

# Appendix 'G'

## (Green Building Standards)

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## Overview

The Alberta Infrastructure Green Building Standards apply to all capital projects and should be included in all Requests for Proposals issued for new projects and referenced in contracts for design consultants and construction managers. These standards are intended to assist in establishing Alberta Infrastructure as an internationally recognized leader in green building and are an essential component of the Province's commitment to sustainability, including the Climate Leadership Plan and the major goals of reducing methane emissions (GHG emission reduction), and ending pollution from coal-fired electricity generation (GoA, 2016).

The Green Building Standards identify a minimum level of design and process requirements for all new construction and renovation projects, while providing enough flexibility for individual project teams to meet project goals. The Standards also include recommendations that project teams should attempt to achieve. The requirements and recommendations are organized within four categories that are aligned with Infrastructure's four project tiers as described below.

Tier 1	Tier 2	Tier 3	Tier 4
New Buildings or Major Renovations	Major Modernizations or Building Fit-outs of >\$1million	System Upgrades to Buildings of <\$1million	Non-Energy Projects
New Buildings, Building Additions and Building-Wide Full-Gut Renovations that include Building Envelope	Partial Building Interior Fit-Outs with one or more of HVAC, Electrical Systems, Interior Partitioning or Other Individual Systems within the Scope.	Limited Scope Projects with Energy and GHG Impacts with one or more Systems.	Limited Scope Projects with no or Limited Energy and GHG Impacts (Landscape project, for example)

**Tier 1:** Tier 1 projects include all new buildings, major building additions and full building renovations with a comprehensive scope that includes building envelope system modifications, room configuration modifications, new HVAC systems, and new electrical systems.

**Tier 2:** Tier 2 projects are partial renovations or fit-outs of existing facilities in which one or more systems within the renovated spaces are largely replaced (e.g. lighting, finishes, plumbing, and/or HVAC), base building envelope systems remain largely unaffected and project costs exceed \$1million.

**Tier 3:** Tier 3 projects include renovations to systems with an energy impact but are focused only on those systems (e.g. controls upgrades, AHU replacement, lighting replacement, etc.) and project costs are \$1million or less.

**Tier 4:** Tier 4 projects have no or limited energy and GHG impact, such as a landscape project or a project that only renovates finishes and furnishings.

The Green Building Standards were developed by Technical Services Branch by consolidating best practices information, from the position of knowledgeable owner, as well as by adapting portions of Harvard University's Green Building Standards (Harvard, 2016) – [used with



permission]. They are based on components and systems that have proven to be reliable and efficient, to meet the needs of users, and to have acceptable life cycle costs. They build upon the 2016 Technical Design Requirements and will be formally updated periodically as required. In addition to the guidance within this document, there is an associated set of Appendices, provided within a single Microsoft Excel document entitled “Deliverables Checklist”, that contains templates for documentation, deliverables, and guidance on review requirements.

## Definitions

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### Integrated Design:

In order to help project teams in the vetting and setting of sustainability goals and objectives, Infrastructure has identified different levels of formal integrated design requirements for projects depending on their scope of work.

### Life Cycle Costing:

In order to assist project teams assess the total cost of ownership impacts that decisions have throughout the course of design, Infrastructure has identified various levels of Life Cycle Cost (LCC) analysis for projects depending on their scope of work. Responsible Life Cycle Costing includes an analysis of (any) utility rebates, grants, stimulus funding, or other alternative funding sources. It is best practice to include building operations staff in all LCC and value engineering review.

### Energy Modeling/GHG Calculations:

In order to assist project teams in creating energy efficient designs that yield reduced or zero greenhouse gas emissions, Infrastructure has identified different levels of building energy simulation appropriate for projects depending on their scope of work.

### Prescriptive Requirements:

Infrastructure requires projects to achieve prescriptive levels of environmental performance according to project size and scope. New construction and major renovation projects (Tier 1) are required to register and achieve Silver certification using version 4 of the U.S. Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED™) green building certification rating systems. All projects are encouraged to pursue higher levels of energy efficiency and sustainable design using recognized performance standards as design minimums.

### Metering and Ongoing Verification of Performance:

In order to facilitate efficient building operations, assist with energy conservation measure verification, and to allow engagement of building occupants, Infrastructure 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 “if you don’t measure it, you can’t manage it (Kessler, July 2013).” Measurement followed up with corrective measures need to be a part of a full use of M&V strategy.



**Close-Out Documentation/O&M Readiness:**

In order to capture critical project data and ensure building managers have the necessary tools to reduce facility emissions at optimal levels, Infrastructure has identified various levels of Closeout Documentation / Operations and Maintenance Readiness for projects.



## Tier 1 – Whole Buildings: New Buildings, Building Additions and Building-Wide Gut Renovations

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### Analysis:

Prior to the end of the Schematic Design (SD) phase evaluate the feasibility of pursuing Living Building Challenge (LBC) Certification as an alternative or in addition to the LEED requirement. If applicable, include the analysis in the project Request for Proposals (RFP). Projects are not required to pursue LBC certification but must demonstrate that it was evaluated:

- Review applicable Infrastructure Green Building Standards with team during conceptual design.
- When setting goals, look at each LBC credit and petal and seek to set goals that align with this Standard, regardless of whether full certification is pursued.
- Viable components should be implemented as appropriate.
- Please complete the “Tier 1 – LBC Feasibility” tab in the *Green Building Standards – Deliverables Checklist* and explain why credits cannot be achieved as appropriate.

Prior to the end of the SD phase, present the feasibility of pursuing net zero energy and determine the renewable energy generation potential of the site. Consider including net zero energy performance in the RFP or Owner’s Project Requirements (OPR) as a stretch goal. Projects are not required to pursue net zero energy or on-site renewables, but must demonstrate that they were evaluated:

- Using Province-wide benchmarks, develop an energy target for the project in EUI (expressed in kWh per square meter per year).
- Complete an analysis for renewable potential to determine what the site and project roof are capable of and compare to the energy target.
- While project teams may pursue more enhanced strategies for developing the energy use intensity and site generation potential of the project, teams are only required to complete the “Tier 1 – Net Zero Feasibility” tab in the *Green Building Standards - Deliverables Checklist* that uses Province-wide benchmarks.

### Integrated Design:

At least three integrated design charrettes are required, the first of which should happen at the time of project kickoff and prior to the end of Schematic Design. Charrettes should include identification and tracking of project goals and analyzing the life cycle cost impacts of potential design options. Charrettes should include representation of major stakeholders including occupants and operations staff.

It is recommended that project teams adhere to the requirements of LEED IP Credit 1: Integrative Process (based on ANSI Consensus National Guide 2.0 for Design and Construction of Sustainable Buildings and Communities – February 2, 2012) to formalize the integrated design process, **that** focuses on energy and water analysis. See the LEEDv4 Reference Guide for full details.





### Life Cycle Costing:

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

<b>Planning / Conceptual Design</b>	Initial LCC calculations presenting options for optional design elements with major budget implications.
<b>Schematic Design</b>	LCC calculations presenting options for major energy-consuming systems.
<b>Value Engineering (Any Phase)</b>	LCC calculations presenting impacts beyond initial capital outlay.

Note that a tool that is available for LCC is the Harvard Life Cycle Calculator that can be downloaded at the following site: <http://www.energyandfacilities.harvard.edu/green-building-resource/search?terms=life%20cycle%20calculator> . [Note:Infrastructure is also developing one]

### Energy Modeling:

Utilize EE4, eQuest, DOE-2, Energy Plus, IES Virtual Environment, Hourly Analysis Program (HAP), TRACE 700, EnergyPro v5.1 or compatible plug-ins for Revit or other BIM platforms to model proposed building designs, assist with life cycle costing, estimate greenhouse gas (GHG) emissions, and facilitate future measurement and verification.

At minimum, the following deliverables or reports summarizing these deliverables are required:

<b>Schematic Design</b>	Initial model results of massing, orientation, and/or major HVAC systems with sensitivity analysis.
<b>Design Development</b>	Multiple parametric runs comparing options of systems and strategies as determined in the initial and/or subsequent integrated design charrettes.
<b>Contract Documents</b>	Complete design and base case models used for LEED and/or code compliance verification, or use CaGBC's Alternative Compliance Path (ACP) to assist with bridging the dual need for LEED and NECB modeling.
<b>Document Turnover</b>	As-built energy model and electronic files.

### Prescriptive Requirements and Certification:

Unless Living Building Challenge certification is being pursued, use the appropriate LEED Rating System (that most often will be LEED BD+C) and achieve the mandatory credits identified by Infrastructure. All projects must achieve at least LEED version 4, Silver certification. For LEED credits listed below, refer to the Reference Guide for detailed requirements.



## MANDATORY REQUIREMENTS

<b>Energy</b>	<p>On a project-by-project basis, establish maximum Energy Use Intensity (EUI) goals, where EUI is expressed as kWh/m<sup>2</sup> (equivalent kilo-Watt hours per meter squared).</p> <p><i>New Construction:</i> Demonstrate, via energy modeling, a minimum 29%* reduction below ASHRAE 90.1-2010 based on energy cost reductions for schools and offices; a minimum of 22% for health care. (*unless an alternative specific individual goal is set for the bldg. type)</p> <p><i>Existing Buildings and Major Renovations:</i> Demonstrate, via energy modeling, a minimum of 18% reduction below ASHRAE 90.1-2010 based on energy reductions.</p>
<b>Commissioning</b>	<p>Meet the requirements of <b>LEED-BD+Cv4 Enhanced Commissioning: Enhanced Systems Commissioning</b> (including Monitoring Based Cx (MBCx)) credit for the relevant building type.</p>
<b>Materials</b>	<p>Meet the requirements of:</p> <ul style="list-style-type: none"> <li>• <b>LEED-BD+Cv4 Building Product Disclosure and Optimization – Environmental Product Declarations</b></li> <li>• <b>LEED-BD+Cv4 Building Product Disclosure and Optimization – Sourcing of Raw Materials</b></li> <li>• <b>LEED-BD+Cv4 Building Product Disclosure and Optimization – Environmental Product Declarations</b></li> <li>• <i>Note: For this category, achieve 3 points of 6 available where 2 points are available in each sub-category. Prioritize use of products within 160 Km of project site.</i></li> </ul>

## RECOMMENDATIONS

<b>Indoor Potable Water</b>	<p>Meet the requirements of <b>LEED-BD+Cv4 Indoor Water Use Reduction</b> credit, including reducing indoor potable water use by a minimum of 35%.</p>
<b>Outdoor Potable Water Use</b>	<p>Sub-meter irrigation separately from other potable water use.</p> <p>Comply with the <b>LEED-BD+Cv4 Outdoor Water Use Reduction</b> credit, including a reduction of water use by at least 50% using the EPA's WaterSense Water Budget tool or provide no irrigation from potable sources.</p>
<b>Education</b>	<p>Consider acoustic performance.</p>

### Metering and Ongoing Verification of Performance:

Separately meter all utilities coming into the building. When appropriate to project scope, separately sub-meter significant use types within the building. At a minimum, separately meter:

- Parking garages
- Commercial spaces
- Large kitchens





- Data Centres or Large Data Closets

**LEED Compliance:** Meet the requirements of either *LEED-BD+Cv4 Advanced Energy Metering* or *LEED-BD+Cv4 Enhanced Commissioning, Option 1, Path 2, Enhanced and Monitoring-Based Commissioning*. These credits provide infrastructure for ensuring comprehensive information about the performance of major building system is available.

**M&V Strategy:** For each project, the design team will be tasked with developing a M&V strategy for the applicable goals as determined by the Project Manager and appropriate Building Manager or department operations staff. Ensure this plan aligns with efforts related to both of the LEEDv4 Advanced Energy Metering and Enhanced Commissioning, Monitoring Based Commissioning (MBCx) requirements.

**Operations Staff Feedback:** The project's M&V strategy will address requests and recommendations from the building's operations team, determine the minimum level of measurement and verification that is required for the applicable goals, and include flexibility in engineering and architectural designs for obtaining additional information in the future.

**High Energy and Energy Intensive Programs:** Some projects with energy intensive occupancies such as hospitals, labs, research centres, data centres, correctional facilities and collections of rare books and art may need additional guidance when determining the best M&V strategy. Alberta Infrastructure's Technical Services Branch staff are available as an additional resource for determining minimum requirements while balancing operational needs. Continue to meter energy intensive occupancies separately.

**VE:** Value engineering and changes during construction must be reviewed with Alberta Infrastructure's Technical Services Branch in conjunction with the project's M&V strategy before approval.

**Support:** N/A. Other technical guidance not available at this time.

**Post-occupancy:** Evaluate the feasibility of LEED-EBOM certification one-year post-occupancy.

### Close-out Documentation / O&M Readiness:

Projects must collect and turn over documentation that will assist with efficient operations of the space or will be beneficial to the performance of future Alberta Infrastructure projects. This process should be done in a consistent and thorough process and includes the following requirements:

- Follow an asset management program and coordinate all documentation to follow a consistent naming convention.
- Prepare and turn over to the Owner a Systems Manual following the requirements of ASHRAE Guideline 4-2008. This is frequently delivered as part of the project's commissioning (Cx) efforts.



- Official acceptance of O&M documentation must be approved by the building's facility director (or designated appointee).
- Turn-over documentation required by Alberta Infrastructure's CAD/GIS and Records Group, including as-built energy model with summary of inputs and outputs and electronic model file.
- Provide access to LEED-Online to the Project Manager for Alberta Infrastructure tracking purposes.



## Tier 2 – Fit-Outs: Partial Building Interior Fit-Outs

The following requirements and recommendations apply to the project unless the affected system or strategy is specifically excluded from the scope of the project.

### Integrated Design:

At least two integrated design charrettes are required, the first of which should happen at the time of project kickoff and prior to the end of Schematic Design. Charrettes should include identification and tracking of project goals that set expectations and evaluate project success. Charrettes should include representation of major stakeholders including occupants and operations staff.

### Life Cycle Costing: \*

Life Cycle Costing (LCC) will be performed to quantify the 20 year impacts on GHG, energy costs, maintenance costs, etc. The scope of LCC will vary depending on project, but will typically include envelope, HVAC, electrical, and many other building systems. Requirements by design phase include: [\* *Harvard is re-visiting this one, to simplify*]

<b>Planning / Conceptual Design</b>	Initial LCC calculations presenting design options elements with major budget implications.
<b>Schematic Design</b>	LCC calculations presenting options for major energy-consuming systems.
<b>Value Engineering (Any Phase)</b>	LCC calculations presenting impacts beyond initial capital outlay.

### Energy Modeling / GHG Calculations:

As appropriate to the project type, estimate the energy demand and consumption impacts, as well as GHG emissions, from proposed design options and propose a strategy to verify performance.

### Prescriptive Requirements and Certification:

Project performance must meet the requirements of select LEED v4 credits **only if work affecting those systems is included in the scope**. LEED Version 4 certification is encouraged as deemed appropriate by the nature of the project (i.e. **where percentage of floor area renovated exceeds 60% and enough system components in the scope make LEED practical to pursue**). All projects will include a LEED feasibility section in the initial design submission.



## MANDATORY REQUIREMENTS

<b>Energy</b>	<b>LEEDv4 BD+C or LEEDv4 ID+C: Optimize Energy Performance:</b> Where LEED certification isn't achievable, pursue a minimum of 8 points within this category, or demonstrate a 6% reduction below ASHRAE 90.1-2010, appropriately tailored to the building type.
<b>Commissioning</b>	Meet the requirements of <b>LEEDv4 BD+C or LEEDv4 ID+C Enhanced Commissioning</b> (including Monitoring Based Cx (MBCx)) credit for the relevant building type.
<b>Materials</b>	Meet the requirements of: <ul style="list-style-type: none"> <li>• <b>LEEDv4 BD+C or LEEDv4 ID+C Building Product Disclosure and Optimization – Environmental Product Declarations: Option 1 – Environmental Product Declarations (EPD)</b></li> <li>• <b>LEEDv4 BD+C or LEEDv4 ID+C Building Product Disclosure and Optimization – Sourcing of Raw Materials: Option 1 – Sourcing of Raw Materials</b></li> <li>• <b>LEEDv4 BD+C or LEEDv4 ID+C Building Product Disclosure and Optimization – Environmental Product Declarations: Option 1 – Material Ingredients</b></li> <li>• <b>LEEDv4 BD+C or LEEDv4 ID+C Construction and Demolition Waste Management: Divert a minimum of 90% of construction waste from landfills.</b></li> </ul>

## RECOMMENDATIONS

The following credits are not required to be achieved by project teams, but are strongly recommended as project scope, budget, and other considerations allow.

<b>LEED Certification</b>	Tier 2 projects are encouraged to pursue <b>LEEDv4 BD+C or LEEDv4 ID+C</b> certification ( <i>where % of floor area renovated exceeds 60%</i> ). Feasibility should be assessed early in design.
<b>Rainwater Management</b>	<b>LEEDv4 BD+C or LEEDv4 ID+C</b> SS credit 4: Incorporate green infrastructure and low impact development strategies into the site design in order to manage on-site 100% of the total volume of runoff calculated for the 95 <sup>th</sup> percentile rainfall event for the site.
<b>Indoor Potable Water</b>	Meet the requirements of <b>LEEDv4 BD+C or LEEDv4 ID+C Indoor Water Use Reduction</b> credit, including reducing indoor potable water use by a minimum of 35%.
<b>Outdoor Potable Water Use (if in scope)</b>	Sub-meter irrigation separately from other potable water use.
<b>Light Pollution Reduction</b>	LEED-NC SS credit 6: Meet the requirements of LEED v4 SSc6.
<b>Sustainable Sites Initiative</b>	If project is primarily a landscape project, adhere to Sustainable Sites Initiative requirements.
<b>Indoor Environmental Quality</b>	Low-emitting materials.
<b>Education</b>	Consider acoustical performance.

### **Metering and Ongoing Verification of Performance:**

Separately meter all utilities coming into the building. When appropriate to project scope, separately sub-meter significant use types within the building. At a minimum, separately meter:



- Parking garages
- Commercial spaces
- Large kitchens
- Data Centres or Large Data Closets

Alberta Infrastructure encourages separately metering of utilities by end use, such as separating lighting loads from plug loads. If this level sub-metering is not part of the project scope, teams are encouraged to wire/pipe the building in such a way that sub-metering may be utilized at a later date to help identify utility demand and consumption by end use. Meters and sub-meters must be tied into the building management system when one exists.

### Close-Out Documentation / O&M Readiness:

Projects must collect and turn over documentation that will assist with efficient operations of the space or will be beneficial to the performance of future Alberta Infrastructure projects. This process should be done in a consistent and thorough process and includes the following requirements:

- Follow an asset management program and coordinate all documentation to follow a consistent naming convention.
- Prepare and turn over to the Owner a Systems Manual following the requirements of ASHRAE Guideline 4-2008. This is frequently delivered as part of the project's commissioning (Cx) efforts.
- Official acceptance of O&M documentation must be approved by the building's facility director (or designated appointee).
- Turn-over documentation required by Alberta Infrastructure's CAD/GIS and Records Group, including as-built energy model with summary of inputs and outputs and electronic model file.
- If the project completed LEED certification, provide access to LEED-Online to the Project Manager for Alberta Infrastructure tracking purposes.



## Tier 3 – System Upgrades: Limited Scope Projects with Energy and GHG Impact

The following requirements and recommendations apply to the project unless the affected system or strategy is specifically excluded from the scope of the project.

### Integrated Design:

Review applicable Alberta Infrastructure Green Building Standards with design team when project begins. There are no formal requirements, though project teams encouraged to pursue integrated design practices to the extent that it is feasible.

### Life Cycle Costing:

Life Cycle Costing (LCC) will be performed to compare the design options based on 20 year impacts on GHG, energy costs, maintenance costs, etc. The scope of LCC will vary depending on project, but will typically include envelope, HVAC, electrical, and many other building systems. Requirements by design phase include:

<b>Planning / Conceptual Design</b>	Initial LCC calculations for design options with major budget implications.
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### Energy Modelling / GHG Calculations:

As appropriate to the project type, estimate the energy demand and consumption impacts, as well as GHG emissions, from proposed design options and propose a strategy to verify performance.

### Prescriptive Requirements:

Project performance must meet the requirements of select LEED v4 credits **only if work affecting those systems is included in the scope**. In some cases LEEDv4 ID+C may be achievable.

#### MANDATORY REQUIREMENTS

<b>Energy</b>	Review the feasibility of meeting credits in: <b>Interior Design and Construction: LEED-ID+Cv4 - Optimize Energy Performance</b> .
<b>Commissioning</b>	Meet the requirements of <b>LEED-ID+Cv4 - Enhanced Commissioning</b> , including <b>monitoring based commissioning</b> , if in scope.
<b>Materials</b>	Meet the requirements of: <ul style="list-style-type: none"> <li><b>LEED-ID+Cv4 Construction and Demolition Waste Management: Divert a minimum of 90% of construction waste from landfills.</b></li> </ul>





## RECOMMENDATIONS

The following credits are not required to be achieved by project teams, but are strongly recommended as project scope, budget, and other considerations allow.

<b>Rainwater Management</b>	<b>LEEDv4 BD+C</b> SS credit 4: Incorporate green infrastructure and low impact development strategies into the site design in order to manage on-site 100% of the total volume of runoff calculated for the 95 <sup>th</sup> percentile rainfall event for the site.
<b>Indoor Potable Water</b>	Meet the requirements of <b>LEEDv4 ID+C</b> - <i>Indoor Water Use Reduction</i> credit, including reducing indoor potable water use by a minimum of 35%.
<b>Outdoor Potable Water Use (if in scope)</b>	Sub-meter irrigation separately from other potable water use.
<b>Light Pollution Reduction</b>	<b>LEEDv4 BD+C</b> SS credit 6: Meet the requirements of <b>LEEDv4 BD+C</b> SSc6.
<b>Sustainable Sites Initiative</b>	If project is primarily a landscape project, adhere to Sustainable Sites Initiative requirements.
<b>Indoor Environmental Quality</b>	Low emitting materials.

### Metering and Ongoing Verification of Performance:

Separately meter all utilities coming into the building. When appropriate to project scope, separately sub-meter significant use types within the building. At a minimum, separately meter:

- Parking garages
- Commercial spaces
- Large kitchens
- Data Centres or Large Data Closets

Alberta Infrastructure encourages separately metering of utilities by end use, such as separating lighting loads from plug loads. If this level sub-metering is not part of the project scope, teams are encouraged to wire/pipe the building in such a way that sub-metering may be utilized at a later date to help identify utility demand and consumption by end use. Meters and sub-meters must be tied into the building management system when one exists.

### Close-Out Documentation / O&M Readiness:

Projects must collect and turn over documentation that will assist with efficient operations of the space or will be beneficial to the performance of future Alberta Infrastructure projects. This process should be done in a consistent and thorough process and includes the following requirements:

- Follow an asset management program and coordinate all documentation to follow a consistent naming convention.



- Prepare and turn over any energy conservation measure details to Project Manager for adding to Owner's data base.



## Tier 4 – Non-Energy: Limited Scope Projects with No or Limited Energy/GHG Impact

The following requirements and recommendations apply to the project unless the affected system or strategy is specifically excluded from the scope of the project.

### Integrated Design:

Review applicable Alberta Infrastructure Green Building Standards with design team when project begins.

### Prescriptive Requirements:

Project performance must meet the requirements of select LEED v4 credits **only if work affecting those systems is included in the scope.**

#### MANDATORY REQUIREMENTS

N/A	There are no mandatory requirements in this Tier.
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#### RECOMMENDATIONS

The following credits are not required to be achieved by project teams, but are strongly recommended as project scope, budget, and other considerations allow.

Rainwater Management	<b>LEEDv4 BD+C</b> SS credit 4: Incorporate green infrastructure and low impact development strategies into the site design in order to manage on-site 100% of the total volume of runoff calculated for the 95 <sup>th</sup> percentile rainfall event for the site.
Indoor Potable Water	Meet the requirements of <b>LEEDv4 ID+C - Indoor Water Use Reduction</b> credit, including reducing indoor potable water use by a minimum of 35%.
Outdoor Potable Water Use (if in scope)	Sub-meter irrigation separately from other potable water use.
Light Pollution Reduction	<b>LEEDv4 BD+C</b> SS credit 6: Meet the requirements of LEED v4 SSc6.
Sustainable Sites Initiative	If project is primarily a landscape project, adhere to Sustainable Sites Initiative requirements.
Materials	Develop a construction waste plan.
Indoor Environmental Quality	Low emitting materials.



## References

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CaGBC. (2016). LEED v4 Resources. Retrieved from:

[http://www.cagbc.org/CAGBC/Programs/LEED/LEEDv4/LEED\\_v4\\_Resources.aspx](http://www.cagbc.org/CAGBC/Programs/LEED/LEEDv4/LEED_v4_Resources.aspx)

GoA. (2016). Ending coal pollution. *Alberta Government*. Retrieved from:

<http://www.alberta.ca/climate-coal-electricity.cfm>

GoA. (2016). Technical Design Requirements. Retrieved from:

<http://www.infrastructure.alberta.ca/Content/docType486/Production/TechDesignRequirements.pdf>

Harvard University. (2016). *Green Building Standards*. Retrieved from:

<https://green.harvard.edu/>

Kessler, H. (July, 2013). Measurement and verification can help maintain efficiency, improve LEED scores. *Green Building Report / Facilitiesnet*. Retrieved from:

<http://www.facilitiesnet.com/green/article/Measurement-and-Verification-Can-Help-Maintain-Efficiency-Improve-LEED-Scores-Facilities-Management-Green-Feature--14148>

NRC. (2014). *Alberta Building Code - 2014 (9<sup>th</sup> edition)*. *National Research Council, Volume 2*.  
Ottawa, Ontario.

NRC, (2011). *National Energy Code of Canada for Buildings - 2011 (1<sup>st</sup> edition)*. *National Research Council*. Ottawa, Ontario.



*Appendix*

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