Sustainable Building Guidance Document

Part B: Minimum Sustainability Performance Requirements

April 29, 2019

Introduction

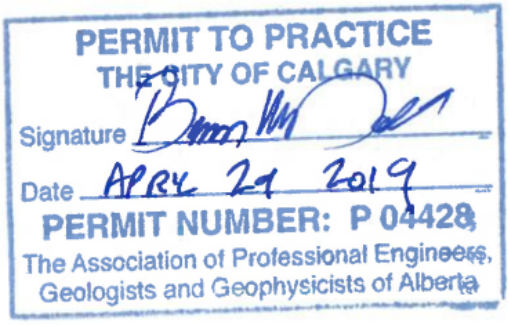
The minimum sustainability performance requirements were developed to established clear sustainability objectives that are consistent and directly align with Council priorities and other City policies and objectives. They are intended to provide clarity during project planning and delivery while ensuring The City invests in sustainable practices that provide best long-term value for The City.

This document is intended to provide the Strategic Planning Team / Project Sponsor, the Policy Steward, the Project Manager and the rest of the Project Team with a list of minimum sustainability performance requirements (MSPR)s and supporting guidance to help meet the intent of The City of Calgary's Sustainable Building Policy (The Policy). The MSPRs were developed from industry standards, past project experience, and internal and external subject matter experts and working groups.

Special circumstances and project scope may prevent Project Teams from achieving one or more MSPR. Strategic Planning Teams / Project Sponsors are to contact a Policy Steward during the pre-project phase, as defined by The City of Calgary's Project Management Practices Guide, for support identifying applicable MSPRs for each project. MSPR are to be signed off during the pre-project phase by the Strategic Planning Team / Project Sponsor and the Policy Steward. If it is later determined the achievement of any of the MSPR is not feasible the MSPRs can be adjusted with sign-off from the Strategic Planning Team / Project Sponsor and the Policy Steward.

Policy Steward Contact Information:

Arsheel Hirji Leader, Sustainable Infrastructure Corporate Analytics & Innovation Corporate Engineering & Energy T 403.268.5978 | C 403.650.2742 | arsheel.hirji@calgary.ca	Tyler Young, P.Eng., LEED AP BD+C Sustainable Infrastructure Engineer Corporate Analytics & Innovation Corporate Engineering & Energy T 403.268.1455 | C 587.998.2045| tyler.young@calgary.ca	Yichao Chen, P.Eng., CEM, CMVP, LEED AP BD+C Sustainable Infrastructure Engineer Corporate Analytics & Innovation Engineering & Energy Services T 403.268.3213 C 403.801.1979| yichao.chen@calgary.ca



Acknowldegment

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- Dale Ewing
- Darrel Bell
- Jennifer Ouyang
- Kiefer MacKenzie
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- The entire Corporate Engineering Team

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Checklist

SBGD Part B: Minimum Sustainability Performance Requirements

The following checklist provides a high-level summary of the minimum sustainability performance requirements. Detailed requirements are outlined further in this document.

#	Topic	Requirement Summary	Required [Y/N/NA]
1	Optimize Energy Performance	Achieve an energy use and energy cost performance improvement of at least 40% above the National Energy Code for Buildings (NECB 2011) baseline (26% better than NECB 2015 or 16% better than NECB 2017 for Affordable Housing). For interior renovations, achieve a lighting power density improvement of at least 40% above NECB 2011.	
2	Commissioning	Complete enhanced commissioning for the major energy consuming systems, energy generation systems and the building envelope.	
3	Green Power and Carbon Offsets	Contact a Policy Steward or the Energy Management Office for consultation.	
4	Enhanced Refrigerant Management	Use either low-impact refrigerants or no refrigerants.	
5	Future Resiliency Planning	At a minimum, design the facility to be solar PV ready and electric vehicle charging station ready.	
6	Indoor Water Use Reduction	Achieve a minimum designed non-process plumbing fixture water savings of 35% above the defined baseline in LEED V4 and do not exceed maximum flow/flush fixture rates.	
7	Stormwater Management	Manage stormwater on-site using green stormwater infrastructure.	
8	Responsible Landscaping	Design landscaping in a manner that reduces potable water use, manages stormwater, promotes biodiversity, and is accessible for facility occupant / visitor use.	
9	Multimodal Accessibility	Design the site providing priority access to pedestrians, cyclists, and public transit users. Ensure these groups can access the facility in a dignified and safe manner.	
10	Construction and Demolition Waste Management	Divert at least 80% of non-hazardous construction and demolition waste from landfill.	
11	Construction Indoor Air Quality Management	Develop and implement an indoor air quality management plan for project construction.	

Details and Guidance

Optimize Energy Performance

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Encourage occupant comfort, provide access, and maintain social wellbeing in design and operations
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

Energy optimization reduces The City's utility costs and is necessary to support The City's Climate Resilience Strategy and to help achieve The City's 2020 and 2050 greenhouse gas emission reduction targets of 20 percent and 80 percent below 2005 levels respectively. Energy use reductions not only reduce greenhouse gas emissions, and utility costs, but they also protect The City from future utility price volatility and carbon costs.

Requirement

For new construction, additions, and major renovations, comply with the minimum energy optimization targets identified in the table below:

Building Type	Energy Use and Cost Optimization Target (% better than NECB 2011)
Administration	≥ 40%
Affordable Housing[1]	≥ 16%
Data Centre	≥ 40%
Fire Station	≥ 40%
Other	≥ 40%
Police Station	≥ 40%
Recreation Centre	≥ 40%
Vehicle Maintenance Facility	≥ 40%
Warehouse	≥ 40%

Table 1: Energy Optimization Targets for New Construction, Additions and Major Renovations

[1]Afforable Housing targets are compared to an NECB 2017 baseline. They can alternatively use ≥ 26% above NECB 2015

For interior renovation projects, achieve a lighting power density improvement of 40% or better than an NECB 2011 Division B Part 4 Lighting baseline (if lighting is in scope) and evaluate additional energy conservation measures.

Guidance

Improving the energy performance of City buildings helps achieve utility savings and reduces the corporation's greenhouse gas emissions. This is a high priority Minimum Sustainability Performance Requirement that directly aligns with Council Priorities "a healthy and green city" and "a well-run city".

Achieving energy optimization should be prioritized in the following order:

1. Energy conservation: maximize passive design and use energy only when needed;
2. Energy efficiency: the utilization of efficient equipment and technology;

3. Renewable and on-site energy generation.

Energy conservation measures (ECMs) to be evaluated include, but are not limited to, the following (if in scope):

- Energy education opportunities influencing occupant behavior;
- Building form (massing, solar orientation and exposure, window-to-wall ratio, natural wind-breaks, shading, etc.);
- Building envelope (effective R and U values including thermal bridging, infiltration mitigation, alternate construction methods and materials, etc.);
- Passive HVAC strategies (passive solar, natural ventilation, solar chimneys, thermal mass, etc.);
- HVAC systems (equipment setbacks, occupancy sensors, equipment efficiency ratings, variable frequency drives, centralized heating / cooling plants, dedicated outdoor air systems, interaction of systems and improved sequences of operation etc.);
- Domestic hot water (water setpoints, equipment efficiency ratings, water conservation approaches, on-demand hot water, etc.);
- Efficient lighting (including LED technologies, daylight harvesting strategies, occupancy / vacancy and daylight sensors, after-hours shutoff sweep, etc.);
- Plug-loads (smart power bars, scheduled after-hours shut-off, efficient equipment, etc.). Note that it may be inadmissible to take energy savings on plug loads for LEED or code compliance;
- On-site energy generation (solar PV, solar thermal, solar pre-heat, wind, cogeneration, trigeneration, geothermal, geo-exchange, energy storage, etc.).

Project types defined by The Policy as a “New Construction” or “Addition or Major Renovation” are to follow the Building Energy Performance Compliance Path of the National Energy Code for Buildings (NECB) Part 8. This compliance path requires the creation and submission of an energy model to comply with the NECB as per the Alberta Building Code. The energy model is a valuable tool that should be used to evaluate and select alternative ECMs during the design process.

Projects defined by The Policy as an “Interior Renovation” project type typically focus on tenant improvement work. Consequently, project scope will dictate available ECM opportunities. Project’s under this category may or may not have an energy model included in scope. If lighting is in scope “Interior Renovation” projects are to achieve an energy savings of 40% above an NECB 2011 Division B Part 4 Lighting baseline.

If the project scope includes the completion of an energy model, it is highly recommended that projects use the *Sustainable Building Guidance Document Part D: Consultant Scopes of Work: 2 Building Energy Consultant*.

Future iterations of the MSPR’s may include additional energy targets such as Energy Use Intensity (EUI) targets and Thermal Energy Demand Intensity (TEDI) targets. To help inform decision making on potential future targets, consulting teams are to submit energy use intensity (EUI) and thermal energy demand intensity (TEDI) calculations and values from a project’s energy model, if in scope, to the Policy Steward and City Project Manager.

Deliverables

All energy modeling summary reports and NECB compliance documentation is to be submitted to the Project Manager and the Policy Steward. See the *Sustainable Building Guidance Document Part D: Consultant Scopes of Work: 2 Building Energy Consultant* document for a more detailed description on suggested deliverables. “Interior Renovation” projects that include lighting in scope are to submit lighting calculations to the Project Manager and the Policy Steward. EUI and TEDI calculations are to be submitted to the Policy Steward if energy modeling is in scope.

Supporting Council Priorities, City Policies and City Strategies

- Corporate Energy Strategy
- Corporate Energy Plan – 2016-2026
- The City of Calgary’s Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities: A healthy and green city
- Council Priorities: A well-run city
- Triple Bottom Line Policy
- 2020 Sustainability Direction

Commissioning

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Encourage occupant comfort, provide access, and maintain social wellbeing in design and operations
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

Commissioning of building systems is necessary to ensure that they are operating as intended and that The City is getting full value on the infrastructure it has invested in. When buildings are not properly commissioned, building systems can use significantly more energy than they were designed to, they can incur increased maintenance costs, and they may need early lifecycle replacements. This applies to building energy consuming systems and the building envelope.

Requirement

Complete enhanced commissioning for the major energy-consuming systems, energy generation systems and the building envelop as per the Fundamental Commissioning pre-requisite and Enhanced Commissioning credit defined in the Leadership in Energy and Environmental Design (LEED) V4 reference manual.

Guidance

Commissioning building systems ensures that The City receives full value during building operations from the equipment and systems it invests in. Commissioning requirements are referenced in relation to LEED V4 as this is the standard The City is most familiar with. Commissioning activities are to be completed to a LEED standard regardless if the project is pursuing LEED certification.

A commissioning authority should be appointed to coordinate and complete commissioning activities. The commissioning authority is responsible for hiring any additional commissioning agents required to complete the commissioning of building systems.

The commissioning authority shall be an independent third-party consultant. It is recommended that the Project Manager use the *Sustainable Building Guidance Document Part D: Consultant Scopes of Work: 3 Commissioning Authority* document.

The following systems, if in scope, should be included in enhanced commissioning:

- Mechanical (HVAC, DHW, plumbing),
- Electrical (lighting, electrical including service and distribution),
- Renewable energy systems,
- Building envelope,
- Controls for all the above, and
- Other project-specific systems, such as arena refrigeration systems, aquatic systems, data center equipment, security systems, power generation systems, etc.

Deliverables

Deliverables defined in the LEED V4 Fundamental and Enhanced Commissioning prerequisite and credit are to be submitted to the Project Manager and the Policy Steward.

Supporting Council Priorities, City Policies and City Strategies

- Corporate Energy Strategy
- Corporate Energy Plan – 2016-2026
- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities: A healthy and green city
- Council Priorities: A well-run city

Green Power and Carbon Offsets

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

To achieve The City's greenhouse gas emission reduction targets, as outlined in the Council-approved Climate Resilience Strategy, it is important that The City accelerate investment in regional renewable electricity and carbon reduction projects.

Requirement

Contact the Policy Steward or The City's Energy Management Office for details on The City's green electricity contract, and to determine the appropriateness of purchasing or retiring carbon offsets for the project.

Guidance

In January 2009, City Council unanimously approved a motion to amend the electricity contract between The City of Calgary and ENMAX Energy Corporation and the two entered into a 100% renewable electricity contract. The Energy Management Office (EMO) is The City group responsible for managing and allocating the distribution of green power. The Policy Stewards are members of the EMO and can be contacted directly.

The EMO is available to help project teams determine if existing carbon offsets exist within the organization that can be allocated towards the specified project and can provide the necessary documentation to demonstrate compliance with green power and carbon offset requirements.

The Energy Management Office is to be engaged during the early design phase of a project to begin planning for the allocation of green power and carbon offsets. Any green power or carbon offsets shall be sourced locally from Alberta to keep investment and environmental benefits within the province.

Deliverables

Documentation for City owned projects can be provided by the Energy Management Office.

Supporting Council Priorities, City Policies and City Strategies

- Corporate Energy Strategy
- Corporate Energy Plan – 2016-2026
- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities: A healthy and green city
- Triple Bottom Line Policy
- 2020 Sustainability Direction

Enhanced Refrigerant Management

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

Refrigerants can impact our atmosphere by causing ozone depletion and contributing to global warming. Refrigerants with the most extreme ozone depletion potential were phased out under the Montréal Protocol (1997), however, many allowable refrigerants still in use today impact the atmospheric ozone and global warming. No to low impact refrigerants are available and should be utilized when refrigerants are required.

Requirement

Do not use refrigerants with an ozone depletion potential (ODP) greater than 0 or a global warming potential (GWP) greater than 50.

Alternatively, calculate and comply with a facility weighted average impact per the guidance below.

Guidance

The requirement was adapted from the LEED V4 credit Enhanced Refrigerant Management. The intent of this requirement is to reduce or eliminate atmospheric ozone depletion and global warming impact caused by project refrigerants.

If pursuing the alternate approach of a weighted average impact calculation, follow the methodology described in the LEED V4 Building Design + Construction “Enhanced Refrigerant Management” credit.

Deliverables

Submit to The City Project Manager and the Policy Steward:

- Refrigerant product datasheets for used refrigerants
- Calculations demonstrating GWP and ODP of project refrigerants, if calculation method was used

Supporting Council Priorities, City Policies and City Strategies

- The City of Calgary’s Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities 2015-2018: A Healthy and Green City

Future Resiliency Planning

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Reduce potable water use through conservation and efficiency measures
- Encourage the integration of green stormwater infrastructure
- Maintain and improve biodiversity
- Encourage occupant comfort, provide access, and maintain social wellbeing in design and operations
- Select sites that have access to alternative transportation and consider the impact of site selection on the environment, people and the building
- Design for resiliency to changing economic, social, and environmental conditions
- Divert waste from landfills during construction, occupancy and demolition

Rationale

The world's climate and market are continuously evolving. The City of Calgary must recognize global and regional trends that will help adapt and plan for the future. All other MSPR's were selected with future resiliency planning in mind. In addition to the listed MSPR's, falling costs of photovoltaic (PV) technology and advancements in electric vehicle technology are just two of the ways The City can prepare our municipal infrastructure for upcoming opportunities and challenges. This will, in turn, reduce future retrofitting costs and allow The City to be more resilient to fluctuating utility rates and other costs, such as the carbon tax.

Requirement

Solar Photovoltaic Ready Buildings

Evaluate if the project is a suitable candidate for a roof, ground mounted or parking lot solar PV array. One of the primary requirements is for the site to have a ground, roof or parking area that is not shaded by neighboring trees or structures. Contact a Policy Steward for help evaluating a projects suitability. Projects identified as feasible candidates for solar PV shall follow the guidance section below.

Electric Vehicle Charging Rough-Ins

Provide empty electrical conduit(s) to the general parking area (conduit to each stall is not necessary) and provide space in an electrical panel for the potential future installation of level 2 electric vehicle chargers in the parking area, for at least 10% of parking spaces.

If block heaters are provided to parking stalls, size this conduit such that it can accommodate the future installation of level 2 electric vehicle charging stations at these stalls, for at least 10% of parking spaces.

Guidance

Solar Photovoltaic Ready Design

At a minimum, evaluate and design for the following considerations:

Electrical:

- Provide appropriately sized electrical conduit from the roof, ground or parking lot location to the electrical room for a future PV system.
- Reserve space in an appropriate electrical panel for future solar interconnection.

- Reserve space outside or in the electrical room for future inverters, transformers, and any other equipment needed for a future PV system.
- Consider allotting space for future battery storage units. These could be interior or exterior batteries.

Structural

- If required, locate permanent rooftop fall arrest systems along perimeter areas to maximize roof area available for solar PV panels.
- Design the building with additional structural capacity to accommodate the additional load from a solar PV system, wind loads, associated snow drift and live load for maintenance.
- Design a durable roof and avoid roofs that are easily damaged by weight or foot traffic.
- It is strongly recommended that a rigid board be used under the roofing materials to support the roofing membrane.
- Select a roof product with an anticipated life-expectancy that aligns with or exceeds the anticipated PV system service life of 25+ years.
- Consider south orientated standing seam roofs where appropriate. Standing seam roofs can provide reduced solar installation costs through savings on the panel mounting systems.

Mechanical:

- Group mechanical equipment, exhaust, flue pipes, penthouses, and other obstructions to the north of the roof to maximize unobstructed southern open roof space.
- If including interior electrical equipment, such as inverters or transformers, consider additional cooling requirements.

Deliverables

Provide the Project Manager and the Policy Steward infrastructure design details, parameters and assumptions that will allow for the install of a future solar PV system and electrical vehicle charging stations, if not already included in scope.

Supporting Council Priorities, City Policies and City Strategies

- Electric Vehicle Strategy
- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities 2015-2018: A Healthy and Green City
- Corporate Energy Strategy
- Municipal Development Plan
- 2020 Sustainability Direction

Indoor Water Use Reduction

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Reduce potable water use through conservation and efficiency measures
- Encourage the integration of green stormwater infrastructure
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

As Calgary continues to grow so does the demand for safe reliable water. This continued growth is unsustainable and puts pressure on Calgary's water resources. This resource must be conserved so Calgary can continue to provide clean water for future generations.

In addition to the consumption of the water utility itself, the treatment and distribution of potable water around the city is one of The City of Calgary's largest electricity consumers which costs taxpayers millions of dollars annually. Reducing potable water consumption conserves water and energy resources and delays the need for infrastructure expansion.

Requirement

The following requirements were adapted from the *Leadership in Energy and Environmental Design* (LEED) rating system.

For non-process plumbing fixtures achieve a minimum overall indoor water use savings of 35% in comparison to a baseline consumption defined by the LEED V4 rating system.

Do not install plumbing fixtures exceeding the following flow/flush rates:

- Water closets = 4.8 L / flush
- Urinals = 0.5 L / flush
- Lavatory faucets = 1.9 L / min
- Kitchen faucets = 5.7 L / min
- Showers = 5.7 L / min.

For process equipment:

- All dish washers and clothes washers shall be Energy Star rated;
- Do not use once-through cooling with potable water for any equipment or appliances that reject heat.

Guidance

Designed Water Savings Calculation Methodology

Calculate water use reduction per the *Leadership in Energy and Environmental Design* Indoor Water Use Reduction prerequisite and credit.

Fixture Control

Consider the use of sensor / motion controls for all water closets, urinals, and lavatory faucets. Evaluate battery operated or hard-wired sensors considering the impact on capital and operating costs.

Waterless Urinals

If incorporating waterless urinals, be sure to design appropriately, including:

- urinals downstream of lavatory faucet drains,
- appropriately sloped drainage pipes, etc.

If considering the use of waterless urinals be sure to discuss their use with the building operations team prior to including them in design.

Bottle Refill Stations

Where appropriate, provide water bottle refill stations to reduce the use of disposable water bottles.

Deliverables

Submit water fixture product data sheets and completed water use calculations demonstrating compliance with the above requirements to The City Project Manager and The Policy Steward.

Supporting Council Priorities, City Policies and City Strategies

- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities 2015-2018: A Healthy and Green City
- Water Efficiency Plan 30-in-30, by 2033

Stormwater Management

Sustainability Principle Alignment

- Reduce potable water use through conservation and efficiency measures
- Encourage the integration of green stormwater infrastructure
- Maintain and improve biodiversity
- Select sites that have access to alternative transportation and consider the impact of site selection on the environment, people and the building
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

Stormwater Management has become an increasingly important priority for The City of Calgary. The 2013 flood demonstrated the devastating impacts that can result from stormwater. Well planned stormwater management helps reduce the burden on The City's stormwater infrastructure, our rivers and our streams.

Requirement

Use green infrastructure (GI) to manage stormwater onsite. The total runoff volume of rainwater must be managed through infiltration, evapotranspiration, or capture and reuse. Satisfy one of the following two compliance options, from the *LEED v4.1* credit "Rainwater Management":

Option 1 Percentile of Rainfall Events

- Path 2 – 90th Percentile:
  In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 90th percentile of regional or local rainfall events using GI.
- Path 3 – Zero Lot Line Projects Only – 80th Percentile:
  In a manner best replicating natural site hydrology processes, manage on site the runoff from the developed site for the 80th percentile of regional or local rainfall events, using GI.

Option 2 Natural Land Cover Conditions (LEED v4)

- Manage on site the annual increase in runoff from the natural land cover condition to the post-development condition.

Guidance

Option 1. Percentile of Rainfall Events (LEED v4.1)

The percentile-based approach is adapted from the U.S. Environmental Protection Agency's Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act. This document can be found on the EPA's website.

The 90th and 80th percentile rainfall events represents a precipitation depth which 90 and 80 percent of all rainfall events for a period of record do not exceed. A generally acceptable period of record is 20 years.

Option 2. Natural Land Cover Conditions (LEED v4)

Determine natural site conditions that existed prior to any site development. Design the site in a manner that manages stormwater onsite equal to or better than what existed prior to human development.

City of Calgary Stormwater Management Requirements and Green Infrastructure

Consultants working on projects in Calgary should review and familiarize themselves with all Water Development Approvals and Permits requirements as well as guidelines available from The City's Water

Services Business Unit. These and other important resources related to development approval submissions can be found here.

The City of Calgary's Stormwater Source Control Practices Handbook contains important information regarding the design, construction, inspection, and operation and maintenance of Source Control Practices. Source Control Practices (SCP) that should be evaluated as part of green infrastructure design include:

1. Bioretention
2. Bioswale
3. Absorbent landscape
4. Green roof
5. Stormwater capture and reuse
6. Rainwater harvesting
7. Permeable pavements

Figures 1 & 2 provide examples of effective Green Infrastructure Designs.

Figure 1: Bridgeland / Riverside Rain Garden

Figure 2: Winston Heights Mountview Rain Garden

Deliverables

Calculations demonstrating compliance with the above requirements should be submitted to the City Project Manager and the Policy Steward.

Supporting Council Priorities, City Policies and City Strategies

- Policy on Regional Water, Wastewater and Stormwater
- The City of Calgary Wetland Conservation Plan and Policy
- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Water Management Strategic Plan (WMSP)
- Council Priorities 2015-2018: A Healthy and Green City
- Council Priorities 2015-2018: A city of Inspiring Neighbourhoods
- 2020 Sustainability Direction

Responsible Landscaping

Sustainability Principle Alignment

- Encourage the integration of green stormwater infrastructure
- Maintain and improve biodiversity
- Encourage occupant comfort, provide access, and maintain social wellbeing in design and operations
- Select sites that have access to alternative transportation and consider the impact of site selection on the environment, people and the building
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

Responsible landscaping aligns with existing City objectives by actively supporting local flora and fauna biodiversity, conserving potable water resources, and supporting the wellbeing of building users and citizens through access to nature.

Requirement

Design project landscaping in a manner that reduces or eliminates potable water consumption for irrigation, manages stormwater on site, provides habitat for local wildlife, and provides access to nature for those that use City facilities.

Guidance

Strategies to achieve responsible landscaping requirements can include but are not limited to the following:

Eliminate Spray Irrigation and Use Smart Irrigation (if irrigation is required)

Spray irrigation is inefficient because a portion of it evaporates into the air or lands on hardscaped surfaces. This is not only a problem because of wasted water, but also because spray irrigation is provided by potable water that has imbedded costs and energy required to treat and pump the water. Drip irrigation or soaker hoses should be utilized if irrigation is required because they are more efficient in that smaller amounts of water are delivered directly to plant roots underground or at grade. Also consider smart irrigation using moisture sensors with automatic or timed controllers adjusting the schedule to only water in evenings or early mornings. Recommendations on irrigation are further detailed on The City's irrigation setup and maintenance tips website.

Diversion and Retention of Stormwater Through Site Grading and Green Infrastructure

Design site landscaping in such a way that rainwater is transported to planter beds and vegetation through site grading and green infrastructure. This approach can reduce irrigation needs, support healthier and visually appealing vegetation, and help retain stormwater onsite to lesson impacts on downstream City infrastructure, rivers and streams.

Install Drought-Tolerant and Native Vegetation

Drought-tolerant and native plants are more capable of surviving in Calgary's dry climate without the need for added irrigation. This practice reduces water use, water utility costs, capital cost (for irrigation systems), and maintenance fees.

Consider Installing Vegetation Providing Year-round Benefits

Installing vegetation with larger tree canopy's providing habit in winter, coniferous vegetation that remains green in winter or vegetation with other winter interest provides biodiversity and aesthetic benefit to users, visitors and nature throughout the year.

Support Local Fauna

Ensure selected vegetation provides habitat, food, or otherwise supports local animals, birds and insects.

Minimize or Eliminate Sod / Turf Grass

Eliminate or reduce the use of sod / turf grass except for use-specific applications such as sports and playing fields.

In Calgary's climate, sod / turf grass requires continuous maintenance and irrigation to keep it attractive aesthetically. Limiting the use of sod / turf grass and prioritizing other vegetation, native grasses and ground-coverage, such as mulch and crushed rock, can reduce water use, reduce maintenance, improve overall year-round aesthetics, and promote biodiversity.

Figure 3: Native vegetation such as vetch, blue flax, and a variety of grasses grow in Calgary

Figure 4: Shrubby cinquefoil and blue flax are native wildflowers being planted as part of the naturalization initiative

Deliverables

Provide a description of the proposed approach to comply with the above requirements in the project Owner's Requirements, or in another form of project design documentation such as the schematic design report.

Provide Landscape, Irrigation and Civil drawings to the City Project Manager and Policy Steward.

Supporting Council Priorities, City Policies and City Strategies

- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities 2015-2018: A Healthy and Green City
- Council Priorities 2015-2018: A city of Inspiring Neighbourhoods
- City of Calgary Site Naturalization Strategy
- City of Calgary Biodiversity Strategy
- YardSmart - Trees and shrubs
- 2020 Sustainability Direction

Multimodal Accessibility

Sustainability Principle Alignment

- Encourage occupant comfort, provide access, and maintain social wellbeing in design and operations
- Select sites that have access to alternative transportation and consider the impact of site selection on the environment, people and the building
- Design for resiliency to changing economic, social, and environmental conditions

Rationale

Planning and developing infrastructure with improved multimodal access is intended to maximize site and building accessibility for Calgarians using all forms of transportation. Prioritizing transportation alternatives that reduce the burden on City infrastructure reduces the need for costly infrastructure build-outs and can increase vibrancy in an area by encouraging pedestrian and cyclist traffic.

Multimodal accessibility also promotes an active and healthy lifestyle for Calgarians by encouraging walking and cycling.

Requirement

Design site access in a manner that prioritizes pedestrians, cyclists, and public transit users. Ensure these groups can access the site and facility in a convenient, efficient and safe manner.

Guidance

Projects with landscaping, hardscaping, site works, interior layout and/or building access points in scope can best utilize multimodal accessibility.

Available approaches to satisfying this MSPR may be limited depending on existing site conditions, existing transportation networks and the project scope.

Strategies to achieve this requirement may include, but are not limited to:

Facility Entrance Location

Where possible, locate primary entrances or access pathways in locations that provide convenience from transit stops or pedestrian / cycle corridors adjacent to or near the project site.

Pedestrian-Accommodating Parking Lots

Where possible, design sites in a manner that avoids or minimizes pedestrian traffic through parking lots. If pedestrians must pass through a parking lot or other automobile-orientated area to access the building, ensure a visually distinct and continuous pedestrian pathway is provided through or around the area to promote safe and comfortable pedestrian passage.

Pedestrian/Cyclist and Automobile Separation

Where possible, provide clear separation between pedestrian / cyclist spaces and automobile spaces to reduce audible, visual, vehicle exhaust and safety impacts on pedestrians / cyclists. This can be achieved using barriers such as trees, bicycle parking, vegetation, other landscaping etc.

Figure 5: Wide sidewalks and physical separation / barriers between pedestrians and automobiles in Calgary's East Village

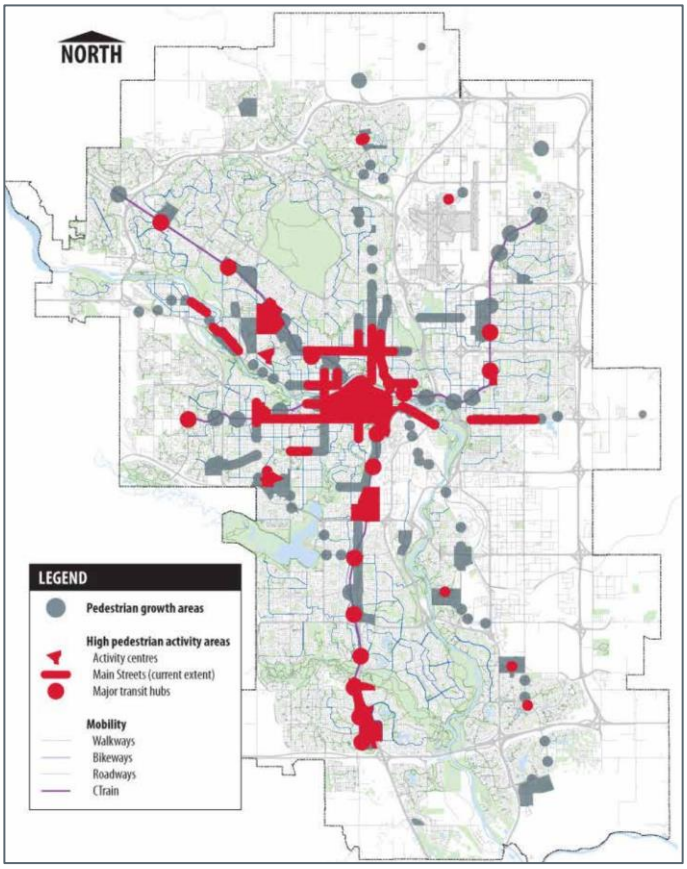

Figure 6: High pedestrian activity areas in Calgary (2016)

Deliverables

Include multimodal accessibility requirements in the projects Owner's Project Requirements. In the project schematic design report, include a section discussing how multimodal accessibility was considered and achieved.

If a schematic design report is not included in the project scope provide another form of design documentation from the coordinating professional of record confirming how multi-modal access was included in the design.

Supporting Council Priorities, City Policies and City Strategies

- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Complete Streets Policy
- Calgary Transportation Plan and Policies
- Bicycle Policy
- Pedestrian Policy
- Triple Bottom Line Policy
- Council Priorities 2015-2018: A City of Inspiring Neighbourhoods
- Council Priorities: A city that moves
- City of Calgary Pedestrian Strategy
- City of Calgary Cycling Strategy
- City of Calgary Transportation Strategy
- Transit Oriented Development Policy Guidelines
- 2020 Sustainability Direction

Construction and Demolition Waste Management

Sustainability Principle Alignment

- Design for resiliency to changing economic, social, and environmental conditions
- Divert waste from landfills during construction, occupancy and demolition

Rationale

Waste diversion from the landfill conserves finite and costly landfill space, reduces risks to the environment and water table, and reduces methane (a potent greenhouse gas) and other emissions from landfill operations. Recycling, composting and the reuse of materials can help reduce the need to manufacture or import new materials, conserving resources. Composting can also reduce the quantity of fertilizer production which is often an energy intensive process.

Requirement

During construction and demolition work, divert at least 80% of non-hazardous waste from landfill to be recycled, composted, or otherwise reused. Create and follow a construction waste management plan for all projects.

For projects pursuing LEED certification, satisfy the specific requirements for LEED credit Construction and Demolition Waste Management Option 1. Diversion, Path 2. Divert 75% and Four Material Streams or Option 2. Reduction of Total Waste Material.

Guidance

A construction waste management plan should be created by the project's prime contractor and followed throughout the construction process. Waste tracking and reporting is the responsibility of the prime contractor.

Waste includes all non-hazardous construction and demolishing materials including packaging waste from materials brought to site. Consider working with material and product suppliers that deliver materials to site with reusable packaging that can be taken-back by the manufacturer for reuse.

Deliverables

A Construction Waste Management Plan is to be created and submitted by the Prime Contractor to the Project Manager and the Policy Steward.

Waste diversion tracking sheets identifying overall diversion rates, and that break out each shipment / delivery with associated material streams, diversion rates and diversion destinations shall also be provided to The City Project Manager and The Policy Steward.

Supporting Council Priorities, City Policies and City Strategies

- The City of Calgary's Environmental Policy
- The Climate Resilience Strategy – Mitigation & Adaptation Action Plans
- Council Priorities 2015-2018: A Healthy and Green City
- City of Calgary's Waste Diversion Strategy
- 2020 Sustainability Direction

Construction Indoor Air Quality Management

Sustainability Principle Alignment

- Optimize for energy efficiency and conservation, specifically through passive design, thereby reducing and avoiding GHG emissions
- Encourage occupant comfort, provide access, and maintain social wellbeing in design and operations

Rationale

Improved indoor air quality during construction supports a safe and healthy environment for the construction team as well as future occupants. Managing indoor air quality during construction also protects building HVAC equipment from excessive dust, debris, and contaminants during building start-up.

Requirement

The prime contractor shall develop and implement an indoor air quality (IAQ) management plan for the project.

Guidance

The IAQ management plan shall be submitted to The City Project Manager and The Policy Steward for review and approval before any indoor construction commences.

The IAQ management plan should align with the approach and considerations identified in the Sheet Metal and Air Conditioning National Contractors Association (SMACNA)'s *IAQ Guidelines for Occupied Buildings Under Construction, 2007 (chapter 3)* and LEED V4 credit Construction Indoor Air Quality Management Plan.

Deliverables

Prior to construction, the prime contractor shall develop and submit an IAQ management plan outlining how the contractor will maintain good indoor air quality.

The prime contractor shall also provide construction photos demonstrating compliance with the IAQ plan taken intermittently throughout construction.

Supporting Council Priorities, City Policies and City Strategies

- Council Priorities 2015-2018: A Healthy and Green City
- 2020 Sustainability Direction