

Procedure

Climate Resilient Design and Construction of City Buildings



This procedure falls under *C627 Climate Resilience Policy*.

Program Impacted	Environmental Stewardship <i>The City of Edmonton's operations and service delivery sustains and conserves the environment.</i>
Approved By	City Manager
Date of Approval	June 10, 2021
Approval History	This is a new Administrative Procedure with content formerly in: May 9, 2017 (<i>C532 Sustainable Building Policy</i>) April 10, 2007 (<i>C532 Sustainable Building Policy</i>)
Next Scheduled Review	June 10, 2024

1. Application

- 1.1. This procedure applies to the design and construction of new City Owned, Occupied Buildings greater than 600 square metres; and additions to City Owned, Occupied Buildings greater than 600 square metres initiated after the approval of this procedure.
- 1.2. For construction projects of new City Owned Buildings that are less than 600 square metres, or are not Occupied, the requirements in this procedure are not mandatory. However, Project Managers should demonstrate the intent to meet the requirements as outlined in section 3.11.

2. Governance

- 2.1. The Deputy City Managers (DCMs) who have oversight of facility planning, design, construction, operation, maintenance, renewal and demolition of City Owned Buildings shall be accountable for ensuring that City Buildings comply with this Administrative Procedure.
- 2.2. The project managers for the applicable New Construction projects will be responsible for ensuring that the design teams follow the requirements of this procedure, and will be responsible for facilitating communications with the Climate Resilient Building Team as needed.
- 2.3. City Administration, through training and recruitment, shall ensure there is sufficient internal expertise related to Climate Resilient building practice, to support effective and efficient Policy

compliance. Key Policy and Administrative Procedure users shall be supported in the application and maintenance of LEED or other green professional accreditations.

- 2.4. Capital and operating budgets that are impacted by this Administrative Procedure will include allowances to meet the procedure standards.
- 2.5. A Climate Resilient Building Team shall exist for the purposes of oversight, as outlined in their Terms of Reference. Oversight by the Climate Resilient Building Team includes the following:
 - 2.5.1. Policy implementation, including ensuring that the appropriate business section(s) develop and maintain guidance documents such as procedures, standards, guidelines, best practices, manuals, and tools. This will include communications to or training of appropriate parties on the use of these policy implementation tools;
 - 2.5.2. Policy evaluation in the form of compliance reporting: annual reporting to the City Manager and City Council on policy compliance, including all exceptions to the Administrative Procedures; and
 - 2.5.3. Periodic evaluations of the appropriateness and effectiveness of the Administrative Procedure, and Climate Resilient Building Team membership.

3. Requirements

- 3.1. The City will recognize the significant resource requirements and greenhouse gas impacts of New Construction, as well as the amount and impact of the Embodied Carbon in its existing building stock. As part of any business case development, the operational area leading the project will assess whether an identified real estate need of its programs or services can be met through its existing building portfolio and achieved in the absence of New Construction.
- 3.2. All New Construction shall review, with advice provided by the section responsible for Renewable Energy Systems development, the potential for integration into an existing or contemplated District Energy node, aligned with any District Energy policy or strategy in the City of Edmonton.
- 3.3. All new City Owned, Occupied Buildings shall be designed Emissions Neutral (e.g. passive design strategies, durable energy conserving building envelopes, energy-efficient mechanical and electrical systems, etc.).
 - 3.3.1. In addition, a project that cannot demonstrate that it: consumes 20% less energy compared to the National Energy Code for Buildings (NECB) 2017 reference building on an annual basis before accounting for Renewable Energy; and have a Thermal Energy Demand Intensity (TEDI) less than 50 kilowatt hours per square meter for office Buildings, or less than 80 kilowatt hours per square meter (ekWh/m²) for all non-office building archetypes, must be reviewed and approved by the Climate Resilient Building Team.

- 3.4. A minimum of 1% of the total capital project budget of newly designed and constructed City Owned, Occupied Buildings will be dedicated to the incorporation of on-site Renewable Energy and or Alternative Energy generation systems.
 - 3.4.1. With respect to hybrid or upgraded elements: the 1% funding to support incorporation of on-site Renewable and or Alternative Energy generation systems shall only be used for the cost delta or difference from a base case. For example, if solar photovoltaic wall panels are implemented the 1% would only be drawn on to fund the difference from a base wall system.
- 3.5. All New Construction shall require Embodied Carbon assessments as outlined in the City's Facility Design and Construction Consultant Manual(s).
 - 3.5.1. All New Construction must consider using the material with the lowest Embodied Carbon for an otherwise equivalent material. This review and consideration must be documented alongside the Embodied Carbon assessment.
- 3.6. New City Owned, Occupied Buildings will be designed and constructed in a manner that provides flexibility to plan for and incorporate reasonably foreseeable emerging technology installations. For example solar-ready Buildings to suit installations that meet the City of Edmonton Solar Photovoltaic Program Design Guideline, provisions for future geothermal, energy storage, low or Carbon Neutral energy, district energy nodes and connectivity where appropriate and as identified in the City of Edmonton's Facility Design and Construction Manuals.
- 3.7. All New Construction will be designed and constructed in a manner that supports ongoing optimal performance management of the building, and ensures persistence of the carbon reducing benefits built into the building. This will be enabled through technology use for continuous optimization of the building (e.g. Installation of a building automation system which will include control and sequence of building mechanical and electrical systems, and connection to the utility meters and submeters where applicable.).
- 3.8. All New Construction shall attain LEED Silver, higher level LEED Certification or pre-approved Alternative Certification (Section 5: Evaluation of Alternative Certification"). The City will strive to attain the highest LEED rating possible, within the allocated project budget.
- 3.9. All New Construction shall be designed and constructed to mitigate the risk and impacts of climate change (e.g. flood resilience, reduce heat island effect, etc). New construction shall achieve Resilient Design Credits in the LEED Certification program as outlined in the City's Facility Design and Construction Consultant Manual(s). The process for completing the climate risk assessment will also be outlined in the Consultants Manual(s).
- 3.10. All New Construction shall support BOMA BEST certification upon occupancy through provision of required design and construction documentation as outlined by BOMA BEST program and uniquely required for New Construction to meet the requirements of the program.

- 3.11. Construction projects of new City Owned Buildings that are less than 600 square metres, or are not Occupied as identified in section 1.2, must demonstrate how the project will be designed and constructed to meet the intent of the procedure where possible. The demonstration of intent by the Project Team is required to be documented within the required project deliverables by specifically noting the sustainable goals that will be pursued and achieved in the completed project.

4. Exceptions

- 4.1. Buildings that meet the application criteria (Section 1: Application) of this Administrative Procedure, but for some extraordinary reason cannot meet the Administrative Procedure requirements, may apply for an exception. Exceptions should only be requested as an absolute last resort. A request for an exception may be considered where the cost to achieve all, or a portion, of the Administrative Procedure outweighs the expected benefits, as demonstrated by a Lifecycle Cost-Benefit Analysis.
- 4.2. If a project manager is unsure if a formal exception request is appropriate or would appreciate feedback from the Climate Resilient Building Team they may request an informational meeting with the Climate Resilient Building Team.
- 4.3. A request for an exception shall be made as follows:
 - 4.3.1. A summary of the issue, reasoning for the exception request, and supporting documentation shall be submitted to the Climate Resilient Building Team. This request must be signed by the appropriate GS and/or Director.
 - 4.3.2. The Climate Resilient Building Team will review the documentation and will:
 - 4.3.2.1. First: Provide a recommendation to the project team for additional steps or opportunities to be investigated that could improve project alignment with the Administrative Procedure requirements. The project team will implement the suggestions and report back to the Climate Resilient Building Team with the results if still not compliant with the Administrative Procedure. Then;
 - 4.3.2.1.1. Agree with the submitted analysis and recommend that the project is granted an exception (with or without conditions). Or;
 - 4.3.2.1.2. Disagree with the submitted analysis and recommend that the project is not granted an exception (either in full or part). Providing a recommendation for how the project could meet the Administrative Procedure requirements.
 - 4.3.3. Once the Climate Resilient Building Team provides a decision on the project's request for an exception, the Climate Resilient Building Team will submit the request and their recommendation to the DCM(s), whose business unit(s) are responsible for achieving the specific policy standard(s) via the appropriate protocols. The DCM's approval is required to

formally authorize an adjustment to the policy standards through an exception to the Administrative Procedure(s).

- 4.4. If not communicated directly to the Climate Resilient Building Team the project manager shall submit the formal decision of the DCM to the Climate Resilient Building Team for tracking and reporting purposes.

5. Evaluation of Alternative Certification Options

- 5.1. Alternative certification systems may be used if the alternative is shown to be:
 - 5.1.1. more appropriate for the type of building,
 - 5.1.2. equivalent or better than the required certification with regards to energy, greenhouse gas performance, and climate adaptation planning and performance.
- 5.2. The alternative certification option with the justification noted above will be submitted to the Climate Resilient Building Team for review, discussion, and recommendation and will either be approved or rejected as an acceptable alternative. No additional DCM approval will be required if approved.

Definitions

Unless otherwise specified, words used in this procedure have the same meaning as defined in the C627 Climate Resilient Policy.

- **Alternative Energy (and onsite generation)** Energy generated from alternatives to fossil fuels such as Renewable Energy, biofuel, biogas, biomass and hydrogen fuel cell. For the purpose of this policy, Alternative Energy also refers to alternative, localized, on-site energy generation such as heat and power cogeneration. Ground source/sink heat pumps, and the associated shallow geothermal fields are not considered Alternative Energy.
- **BOMA BEST** A voluntary certification program that provides a framework for assessing the environmental performance and management of existing Buildings. The rating system assesses ten key areas including: energy, water, air, comfort, health and wellness, custodial, purchasing, waste, site and stakeholder engagement. Refer to external BOMA BEST resources for more information.
- **Buildings** As defined by the National Building Code (Alberta Edition).
- **City Owned Buildings:** Buildings that are legally owned by the City including arenas, pools, leisure centres, libraries, fire stations, police stations, administration Buildings, maintenance and shop facilities.
- **City Leased Buildings** Buildings that are legally owned by someone other than the City but that the City leases as a tenant.

- **Climate Resilient Building Practice** Identified processes, practices or systems widely recognized as ways of improving building resilience. Such practices extend beyond green building certification that is based on initial Climate resilient design and construction, and emphasizes Climate resilient practices throughout the entire building lifecycle.
- **Embodied Carbon** The total of all greenhouse gas emissions that result from the manufacture and supply of construction products and materials, as well as the construction process itself.
- **Emissions Neutral/Emissions Neutral Building** An Emissions Neutral building is a building that is highly energy efficient and:
 - a) uses only Renewable Energy for its operations on an annualized average basis (this may include either on or offsite generated Renewable Energy),
 - OR
 - b) produces and supplies onsite Renewable Energy in an amount sufficient to offset the annual greenhouse gas emissions associated with the energy consumed for its operations.
- **Leadership in Energy and Environmental Design (LEED) Certification** A building rating system that provides independent, third-party verification that a building, home or community was designed and built using strategies aimed at achieving high performance in key areas of human and environmental health: sustainable site development, water efficiency, energy efficiency, materials selection and indoor environmental quality. Refer to external Canada Green Building Council and LEED resources for more information.
- **Lifecycle Cost** The total cost of ownership of an asset over its life. Lifecycle cost takes into account all costs of acquiring, owning, operating, maintaining and disposing of an asset in order to maximize return on investment and achieve the highest, most cost-effective performance.
- **Lifecycle Cost-Benefit Analysis (LCBA)** The analysis entails an assessment of key building elements on a 30-year lifecycle, apply net present value methodology, include energy costs and maintenance costs (above business-as-usual), include element replacement costs over the 30-year lifespan, and apply a City-approved discount rate. Refer to the City's Facility Design and Construction Consultant Manual(s).
- **New Construction** Construction that is new. Includes the construction of new Buildings, or additions, as applicable in this Administrative Procedure.
- **Operational Control** The full authority to introduce and implement its operating policies at the operation. As further defined by The Climate Registry. Local Government Operations (LGO) Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories (Version 1.1, May 2010).
- **Occupied Building** A building that is regularly occupied by staff, contractors or visitors. Occupied Buildings exclude: LRT stations; unconditioned storage Buildings; pump stations; power

substations; Buildings that are not occupied by individuals year-round (e.g., a seasonal park pavilion, outdoor pool, etc.).

- **Renewable Energy** Energy that is obtained from natural resources that can be naturally replenished or renewed within a human lifespan (i.e., the resource is a sustainable source of energy). These resources include moving water, wind, biomass, solar, geothermal, and ocean energy. Biomass is a renewable resource only if its rate of consumption does not exceed its rate of regeneration. Ground source/sink heat pumps, and the associated shallow geothermal fields are not considered Renewable Energy.
- **Resilience/Resilient** The concept of resilience covers the proactive capacity of public, private, and civic sectors to withstand disruption, absorb disturbance, act effectively in a crisis, adapt to changing conditions including climate change, and grow over time.
- **Thermal Energy Demand Intensity (TEDI)** The amount of heating energy required (based on envelope, ventilation losses and internal gains) to the project that is outputted from any and all types of heating equipment, per unit of modeled floor area. A project specific calculation methodology will be detailed in the project specific City's Facility Design and Construction Consultant Manual(s) and guidelines. Annual Heating Demand (AHD) is a synonym for Thermal Energy Demand Intensity.

References

- City's Facility Design and Construction Consultant Manual(s): Consultant Manual (2019): Volume 1 - Design Process and Guidelines, latest edition
- City's Facility Design and Construction Consultant Manual(s): Consultant Manual (2019): Volume 2 - Technical Guidelines, latest edition
- City of Edmonton Solar Voltaic Program Design Guideline
- BOMA Requirements
- [Climate Resilient Buildings Team - Terms of Reference](#)
- National Energy Code for Buildings (NECB) 2017
- National Building Code (Alberta Edition)