The final interview that the group conducted was with Jeff Lamb, Director of Facilities Management. Mr. Lamb's main point was that it is not necessarily the University's fault that there is a lack of green space on University Avenue. He stated that the 1991 University Campus Plan is being followed as much as possible, but that there are some impediments to the full implementation, such as money, and HRM. He said the major problem seems to be with HRM not giving the university the ability to alter the infrastructure that surrounds the university. He explained that HRM feels that if Dalhousie was given the permission to make these changes, it would open the floodgates for other institutions to want to have the same rights. This, however, should not be the case with Dalhousie University, because, unlike other institutions, the University owns a large portion of the land around the infrastructure they wish to alter.

Both Mr. Lamb and Mr. Reashor spoke of the negotiations that are currently happening between Dalhousie University and HRM, concerning who can have control over the median space on University Avenue. Dalhousie University is seeking to gain control over aspects such as landscaping, so that they can make the space more attractive.

The main issues that were continuously reiterated were pertaining to issues of emergency access, parking, traffic flow and Metro Transit access.

The interviewees provided insight into what sort of things the group needed to consider when formulating their recommendation for a car-free University Avenue. Things such as emergency access, delivery access, and Metro Transit bus access, side street accessibility, and traffic flow were all discussed in interviews. The group has taken these things into account for their University Avenue car-free design proposal.

6.0 DISCUSSION

6.1 *Significant Findings*

The main problem that the group researched for this project was that University Avenue was designed for motor vehicles, but it is now primarily used by pedestrians. The goal of this project was to determine if it is feasible for University Avenue to become a car-free space.

There were a number of significant findings that can be taken from the group's research. Out of the observational study, the main finding was that there are more pedestrians than motorized vehicles that travel on University Avenue, especially during class-change times.

The group was able to determine that the majority of survey participants, 51 percent of those who answered this question, feel that motorized vehicle accessibility is necessary on University Avenue. The group was also able to determine from the survey that the majority of survey participants, 60 percent of those who answered this question, feel that University Avenue should not be car-free. However, many of the reasons given in both questions for why the participants feel this way are being addressed by the group in their car-free recommendation. These are such things as emergency access, delivery access, and general accessibility, dropping off and picking up people, and general road use.

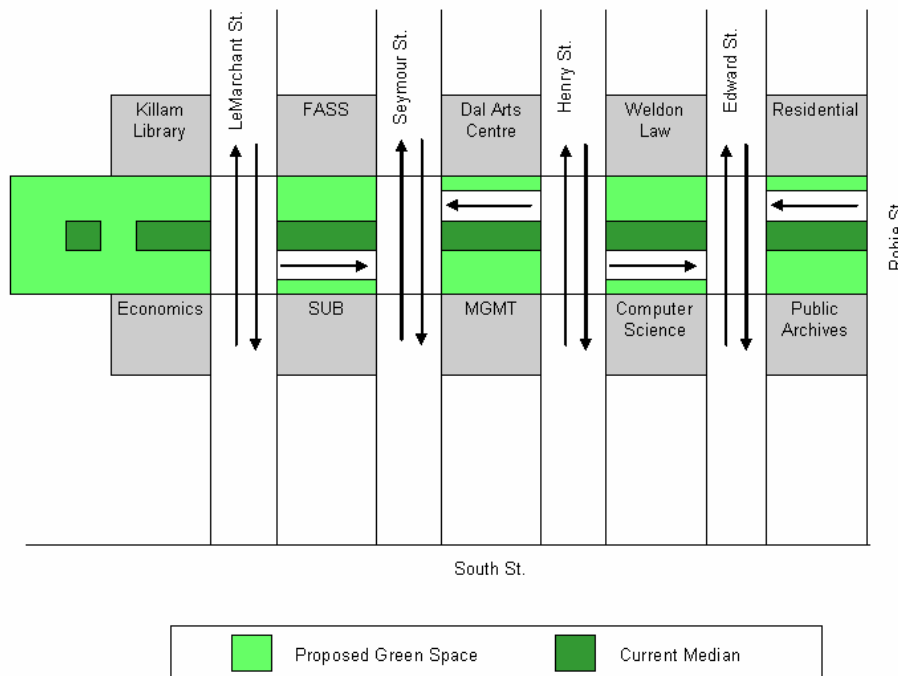
The group was also able to determine what survey participants would like to see done with University Avenue if it were made car-free. The overwhelming responses were walking space, green space, and park area.

The interview results were perhaps the most useful to the group in determining the feasibility of making portions of University Avenue car-free. The main themes that came out of all the interviews was the need for emergency access, delivery access, Metro Transit bus access, the need for community consultation regarding the issue of changing the access to the side streets, as well as the completion of a traffic impact study. Also, in order for any this to work, there needs to be better communication and cooperation between Dalhousie University and HRM.

6.2 Proposed Changes to University Avenue

The group has concluded that it is feasible for parts of University Avenue to be made car-free. The group has come up with two different alternatives. It is still essential to have side road access, bus access, emergency access, and delivery access, but the group feels that their designs meet all of these requirements. In each design, the group proposes that certain sections of University Avenue be closed to vehicle traffic, and made into green space. The remaining open sections would allow for the necessary vehicles to make loops around buildings such as the Student Union Building, where the Metro Transit number 10 bus route goes, and around the Dalhousie Arts Centre (since this building is used frequently by the public). Allowing for these loops would also give the necessary space for snow ploughs to clear the roads in the winter. Simply cutting off access to University Avenue from the side streets would not allow for this.

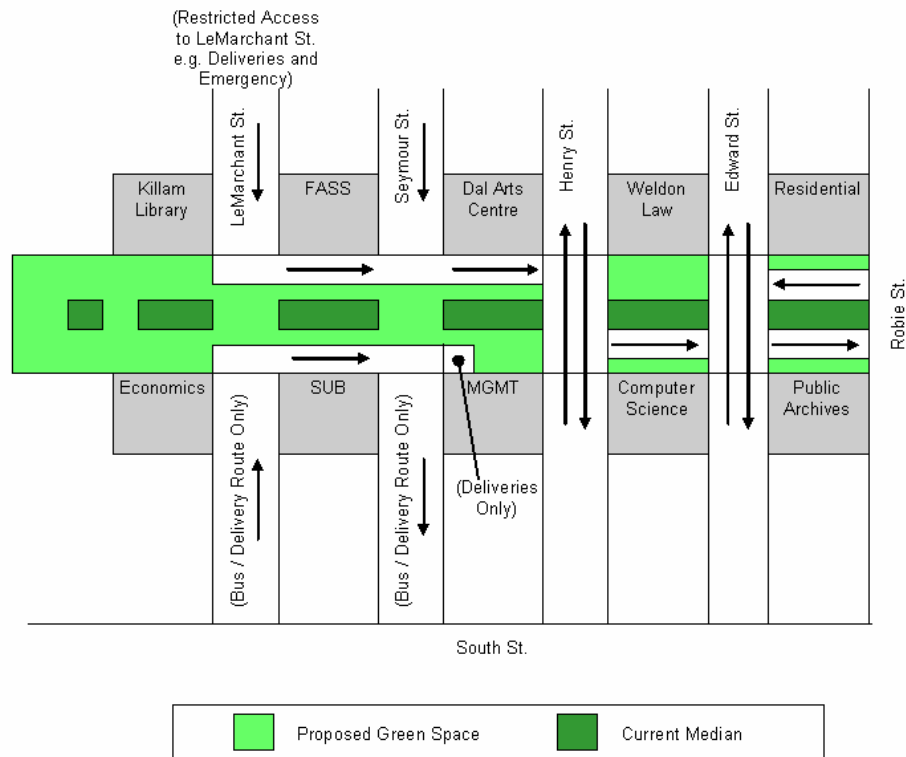
Changes to University Avenue—Proposal 1



Proposal one meets the group's stated design requirements because it meets the standards put forward by the people interview and students surveyed. The staggered route along University Avenue will calm traffic, making it more spread out and slower. This proposal follows the information the

Metro Transit interview gave us, leaving access around the SUB for bus routes. This setup also still allows for deliveries to all of the buildings on University Avenue. This design also allows for the through flow of traffic between Coburg Road and South Street, therefore, traffic that uses these streets will not be greatly displaced.

Changes to University Avenue—Proposal 2



Proposal two meets all of the same criteria stated in proposal one, with a few differences.

Instead of a staggered route along University Avenue to slow traffic, a series of loops have been set up along its length to disjoin the route, which will slow traffic as well. Proposal two also slightly displaces North to South bound traffic, by removing access from Coburg Road to South Street along LeMarchant Street and Seymour Street. This will lessen traffic flow on LeMarchant Street and Seymour Street, making for safer pedestrian travel between the Killam and the FASS.

Should either of these recommendations be carried out by Dalhousie University and the Halifax Regional Municipality, Dalhousie students and adjacent residents will be able to enjoy the benefits of additional green space and less motor vehicle traffic. This includes economic benefits (Wilkie and

Roach, 2004), improved health, improved pedestrian safety, and a cleaner environment (Ecology Action Centre 2004).

6.3 Recommendations for Further Research

The conclusions of our feasibility study show that turning parts of University Avenue into car-free areas is a possibility. Since many people on campus feel that there would be benefits to having less motor-vehicle traffic on campus by creating various green spaces for the community to use, it makes sense to look at further recommendations on which to focus thus putting the plan into action. From interviewing various community officials, students, and staff many suggestions have arisen to aid in further research that will help this project to come to fruition. It, therefore, becomes necessary to consider the recommendations from the people that will potentially be affected by the proposed changes in order to satisfy the needs of all in the area.

The main recommendations that the HRM representatives from traffic and planning departments stressed obtaining the community opinion and making a plan that would satisfy the residents. By creating a car-free area on University Avenue, traffic flow, parking, and pedestrian access must be a consideration, along with access for emergency response vehicles and Metro Transit buses. Recommendations for future research may include a cost/benefit analysis, which may be necessary to show members of the community and Dalhousie officials. Since the main recommendation for future projects would be to consider the needs of the community, it would make sense to focus on educating the public on improving the urban quality of life. According to the results of the student surveys not everyone understands the values of natural capital. Urban natural capital improves the quality of life in many ways, yet it often is not a main consideration in project planning, and is in fact often sacrificed in place of seemingly more important objectives (Wilkie & Roach, 2004, p. 14).

Another consideration in future projects can include looking at various universities that have managed to make their campus car-free. By looking at different solutions to the same type of problem

new approaches may be incorporated into Dalhousie's Car-Free University Avenue project. Overall, future projects should ideally use this group's research in conjunction with the provided suggestions to continue the plan in creating car-free space on University Avenue.

7.0 CONCLUSION

This project has contributed to the Greening the Campus movement at Dalhousie University as part of the class Environmental Problem Solving II: The Campus As a Living Laboratory. The group has determined that it is feasible for parts of University Avenue to be made car-free, and our rationale, methods, and the findings of our research have been outlined in the above report. The group has achieved the objectives that the group set out to cover, and the group has made recommendation for further research regarding this issue. This report will be available online at www.dal.ca/environment, and will be distributed to all interviewees who helped the group with this project. The group hopes that the finding of this research will enable Dalhousie University's Studley Campus to some day have more green space for students and community members to enjoy.

8.0 BIBLIOGRAPHY

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Appendix A

Survey - Experiences While Traveling on University Avenue

The following questions apply to the portion of University Avenue between the end of University Avenue, by the Killam Library, and Robie St. This area includes crossing roads perpendicular to University Avenue; for example, crossing LeMarchant between the Killam Library and the F.A.S.S. Building. Please circle only one of the alternatives for each question.

1. What is your year of study? _____
 2. What is your program of study/major? _____
 3. What is your age? 16-18 19-21 22-25 26+
 4. What is your sex? Male Female
 5. How far away from Studley Campus do you live?
0 - 2km 3 - 5km 6 - 9km 10km +
-

Please respond to questions 6 through 9 considering your experiences on a typical day of classes.

6. What is your most common mode of transportation on University Avenue?
Motor vehicle Bicycle In-line/Roller Skates Skateboard Walk Other: _____
 7. How many times on a typical day of classes do you walk across University Avenue?
0 1 - 4 5 - 8 9 +
 8. How safe do you feel when crossing University Avenue?
(Very safe) 1 2 3 4 (Very unsafe)
 9. Motorized vehicle traffic on University Avenue is in your opinion...(please complete the sentence)
Excessive Moderate Minimal
-

Non-Drivers, please skip to questions 16, 17, and 18. Drivers, please continue through to the end. Respond to questions 10 through 15 considering your experiences on a typical day of classes.

10. Do you drive on University Avenue? (If "No" go to question 16) No Yes
11. How many times on a typical day of classes do you drive on University Avenue?
0 - 1 2 - 3 4 - 5 6 +
12. How long do you usually wait at intersections either on University Avenue or entering University Avenue while in your vehicle during class-change times?
0 - 5 seconds 6 - 10 seconds 11 - 20 seconds 21-30 seconds 31 + seconds

PLEASE TURN OVER

13. How long do you usually wait at intersections either on University Avenue or entering University Avenue while in your vehicle **when classes are in session?**

0 – 5 seconds 6 - 10 seconds 11 – 20 seconds 21-30 seconds 31 + seconds

14. While waiting to cross University Avenue in your vehicle, about how many students cross the street in front of your car during the period you wait **during class-change times?**

0 - 5 6 – 10 11 – 15 16 +

15. While waiting to cross University Avenue in your vehicle, about how many students cross the street in front of your car during the period you wait **when classes are in session?**

0 - 5 6 – 10 11 – 15 16 +

16. Do you feel that accessibility for motorized vehicles is necessary on University Avenue? No Yes No Opinion

Explain: _____

17. Do you feel that University Avenue should be car-free? No Yes No Opinion

Explain: _____

18. If University Avenue were made car-free, how would you see the space being used?
(Sentence or two is sufficient.)

Appendix B

Information Letter for Interviewees:

Dear Interviewee:

We are taking the time to speak to you as part of a research project for the class ENVS 3502, Environmental Problem Solving II: The Campus as a Living Laboratory.

We are interviewing you to help us evaluate the feasibility of a car-free University Avenue, from the end of University Avenue by the Killam Library, to Robie Street.

We may audio record this interview to help us record your responses. If you do not wish for the interview to be audio recorded, please indicate so below.

We also ask below for your written consent to participate in this interview.

Thank-you for your participation.

I give my written consent to participate in this interview:

Signature _____ Date: _____

I do _____ do not _____ give my consent for this interview to be audio recorded.

Signature _____ Date: _____

Appendix C

Information Letter for Survey Participants

Dear Participant:

We are collecting data from this survey as a part of a research project for the class ENVS 3502, Environmental Problem Solving II: The Campus as a Living Laboratory.

The survey asks questions about your experiences while travelling on University Avenue, as well as about your opinions of traffic on University Avenue. All of your responses are completely confidential and will not be seen by anyone other than the researchers and our faculty advisor.

Collected data will be used strictly for statistical purposes for this project.

Thank-you for your participation.

Appendix D

Sample Questions for interviewees:

Sample questions for Dalhousie University Facilities Management representatives:

1. What are the main access points for university deliveries?
2. Would a car-free University Avenue hamper these operations?
3. Are there any other concerns/suggestions you have on the issue of a car free University Avenue?

Sample questions for Fire/Police department representatives:

1. How would a car free University Avenue affect emergency responses to Dalhousie University?
2. Would other entrances to Dal (Lord Dalhousie Drive, Wickwire Field entrance, King's College entrance) suffice for quick travel to Dal in the event of an emergency?
3. Are there any other concerns/suggestions you have on the issue of a car free University Avenue?

Sample questions for Metro Transit representatives:

1. Would it be viable to relocate the #10 bus stop outside the Student Union Building?
2. Is it necessary for the #10 bus to travel/cross University Avenue during its rounds?
3. Are there any other concerns/suggestions you have on the issue of a car free University Avenue?

Sample questions for EAC representatives:

1. Have you ever been involved in a movement aimed to make a street car-free?
2. By your standards, is a car-free University Avenue feasible?
3. Are there any other concerns/suggestions you have on the issue of a car free University Avenue?

Appendix E

ENVS 3502 - Observational Studies of University Ave. at LeMarchant St. Crossing

Pedestrian Study:

Pedestrian Study: Monday March 14th, 2005

Table 1:

Monday March 14th, 2005

Students on University Ave. Crossing LeMarchant St. (from the Killam to the FASS - one direction)

Time Interval	Pedestrian crossing count
11:35 - 11:44	37
11:45 - 11:54	20
11:55 - 12:04	20
12:05 - 12:14	19
12:15 - 12:24	106
12:25 - 12:34	173
12:35 - 12:45	47
Pedestrian Total:	422

Table 2:

Monday March 14th, 2005

Students on University Ave. Crossing LeMarchant St. St. (from the FASS to the Killam - one direction)

Time Interval	Pedestrian crossing count
11:35 - 11:44	32
11:45 - 11:54	21
11:55 - 12:04	18
12:05 - 12:14	34
12:15 - 12:24	57
12:25 - 12:34	212
12:35 - 12:45	37
Pedestrian Total:	411

Table 3:

Monday March 14th, 2005

Students on University Ave. Crossing LeMarchant St. (between the FASS to the Killam - both direction)

Time Interval	Pedestrian crossing count
11:35 - 11:44	69
11:45 - 11:54	41
11:55 - 12:04	38
12:05 - 12:14	53
12:15 - 12:24	163
12:25 - 12:34	385

12:35 - 12:45	84
Pedestrian Total:	833

Table 4:

Monday March 14th, 2005

Students crossing University Ave. (one side to the other) at the Killam side of the LeMarchant intersection

Time Interval	Pedestrian crossing count
11:35 - 11:44	40
11:45 - 11:54	56
11:55 - 12:04	40
12:05 - 12:14	34
12:15 - 12:24	43
12:25 - 12:34	37
12:35 - 12:45	32
Pedestrian Total:	282

Table 5:

Monday March 14th, 2005

Students crossing University Ave. (one side to the other) on the FASS side of the LeMarchant St. intersection

Time Slot	Pedestrian crossing count
11:35 - 11:45	48
11:45 - 11:55	33
11:55 - 12:05	27
12:05 - 12:15	45
12:15 - 12:25	57
12:25 - 12:35	123
12:35 - 12:45	65
Pedestrian Total:	398

Table 6:

Monday March 14th, 2005

All Pedestrians Crossings at Intersection of University Ave. and LeMarchant Street

Time Slot	Pedestrian crossing count
11:35 - 11:45	157
11:45 - 11:55	130
11:55 - 12:05	105
12:05 - 12:15	132
12:15 - 12:25	263
12:25 - 12:35	545
12:35 - 12:45	181
Pedestrian Total:	1513

Pedestrian Study: Tuesday March 15th, 2005

Table 7:

Tuesday, March 15th 2005

Students crossing University Ave. (either way) on the Seymour end of the island

Time Interval	Pedestrian crossing count
11:35 - 11:44	10
11:45 - 11:54	12
11:55 - 12:04	33
12:05 - 12:14	19
12:15 - 12:24	24
12:25 - 12:34	26
12:35 - 12:45	42
Pedestrian Total:	166

Table 8:

Tuesday, March 15th 2005

Students crossing University Ave. (either way) between the FASS and the SUB

Time Interval	Pedestrian crossing count
11:35 - 11:44	23
11:45 - 11:54	30
11:55 - 12:04	39
12:05 - 12:14	17
12:15 - 12:24	23
12:25 - 12:34	38
12:35 - 12:45	62
Pedestrian Total:	232

Table 9:

Tuesday, March 15th 2005

Students crossing University Ave. (either way) on the LeMarchant end of the Island

Time Interval	Pedestrian crossing count
11:35 - 11:44	34
11:45 - 11:54	91
11:55 - 12:04	60
12:05 - 12:14	86
12:15 - 12:24	77
12:25 - 12:34	75
12:35 - 12:45	128
Pedestrian Total:	551

Table 10:

Monday March 14th, 2005

All Pedestrians Crossings at Intersection of University Ave. and LeMarchant Street

Time Slot	Pedestrian crossing count
11:35 - 11:45	67
11:45 - 11:55	133
11:55 - 12:05	132
12:05 - 12:15	122
12:15 - 12:25	124
12:25 - 12:35	139
12:35 - 12:45	232
Pedestrian Total:	949

Motor Vehicle Study:

Motor Vehicle Study: Monday March 14th, 2005

Monday March 14th, 2005

Motor Vehicle Observations of University Ave. at LeMarchant St. Intersection

***Table 11:**

Total Number of Motor Vehicles Per Time Interval

Time Interval	# of Motor Vehicles
11:35-11:44	32
11:45-11:54	50
11:55-12:04	24
12:05-12:14	47
12:15-12:24	37
12:25-12:34	46
12:35-12:45	28
Total Motor Vehicles:	264

Table 12:

Total Number of Motor Vehicles Entering and Exiting from Each Direction

Direction	Enter	Exit
N	103	81
E	115	0
S	46	133
W	0	50

Table 13: (Car's Route)

Intersection Index Totals

Intersection Index	Total Motor Vehicles
NE	0
NS	82
NW	21
SE	0
SW	6
SN	39
EW	23
ES	50
EN	42
WE	0
WS	0
WN	0

Motor Vehicle Study: Tuesday March 15th, 2005

Table 14:

Tuesday March 15th, 2005

Motor Vehicle Observations of University Ave. Between LeMarchant St. and Seymour St.

Total Number of Cars Headed in Which Direction During Time Intervals

Time Interval	Total Cars	FASS Side	SUB Side
11:35-11:45	27	18	9
11:45-11:55	32	14	18
11:55-12:05	28	14	14
12:05-12:15	18	8	10
12:15-12:25	32	15	17
12:25-12:35	41	17	24
12:35-12:45	47	22	25
Total Motor Vehicles:	225	108	117

Appendix F

ENVS 3502 - Survey Data

Table 15:

Year of Study

Year of Study	Total Responses
First Year	105
Second Year	109
Third Year	108
Fourth Year	80
Fifth Year	20
Sixth Year	5
Seventh Year	2
Total:	429

Table 16:

Age of Participants

Age	Total Responses
16 to 18	50
19 to 21	239
22 to 25	121
26+	19
Total:	429

Table 17:

Sex of Participant

Sex	Total Responses
Male	152
Female	277
Total	429

Table 18:

Distance Traveled to Dalhousie

Distance / km	Total Responses
0 to 2	154
3 to 5	87
6 to 9	35
10+	153
Total	429

Table 19:
Common form of
Transportation

Mode of Transportation	Total Responses
Motorized Vehicle	94
Bicycle	16
In-line / Roller Skates	0
Skateboard	4
Walk	298
Other	17
Total	429

Table 20:
Average Crosses per Day

Crosses	Total Responses
0	19
1 to 4	312
5 to 8	80
9+	18
Total	429

Table 21:
Sense of Safety

Safety	Total Responses
1 (Very Safe)	119
2	167
3	107
4 (Very Unsafe)	36
Total	429

Table 22:
Sense of Traffic Conditions

Traffic Conditions	Total Responses
Excessive	108
Moderate	287
Minimal	34
Total	429

Table 23:
Drives on University Ave.

Drives	Total Responses
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0 to 1	92
2 to 3	24
4 to 5	2
6+	1
Total	119

Table 24:

Wait at Intersection During Class Change

Wait / sec	Total Responses
0 to 5	12
6 to 10	14
11 to 20	33
21 to 30	23
31+	37
Total	119

Table 25:

Wait at Intersection During Class Time

Wait / sec	Total Responses
0 to 5	47
6 to 10	36
11 to 20	21
21 to 30	9
31+	6
Total	119

Table 26:

Pedestrian Crossings During Class Changes While Waiting

People Crossed	Total Responses
0 to 5	8
6 to 10	34
11 to 15	38
16+	38
Total	118

Table 27:

Pedestrian Crossings During Class Time While Waiting

People Crossed	Total Responses
0 to 5	72
6 to 10	35
11 to 15	7
16+	4

Total	118
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Table 28:

Are Cars Necessary on University Ave.?

	Total Responses
Yes	216
No	144
No Opinion	66
Total	426

Table 29:

Should University Ave. Be Car-Free?

Car Free	Total Responses
Yes	154
No	237
No Opinion	38
Total	429

Table 30:

	Total Responses
Drivers on University Av.	118
Drivers not on University Avenue	143
Non-Drivers	168

Table 31:

Commonality of Motor Vehicles on University Ave. Vs. Other Forms of Transportation

	Total Responses
Motor Vehicle Users	94
Other Forms of Transportation	335
Total	429

