McGill

UNVERSITY SERVICES

McGill Green Building Standards

1st issue: January 2014

2nd issue: June 2015

Document in progress

1. INTRODUCTION

McGill University is committed to environmental stewardship and promote the implementation of sustainable design concepts. Many of these concepts are incorporated directly into various sections of the McGill *Design and Technical Standards*. It is the University's expectation that sustainable solutions that require little or no additional cost to the project be included in the design, unless a reason why this is impractical is clearly identified. This section addresses additional requirements and resources with respect to sustainable design and LEED requirements.

This document was developed by Facilities, Operations and Development (FOD) and McGill's Office of Sustainability to guide all actors of construction/renovation projects on McGill buildings. This standard follows principles of the *University's Environmental Policy (2002)* and the *Sustainable Policy (2010)*.

2. DEFINITIONS

What is Sustainability?

Sustainability is based on a simple principle: Everything that we need for our survival and well-being depends, either directly or indirectly, on our natural environment. Sustainability creates and maintains the conditions under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic and other requirements of present and future generations. Sustainability is important to making sure that we have and will continue to have, the water, materials, and resources to protect human health and our environment. (Ref. EPA agency)

What is a Green building? What is a Sustainable Design?

It refers to a structure and processes that are environmentally responsible and resource-efficient throughout a building's life-cycle: from siting to design, construction, operation, maintenance, renovation, and demolition. This requires close cooperation of the design team, the architects, the engineers, and the client at all project stages.[1] The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. (Ref. Wikipedia)

LEED (Canada):

Leadership in Energy and Environmental Design (LEED) is an ecology-oriented building certification program run under the auspices of the Canadian Green Building Council (CaGBC), in Canada.

What is a Life Cycle Cost analysis (LCCA)?

A Life cycle cost analysis (LCCA) is a tool to determine the most cost-effective option among different competing alternatives to do a project, when each is equally appropriate to be implemented on technical grounds. (Ref. Wikipedia) Life cycle cost analysis includes all aspects from cradle to grave such as design, construction, operation, demolition, and environmental impacts.

What is Integrated Design?

Integrated design is a collaborative method for designing buildings which emphasizes the development of a holistic design.

Conventional building design usually involves a series of hand-offs from owner to architect, from builder to occupant. This path does not invite all affected parties into the planning process, and therefore does not take into account their needs, areas of expertise, or insights. In some cases, using the conventional method, incompatible elements of the design are not discovered until late in the process when it is expensive to make changes. In contrast, the integrated design process requires multidisciplinary collaboration, including key stakeholders and design professionals, from conception to completion. Decision-making protocols and complementary design principles must be established early in the process in order to satisfy the goals of multiple stakeholders while achieving the overall project objectives.

In addition to extensive collaboration, integrated design involves a “whole-building design” approach. A building is viewed as an interdependent system, as opposed to an accumulation of its separate components (site, structure, systems, and use). The goal of looking at all the systems together is to make sure they work in harmony rather than against each other.

Integrated design has evolved in conjunction with the rise of multidisciplinary design firms and sustainable design. It frequently begins with a charrette or eco-charrette, an intensive design workshop, in which many stakeholders gather to set goals and identify strategies for achieving the desired outcomes. (Ref. Wikipedia)

3. RELATED SECTIONS

McGill Design Standards
McGill Technical Standards
McGill Energy Guidelines

4. RELATED DOCUMENTS AND FORMS

McGill Baseline LEED Checklist
McGill Life cycle Cost Analysis
McGill Energy Guideline
Design Standards Conformity form

5. REQUIREMENTS FOR MCGILL UNIVERSITY CONSTRUCTION/RENOVATION PROJECTS

This table summarizes the requirements for different project types. Levels of requirements will be described in the related category. If for valid reasons a deviation from the standards becomes necessary, it must be addressed in the "Variance Form".

Project types are the following:

A New building or Building-wide, full-gut renovation: more than 50% of the building spaces

B Fit-Outs, Partial building interior fit-outs: more than 500 m², at least one building storey and multiple building systems

C System upgrades, Energy impact: change of more than 50% of a system

D All other projects: no or limited energy impact

	Project types			
Requirements	**A** New building or Building-wide, full-gut renovation	**B** Fit-Outs Partial building interior fit-outs	**C** System upgrades with Energy impact	**D** All other projects
1. Design and Technical Standard Conformity	Mandatory			
2. Integrated Design	Level 1		Level 2	
3. Life Cycle Costing Analysis	Level 1		Level 2	
4. Energy Modeling/Utility Metering	Level 1	Level 2		N/A
5. LEED Certification and McGill-Mandatory LEED Credits	Level 1	Level 2	Level 3	

Table 1: Project Types and Requirements

1. DESIGN AND TECHNICAL STANDARDS CONFORMITY

Design Standards, for the design and construction of facilities at McGill University, were created to ensure maximum quality and value in construction projects through uniformity, system or component quality, compatibility, functionality, and ease of maintenance. These Standards must be applied by all

consultants (Architects, Engineers, lighting consultant, acoustical consultant, etc.) in the preparation of construction documents for any new construction or renovation project.

For every project, the *Design Standards Conformity Form* must be filled in by all consultants working on the construction documents, confirming that the design and specifications are in conformity with McGill's Design and Technical Standards. Any derogation to the Standards must be submitted to the owner for approval using the *Variance Request Form*. If the requestor is not satisfied with the decision, the matter can be appealed to the Director of Design Services. The *Design Standard Conformity Form* and, if applicable, the *Variance Request Form*, must be submitted with all documents at the Owner's Review stage.

2. INTEGRATED DESIGN AND PROJECT SUSTAINABILITY SUMMARY

In order to assist project teams in the vetting and setting of sustainable goals and objectives, McGill has identified two levels of formal, integrated design requirements for projects depending on their scope of work. The first meetings of all projects should clarify the design objectives with respect to sustainable design, in conjunction with McGill's Project Manager. At the end of the Schematic Design Phase, the design team shall complete a *Project Sustainability Summary* to be posted on the FOD website. This summary should be updated if required at the end of the project. The requirements for integrated design are as followed:

Level 1

At least three integrated design charettes, the first of which should happen at the time of the project kickoff, must include identification and tracking of project goals and analysis of the life cost impacts of potential design options. Charettes should include representation of major stakeholders including occupants and operations staff.

Level 2

At least two integrated design meeting, the first of which should happen at the time of project kickoff, must specifically address goal setting and tracking that sets expectations and evaluates project success. These meetings should include representation of major stakeholders including occupants and operations staff.

3. LIFE CYCLE COST ANALYSIS

In order to assist project teams assess the total cost of ownership impacts that decisions have throughout the course of design, McGill has identified various levels of Life Cycle Cost Analysis for projects depending on their scope of work. Responsible Life Cycle Cost Analysis includes an analysis of utility rebated, grants, stimulus funding, or other alternative funding sources. It is best practice to include building operations staff in all LCCA and value engineering review. At minimum, the requirements are as follows:

Level 1

Life Cycle Cost Analysis will be performed to quantify the 20-year impacts on GHG, energy costs, maintenance costs, etc. The scope of LCCA will vary depending on project, but will typically include envelope, HVAC, electrical, and many other building systems. Requirements by design phase include:

- Planning/conceptual design: initial LCCA templates with supporting narratives for optional design elements with major budget implications;
- Schematic design: LCCA templates presenting options for major energy-consuming systems;
- Value engineering (any phase): LCCA templates presenting impacts beyond initial capital outlay.

Level 2

Life Cycle Cost Analysis should be performed to compare design options based on 20-year impacts on GHG, energy cost, maintenance costs, etc. The scope of LCCA will vary depending on project, but will typically include envelope, HVAC, electrical, and many other building systems. Requirements by design phase include:

- Design: LCCA template for design options with 20-year impacts on GHG, energy costs, maintenance costs, etc.

4. ENERGY MODELING AND UTILITY METERING

In order to facilitate efficient building operations, assist with the tracking of savings from energy conservation measures, and to allow engagement of building occupants, McGill has identified various levels of metering and sub-metering for projects depending on their scope of work. These requirements are based on the premise that "you cannot manage what you cannot measure''. The requirements are as follows:

Level 1

Complete energy model of the building with recognized software (SIMEB, eQuest, EE4-CBIP, etc.) comparing the proposed design with the Model National Energy Building Code (NEBC) 2011 or ASHRAE 90.1-2007.

- Separate metering of all utilities entering the building and sub-metering of main cafeterias, parking garages, server rooms or major IT cabinets, food outlets and other shops, HVAC systems, and chillers.
- Energy intensity target: 5% more efficient than NEBC 2011 or 24% more efficient than ASHRAE 90.1-2007.

Level 2

- Consultant must estimate the impact of the project on energy use and greenhouse gas emissions by estimating the consumption of the area and systems before and after project implementation. Use of McGill's energy fiche is recommended.
- Sub-metering of main cafeterias, parking garages, food outlets, and chillers. Sub-metering of HVAC system if major upgrade of the system.

6. LEED CERTIFICATIONS AND MCGILL MANDATORY LEED CREDITS

McGill requires projects to achieve prescriptive levels of environmental performance according to project size and scope. New construction and major projects (type A) are required to register and get certified using the *Canadian Green Building Council (CaGBC) Leadership in Energy and environmental Design (LEED)* green building certification rating system. All projects are encouraged to pursue aggressive levels of energy efficiency and sustainable design using recognized performance standards as design minimums. Minimum performance standards for McGill will be as follow:

Level 1

All projects must achieve at least a **LEED Gold certification** (using the appropriate rating system), recognizing that projects achieve all McGill-mandatory LEED credits as a baseline (see credit list, level 1 column), if work affecting those systems is included in the scope. All projects will produce an assessment of the maximum number of LEED credits achievable and the costs to the project for achieving these objectives.

Level 2

All projects must achieve at least a **LEED Silver certification equivalence** (using the appropriate rating system), recognizing that projects achieve all McGill-mandatory LEED credits as a baseline (see credit list, level 2 column), if work affecting those systems is included in the scope. LEED certification is encouraged as deemed appropriate by University Services ''Sustainable Construction Working Group''. All projects will include a LEED feasibility section in the initial design submission.

Level 3

Project performance must meet the requirements of **selected** McGill-mandatory **LEED credits** if work affecting those systems is included in the scope (see credits list, level 3 column). LEED certification is encouraged as deemed appropriate by University Services ''Sustainable Construction Working Group''.

7. MCGILL-MANDATORY LEED CREDITS

Depending on the level required in tables 2 and 3, follow McGill-mandatory LEED credits according to project types (see table 1). Provide LEED reports identified in the tables, to McGill Project manager.

For the LEED CI rating system, level=1 and -2 McGill-mandatory credits add up to 25 possible points (+4 credits under Sustainable Sites, possible for McGill projects on the Downtown Campus), which is equivalent to a LEED Silver certification. For level 3, McGill-mandatory credits add up to 19 possible points (+4 credits under Sustainable Sites, possible for projects on the Downtown Campus), which is equivalent to a LEED certified certification.

For the LEED NC rating system, level 1 McGill-mandatory credits add up to 29 possible points (+16 credits under Sustainable Sites, possible for projects on the Downtown Campus), which is equivalent to a LEED Certified certification. The LEED NC rating system does not apply to type B projects because these projects are interior fit-outs.

Table 2: List of LEED Credits for LEED CI

Building with purpose

LEED Canada CI 2006 Certification
McGill minimum required credits

Credit by Credit						
Levels 1 and 2	Level 3	Total Points	Sustainable Sites		*TEMPORARY NOTES*	*Report required*
		3	c1 - **Site Selection**		N/A	
		1	c2 - **Development Density and Community Connectivity**		possible credit for Downtown	
		1	c3.1 - **Alternative Transportation**, Public Transportation Access		possible credit for Downtown	
		1	c3.2 - **Alternative Transportation**, Bicycle Storage & Changing Rooms		possible credit for Downtown	
		1	c3.3 - **Alternative Transportation**, Parking Capacity		possible credit for Downtown	
			Water Efficiency			
1	1	1	c1.1 - **Water Use Reduction, 20% reduction**		obligation by the Qc. Gov.	YES
		1	c1.2 - **Water Use Reduction, 30% reduction**		difficult in existing buildings/ drainage slope and maintenance	
			Energy & Atmosphere			
yes	yes	-	p1 - **Fundamental Commissioning**		can be done by member of the eng. Firm	YES
yes	yes	-	p2 - **Minimum Energy Performance**		follow ASHRAE or Energy code 2005	YES
		-	p3 - **CFC Reduction in HVAC&R Equipment**		No, too demanding	
2	2	3	c1.1 - **Optimize Energy Performance, Lighting Power**		possible but only 2 credits to alow for choices	
1	1	1	c1.2 - **Optimize Energy Performance, Lighting Controls**		possible	
2	2	2	c1.3 - **Optimize Energy Performance, HVAC**		possible	
1	1	2	c1.4 - **Optimize Energy Performance, Equipment &Appliances**		possible but only 1 credit to alow for required equip.	
		1	c2 - **Enhanced Commissioning**		ONLY for C cathegory of reno, complete HVAC retro.	YES
		2	c3 - Energy Use, **Measurement & Payment Accountability**		No, too many meters	
		1	c4 - **Green Power**		No, long term general vision best than project by project approach	
			Materials & Resources			
yes	yes	-	p1 - **Storage & Collection of Recyclables**		possible credit, to be seen in link with building maint.	
		1	c1.1 - **Tenant Space, Long-Term Commitment**		Not possible in the university context	
		1	c1.2 - **Building Reuse:** Maintain 40% of interior Non-Structural Components		Not necessarly possible, depending on the project	
		1	c1.3 - **Building Reuse:** Maintain 60% of interior Non-Structural Components		Not necessarly possible, depending on the project	
1	1	1	c2.1 - **Construction Waste Management, Divert 50% From Landfill**		already in our Standards	
1	1	1	c2.2 - **Construction Waste Management, Divert 75% From Landfill**		already in our Standards	YES
		1	c3.1 - **Materials Reuse, 5%**		Not necessarly possible, depending on the project	
		1	c3.1 - **Materials Reuse, 10%**		Not necessarly possible, depending on the project	
		1	c3.1 - **Materials Reuse, Furniture and Furnishings**		Not necessarly possible, depending on the project	
		1	c4.1 - **Recycled Content, 10% (post-consumer + 1/2 pre-consumer)**		Not necessarly possible, depending on the project	
		1	c4.2 - **Recycled Content, 20% (post-consumer + 1/2 pre-consumer)**		Not necessarly possible, depending on the project	
		1	c5.1 - **Regional Materials, 20% Manufactured Regionally**		Not necessarly possible, depending on the project	use MAT
		1	c5.2 - **Regional Materials, 10%Extracted and Manufactured Regionally**		Not necessarly possible, depending on the project	
		1	c6 - **Rapidly Renewable Materials**		Not necessarly possible, depending on the project	
1	1	1	c7 - **Certified Wood**		already in our Standards	
			Indoor Environmental Quality			
		-	p1 - **Minimum IAQ Performance**		No, too demanding	
yes	yes	-	p2 - **Environmental Tobacco Smoke (ETS) Control**		already	
1		1	c1 - **Outdoor Air Delivery Monitoring**		CO2 sensors where >25 people/1000 sq.ft.	
		1	c2 - **Increased Ventilation**		No because we need to treat more air	
1	1	1	c3.1 - **Construction IAQ Management Plan:** During Construction		possible and good practice, filters and…	
		1	c3.2 - **Construction IAQ Management Plan:** Before Occupancy		No because high quantity of air flush	
1	1	1	c4.1 - **Low-Emitting Materials:** Adhesives & Sealants		already in our Standards	
1	1	1	c4.2 - **Low-Emitting Materials:** Paints and Coating		already in our Standards	
1	1	1	c4.3 - **Low-Emitting Materials:Carpet** Systems		already in our Standards	use MAT
1	1	1	c4.4 - **Low-Emitting Materials:** Composite Wood and Laminate Adhesives		already in our Standards	
1	1	1	c4.5 - **Low-Emitting Materials:** Systems Furniture and Seating		already in our Standards	
1	1	1	c5 - **Indoor Chemical & Pollutant Source Control**		to follow	
1	1	1	c6.1 - **Controllability of System,** Lighting		No, but to explore in details	
		1	c6.2 - **Controllability of System,** Temperature and Ventilation		No, too demanding for operation	
1		1	c7.1 - **Thermal Comfort,** Compliance		No, too demanding for operation	
		1	c7.2 - **Thermal Comfort,** Monitoring		No, too demanding for operation	
1		1	c8.1 - **Daylight & Views,** Daylight 75% of Spaces		Not necessarly possible, existing buildings	
		1	c8.2 - **Daylight & Views,** Daylight 90% of Spaces		Not necessarly possible, existing buildings	
1		1	c8.3 - **Daylight & Views,** Views for 90% of Seated Spaces		Not necessarly possible, existing buildings	
			Innovation in Design			
1		1	c1.1 - **Innovation**	Occupant education	idea from Harvard, interesting to have	
1		1	c1.2 - **Innovation**	low mercury lighting	possible easy credit	
		1	c1.3 - **Innovation**			
		1	c1.4 - **Innovation**			
		1	c1.5 - **Innovation**			
1		1	c2 - **LEED® Accredited Professional**		already asked in tender for services on our big projects	

Table 3: LEED credits list for LEED NC

Building with purpose

LEED Canada NC 2009 Certification
McGill minimum required credits

Credit by Credit						
Level 1	Level 3	Total Points	Sustainable Sites		*TEMPORARY NOTES*	*Report required*
yes	yes	-	p1 - **Construction Activity Pollution Prevention**		good practice, and possible to achieve, min.$	
		1	c1 - **Site Selection**		N/A	
		3, 5	c2 - **Development Density and Community Connectivity**		possible credit for Downtown	
		1	c3 - **Brownfield Redevelopment**		N/A	
		3, 6	c4.1 - **Alternative Transportation**, Public Transportation Access		possible credit for Downtown	
		1	c4.2 - **Alternative Transportation**, Bicycle Storage & Changing Rooms		possible credit for Downtown	
		3	c4.3 - **Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles		dealt with as a whole, not by projects	
		2	c4.4 - **Alternative Transportation**, Parking Capacity		possible credit for Downtown	
		1	c5.1 - **Site Development**, Protect and Restore Habitat		Not necessarily possible, depending on the project	
		1	c5.2 - **Site Development**, Maximize Open Space		Not necessarily possible, depending on the project	
		1	c6.1 - **Stormwater Design**, Quantity Control		Not necessarily possible, depending on the project	
		1	c6.2 - **Stormwater Design**, Quality Control		Not necessarily possible, depending on the project	
1	1	1	c7.1 - **Heat Island Effect**, Non-Roof		already in our Standards	YES
1	1	1	c7.2 - **Heat Island Effect**, Roof		already in our Standards	YES
1	1	1	c8- **Light Pollution Reduction**		already in our Standards	
			Water Efficiency			
		-	p1 - **Water Use Reduction**		obligation by the Qc. Gov.	YES
2.4	2.4	2, 4	c1 - **Water Efficient Landscaping**		possible if project includes landscaping	
		2	c2 - **Innovative Wastewater Technologies**		Not necessarily possible, depending on the project	
		2 - 4	c3 - **Water Use Reduction**		difficult in existing buildings/ drainage slope and maintenance	
			Energy & Atmosphere			
yes		-	p1 - **Fundamental Commissioning of Building Energy Systems**		> 50 000sq. Ft, by third partie	YES
yes	yes	-	p2 - **Minimum Energy Performance**		follow ASHRAE or Energy code 2005	YES
		-	p3 - **Fundamental Refrigerant Management**		No	
9		1 - 19	c1 - **Optimize Energy Performance**		35% > MNECB	YES
		1 - 7	c2 - **On-site Renewable Energy**		No, wider vision than on project bases	
2		2	c3 - **Enhanced Commissioning**		only on project of cathegory A	YES
		2	c4 - **Enhanced Refrigerant Management**		no, too demanding	
		3	c5 - **Measurement & Verification**		No, too many meters	
		2	c6 - **Green Power**		No, long term general vision best than project by project approach	
			Materials & Resources			
yes	yes	-	p1 - **Storage & Collection of Recyclables**		possible credit, to be seen in link with building maint.	
		1 - 3	c1.1 - **Building Reuse:** Maintain Existing Walls, Floors, and Roof		Not necessarily possible depending on the project	
		1	c1.2 - **Building Reuse:** Maintain Interior Non-Structural Elements		Not necessarily possible depending on the project	
2	2	1 - 2	c2 - **Construction Waste Management**		already in our Standards	YES
		1 - 2	c3 - **Materials Reuse**		Not necessarily possible, depending on the project	use MAT
		1 - 2	c4 - **Recycled Content**		Not necessarily possible, depending on the project	
		1 - 2	c5 - **Regional Materials**		Not necessarily possible, depending on the project	
		1	c6 - **Rapidly Renewable Materials**		Not necessarily possible, depending on the project	
1	1	1	c7 - **Certified Wood**		already in our Standards	
			Indoor Environmental Quality			
		-	p1 - **Minimum IAQ Performance**		No, too demanding	
yes	yes	-	p2 - **Environmental Tobacco Smoke (ETS) Control**		already	
		1	c1 - **Outdoor Air Delivery Monitoring**		CO2 sensors where >25 people/1000 sq.ft.	
		1	c2 - **Increased Ventilation**		No because we need to treat more air	
1	1	1	c3.1 - **Construction IAQ Management Plan:** During Construction		possible and good practice, filters and…	
		1	c3.2 - **Construction IAQ Management Plan:** Before Occupancy		No because high quantity of air flush	
1	1	1	c4.1 - **Low-Emitting Materials:** Adhesives & Sealants		already in our Standards	use MAT
1	1	1	c4.2 - **Low-Emitting Materials:** Paints and Coating		already in our Standards	
1	1	1	c4.3 - **Low-Emitting Materials:** Flooring Systems		already in our Standards	
1	1	1	c4.4 - **Low-Emitting Materials:** Composite Wood and Agrifibre Products		already in our Standards	
		1	c5 - **Indoor Chemical & Pollutant Source Control**		to follow	
		1	c6.1 - **Controllability of System,** Lighting		No, but to explore in details	
		1	c6.2 - **Controllability of System,** Thermal Comfort		No, too demanding for operation	
		1	c7.1 - **Thermal Comfort,** Design		No, too demanding	
		1	c7.2 - **Thermal Comfort,** Verification		No, too demanding	
1		1	c8.1 - **Daylight & Views,** Daylight		Not necessarily possible, existing buildings	
1		1	c8.2 - **Daylight & Views,** Views		Not necessarily possible, existing buildings	
			Innovation in Design			
1		1	c1.1 - **Innovation**	Occupant education	idea from Harvard, interesting to have	
1		1	c1.2 - **Innovation**	low mercury lighting	possible easy credit	
		1	c1.3 - **Innovation**			
		1	c1.4 - **Innovation**			
		1	c1.5 - **Innovation**			
1		1	c2 - **LEED® Accredited Professional**		already asked in tender for services on our big projects	
			Regional Priority			
		1	c1 - **Durable Building**			
		1	c2.1 - **Priority**			
		1	c2.2 - **Priority**			
		1	c2.3 - **Priority**			

8. SUSTAINABLE PRODUCTS SELECTION

For the selection of building products, refer to the *MAT (Material Analysis Tool) website* http://www.materialanalysis.ca/en . This site was created to assist consultants and McGill in choosing healthier and environmentally-responsible products. Performance criteria used for this assessment are:

- *Certification of the company, product or product attributes*
- *Durability of the product*
- *Health implications of the product on users and occupants*
- *Rapidly-renewable content of the product*
- *Recycled content of the product and packaging*
- *Recyclability of the product and packaging*
- *Region of manufacture and extraction*

In order to use a product which is not listed in MAT, the consultant should ask the manufacturer to enter the product on the website in order to rank it according to McGill's criteria. Products must be chosen among those having an equal or greater than (= or >5).

However, if some specific brands and models are prescribed in the Technical Standards, it is mostly for reasons of ease of maintenance and replacement of parts.