

## **Sustainable Buildings and Campus Development**

School of Engineering Practice Course 704 Inquiry Paper

### *Final Submission*

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## **i. Abstract**

This inquiry examined the current policies that govern new building development at several of Ontario's Universities. It was the intent of this investigation to determine how future sustainability of these buildings was considered during their planning and development, and to suggest what additional policies need to be in place for new campus facilities to be sustainable in the future. The approach that was taken was to break-up the inquiry into several key sections to look at various influencing factors for the policy recommendations.

Within the first section, this inquiry investigates the relationship between population demographics and a universities' predicted growth trend, to determine how one of the current justifications for future campus expansion could impact sustainable building development. The next major section looked at the existing policies for building development throughout the various campuses studied to examine the existing governing forces behind the design, location, and functionality of new facilities and their subsequent integration onto the existing campus. The last major section presented, determined the role that stakeholder relationships (both on-campus and off-campus), have had on current building development policies.

The result was the creation of five policies that are intended to be a step towards creating university campus facilities that will strive to be sustainable or at least attempt to improve upon their current development policies. These policies were developed in such a way that they could be adopted (or integrated into existing policies) by any of the schools that were studied within this report.

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## **1.0 Introduction:**

Canada exists in a world that is constantly changing, physically and socially. Whether it is the concerns over global climate change; political instabilities; declining energy supplies; or global economies (just to name a few), we as a society and as part of a larger global community need to develop methods to ensure that there exists academic institutions to properly prepare current and future generations to adapt to the upcoming and ongoing changes ahead.

The focus of this inquiry will be centered on several university institutions within a geographical region of southwestern Ontario, defined by a 150km radius from the city of Hamilton<sup>1</sup>. The institutions that will be studied within this inquiry (as defined by the region above) are Brock University; McMaster University; the University of Guelph; the University of Toronto St. George Campus; the University of Toronto at Mississauga; York University; University of Ontario Institute of Technology (UOIT); Wilfred Laurier University.

The scope of this focus leads to the central defining question of this inquiry. Since these schools are highly regarded by society as facilities that train and mold the future leaders and global citizens of tomorrow it is important that they remain viable and sustainable entities of the public infrastructure. This however presents a problem in that for each of these institutions to continue to be successful in attracting students they may overzealously push for expansions in order to offer new facilities to entice larger enrolments from generally the same pool of applying students (especially within southwestern Ontario). It is this situation where institutions continually seek to expand that is the primary cause for this inquiry paper. It is the intention of this paper to investigate the following central question: **What policies need to be in place for new campus facilities to be sustainable in the future?** Before this question can be looked at with any sort of depth it is important to clearly define the terms ‘*new campus facilities*’, ‘*future*’ and ‘*sustainable*’, and how they are to be interpreted within this inquiry paper.

The use of the term ‘*new campus facility*’ refers to any campus-building project that is defined by one of the following:

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<sup>1</sup> This region was chosen because of its significant amount of post secondary institutions, and because it is one of the most populated regions within Canada.

- The building is completely new in construction from the foundation up
- The building is built on an existing foundation after the previous building has been demolished
- The building is a retrofit of a pre-existing non-campus building for future campus use

It should be noted that although temporary campus buildings may not fall within the definitions defined above, it is still important that their effects on campus sustainability be taken into consideration if their use is evident within individual campus policies.

For the purposes of this inquiry the future refers to a time period of 25 to 30 years from 2006. This time scale was chosen for two reasons: the first is based on the projection planning horizons stated within the Master Campus Plans of a majority of the eight schools being studied<sup>2</sup>; the second is based on the data provided by Statistics Canada whose provincial statistical projection only extend to 2031(*Statistics Canada: Current Population, 2006*).

The final aspect of the central question that needs to be defined and clarified is what the term *sustainable* means within the scope of this inquiry paper. A preliminary source for the definition of sustainability has historically been linked to the Brundtland Commission and their subsequent report in that they defined sustainable practices as those that do not diminish the availability of resources to future generations (*Brundtland Commission, 1987*). This definition is thought to be too vague to be effectively used within the scope of this inquiry paper. Therefore, sustainability will not only be defined in terms of the *Brundtland Report*, but will also use three key metrics: Economic; Environmental; and Social.

The economic metric will look at whether the new developments consider the required investments and future operating costs? The environmental metric will look at current and future environmental footprint as it relates to energy conservation, land-use, and campus integration. Whereas, the social metric will look at the various stakeholders groups and their effect on new building development, and the intended functionality as viewed by users of new buildings.

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<sup>2</sup> Of the schools being studied the only school without a current Master Campus Plan was York University

The methodology that will be used to investigate the central question, will be to divide this inquiry into four major components: *Driving the need for new building: population growth versus predicted university trends; Existing policies for building development; Stakeholders; Policy recommendations and concluding remarks.*<sup>3</sup>

## **2.0 Driving the need for new buildings: Population growth versus predicted university trends**

One of the key factors that will affect the future role and operation of Canadian universities is the current and estimated population demographics. These demographics can be direct indicators for a university's need (or perceived need) for new buildings and the subsequent acquisition for new land. These may not be the only indicators (for instance, perceived competition from other schools) but historically provincial funding is often linked to student enrolments. The purpose of this analysis was to determine whether the Canadian population demographics are in line with anticipated student enrolments within these universities, to see if there is any evidence that the current level of campus growth is representative of the capacity and level of services that will be required in the future.

This analysis was conducted by using data freely available through Statistics Canada<sup>4</sup> and the Council of Ontario Universities, student enrolment and projected enrolment data provided by the schools being studied.

### **2.0.1 Current and estimated population demographics**

As of 2005, Statistics Canada reported a current total population estimate of 32,270,500 people and showed the most populous regions to be Ontario (12,541,400), Quebec (7,589,100), British Columbia (4,254,500), and Alberta (3,256,800), while all other provinces and territories had population less than 1 million people (*Statistics*

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<sup>3</sup> While this paper does acknowledge that there is a difference in the ways that private, public and institutional buildings are financed, designed and constructed, the focus will primarily be on institutional (university) building development and the unique challenges that these developers and planners must work within.

<sup>4</sup> Statistics Canada Website can be found at <http://www.statcan.ca/>

*Canada: Current Population, 2006*). For the purposes of this inquiry the focus will mainly be within Ontario.

In addition to the current population estimates, Statistics Canada provides estimated national and provincial populations based on several possible growth scenarios. The following three growth scenarios were chosen:

Scenario #1 Low Growth: assumes a relatively low fertility rate of 1.3 births per woman, combined with relatively low levels of immigration (approximately 0.55%), and an overall life expectancy of 81.1 years for men and 85.3 years for women (*Statistics Canada: Table 052-0004, 2005*)

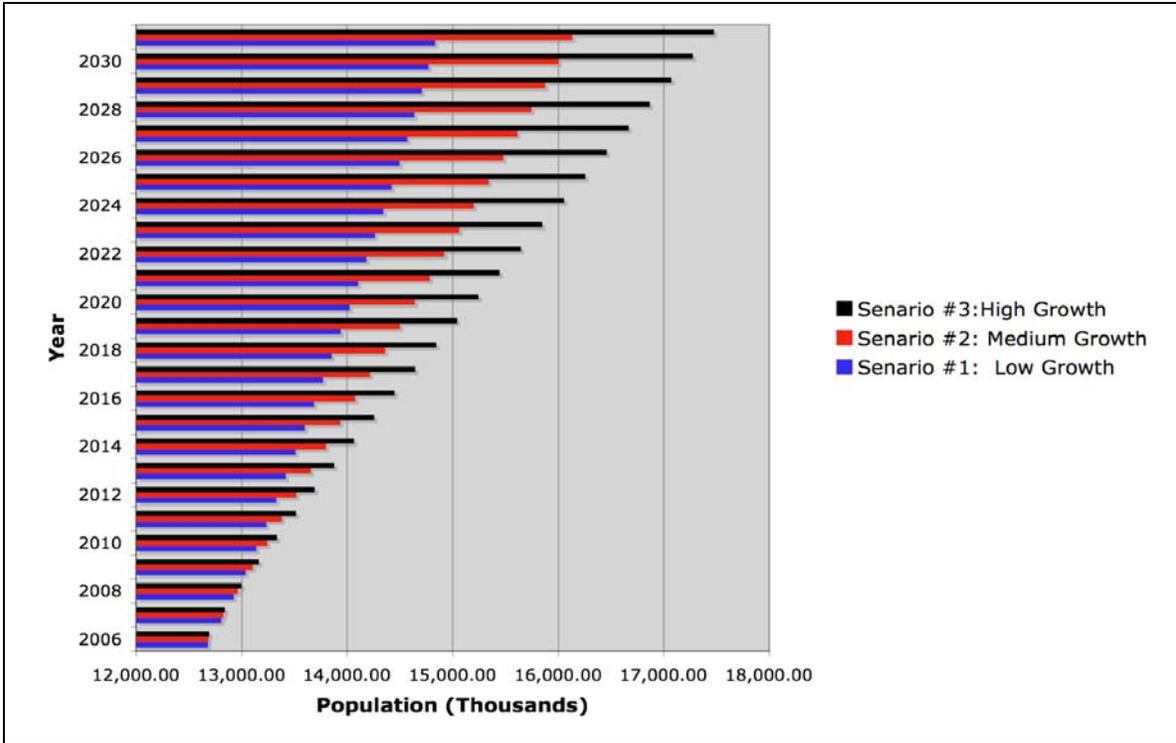
Scenario #2 Medium Growth: assumes a moderate fertility rate of 1.5 births per woman, combined with moderate levels of immigration (approximately 0.7%), and an overall life expectancy of 81.9 years for men and 86.0 years for women (*Statistics Canada: Table 052-0004, 2005*)

Scenario #3 High Growth: assumes a relatively high fertility rate of 1.7 births per woman, combined with higher levels of immigration (approximately 0.85%), and an overall life expectancy of 82.6 years for men and 86.6 years for women (*Statistics Canada: Table 052-0004, 2005*)

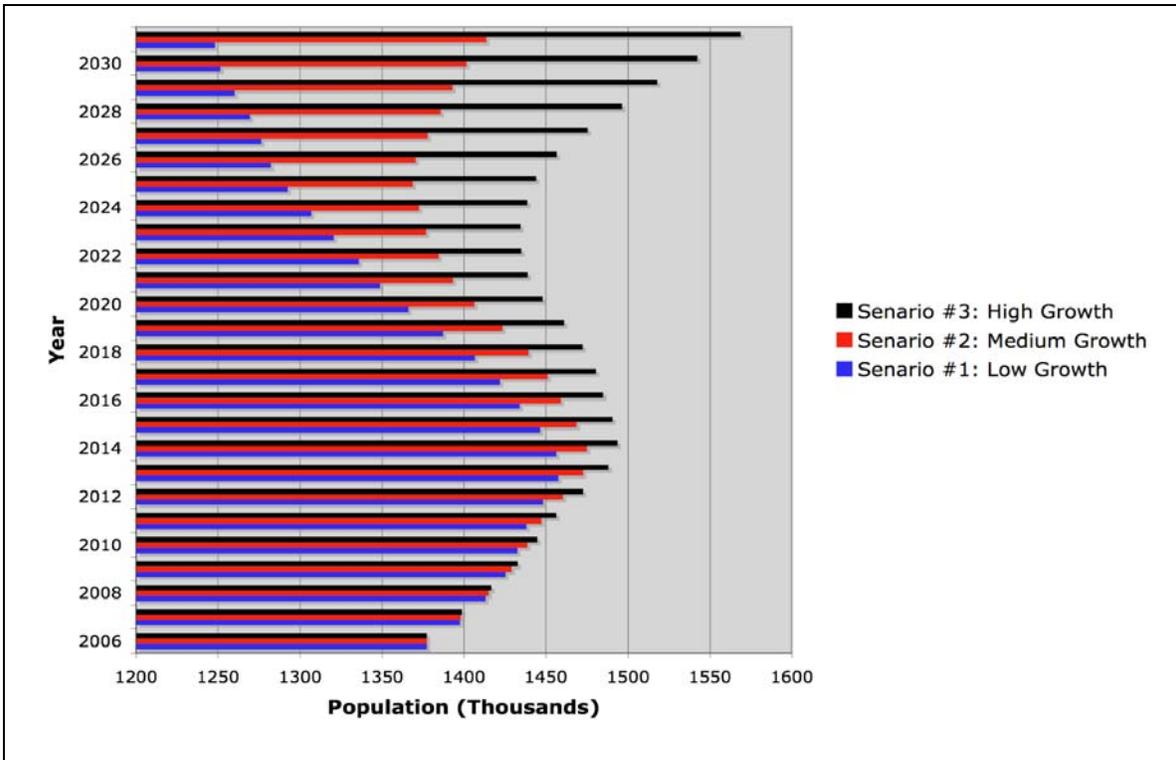
The focus for these projections will be on the age groups most likely to be pursuing post-secondary university educations, the age range of 17 to 24 years<sup>5</sup>. *Figure 2.0.1.1* displays the projected provincial population (all ages) from 2006 to 2031 and *Figure 2.0.1.2* displays the projected population for the selected age demographics (age 17 to 24).

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<sup>5</sup> The age demographic 17 to 24 was selected to incorporate those who are just starting or pursuing their undergrad degree and those older students who are working towards their graduate work.



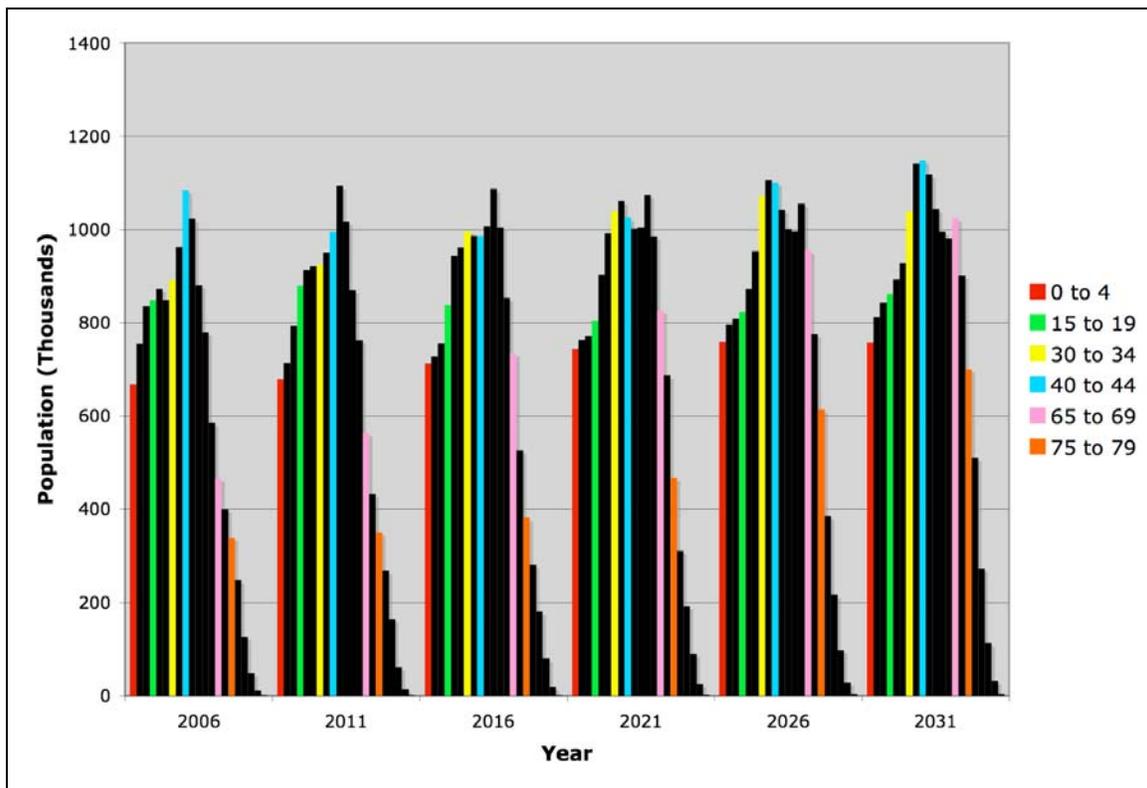
**Figure 2.0.1.1** Projected Ontario population from 2006 to 2031 (*Statistics Canada: Table 052-0004, 2005*)



**Figure 2.0.1.2** Projected Ontario population for age demographics 17 to 24 (*Statistics Canada: Table 052-0004, 2005*)

Figure 2.0.1.2 demonstrates that while the provincial population trends (shown in figure 2.0.1.1) show a tendency to consistently rise, the same cannot be said about the demographics of ages between 17 and 24, which show levels of rising and falling.

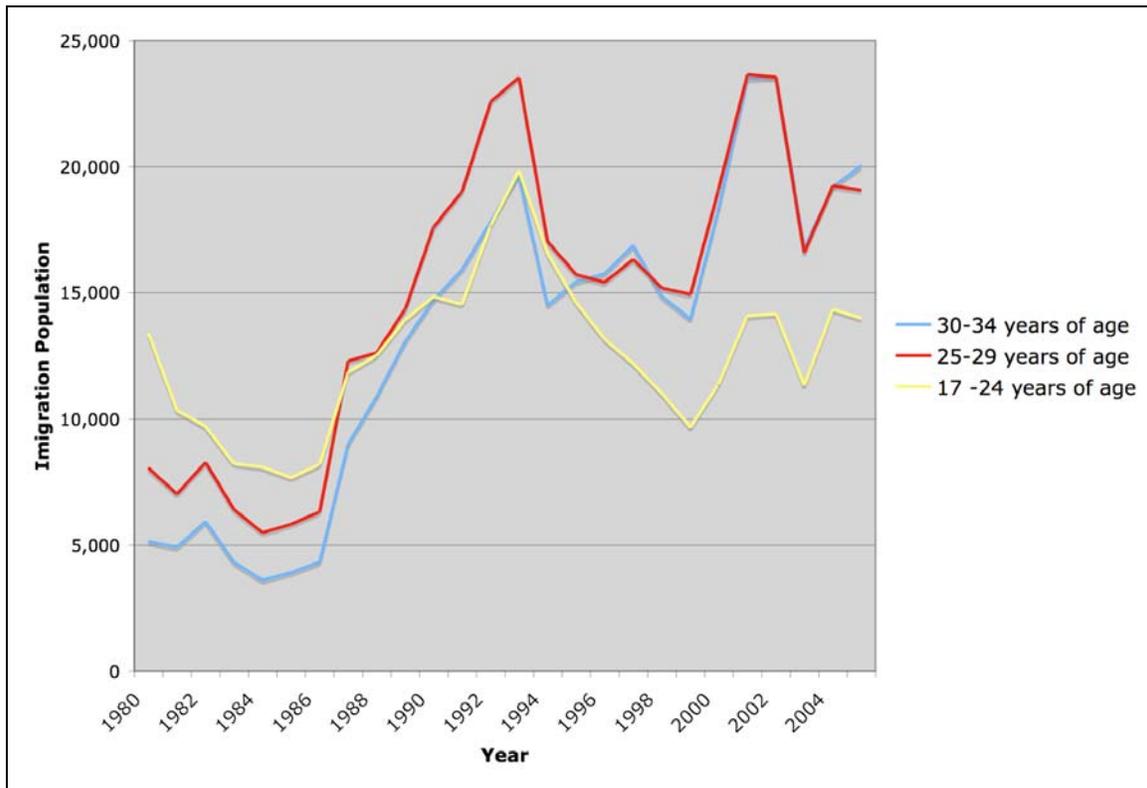
This trend observed in Figure 2.0.1.2, can be explained by examining an entire population trend for the entire age demographic over the same duration, 2006 to 2031. To simplify the graph and analysis, only scenario #2 was used and only six demographic regions will be studied, the results of which can be observed in Figure 2.0.1.3.



**Figure 2.0.1.3 Population trends over entire age demographic (Scenario #2 Used)**  
(Statistics Canada: Table 052-0004, 2005)

The 0 to 4 age demographic (highlighted in red) representing births and newly immigrated children remains relatively consistent over the duration of the period. When this is taken into account with the 65 to 69 (pink) and 75 to 79 age demographic (orange) which seems to be climbing, there is evidence to suggest that expected increasing longevity and increased immigration and not birth rates are pushing the majority of the population to fall above 40 years of age. It is also important to note that there appears to be a cyclical nature (patterned rising and lowering) within the 15 to 19 age demographic

indicating that immigration levels for this age group may not be enough to offset the relatively consistent birthrates, this observation is important because it is within this age bracket that Ontario universities are targeting for enrolment. Another important indicator to look at is displayed within the 30 to 34 age demographic (yellow) in that the population tends to steadily climb over the duration of the projection time period, and since there is evidence of fluctuations within lower age demographics (*Figure 2.0.1.2, Figure 2.0.1.1*), this in conjunction with *Figure 4.0.1.4* is evidence of immigration helping to increase the population within this age group.



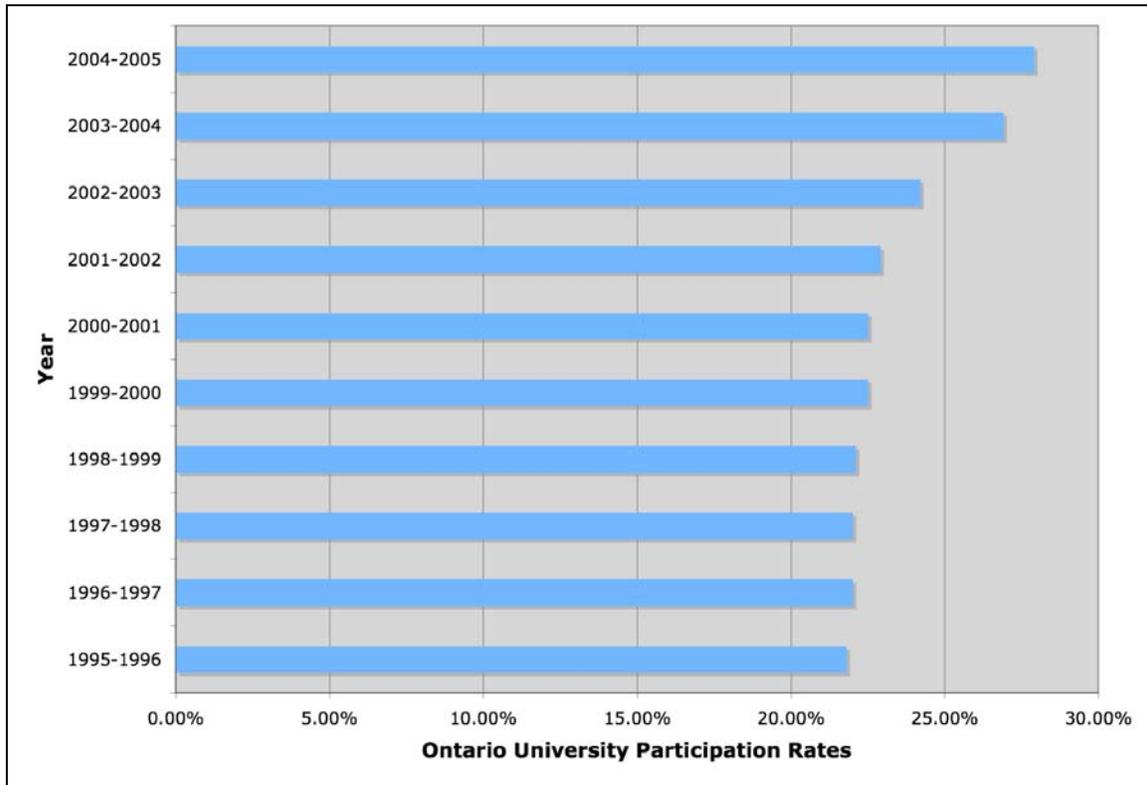
**Figure 2.0.1.4** Ages of new immigrant populations for a 25 year period between July 1<sup>st</sup> 1980 and July 1<sup>st</sup> 2005 (Statistics Canada: Table 051-0011, 2006)

Therefore in all three scenarios, is it evident that there will eventually be a peak in the amount of the provincial population generally targeted for university enrolment.

## 2.0.2 Current and estimated university demographics

Before considering university-specific demographics and trends it is important to relate the percentages of the desired provincial population demographic (age 17-24) that

are actually attending universities within Ontario. The most current information as collected by the Council of Ontario Universities is presented within *Figure 2.0.2.1*.



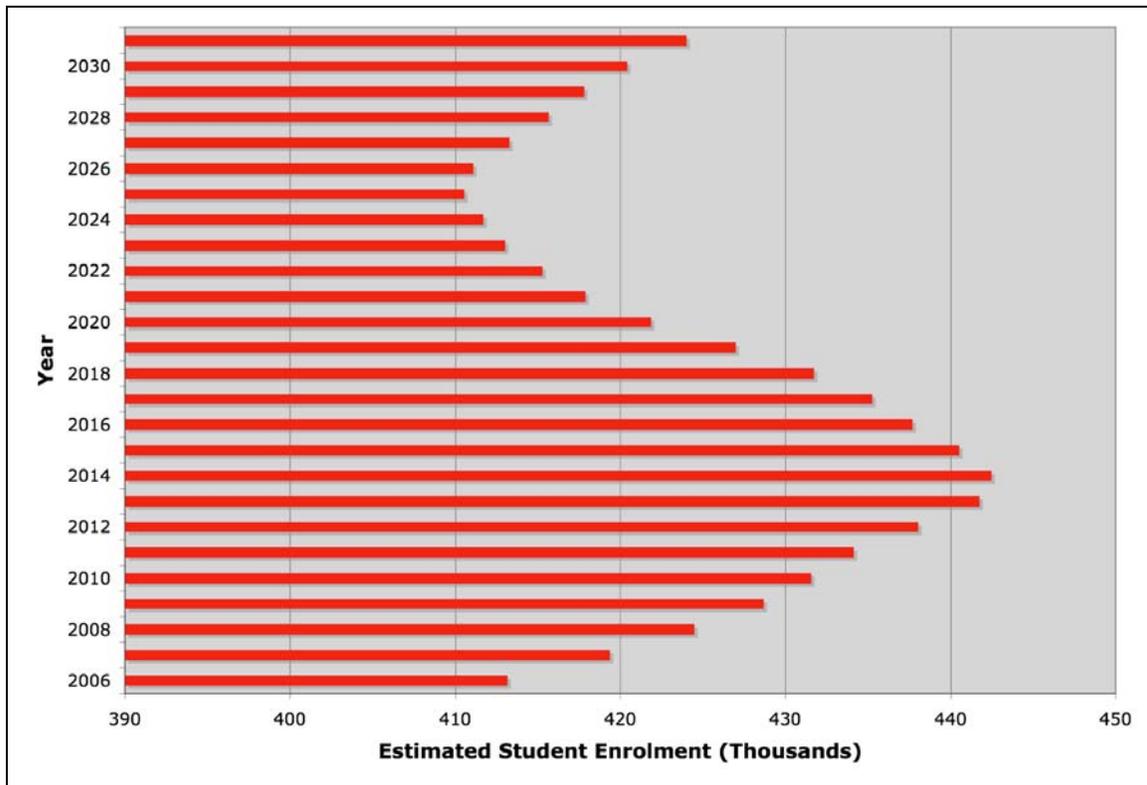
**Figure 2.0.2.1 Current participation rate of the Ontario's population (Aged 17-25) attending university** (*Council of Ontario Universities, July 2006*)

As portrayed in *Figure 2.0.2.1*, in the years from 1995-1996 to 2001-2002 the average rate of participation was approximately 22.5% of the targeted population demographic (ages 17-24). It should be noted that even with the abnormality of the double cohort in 2002-2003 (and 2003-2004) and the subsequent change in how Ontario's largest university (Toronto) reclassified full time enrolment within one of its programs, the observed participation rate is still fairly low (below 30%) and is expected to remain relatively level and perhaps even lower when the last of the double cohort<sup>6</sup> class graduates (*Council of Ontario Universities, July 2006*)<sup>7</sup>.

<sup>6</sup> The double cohort refers to when the Ontario Government phased out grade 13 in all secondary schools in 2002-2003. What resulted from this is that there was an artificial increase in students finishing secondary school (grade 12 and grade 13 graduates), and an increase in the number of students applying for post-secondary education.

<sup>7</sup> This is also the consensus of most of the universities that were consulted in the research of this inquiry paper

To give a clearer picture of the estimated number of students (from Ontario) that will be available for university recruitment over the period of this study (2006 to 2031) a 30% population participation rate was assumed<sup>8</sup> in conjunction with the medium growth scenario data presented in *Figure 2.0.1.2*, the results are shown in *Figure 2.0.2.2*.

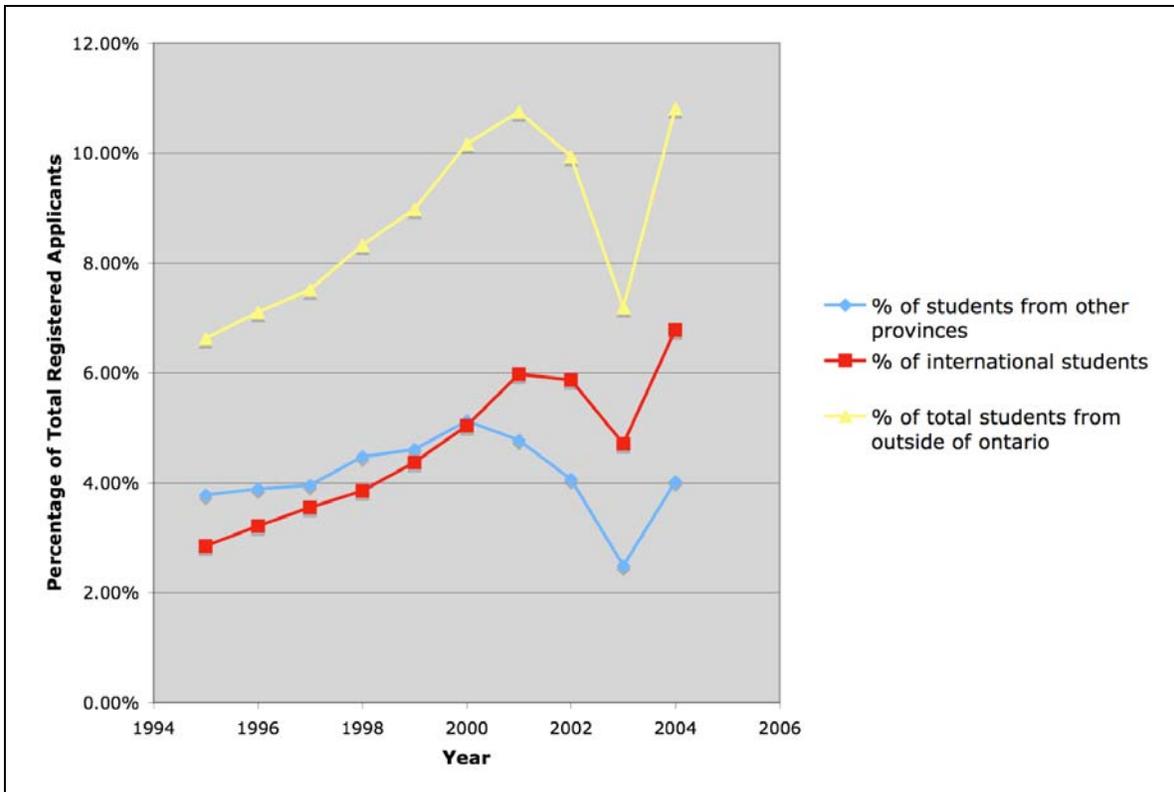


**Figure 2.0.2.2 Estimated students available for enrolment at Ontario's Universities to the year 2031, based on a population participation rate of 30% and a medium growth rate**

*Figure 2.0.2.2* Shows an estimation that the targeted demographic available to Ontario’s universities will peak approximately in 2014, or approximately one third of the time horizon depicted within a majority of the Campus Master Plans being proposed by Ontario’s universities.

In addition to looking at the available targeted population it is also important to look at where the bulk of the students will be coming from. Are they mostly provincial (coming from the province of Ontario)? Or are the applicants significantly from diversified sources? (*out-of-province or international students*)

<sup>8</sup> Represents a maximum participation rate estimate, the actual number could be less.



**Figure 2.0.2.3 Percentage of new registered students attending Ontario’s universities who originate from out of province** (*Council of Ontario Universities, July 2006*)

Figure 2.0.2.3 shows the most currently available data on the percentage of new registered students<sup>9</sup> who originate from outside the province of Ontario from September 1995 to September 2004. This figure breaks up the data into 3 main components: the percentage of students from other provinces within Canada; the percentage of international students; and the total percentage of students who originate from outside Ontario.

The first significant observation that is evident upon inspection of *Figure 2.0.2.3* occurs in all three datasets during the period between 2002 and 2004, in that the percentage of each group drops with respect to the total number of students newly enrolling in university. These phenomena can be explained by the double-cohort transition that saw more Ontario students graduating at the same time due to the phase out of the OAC level in secondary school. It should be noted that this data can be somewhat misleading because although it shows that out-of-province students comprise

<sup>9</sup> The data shown represents students who are newly enrolled within undergraduate programs, no data was available for graduate students.

less than half of the total students from outside Ontario, it is upon closer inspection of *Table 2.0.2.1*, that one can see that the international student population actually continued to increase, and the out-of-province students actually decreased during the period of the double-cohort transition. A possible explanation to why this divergence of these two groups occurred could be due to an increased public knowledge about the double-cohort within Canada discouraging out-of-province students from applying within Ontario, and a lack of knowledge available to international students outside of Canada about how the double-cohort could affect acceptance into Ontario's universities.

**Table 2.0.2.1 Excerpt from numerical data used to create Figure 2.0.2.3 (Council of Ontario Universities, July 2006)**

Year	2001	2002	2003	2004
Total First Year Enrolment	51,555	58,706	78,409	65,838
International Students	3,082	3,449	3,691	4,468
Out-of-Province Students	2,463	2,388	1,952	2,650

The second significant trend that can be observed in *Figure 2.0.2.3* is that the percentage of students coming from out-of-province appears to be leveling off or perhaps even in decline<sup>10</sup>, while the percentage of international students continues to increase at a rate that is consistent with the rate of growth perceived in the percentage of total students from outside Ontario. With this in mind it is important to remember that even though international students made up approximately 70% of all new undergraduates originating from outside of Ontario in 2004, approximately 90% of all new Ontario undergraduates in that year originated from the Ontario population. Therefore if student population does play a role in the drive to build and create new spaces, provincial enrollment numbers could sway building decisions and priorities since an overwhelming majority of their students originate within the province.

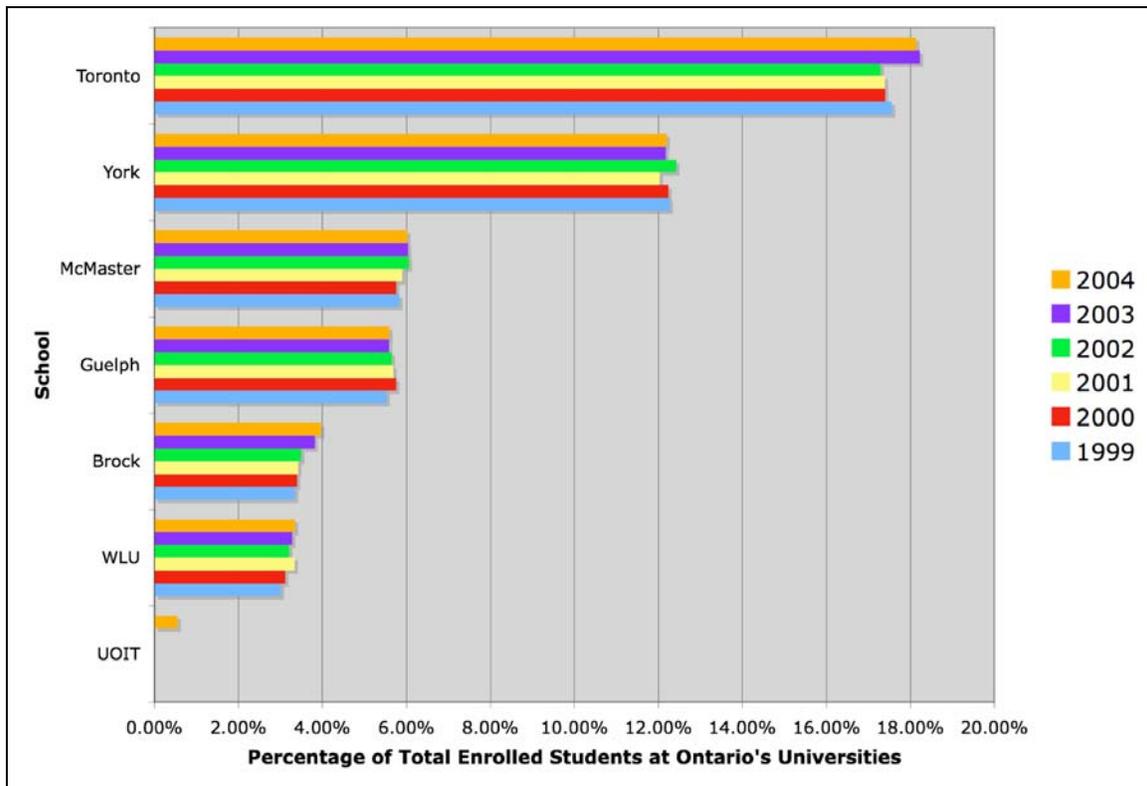
### **2.0.3 Relating these estimations to the universities being studied**

Making estimations on how an individual institution will react to the various provincial and international students demographics is not an easy task, therefore the

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<sup>10</sup> It is impossible to tell for sure, more information is needed to make a more accurate decision

proposed analysis on the subject will be limited to what has been observed historically and the material that was disclosed in the various interviews conducted for this inquiry.

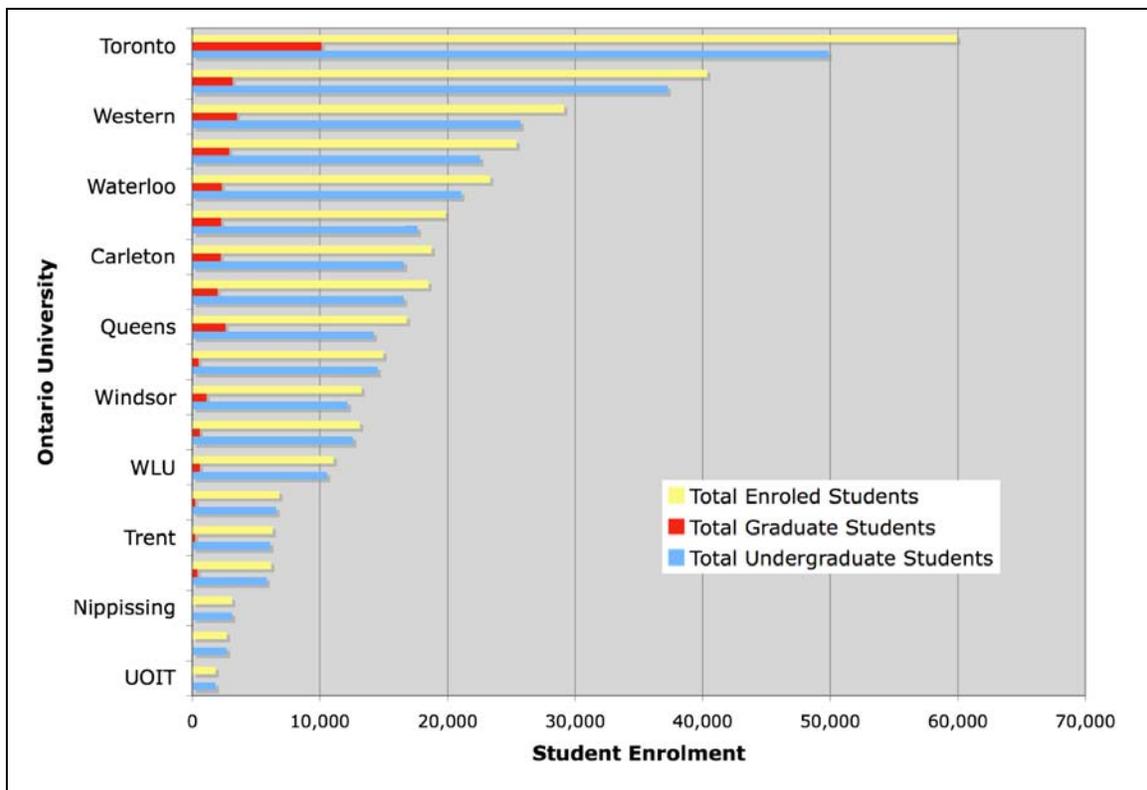


**Figure 2.0.3.1 Distribution of enrolment attending the eight universities being studied within this inquiry** (Council of Ontario Universities, July 2006, January 2005, March 2001)

One of the initial areas that was looked at was how the total provincial enrolments were distributed among the universities being studied. The analysis looked at the most current data provided by the Council of Ontario Universities (for 2004) and compared these against the total enrolment from the four previous years. *Figure 2.0.3.1* shows the results of this analysis. One dominant trend that can be seen in *Figure 2.0.3.1* is that the enrolment levels when compared to each other as a function of percentage of total provincial enrolment remain fairly consistent to  $\pm 0.75\%$ . The only one that does not conform to this trend is the University of Ontario Institute of Technology (UOIT), which was not formed until the 2004 academic year. If this trend were to remain consistent it could be a useful tool to estimate the projected enrolment numbers. However, this is a tool that should be used with great caution, because it is only an approximation, and does

not reflect the impact of individual institutions introducing new programs into their curriculum.

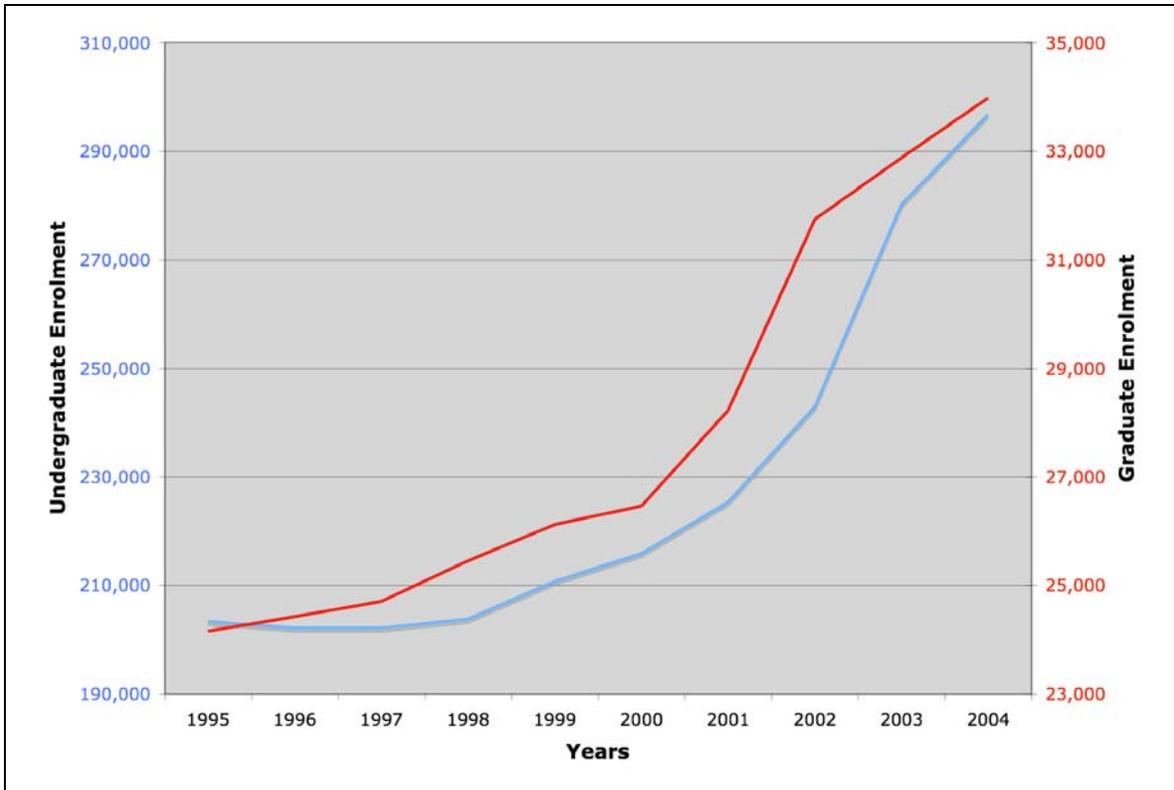
In looking at how the projected demographics demonstrated within the earlier sections (2.0.1 and 2.0.2) relate to the future enrolment levels, and their significance to the need for building development, again caution will be taken as to try to avoid any poorly based assumptions (for instance assuming that student distribution remain consistent to the number shown in *Figure 2.0.3.1* over the 30-year planning horizon). *Figure 2.0.3.2* shows the total student enrolment population for all Ontario universities as recently published by the Council of Ontario Universities, for the year 2004. Although the *Figure* shows the undergraduate students are in majority, there does appear to be



**Figure 2.0.3. 2 Student enrolment by Ontario university for 2004** (*Council of Ontario Universities, July 2006*)

evidence to suggest that in addition to pursuing undergraduate students there is a large focus on attracting students at the graduate level (creation of research intensive universities) and both actions may affect the required need for new buildings.

To demonstrate the rate of increased growth that has been experienced within enrolment in both undergraduate and graduate level programs in Ontario, the data used (shown in *Figure 2.0.3.3*) covered a 10-year period between 1995 and 2004.



**Figure 2.0.3.3 Growth of graduate and undergraduate full-time enrolments from 1995 to 2004** (*Council of Ontario Universities, July 2006*)

*Figure 2.0.3.3* shows that both graduate and undergraduate attendance has steadily been increasing over a ten-year period from 1995 to 2004, however how this becomes significant to the need for new buildings and campus space is not evident until the amount of required space for each additional student is taken into account. The space requirements that are used within this inquiry were developed by the Council of Ontario Universities, and are complied within their *Inventory of Physical Facilities of Ontario Universities* report issued in December 2005. The report states that while there are increases in building spaces they are predominately specific use facilities such as classrooms, research labs and faculty offices and that there currently is insufficient new buildings and spaces to accommodate the new enrolments. (*Council of Ontario Universities, December 2005*) Therefore the argument that the Council of Ontario Universities is putting forward is that further expansion is required. To give an idea of the

general short-fall estimated by the Council of Ontario Universities, they provide the following figures (shown in *Table 2.0.3.1*):

***Table 2.0.3.1: Space short-fall estimations for Ontario universities for 2004-2005 (Council of Ontario Universities, December 2005)***

Year	Enrolment Increase	Space Increase
2004-2005	26.1%	11.6%

Table 2.0.3.1 shows that while the space provided did increase it was significantly less than was deemed required by the Council of Ontario Universities to satisfy the enrolment increase. The Council of Ontario University continues on to predict that even though new buildings and facilities are being constructed at almost all universities they foresee further decline in the future 2007-8 report (of the same name) (*Council of Ontario Universities, December 2005*). The reasons to why this decline is predicted can be directly related to the levels of graduate student growth, demonstrated in *Figure 2.0.3.3*. This is because the Council of Ontario Universities estimates that the space requirements for graduate students is significantly greater (on average 3 times larger) than that of the general undergraduate student <sup>11</sup>, and they feel that the pace of new building and facility development will not keep pace with the graduate demand (*Council of Ontario Universities, December 2005*). Although this would appear to be a case to justify increased rapid expansion on campuses, it is the author’s opinion that if rapid expansion is solely the main criterion pushed for new building development with schools building just to keep up to student population, there could be times where these buildings are underutilized because the building’s functionality may not have been fully considered. Such is the case with 300+ seating lecture halls, that may be underutilized in summer months because in general, universities in Ontario operate at full capacity 8 months of the year from September to April, Monday to Friday.

A second factor that while not primary identified within the Council of Ontario Universities’ documentation, but brought up within several interviews was that of student

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<sup>11</sup> In terms of facilities such as classrooms, lab space, graduate offices, office support, and libraries, whereas the undergraduates tend to primarily need classrooms and libraries

accommodations (residences) development (*Interviews 1,2,3,5,6,10,11,13*). This becomes a significant factor when one observes the rapid rate of undergraduate growth shown in *Figure 2.0.3.3*, and the estimated provincial enrolment numbers for this upcoming year (approximately 480,000 enrolled students (*Government of Ontario, 2006*)) in conjunction with the policies that some schools within Ontario have guaranteed housing for qualifying first year students (for instance: University of Toronto and McMaster University have such policies) (*University of Toronto, September 2006*) (*McMaster University, September 2006*). In touring, interviewing, and reviewing the websites of the various schools the impact of how significant new residence buildings are to the overall campus development became evident, in that most schools were doing or had done at least one of following:

- Built at least one residence in the last 4 years
- Have purchased existing off-campus buildings for student residence use
- Have plans to build new residence buildings in future capital projects

### **3.0 Existing policies for building development:**

#### **3.1 What governs new building development?**

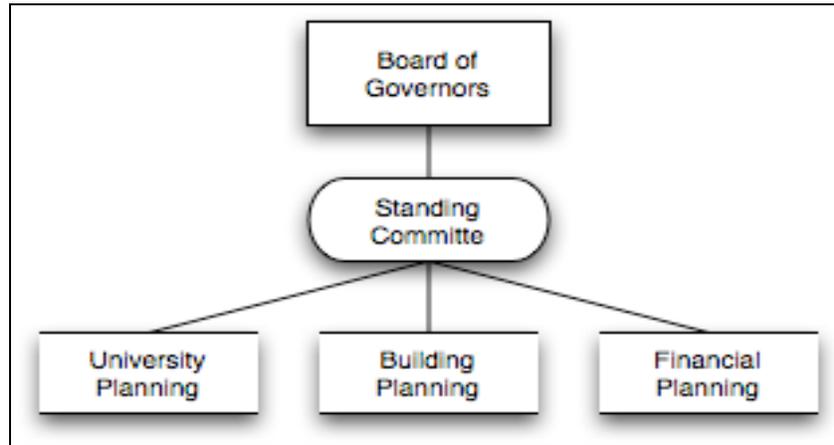
This section looks at the existing governing forces behind new building development and will look at the following questions:

1. Which groups approve and oversee new building development?
2. Are there policies in place to influence new building development?
3. Are there any policies that dictate or influence how new buildings and development are financed?

While specific universities will not be disclosed, a general picture can be presented to demonstrate similarities and differences that became evident during the course of conducting interviews at the various universities.

In looking at the first question, the overwhelming response by all those who were interviewed replied that all new building developments needed to be approved by an institutional governing board (*Interviews 1,2,3,4,5,6,7,8,9,10,11,12,13*). For the most part, the structure and nature of the process that the various institutional governing board's use to approve new building development is similar. To illustrate the general

requirements to satisfy the decision process, a general case will be used. In a majority of the institutions studied each new building project involves the use of a fixed *Standing Committee* (or Capital Projects Group), comprised of at least three main groups (see *Figure 3.1.1*), each having specific roles in the development of the new buildings. (*Interviews 3,5,10,11,12,13*)



**Figure 3.1.1 General approval structure for new building development at the various university institutions studied for this inquiry**

The first group looks at an overall university plan and takes into account things such as a building's location and general functionality. The second group would be more concerned with planning and would look at the general design and the functionality of the building with respect to the clients or intended end users of the development. It is also this group that is generally concerned with the general costing and estimation of expenses. The third major group that comprises the general standing committee is the financial group who looks at a new building in terms of how will it be paid, and where will the money come from in terms of grants, donations, mortgages, etcetera. In a majority of the institutions studied all three of the above groups (or a variation thereof), needs to be satisfied before the approval for a new building is granted (*Interviews 3,5,10,11,12,13*).

The overall responses to questions concerning the presence of policies that influenced new building development were varied. Some individuals stated that to the best of their knowledge their institution did not have any specific formal university policies dealing with sustainable buildings (*Interviews 6,8,11,12*). Others said that while some environment policies were in place they tended to be optional in nature and lacked

significant bite to affect the current set of buildings being planned, but that they were optimistic that this may change in the future (*Interviews 2,7*). There was however one institution that had implemented one fairly ambitious policy as it pertained to new building development, in that the policy called for all new buildings to be a minimum of L.E.E.D.<sup>12 13</sup> silver certified (the impact of such a policy will be discussed within section 3.3) (*Interviews 9,10*).

In examining if any policies influenced how new building development was funded at the various institutions, the overall responses was consistent across all interviews conducted. There are no formal policies on how their new buildings were financed and that the funding could come from varied sources such as grants, donations, and mortgages (*Interviews 3,5,8,9,10,11,12,13*). The one aspect of financing that was consistent regardless of institution was residence buildings (student living accommodations), are not applicable for government funding, they are largely paid for by the institutions taking out mortgages, financed by student rental fees (*Interviews 10,12,13*).

### **3.2 Input into design and location**

During the course of conducting interviews almost all schools studied had similar techniques when deciding who has input into the design and location of new buildings. This analysis will look at the general groups who are involved within this process, and what their roles have historically been.

All universities studies within this inquiry have a school council or committee that is used to determine where a building should be located or how it should be designed, and although the names may be different (such as *Planning and Building Committee* or *Project Planning Committee*) the roles were the same (*Interviews 3,5,9,10*). Even though

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<sup>12</sup> LEED stands for Leadership in Energy and Environmental Design and is designed to be a method to rate how green a building is by looking at five key areas of human and environmental health: sustainable site development; water savings; energy efficiency; materials selection; and indoor environmental quality

<sup>13</sup> Please note that the arguments for the adoption or rejection of the L.E.E.D. standards will not be covered in this inquiry paper. It is the author's opinion that even though the L.E.E.D. standards may have their flaws, by following them matters of sustainability and environmental issues are brought to the forefront and are evaluated during the design of the building, which may not have been looked at otherwise.

the process used to determine the location and the process used to determine design were both extremely important each looked at very different aspects of building development.

The methods of deciding the location of new facilities have common elements among schools studied. The two largest groups within these committees that hold the most power over the decision of where buildings could be located, (or should be located on campus) were the university planners and the faculty members (this was often seen at the larger institutions) but both groups have very different roles (*Interviews 3,5,6,7,8,9,10,11,12,13*). The university planners need to look at new developments in terms of direction of the campus master plan and the current level and availability of building services (for instance the ease of integration into campus physical plant for water, steam, electricity, sewers, heat, air conditioning) (*Interview 10*). The faculties are largely concerned with how their new buildings integrate or interact with their existing ones (for instance new engineering buildings should be near other engineering facilities when possible, for ease of faculty services) (*Interviews 10, 12, 13*).

The decisions involved in the design of a new facility can also be varied based on the specific institutions involved, one of the similarities evident when conducting the various interviews was described by one school as a *functional plan* (*Interview 10*). This *functional plan* stage of design would examine what the required new building or facility needs in terms of demands from its intended user group. After the university committee (or council) *approves the functional plan* the next steps in the design process in simplified terms would be: Funding Approval→Architectural Design→Building Construction (*Interviews 5,7,10,13*).

### **3.3 What is the intended functionality of new buildings?**

In order to understand whether a new building's functionality is reflective of its sustainability, this analysis will look into why a building's functional design is increasingly becoming important as it relates to its sustainable use on campus. This analysis considers such factors as: a buildings designed purpose; the integration of new buildings with older ones or the surrounding environment and its effect on campus growth.

### 3.3.1 A building's designed purpose

To examine how a building's designed purpose is important to the sustainability of the building and to the perception of the building for the intended users, one of the questions that was asked during the course of the interviews was: *Are there any buildings on campus that in retrospect, you would have preferred were designed and/or located differently?* Not surprisingly the general answer was yes from all those who were interviewed, however to be fair some did point out their campuses were older with several historic buildings and that when these buildings were constructed, sustainability and adaptability were probably not developed into their designs (*Interviews 2,5,7,8,9,10*). In hearing these responses the same question was asked regarding buildings that were constructed within the last 10-years, the result interestingly yielded the same result. What was interesting was that the problems or limitations that were brought up about these buildings were not complaints about the aesthetics but rather the functionality of the building in that it was not designed to the full potential required by its targeted user group (*Interviews 1,2,6,7,8,10*). Although this answer can at first be a bit discouraging, it is important to note that at most schools there is evidence that user functionality and building sustainability is slowly being implemented in new building design. The evidence of this was the answers provided for the following interview question: *To your knowledge, is future functionality being considered for new building design and construction?* While all schools did mention that they actively wanted to pursue a building development policy focusing on sustainable or even in some cases<sup>14</sup> adaptable buildings, this report will highlight a few of the fairly large ongoing initiatives.

1. Several schools are looking at creating student-focused buildings to be adaptable overtime to reflect current technologies (*Interview 3,4,5,9,13*). One example of this type of adaptable building is a library that uses compression shelving to store books to allow more space for students study area while still maintaining its collections. One school that was interviewed was planning on taking the idea of compression shelving to a more complete level, in that they are replacing printed texts and journals as they become available with electronic versions, while

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<sup>14</sup> This sometimes is not possible because some of the new constructions are purpose built such as residences, hazardous lab spaces, etcetera.

- placing an emphasis on people and the space they require, therefore as more electronic media replaces printed material the area available for student work will be gradually increased (*Interview 3,5*).
2. Several schools have started to adopt L.E.E.D. standards into some of their new developments (*Interview 2,3,5,9,10,13*), however as was mentioned in section 3.1 only one school has created a policy that all new buildings being constructed are required to be L.E.E.D silver minimum certification (*Interview 10*). This policy is a very ambitious one because the additional planning and documentation will be required to be completed before a building can receive its certification (given after the building is completed). The reason why this policy is significant is not only because the school has said that it will enforce L.E.E.D. certifications but the fact that it was spearheaded primarily by one individual who wanted to see a change in the way buildings were looked at and developed.
  3. The University of Toronto St. George Campus, has developed an innovative building for the biological sciences, which uses several functional technologies to allow it self to be more adaptable to needed change in the future. This building is the *Centre for Cellular and Bio-molecular Research (CCBR)*. Functionalities such as utilities (lights, electrical) are located in exposed ceiling tracks for maximum flexibility of equipment location and labs are space adaptable because of moving partitions; and 40% of the building was left unfinished as *shell* space that can be use to accommodate future expansions within the faculty using this building (*Lum, 2006*).

### **3.3.2 Building integration and campus growth**

A second key aspect of a building functionality as it relates to existing building policies is how new buildings are being integrated within the existing campuses, and their effects on overall campus growth.

Two questions were asked of all the individuals who were interviewed: *What considerations are given to the integration of new building development within the existing/surrounding environment on campus?* and *Do you feel that the direction and rate of new construction and growth reflects the aspirations set forth within your institution's campus master plan?* One of the most straightforward answers received that summed-up

the difficulties in balancing building integration and campus growth in that the challenge from a future use or sustainability point of view is to be able to marry older technologies into newer more efficient systems (*Interview 13*). This became evident when touring around some of the older universities, such as the St. George Campus of the University of Toronto, Guelph and McMaster, and seeing how these schools need to be conscious of how retrofits and new building are planned and located so as not to detract from some of the more historic buildings and open space areas.

There is a basic level of integration that all of the institutions adhere to, in that the new building designs try to incorporate the different aesthetics/architectural/environmental features from the new building's planned surroundings (*Interviews 7,8,10,12,13*). This is the same sort of policy that is seen within various different campus master plans studied for this inquiry. These are a few examples from some of the master plans from the schools being studied:

*Guelph University: Campus Master Plan*

“Project sites will be selected to preserve campus assets, favor the repair of problem sites, and avoid compromising good quality buildings and landscapes” (*University of Guelph, 2002*)

“Building design must be of its time but take inspiration from the original older buildings.” (*University of Guelph, 2002*)

*McMaster University: Campus Master Plan*

“New buildings, additions to historic structures, ... will be sensitively designed and carefully reviewed to ensure an appropriate fit with the architectural character of the building, the historic image they create, and their relationship with the Cootes Paradise Ravine and other important open spaces.” (*McMaster University, March 2002*)

*Brock University: Campus Master Plan*

“A bold and modern architectural expression in keeping with the existing academic buildings will be encouraged for all new buildings, both academic and residential” (*Brock University, 2003*)

However, what is not clear is whether these policies within the various plans have any bite or enforcement to them. In addition to this what is not stated or implied within the

studied Campus Master Plans (as it relates to new building integration) is that one of the largest constraints that can affect the level of integration is economics (*Interview 7*). This is because some of the various historic buildings used materials that can be quite cost prohibitive (for instance marble) for new buildings.

In response to the second question, the general findings are:

1. For some of the schools it has been a learning process. Their campus master plans were so rigorous in when growth would be anticipated or required, that they have had to remove or plan expansions because more information became known after the document was written (*Interview 3,4,5,13*).
2. One aspect of the various campus master plans is that most were written several years ago, and some of those interviewed were very surprised at how fast their school had grown population wise yet the Campus Master Plans remained adaptable and robust enough to maintain on course (*Interviews 3,10,11,12,13*).
3. Most of those who interviewed agreed that for the various Campus Master Plans to be successful they needed to be living documents not static ones, in order to be able to adapt to unforeseen changes in university policies, or to add beneficial changes to university policies (include sustainability criteria into building designs: L.E.E.D. / CBIP programs) (*Interviews 3,4,5,9,10,11,12,13*).

### **3.4 Land-use policies**

In examining the current land use restrictions in the several campuses being studied, there are mainly three categories that these restrictions are placed into.

- 1- The campus development area is predefined by man-made barriers such as existing structures (as is the case in the University of Toronto at St George, McMaster, Wilfrid Laurier) or by natural boundaries such as rivers, ravines, escarpment (as is the case of McMaster, Brock, University of Ontario Institute of Technology, University of Toronto at Mississauga)
- 2 – City and Municipal zoning and regulations.
- 3 – The development area is specifically defined by university policy: Campus Master Plan; Green Plan.

The first and second categories will not be discussed within this report due to the following issues: each school is located within a different geographical area that may require policy decisions that are unique to those schools; the various city and municipal regulations is beyond the scope of the central inquiry topic. The main focus of this section will examine the various existing university policies that govern land-use at their individual institutions.

In reading the various Campus Master Plans and interviewing individuals of those campuses there are some similarities on how land-use is governed. The first similarity that was mentioned in both interviews and Campus Plans, is the current and future preservation of a centralized green space or gardens, which have taken on significant historical and aesthetic significance at those schools (*Interviews 1,2,3,4,5,7,8,9,10*). Examples of these spaces are Johnston Green at Guelph, and the Front and Back Campus Greens at the University of Toronto at St George. The second similarity is that some schools state within their Campus Master Plans the need for pedestrian friendly building development, by encouraging dense growth for new buildings (*Brock University, 2003*) (*University of Toronto, 1999*) (*McMaster University, March 2002*) (*Guelph University, 2002*). The last similarity that will be discussed is how several of the universities have specific policies, on the land-use for development facing outside the campus into the surrounding community (*University of Ontario Institute of Technology, 2001*) (*McMaster University, 2002*) (*University of Toronto at Mississauga, 2000*) (*University of Guelph, 2002*). These are specific policies outlined within the various Campus Master Plan to “provide gateways with distinctive landscape and architectural features that announce “arrival” to campus” (*McMaster University, March 2002*). The impression on the author is that these types of policies are in place to present attractive outward images of the university to it’s surrounding community.

### **3.5 Energy**

The most significant factor when looking at existing building policies with respect to the investigation of the central question was *Energy*<sup>15</sup>, this was reflected in all

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<sup>15</sup> It is important to note that Energy will largely be defined as Electrical (from a variety of sources)

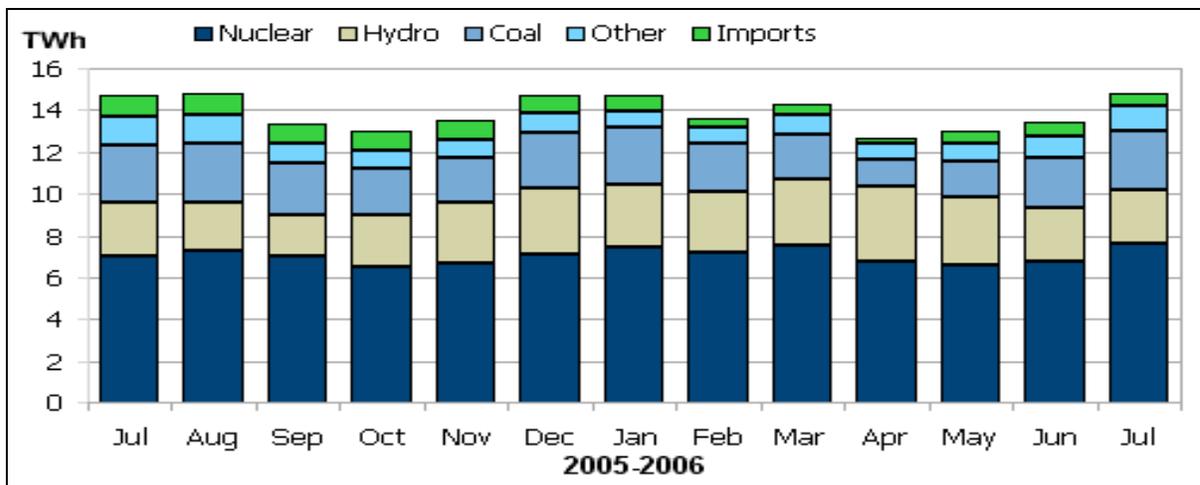
interviews that were conducted in the research of this inquiry (*Interviews 1,2,3,4,5,6,7,8,9,10,11,12,13*).

### 3.5.1 Current and predicted electrical capacity

Ontario’s current state of electricity production is at one of the most strained points in its existence, in that there is less capacity in its current state than there was 12 years ago and yet demand tends to remain on the increase (*Ontario Power Authority, 2005*). This is a problem that not only threatens the sustainability of Ontario’s University institutions but also is cause for concern within other residential and commercial uses, as (Ontario) society progresses into the near future.

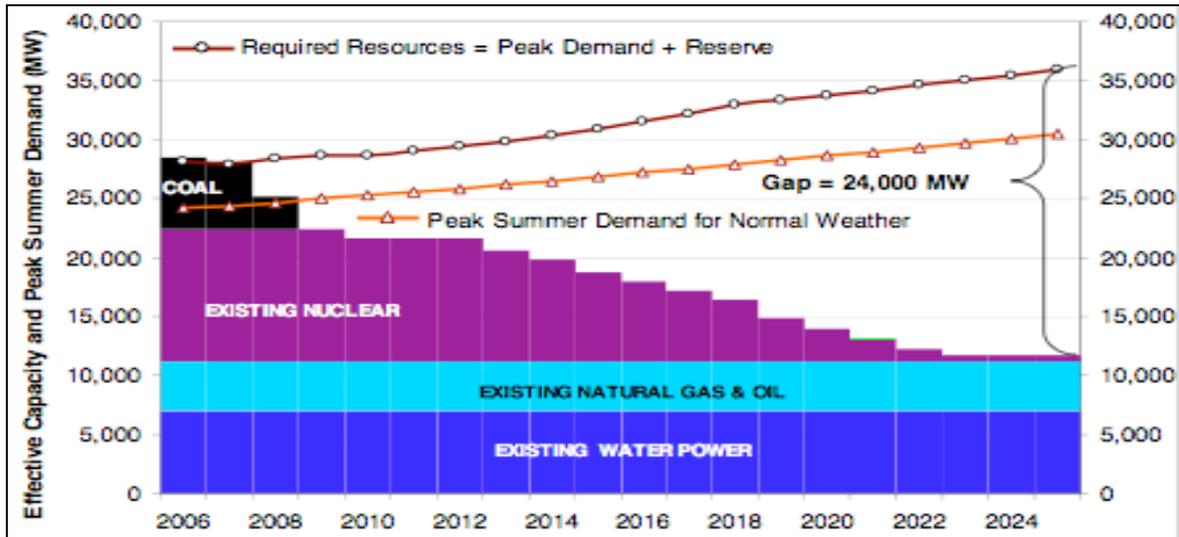
The most currently available data (provided by IESO) for provincial power supply within Ontario (*Figure 3.5.1.1*), results in two initial observations:

- 1) The three most significant generation sources over the past year were Nuclear, Hydro and Coal-fired plants. It is also evident that nuclear energy is responsible for close to half of the required electricity for the Province of Ontario, with Hydro and Coal-fired taking up a significant chunk of the remaining second half.
- 2) In each of the 12 months listed within this observed period, imports were necessary to help the required provincial demand, indicating that the current capacity delivered may not be enough.



**Figure 3.5.1.1 Available sources of electrical power generation and their output over a year period between July 2005 and July 2006 (*IESO, 2006*)**

Figure 3.5.1.2 further illustrates the energy problems currently facing the province of Ontario.



**Figure 3.5.1.2 Current and predicted electricity production for Ontario from 2006 to 2025 assuming that no new capacity is built (Ontario Power Authority, 2005)**

Figure 3.5.1.2 is an analysis by the Ontario Power Authority that shows the current electricity production levels and the predicted energy gap that will be created between 2006 and 2025 within Ontario. The gap is growing because of several factors however the two most prevalent are:

- 1) Ontario has an existing policy to reduce and eventually phase out coal-fired generation by 2009 (Ontario Power Authority, 2005).
- 2) Nuclear facilities are slowly being decommissioned and taken off-line as they come to their end of life (Ontario Power Authority, 2005) (Spears, 2003).

While this figure shows a fairly bleak energy future with a possible 24,000 mega watt (MW) deficiency predicted by 2025, the scenario presented appears to be a worse case. It uses the following major assumptions: no new production facilities are being created to offset decommissioned ones; Ontario will be able to fully phase out coal-fired generation by 2009; and that there are no new alternative generation sources or further conservation efforts. All three of these assumptions do have flaws.

The first and third assumptions that Ontario will not be looking at new production facilities to offset decommissioned ones, is a very naïve one to make since it is in Ontario's best interests to ensure that it has the power to sustain its residential and

commercial sectors. To support this view one needs only to view the press releases produced by the current Ontario Government and its Ministry of Energy; which report initiatives to increase hydroelectric capacity (*Office of the Premier, 2006*), adding additional nuclear capacity (to remain at the current 2006 levels of 14,000 MW) (*Ministry of Energy, 2006*), and alternative energies (*Office of the Premier, 2006*). Considering the second assumption that Ontario will be able to fully phase out coal-fired generation by 2009, there appears to be much debate within the current Ontario government on whether or not it is feasible to accomplish that within this time frame (*Energy Probe, 2006*), indicating that coal-fired generation may possibly supply more than *Figure 3.5.1.2* predicted. However these assumptions aside, there is potential trouble ahead if energy conservation is not viewed as a high priority.

### **3.5.2 Energy's effect on university building development policies**

To study the effect that energy use and consumption is beginning to have at the various universities, this analysis examined types of energy initiatives these institutions are currently researching or have implemented and what factors have attributed to the need for these changes.

In conducting the interviews there is a general sense of concern for energy use and the how the costs of energy have continued to increase disproportionately to what would be expected, even after accounting for new building development (*Interviews 2,3,4,5,7,8,10,11,12*). This increase is especially apparent when discussing utility bills that saw the costs increase several million dollars per year in the case of some campuses. (*Interviews 10, 12*) In examining how these increased energy costs have affected existing and new building usage and development, this inquiry will present some solutions that seem fairly consistent at all the schools studied, then discuss some approaches that were unique to individual schools (or groups of schools).

How are these emerging energy costs affecting the current constructed campus building energy policies? One common theme in all interviews, was the concept of utilities retrofits, where aging existing infrastructure and technology is decommissioned and replaced with modernized more energy efficient ones (*Interviews 1,2,3,4,7,10,11,12,13*). The easiest and most cost effective solution that has been

implemented (or is in the process of being implemented) in many of the schools, is the conversion of buildings from using 60-watt incandescent lighting to using 13-watt compact fluorescent lighting. To give an idea of one school's level of success, after retrofitting their residence buildings they predicted an annual savings of approximately \$60,000 at a cost of \$15- \$20,000 for 6600 conversions, indicating an initial return on investment to be less than half a year. (*Interview 8*) A second popular retrofit that has also been widely implemented is in replacing a building's standard glass windows to a reflective better insulating glass (*Interviews 2,8,10,12,13*).

In addition to the retrofitting of existing buildings on campus there is evidence to suggest that in several schools, energy use and conservation is starting to affect the ways in which new buildings are built and designed. One change that was noticed in some institutions was the use of L.E.E.D. standards (not necessarily following through with the complete certification) and/or designing buildings under the guidelines of the Commercial Building Incentive Program (CBIP) (*Interviews 3,4,5,7,10,11,12,13*). This section will largely focus on CBIP because it is an initiative that is specifically designed to encourage investment into creating energy-efficient building design (*Office of Energy Efficiency, August 2006*), and while L.E.E.D. standards do look at energy use within their mandate (*Canada Green Building Council, 2003*) do not solely focus on them.

CBIP funding is based on two documents developed by the Canadian Government: Model National Energy Code for Buildings (MNECB) (*Office of Energy Efficiency, April 2006*); the CBIP Technical Guide (*Office of Energy Efficiency, May 2005*). The main requirement that a new building must comply with to be eligible for the CBIP funding, is that it must demonstrate a minimum energy efficiency increase of 25% compared to the minimal standards set forth in MNECB and applications must be submitted before March 31 2007 (*Office of Energy Efficiency, August 2006*). Eligibility is determined using energy performance simulation software (EE4 (*CAMNET, 2006*)) developed by the CANMET Energy Technology Centre (CETC), a subsidiary of Natural Resources Canada: Sustainable Building and Communities, to look at how a building's energy efficiency compares to the minimum energy requirements set in MNECB (*Office of Energy Efficiency, August 2006*). The funding or incentive that CBIP provides is equal to twice the difference of the estimated annual energy cost savings between the CBIP

approved design and one built to MNECB requirements, and is a one-time financial incentive (*Office of Energy Efficiency, August 2006*). An example calculation is shown in Table 3.5.2.1.

**Table 3.5.2.1 Example of CBIP incentive amount**

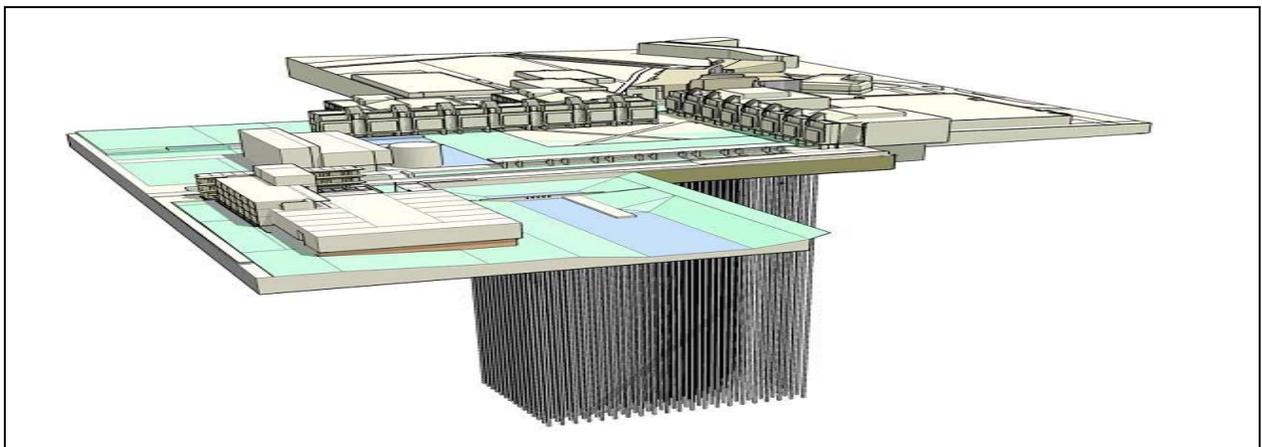
Estimated annual energy costs (MNECB requirements)	\$200,000
Estimated annual energy costs (CBIP approved design)	\$170,000
Estimated annual energy cost savings	\$30,000
CBIP incentive	\$30,000 x 2 = \$60,000

Table 3.5.2.1 show the maximum amount of funding available through CBIP per building project, with up to a maximum of six projects or \$250,000 in financial incentives per institution (*Office of Energy Efficiency, August 2006*). The significance of the CBIP incentive program in comparison to the L.E.E.D. certification is that it offers an institution financial compensation to help with the costs of integrating more energy efficient technologies into new building design.

**Examples of energy innovation and design**

**Example 1- Borehole Thermal Energy Storage System**

Located at the University of Ontario Institute of Technology in Oshawa, it is one of the largest geothermal well fields in North America, involving 384 wells each 700 feet deep (completed in 2004) (*University of Ontario Institute of Technology, 2006*). Provides heating and cooling to all buildings on UOIT campus.



**Figure 3.5.2.1: Design and placement of the geothermal wells on the UOIT campus** (*University of Ontario Institute of Technology, 2006*)

**Example 2- Campus Renewal Partnership** (*McMaster University, 2006*)

This initiative is currently occurring at McMaster University, in Hamilton. This is a partnership started in the fall of 2003 between Ameresco (an energy consulting firm) and McMaster for the energy reduction and the renewal of McMaster facilities, with respect to structures retrofits and functionality (*McMaster University, 2006*). Key highlights of the program are shown in *Table 3.5.2.2*.

**Table 3.5.2.2: Key highlights of campus renewal partnership at McMaster** (*McMaster University, 2006*)

McMaster is currently saving \$1.5 million annually in utility costs
Even with steady campus growth McMaster is still exceeding saving targets by 7%
In 2005 McMaster reduced GHG emissions by 11,252 tonnes

**Example #3 - The Centre for Emerging Energy Technologies**

This is an initiative that started in 2003/04 at the University of Toronto at Mississauga (UTM) that looks at incorporating alternative or energy efficient technologies into its campus. UTM is able to do this cost effectively because they see themselves as early adopters of technologies and are therefore able to receive corporate and government grants/donations. Some of the initiatives they are currently investigating are: Microturbines, Photovoltaic arrays, Hydrogen Technologies (*University of Toronto at Mississauga, 2006*).

**Example #4** - One school is planning on implementing a system where the utilities cost will no longer be paid for by the institution's physical plant, but rather the costs will be passed directly to the various faculties within the university (*Interviews 3,4,5,7*). This policy is significant because the intention of its implementation is to force the various faculties that make up this particular campus to evaluate their energy use, and actively seek ways to conserve in existing and future buildings.

**4.0 Stakeholders**

While it is important to look at what drives the need for new buildings or what the existing policies for building development are, to properly address the central question the focus should also include how a stakeholders' participation (or in some case lack thereof) can influence the direction and sustainability of a campus. The term *stakeholder*,

refers to individuals (or groups) that are affected (directly or indirectly) by the increased development on campus. There are 4 main stakeholder groups that this inquiry will focus on: Administration; Faculty and Staff; Students; and Community. The methodology that will be used for this analysis is journal research on stakeholder relations within universities and personal interviews at each of the schools being studied.

#### **4.1 Understanding the University-Community Relationship**

Universities are a part of a greater community or city and are therefore subjected to constraints by way of regional and zoning laws in addition to their own policies and guidelines.<sup>16</sup> In acknowledgment of this, the first stakeholder relationship that will be addressed is the University-Community partnership, where the *University* group is comprised of all on-campus stakeholders (administration/ faculty and staff/students) as one group representing one focused voice and the *Community* groups will comprise of the permanent residents, and Non-Governmental-Organizations (NGO) within the direct geographic area.

The reason why these partnerships are often formed between the university and its surrounding community is usually one of mutual benefit for both groups. They are built with overlapping interests that for the most part are focused on improving/maintaining community conditions (*Baum, 2000*). For instance the *University* group relies on services such as entertainment, accommodation (availability of rental properties), and other essential services such as financial and medical, while the *Community* group benefits from the availability of university resources<sup>17</sup> and a fairly stable and reliable employer (*Lederer & Seasons, 2000*). With these mutual benefits in mind, it is also important to remember that these types of partnerships are not without their inherent problems. Universities in the past have often faced harsh criticism because of the differences in lifestyles between the student communities and permanent residents (of that area), because they can be responsible for *student slums*<sup>18</sup> and subsequent transportation congestion issues (*Lederer & Seasons, 2000*). It is because of these inherent problems

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<sup>16</sup> Due to the complexity involved in analyzing the municipal regulations for all eight schools (all located in different municipalities) the city/or regional constraints will not be analyzed within this inquiry.

<sup>17</sup> Resources such as libraries, athletic centers, restaurants, etc

<sup>18</sup> Low rent, population dense area primary comprised of student tenants

that there could be a cause for concern for outside communities looking at forming local university-community partnerships but there is evidence to show that the university groups are understanding and taking their role within this partnership more seriously. One key indicator that seems to point to this envisioned new commitment from the various urban located universities (towards their surrounding communities) can be observed within the future direction set forth within their campus master plans.<sup>19</sup> This is especially true with some universities defining explicit policies regarding their proposed continuing community partnerships, such as McMaster (*McMaster University, March 2002*) and the University of Toronto (at St. George) (*University of Toronto, 1999*). Simply stated many schools are beginning to comprehend that in order to protect their immediate and future interests they need to protect their surrounding environment, create innovative developments and be willing to learn from as well as teach the stakeholders within their partnered communities (*Lederer & Seasons, 2000*) (*Keating & Sjoquist, 2000*).

Whether community stakeholders have any significant influence behind the need for new buildings or creating building development policies, has been more elusive in resolution, because each school and community presents its own set of problems. The simple answer is that historically the surrounding community has had little<sup>20</sup> to no impact on campus-based policies as it pertains to the sustainability of campus facilities, this is the consensus of several of the interviews (*Interviews 2,3,4,5,6,9,10,11,12*). However this does not mean that the surrounding community does not have a vested interest in seeing their local campuses continue to sustainably grow and thrive (due to the benefits previously described). To reinforce this there are some<sup>21</sup> who believe there are methods to ensure that universities can significantly benefit from increased collaboration efforts with their surrounding communities. Baum, recommends that there are four steps to creating a successful university-community partnership, and while they do not directly pertain to new building future sustainability, in the opinion of the author they are actions

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<sup>19</sup> Please note that at the time of this inquiry neither York University nor Ryerson University had released a current campus master plan.

<sup>20</sup> One example where community involvement did help play a significant role was with the Bahen Centre at University of Toronto (St. George Campus), in that the community and various campus groups wanted an existing historic building (Victorian house) incorporated into the new design (*Interviews 2,7*)

<sup>21</sup> Howell S. Baum; David N. Cox; Larry Keating and David L. Sjoquist to name a few

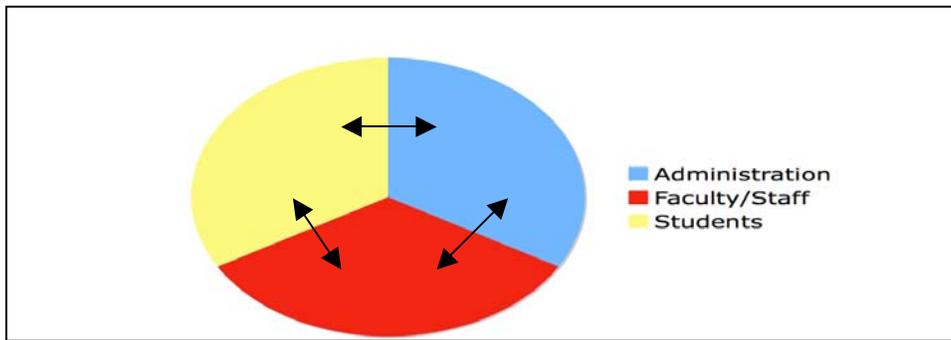
that a university can take to ensure they maintain healthy partnerships with their surrounding communities.

1. Match Resources to Purposes: In that all affected groups need to be able to manage and allocate their key resources. With the three most important being knowledge, time, and money (*Baum, 2000*)
2. Make Funders Partners: If all affected groups have a vested interest in a projects' development, it will reinforce a strong sense of responsibility for them and this will in turn provide for more constructive influence in products planning and development (*Baum, 2000*)
3. Make Partners Accountable to One Another: All groups must be willing to commit themselves and follow through on projects. In that they must be willing to give their time, knowledge, authority and resources, and be accountable for what they have agreed to commit (*Baum, 2000*). The purpose of this is to discourage groups from benefiting without contribution.
4. Organize, Continually: This is important because for the partnership to be successful it must be worked at: work groups need to be developed; constructive meetings need to be held; framework needs to be developed to create and implement plans; and plans need to be in place to find successors as individuals leave the partnership (*Baum, 2000*)

#### **4.2 Understanding the Administration-Faculty/Staff-Student Relationship**

The next relationship that will be examined is the interaction between the stakeholders that comprise the *university group* discussed within the previous section.

To give an indication of how these three stakeholder groups are inter-dependant, *Figure 4.2.1* represents how an ideal interaction between the three would conceptually look like.



**Figure 4.2.1 Proposed ideal interaction between on-campus university stakeholders**

It shows that all three stakeholders should have an equal voice and vested interest within the *university group*. However after visiting the many campuses and conducting interviews, the reality is that the student voice has historically had little impact on the need for new buildings, building policies or building sustainability assessments (*Interviews 1,2,6,7,8,10,11*).

There appears to be a communication breakdown not only between the stakeholder groups but also within each of the stakeholder groups themselves (*Interviews 1,2,6,8,9,10,11,12*). To give an idea of the impression that was given, please refer to the following flow diagram:

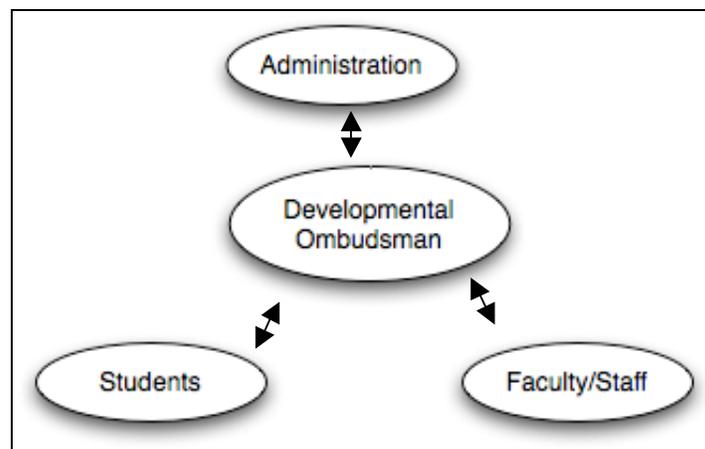


**Figure 4.2.2 Generalized perceived state of current university group stakeholder communication**

While on the surface it would seem that there was an established flow of information between all involved stakeholders, it was evident within certain interviews that not all stakeholders (particularly the students) knew the extent of the projects or initiatives that were being developed within their own universities (*Interviews 1,6,8*). The tools<sup>22</sup> for communication are available, however there is a problem within the implementation, in that there isn't a central medium where all the information can be accessed within one place.

<sup>22</sup> Sources available to all stakeholders within the university group include: administrative websites; university planning websites; student initiative websites; physical plant websites; and capital project websites

While there may be several solutions to this disjointed-communication problem, this inquiry will focus on just one potential strategy. The proposed solution was inspired by a case study developed by Robert L. Shelton (2000), in which he looked at the significance of the institutional ombudsman in resolving many of the academic disputes between many of the various stakeholder groups that one would encounter in a university. The proposed idea is to create a developmental ombudsman, who would look specifically at the interactions between the various university stakeholder groups in relation to ongoing facilities growth and development at the institution. The proposed interaction would resemble the following flow diagram:



**Figure 4.2.3 Proposed communication method for university group stakeholders**

By using a system such as this the developmental ombudsman acts as a central hub for communication between all three-stakeholder groups, and facilitate in an easier transference of information. The primary medium recommended for relating the current development issues could be the use of newsletters, however an easier method would be to use the existing user base and distributions networks of the university or community papers. Taking out one to two pages to list and answer the following: What projects are currently in development?; Who will these projects affect?; Why are they being done? Etc.

### **5.0 Policy recommendations and closing remarks:**

The final component that will be looked at is the future policy recommendations, as they relate to the central question of this inquiry. These will be based upon the information discussed previously within sections four, five, and six of this report, and from the interviewed responses for the following question: *Is there anything within the*

*current new development process or existing development policies that you would like to see changed?*

1: Developmental Ombudsman Staffing Policy

This policy stems from the recommendation on how to remediate the communication problem discussed within section 6.2. The developmental ombudsman role is to act as a central point of contact for communication between the three university based stakeholder groups (Administration, Students, Faculty/Staff) as it relates to the various initiatives and development projects that are ongoing at that particular school. This policy can help new campus facilities to be more sustainable in the future for 2 reasons: as communication is increased between all involved stakeholders, buildings can be better designed and located to ensure that they will be used to the full extent needed by the users of these facilities; and the use of a developmental ombudsman will provide an unbiased channel to voice concerns and suggestions for future development.

The implementation of the developmental ombudsman would include the hiring of one person who is external from the school, in that they cannot be a current member of the administration, faculty/staff personnel or student (this is done to help ensure impartiality). The hiring process would involve a panel interview with representatives from all three stakeholder groups. He/she would be responsible for setting up an office accessible to all three stakeholder groups, and would be responsible to attend the various general meetings held by each of the stakeholder groups to speak and answer questions. He/she is also responsible for delivering a written summary of the current and proposed on campus development within the school paper/website once per month during the school year. While not initially proposed this position may also work with the university-community liaison(s) to development plans to the surrounding communities.

2: Utility Accountability Policy

This policy is based upon one of the energy initiatives currently being implemented by one of the universities being studied (as mentioned in section 5.6.2), and the desires expressed by one of those being interviewed (*Interview 10*). This policy can help new campus facilities to be more sustainable in the future because it requires the users (Faculties, Departments, and Ancillary Operations) to evaluate their current use of university utilities, and look for ways to conserve and save on costs. This can especially

be true when faculties want to build new buildings, because now there is incentive for them to be involved at looking at more efficient energy saving technologies and using the recovered savings towards upgrading older facilities.

The implementation of this policy would require extensive effort but the energy savings could be substantial. The following are the general steps that would have to be initiated to start such a policy:

- i. An energy audit would need to be performed for all existing facilities to determine how much power each room used while in use. Energy meters would need to be installed on labs, and experimental facilities.
- ii. The school administration would have to reevaluate how tuition and other sources of income are split between department/faculties and required school costs (maintenance, employee salaries etc.) in order to be able to cover current levels of utility use.
- iii. Teaching schedules need to be evaluated to see the required number of lecture hours required by the teachers of various faculties, this is cross referenced with the size and energy requirements of the required classroom, and a cost is calculated
- iv. For labs, the costs need to be calculated monthly by the installed metered readings
- v. In cases of external research an additional energy cost may have to be included into fees currently charged by the schools

### 3: Combined Operational and Construction Cost Policy

This policy is based on several of the interviews conducted (*Interviews 2,3,5,8,10,11,12*), and seeks to address their growing concern that there is a divorce between the construction and operation costs for new or proposed buildings because traditional building design has not considered the potential utility and maintenance costs that will be associated after its construction. This policy can help new campus facilities to be more sustainable in the future because more informed decisions can be made by the school's building development committees or various board groups as to what a more complete cost for a building will be and not just the sticker price for construction.

The implementation of this policy would also require extensive effort as was the case with *Policy 2*, but in this case both the operational and maintenance savings could be

substantial. The following are the general steps that would have to be initiated to start such a policy:

- i. Once there is a desire for a new building on campus, the normal groups of committees are formed (described in sections 5.1 and 5.2)
- ii. After the proposed use and functional plan of the new facility is established, architects, design consultants, and utility/energy consultants are brought in and work together to create the building design. It is at this point that the concept of building sustainability must be introduced to the project, so that it can be incorporated into the design from the start of planning and design. Sustainability must not be an afterthought, in the design process.
- iii. The development plan would then follow the regular channels described in sections 5.1 and 5.2

#### 4: Building Utilization Policy

The issues discussed in sections 4 and 5.3 influenced this policy. This policy looks to create a 6 day (or 7 day) academic week as opposed to the 5 day week discussed in section 5.3. This policy can help new campus facilities to be more sustainable in the future because it will allow a better utilization of current buildings (by accommodating more students) and reduce the perceived pressure to develop new buildings that will require more of the universities financial resources. An example of a better utilization would be seen in requiring the building of less 300+ seating lecture halls. The required space could be made up by shifting some first year (or large) classes to Saturday or Sunday, therefore the majority of new buildings can be designed to accommodate other needs or university groups.

The implementation of this policy might initially face student and/or faculty resistance, however it is a solution that may prove more cost effective than the rapid construction of a new building. The following are the general recommended steps for implementing this policy:

- i. Need to approach the teaching unions to discuss why this policy is being implemented, and to suggest the addition of teacher's scheduled days off to ensure that if they need to have classes on weekends that this time will be available to them during the course of the week. Another alternative would be to

also offer rotating days, where they would only be required to have one or two weekend lecture sessions per month. Once the teaching unions have agreed, the same may need to be done for the Teaching Assistants (T.A.), Janitorial staff, Physical Plant etc.

- ii. Approach the registrars office to create new class schedules and room locations before the start of fall classes, preferably before the start of student registration.

One important aspect of this policy is that the effects can be studied one year and if the results are not as was anticipated, the policy can be modified before the next academic school year.

#### 5: CBIP Program Extension Policy

This policy is also based upon one of the energy initiatives currently available to all the universities being studied, and it involves the reevaluation by the Canadian Government to extend the CBIP program beyond its current termination date of March 31<sup>st</sup> 2007 or to develop a similar program to take its place after this date. This policy can help new campus facilities to be more sustainable in the future because it provides government financial incentive to look at developing and constructing energy efficient buildings.

The implementation of this policy would require the various universities within South-Western Ontario request that the Canadian Government extend the program, or develop another similar one to replace it. One way to influence the Government's decision would be to have key school figures (i.e. presidents, physical plant director, university planners) lobby the Office of Energy Efficiency to voice their appreciation for the program. Possible suggestions for the program could be the following:

- i. Remove the maximum cap limit from six buildings
- ii. Extend the program to 2010, to allow the next wave of university buildings to be built
- iii. To create a competition and award an addition CBIP incentive for the building that was able to create and sustain the largest annual energy cost savings (at the end of the extended program)

The proposed five policies are intended to be a step towards creating university campus facilities that will strive to be sustainable or at least attempt to improve upon their current development policies. These policies were developed in such a way that they could be adopted by any of the schools that were studied within this report, however it is important to remember that these policies provide generalized steps and that the various schools may have to modify/adapt some of the implementation aspects to better suit their organizational structure.

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