



MEMORANDUM

Date: Mar 28, 2019  
To: Planning and Resources Committee  
From: Mrs. Debbie Martin, Assistant Vice-President and Chief Facilities Officer  
Re: **Asset Management Plan (AMP) – Update on Implementation**

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**Background**

The AMP Version 2, dated December 2012, was approved by the Planning and Building Committee on January 17, 2013 and by the Board of Governors on June 6<sup>th</sup>, 2013. Subsequent updates were submitted for information to the Planning and Building Committee (subsequently the Planning & Resources Committee) with the latest update on May 24<sup>th</sup>, 2018.

This report provides an update on the status of deferred maintenance at McMaster.

**Assessment methodology change and the new direction:**

In order to more accurately define the true current replacement value of a facility and provide defensible system cost and condition data, a new System model was developed. This model develops system costs based on actual system assembly of the facility assessed. Most Ontario Universities are migrating towards the new system model and McMaster also decided to transition to the new model. The 20% campus re-audit of 2018 followed this new model. The remaining 80% relies on the previous approach.

Previously, all facilities assessed and entered into the VFA, McMaster's asset management software, had a cost model built to reflect the cost and condition of a facility. Eleven cost models were developed utilizing the RS Means Cost/Square Foot reference and that was used to estimate the value of a facility based on the function of the facility. The assessor determines the building use category and selects the appropriate building cost model from the eleven available categories.

The former model also relied on "requirement cost", which was that the requirement cost in the database was not reflective of the actual project cost which were substantially higher, as requirement cost for this purpose is defined as the cost to replace the system, excluding all soft costs. In order to adjust for this discrepancy, the new assessments are adding a factor of 1.3 to the requirement costs. These adjustments have substantially increased our deferred maintenance (DM).

**Current facility data compared with data reported in AMP Version 2:**

Facility Services continues to update McMaster University's building condition assessment database as deferred maintenance projects are created, implemented and completed. McMaster continues to re-audit 20% of the campus every year, so that each asset is audited at least once every 5 years. Table 1 below compares the current DM backlog and Facility Condition Index (FCI) of McMaster University buildings to the values reported in the AMP Version 2 dated December 2012.

**Table 1 – Campus data**

No:	Description	AMP Version 2			Current		
		All Bldg. & Infrastructure	HCS	MUMC	All Bldg. & Infrastructure	HCS	MUMC
1	Number of buildings	43	12	1	51*	12	1
2	Total Gross Area of buildings	356,786 m <sup>2</sup>	93,744 m <sup>2</sup>	118,268m <sup>2</sup>	400,822 m <sup>2</sup>	93,744 m <sup>2</sup>	118,268m <sup>2</sup>
3	Current Replacement Value	\$1.36B	\$187 M	\$221.1 M	\$1.7 B	\$227.4M	\$304 M
4	Deferred Maintenance backlog (All Priorities)	\$227 M	\$28 M	\$80 M	\$259.6 M	\$42.67 M	N/A
5	Deferred Maintenance backlog (Priorities: 1 to 3)	\$216.5 M	\$22 M	\$78.5 M	\$247.8 M	\$38.9 M	\$126.89 M
6	FCI**	15.9%	11.8%	35.5%	14.55%	17.1 %	41.7%
7	Prioritized Priorities Backlog	\$159 M	N/A	N/A	\$194 M	N/A	N/A
8	McMaster Portfolio Gross Area	568,798 m <sup>2</sup>			612,534 m <sup>2</sup>		
9	McMaster Portfolio CRV	\$1.75 B			\$2.23 B		
10	McMaster Portfolio FCI	18.2%			18.68%		

\*Three (3) buildings were demolished (T18, T28 and T29), CIM Ancaster building sold and ten (10) additional buildings were added (L. R. Wilson Hall, David Braley Health Sciences Centre, Halton McMaster Family Health Centre, McMaster Children’s Centre temporary portable (T33), Offices temporary portable (T32), Classroom temporary portable (T34), 182 Sterling Street, 47 Whitton Road, 88 Forsyth Avenue, 96 Forsyth Avenue and 106 Forsyth Avenue.

\*\*FCI is a numeric score reflecting the asset condition. It is the ratio of the value of Deferred Maintenance to the Current Replacement Value of the asset.

As compared to previous updates where the DM backlog and FCI were improving year over year, the change in the assessment methodology, requirement costing, and the aging infrastructure are factors contributing to the increase in FCI values and DM backlog in this update.

If the methodology changes were not implemented, the campus FCI would have shown a decrease from 18.2% (from the AMP Version 2) to approximately 13%, however with the changes, the FCI has slightly increased to 18.68%. When we complete the application of the new methodology to the remaining 80%, we can anticipate similar increases.

The ‘All Buildings and Infrastructure’ column in Table 1 include all academic and ancillary buildings on campus as well as the campus infrastructure. The DM backlog for all priorities 1, 2 and 3 has

increased from \$216.5 million to \$247.8 million, a 14.5% increase. There was an investment of \$62.2 million in DM over the last seven (7) years (from 2012 to 2018). A listing of completed DM projects is included in Appendix A. The FCI has slightly improved from 15.9% to 14.55%. The increased spending to tackle the high deferred maintenance backlog, and addition of newer buildings such as L.R Wilson Hall and David Braley Health Sciences Centre, helped to reduce the overall campus FCI value.

Many HCS Buildings (Matthews, McKay, Woodstock, Brandon and Bates) built in years 1964 to 1971 are at the 50-year mark where many new requirements get added to the backlog list. We did a reassessment of Matthews, McKay, Wallingford, and Edwards in 2018 and the DM increased substantially in these buildings. This resulted in an increase in FCI to 17.1% compared to the AMP Version 2 value of 11.8%. Bates Residence alone has \$7 million in deferred maintenance backlog and the proposed redevelopment of Bates will result in a substantially better FCI value for the HCS building portfolio.

Ontario Hospitals ended their contract with VFA and entered into a new contract with Nadine International, a similar service provider, in 2018. They did a reassessment of McMaster University Medical Centre (MUMC) last year and the revised DM backlog value to \$333,915,034. Costs for the MUMC building are split between McMaster and Hamilton Health Sciences based on occupancy. Occupancy over the past several years has remained stable at 38% McMaster and 62% HHS. This would translate to \$126.89 million as McMaster's share, which is a 58.6% increase over the AMP Version 2 value. It is important to note that were HHS to vacate this building, as their strategic plan foretells, the entire DM liability of \$333 million would fall on the University. Clearly, this would be a topic for discussion at the time, because HHS is contractually responsible for the deferred maintenance of MUMC under the terms of their lease.

#### **Funding the Asset Management Plan**

The recommended, and subsequently approved, Asset Management Plan funding was an incremental budget allocation of \$2 million per annum for four (4) years until we reached an annual deferred maintenance increase of \$8 million. The first \$2 million Asset Management Base Increase was received in 2013/14. Table 2 shows the annual Deferred Maintenance and Facility Renewal Program budgets for 2012/13 to 2018/19. <sup>1</sup>

#### **Additional Ministry Funding**

On April 4<sup>th</sup>, 2014, the Ministry of Training, Colleges and Universities in a letter release, announced enhanced future funding for Facilities Renewal Program (FRP) beginning in 2015/16. The proposed phased-in funding increase raised the total allocation to all institutions from \$17.2 million to \$40 million in 2015/16 and 2016/17, with a further increase to \$60 million in 2017/18, \$80 million in 2018-19 and projected to \$100 million in 2019/20.

The funding to McMaster University for 2020/21 is expected to be about \$4.42 million (based on the percentage share received by McMaster in previous years) subject to budget approval in the Legislative Assembly. The funding forecast (assuming continuation of the \$100 million fund allocation for deferred maintenance in the higher education sector for years 2020 and beyond) for the next 10 years are shown in Table 3 below.

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<sup>1</sup>All campus buildings and infrastructures that provide and sustain their own funding for deferred maintenance are excluded. These include all HCS buildings, MUMC, Parking Infrastructure, Divinity College and Student Centre.

**Table 2 – Summary of Funding Received for AMP**

No:	Funding Source	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19
1	Ministry – FRP	\$1,155,100	\$1,231,000	\$1,231,000	\$1,818,800	\$1,818,800	\$2,731,972	\$3,642,629
2	Facilities Operating Annual Allocation	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000
3	One-Time University Allocation	\$2,552,000	\$1,000,000	-	-	-	-	-
4	Asset Management Base Increase	-	\$2,000,000	\$4,000,000	\$6,000,000	\$8,000,000	\$8,000,000	\$8,000,000
5	Ministry One-Time top-up Funding 2016/17	-	-	-	-	\$2,012,300	-	-
6	Yearly Totals	<b>\$4,707,100</b>	<b>\$5,231,100</b>	<b>\$6,231,000</b>	<b>\$8,818,800</b>	<b>\$12,831,100</b>	<b>\$11,731,972</b>	<b>\$12,642,649</b>
7	Total (2012/13 to 2018/19)	<b>\$62,193,721</b>						

**Table 3: Forecasted deferred maintenance fund for the next ten years**

Year \ Fund	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26	26/27	27/28	28/29
<b>MTCU</b>	\$2.73M	\$3.64 M	\$3.56M	\$4.42M	\$4.42M	\$4.42M	\$4.42M	\$4.42M	\$4.42M	\$4.42M	\$4.42M	\$4.42M
<b>FOC</b>	\$1.0 M	\$1.0 M	\$1.0M	\$1.0M	\$1.0M	\$1.0M	\$1.0M	\$1.0M	\$1.0M	\$1.0M	\$1.0M	\$1.0M
<b>AMP - Base Increase</b>	\$8.0M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M	\$8.0 M
<b>Total</b>	\$11.73 M	\$12.64M	\$12.56M	\$13.42M	\$13.42M	\$13.42M	\$13.42M	\$13.42M	\$13.42M	\$13.42M	\$13.42M	\$13.42M

**Prioritization Criteria:**

Facility Services undertakes a prioritization process to select the DM projects every year. A review of the annual maintenance work orders, interviews with tradesmen, supervisors and front line managers are conducted to select the most critical DM projects. These are then reviewed by the AVP/CFAO and VPA against known priorities and in relation to other projects.

The following are the considerations for project prioritization.

- Required repairs (failed systems) within Priorities 1, 2 or 3;
- Component failure that has or will affect the health & safety of the University students, staff, faculty or visitors;
- Higher priority for mechanical, electrical, building envelope and fire safety systems, which are considered critical building systems;
- Systems or components which are most likely to have a significant impact on the learning, teaching and research mission of University, if they fail;
- Items that have an impact on the reputation of the University;
- Systems that are likely to suffer from sudden failure.

Figure 1 summarizes the percentage of the \$62.19 million allocated to building system for the years 2012-13 to 2018-19. Ninety-six percentage (96%) of the funding (\$59.98 million) to date have been allocated to critical building systems such as building envelope - foundation, roofing, cladding, windows and doors (\$15.72 million), mechanical (\$22.6 million) and electrical equipment (\$16.9 million) and fire safety systems (\$4.7 million); areas deemed to be the highest priorities within the Prioritized Priority backlog.

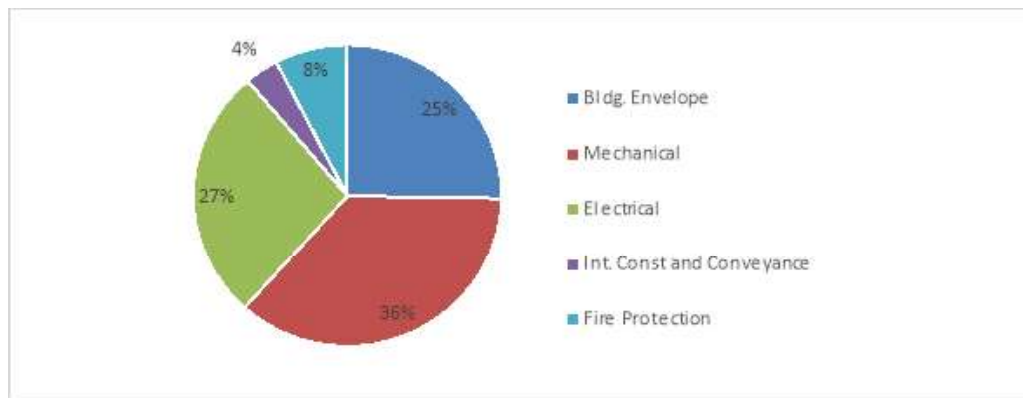


Figure 1: Budget allocated to building system as a percentage of total funding: Years 2012/13 to 2018/19

**Comparison to G6 Universities:**

The graph below (Figure 2) depicts comparative FCI, backlog and current replacement values for the G6 Universities. This information was obtained from the VFA database that the universities use to manage their built assets. The data does not include infrastructure DM requirements.

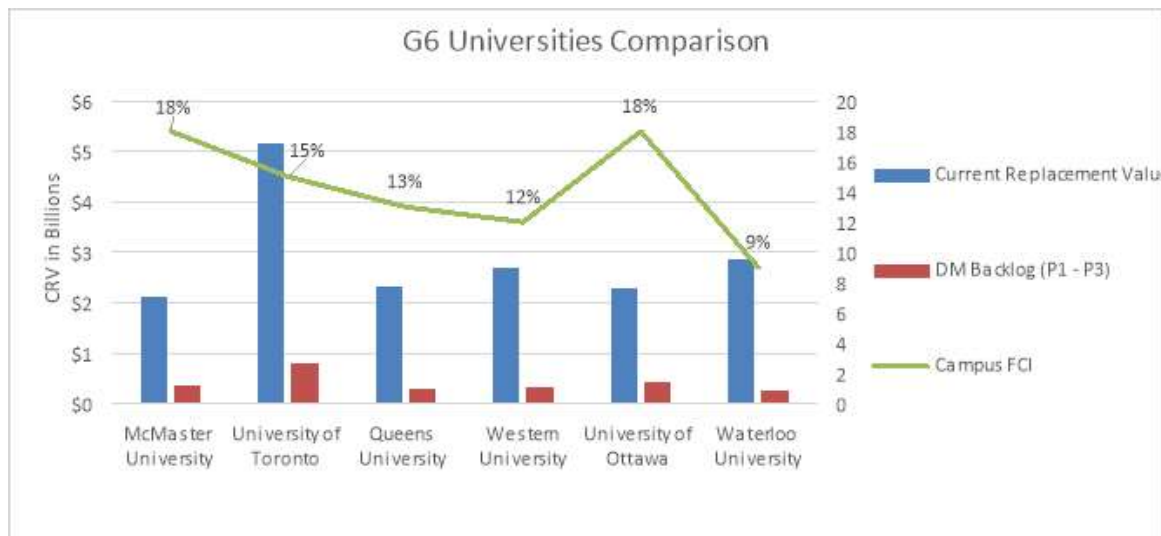


Figure 2: FCI and Backlog comparison to Ontario G6 Universities

**Deferred maintenance funding and its effect on backlog:**

Considering the large deferred maintenance funding requirements for the University, and limitations in available funding, a methodical prioritization process was necessary to develop an implementation plan based on the prioritization criteria as illustrated earlier in this report.

Process to Develop Prioritized Priorities:

The non-critical building system components which are least likely to suffer from sudden failure are excluded. These includes requirements such as floor, ceiling and wall finishes replacement, washroom upgrades, interior doors and hardware replacement, parking lots, sidewalks, site infrastructure except tunnels, grandfathered code compliance items, etc. This reduced the DM backlog (Priorities 1 to 3) from \$247.8 million to \$194 million, a reduction of \$53.8 million. This resulted in a shortened list focused on Priority 1, 2 and 3 requirements in academic buildings and the most vulnerable building systems.

Most of the requirements with Priority 1, 2 or 3 rating are building systems that have exceeded their recommended life cycle. The priorities are assigned at the time of the visual assessment and may become a critical item due to sudden failure. Checking the maintenance work order log and interviews with trades and supervisors, help ensure that McMaster is allocating DM \$ to the most vulnerable and critical building components. The proposed annual DM and FRP project list is created from this process and is presented to the PRC in a concurrent memorandum for approval.

The prioritized priorities of \$194 million is made up of Priority 1 (\$8.6 million), Priority 2 (\$39.9 million) and Priority 3 (\$145.5 million) items. The total available money for deferred maintenance in 2019/20 is \$12.56 million. Facility Services has allocated \$6.3 million towards Priority 1 items and \$5.29 million towards Priority 2 items that have become critical during the last year. Other commitments such as environmental compliance, contributions to MUMC and a joint project with Faculty of Engineering to upgrade washrooms and corridors at JHE are consuming the rest of the available budget which is about \$1.06 million.

The increased funding to deferred maintenance is projected to make a substantial impact on the deferred maintenance backlog dollars for the next ten years. Figure 3 illustrates the forecasted Priorities 1, 2 and 3 backlog for the next 10 years. This graph is based on the current survey of deferred maintenance.

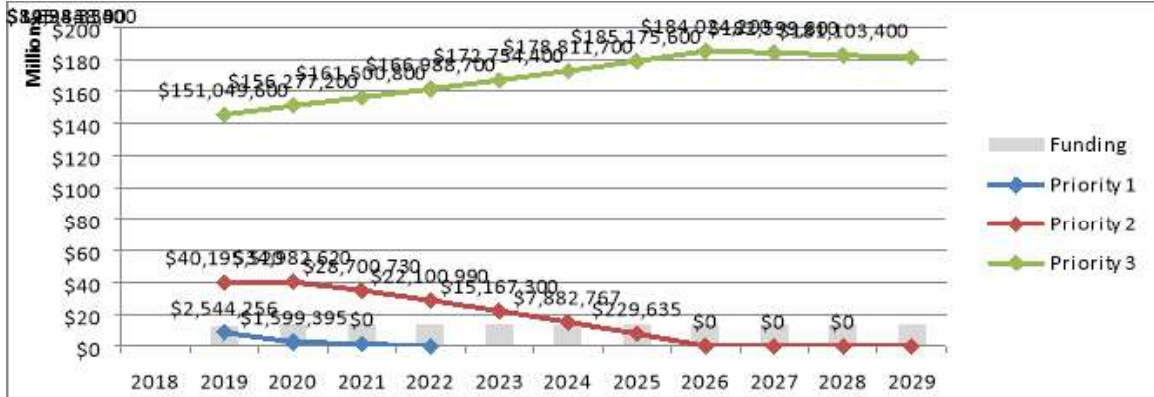


Figure 3: Backlog forecast for Prioritized Priorities 1, 2, & 3

The following are assumptions made to generate this backlog forecast projection.

- Inflation at 2% and backlog deterioration at 3%
- 75% of the funding from years 2021 is applied to Priority 2 items and 25% applied to Priority 3
- Funding is maintained as per Table 3
- Soft costs at 20%
- New requirements that will be added as a result of future audits are not considered

**Housing and Conference Services (HCS) Buildings**

In addition to the university funding for deferred maintenance, HCS operations maintains its own funding for HCS buildings. Approximately \$2 million is spent on deferred maintenance projects in any given year. The effect of this deferred maintenance investment on the Residence FCI and backlog, based on the current deferred maintenance spending model, is depicted in Figures 4 below.

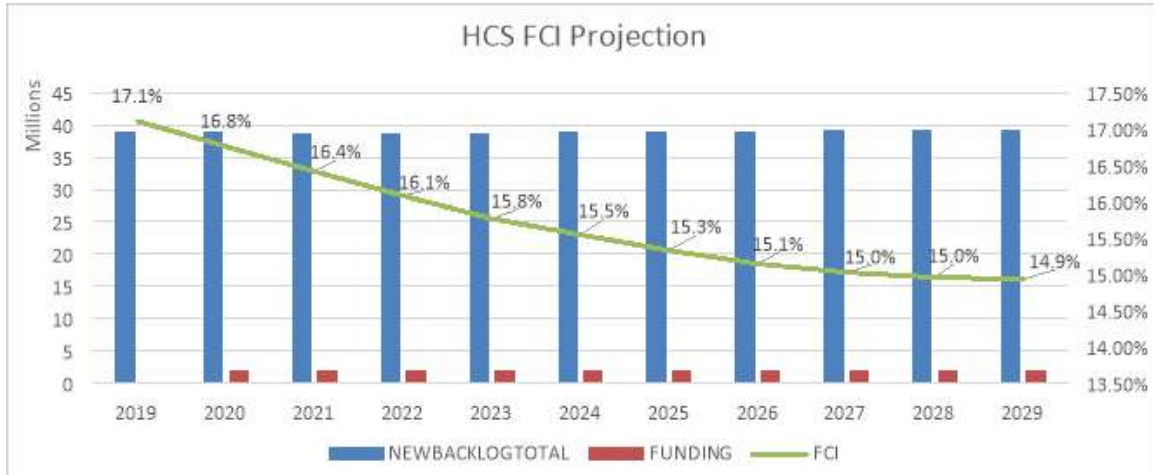


Figure 4: Current funding level and its projected effect on FCI and Backlog for Residence Buildings

**McMaster University Medical Centre (MUMC) Building:**

The University has an agreement with Hamilton Health Sciences whereby McMaster is responsible for 38% of the deferred maintenance (based on building occupancy). After reviewing the DM requirements at MUMC, the University has agreed to increase the base allocation by \$700,000 bringing the total allocation to MUMC to \$1.3 million annually from the total DM funding Facility Services receives. This amount was arrived at after comparing the square footage of MUMC and allocating an appropriate portion of the total DM funding received by Facility Services. McMaster’s share of backlog at MUMC is \$126.89 million and funding it at \$1.3 million is barely enough to keep the FCI from deteriorating.

**Conclusion:** There is no doubt that our historic level of funding of Deferred Maintenance was inadequate. The University’s commitment of \$8 million per year plus the increased provincial support make substantial inroads into the problem, leading to a significant reduction in prioritized priorities over the next decade. Current priority 1 requirements will be eliminated and McMaster will be very close to eliminating the priority 2 requirements in the next 8 years. Admittedly the regular reviews of facility conditions will lead to future increases in the Deferred Maintenance total demanding continued vigilance.



**APPENDIX A**

**List of Completed Deferred Maintenance Projects**

#	Description
1	Gilmour Hall Substation replacement
2	Chester New Hall brick work restoration
3	Ivor Wynne Centre roof replacement
4	Togo Salmon Hall window replacement
5	University Hall window replacement
6	E.T. Clarke Centre roof section replacement
7	Kenneth Taylor Hall window replacement
8	Life Sciences Building structural repairs to retaining wall
9	Communication Research Lab heating pump replacement
10	General Sciences Building window replacement
11	John Hodgins Engineering window replacement
12	E.T.Clarke Centre – Boiler 4 replacement
13	Gilmour Hall exterior steps repair leaks to basement
14	Burke Sciences Building foundation wall water leak repair
15	Hamilton Hall foundation wall water leak repair
16	Mills Library foundation wall water leak repair
17	General Sciences Building foundation water leak repair
18	University Hall replace drainage system and failed floor drain
19	H.G.Thode Library elevator modernization
20	Mills Library window replacement
21	Burke Science Building roof replacement
22	University Hall fire alarm system replacement
23	Various buildings – repair / install fire stops at fire penetrations
24	Replace aging fire hoses in all buildings
25	Psychology replace water main feed to building
26	MDCL modifications to strobic fans to achieve noise compliance
27	Ivor Wynne Centre replace electrical service feeders and buried conduits
28	Perform arc flash study campus wide
29	Kenneth Taylor Hall repair foundation water leak
30	Refectory repair foundation water leak
31	Ivor Wynne Centre south ramp replacement
32	Burke Science Building elevator modernization
33	University Hall roof replacement
34	Kenneth Taylor Hall roof replacement
35	Chester New Hall replace fire alarm system
36	Commons building replace fire alarm system
37	ABB replace constant volume air distribution system
38	Life Sciences Building replace domestic water distribution system
39	Ivor Wynne Centre MCC replacement
40	Life Sciences Building MCC replacement
41	ABB MCC replacement

42	Campus high voltage underground cable replacement
43	Ivor Wynne Centre – Spinal cord – strobic fan noise compliance
44	Nuclear Reactor – modifications to building mechanical systems for noise compliance
45	Alumni Memorial Hall – exhaust fan replacement for noise compliance
46	General Sciences Building – modifications to building mechanical systems for noise compliance
47	H.G.Thode Library foundation wall repair
48	Cootes Bridge repairs
49	Togo Salmon Hall – Freight elevator modernization
50	University Hall – repairs to exterior masonry
51	Hamilton Hall – roof replacement
52	ABB – roof replacement
53	H.G. Thode Library – roof replacement
54	DeGroote School of Business – roof replacement
55	Campus Fire Hydrants repairs
56	Hamilton Hall – replace fire alarm system
57	Life Sciences Building – replace fire alarm system
58	H.G. Thode Library – replace fire alarm system
59	John Hodgins Engineering Annex – repairs to fire alarm system
60	ABB – air handling units replacement
61	Psychology Building – air handling units replacement
62	Install pressure relief valves in various campus buildings
63	E.T. Clarke switch gear replacement (NF 91)
64	John Hodgins Engineering south wing substation and main distribution panels replacement
65	High voltage cables condition testing and infrared scans for switchgears and transformers
66	Applied Dynamics Lab – repair foundation water leak
67	Life Sciences Building – repair foundation water leak
68	Psychology Building window replacement
69	Life Sciences Building replace roofing
70	John Hodgins Engineering building – replace roofing
71	John Hodgins Engineering building – replace fire alarm
72	Mills library – replace air handling units 10 and 11
73	Commons Building – replace Air Handling Units SF1 and 6
74	NF 91 replacement – 2 transformers
75	E.T.Clarke Boiler replacement as part of the CHP project
76	ABB – SIF Project – deferred maintenance work
77	Ivor Wynne Centre – repair structural damage in the basement
78	Togo Salmon Hall – repairs to exterior precast concrete panels
79	John Hodgins Engineering – replace south windows
80	Gilmour Hall – replace windows
81	Burke Science Building – replace entrance doors
82	Biology Greenhouse – replace roofing
83	Institute of Applied Health Science – replace fire alarm system
84	Mills Library – Elevator modernization
85	88 Forsyth Ave – building upgrade

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86	Museum of Arts – replace air handling unit
87	Information Technology Building – replace heat exchangers
88	Chester New Hall – chilled water supply and return piping system replacement
89	General Science Building – basement mechanical room, pumps, distribution system, valves and electrical switchgear replacement
90	Applied Dynamics Lab – replace existing cooling system
91	E.T.Clarke Centre – MCC 3 & 4 replacement
92	Ivor Wynne Centre – Solar collector roof replacement
93	Psychology – courtyard and balcony roof replacement
94	General Sciences Building – fire alarm replacement
95	Togo Salmon Hall – fire alarm replacement
96	Fire Alarm Campus System installation
97	Institute of Applied Health – rebalance air and water distribution systems and replace valves
98	John Hodgins Engineering – replace fumehoods and exhaust system and achieve noise compliance
99	Burke Sciences Building – strobic fan replacement and achieve noise compliance
100	Tandem Accelerator exhaust fan – noise remediation
101	Nuclear Research Building – Strobic fan – noise remediation
102	Mary Keyes – East Meets West Café Exhaust fan noise remediation