HUMBER ENERGY MASTERPLAN

# Green Building Standards

## Type B Projects

**Type B Projects – New Buildings, Additions, and Major Renovations:**

**Small (<2500m², <$15M)**

**Version 1**

**Date: August 1, 2023**

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# INTRODUCTION

## 1.0 Purpose

Sustainability is one of Humber College's core values and we strive to be national leaders in sustainable development and campus operations. Humber continues to push the boundaries of low and zero-carbon, sustainable, healthy and resilient infrastructure across our campuses through our various strategic plans and initiatives: Sustainability Plan 2019-2024, Integrated Energy Master Plan and Climate Action Plan.

These Green Building Standards mandate sustainability requirements for the various types of construction projects at the College. There is a particular emphasis on the design and construction teams to demonstrate compliance with the requirements through very clear deliverables. It is the responsibility of design and construction teams to ensure these requirements are captured in design documents and implemented during construction.

The goals are simple; clearly communicate our sustainability objectives, demonstrating leadership and accelerating market transformation.

## 2.0 Project Types

### 2.1 General

There are various types of construction projects implemented at the College and the sustainability requirements will vary based on the size and complexity of the project. In order to standardize the requirements, projects are divided into the four main project types described in Sections 2.1.1 to 2.1.4 below. This document specifically focuses on the requirements for **Type B projects**.

#### 2.1.1 Type A – New Buildings, Additions & Major Renovations - Large (>2500m², >$15M)

- This project type applies to larger new buildings or major building renovations. Typically, these projects would impact over 2,500m² of floor area or have a capital budget exceeding $15M.

For a renovation to be considered major, the entire building would typically need to be unoccupied during construction and include extensive alteration work in addition to work on the exterior shell of the building and/or primary structural components and/or the core and peripheral MEP (mechanical-electrical-plumbing).

### 2.1.2 Type B – New Buildings, Additions & Major Renovations - Small (<2500m², <$15M)

- This project type applies to smaller new buildings, additions or major building renovations. Typically, these projects would impact less than 2,500m² of floor area or have a capital budget below $15M. For a renovation to be considered major, the entire building would typically need to be unoccupied during construction and include extensive alteration work in addition to work on the exterior shell of the building and/or primary structural components and/or the core and peripheral MEP (mechanical-electrical-plumbing).

### 2.1.3 Type C – Interior Renovations & Fit-Outs - Large (>$3M)

- This project type applies to larger interior renovations & fit-outs that have a capital budget exceeding $3M.

### 2.1.4 Type D – Interior Renovations & Fit-Outs – Small ($100k to $3M)

- This project type applies to smaller interior renovations & fit-outs that have a capital budget below $3M.

## TYPE B PROJECTS – NEW BUILDINGS, ADDITIONS & MAJOR RENOVATIONS – SMALL (<2500m$^2$,<$15M)

# 3.0 Building Standards & Certifications

## 3.1 Toronto Green Standard

- Achieve all requirements for Tier 1 of the Toronto Green Standard (TGS).
- Retain a sustainability consultant that can demonstrate extensive experience on similar projects. The consultant will be responsible for providing appropriate guidance to the project team to ensure TGS requirements are captured in the design and construction of the project. The consultant will be responsible for preparing all documentation required for the submission. In cases where the project does not pursue building permit, the consultant is still required to prepare the documentation to demonstrate compliance with the requirements.
- Deliverables:
    - Prior to Issued for Tender Documents, provide final Toronto Green Standard Application package (including all resubmission documents). This includes: Checklists, Statistics Template, Bird-Friendly Design Statistics, Green Roof Statistics, Green Roof Statistics and Energy Report. The package must be complete with associated plans, drawings and reports that clearly demonstrate compliance with Toronto Green standard performance measures and include adequate detailed notations and legends.

## 3.2 LEED®

- The Project must achieve LEED® Silver Certification under LEED® v4 for Building Design and Construction rating system or otherwise most current version.

- Retain a sustainability consultant that can demonstrate extensive experience on similar projects . The LEED® consultant will be responsible for developing the certification strategy, providing guidance and monitoring the project through design and construction to ensure the desired level of certification. The LEED® consultant will also be responsible for preparing the

submission packages and all communication with the relevant certification body, including managing registration and certification.

- The proponent may not rely on credits that have operations and maintenance requirements that would be borne by Humber without prior approval. Additionally, Humber has pre-existing plans in place that have successfully been used to achieve Innovation Credits on previous projects. It is the LEED® consultant's responsibility to evaluate Humber's current operating plans and assess their relevance to achieving LEED® certification.
- Mandatory Project Credits: The project shall achieve the following mandatory credits as part of the project certification:
    - Water Efficiency:
        - WE Credit: Outdoor Water Use Reduction, Option 1: No Irrigation Required
        - WE Credit: Indoor Water Use Reduction – 4 points
- Additional Requirements:
    - There is a strong desire to achieve SS Credit Rainwater Management. Projects must present a high-level cost analysis for SS Credit Rainwater Management as part of the early-stage sustainability charrettes.
    - The Contractor is responsible for all registration and certification fees associated with the project.
    - Submit application for certification within 60 days of Substantial Performance of the work. Apply for final review within 60 days of receiving review comments from the certification body.
    - Humber anticipates that the project will achieve certification within 6 months after the date of substantial performance. If certification is not achieved within 6 months after the date of Substantial Performance of the work, submit a status report every month until certification is achieved.
- <u>Deliverables</u>
    - Upon certification, provide the complete LEED® submission package (as submitted to the certifying body), including revisions and responses to review comments.

# 4.0 Greenhouse Gas Emissions & Energy Efficiency

## 4.1 General

- This section provides further details on energy efficiency and greenhouse gas emissions requirements that compliment or are in addition to the effort needed to meet requirements in the various standards and certifications mandated for the project.
- The design team is expected to have a dedicated energy charrette with Humber early in the design process to brainstorm ideas for energy savings and solicit feedback on design strategies.

## 4.2 Design Principles

- The design team will be required to adopt a "passive design" approach that uses the building architecture to maximize occupant comfort and minimize energy use. Some key passive design recommendations are summarized below:
    - Design each façade specific to its orientation
    - Limit glazing ratios, taking into account aesthetic and livability criteria. Locate glazing to maximize daylight harvesting and minimize solar gains.
    - Consider shading and landscaping to minimize unwanted solar gains.
- In general, the design team is encouraged to prioritize the reduction of loads through good passive design practices and a high-performance building envelope rather than sophisticated and oversized HVAC systems.

## 4.3 Total Energy Use Intensity (TEUI) and Thermal Energy Demand Intensity (TEDI)

- New Buildings & Additions:
    - The project must have a TEUI <75kWh/m$^2$/yr and TEDI <22kWh/m$^2$/yr.
- Existing Building Retrofits:
    - The project must meet or exceed Total Energy Use Intensity (EUI) of 125kWh/m$^2$ and TEDI <35kWh/m$^2$/yr.
- Energy generated by on-site renewable energy systems is not to be subtracted from base-building energy use in the final TEUI value.

## 4.4 On-Site Combustion

As part of Humber's Climate Action Plan, the institution has committed to net zero carbon emissions by 2050. As a result, projects are expected to significantly limit on-site combustion for space heating to ensure fossil fuels are used as a last resort only. Projects are encouraged to utilize high-efficient electrical heating sources (i.e. heat pumps) to provide space heating needs.

Projects undergoing significant renovations to base building mechanical systems must meet the CaGBC ZCB: Design Standard Version 3 requirements by demonstrating that they are capable of providing all space heating with installed non-combustion based technologies at an outdoor air temperature of -10C.

This section <u>does not</u> apply to projects that connect to Humber's campus District Energy systems for heating and service hot water.

- <u>Deliverables</u>
    - Submit with the Issued for 75% Construction Documents
        - Energy modelling outputs indicating the building and space heating loads
        - Calculations and/or documentation that verifies the system can meet the maximum space heating load at -10C without on-site combustion.

## 4.5 Renewable Energy

- Projects must meet the CaGBC ZCB: Design Standard Version 3 requirements by installing onsite renewable energy systems capable of generating 5% of total energy needs onsite, or solar photovoltaic systems covering 75% of the available roof area after accounting for vents and mechanical equipment.

## 4.6 Partial Load Operation

- Buildings often operate at significantly reduced occupancy levels than the peak conditions for which they are designed. The design team must consider low-load, partial occupancy of the project. This includes periods during normal operation when zones are vacant (e.g. someone leaves private office for a meeting, or a student leaves a dorm to attend class). The design team must design HVAC systems to automatically turn off or ramp down at the zone level when there is no occupancy.

- Deliverable:

    - Include a dedicated narrative in the design briefs describing how the HVAC system will be able to automatically turn off/turn down when zones are unoccupied.

## 4.7 Energy Modelling

- Retain a specialty Building Energy Consultant to provide energy modelling services to comply with regulatory requirements and requirements of the mandated standards and certifications (i.e. LEED®, TGS, On-Site Combustion, Building Code) and demonstrate compliance with the TEUI requirement. The Building Energy Consultant must be from the Sustainability or Mechanical Consulting Firm.

- The primary objective of the Building Energy Consultant will be to recommend and support design decisions related to building energy performance through the use of computer simulation and engineering judgement. Design teams are encouraged to engage the Building Energy Consultant early in the design process to determine energy implications of the design and maximize passive design opportunities with the architecture, such as building massing & orientation, shading and geometry.

- Deliverables:

    - Submit with the Issued for 75% Construction Documents and as-built package:

        - An energy modelling report which includes the key items & metrics listed below.

            - Total Floor Area
            - Total Site Energy
            - Total Energy Costs.
            - Energy Use Intensity (EUI)
            - Graphical and Tabular End-Use Breakdown by Cost and Energy
            - Sizing methodology

- Calculations to support building envelope thermal performance values used in the energy model. A narrative describing how assembly and interface thermal bridging has been captured in effective R values.
- Window to Wall Ratio (WWR) by elevation
- Occupancy and Schedule Assumptions – including a description of how periods of low occupancy (e.g. weeknights and weekends) are accounted for in the energy model. During actual building operation, periods of low occupancy would mean many spaces in the building are completely unoccupied.
- Peak Lighting Power Density (LPD)
- Peak Electrical Load and Timestamp
- Peak Heating Load and Timestamp
- Peak Cooling Load and Timestamp
- Peak Receptacle Loads
- Additional Calculations and Workarounds

- Electronic energy modelling simulation files and computer simulation output files.

## 4.8 Building Envelope Requirements

- Retain a specialty building envelope consultant with extensive experience designing high-performance building envelope enclosures. Humber recommends utilizing its prequalified list of Building Envelope Consultants:

| Organization | Address | Contact Information | | |
|---|---|---|---|---|
| | | Name | Email | Phone |
| Engineering Link | 375 University Avenue, Suite 901, Toronto, ON, M5G 2J5 | Paul Pasqualini | Paul.p@englink.ca | 647-599-5465 |
| Entuitive | 200 University Avenue, 7th Floor, Toronto, ON, M5H 3C6 | Chris Van Dongen | chris.vandongen@entuitive.com | 416-477-5832 |
| Morrison Hershfield | 1005 Skyview Drive, Suite 120, Burlington, ON, L7P 5B1 | Steve Murray | smurray@morrisonhershfield.com | 905-319-6668 x1101209 |
| Pretium Anderson | 5403 Eglinton Ave West, Suite 100, Toronto, ON, M9C 5K6 | Suzanne Santyr | Suzanne.santyr@pretiumeng.com | 416-636-8886 x114 |

- In order to achieve a highly durable and energy efficient building, the Building Envelope Consultant's scope of work should include:
    - Evaluation of the overall thermal performance of the building envelope (which include impacts due to thermal bridging and interface details), air tightness and durability. This includes, but is not limited to:
        - Participation in early energy-stage energy discussions to provide input on thermal performance of proposed wall and glazing system types as well as recommendations on innovative systems or products for consideration;
        - Design reviews of the building envelope design (including proposed assemblies, interface details and other key details) to recommend improvements for durability, air tightness and to reduce thermal bridging. With respect to durability, the design must be reviewed for vapour and precipitation control (i.e. rain screen). If the design does not comply with the project's building envelope requirements (e.g. Thermal Energy Demand Intensity or Total Energy Use Intensity), work with the design team to modify the envelope design until compliance is achieved.
        - Analyzing details and areas within the project that are at higher risk of excessive air leakage and provide recommendations for simple yet effective construction detailing that is mindful of construction sequences (e.g. soffits, windows, doors, interfaces with other buildings, façade articulations)
        - Determine the total effective thermal performance of the building envelope using Building Envelope Thermal Bridging Guide to demonstrate the project's building envelope performance.
        - Review and comment on the thermal performance assumptions made in the whole-building energy models.
        - Develop requirements for thermal envelope testing and mock-ups appropriate for the project and to be captured in the construction documents.
        - Coordinate and assist the design team with developing a building envelope design that meets the project requirements.
    - Develop an air-tightness testing program appropriate for the project. This includes, but is not limited to:
        - Developing a testing plan and program for construction that will mitigate air-infiltration risk. The plan should focus on high-risk areas identified during design (e.g. soffits, windows, doors, interfaces with other buildings, façade articulations) and structured so that timely feedback can be provided to the construction team to enable adjustments to construction detailing and/or effecting repairs if

required prior to the air barrier system being concealed. The plan should also include:

- Assembly level mockup(s) requiring participation by multiple trades and air-testing of the mockup(s) as the minimum expectation on projects.
- The testing plan must include performance criteria.

- Capture requirements from the testing program into the construction documents.

- Pre-construction meeting with sub-trades to reinforce the envelope design intent and criticality of mock-ups and testing program (e.g. air-leakage and thermography). This meeting must occur at a stage in construction where issues can still be rectified. Reinforce implications of failed tests.
- Review mock-ups of building envelope assemblies or materials with the Architectural team for compliance with the project requirements.
- Review applicable submittals and shop drawings;
- Conduct site-visits and site-visit reports during construction as appropriate (e.g. review mock-up erection, review glazing installation, review wall cladding installation, review roofing and parapet construction, witness testing)
- Thermography
    - Conduct thermographic review of the building envelope prior to Substantial Performance.
    - The thermographic review should be conducted in a period where the temperature gradient between interior and exterior is greater than 20°C and wind speed is at or below 16 km/h. Building thermography will be performed after sunset on a clear night (no snow, rain). Areas should not be obstructed by snow and ice. During the first stage, the building is to be thermographically examined under positive pressure. The building would then be depressurized, stabilized and re-examined under negative pressure (a target pressure differential of 25Pa would be utilized for each). The building mechanical systems must be used to pressurize and depressurize the spaces.
    - In cases where the construction schedule does not align with seasonal weather required for accurate thermography, it is expected that the issue be raised with Humber early to look for alternate solutions.
    - Following the thermographic review, prepare a report outlining observations and opinions on identified thermal anomalies.

- <u>Deliverables:</u>
    - With the Issued for 75% Construction Documents Documentation Package, submit the air-tightness testing plan and final Building Envelope Thermal

Bridging Guide calculation spreadsheet to document the project's building envelope performance.

- Prior to Substantial Performance, submit the thermographic review report.

# 5.0 Health & Wellness

## 5.1 Encourage Physical Activity

- In order to meet the requirements for walkability and encourage physical activity the following is required:
    - A minimum of one main building entrance to egress is oriented to face onto one of the following: sidewalk, footpath, courtyard, or garden/plantings.
    - A variety of the following amenities are included in the public space around the building: benches and seating, public art, street trees and/or planters, wayfinding, shared bicycle stations, or bicycle parking areas/racks.
- Where a staircase is provided it shall be open to regular occupants, servicing all floors of the project that is located physically and/or visibly before the elevators and is aesthetically designed. The aesthetic design shall include two of the following:
    - Music;
    - Artwork;
    - 20 fc light level;
    - Natural design elements (e.g. plants, water features, images of nature); and/or
    - Gamification.

## 5.2 Mental Wellbeing

- In order to meet the requirements for enhancing the mental well-being of building occupants the following is required:
    - A combination of plants (e.g., potted plants, plant walls), nature views, and natural materials, patterns, shapes, colors, and/or images within the common spaces.
    - Design elements intended for human delight that celebrate culture (e.g., culture of occupants, workplace, surrounding community), celebrate place (e.g., local architecture, materials, flora, artists), and integrate art.
- Strive to achieve the following:
    - 70% of all workstations are within 7.5 m of transparent envelope glazing
    - Visible light transmittance (VLT) is greater than 40% OR envelope glazing is no less than 15% of the regularly occupied floor area

## 5.3 Indoor Air Quality

- Entryway systems at high-traffic building entrances shall meet the following criteria:
    - 3 m long in the path of travel;

- Wide as the entrance at a minimum;
- Does not include permanent grates;
- Building entry vestibule with two typically closed doorways; and
- Air curtains with air only and no heating provided at high-traffic entryways.

- All ventilation systems must provide MERV 13 filters for RTUs and MERV 14 filters for AHUs and DOASs.

## 5.4 Ergonomics

- Workstation seating must allow for height, depth, backrest, and armrest adjustment.

## 5.5 Occupant Comfort

- All vertical transparent envelope glazing must include manual shading that is controllable by building occupants at all times.
- All regularly occupied private offices shall have operable windows. Operable windows must include insect screens. Operable windows shall not be automated.
- All thermostats in private offices shall include visual displays with limited controllability of 1 – 2 degrees Centigrade.
- Retain a specialty acoustics consultant with extensive experience addressing acoustic concerns in post-secondary institutions. The consultant will be responsible for providing a detailed report that describes the existing conditions, recommended solutions, and measurement results. The report shall outline acoustical solutions with a focus on managing background noise, speech privacy, reverberation time, and/or impact noise.

## 5.6 Occupant Safety

- In order to meet the requirements for safe stair access, where a new stair is provided, a minimum of two of the following is required:
  - handrails located on two sides;
  - high-contrast tread edges with matte finishes to avoid glare;
  - lighting to illuminate dark corners and/or entrances and exits; and/or
  - visual cues (with paint, lighting, tape) to highlight edges, entrances, exits, or obstacles.
- All new bathrooms included in the project shall meet the following requirements:
  - Trash receptacles are provided in stalls (in women's and single-user bathrooms);
  - A hook, shelf, or equivalent storage support is provided in each toilet stall;
  - Floor drains are equipped with a self-primed liquid-seal trap.
- Where not already provided on the floor, the bathroom must be accessible to all occupants and provide:
  - An accessible stall

- An infant changing table
- An adult changing table

- Where not already provided on the floor, a single-user bathroom must be provided with accompanying signage and meets the room and stall dimensions required by the local accessibility code.
    - Hands-free operation via sensor shall be provided for the following:
    - High traffic entry doors;
    - Water bottle fillers; and
    - Water faucets.

### 5.7 Water

- A drinking fountain with water bottle refilling (min. 1 per floor) shall be provided adjacent to all cafeterias and food outlets.

### 5.8 Deliverables

- As part of the 75% Construction Documents submission, provide a memo report describing how the health and wellness requirements are implemented and the rationale for any items that were not included in the design.

## 6.0 Marketing & Communications

- Green Project Summaries - Humber has a template document for summarizing sustainability features for projects (see APPENDIX A: Green Project Summary Example). These templates are hosted on the Humber sustainability website and are intended to give the public easy access to information on green building initiatives occurring at the college. The team is responsible for completing the template with project specific information. A template example can be found here under "Green Building Standards": https://humber.ca/sustainability/resources-and-reports

- Deliverables:
    - Prior to Issued for Construction Documents, submit completed "Green Project Summaries" document to sustainability@humber.ca. Please include "Green Project Summary" and project name in the subject line.

## 7.0 Resiliency & Climate Readiness

### 7.1 General

- Our infrastructure needs to be ready to withstand the impacts of climate change and extreme weather expected in the future. The overall impact of changes in Toronto's climate on infrastructure includes: higher risk of flooding events, extreme heat and cold events and power outages. To reduce the impact of these expected changes, new development must be constructed in such a way to mitigate floods, improve thermal resilience and ensure critical needs are on back-up power generation.

- The intent of this section is to outline the key design strategies that will reduce risk and life cycle costs of the Humber's infrastructure due to predicted climate change in the Toronto area.

## 7.2 Flooding

- Risks due to increased precipitation and flooding are mitigated through the consideration of specific LEED® credits for stormwater management and pursuit of the Toronto Green Standard requirements – all referenced in other parts of this standard, as well as the following items:
    - Flood proof key electrical and HVAC system infrastructure by locating it above grade. For certain projects, this may be difficult to achieve and challenges should be raised with Humber for a final decision.
    - Locate ground floor electrical circuits in the ceiling
    - Wastewater and storm water back flow prevention
    - Specify watertight utility conduits

## 7.3 Extreme Heat & Cold

- Risks due to extreme heat & cold are mitigated through requirements for a passive design approach which includes a high-performance building envelope and operable windows, implementation of the City of Toronto Green Roof Bylaw and specific LEED® credits to mitigate heat island effects - all referenced in other parts of this standard.

## 7.4 Power Outages

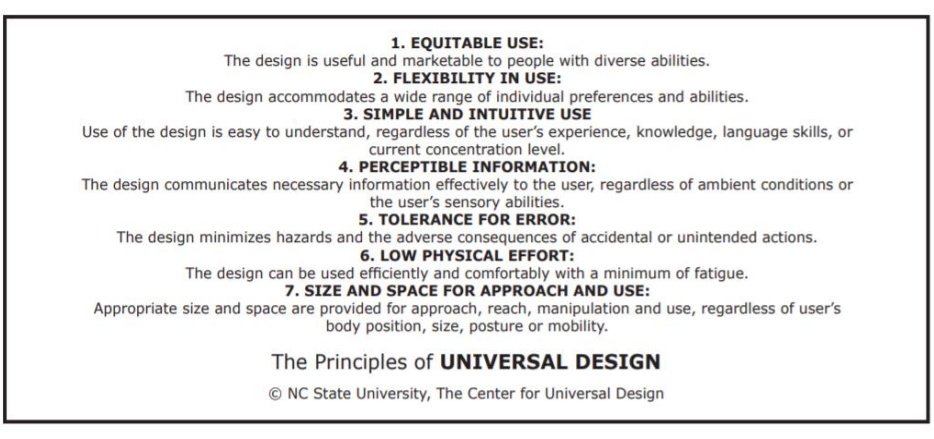
- Risks due to power outages will be mitigated through robust back-up power generation infrastructure and ensuring that critical functions are on emergency power. There is also a focus on centralizing heating and cooling infrastructure through connection to District Energy/Central Plant systems at our main campuses. Project must meet the following requirements:
    - To prevent freezing risk, pipes must be run through interior walls
    - Ensure the following services are on emergency power:
        - Emergency lighting
        - Fire Protection Equipment
        - Passenger elevators (minimum one per bank)
        - Space heating - This includes all central equipment (e.g. boilers, distribution/circulation pumps) and local devices required to prevent freezing, as well as their associated building automation system controls.
        - Sump Pumps
        - Security Cameras
        - Flush Valves & Faucets
        - Commercial fridges and freezers

### 7.5 Deliverables

- As part of the 75% Construction Documents submission, provide a memo report describing how the resiliency requirements are implemented and the rationale for any items that were not included in the design.

## 8.0 Accessibility

- Humber is committed to creating barrier free campuses in compliance with the Accessibility for Ontarians with Disabilities Act (AODA). We strive to meet or exceed best practice.
- Our standard is aligned with the concept of universal design, "The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."




- Humber has adopted Brock Universities Facility Accessibility Standard for all new construction and renovations and projects must comply with its requirements: https://brocku.ca/human-rights/wp-content/uploads/sites/208/2014-Facility-Accessibility-Design-Standards.pdf. This standard was developed based on the City of London FADS 2006 standard, customized for a post-secondary environment. This standard goes beyond the Building Code requirements.

## 9.0 Equity, Diversity, Inclusion (EDI)

### 9.1 General

- Creating optimal learning environments through sustainable, EDI focused design improves the quality of life on campus and knowledge retention for students in a holistic manner. Humber strives to build campus infrastructure and spaces that build a sense of belonging for all, and are optimal learning environments informed by equitable, inclusive and accessible sustainable approaches.

### 9.2 Mandatory Requirements

- Designers are required to bring EDI into the design process and conversation at the beginning of a project. Representatives from Human Rights, Equity & Inclusion and Indigenous Education and Engagement must be invited to a minimum of one building design charette to discuss opportunities to support EDI within Humber's building design. Each

project is unique and will have different requirements for EDI, depending on the building's occupants, use, needs and more. Some examples include:

- Creation of dedicated spaces for Humber community members (e.g. spiritual, social and wellness needs)
- Including language in RFPs to prioritize businesses owned, controlled, and operated by equity-deserving groups (e.g., Indigenous peoples, Persons with Disabilities, Racialized peoples, LGBTQ+ people, and/or women)
- Consideration for all-gender multi-stall washrooms. If all-gender washrooms are included, include urinal stalls where appropriate to promote water efficiency.

- Deliverables

  - Prior to Issued for Construction Documents, submit the Green Project Summary (See Section 7) document which requires a summary of actions implemented and features of the building construction related to belonging, EDI, and others as part of the Green Project Summaries (See Section 5).

# 10.0 Other

## 10.1 Waste and Recycling Infrastructure

- Include sufficient centralized waste sorter bins – front loading colour-coded bins with different openings for each stream and include backboards for signage. Depending on the location, 3 or 4 sections will be required in the sorter bin. The specification is available here: Clean River
- Building designs must consider the reduction and flow of ongoing waste generated within the buildings once in use.
- Consider layout of waste storage room/space, accessibility for staff as well as trucks that are removing the waste, noise, time of day, etc.
- For all projects, representatives from the Office of Sustainability must be invited to a meeting to review requirements for dishwashing and waste management.

- Deliverables:

  - With the Issued for 75% Construction Documents, submit bin types and placement within project to Sustainability Office (sustainability@humber.ca) for review and confirmation prior to order.
  - With the Issued for 75% Construction Documents, submit narrative for LEED® MR Prerequisite: Storage and Collection of Recyclables for review.

## 10.2 Electric Vehicle (EV) Chargers

- If EV chargers are deemed necessary for the project, EV parking must be Level 2 Chargepoint stations.

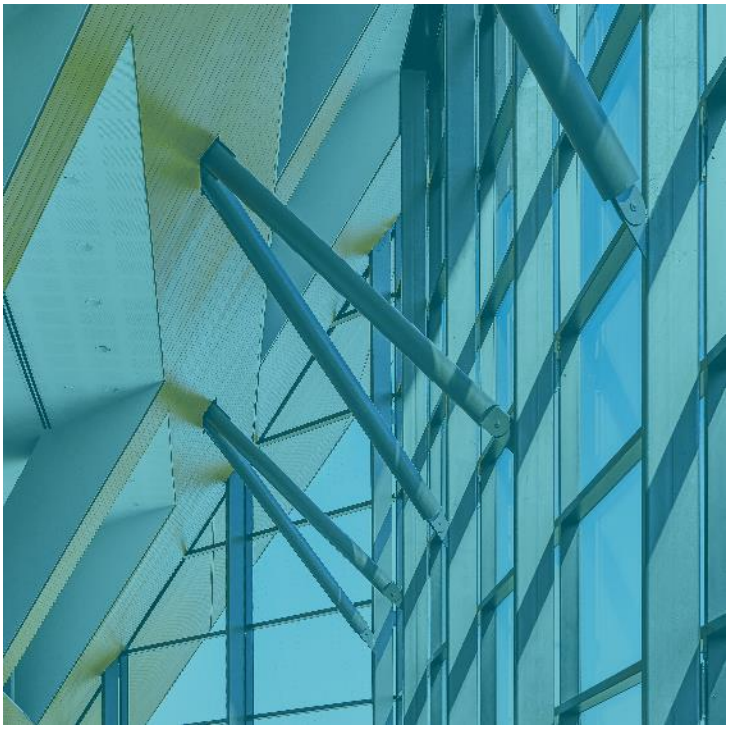
## 10.3 Landscaping

- Humber Campus is a certified Bee Campus, and all new landscaping designs – beds, planters, rooftops - must support Humber's ongoing certification status by supporting a healthy pollinator habitat.
- Designs must incorporate the needs of all wild bees, recognizing that each species has specific needs such as nest material, forages, plants, shrubs and trees.

- Do not include any invasive species in designs (e.g., Norway Maple, Manitoba Maple, Common Buckthorn, Dog Strangling Vine, Goutweed, Phragmites australis, Garlic Mustard, Lily of the Valley, Lamium).
- Humber follows NOFA Standards for Organic Land Care and landscape design should consider this in the landscaping design. The NOFA Standards require the use of rescue treatments using non-organic pesticides to control insect and disease problems that can cause significant harm, providing there are no effective organic alternatives.
- Resources on incorporating native species that support pollinators can be found in the TGS: Ecology & Biodiversity, Natural Heritage Protection and Landscape & Biodiversity sections. All projects must exceed the Tier 1 EC.2.2 On-Site Landscaping requirements and pursue 100% native plants on the project.

- Deliverables:
    - With the Issued for 75% Construction Documents, submit narrative describing how the landscape design supports pollinators, supports NOFA standards and meets the 100% native plant requirement.

# APPENDICES



## APPENDIX A: Green Project Summary Example

# Barrett Centre for Technology Innovation

HUMBER
Office of Sustainability

Green Building Project Summaries
Barrett Centre for Technology Innovation
Opening Day: 4/1/2019

ENERGY MASTERPLAN

| Project Team | |
|---|---|
| Project Manager | Colliers Project Leaders |
| Architect | Perkins&Will |
| Contractor | BIRD Construction |
| LEED Consultant | Fluent Group Consulting Engineering Inc. |
| Structural Engineer | Thornton Tomasetti |
| Mechanical Engineer | MCW Consultants |
| Building Science Professional | RDH Building Science Inc. |
| Building Code Consultant | LRI |
| Acoustical Consultant | Aercoustics |
| Accessibility Consultant | DesignABLE Environments |

The Barrett Centre for Technology Innovation (Barrett CTI) pioneers a new educational model, focusing on sustainable building practices, automated manufacturing and human-centred solutions for the 21st century. Located at Humber's North Campus, the 93,000-square-foot facility is a living laboratory that omits traditional classrooms entirely. Interdisciplinary teams of students, faculty, industry partners and community members make use of interactive technology zones, digital media studios, cutting-edge prototyping and maker spaces, interactive demonstration areas and flexible open concept gathering spaces.

The central atrium, which is the grand entrance to the building and campus life, is a dynamic location to meet, work and socialize. The expansive space is utilized for idea-sharing, showcasing new products and exploring new technologies. Residential suites on the top floor allow industry advisors to live on-site while working on projects. Designed to inspire innovation, the Barrett CTI will enable students to immerse themselves in world-class technologies and mend the gap between education and real-world experiences.

The Barrett CTI is certified LEED-Platinum and the second-largest net-zero energy building in Canada at the time of construction, reflecting Humber's commitment to providing national leadership in sustainable campuses. The sustainability features also function as teaching tools and include:

- Passive heating and cooling systems;
- A high-performance roofing system and building envelope;
- Hydronic in-floor heating;
- An abundance of natural, low-energy materials with long lifespans;
- A green roof.

Several "truth windows" allow onlookers to view the buildings' inner workings, another vital tool for teaching and learning.

## Project Highlights

| | |
|---|---|
| 65% | Reduction in energy use compared to baseline building |
| 85% | Construction waste diverted from landfill |
| 34% | Of materials were locally sourced (within 800 km) |
| 40% | Reduction in water use compared to baseline building |
| 24% | Recycled content in building construction materials |

# Project Overview

## Part of the Community

The Barrett CTI reaches beyond student life; the buildings' future-focused design compliments the surrounding network of campus open spaces and inspires innovation. The gravity-defying infrastructure is accessible and interactive, inviting community members to explore the area. The strategically placed building creates a new community hub for the rapidly growing campus. Connecting to trails, bike parking, and existing and new transit structures, including development of a light-rail transit (LRT)—the Barrett CTI is a gateway to campus life and the vibrant local community.

## Energy, Water & GHG Efficiency

- **Energy Target:** The Barrett CTI aligns with Humber's long-term Integrated Energy Master Plan, which mandates that all new campus buildings achieve an energy use intensity (EUI) of 100kWh/m2/year. This aggressive EUI led to design interventions that used a conservation-first approach.
- **Passive Heating & Cooling Systems:** The base building design for the Barrett CTI prioritized passive strategies and extensive energy conservation measures, including a moderate glazing-to-wall ratio of 40% focuses on glazing on where daylight is needed most in occupied areas; Brise Soleil shading devices on the south façade minimize heat gain and glare; and a multi-storey thermal chimney which allows natural ventilation in mild weather and 100% natural daylighting.
- **High Efficiency HVAC:** The building is provided with 95% efficient condensing style boilers serving DHW and service heating loop; dedicated outdoor air system with energy recovery enthalpy wheels to temper outside air and reduce energy, and distributed fan coils until to cut transmission energy use with hydronic systems instead of central systems.
- **Net-Zero Energy:** The Barrett CTI is a net-zero energy building, the 700 KW-DC (580kW-AC) solar installation on the adjacent parking structure generates enough renewable energy to offset the buildings' annual energy use.
- **High-Performance Roofing System & Building Envelope:** Parametric design analysis, including solar and radiation, wind and day-lighting penetration, optimized both the massing and envelope resulting in a highly insulated façade and concrete floors acting as thermal mass in the lobby.
- **Green Roof:** The building maximizes green spaces and has a partly vegetated enclosed roof and garden to manage stormwater runoff and mitigate potential infrastructure failure and associated financial burdens. The green roof engages students in the concepts of wellness and environmental stewardship.