

SUSTAINABLE PROJECT ANALYSIS

INTRODUCTION:

The following is a brief outline of the prerequisites and credits based on the LEED Canada NC 2009 document, which applies to new construction, as well as major renovations of commercial and institutional buildings. This analysis is general in its terminology, content, reference standards, and requirements, and a further understanding of the LEED sections is needed to fully understand the scope of each. At the end of this analysis is a list of additional references that will assist with this understanding.

There are five major LEED sections included below. Each section is made up of both prerequisites and credits. Prerequisites are **required** to achieve any level of LEED certification, and are noted as '**p**'. Credits are the fundamental LEED criteria by which certification is achieved, and are noted as '**c**'.

The City of Victoria's benchmark for renovations is LEED Silver, which would be very challenging to achieve if the existing building is to be retained and reused. While there are two credits in LEED that address building reuse, the points available through these two credits are minimal in comparison to the points (and ultimately, operational cost savings) that can be achieved through the energy efficiency of a new building.

SUSTAINABLE SITES (SS):

SSp1 – Construction Activity Pollution Prevention

- a) If a renovation consists only of work within the existing facility, then there is very limited pollution control required for this project.
- b) If a renovation is to include a dryland expansion, then this work will need to be determined once a design has been established. This is relevant to the amount of civil and landscape work that will be carried out on the site. This prerequisite requires an erosion, sedimentation, and airborne dust control plan from the contractor before and during construction.

SSc1 – Site Selection

- a) If a renovation consists only of work within the existing facility, then the project will have achieved this credit by virtue of the fact that it is a previously developed site (i.e. the project is not building on farmland, ecologically sensitive land, land close to wetlands, streams and rivers, public parkland).
- b) If a renovation is to include a dryland expansion, then this credit is limited in its scope due to the nature of the project. The new construction is directly related to the existing structure and will limit the choice of site selection.

SSc2 – Development Density and Community Connectivity

The general requirement for LEED is to have the density at a minimum FSR of 1.38. This building has an FSR of 0.6, so will not be able to achieve the density portion. It is likely,

however, to be able to achieve the Community Connectivity portion, in that it has at least ten (10) basic community services located within an 800m radius of the project.

SSc3 – Brownfield Redevelopment

This credit is intended to rehabilitate contaminated sites. This site is not known to be contaminated.

SSc4.1 – Alternative Transportation: Public Transportation Access

There are multiple bus routes accessible to the building occupants. Major bus routes within 400m of the facility are located along Quadra Street, Blanshard Street, and Bay Street.

SSc4.2 – Alternative Transportation: Bicycle Storage and Changing Rooms

The LEED requirement for bike storage and changing rooms is for 5% of the fulltime equivalent occupants. Adequate bike storage can be made available on the site in a renovation scenario. Existing changerooms provide sufficiently to meet LEED requirements.

SSc4.3 – Alternative Transportation: Low-emitting & Fuel Efficient Vehicles

This is a difficult credit to achieve for most projects, and would not be expected to be achieved on this project.

SSc4.4 – Alternative Transportation: Parking Capacity

- a) In the case of a renovation within the existing building: given the small number of available parking spaces, it is possible to meet this credit's intent by virtue of the fact that it will not exceed the minimum local zoning requirements. However, a variance may be required from the city.
- b) In the case of a dryland expansion, then parking capacity will need to be designed to meet the requirements of this credit.

SSc5.1 – Site Development: Protect and Restore Habitat

With the large park space adjacent to the facility, it would likely be possible to achieve this credit.

SSc5.2 – Site Development: Maximize Open Space

Again, with the large park space adjacent to the facility, it would likely be possible to achieve this credit.

SSc6.1 – Stormwater Design: Quantity Control

This credit requires the implementation of a stormwater management plan that limits and controls the peak discharge rate on site with the use of pervious site materials, and is attainable.

SSc6.2 – Stormwater Design: Quality Control

A stormwater management plan must use Best Management Practices to treat stormwater runoff and is expected to be achievable.

SSc7.1 – Heat Island Effect: Non-roof

Under the scope of a renovation, it may be possible to achieve this credit through re-design of hardscape areas with trees and pervious paving materials and by using architectural devices or structures.

SSc7.2 – Heat Island Effect: Roof

Renovation of the existing building will likely require a structural upgrade to the roofing system. As such, it may be possible to achieve this credit through re-design of the roof, using roofing materials with a high solar reflectance or using a vegetated roofing system.

SSc8 – Light Pollution Reduction

Existing exterior fixtures should be evaluated and if necessary, replaced with full cutoff luminaires to limit light pollution. New exterior fixtures should meet the same requirements.

Interior lighting should limit the maximum energy density of the fixtures near the windows at the exterior walls to fall within the structure and not to spill past the plane of the windows.

WATER EFFICIENCY (WE):

WEp1 – Water Use Reduction

The intent of this prerequisite is to use 20% less water than the LEED baseline, and can be achieved by the use of low flush toilets, waterless urinals, low flow showers and faucets, and with metering controls. The use of captured rainwater can also be considered.

WEc1 – Water Efficient Landscaping

Options for this credit are to reduce the use of potable water for landscaping by either 50% or 100%. Through efficient landscape re-design, either of these two options is possible.

WEc2 – Innovative Wastewater Technologies

Interior renovations could allow for reworking of the plumbing systems to include water conserving fixtures or the use of greywater for sewage conveyance.

WEc3 – Water Use Reduction

The intent of this credit is to further increase water efficiency by reducing the amount of water used by 30%, 35%, or 40%.

ENERGY AND ATMOSPHERE (EA):

EAp1 – Fundamental Commissioning of Building Energy Systems

A Commissioning Authority must be appointed to lead, review and oversee the project's energy related systems.

EAp2 – Minimum Energy Performance

The project must demonstrate cost improvement (percentage-wise, using a LEED baseline) in its energy systems.

EAp3 – Fundamental Refrigerant Management

The project must demonstrate zero use of CFC-based refrigerants for new HVAC&R systems, and a comprehensive phase-out conversion prior to project completion for existing buildings.

EAc1 – Optimize Energy Performance (1-19 points)

An extension of EAp2 – Minimum Energy Performance, this credit's intent is to achieve increasing levels of energy performance (percentage-wise, using a LEED baseline). This can be completed by following the general parameters of ASHRAE 90.1-2007 or Model National Energy Code for Buildings (MNECB) 1997.

EAc2 – On-Site Renewable Energy (1-7 points)

Points for this credit are awarded based on the percentage of renewable electrical energy generated on site. Possible renewable energy systems to be considered include solar, wind, geothermal, water, or bio-based systems to provide electric power on-site.

EAc3 – Enhanced Commissioning (2 points)

The basic commissioning of the mechanical and electrical systems is advantageous for the owner to ensure that the new equipment is functional and is achieving the desired design level parameters. Although the enhanced commissioning is more extensive than the fundamental commissioning required by prerequisite EAp1, commissioning "can significantly reduce repairs, construction change orders, energy costs, and maintenance and operation costs" (CaGBC). If new mechanical equipment is to be installed in this facility, enhanced commissioning is highly recommended.

EAc4 – Enhanced Refrigerant Management (2 points)

This credit calls for zero use of refrigerants, or refrigerants that minimize or eliminate the emission of compounds that contribute to ozone depletion and global climate change (based on LEED formulas). Additionally, fire suppression systems may not contain ozone-depleting substances such as CFC's, HCFC's or halons.

EAc5.1 – Measurement and Verification: Base Building

This credit provides for ongoing accountability of building energy consumption over time. It does not apply for buildings specified as New Construction (either new building or major renovation) under LEED Canada NC 2009.

EAc6 – Green Power (2 points)

The intent of this credit is to encourage the development and use of grid-source, renewable energy technologies on a net zero pollution basis. The purchase of power credits for a minimum two-year period will satisfy this demand.

MATERIALS AND RESOURCES (MR):

MRp1 – Storage and Collection of Recyclables

- a) If a renovation consists only of work within the existing facility, then there is limited opportunity to provide an easily-accessed, dedicated area for the collection of recyclables (approx. 225 sq.ft. required for existing facility).
- b) If a renovation is to include a dryland expansion, then this is an easily achieved credit by adding the required area to the design.

MRc1.1 – Building Reuse: Maintain Existing Walls, Floors, and Roof (1-3 points)

The purpose of this credit is to extend the life cycle of an existing building, conserve resources, retain cultural resources, reduce waste, and reduce environmental impacts of new buildings as they relate to materials manufacturing and transport. Points are awarded for percentage of building re-use. This is an achievable credit for this renovation project.

MRc1.2 – Building Reuse: Maintain Interior Non-Structural Elements (1 point)

Similar to the previous credit in its intent, this credit requires the re-use of interior non-structural elements in at least 50% of the completed building (including additions). Achieving this credit is dependent upon design.

MRc2 – Construction Waste Management (1-2 points)

Points are awarded for this credit based on the percentage of construction waste that is recycled or salvaged, and is an achievable credit.

MRc3 – Materials Reuse (1-2 points)

Points are awarded relative to the percentage of re-used, salvaged or refurbished materials, based on cost. These materials must no longer be able to serve their original functions and must be installed for a different use or in a different location.

MRc4 – Recycled Content (1-2 points)

This credit requires the use of materials with recycled content. Examples of targeted products are the flyash content of cast-in-place concrete, and the recycled content in rebar. Points are awarded on a percentage basis (based on cost).

MRc5 – Regional Materials (1-2 points)

Building materials or products must be extracted, harvested, recovered and processed within 800km of the final manufacturing site (2400km if shipped by rail or water). The final manufacturing site must be within 800km of the project site (2400km if shipped by rail or water).

MRc6 – Rapidly Renewable Materials (1 point)

Use rapidly renewable materials and products for 2.5% of the total value of all building materials in the project. Examples of rapidly renewable materials include cork, bamboo, natural rubber, wheat, cotton, straw, linseed (linoleum). Linoleum flooring alone can possibly

achieve this credit; however, that is entirely dependent upon design, and whether the renovation is within the existing building or includes a dryland expansion.

MRc7 – Certified Wood (1 point)

A minimum of 50% (based on cost) of wood-based materials must be made of wood that is certified in accordance with the Forest Stewardship Council's (FSC) Principles and Criteria. Components will include structural and general dimensional framing, flooring, sub-flooring, wood doors and finishes. This is a somewhat difficult credit to achieve as yet.

INDOOR ENVIRONMENTAL QUALITY (IEQ):

IEQp1 – Minimum Indoor Air Quality Performance

Meet the requirements of ASHRAE 62.1-2007 to provide a minimum indoor air quality (IAQ) performance.

IEQp2 – Environmental Tobacco Smoke (ETS) Control

Prohibit smoking within the building and within 25 feet of entries, outdoor air intakes, and operable windows.

IEQc1 – Outdoor Air Delivery Monitoring (1 point)

Install permanent monitoring systems to ensure the ventilation systems maintain designed requirements.

IEQc2 – Increased Ventilation (1 point)

Improve the IAQ for the health and well-being of the building occupants.

IEQc3.1 – Construction IAQ Management Plan: During Construction (1 point)

Develop and implement an IAQ Management Plan to reduce IAQ problems resulting from construction activities, for the health and well-being of the construction workers and building occupants.

IEQc3.2 – Construction IAQ Management Plan: Before Occupancy (1 point)

Similar to the previous credit, an IAQ Management Plan must be developed and implemented to provide for a "clean" building prior to occupancy. This is accomplished in a multitude of ways. The mechanical pre-occupancy process should include a flush out procedure to ensure that lingering VOCs and dust created during construction are removed before the final occupancy permit is issued.

IEQc4.1 – Low-Emitting Materials: Adhesives and Sealants (1 point)

IEQc4.2 – Low-Emitting Materials: Paints and Coatings (1 point)

IEQc4.3 – Low-Emitting Materials: Flooring Systems (1 point)

IEQc4.4 – Low-Emitting Materials – Composite and Laminate Adhesives (1 point)

Credit intent is to reduce indoor air contaminants that odourous, irritating or harmful to building occupants. The above four credits are now standard items to be specified. Due care should be taken in choosing the products for construction.

IEQc5 – Indoor Chemical and Pollutant Source Control (1 point)

The intent of this credit is to protect building occupants from hazardous particulates and chemical pollutants. Methods for achieving this include floor grills at the entrance ways to stop contaminants from entering the building, and sufficiently ventilating janitorial, garbage, or high volume printing spaces to the outside.

IEQc6.1 – Controllability of Systems: Lighting (1 point)

Provide a high level of lighting system control for 90% of building occupants. This is potentially an achievable credit for a high level renovation.

IEQc6.2 – Controllability of Systems: Thermal Comfort (1 point)

Provide a high level of thermal comfort system control by individual occupants or groups in multi-occupant spaces. Methods for achieving this credit may be a combination of operable windows and mechanical controls. This could be achievable in a high level renovation, though would be difficult in a lesser renovation.

EQc7.1 – Thermal Comfort: Design (1 point)

EQc7.2 – Thermal Comfort: Verification (1 point)

Provide a comfortable thermal environment through good HVAC system design, and provide ongoing assessment of the system over time. A high level renovation could possibly achieve this credit, as could a new building. A lesser renovation would have difficulty.

EQc8.1 – Daylight and Views: Daylight (1 point)

EQc8.2 – Daylight and Views: Views (1 point)

This may be a difficult credit to achieve for an existing building with window locations already in place. This is would have a greater chance of success if a dryland expansion were to be involved; however, it would still be a difficult credit given the nature of the buildings being renovated and/or designed.

INNOVATION AND DESIGN PROCESS (ID):

IDc1 – Innovation in Design (1-5 points)

Credits achieved for exceptional performance about the requirements set by this rating system.

IDc2 – LEED Accredited Professional (1 point)

Having a LEED Accredited Professional as the LEED Coordinator will satisfy this requirement.

REGIONAL PRIORITY (RP):

RPc1 – Durable Building (1 point)

Develop and implement a Building Durability Plan. This is potentially achievable for a new building, but unlikely for a renovated building.

RPc1 – Regional Priority (1-3 points)

Credits achieved for addressing geographically-specific environmental priorities related to any of the previously listed LEED credits.

REFERENCE STANDARDS:

LEED Canada Reference Guide for Green Building Design and Construction 2009
LEED Canada 2009 Supplementary Energy Modelling Guidelines
ASHRAE 90.1-2007 Energy Standard for Buildings Except Low-Rise Residential Buildings
(referenced in LEED Canada-NC)
Model National Energy Code for Buildings (MNECB) 1997
ASHRAE 62.1-2007 Ventilation for Acceptable Indoor Air Quality (referenced in LEED Canada-NC)
ASHRAE 55-2004 Thermal Environmental Conditions for Human Occupancy (referenced in LEED
Canada-NC)
IESNA Standard 90.1-2007 Energy Standard for Buildings Except Low-Rise Residential Lighting
(referenced in LEED Canada-NC)
CSA S478-95 (R2007) Guidelines on Durability in Buildings