

University of Waterloo

Waste Audit of Campus Libraries



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1.0 SUMMARY

Between April 2001 and March 2002, two waste audits were conducted on three of the University of Waterloo's libraries: the Dana Porter, the Davis Centre and the University Map and Design. The data collected in these audits was supported by information obtained through a survey of library user attitudes towards waste management and an analysis of waste management strategies at other universities. From this research, it was concluded that several areas of the Davis Centre library have experienced significant contamination problems and high capacity use of waste containers. Furthermore, evidence revealed that similar problems exist on most floors of the Dana Porter library. No waste management problems were observed in the University Map and Design library. Survey results revealed that the causes of these problems were: 1) lack of waste disposal knowledge by patrons 2) student apathy 3) inconveniently placed waste disposal containers. Accordingly, it is recommended that signs be added to waste disposal containers in both libraries to clarify the types of materials that can be disposed of in each bin. It is further recommended that additional recycling containers be placed on all floors of the Dana Porter library used by patrons, in order to make recycling facilities more accessible.

2.0 INTRODUCTION

Each person produces one third of a tonne each year in solid waste.¹ The Ontario government saw the urgency of the waste problem and set a 50% diversion rate for waste by the year 2000. However, by 2000 the province had only achieved a 30% waste diversion rate.² Here at the University of Waterloo (UW), students are in a constant cycle of eating, sleeping and studying. At the university libraries specifically, the Davis Centre (DC), Dana Porter (DP), and the University Map and Design (UMD) libraries, students are constantly carrying out a combination of all three activities, thus generating a large quantity of associated waste. It is with this in mind that our group decided to examine the waste management practices in these three libraries. The researchers undertook a behavioural survey, literature review, and a waste audit in order to identify waste problems in the libraries. From these studies, several recommendations for improving the waste disposal systems within these facilities will be presented to the UW library committee and Waste Management Coordinator, Patti Cook. The presentation date to the library committee is scheduled to take place within the next two weeks.

¹ Jackson, J. ERS 317 Waste Management Lecture, March 6, 2002.

² Ibid.

3.0 BACKGROUND

There is a growing concern amongst students regarding the waste management practices in the university libraries. As a result, the DP library committee approached Patti Cook for assistance. Several audits for DP and DC have been completed in the past under Cook's guidance, and recommendations for improved waste management practices were submitted to the library committee. However, these recommendations were not implemented.³

The first set of DC and DP waste audits were completed in 1992 and were conducted shortly after the libraries had been cleaned. The second set of waste audits for both libraries was conducted during the 2001 winter examination period, a heavy-use period.⁴ At the request of Cook, two additional audits will be conducted for the Environmental Studies Map and Design library.

³ Cook, Patti. Personal communication. February 13, 2002.

⁴ Ibid.

4.0 GENERAL LIBRARY INFORMATION

4.1 *Dana Porter Library*

The libraries are located at various locations on campus (See Appendix A. Map of UW). The DP library is the largest library at the University of Waterloo. Its ten floors house materials in the arts, humanities, and social sciences, the largest part of the library's government publications collection, and

Figure 1: Dana Porter Library



the Doris Lewis Rare Book Room (See Figure 1: Dana Porter Library). The library is open to students Monday through Friday from 8 a.m. until midnight and from 11 a.m. until midnight on Saturday and Sunday. During final examination periods at the end of each academic term, the library extends its operating time by three hours.

4.2 *Davis Centre Library*

The Davis Centre (DC) location is the second largest library at the University of Waterloo (see Figure 2: DC Library). It is located on two levels in the William G. Davis Computer Research Centre. The DC Library houses material on the fields of engineering, mathematics, and the physical and life sciences, as well as a collection of geological maps. The library is open to students Monday to Friday from 8 a.m. until midnight, and from 11 a.m. until midnight during the weekend. During examination period at the end of each academic term, the library extends its operating time by three hours during the week and by four hours during the weekend.

Figure 2: Davis Centre Library



4.3 *University Mad and Design Library (UMD)*

The UMD is a branch of the main library system at the University of Waterloo and is located in the Environmental Studies 1 (ES1) building. The library houses cartographic and architectural materials mainly utilized by Geography, Urban Planning, and Architecture students. Hours of operation are Monday through Thursday from 8:30 a.m. to 8:30 p.m., Friday from 8:30 a.m. to 4:30 p.m., Saturday from 1 p.m. to 5 p.m., and Sunday from 1 p.m. to 6 p.m..

Figure 3: UMD Library



The extended hours at all three libraries during examination periods caters to the significant increase in the number of students studying, which consequently presents an increase in the generation of waste.

5.0 METHODOLOGY

5.1 Audit

The first set of audits of the DP and DC Libraries were conducted on Thursday April 12 and Friday April 13, 2001 respectively, during the winter term final examination period. The second set of audits on these libraries was conducted on Thursday February 28, 2002 (DP) and Monday March 4, 2002 (DC). The first audit of the Map and Design Library was completed Tuesday March 5, 2002; the second audit was completed on Thursday March 7, 2002.

All audits were conducted using a visual inspection technique. Researchers examined each waste disposal container and determined what percentage of the container was full; this observation was recorded on a standardized audit form. Containers were then examined for any percentage and type of contamination evident within them. These observations were also recorded. Finally, the researchers recorded the presence/absence of waste disposal information in proximity to the container and any other problems (i.e. litter around the container) that the researchers observed.

5.2 Case Study

In continuing with the qualitative theme associated with our research project, a case study analysis was utilised as a research method. Universities across Canada were contacted via email by the researchers to gain insight into their current waste management practices. Each university was asked the same questions regarding their waste management policies in order obtain similar information from each administration.

The researchers anticipated responses from at least three Canadian universities for a comparative study, however, only two responded to the email inquiries. These two universities, specifically the

University of Toronto (U of T) in Ontario, and Dalhousie University in Nova Scotia, were utilised for case study analysis.

5.3 *Survey*

By undertaking a behavioural survey, the researchers focused part of their research on assessing student attitudes and practices in the Dana Porter library. Due to time constraints, only one survey for one library was submitted for ethics clearance to the university administration. In their study, the researchers were not interested in a diverse or representative sample. Rather, they were more interested in ensuring participants were strictly from the DP library. According to Ted Palys, author of *Research Decisions*, this study was entirely homogenous. Specifically, the researchers undertook a non-probabilistic sampling technique called “purposive sampling.” As Palys notes, purposive sampling does not aim for formal representativeness. Rather, “people of locations are intentionally sought because they meet some criterion for inclusion in the study.”⁵ This is exactly how the researchers undertook their survey. They sought for participants of their survey who studied in the DP library because they were interested in understanding their waste management attitudes & practices.

Of the ten floors in the DP library, floor four was strictly for administration purposes, and floor one was strictly for administration and the use of microfilms. Therefore, these floors were not included in survey. Of the remaining eight floors, the researchers chose to survey 64 students. By counting every third student, (to a maximum of eight students sitting in a carol or a table per floor), a student was asked to participate in the survey. The participant was given a few minutes to answer the survey, and once they completed the survey, an informational letter describing the rationale behind the survey was distributed (see Appendix B for a copy of the survey and informational letter).

6.0 CASE STUDIES

6.1 *University of Toronto*

Located in Toronto, Ontario, U of T's Environmental Protection Policy states: "the University is committed to minimising waste generation across campus through reduction, reuse, and recycling."⁶ The U of T libraries are all part of the greater university campus waste management program. Currently, food and drinks are not permitted in the library stacks, study areas, or rooms. Therefore, paper recycling and garbage bins are the only waste management options for students and staff. However, it has been noted that despite the prohibition of food and drinks, students do eat food and drink beverages in the library and consequently the garbage bins fill up quite rapidly. Blue boxes are provided in work areas and labs for aluminium, steel, glass, and plastic beverage containers. During exam periods this rate is accelerated and custodial staff tend to work longer hours. Due to contamination problems and student concerns about waste management, the University of Toronto is now in the process of initiating a more encompassing recycling program. The University is currently looking into installing recycling depots in all major problem areas of the library.

6.2 *Dalhousie University*

Currently, recyclables are collected on a weekly basis at Dalhousie University (Halifax, Nova Scotia), and compostable waste is collected daily. The library system is also included in the larger university waste management system. Offices in the library have small desktop containers for recyclable paper and it is up to each office occupant to transfer this material into one of several larger containers placed throughout the library. Due to the fact that food and drinks are not permitted in the library, the

⁵ Palys, Ted. "Sampling." Research Decisions: Quantitative and Qualitative Perspectives. (Toronto, Harcourt Canada Limited, 1997) p.256.

⁶ Anonymous. "Operations and Services: Department of Waste Management." University of Toronto [online]. March 1, 2002.

stacks, study areas, and reading rooms only contain bins for landfill waste and paper recycling. The staff and student lounges do, however, have bins for recycling beverage containers and compostable materials in addition to landfill waste bins. On the main level, or the “ground floor atrium”, of the Killam Memorial Library, Dalhousie’s main library, there is a Second Cup and a deli. Therefore, containers for paper, compostables, beverage containers (glass, plastic, aluminium and tin), and landfill waste are provided to separate the waste. In 2001, Dalhousie collected and diverted from landfill over 402 tonnes of paper, 15 tonnes of beverage containers, and over 100 tonnes of compostable material.⁷

It is important to note that due to time constraints and available waste management information on the selected universities, the uniformity of the data and the email responses vary greatly.

⁷ Anonymous. “Recycling at Dalhousie University.” [Dalhousie University](#) [online]. March 5, 2002.

7.0 ANALYSIS

7.1 Case Studies

The libraries at U of T, Dalhousie, and UW are included in the greater campus waste management system. Campus-wide waste audits were conducted at the three universities in 1999 (See Table 1: 1999 Waste Audit Results).

Table 1: 1999 Waste Audit Results at Various Universities

	<i>Recycled</i>	<i>Landfill Waste</i>
Dalhousie University, Halifax	478.57 tonnes	Not Available
University of Toronto, Toronto	~130 metric tonnes	~140 metric tonnes
University of Waterloo, Waterloo	873.54 tonnes	1678.74 tonnes

Due to the absence of environmental waste management standards for Canadian universities, a comparative analysis was difficult to conduct. Information provided by U of T and Dalhousie University was widely divergent in nature. The greatest disparity between the universities was the authorization of food consumption in the libraries.

The University of Waterloo currently permits the consumption of food and beverages in the university libraries on all floors including the stacks. The amount of waste generated in the stacks amounts to approximately 88.75 kilograms annually. Dalhousie University does not allow food or beverages to be consumed in the library and consequently only paper recycling and waste bins are provided. At present, U of T does not permit food or beverage in their libraries, however, they are currently in the process of installing recycling depots in all major areas of the library due to the problem of garbage overflow from persistent students consuming food items and beverages. Thus, the

inconsistency between the universities hinders the comparative analysis of their waste management policies.

7.2 *Waste Audit*

During the waste audits for both libraries, it was observed that there were many sizes and shapes of waste and recycling containers (See Appendix C for the images).

7.2.1 Davis Centre Library

Waste containers in the DC Library were analysed for the proportion of their capacity being used at the time of the audits in comparison to the size of the bin. Where small sized bins were observed to be using a significant proportion of their capacity, they were earmarked for exchange with a larger bin. The significance of the proportion of the bin used was determined to be 80% or more of potential capacity as observed during one audit or 50% or more as averaged between both audits. Appendix D outlines twenty-two locations where small bins have experienced significant use of their capacity.

In order to determine areas of the library where significant contamination of waste containers exists, researchers identified an average of 5% or more contamination in either audit or as averaged between both audits as the significant level of contamination to warrant concern in a recycling or garbage container. Significant contamination was set at 5% because it was observed all bins had some level of contamination, though it was generally less than 1%. Accordingly it was decided to focus on those bins with more severe contamination problems in order to identify the causes of contamination at such levels and then scale down efforts to deal with smaller problems. As it was generally found that certain areas of the library experience greater contamination problems than others, regardless of the type of bins in those locations, the specific sections of the library found to experience high contamination rates have been

earmarked rather than the individual bins. Appendix D highlights fourteen areas of the library where significant contamination problems occur in one or more bins.

The relationship between information dissemination at the waste disposal location and the level of contamination was investigated for significance; for this analysis, only data from the most recent audit was examined and any evidence of contamination was considered significant. Signs are the only methods of information dispersal on waste disposal in the library. Signs are located on or near eleven of the 124 waste disposal bins in the library; all of the bins with signs are recycling containers (see Figure 4). Of those bins with signs, 36% showed no contamination during the most recent audit, while 64% of

Figure 4: Recycling containers with signs at the Davis Centre



bins with signs on or above them proved to be contaminated during the 2002 audit. Less than half (48%) of the bins without a sign proved to have no contamination; 56% of the bins without a sign were observed to be contaminated. Due to the prevalence of contamination in bins with signs and bins without signs, it is not possible,

from this study, to conclude that signs reduce the level of contamination in bins. However, it is the opinion of the researchers that the low use of signs (11 of the 124 bins) is not enough to conclude that signs, in general could not influence contamination in waste disposal bins.

It should be noted that several areas that have experienced significant contamination problems are also dealing with high container capacity use, as described above. Furthermore, contamination and

capacity problems tend to be in areas with high student use, such as those with a large number of carousels or study tables (see Figure 5 for an example of garbage bin contamination).

Figure 5 : Contamination of a garbage bin with recyclables



It was observed that the capacity of the bin used decreased an average of 5% from the first audit to the second audit, supporting the theory that waste generation in the library is significantly higher during exam periods. Furthermore, of the bins that were observed to be the same type (i.e. recycling or garbage) and in the same location during both surveys, an increase of 0.8% in

contamination of waste in recycling bins was observed. Similarly an increase in contamination of waste bins with recyclables was observed as contamination rose an average of 0.8%.

Researchers observed several trends in the types of materials that were found in garbage containers. These observations are not based on quantified data, however it is believed by the researchers that they present an accurate description of the waste stream in the DC Library. Non-recyclable paper products such as paper towels, toilet paper and take-out food bags were found in large quantities in most containers. Additionally, Styrofoam and cardboard take-out food containers were observed in large proportions in many garbage containers. The single most frequently observed waste item was paper coffee cups. Figure 6 illustrates the frequency of food consumption in the library.

Figure 6 : Food Consumption in DC



7.2.2 Dana Porter Library

Within the DP library, the capacity of 43 small garbage bins was found to be significantly used, as illustrated in Appendix D. 73 garbage containers were found to be contaminated with recyclable materials. Ten recycling containers were found to be contaminated with garbage or the recyclable material that were not specified for disposal within that bin. It should be noted that 36 of the garbage bins that were found to be significantly used were also observed to have significant contamination. One of the main reasons for contamination may be the fact that many of the garbage bins are located along the

Figure 7. Isolated Garbage Cans



carousels while recycling bins are placed farther away from student study areas, making garbage cans a more convenient disposal option than recycling; this explanation for contamination is discussed further in the survey analysis section of the report (see Figure 7).

Collected data was analyzed for the correlation of available waste disposal information to contamination of the waste container. Of those containers with signs (only recycling containers were observed to have signs) on and or above the container, only 16% showed any evidence of contamination. Conversely, of those containers lacking information, 82% showed evidence of contamination. Unlike results found at the DC Library, these findings suggest a strong correlation between the presence of waste disposal information and lower contamination levels. Further discussion of the correlation and potential causal effects of information dispersal and contamination are presented in the survey analysis of this report. Researchers observed a number of waste trends during

the conduction of the audits. While not quantified, these observations are indicative of the type of wastes that dominate the waste stream at the DP Library. The most prominent types of waste identified by the researchers were non-recyclable food and beverage containers, tissues and paper towels, and organic wastes such as apple cores and banana peels. It should be noted that coffee cups and take-out food packaging were consistently observed in large quantities in garbage containers.

Since the DP library decided to change its eating and drinking policy, one of the sources that can attribute to contamination of waste & recycling containers is the recently opened Browser's Cafe on the main floor (see Figure 8).

Figure 8. Dana Porter's Browser's Cafe



7.2.3 University Map and Design Library

The UMD library occupies a small space in the Environmental Studies 2 building and has only five waste disposal bins: three recycling containers and two garbage containers (see Figure 9). No significant

Figure 9. Waste Disposal bins in UMD



garbage container capacity use or contamination was observed during either audit; however, it should be noted that both audits took place during non-exam times and thus, exam-time waste disposal could reveal different trends.

7.3 Student Survey

While the researchers intended to survey 64 library users at the Dana Porter, only 56 students completed surveys (see Table 2). Two of the students refused to participate, and many students were not available using our sampling technique. Of those participants surveyed, results revealed that each person spends on average 7.6 hours/week studying in the Dana Porter library. When asked whether they typically generate waste in the library, 82% of participants responded “yes.” This represents a large number of students who spend a significant number of hours in the library per week and who generate waste.

Table 2: Break-down of Survey Participants (Per Floor)

<i>Floor</i>	<i>Number of Participants Surveyed</i>
10	6
9	7
8	6
7	6
6	7
5	7
3	8
2	8
1	1

Furthermore, when asked how many pieces of waste they generated in the DP library during their time spent there, respondents indicated that the top four types of waste generated are: paper towels, white paper, food waste, and plastic bottles (see Figure 3). For the purposes of our research, paper towels were considered unimportant sources of waste generation because they are collected within the washroom garbage containers and these bins were not audited. White paper, food waste, and plastic bottles were the next highest sources of waste; this finding supports the results of the waste audit audits discussed earlier in this report (see Appendix E for audit data).

Table 3: Waste Generation (pieces per type of waste)

<i>Type of Waste</i>	<i>Number of Pieces</i>
Paper towels	1.80
White Paper	1.70
Food Waste	0.77
Plastic Bottles	0.54
Fast Food packaging	0.50
Glass Bottles	0.29
Newspaper	0.28
Coloured paper	0.25
Cans	0.18
Other (specify) *	0.14

* coffee cups, 1 lined paper, 1 straw.

In addition, when asked which materials they believe can be recycled in the library, 76% of respondents indicated plastic, 67% indicated glass, 52% indicated cans, 35% indicated newspaper, 9% specified coloured paper, 35% specified white paper, 26% indicated paper, 9% specified coloured paper, and 9% believed “everything” could be recycled. Participants were generally aware that plastic, glass, and cans could be recycled. However, only half of the participants were aware that cans were recyclable. Furthermore, few students knew that newspaper was recyclable. Many of the participants indicated “paper,” while some specifically indicated “colour paper” and “white paper” as being recyclable. Whether the 35% of participants who indicated “paper,” meant to include both colour and white paper, remains an unanswered question.

The following question allowed participants to select more than one answer. When asked for their opinion(s) as to why they felt people threw recyclables into garbage or improper recycling bins, 46% of survey participants felt people did not know where the correct bins were located, 46% felt people did not know which materials can be recycled, 43% indicated “other,” 41% felt there are not enough recycling bins in the library, 35% felt people did not want to recycle, and 35% felt recycling bins are placed in inconvenient locations. The comments under the “other” category varied. Some felt people were apathetic about recycling and waste disposal, while others simply said people were lazy. One participant wrote, “people are too lazy to carry their recyclables to the elevators doors,” and recommended there should be no lone garbage cans. As previously discussed, garbage & recycling bins should be kept together to avoid contamination.

8.0 LIMITATIONS

The intent of the researchers in the compilation of this report was to seek out the most accurate, representative, and conclusive data available on waste disposal in the University of Waterloo libraries. While the findings presented in this report demonstrate the achievement of such intentions, several obstacles were encountered during the research. By acknowledging our limitations, it is hoped that the subsequent research project will take into account some of these factors and alleviate some of the problems that arose.

At the planning stage of the waste audit process, the researchers desired to undertake a quantifiable waste audit, in which the garbage in each library would have been weighed and sorted according to type. However, because the data from the new audit was to be compared with data collected during a past audit, researchers were limited to following the methodology of the previously conducted study so that the results could be compared.

Several limitations were found in the comparative analysis of waste management in libraries at the UW and other academic institutions. Firstly, while information requests on waste management strategies were sent out to nine different schools, only Dalhousie and the U of T replied. The relevance of the data from these schools is limited by several factors. The libraries at Dalhousie and the U of T are of different sizes than those at UW. Furthermore, while UW allows food and drink into its libraries, Dalhousie does not, and the U of T is in the midst of converting to a food-allowed policy. The allowance of food or drink in the library creates different quantities and qualities of waste generation. Furthermore, the waste generation reporting techniques of the universities were different. For example, while UW provided an analysis of the quantity of each waste material generated in its libraries, the U of T did not specify the quantity of each waste material produced within its libraries. A few suggestions for the next research project: firstly, allow for an extended time frame to research other universities with similar

waste policies; and secondly, there should be a general standard to which all universities should adhere when providing statistical waste management information (i.e. what type of materials are included in recycling tonnage figures).

Several obstacles were also encountered during the conduction of the survey. Firstly, while the goal of the researchers was to survey eight people on each of the eight floors using the sampling technique identified, there were not enough people on several floors during the research process to fulfill this goal. Consequently, while the research objective was to survey 64 students, in actuality, only 54 were surveyed. One suggestion for any future survey that is conducted is to utilize a sampling technique that did not specify a head count for every three people. Further, another suggestion is to structure the survey in the following manner: do not allow for ranges (i.e. 10-15 hours spent in the library). This forced a midrange to be assumed, which may have affected the overall number of hours spent in the library per student. Secondly, emphasize that if students answered question number #2 with a “no,” then they were finished with completion of the survey. In two instances, students may have misread the instructions, and continued to fill in the survey. This information was not included in the survey data.

9.0 CONCLUSIONS

Upon examining the library waste management strategies of other universities, it was found that there is much diversion in the type of waste produced and, consequently, the management techniques used to deal with this waste. The diversity in waste management practices, food and drink allowance policies, and waste reporting techniques, caused difficulties in drawing comparisons between the UW's library waste management strategies and those of other academic institutions. However, it was noted that both the U of T and UW expanded the working hours of custodial employees during examination periods to manage increased waste generation and extended library hours.

The library audits revealed several trends in waste disposal distribution and contamination of waste containers. In the DC library, waste containers (recycling and garbage) were heavily used in high density work areas such as table and carousel groupings. Almost every waste container in the library was observed to have some level of contamination during either or both audits. No correlation was observed between the posting of waste disposal information in the vicinity of the waste disposal container and the level of contamination in the bin. Food and drink packages were the most consistently observed items found in recycling and garbage containers. Many of the waste containers in the DP library were found to be significantly full during one or both audits. The frequency of bins observed to be contaminated with the wrong waste material in the DP library was proportionate to that observed in the DC. Specifically problematic were bins on the tenth floor; all of the bins on this floor were observed to have significant levels of contamination. Unlike results from the DC audit, a strong correlation between information dissemination and reduced waste container contamination was observed at the DP library. Researchers observed high quantities of food and drink containers (particularly coffee containers) at the DP library which can be attributed to the recent opening of the new café. No significant waste disposal problems were observed at the Map and Design library.

From the surveys, it was found that students spend an average of seven hours per week studying in the DP library. Students reported that most of the waste they produced during their library visits were: paper towel, white paper, and food wastes (including food packaging). The majority of respondents cited ignorance of bin locations and materials that could be recycled, and “laziness” as the major causes of contamination in waste containers in the library.

10.0 RECOMMENDATIONS

It was evident from the results of the comparative study of waste management techniques at other universities, the waste audit and the surveys that several measures could be taken by library administration to reduce waste problems in the library. Within the next two weeks when the library meeting is held, we will present our findings & recommendations to the library committee, and Patti Cook. At that time, we will be offering to put signs up within the libraries to help increase recycling knowledge and decrease contamination. This is especially important in DC library! Recommendations for improving the waste disposal situation in the Dana Porter and Davis Centre library are as outlined below.

10.1 *Dana Porter*

1. In order to alleviate the contribution of “laziness” to the contamination of waste disposal containers, additional recycling bins should be installed on each floor of the library adjacent to as many garbage containers as financially and spatially possible.
2. Signs should be placed on and above all recycling containers in order to improve awareness of available recycling facilities and the types of materials that can be recycled and increase uniformity of signs. (We are offering to help do this.)

10.2 *Davis Centre*

1. For every other blue box located along the carousals, place a “Place your glass here.” sign above it. This sign will inform students of the type of materials that belong in the bin and ultimately lead to reduced contamination and increased separation of materials. (We are offering to help do this.)

2. For every other blue box located along the carousals, place a “Place your Cans & PET here.” sign above it. This will help educate students what materials are accepted in the blue box. (Again, we are offering to help do this.)

10.3 Other Recommendations

1. It is recommended that the library administration consult with other universities on the management of food/drink packaging waste and organic wastes in university libraries. Such consultation could lead to effective management strategies for reducing the level of food related waste handled by library staff.

WORKS CITED

Cook, Patti. Personal communication. February 13, 2002

Dalhousie University. *Recycling at Dalhousie University*. <www2.dal.ca/>. March 2002.

Jackson, John. ERS 317 Waste Management Lecture. March 6, 2002

Palys, T. (1997). *Research Decisions: Quantitative and Qualitative Perspectives Second Edition*. Toronto: Harcourt Canada Limited.

University of Toronto. *Operations and Services: Department of Waste Management*.
<http://www.facilities.utoronto.ca/bldggrou/wasteman/blgrwast.htm>. March 2002.

University of Waterloo. *Waste Management*. <http://www.adm.uwaterloo.ca/infowast/>.
March 2002.

Appendix A

Map of UW

Appendix B

Behavioural Survey & Informational Letter

Appendix C

Legend of Waste/Recycling Disposal Bins



↑ Small pail (two types) ↑



XL can



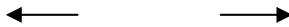
Professional Square (Dana Porter Café only)



Small bin



Tall bin
(two different shapes)





Davis Centre:

White box for recycling white paper (far left)
Blue Carts for: Glass, Cans & PET, newsprint



Dana Porter:

Tall Bins for Recycling



Davis Centre: Blue box



Dana Porter:

Professional Square (in café)

Appendix D

Library Maps and Locations of Recommended Waste Management Improvements

Appendix E

Waste Audit data for DC, DP, and UMD Libraries