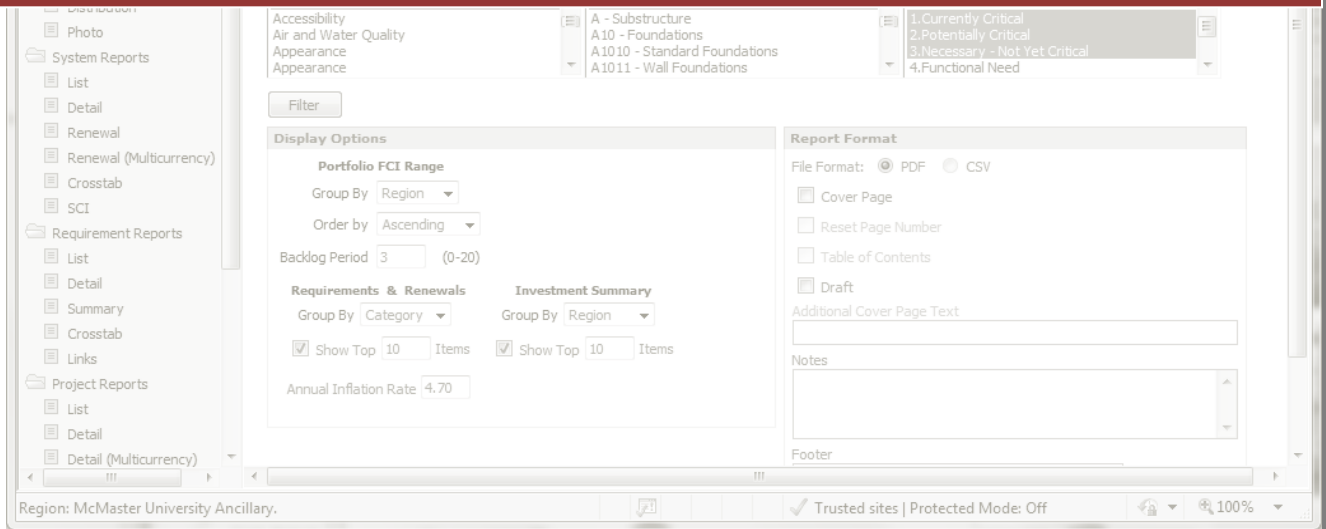


# ASSET MANAGEMENT PLAN

VERSION 02 – DEC 2012



Supporting the priorities and principles outlined in the President’s letter to the McMaster community

## ‘Forward With Integrity’



Dr. Mohamed Attalla, Assistant Vice President  
 Craig MacDonald, Director  
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## **Preamble**

The Asset Management Plan (AMP), Version 01, was prepared and presented to the Planning and Building Committee on September 5, 2012. This plan relied on building survey and audit data that was between five and nine years old. An audit of McMaster buildings and infrastructure for the purpose of updating the deferred maintenance requirements of the campus was underway at that time. Facility Services had arranged for an audit of all campus buildings. Phase 1 of the audit began in March 2012 and Phase 2 in June 2012. The uploading of data and information acquired during the audits was completed in October 2012. The review and validation was then completed in November 2012. This basis of the audit, and evaluation of the building components, was consistent with past audits of the McMaster facilities.

With accurate and current deferred maintenance requirement information, Facility Services is able to update Version 01 of the AMP to reflect the condition of the campus facilities as of 2012.

In addition to data contained within the most recent audits, Version 02 of the AMP also took into account readjusted value and requirements for the McMaster University Medical Centre (MUMC, Building #37) that reflect the current use of 40% of that facility by the University. With the Wilson Building scheduled for construction in 2013 at the site of the current Wentworth House building, Version 02 of the AMP does not consider the condition of Wentworth House in any of the calculations reported herein, as the building is slated for demolition this coming year.

The structure and layout of Version 02 of the AMP has remained consistent with Version 01. As a result of the new audit data, the report includes updated numbers, calculations and figures. The text in a number of the sections has remained unchanged, but in others it has been altered to reflect the current condition of the campus.

It is the intention of Facility Services to audit the campus on a continual basis in order to ensure no building condition data is older than five years. Future versions of the AMP will be issued on a schedule that is appropriate to guarantee the campus is aware of the health of the facilities. An update or summary of the main reportable data contained within the AMP will be done on an annual basis to track and benchmark progress made by the University in funding the deferred maintenance for McMaster.

## 1. Background – Facilities Condition Assessment Program (FCAP)

In 1999, the Council of Ontario Universities (COU), through the Council of Senior Administrative Officers (CSAO) and the Ontario Association of Physical Plant Administrators (OAPPA), agreed to develop a Facilities Condition Assessment Program (FCAP) to catalogue infrastructure requirements associated with deferred maintenance, system and equipment renewal, and the required funding for the adaptation and on-going maintenance of the capital physical infrastructure of Ontario Universities.

Deferred maintenance is defined as work on the maintenance of physical facilities that has been postponed on a planned or unplanned basis to a future budget cycle or until funds become available. To avoid increasing the size of deferred maintenance backlogs, it is necessary to carry out replacement of facility components on an annual basis.

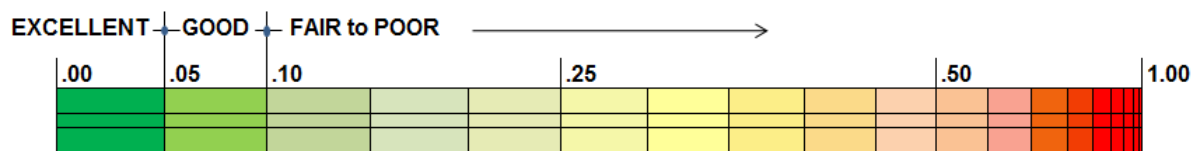
In June 1999, the University’s Facility Services initiated a FCAP when it was agreed that 20% of the portfolio would be audited each year. Condition Assessments and populating the asset management software VFA started in 2002 and continued over the last decade. The FCAP provides a consistent approach to capturing, quantifying, prioritizing and reporting on deferred maintenance liabilities. The program includes academic, administrative, and Health Sciences (MUMC) buildings; the residences; and the campus utilities infrastructure.

Each asset is audited and assigned a numeric score reflecting the building’s condition. This is called the Facility Condition Index (FCI). This index is a ratio of the value in dollars of Deferred Maintenance (DM) required for completion and the Current Replacement Value (CRV) of the building: thus, the lower the FCI, the better the condition of the building or portfolio.

$$FCI = \frac{DM}{CRV}$$

To add a qualitative rating to the FCI, three ranges have been defined to reflect the conditions of the buildings, and are shown below in tabular and graphical form.

Buildings with a FCI ranging from 0 – 5%	Excellent condition
Buildings with a FCI ranging from 5 – 10%	Good condition
Buildings with a FCI over 10%	Fair to Poor condition



**STANDARD OUS FCI VALUES**

*(OUS - Ontario Universities Standard)*

Like FCI, the Requirement Index (RI) is another tool that is used by VFA to indicate the condition of the facility. Unlike FCI, RI uses DM items as well as short-term and long-term capital improvements and

grandfathered code items in its calculations, such as replacement of equipment that has not yet reached their end of service life.

$$RI = \frac{\textit{All Requirements Costs}}{CRV}$$

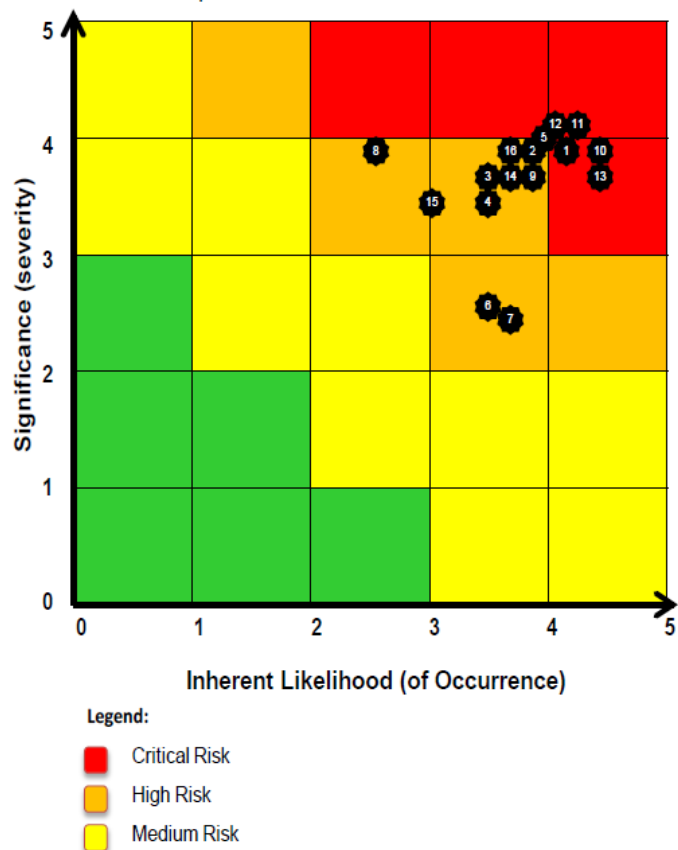
In December 2011, members of the Senior Management Team participated in workshops over three days to detail the key risks to the University in the broad categories of reputational, strategic, operational, financial, and compliance risks. These risks were selected based on their “impact on the University’s ability to achieve its core mission, strategic priorities and objectives, and the advancement of the President’s letter – *Forward with Integrity.*” The operational risk of *Physical Infrastructure* was determined to be the highest risk in the list of critical risks; it was one of only two risks to be in the highest category for both *Severity* and *Likelihood of Occurrence*. As this process is ongoing, there will be refinement of the risk ratings. There is, however, no doubt that Physical Infrastructure Risk will remain a top five risk for the University. The summary graph of the findings from the risk exercise is featured below.

## Key Risks - Identified and Assessed

Map Point	Risk Category	Risk Name
1	Strategic	Change Readiness Risk
2	Strategic	Financial Stability Risk
3	Strategic	Organizational Alignment Risk
4	Strategic	Government Policy Risk
5	Strategic	Human Capital Risk
6	Strategic	Internationalization Risk
7	Strategic	Research Engagement Risk
8	Reputational	Reputation and Brand Risk
9	Reputational	Student Experience Risk
10	Reputational	Community Engagement Risk
11	Operational	Physical Infrastructure Risk
12	Operational	Technology Risk
13	Operational	Information Availability & Integrity Risk
14	Operational	Information Security Risk
15	Operational	Student Satisfaction Risk
16	Financial	Funds Availability Risk
17	Strategic	Research Risk*

\* To be assessed

Risk Map showing the impact (severity) of the risk and probability (likelihood) of the risk occurring using common assessment criteria for McMaster. See legend below for definition of colours used in the map.



The Canadian Universities Reciprocal Insurance Exchange (CURIE) provides McMaster University with a yearly report on loss ratios related to its property and liability coverage. Loss ratio is calculated by dividing the incurred losses by premiums paid. It indicates the percentage of premium dollars that has or is expected to be used towards the cost of settling claims. The report generated by CURIE dated September 2011 for the 2006-2010 period included rankings for its 58 member universities; it is shown below.

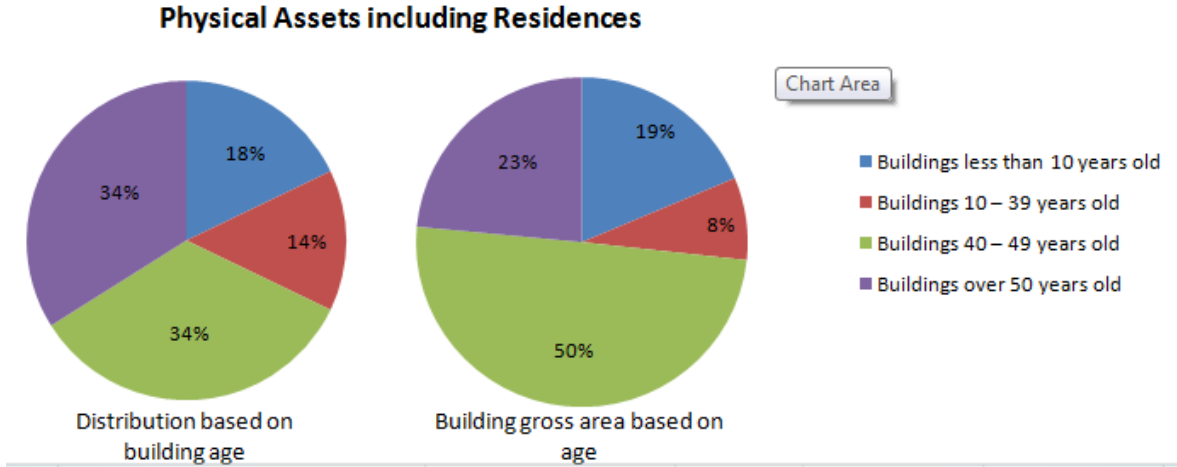
58 Universities – period 2006-2010	Liability Ranking	Property Ranking
Loss Ratio	39	53
Total Loss Dollars	49	56

McMaster University ranked extremely low because of the fire in Brandon Hall in 2008, but also its high number of sudden equipment and building component failure claims.

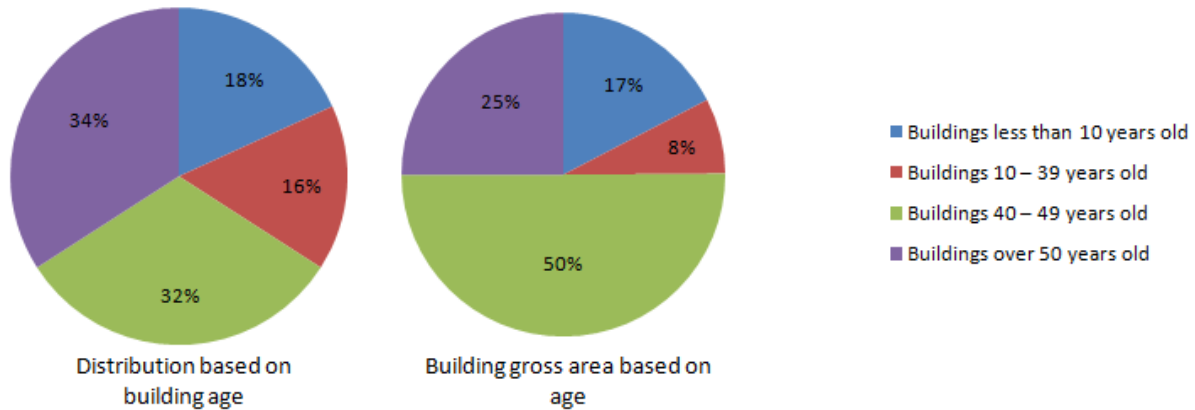
On June 24, 2011, the Government of Ontario released its long-term infrastructure plan, *Building Together*. The Plan makes it a requirement for all Ontario post-secondary institutions to produce an Asset Management Plan as a prerequisite for receiving infrastructure funding. The Province has also indicated that deferred maintenance will receive a higher proportion of capital allocations over the coming years. The significance of this report is, therefore, evident.

**2. Facilities Assets Portfolio**

McMaster University’s Portfolio of physical assets and current enrollment data is shown in **Table 1**.



### Physical Assets excluding Residences



**Table 1 – Campus building statistics, enrollment and employee compliment**

	<b>(Including Residences)</b>		<b>(Excluding Residences)</b>	
Total number of buildings	56		44	
Total Gross Area of buildings	568798 m <sup>2</sup>		475054 m <sup>2</sup>	
	<b>Number</b>	<b>Area</b>	<b>Number</b>	<b>Area</b>
Buildings less than 10 years old	10	105866 m <sup>2</sup>	8	82,435 m <sup>2</sup>
Buildings 10 – 39 years old	8	45560 m <sup>2</sup>	7	35,872 m <sup>2</sup>
Buildings 40 – 49 years old	19	281993 m <sup>2</sup>	14	237,828 m <sup>2</sup>
Buildings over 50 years old	19	133199 m <sup>2</sup>	15	118,919 m <sup>2</sup>
Total number of students (2012)	28,962 (includes 4072 Graduate students)			
Total number of staff (2012)	6,289			

Based on the current building audit data including all of its owned buildings and infrastructure, McMaster’s overall CRV is \$1.75 billion and the FCI is at 18.2%. The overall DM backlog (Priority 1, 2, and 3) across campus is estimated at \$317 million. Including priorities 4 and 5 to the DM backlog list revises this figure to \$335 million. These revised values represent a significant deterioration from Version 01, which can primarily be attributed to working with new and updated data. On average, the data contained within Version 02 is 5 years more current in its evaluation.

Excluding Residences, the campus CRV changes to \$1.56 billion and the revised FCI is 18.9%. DM backlog (Priority 1, 2 and 3) for buildings and infrastructure excluding residences is estimated at \$295 million. Adding Priority 4 and 5 items which are not included in the DM backlog calculation, revises the total requirements estimate to \$307 million. This is a standardized estimate based on rates established by COU across the Province. A detailed summary of McMaster owned buildings and infrastructure

excluding Residences and their individual CRV, FCI, etc. is outlined in Appendix 'A.' A similar set of data for Residences is included in Appendix 'B'.

A comparison of McMaster with the five peer Ontario Universities that comprise the G6 Universities (the others being Ottawa, Queen's, University of Toronto, Waterloo and Western) was performed using data from the COU report dated February 2010. The average FCI for these five universities is 8.4%. When Version 01 of this plan was released, the McMaster FCI was slightly higher than the average at 8.7%. The FCI based on the new current data indicates that McMaster, at 18.9%, is well above this average. As McMaster has undertaken the re-auditing of the campus, so have other G6 institutions. This will mean that the average FCI for these other 5 institutions will rise, but currently, this information is not available for comparison. It is safe to conclude that an increase from 8.7% to 18.9% is consistent with the deterioration of the physical infrastructure of the campus over the last 5 years, and this increased FCI trend will be consistent at the other Ontario G6 Universities, but cannot be quantified at this time.

It is important to note that the total DM figures in this report are accurate for the reporting of the deferred maintenance requirements, but due to the data keeping and reporting functions of the VFA database, there are several items that are not considered in the values reported. These are:

1. The VFA audits include a review of the existing building systems and not the systems that should be in the building. Capital renewal items, which address requirements to meet current fire codes; accessibility standards; or the cost to modernize the buildings to present day heating, ventilation or air conditioning standards are not included. These upgrades are defined by the COU as "adaptive renewal" and are excluded from the database.
2. The current VFA cost estimates for Requirements does not include other construction related costs and cannot be used in isolation for budgeting purposes. For example, soft costs, such as consulting fees and permit costs (which can add 15% to 25% to the overall cost of a project) are not included in the database figures.
3. Secondary effects needed to complete some of the repairs, such as asbestos removal, are also not included in the database figures. This is estimated to add up to **50%** to the estimated cost of repairs. This is significant because about 70% of the buildings on campus are assumed to have designated substances present in them.
4. The data and life cycle determinations do not take into account the enrollment growth or facility use. Growth results in increased use of the facilities, adding pressure on the buildings and infrastructure, while decreasing the life cycle of many building components. This means that some items, usually in the category of finishes, should be considered critical and due for replacement ahead of standard life cycle schedules. The enrollment figures from 2002/03 to 2012/13 are shown in **Figure 1**, and represent a 47% increase in 11 years.
5. Using a campus-wide FCI may be misleading since the addition of new space to the campus contributes to the overall reduction of the FCI by increasing the CRV, without any improvements to the conditions of the older buildings. If we exclude eight newer buildings on campus from the FCI calculations the resulting FCI would be 25%. This suggests that a more realistic FCI would be in the range of 18.9% to 25%. The calculation detail is included in Appendix 'C.'



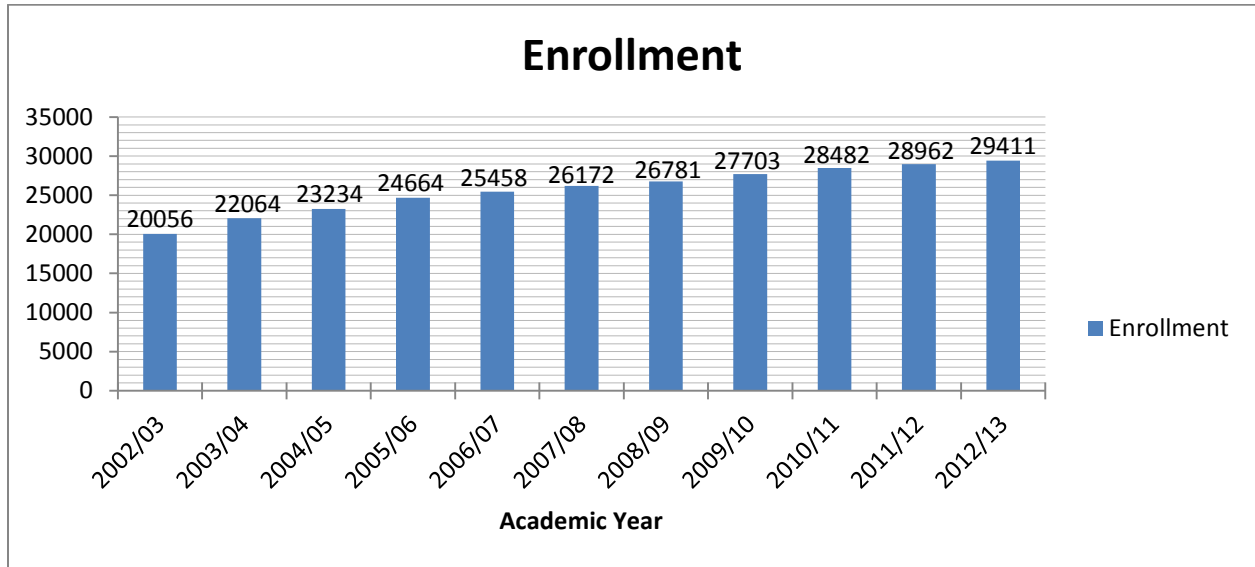


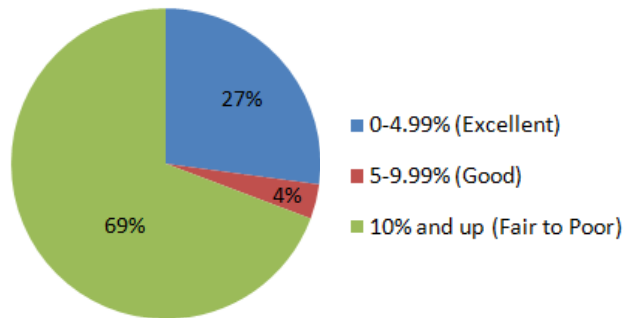
Figure 1: Growth of enrollment from 2002/03 to 2012/13

Table 2 (below) summarizes the number of buildings in the broad categories of “excellent,” “good,” and “fair to poor” condition; the size of the buildings and the percentage of campus space are also listed in their respective categories. It should be noted that excluding residences, 26 buildings, comprising 69% of the total square footage of buildings, are in the “fair to poor” condition.

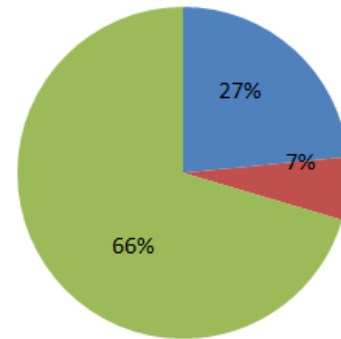
Table 2 – FCI ratings for campus buildings

FCI Rating Range	Including Residences			Excluding Residences		
	Number of Buildings	Total Gross Area	% of Total Gross Area	Number of Buildings	Total Gross Area	% of Total Gross Area
0 – 4.99% (Excellent)	14	152,287m <sup>2</sup>	27%	12	128,856	27%
5 – 9.99% (Good)	9	39,327m <sup>2</sup>	7%	6	17,159	4%
10% and up (Fair to Poor)	33	377,184m <sup>2</sup>	66%	26	329,039	69%

**Facility Condition by Building Gross Area (excluding Residences)**



**Facility Condition by Building Gross Area (including Residences)**



The FCAP not only identifies deficiencies, but also classifies DM items into priorities, ranging from 1 to 5. **Table 3** (below) summarizes the various priorities assigned to the Requirements.

**Table 3 – Requirements definitions**

Priority level	Description	Timeframe to complete requirement
1	Critical	Immediate to within one year
2	Potentially critical	One to three years
3	Necessary, but not yet critical	Three to five years
4	Recommended	Not required to meet basic function of facility, but would improve overall usability and/or reduce long-term maintenance
5	Does not meet current code or standard	Requirement does not conform to current code, but items grandfathered in existing condition

Requirements are classified as priority 1 if they are still in operation and are operating beyond their designed and useful life. Items in this category would include mechanical systems such as pumps, fans, and piping systems; electrical systems, including distribution and safety items; building envelope, such as windows, roofing and foundations; building finishes, such as flooring, acoustic ceilings and painting; and large utility items, such as steam or cooling generating equipment. These items have a high risk of failure, a high operating maintenance cost, and in their current condition, a profound impact on building occupants and the core function of the building’s operation.

Priority 2 and 3 requirements include the same building components and systems as priority 1, but they are not yet at the end of their useful life. Their impact on the building and occupants will not be seen for between 1 and 5 years, depending on their priority classification.

Priority 4 requirements include improvements to a facility, such as adding redundancy or energy-efficient upgrades. Priority 5 requirements include existing grandfathered code items, such as compliance to the latest barrier free standards.

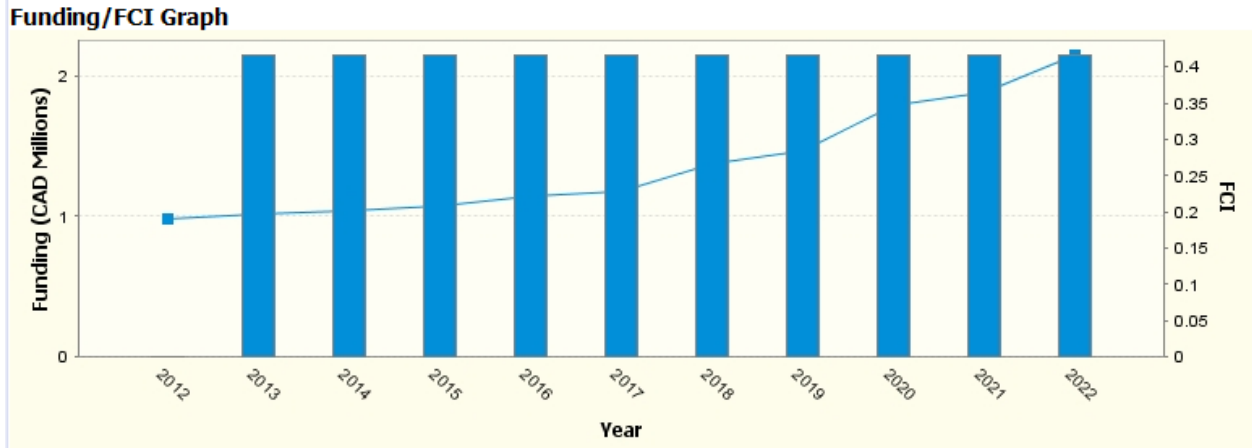
It is important to note that McMaster's total DM backlog classified as **critical** (priority 1) amounts to \$28.86million and by definition should be corrected within the next year. The deferred maintenance classified as **potentially critical** and **necessary but not yet critical** (priorities 2 & 3) totals over \$266million and should be addressed within the next 5 years.

### 3. Current Funding

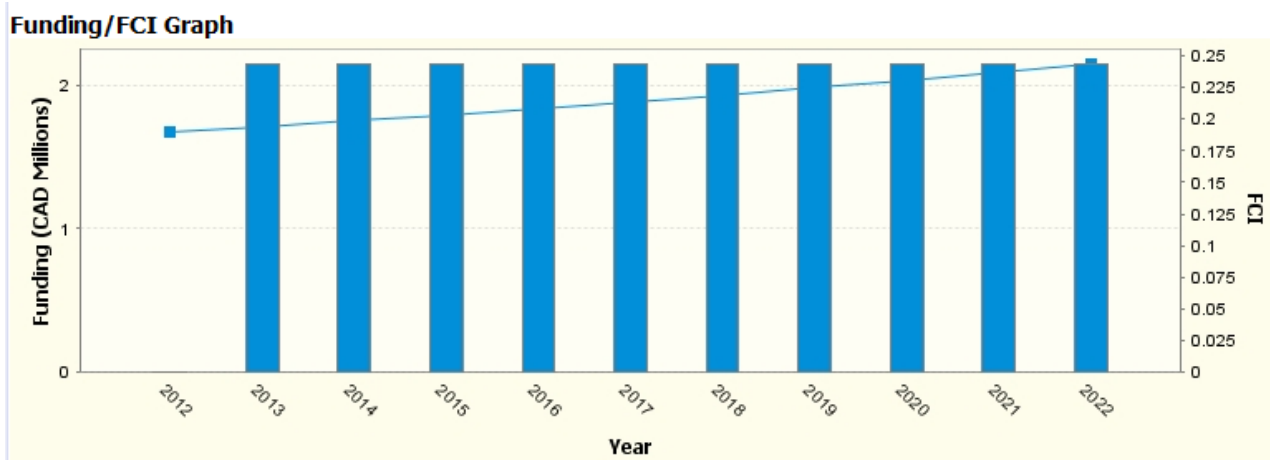
As reported in the February 2010 COU report, the generally accepted minimum industry standard of re-investment in buildings and infrastructure is 1.5% of the CRV per year. When the actual funding is consistently less than 1.5%, as has been the case at most Canadian universities for an extended period of time, the volume of deferred maintenance will grow. The failure to adequately address deferred maintenance results in substandard facilities, and the breakdown of critical building systems and infrastructure. Based on the current replacement value of our facilities excluding Residences (\$1.56 billion) and the 1.5% reinvestment in capital, annual spending on major maintenance for campus buildings should be at \$23.4 million. In 2011, Facility Services was allocated a total of \$2.15 million for deferred maintenance, which represents just over 9% of the required industry-standard funding level or 0.14% of the CRV. This allocation was reduced to the current level by the Province in 2010-11.

#### 3.1 Current Funding – Academic, Ancillary and Infrastructure Portfolio

Using the requirements in the VFA database, and projecting 10 years forward based at the current funding levels of \$2.15 million/year, the FCI for the existing buildings and infrastructure, excluding Residences, will increase from 18.9% to 24.3% (excluding building systems renewal approaching their end of service life and Priorities 4 and 5) or 41.6% (including building systems renewal approaching their end of service life and Priorities 4 and 5), and buildings will deteriorate at a serious rate. Figure 2A and 2B shows the current funding level and its effect on FCI for both scenarios, including and excluding system renewal and priorities 4 and 5.

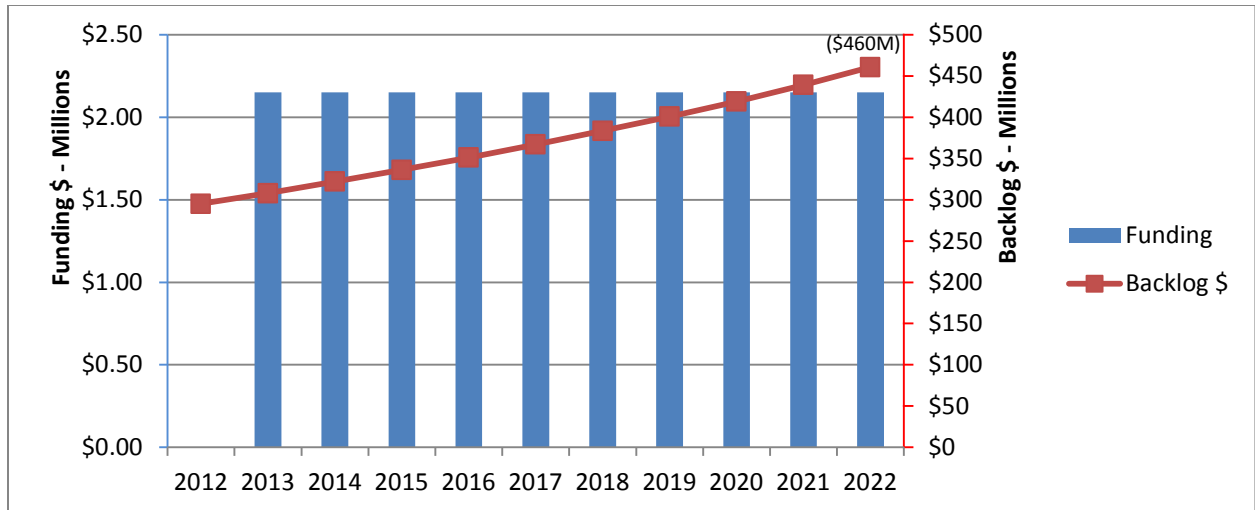


**Figure 2A: Current funding level and its projected effect on FCI on Academic, Ancillary and Infrastructure Portfolio and including Renewal items and all Priorities**



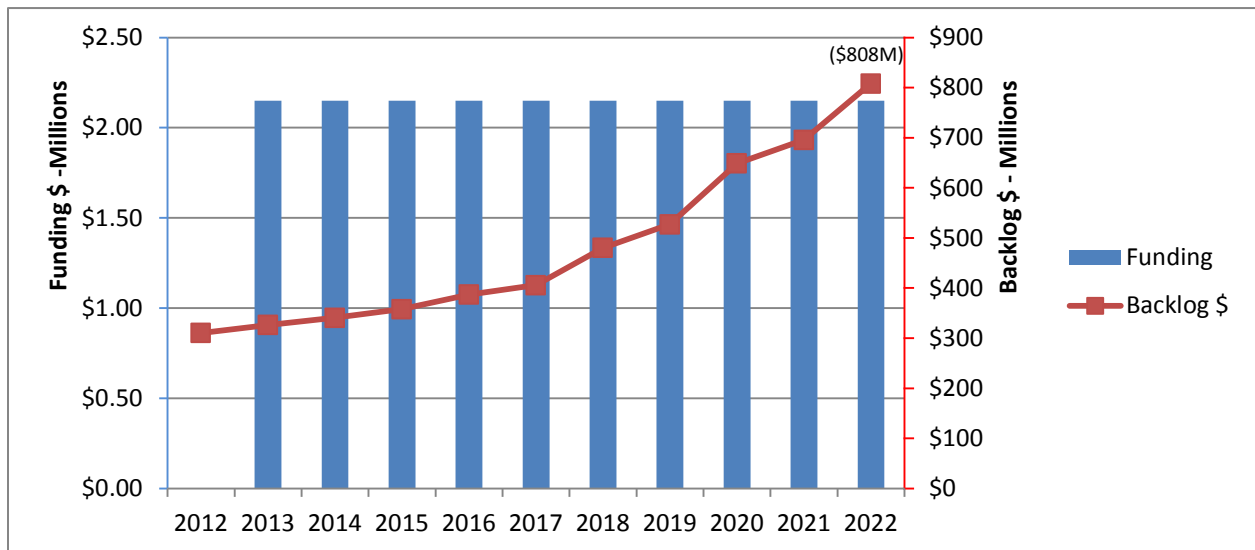
**Figure 2B: Current funding level and its projected effect on FCI on Academic, Ancillary and Infrastructure Portfolio and excluding Renewal items and Priorities 4 & 5**

Funding at a \$2.15 million level will also affect the length of time for which requirements in the backlog remain unaddressed; this ultimately affects the total value of the backlog. The amount of backlog in 2012 projected out to 2022 (based on a \$2.15 million annual investment) is depicted in **Figure 3A**. The requirements backlog of approximately \$295 million is estimated to grow to over \$460 million by 2022. This projection assumes a 2% per year inflation rate and 3% backlog deterioration. Furthermore, it does not take into account any of the priority 4 and 5 requirements or renewal of building systems that will approach the end of their service life in the next 10 years.



**Figure 3A: Current funding level and its projected effect on Backlog Requirements (excluding Renewal Items)**

If renewal of building systems that will approach their end of service life in the next 10 years is included in the projection, total backlog dollars will to grow to \$808 million in 2022, for the \$2.15 million yearly funding scenario. This is depicted in Figure 3B.



**Figure 3B: Current funding level and its projected effect on Backlog Requirements (including Renewal items)**

It is important to note that the provincial government, through various, one-time capital funding programs, has recognized the importance of capital funding. In 2007/08, the Province supplemented the regular Facilities Renewal Program (FRP) of \$1.8 million with the Campus Renewal Program (CRP) at \$9.16 million and the University Campus Renewal Fund (UCRF) at \$13.5 million. These programs reinforced the Government’s commitment to capital funding and deferred maintenance, and this

funding contributed to McMaster’s ability to sustain the FCI at the current levels. However, this one-time funding has not stopped the growth in the total value of the DM backlog.

**Table 4** depicts the historical funding of DM for the Academic Portfolio on campus from 2003 to 2012.

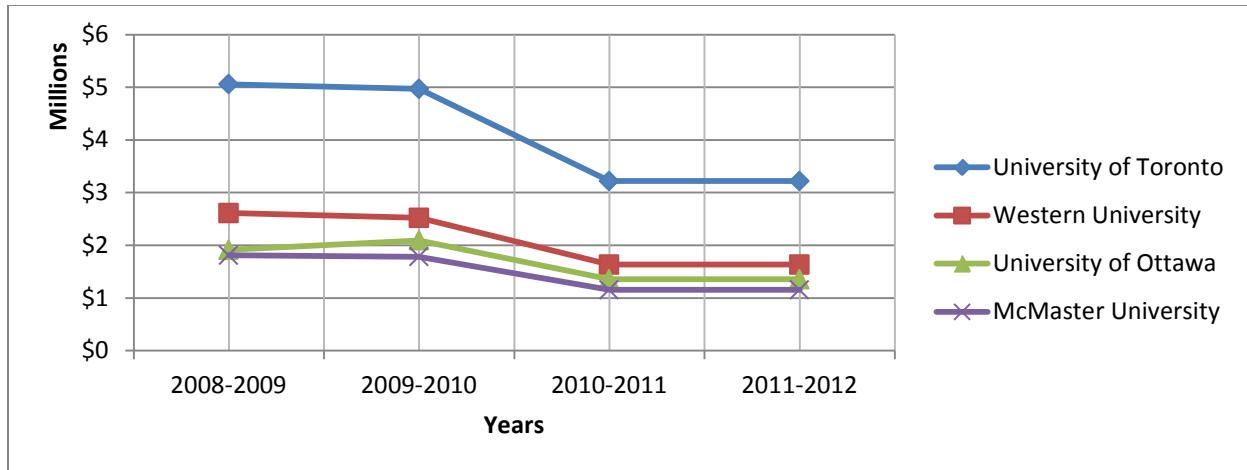
**Table 4 – Historical funding levels for deferred maintenance**

Fiscal Year	FRP	DM (University-funded)	Other MTCU Programs	TOTAL
2003/04	\$2,118,380	\$1,000,000		\$3,118,380
2004/05	\$1,755,310	\$1,000,000		\$2,755,310
2005/06	\$1,755,310	\$1,000,000		\$2,755,310
2006/07	\$1,810,900	\$1,000,000		\$2,810,900
2007/08	\$1,810,900	\$1,000,000	\$9,160,000.00 CRP \$13,513,000.00 UCRF	\$25,483,900
2008/09	\$1,810,900	\$1,000,000		\$2,810,900
2009/10	\$1,782,800	\$1,000,000		\$2,782,800
2010/11	\$1,155,100	\$600,000		\$1,755,100
2011/12	\$1,155,100	\$1,000,000		\$2,155,100
2012/13	\$1,155,100	\$1,000,000		\$2,155,100

Note: Table 4 excludes DM expenditures on: Residences, MUMC, MUSC, and off-Campus Buildings.

In order for Facility Services to maintain the current FCI level and to address the requirements in the DM backlog (valued at approximately \$290 million), a significant funding increase is required over the next decade. In its 2010 report, the Council of Senior Administrative Officers (CSAO) and the Ontario Association of Physical Plant Administrators (OAPPA) indicated that Ontario’s deferred maintenance backlog was at \$1.97 billion, and the annual required investment to keep the current level was \$380 million, or 19% of the backlog. Also, in order to improve the FCI to 5%, an annual investment of \$586 million would be required, which represents about 30% of the backlogged deferred maintenance.

Comparatively, other universities in the G6 are investing in their deferred maintenance at a level far higher than McMaster’s. **Figure 4** illustrates this comparison.



**Figure 4: Comparison of funding received by 4 Universities over the last 4 years**

The University of Ottawa is funding at \$26 million per year, Western University at \$11 million per year, and the University of Toronto at \$10.8 million (but proposing an increase to \$16 million) per year. A comparison between McMaster, Ottawa and Western is shown in **Table 5**. Residence data is not included in this table.

**Table 5 – comparison of building conditions between McMaster, Ottawa and Western**

	McMaster	Ottawa	Western
Total Building Area (m <sup>2</sup> )	475,054	485,587	524,175
Area in Excellent Condition (%)	27	50	41
Area in Fair Condition (%)	4	19	7
Area in Poor Condition (%)	69	31	52
Weighted average age of campus buildings (yrs)	38.96	35.0	38.0
Current annual investment in DM (\$)	2.15M	26M	11M

On campus, the McMaster University Student Centre (MUSC) is currently setting aside \$55,000 per year to fund DM in that building. This money is augmenting the existing DM fund for MUSC that is presently at \$3.5 million and is in addition to the \$2.15 million funding per year.

### 3.2 Current Funding - Residences

The Residences currently dedicate an annual funding of \$3.0 million from their cost of operations for deferred maintenance. Using the existing requirements in the VFA database for the Residence portfolio and projecting out 10 years based on the current funding levels, **Figure 5** shows the overall Residences FCI is projected to decrease from 11.8% to 4.4% in the next 10 years. This projection assumes a 2% per

year inflation and 3% backlog deterioration. Furthermore, it does not take in to account priority 4 and 5 items or renewal of building systems that will approach the end of their service life in the next 10 years.

The amount of backlog for Residences is projected to decrease to \$6.09 million in the next 10 years based on current funding.

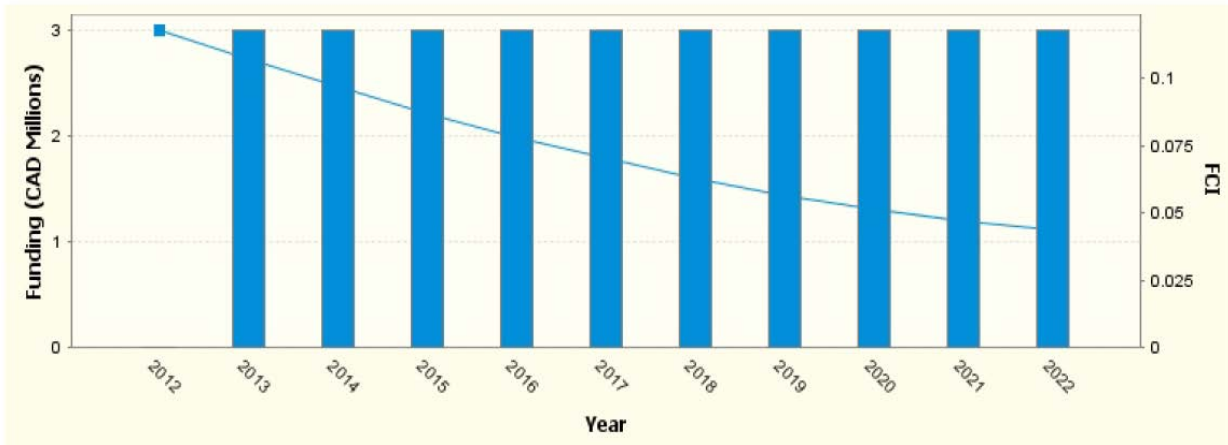


Figure 5: Current funding level and its projected effect on FCI on Residences

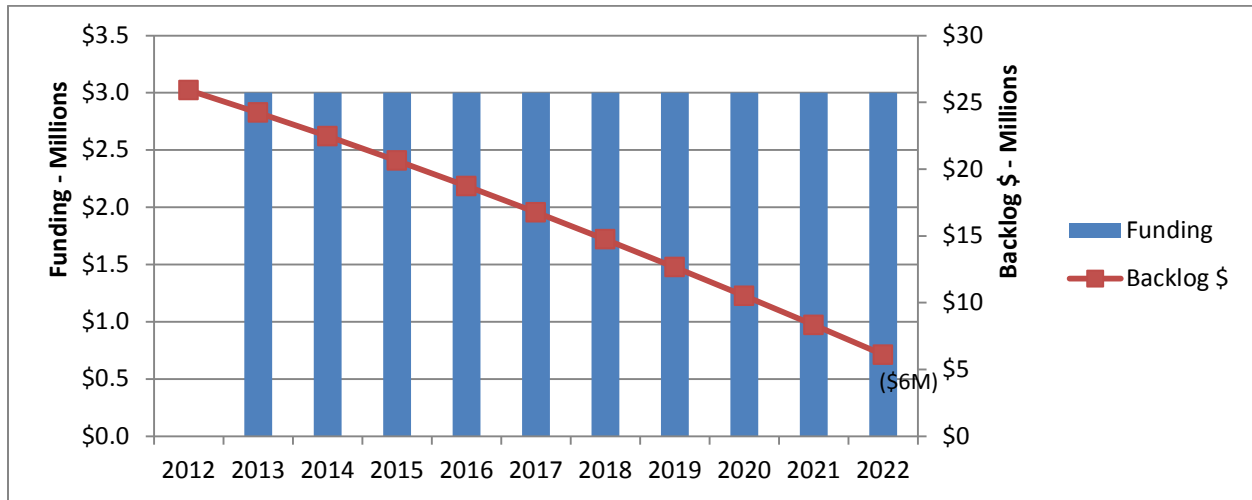


Figure 6: Current funding level and its projected effect on Backlog Requirements on Residences

Table 6 shows the historical funding of DM for the Residences Portfolio on campus from 2003 to 2012.



**Table 6 - Historical funding levels for deferred maintenance for Residence portfolio**

<b>Fiscal Year</b>	<b>Capital Renewal Fund</b>	<b>Additional funding</b>	<b>TOTAL</b>
2003/04	\$1,299,931	\$252,219 (for new residence)	\$1,552,150
2004/05	\$1,552,219	-	\$1,552,219
2005/06	\$1,552,100	-	\$1,552,100
2006/07	\$1,647,706	-	\$1,647,706
2007/08	\$1,647,700	-	\$1,647,700
2008/09	\$1,734,700	-	\$1,734,700
2009/10	\$1,834,705	-	\$1,834,705
2010/11	\$3,114,706	-	\$3,114,706
2011/12	\$3,114,706	-	\$3,114,706
2012/13	\$3,114,706	-	\$3,114,706

#### 4. Proposed Comprehensive Plan

The current data indicates that the DM backlog relating to critical, potentially critical, and necessary but not yet critical requirements (Priority 1, 2 and 3), excluding Residences amount to approximately \$295 million. Based on the forecast for the next 10 years, by 2022 the DM backlog has the potential to exceed \$460 million (refer to **Figure 3A**), and this does not include priority 4 and 5 requirements or renewal of building systems that will approach the end of their service life in the next 10 years.

If the renewal items, which are building system components that will reach the end of their theoretical useful life at some point over the next 10 years, are included into the projections, the DM maintenance backlog will approach \$808 million by 2022 (refer to **Figure 3B**).

As part of this proposed comprehensive plan, three different funding proposals were considered. Each one focused on the period 2012-2022. One model funds the DM at a fixed annual rate, with the intention of holding the RI relatively fixed over this period. The second model considered the required annual funding to hold the FCI at a fixed value while the third funds DM at a fixed annual rate to hold the backlog of priority 1, 2 and 3 items at the current level.

##### 4.1 Funding for a fixed RI

The first funding proposal concentrates on keeping the campus RI value for all buildings and infrastructure except Residences, relatively constant in the next 10 years. **Figure 7** shows the effect of various funding scenarios on the resulting overall campus RI Value. The graph indicates that \$40 million per year funding will be required to keep the RI value in the current range. This includes all Priorities (1, 2, 3, 4, & 5) and building system renewal costs that is assumed to reach their end of service life in the years 2018 – 2022.

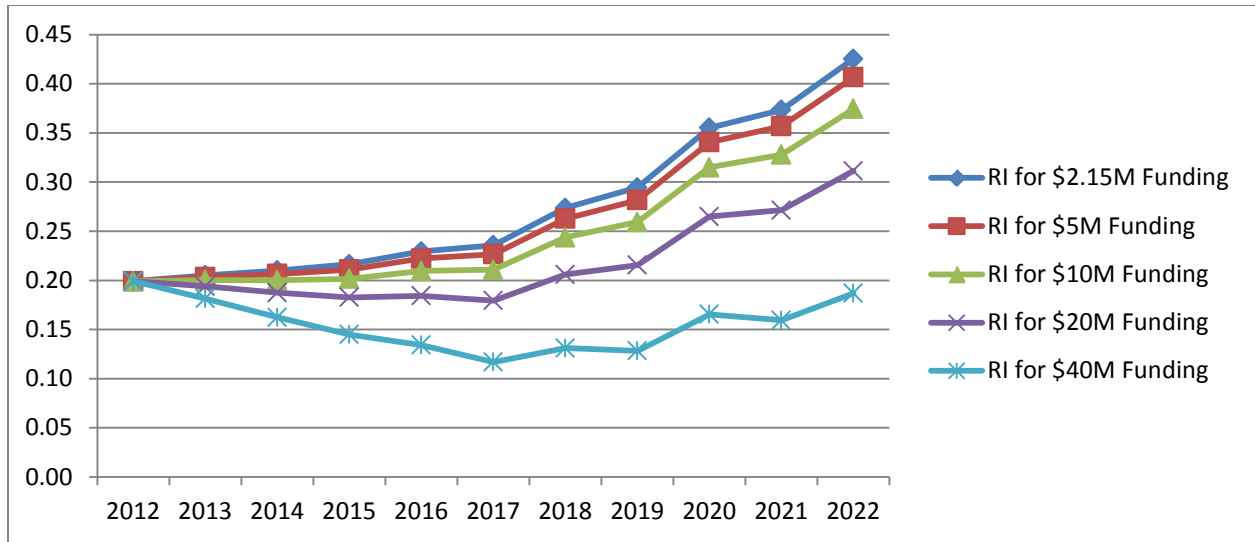


Figure 7: Various funding scenarios and their effect on RI values for the next 10 years

#### 4.2 Funding for a fixed FCI

A second funding proposal considered is depicted in **Figure 8** and **Table 7** and represents the yearly funding required to keep the campus FCI value in the current range over the next 10 years. This projection includes all Priorities (1, 2, 3, 4 & 5) and building system renewal costs that will approach their end of service life in the years 2018 – 2022.

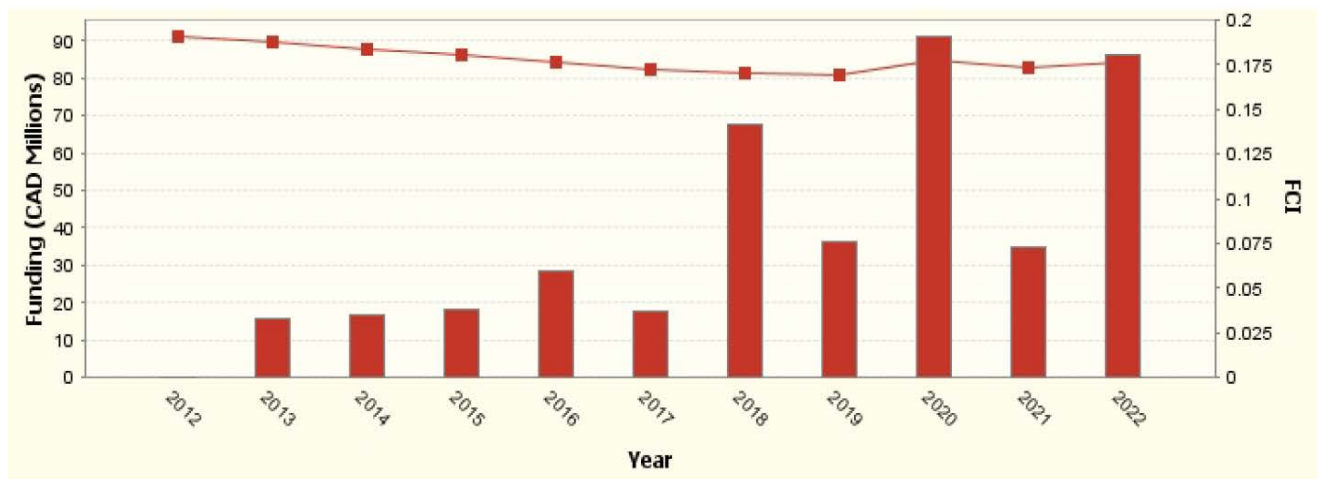


Figure 8: Annual funding required to maintain FCI in the current range

**Table 7 – Annual funding required to maintain FCI in the current range**

Year	Funding Required	Projected FCI
2013	\$15.7 Million	18.8%
2014	\$16.5 Million	18.4%
2015	\$18.2 Million	18.0 %
2016	\$28.6 Million	17.6%
2017	\$17.7 Million	17.1%
2018	\$67.6 Million	17.1%
2019	\$36.1 Million	16.9%
2020	\$91.2 Million	17.8%
2021	\$34.7 Million	17.3%
2022	\$86.2 Million	17.6%

When considering Figure 8, the building system renewal costs remain relatively constant from years 2013 to 2017. In years 2018, 2020 and 2022 there are significant spikes of required funding required to hold FCI constant, as during these years, large expensive building systems are scheduled to reach the end of their theoretical life. The effect of these building system failures of RI during these specific years can also be seen in Figure 7. Looking at the \$40M funding scenario of Figure 7, the value of RI is driven down by surplus funding in the years 2013-2017. With the funding fixed, the RI starts to increase from 2018 onward as the funding level is below the actual system requirements for three years within the 2018-2022 timeframe, i.e. 2018, 2020 and 2022. The net result when considering the \$40M over this ten year period is a value of RI equal to the 2012 value in 2022.

### 4.3 Funding for a fixed DM backlog

A third funding proposal is considered in **Figure 9** below. The DM backlog forecast (\$), for requirements identified for the next 5 years only, is depicted below. Various funding scenarios including the current funding of \$2.15 million and higher amounts of funding are plotted. This scenario was generated after excluding Priorities 4 and 5 and all building system renewal items which are anticipated to reach their end of service life in the years 2018 – 2022. Further assessment of McMaster University buildings and infrastructure assets in 2017 could reconsider these items but a funding strategy could be helpful.

According to these projections, a funding allocation of \$16 million per year for the next 10 years is required in order to keep the deferred maintenance backlog at its current level accounting for the yearly inflation and backlog deterioration.

A funding investment of \$16 million per year will allow us to keep the campus FCI in the current range for the next 5 years as depicted in **Figure 10**. This graph incorporates all priority requirements and building systems that are approaching their end of service life. The projection indicates that the

upcoming building system renewals may push the campus FCI higher during the latter half of the next 10 years.

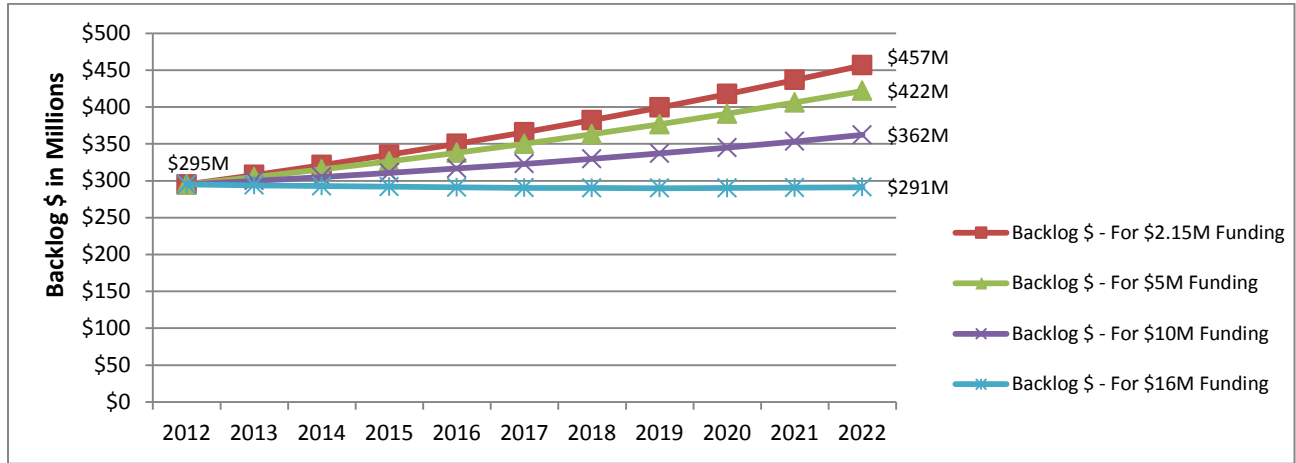


Figure 9: Various funding scenarios and their effect on backlog dollars (for Priorities 1, 2 & 3) for the next 10 years

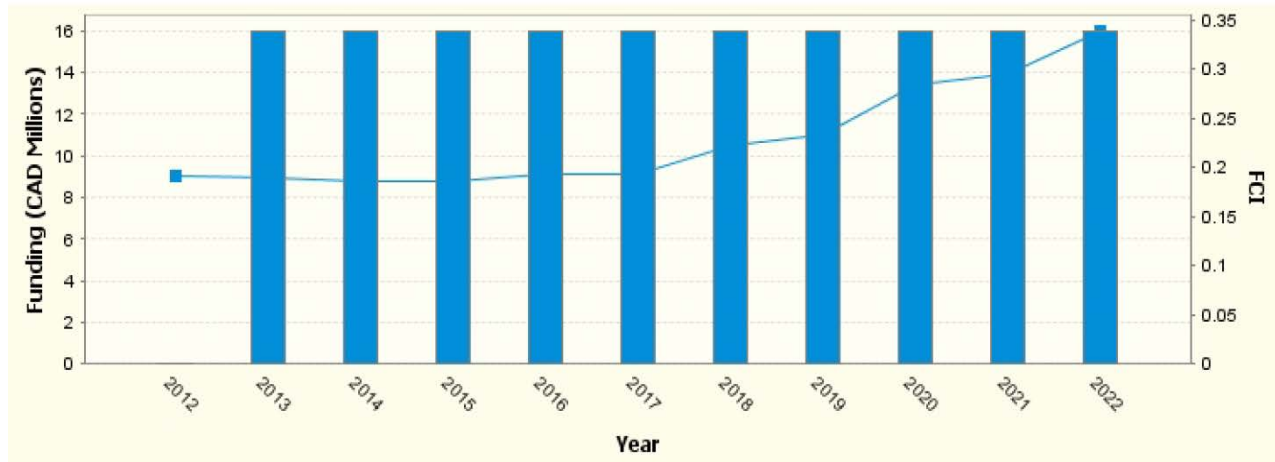


Figure 10: Effect of \$16 million per year funding on FCI (including all priorities and building system renewals)

It is the recommendation of Facility Services that we strive to maintain the backlog value of \$295M constant over this ten year period. To do this, a comprehensive funding plan would be in the amount of \$16M per year plus associated soft costs.

Appendix ‘D’ provides examples of a few of the DM projects that are either underway or required in the immediate term. All of these requirements are currently considered **critical** and deemed to have a very high risk factor if not performed. Pictures have been included to show the extent and severity of the requirement.

## 5. Proposed Prioritized Plan

To keep the university facilities functioning and at the same time considering the current fiscal state of the university, it is necessary to strategically prioritize, priorities 1, 2 and 3 requirements. In order to prioritize requirements and to assess the required funding levels, ancillaries and other campus buildings and infrastructures that provide and sustain their own funding for DM will be excluded. These buildings include all Residence buildings, Athletic and Recreation, Parking Infrastructure, Divinity College, Students Centre and the Hospital – Faculty of Health Sciences. If we exclude these buildings, which provide their own DM funding, the remaining backlog will be reduced from \$295 million to \$200 million.

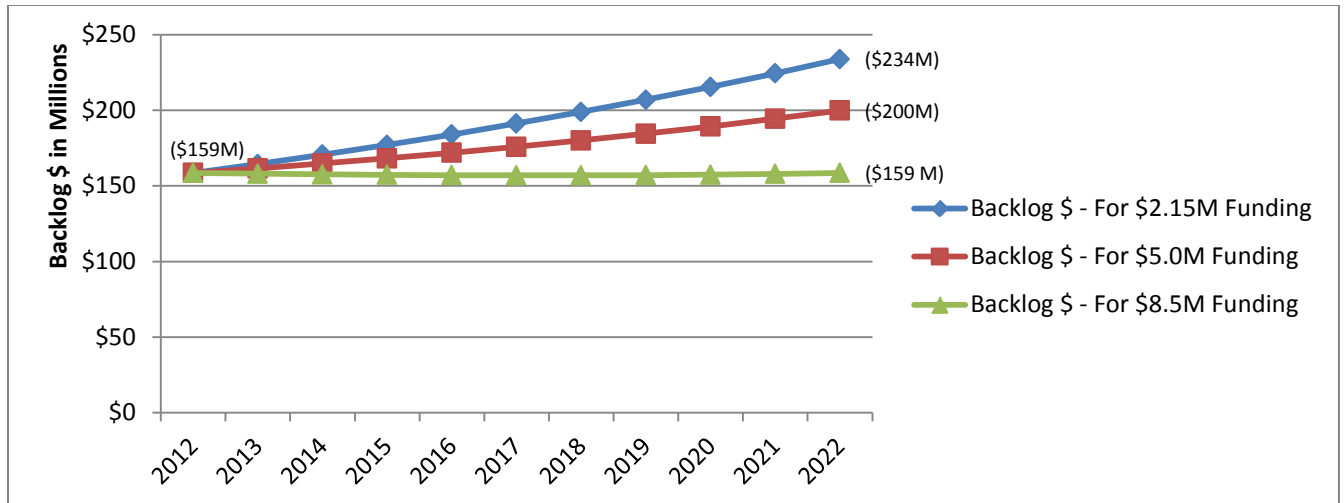
The second order of priority is to consider the most vulnerable building system components which are more likely to suffer from sudden failure. Also such sudden failure would have a significant impact on the learning, teaching and research operation in the university. These systems were found to be:

- Fire protection
- Plumbing and mechanical systems
- Electrical distribution systems
- Exterior enclosure (Roofing, Windows, Exterior Façade, etc)
- Heating, Ventilation and Air Conditioning (HVAC)
- Conveyance

When focusing on these prioritized buildings and systems only, Figure 9 can be forecasted in a new **Figure 11** as seen below. The current 2012 value of backlog for these high priority buildings systems in the academic and administrative buildings is \$158.5 million (for priorities 1, 2, and 3 only). Using this backlog as a starting point, Figure 11 was created to determine the appropriate funding level required to hold the backlog at this amount for the next ten years.

Figure 11 shows that this funding level is \$8.5 million per year and allows for a reduced annual program from the \$16M proposed in the comprehensive plan contained in section 4. Adding a soft cost allowance (based on 20% of project value) into the funding investment equates to an annual investment of \$10.2 million per year for funding of the most critical DM items on campus.

It should be noted that funding at this level will still result in the RI and the FCI increasing over the next ten years. This funding is also not considering the buildings system requirements that will fail over the next ten years. As discussed, there are building systems and components that will approach the end of their theoretical life in the years 2018, 2020 and 2022. The University would still be in a position of owning buildings that contain systems operating beyond their normal useful life. However, as discussed earlier an appropriate fund planning for 2017 would eliminate this.



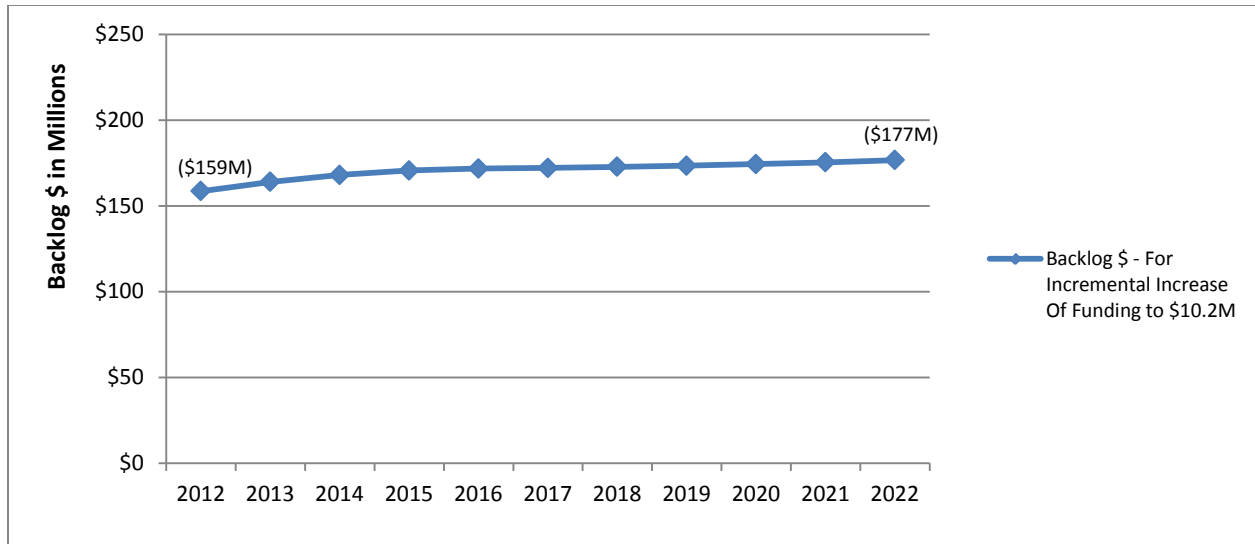
**Figure 11: Various funding scenarios and their effect on backlog dollars for the next 10 years on the prioritized plan**

## 6. Funding the Proposed Prioritized Plan

Funding strategy options under consideration include:

- An annual allocation from unfunded priorities in the annual budget cycle. This was possible in the 2012-13 budget to the extent of \$1.802 million. However, this solution will never reach required levels and is unreliable because it is conditional.
- Under the new budget model, receive an annual allocation from the university fund and/or consider an increase in the rent charge to build an annual, reliable allocation.
- Under the current or new budget model, adopt a plan to phase in an annual increase of \$2 million per year until the DM fund reaches the \$10.2 million level.
- Borrow for this purpose.

The most feasible option is the one that sees an incremental budget allocation of \$2M per annum until the DM fund reaches the necessary recommended \$10.2M annual level. If this option is approved, it would see the Deferred Maintenance for the academic portfolio increase to \$10.2M in four years. Figure 12 shows the effect on backlog for the prioritized priority 1, 2 and 3 requirements if this incremental funding model is applied. It is important to note that of the \$10.2M allocated funds, only \$8.5M is being applied to the backlog each year. The balance of \$1.7M is used to cover the soft costs of design, permits, asbestos abatement etc. that are associated with the annual program. This \$8.5M funding is consistent with the proposed funding scenario presented in Figure 11.



**Figure 12: DM funding from present level to \$10.2Million funding in \$2M annual increments and its effect on backlog (for the Prioritized Priority 1, 2 and 3 requirements) for 2012-2022.**

Given the approved funding in 2012-13 for DM as well as the allocated funds from ancillaries and other self-funded buildings, funding for 2012-13 is shown in **Table 8**:

**Table 8 – Deferred Maintenance Funding, all sources, for fiscal year 2012-13**

DM Fund / Building Group	\$
Deferred Maintenance / MTCU	\$4,707,100
Residence	\$3,114,000
Athletics	\$50,000
Health Science Centre	\$600,000
Roadways and Parking	\$358,000
McMaster University Student Centre	\$55,000
<b>Total</b>	<b>\$8,884,100</b>

If adopted, the \$2M annual increase to the academic portfolio DM fund would increase the annual campus DM allocation to over \$14M by 2016-17 budget cycle. The proposed DM fund for future years and the various other allocated funds (ancillaries and other self-funded building groups) are captured in **Table 9**.

**Table 9 – Proposed Deferred Maintenance Funding, all sources, for fiscal year 2016-17**

<b>DM Fund / Building Group</b>	<b>\$</b>
Deferred Maintenance / MTCU	\$10,200,000
Residence	\$3,114,000
Athletics	\$50,000
Health Science Centre	\$600,000
Roadways and Parking	\$358,000
McMaster University Student Centre	\$55,000
<b>Total</b>	<b>\$14,377,000</b>

## 7. Conclusion

Priority 1, 2, and 3 deficiencies amount to over \$295 million excluding residences. With a prioritized plan focusing on high priority building systems only, the DM deficiencies for the academic and administrative buildings for the prioritized building components is \$158.5 million. The historical \$2 to \$3 million annual allocation for deferred maintenance will not address the existing deferred maintenance backlog or provide an appropriate Asset Management Plan for the University. Funding the backlog at the current levels will result in the FCI increasing, pushing the University further down the **poor condition** rating continuum. This growing liability will continue to pressure Facility Services’ ability to maintain the current condition of the buildings and will increase the potential of unforeseen building and system failures, which threatens the normal operation of the University.

A \$10.2 million annual investment will maintain control of the priority 1, 2 and 3 requirements and will also put McMaster in compliance with the provincial government’s *Building Together* guidelines. This plan will also enable Facility Services to support the President’s initiative, *Forward with Integrity*, through the provision of enhanced facilities that supports the student’s learning experience and advanced research environment.



## Appendix A: McMaster University Facility Condition Index – Owned Buildings and Infrastructure excluding Residences – 2012

Bldg #	Asset Name	Area (sq.m)	Replacement Value	Currently Critical	Potentially Critical	Necessary	Total FCI Cost	FCI
1	University Hall	4,520	\$18,804,872	\$1,446,442	\$2,251,057	\$5,036,539	\$8,734,036	0.46
2	Hamilton Hall	4,818	\$20,044,663	\$29,559	\$103,476	\$1,307,852	\$1,440,887	0.07
4	Refectory	2,171	\$6,554,879	\$112,883	\$163,451	\$701,823	\$978,158	0.15
7	Alumni House	606	\$803,295	\$104,429	\$9,872	\$181,382	\$295,683	0.37
8	Alumni Memorial Hall	1,306	\$3,943,193	\$53,574	\$3,154	\$308,150	\$364,876	0.09
9	Nuclear Research Building	5,853	\$24,350,646	\$35,430	\$1,808,500	\$1,785,186	\$3,629,117	0.15
10	Mills Memorial Library / Museum of Art	22,169	\$38,914,798	\$1,047,897	\$822,769	\$4,760,836	\$6,631,505	0.17
11	Burke Science Building	18,246	\$75,910,111	\$37,356	\$518,177	\$1,483,259	\$2,038,793	0.03
12	E.T. Clarke Centre	4,967	\$56,368,347	\$1,251,668	\$14,129,201	\$6,410,527	\$21,791,393	0.39
15	Nuclear Reactor	2,261	\$9,406,597	\$53,010	\$657,566	\$665,162	\$1,375,738	0.15
16	John Hodgins Engineering Building	23,056	\$95,921,491	\$452,948	\$11,249,136	\$7,992,502	\$19,694,585	0.21
17	Divinity College	3,544	\$14,744,351	\$180,709	\$1,933,227	\$3,542,839	\$5,656,776	0.38
20	Gilmour Hall	8,373	\$17,490,862	\$214,875	\$3,589,530	\$4,465,706	\$8,270,112	0.47
22	General Sciences Building	5,535	\$23,027,648	\$806,930	\$6,525,927	\$1,801,367	\$9,134,225	0.40
23	Chester New Hall	8,163	\$33,961,100	\$700,117	\$2,336,187	\$6,778,566	\$9,814,870	0.29
24	Ivor Wynne Centre	22,943	\$37,859,850	\$299,010	\$6,953,826	\$5,316,742	\$12,569,580	0.33
25	A.N. Bourns Science Building	26,893	\$111,884,830	\$2,069,722	\$8,071,278	\$12,534,460	\$22,675,463	0.20
28	Commons Building	5,244	\$15,833,157	\$536,703	\$1,421,234	\$3,430,139	\$5,388,075	0.34
29	Togo Salmon Hall	13,050	\$27,260,928	\$2,216,578	\$3,611,509	\$6,159,972	\$11,988,057	0.44
30	Biology Greenhouse	778	\$3,236,768		\$174,244	\$665,105	\$839,346	0.26
31	Campus Services Building	4,825	\$10,079,232	\$227,240	\$1,172,637	\$2,294,709	\$3,694,589	0.37
32	Tandem Accelerator Building	3,390	\$14,103,654	\$0	\$548,963	\$886,551	\$1,435,511	0.10
33	Applied Dynamics Building	1,996	\$8,304,099	\$0	\$487,734	\$1,239,207	\$1,726,939	0.21
34	Psychology Building	8,410	\$34,988,712	\$38,105	\$833,119	\$2,997,371	\$3,868,596	0.11
37	Health Sciences	118,268	\$221,138,952	\$3,320,098	\$15,638,767	\$59,553,983	\$78,512,848	0.36

	Centre							
38	Kenneth Taylor Hall	11,798	\$49,084,045	\$1,678,427	\$2,173,296	\$4,960,899	\$8,812,623	0.18
39	Life Sciences Building	9,927	\$41,299,993	\$1,291,093	\$8,234,192	\$3,805,816	\$13,331,103	0.32
42	H. G. Thode Library of Science & Engineering	8,156	\$14,316,798	\$481,305	\$3,218,781	\$360,733	\$4,060,816	0.28
43	Communications Research Laboratory	2,681	\$11,153,952	\$23,120	\$345,250	\$629,953	\$998,322	0.09
46	Michael G. DeGroote School of Business	6,914	\$28,764,798	\$117,292	\$929,186	\$1,249,763	\$2,296,241	0.08
47	CIM Building	1,284	\$5,341,915	\$0	\$166,335	\$222,373	\$388,708	0.07
48	Institute for Applied Health Sciences	16,485	\$68,583,699	\$2,226	\$12,759	\$36,751	\$51,736	0.00
49	Information Technology Building	11,494	\$47,819,293	\$0	\$0	\$80,130	\$80,130	0.00
51	McMaster University Student Centre	13,511	\$40,726,342	\$217,813	\$7,688	\$92,353	\$317,854	0.01
52	Michael DeGroote Centre for Learning & Discovery	28,254	\$117,547,094	\$36,038	\$58,569	\$2,061,268	\$2,155,873	0.02
54	David Braley Athletics Centre	13,051	\$54,296,989		\$113,850	\$703,633	\$817,484	0.02
55	Ron V. Joyce Stadium	5,290	\$8,729,399	\$0	\$200,551	\$0	\$200,551	0.02
56	Engineering Technology Building	11,669	\$48,547,358	\$8,390	\$22,329	\$0	\$30,719	0.00
57	Ron Joyce Centre	9,624	\$26,824,000	\$0	\$0	\$0	\$0	0.00
T13	Preliminary Medical Bldg.	2,143	\$8,915,673	\$0	\$640,286	\$1,228,815	\$1,869,102	0.21
T18	Dramatic Arts	156	\$298,545	\$7,467		\$9,641	\$17,108	0.06
T26	Scourge Building	196	\$815,433		\$1,626	\$25,991	\$27,618	0.03
T28	T28 - Temporary Lecture Hall	472	\$903,290	\$0	\$5,137	\$9,596	\$14,734	0.02
T29	T29 - Temporary Lecture Hall	564	\$1,079,355	\$0	\$5,137	\$11,081	\$16,219	0.02
Zones 1-7	Elec-Zone 1-7		\$9,425,000	\$6,443,360	\$973,560	\$31,273	\$7,448,193	0.79
1-00	Tunnels 1-01 TO 1-03		\$2,028,886	\$40,955	\$16,223	\$280,153	\$337,331	0.17
10-00	Tunnels 10-01 TO 10-02		\$1,883,965	\$23,549	\$66,827	\$127,437	\$217,814	0.12

2-00	Tunnels 2-01 TO 2-04		\$3,260,709	\$61,494	\$2,606	\$76,684	\$140,784	0.04
3-00	Tunnels 3-01 TO 3-03		\$1,666,585	\$16,517	\$3,257	\$41,697	\$61,472	0.04
4-00	Tunnels 4-01 TO 4-19		\$14,781,881	\$231,854	\$310,694	\$1,440,280	\$1,982,828	0.13
5-00	Tunnels 5-01 TO 5-07		\$4,383,842	\$98,428	\$25,207	\$427,396	\$551,030	0.13
6-00	Tunnels 6-01 TO 6-02		\$960,098	\$20,947	\$7,297	\$35,182	\$63,427	0.07
7-00	Tunnels 7-01 TO 7-08		\$4,601,223	\$78,355	\$36,259	\$522,518	\$637,131	0.14
8-00	Tunnels 8-01 TO 8-02		\$2,391,187	\$31,618	\$12,964	\$72,123	\$116,707	0.05
9-00	Tunnels 9-01 TO 9-03		\$2,499,877	\$29,466	\$11,728	\$73,947	\$115,141	0.05
Zone 1	Zone 1 - INF - M and E		\$702,975	\$41,701	\$33,840	\$5,864	\$81,404	0.12
Zone 2	Zone 2 - INF - M and E		\$1,953,912	\$48,012	\$14,691	\$161,577	\$224,279	0.11
Zone 3	Zone 3 - INF - M and E		\$2,712,969	\$135,309	\$124,279	\$54,583	\$314,171	0.12
Zone 4	Zone 4 - INF - M and E		\$172,404	\$1,470	\$159,606	\$0	\$161,076	0.93
Zone 5	Zone 5 - INF - M and E		\$246,873	\$165,707	\$70,245	\$12,414	\$248,366	1.01
Zone 6	Zone 6 - INF - M and E		\$3,222,039	\$2,217,615	\$367,007	\$11,727	\$2,596,349	0.81
Zone 7	Zone 7 - INF - M and E		\$2,024,789	\$79,961	\$1,449,228	\$10,424	\$1,539,614	0.76
<b>Total</b>		<b>475,054</b>	<b>\$1,558,904,217</b>	<b>\$28,864,772</b>	<b>\$104,835,031</b>	<b>\$161,174,010</b>	<b>\$294,873,815</b>	<b>0.19</b>

## Appendix B: McMaster University Facility Condition Index – Residences – 2012

Bldg #	Asset Name	Area (sq.m)	Replacement Value	Currently Critical	Potentially Critical	Necessary	Total FCI Cost	FCI
05	Edwards Hall	2,325	\$4,835,650	\$28,209	\$138,673	\$1,070,593	\$1,237,475	0.26
06	Wallingford Hall	2,180	\$5,006,573	\$22,502	\$65,466	\$633,251	\$721,219	0.15
18	Moulton Hall	5,453	\$13,613,985	\$23,120	\$894,332	\$566,187	\$1,483,639	0.11
19	Whidden Hall	6,502	\$11,059,655	\$0	\$140,587	\$564,804	\$705,391	0.06
26	Matthews Hall	5,742	\$13,605,622	\$1,108,012	\$205,983	\$2,038,678	\$3,352,673	0.25
27	McKay Hall	6,208	\$14,013,959	\$92,679	\$54,150	\$3,187,249	\$3,334,168	0.24
35	Woodstock Hall	5,978	\$12,434,335	\$23,120	\$308,643	\$801,374	\$1,133,137	0.09
36	Brandon Hall	10,996	\$19,797,902	\$1,077,269	\$84,571	\$929,139	\$2,090,979	0.11
40	Bates Residence	15,241	\$27,902,958	\$728,749	\$874,601	\$3,900,238	\$5,503,588	0.20
45	Hedden Hall	9,688	\$1,617,475	\$71,549	\$0	\$1,199,508	\$1,271,057	0.08
50	Mary Keyes	13,582	\$28,327,158	\$0	\$0	\$1,183,391	\$1,183,391	0.00
53	Les Prince Hall	9,849	\$20,576,720	\$0	\$36,408	\$0	\$36,408	0.00

## Appendix C: Building Audits

### Batch 1 – Completed in June 2012


Bldg. #	Building Name	Construction Year	Original Audit Year	Original FCI
<b>Academic Portfolio</b>				
9	Nuclear Research Building	1950	2005	0.07
11	Burke Sciences Building	1953	2005	0.01
12	E.T. Clarke Centre	1954	2005	0.45
16	J.H. Engineering	1958	2005	0.08
22	General Sciences Building	1962	2005	0.07
25	Arthur Bourns Building	1968	2005	0.03
34	Psychology Building	1970	2003	0.05
38	Kenneth Taylor Hall	1971	2009	0.09
39	Life Sciences Building	1970	2005	0.03
43	Communications Research Laboratory	1983	2009	0.04
48	Institute for Applied Health Sciences	2000	2008	0
49	Information Technology Building	1955	2008	0
52	Centre for Learning and Development	2004	Not Audited	0
<b>Residences Portfolio</b>				
5	Edwards Hall	1931	2006	0.08
6	Wallingford Hall	1930	2006	0.12
18	Moulton Hall	1961	2006	0.06
19	Whidden Hall	1961	2006	0.07
26	Matthews Hall	1965	2006	0.04
27	McKay Hall	1965	2006	0.06
35	Woodstock Hall	1970	2006	0.05
36	Brandon Hall	1970	2006	0.08
40	Bates Residence	1973	2006	0.02
45	Hedden Hall	1990	2006	0.04
50	Mary E. Keyes Residence	2003	2006	0
53	Les Prince Hall	2006	Not Audited	0




## Batch 2 – Completed in September 2012



### Academic and Ancillary Portfolio



1	University Hall	1929	2008	0.13
2	Hamilton Hall	1929	2008	0.01
4	Refectory Building	1929	2008	0.12
7	Alumni House	1929	2003	0.31
8	Alumni Memorial House	1949	2005	0.08
10	Mills Memorial Library	1950	2005	0.10
15	Nuclear Reactor	1957	2009	0.23
17	Divinity College	1959	2005	0.19
20	Gilmour Hall	1959	2005	0.20
21	Wentworth House	1959	2005	0.35
23	Chester New Hall	1964	2009	0.11
24	Ivor Wynne Centr	1964	2008	0.14
28	Commons	1965	2009	0.07
29	Togo Salmon	1965	2009	0.13
30	Biology Greenhouse	1967	2005	0.76
31	Campus Services Building	1968	2008	0.12
32	Tandem Accelerator	1966	2005	0.08
33	Applied Dynamics Laboratory	1967	2005	0.12
42	Thode Library	1976	2005	0.08
46	DeGroote School of Business	1990	2009	0.06
47	CIM	1983	2005	0.13
54	David Braley Athletics Centre	2007	2008	0.01
55	Ron V. Joyce Stadium	2008	2008	0
56	Engineering Technology Building	2009	2010	0
T13	Preliminary Medical Building	1967	2009	0.17
T18	Dramatic Arts	2000	2003	0.01
T26	Scourge Building	1989	2009	0.11
T28		2002	Not Audited	0
T29		2003	Not Audited	0
51	McMaster Student Centre	2011		0

## Appendix D: Critical Deferred Maintenance Requirements - Examples:



Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
N/A	NF91 Substation	\$1,960,000
<b>Scope Description</b>		<b>Risks</b>
<p>Engineer the Substation replacement and Phase 1 of Substation replacement (A phased in replacement is proposed - Phase 2 and 3 for years 2 &amp; 3 respectively)</p>		<p>The Substation/Transformers are beyond their service life. Failure will affect power supply to the whole campus. This is a multiyear project. Hydro One has stepped up their replacement of this vintage of equipment due to failures.</p>
		



Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
12	E.T. Clarke Centre	\$4,000,000
<b>Scope Description</b>		<b>Risks</b>
<p>Replace Boiler # 4 – 150,000 mbh.</p>		<p>The existing Foster Wheeler boiler is beyond its service life (42+). Failure will affect the whole campus as it supplies steam to all buildings on campus.</p>
 <p data-bbox="285 1528 706 1545">Insulating blanket type material missing at steam drum below some tubes in penthouse area.</p>  <p data-bbox="329 1854 662 1871">Several inches of debris has accumulated along the top of the mud drum.</p>		 <p data-bbox="930 1770 1365 1797">Transition area where flue gas leaves furnace and enters generating bank. This is the area of tube contact and heavy debris buildup on top of mud drum.</p>


Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
20	Gilmour Hall	\$744,000
<b>Scope Description</b>		<b>Risks</b>
Replace Substation		Transformer is overloaded and heats up. It could fail at any time.
		


Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
23	Chester New Hall	\$200,000
<b>Scope Description</b>		<b>Risks</b>
Repair parapet walls on north side, repair parapet wall on west side – low roof		Repair parapet walls that are in very poor condition, affecting building integrity.
		







<b>Bldg. No.</b>	<b>Bldg. Name</b>	<b>Order of Magnitude Budget Estimate</b>
24	Ivor Wynne Centre	\$100,000
<b>Scope Description</b>		<b>Risks</b>
Replace flat roof area		Flat roof area is in very poor condition with many active leaks and fully saturated insulation, affecting building integrity.
		

<b>Bldg. No.</b>	<b>Bldg. Name</b>	<b>Order of Magnitude Budget Estimate</b>
29	Togo Salmon Hall	\$750,000
<b>Scope Description</b>		<b>Risks</b>
Reengineer window detail and replace windows, re-caulk exterior precast panels		Window detail and poorly caulked joints permit water/moisture penetration affecting building integrity.
		





<b>Bldg. No.</b>	<b>Bldg. Name</b>	<b>Order of Magnitude Budget Estimate</b>
1	University Hall	\$586,000
<b>Scope Description</b>		<b>Risks</b>
Replace windows		Windows are original – single pane leaded. They are beyond their service life, not energy efficient and require immediate replacement
		




<b>Bldg. No.</b>	<b>Bldg. Name</b>	<b>Order of Magnitude Budget Estimate</b>
12	E.T. Clark Centre	\$500,000
<b>Scope Description</b>		<b>Risks</b>
Replace 3 roof sections and repairs to 2 sections		3 roof areas are in very poor condition and require immediate replacement. 2 areas that were replaced a few years back require repairs
		





Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
38	Kenneth Taylor Hall	\$620,000
<b>Scope Description</b>		<b>Risks</b>
Reengineer window detail and replace windows, re-caulk exterior precast panels		Window detail and poorly caulked joints permit water/moisture penetration affecting building integrity.
		

Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
39	Life Sciences Building	\$200,000
<b>Scope Description</b>		<b>Risks</b>
Structural repairs to retaining wall in the patio area. Re-caulk windows and concrete precast panels.		Retaining wall is shifting pulling out the patio away from the building and needs repairs. There is also some serious water penetration on the north side due to poorly caulked joints affecting building integrity.
		

<b>Bldg. No.</b>	<b>Bldg. Name</b>	<b>Order of Magnitude Budget Estimate</b>
43	Communications Research Lab	\$25,000
<b>Scope Description</b>		<b>Risks</b>
Replace radiation pump and add redundancy		The only heating pump in this building is in poor condition and if it fails there will not be heat in the building.

<b>Bldg. No.</b>	<b>Bldg. Name</b>	<b>Order of Magnitude Budget Estimate</b>
7	Alumni Hall	\$188,000
<b>Scope Description</b>		<b>Risks</b>
Exterior windows and exterior door replacement		Windows are original – single pane leaded. They are beyond their service life, not energy efficient and require immediate replacement
		
		

Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
22	General Sciences Building	\$542,000
<b>Scope Description</b>		<b>Risks</b>
Exterior windows replacement		Windows are original – single pane. They are beyond their service life, not energy efficient and require immediate replacement. Many are leaking causing water damage on walls and sill
		
		

Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
16	John Hodgins Engineering Building	\$450,000
<b>Scope Description</b>		<b>Risks</b>
Exterior windows replacement on the south façade, north side of the south block and west side		Windows are original – single pane. They are beyond their service life, not energy efficient and require immediate replacement
		
		

Bldg. No.	Bldg. Name	Order of Magnitude Budget Estimate
20	Gilmour Hall	\$135,000
<b>Scope Description</b>		<b>Risks</b>
Repair exterior steps (excavate and install new waterproofing membrane)		There is active water leaks in the basement bookstore offices from the exterior steps above
