



Carleton University

# Campus Master Plan Update

## Part 2: Campus Design Guidelines

2023





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# 6.0 Campus Design Guidelines

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The following Campus Design Guidelines should be used to inform the comprehensive development, built form, open space, public realm, and circulation across Carleton University. These guidelines are rooted and informed by the Guiding Principles, Campus Vision, Design framework and Master Plan Concept contained in the previous sections of this Campus Master Plan Update.

The established guidelines provide flexibility and structure while encouraging creative, high-quality architectural and design expression. The guidelines strive to build upon existing plans, policies, and frameworks to create an accessible, safe, inclusive, and sustainable campus.

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- 6.1** Universal Design and Accessibility
- 6.2** Indigenous Placemaking and Placekeeping
- 6.3** Culture and Inclusion
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# 6.1 Universal Design and Accessibility



For the visually impaired, incorporating specific tactile elements in architecture and urban design can vastly improve the navigability of a foreign space. (Paleisbrug, Benthem Crouwel Architects © Jannes Linders)

Universal Design ensures that the design and composition of interior and exterior built environments result in accessible, safe, and comfortable spaces for users of all ages and abilities. It focuses on ensuring spaces are equitable, inclusive and inviting to all users.

Existing and future development should strive to meet the following guidelines to the greatest extent possible. It is understood that at times Universal Design strategies may conflict with other priorities, such as cultural or significant natural features, or may be impractical due to site constraints. In these cases, further consultation with the campus community and accessibility consultants may be required.

Carleton University should work in stronger collaboration with the Paul Menton Centre for Students with Disability to ensure disability services on campus are prioritized. Additional support should be provided to Carleton’s Attendant Services Program, which offers free personal care services to students with physical disabilities living in residence.

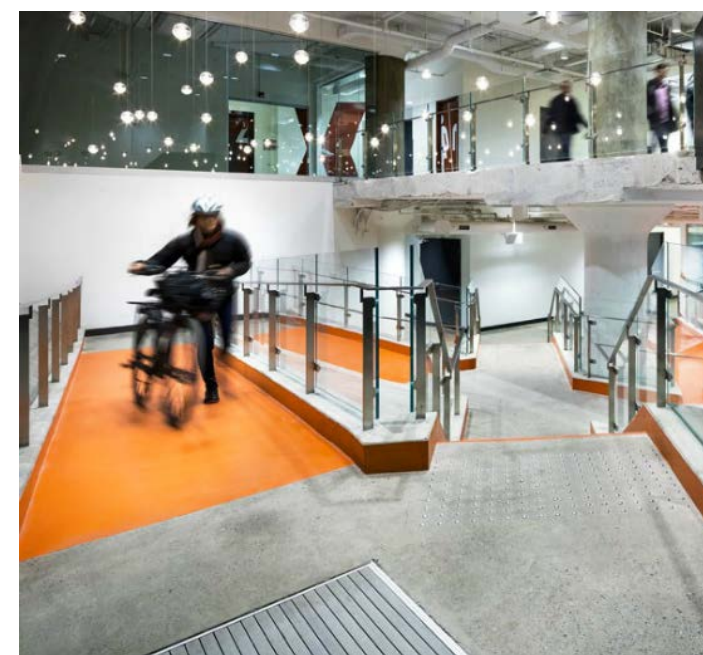
Building on Carleton’s Coordinated Accessibility Strategy, the Universal Design and Accessibility guidelines intend to address the following:

- Ensure that a wide range of accessible design standards and guidelines are followed from the start of the development process and throughout. This will assist in achieving an inclusive and universally accessible built environment.
- Meet and exceed minimum accessibility requirements of National and Provincial Building Codes, as well as the AODA, and follow best practices, recognizing that inclusive design goals, objectives and principles will inform the broader design of the Carleton campus.

- Address and incorporate future accessible design requirements that may be implemented at the Federal level to further achieve excellence in design and to support broader user groups and people with disabilities. This will aid Carleton in continuing to be a leading post-secondary institution in accessibility.

## General

- a. Create campus-wide visual and physical connections between buildings, tunnels, and pathway systems.
- b. Integrate wayfinding and signage consistently and continuously into the landscape and open space design.
- c. Utilize principles of Universal Design throughout the campus.
- d. Use high quality, durable and smooth materials to ensure accessibility, comfort, and safety are maintained.
- e. Place wayfinding at intuitive locations to provide navigation ease in all conditions and seasons by implementing digital wayfinding platforms and developing/maintaining a robust maintenance plan for pathway clearance.
- f. Avoid creating grade changes that would require stairs or winding ramps.
- g. Improve connections and permeability to transit, parking, and active transportation opportunities.



Vibrant, high-contrast pathways and tactile ground surface indicators can assist navigation within the interior of buildings. In the image above, a bold, orange feature ramp can accommodate mobility devices of various widths. (100 Broadview © Quadrangle)



## Exterior Environments

### Exterior Paths of Travel

- h.** Exterior paths should have a minimum clear width of 2100mm. Where high traffic is expected or at shared use pathways, this should be increased to 2500mm to ensure adequate space for pedestrians, cyclists, mobility aids, and strollers.
- i.** Pedestrian pathways should be firm, stable, and slip resistant with proper drainage considerations.
- j.** Gradual running slopes should not exceed 5% (1:20) and cross slopes should not exceed 2% (1:50).
- k.** As part of detailed ramp design, ensure the integration of any required landings, with suitable dimensions and at maximum intervals. Provision of other design features such as clear width surface, high colour/tonal contrasting strips, handrails, guards, and edge protection.
- l.** Provide an intuitive, direct, accessible route to key use areas and provide a logical, direct, and accessible path from parking, transit, and pathways to building entrances.
- m.** Ensure doors do not swing into paths of travel. Where this cannot be avoided, ensure that a cane detectable guard or other barrier is installed perpendicular to the wall containing the door.
- n.** Straight paths of travel are preferable to a winding, indirect path, as straight paths are easier to follow for people who are blind or have low vision.
- o.** In large open areas, both indoor and outdoor, consider using textured surfaces to differentiate paths of travel from adjacent areas.
- p.** Ensure a smooth transition is provided between sidewalk segments.
- q.** Where gratings are present in the path of travel, such as sewer catch basin covers or drainage grates, ensure that any openings are situated perpendicular to the path of travel. Openings in gratings shall be no wider than 13 mm.
- r.** For stair systems, provide closed risers, required riser/tread dimensions and handrails/guards. Ensure uniform riser height and tread depth throughout. Provision of high colour/tonal contrast horizontal marking strips (50 mm depth) is required, located at the leading edge and extending the full width of treads. Tactile Walking Surface Indicators (TWSI's) should be provided at the top landing of all exterior stair systems. Handrails should contain suitable grasping dimensions, appropriate handrail mounting height, use of colour contrast and clearances from mounting surfaces.
- s.** Curb ramps should integrate the provision of tactile walking surface indicators (TWSIs), with high colour / tonal contrast compared to the mounting surface, as a navigational aid for users with vision loss. Suitable clear width (2100mm minimum), transition areas at top and minimal slope should be provided to benefit users of mobility aids and people with vision loss.
- t.** Provide site furniture and amenities that highly contrast against surroundings and adjacent mounting surfaces, as well as for the identification of accessible rest areas.

### Landscaping

- u.** Avoid planting thorny and poisonous plants as well as those with large seed pods or fruit bearing trees bordering in public areas.
- v.** Ensure that tree limbs and overhead plantings that overhang pathways and accessible routes do not impede the clear headroom of 2100 mm.
- w.** Provide accessible rest areas with a range of seating options. Ensure to include a suitable mix of shelters at strategic and central locations for shade and protection from elements.
- x.** Utilize landscaping as a buffer between pedestrians and elements that are potential hazards.

### Accessible Parking & Passenger Loading Zones

- y.** Where a potential parking lot or parking structure is designed to serve multiple buildings or accessible entrances, distribute accessible parking spaces to provide users with options for more convenient parking locations.
- z.** Locate accessible parking spaces as close as possible to accessible route(s) and primary accessible entrances. Integrate information and directional signage to assist with locating designated parking spaces, connecting buildings or routes, and exit/entry points.
- aa.** Accessible parking spaces should be designed with suitable dimensions and clearly marked access aisles. Gently sloped curb ramps or level access should provide continuous accessible pedestrian routes, as required.
- ab.** Designated accessible parking spaces should have a clear path of travel to pathways and sidewalks.
- ac.** Provision of an accessible route, no greater than 30m distance from the accessible passenger loading zone leading to an accessible entrance of any adjacent facility.

- ad.** Access aisles must be provided alongside and parallel to the vehicle pull-up space at an accessible passenger loading zone.
- ae.** Access aisle dimensions must be a minimum of 2440 mm wide by 7400 mm long, with covered accessible rest areas located nearby.
- af.** Maintain overhead height clearance at a minimum of 3600 mm at any accessible passenger loading zone, as well as along vehicle access and egress route(s).
- ag.** Consider additional overhead height clearance of 4000 to 5000 mm high, where larger double-deck buses may be used at accessible passenger loading zones.

### Rest Areas

- ah.** Provide handrails along extended paths of travel for users with limited mobility.
- ai.** Provide rest areas at intervals along extended paths of travel. Ensure rest areas include a variety of seating types, as well as clear space for wheeled mobility devices.
- aj.** Seating areas adjacent to paths of travel should offer a mix of options to suit different user needs. Incorporate furnishing with shelter and shaded spaces to support a four-season climate.
- ak.** Avoid planting high allergen producing vegetation and trees in open and shared outdoor spaces.
- al.** Provide accessible shelters and rest areas at high-use accessible transit stops.

## Entrances

- am.** Main entrances should link to exterior accessible routes and should be step and transition free, excluding the provision of required accessible threshold transitions at doorways.
- an.** Ensure main entrances and other high-use entrance/exit doors provide ample clear width (950 to 1100 mm preferred, 860 mm minimum). Suitable hardware (lever or D-pull type) with minimal opening force required.
- ao.** Provide automatic or sliding doors at all main entrance circulation doors, where possible. Provide power operated doors if automatic doors are not feasible.
- ap.** Power door operator controls installed on the pull side of doors are to be located no more than 1500 mm beyond the door swing. Power door operators installed on the push side of doors should be located at least 600 mm from the edge of the door frame.
- aq.** A clear floor space of 900 mm by 1500 mm minimum should be provided adjacent to any power door operator control.
- ar.** Clear distance between two doors in a series, as part of an entrance vestibule should be 2500 mm. Clear floor space also provides suitable turning spaces for a wheeled mobility device and space for high levels of pedestrian traffic.
- as.** Provide suitable shelter or overhead canopies at all main entrances and/or where there is a high level of pedestrian use.
- at.** For fully glazed doors, sidelights, or adjacent window wells, provide a continuous opaque and visually contrasted strip, decal, or logo mounted at eye level between 1350 mm and 1500 mm high from the floor or ground level, with a minimum width of 50 mm.

- au.** Service animals should be welcomed at key venues and locations, including offices, recreation centres, sports venues and assembly areas, as well as the provision of exterior service animal relief areas, which are required to be located near a main entrance.

## Winter Maintenance

- av.** Design for weather protection by including covered accessible entrances at buildings to protect users and visitors from elements.
- aw.** Provide continuous street and pathway lighting to provide a high level of illumination and to mitigate shorter daylight hours.
- ax.** Protect accessible routes, ramps, stairs, and sidewalks from ice and snow.
- ay.** Include consideration of new snow removal technology, particularly at curb cuts and ramps, which tend to collect snow and ice.
- az.** Design sidewalks and pathways to support the storage and removal of snow outside paths of travel.
- ba.** Align new developments to maximize sunlight penetration into buildings and public spaces, as well as provide protection from prevailing winds.
- bb.** Ensure overall ground design prevents any excess glare throughout interior spaces.
- bc.** Ensure building roofs are designed to prevent falling snow, ice, and water from accumulating on accessible entrances, pathways, and surfaces in the path of travel.

## Interior Environments

### Interior Circulation

- bd.** Where ramps are required, ensure maximum running slope ratio between 1:25 (4%) and 1:20 (5%), with cross-slope at a maximum of 2%. As part of detailed design, ensure the integration of any required landings, with suitable dimensions and at maximum intervals. Provision of other design features such as clear width, surface, high colour/tonal contrasting strips, handrails, guards, and edge protection.
- be.** Provide closed risers for stair systems, as well as required riser/tread dimensions and handrails/guards. Ensure uniform riser height and tread depth throughout. Provision of high colour/tonal contrast horizontal marking strips, located at the leading edge and extending the full width of treads is required. TWSI's to be provided at the top landing of all stair systems.
- bf.** Handrails should contain suitable grasping dimension, handrail mounting height, use of colour contrast and clearances from mounting surfaces.

### Lighting

- bg.** Provide even light distribution at ground surfaces and at floor level for all occupied floor areas, including exterior and interior accessible routes, and at the leading edge of stairs and ramps.
- bh.** Ensure lighting levels of at least 100 lx are present at the ground level and on ground surfaces, along pedestrian pathways and accessible routes.
- bi.** Provide continuous lighting to mitigate dark or shadowed areas. Avoid using lighting fixtures or features that cause glare or additional shadowing.
- bj.** Avoid pools of light, areas of shadow, and any reflective glare from surfaces where possible.

### Additional Considerations

- bk.** Environments should be designed to minimize distracting and/or disorienting sound such as echoes while still allowing for necessary auditory cues that are useful for wayfinding.
- bl.** Ensure that the types of auditory cues provided are consistently implemented and do not result in excessive noise.

## Facility Systems and Communications

### Operating Controls & Building Systems

- bm.** All operating controls intended for public use are to be mounted at an accessible height, between 900-1100 mm from the finished floor.
- bn.** Provide occupancy sensors for lighting systems at frequently used locations and spaces such as meeting rooms, washrooms, and classrooms, where possible.
- bo.** At doorways, where there is secured access to buildings, provide proximity readers with the following features:
  - Audible indicator when activated.
  - Visual indicator when activated.
  - Where power door operators and controls are provided, locate the secure access in close proximity, or sync the two systems to ensure full accessibility.
- bp.** Provide assistive listening systems and/or devices for users with hearing loss.



## Emergency Planning (Fire & Life Safety Systems)

- bq.** An emergency plan should be in place for the evacuation or sheltering of individuals with mobility and wheeled mobility devices, and/or for individuals who cannot evacuate buildings or shelter in place independently.
- br.** Clearly identify locations for accessible areas of refuge with accessible signage and use of pictograms, with large print, tactile, and braille features.
- bs.** Provide areas of refuge at central and strategic locations for floor levels below or above grade that are suitably sized, away from any door swing, and located as part of an accessible route.
- bt.** Ensure the design of areas of refuge comply with applicable building and fire code requirements. Accessible areas of refuge are typically adjacent to firefighter elevators and/or at the exit stair locations with landings large enough to accommodate mobility devices. A 2500 mm turning space is ideal.
- bu.** Equip all areas of refuge with an accessible, two-way communication system, including identification and instructional signage, audible and visual indicators, as well as accessible operating controls, with hands-free speaker communication and induction loop system integration.
- bv.** Include visual elements in fire alarms such as strobes, throughout interior areas and at all common use areas, washrooms, corridors, and tunnels etc.
- bw.** Emergency backup power should be provided for all power door operators and for the lighting of key interior spaces.
- bx.** Ensure accessible emergency exiting signage is visible and placed in logical locations.
- by.** All accessible exiting and egress points should lead to a level muster point.

## Signage & Wayfinding

### Navigational Signage

- bz.** Signage should be placed in consistent locations that are highly visible and should identify the nearest accessible path, washroom, and building entrances (or accessible entrance if separate from the main entrance).
- ca.** Signage that identifies the accessible entrance of a building should be obvious and visible from a distance.
- cb.** Where possible, informational signage for buildings should list what is contained within the building i.e., faculties, offices, or food options.

### Building Signage

- cc.** Signage placed on buildings should be visible from a distance.
- cd.** Signage should be illuminated and contrasting with mounting surfaces. Building signage helps in signaling the intended entry point(s) from the exterior, as well as from the tunnel network.

### Room Signage

- ce.** Room signage should be consistently placed on the latch side of doors and should include both tactile characters and braille. Always avoid placing tactile and braille signage on doors.
- cf.** Room signage should be mounted at a consistent height throughout the campus.

### Wayfinding

- cg.** Utilize auditory and olfactory cues as they promote health and wellbeing, while contributing to enhanced wayfinding and inclusion for diverse users of the space.
- ch.** Provide high colour contrast for key elements of the built environment for enhanced wayfinding, overall visibility, as well as usability for persons with vision loss and cognitive impairments.



The Exhibition, 'In the Forest', educated visitors on topics of biodiversity, moors and forest as CO2 binders, formation of groundwater, sustainable use of wood and importance of natural forestry. (Berlin, hochC Landscape Architects © Winkelmeier)



## 6.2 Indigenous Placemaking and Placekeeping



The Awen' Gathering Place was designed by architects and landscape architects of Brook McIlroy's Indigenous Design Studio in collaboration with renowned educator, artist, and poet Dr. Duke Redbird of the Saugeen First Nation. The concept, based on the teachings of Dr. Redbird, is a representation of the layers of the food forest, with each layer linked to one of the Seven Ancestor Teachings. (Collingwood's Awen' Indigenous Gathering Place © Brook McIlroy)

Carleton University is located on the traditional territory of the Algonquin Anishinabeg Nation. The Campus Master Plan Update intends to weave Indigenous narratives, imagery, languages, histories, and cultures throughout the campus' buildings and open spaces.

The objective of placekeeping is to create special gathering places, focal points, and landmarks that promote connectivity, sociability and comfort while strengthening one's sense of attachment to place. Indigenous placekeeping is specific to the histories, narratives, cultures, ontologies and pedagogies

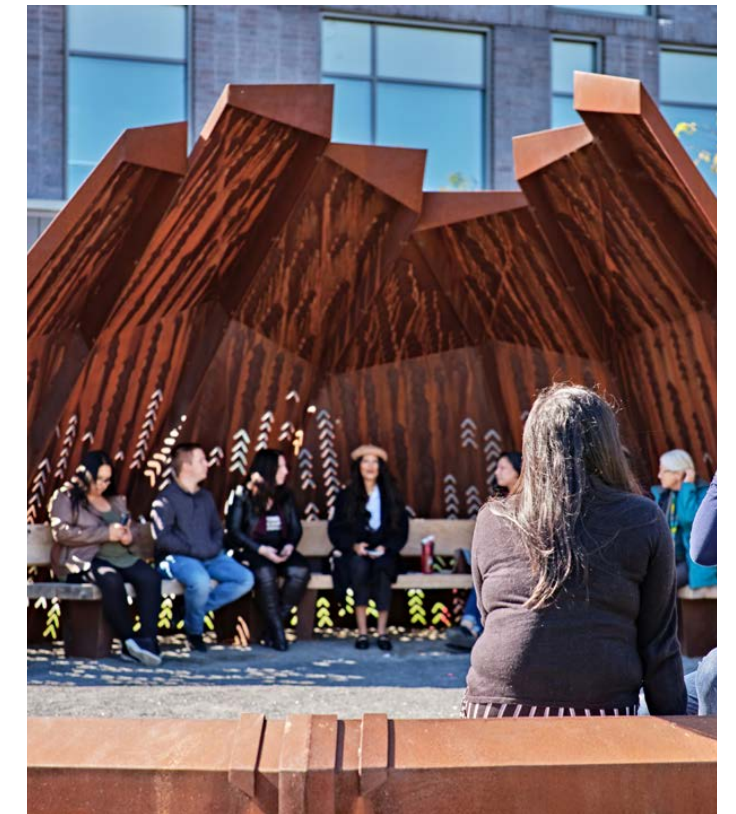
of Indigenous Peoples and communities. Through elevating and bringing into focus Indigenous ways of knowing and doing, and through the teachings of Indigenous knowledge keepers and practitioners, we may begin to create more inclusive spaces and continue the work of reconciliation.

Placekeeping establishes connections to the land and its inherent stories, languages, and culture. It works to keep the cultural memories associated with a locale alive, while supporting the ability of local people to maintain their way of life. Indigenous design and placekeeping are important tools for

sharing and celebrating diverse Indigenous cultures, expressions and ways of life. These practices acknowledge connections to the land and create unique, iconic spaces that can facilitate mutually respectful relationships between Indigenous and non-Indigenous people.

Indigenous placemaking at the university should include a co-design process with local Indigenous communities and groups, including though not limited to, Carleton's Strategic Indigenous Initiatives Committee (CUSIIC). It is critical to engage and consult Indigenous peoples when designing elements that incorporate Indigenous imagery, languages, and processes. Co-design processes (also known as co-operative or participatory design) are a form of engagement that involve groups in the design process to ensure that the final outcome is representative of the communities' wishes. Co-design processes with Indigenous communities provide opportunities for employment, internships, and training of Indigenous peoples in the placemaking professions.

Carleton is situated on unceded Algonquin Anishinabeg territory. Therefore, the spaces that are created should reflect, respect, and celebrate Algonquin histories, stories and cultures and the specific connections between experiential, land-based learning and Indigenous knowledge and world views. Further to this, recognizing that universities are spaces in which many diverse people come together, including Indigenous people from different Nations and cultures, creating environments for Indigenous people to get to know one another is a critical part of fostering community and support for Indigenous learners.



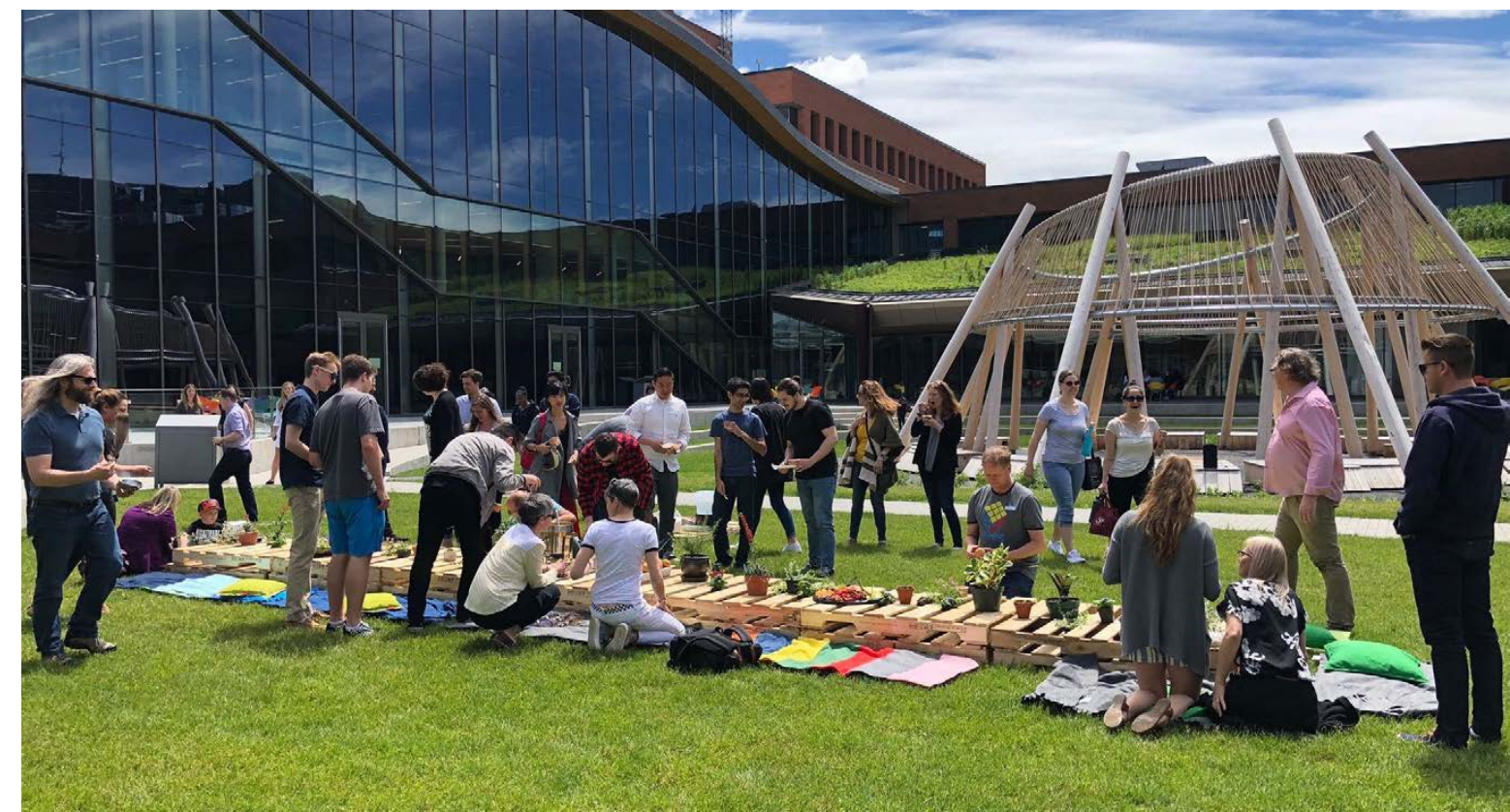
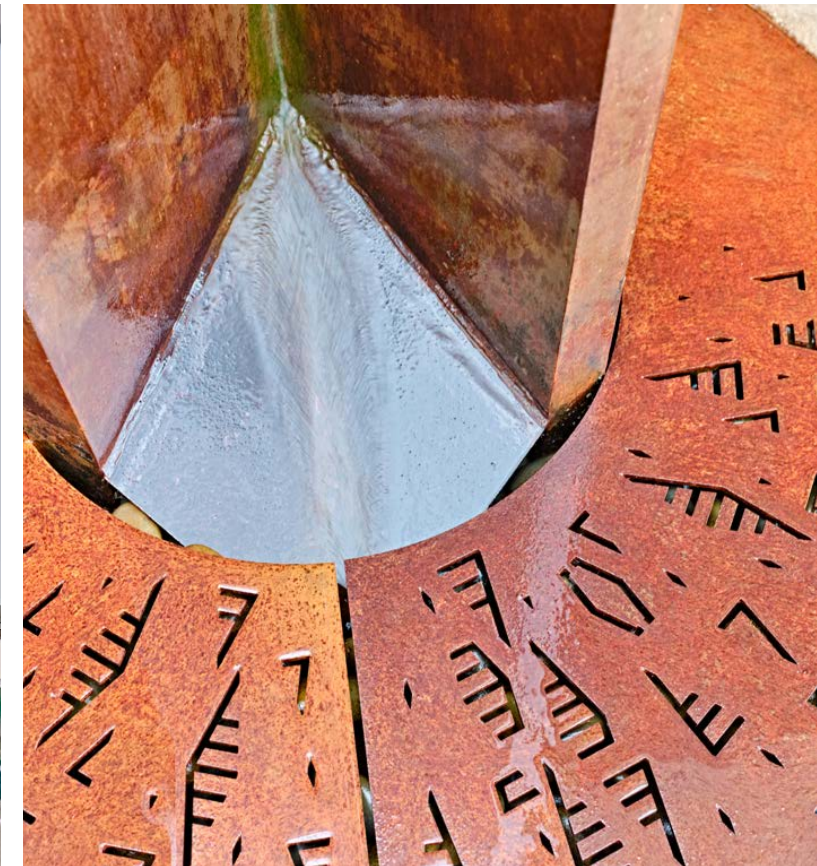
Incorporating Indigenous placemaking elements that tell stories and act as campus wayfinding cues (Toronto, Ontario; © Brook McIlroy)

The following guidelines intend to be a launching point for further Indigenous engagement at Carleton University. It is important that Indigenous community members are actively consulted with for any Indigenous related projects and/or development on Carleton University. These guidelines build upon existing frameworks the Carleton has established in working with Indigenous communities, including the Kinàmàgawin (Carleton's Indigenous Strategy) and the Outdoor Space Master Plan (OSMP).



## General

- a. Foster a campus culture that understands, acknowledges, and respects connections to the place, the land, and the Indigenous Nations and People of the area, past and present.
- b. Ensure placemaking features and structures are representative of Algonquin Anishinabeg culture and ensure that there is meaningful inclusion and representative of other First Nations, Inuit and Metis Peoples from across Turtle Island.
- c. Embrace Indigenous-led design and placekeeping opportunities as a means of contemporary expression. Maximize opportunities for Indigenous involvement at every level (design, labour, craft, entrepreneurship, art, cultural programming). Ensure that collaborators are appropriately recognized and credited.
- d. Design welcoming spaces that embody Indigenous worldviews, values and histories.
- e. Maximize opportunities for Indigenous involvement at every level of campus development, including design, labour, craft, entrepreneurship, art, and cultural programming.
- f. Include traditional building practices, artisanship, and craft while embracing contemporary technologies. Use of natural, local and recycled materials should be encouraged.
- g. Avoid locating placemaking spaces in isolated areas where visibility is low to increase awareness and use of placemaking elements.
- h. Consider themes for buildings and open spaces that express the location, natural features, and the Indigenous identity, history, cultural characteristics, stories and practices specific to the Algonquin Anishinabeg traditional territory, land in which Carleton University is located upon, as well as the greater histories of Indigenous Peoples across Turtle Island.
- i. Accommodate flexible use over the years, seasons and times of day to respond to space requirements and needs.
- j. Placekeeping elements may be integrated into hardscaped areas and functional elements of the streetscape such as transit shelters, planter walls and tree planting grates. These may include inlaid poetry, text, murals, imagery or unique painting motifs, or distinctive paving patterns.
- k. Indigenous placekeeping should be integrated into wayfinding elements, such as language, imagery and symbolism. Consult with and give recognition to local Knowledge Keepers who speak the language in this process.
- l. Design with Indigenous flora, fauna and natural medicines in mind when considering future landscaping.



Collection of images from Algonquin College, Centre for Innovation and Learning. By drawing strong connections between the land and built form, and by imbuing cultural references through art and iconography, the design welcomes Indigenous and non-Indigenous students into an inclusive and supportive learning environment. (Ottawa, Ontario; Brook McIlroy © Tom Ridout)



## Environmental Stewardship

- m. Articulate the intrinsic value of nature in interpretive signage, storytelling or themes. Embed messaging that encourages environmental responsibility and relationship to the land.
- n. Communicate Carleton's proximity to the Rideau River and Canal by weaving opportunities to learn about environmental and natural systems.
- o. Model environmental stewardship and sustainability for other communities at Carleton University.
- v. Interpretive or artistic expressions in the built environment should relate to the natural world and natural systems such as earth, trees, water systems, fire, and air.
- w. Awareness and opportunities to learn about Algonquin Anishinabeg history and culture can be achieved through signage, markers and other Indigenous placemaking opportunities.
- x. Ensure the interpretive information on the history of the area has been consulted on with Indigenous community members and is clearly communicated.

## Safety, Accessibility, and Inclusion

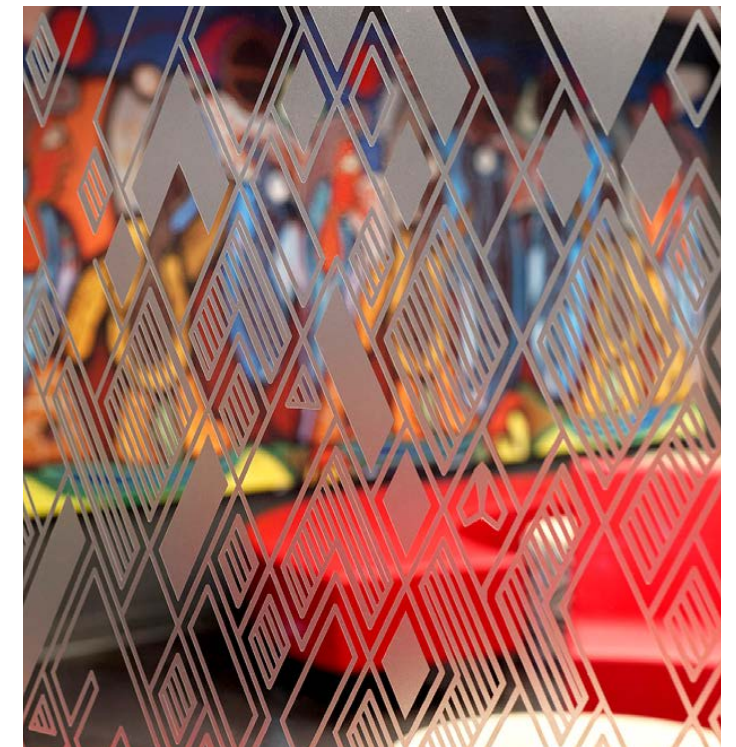
- p. Ensure that all community members can fully experience placemaking spaces and features, regardless of age, ability, and means.
- q. Strive to create accessible and inclusive places that reveal the deep culture of Indigenous communities and their relationships to the land.
- r. Prioritize the safety, accessibility, and inclusion of Indigenous peoples and perspectives in Indigenous placekeeping features on campus.
- s. Connect placekeeping features and spaces with their surroundings and with the public realm.
- t. Locate placekeeping spaces and features at locations where there are supporting programs and activities nearby to activate the space and provide stewardship.
- u. Cluster Indigenous design features and elements in close proximity to each other to create activity nodes, supported by university-led programming to foster community building.



Placekeeping elements should be well integrated into the Carleton University fabric and interwoven into the Green Ribbon as a standalone element embedded into other structures. (Humber College Cultural Markers, Toronto, Brook McIlroy; ©Tom Ridout)

## Learning, Engagement and Relationship Building

- y. Ensure engagement with Indigenous communities occurs early on in the design process and continues throughout to avoid cultural tokenism and appropriation, and to display authentic and genuine engagement.
- z. Build and foster authentic relationships with local Indigenous communities to allow for more meaningful engagement and to work towards building trust with Indigenous communities.
- aa. Ensure interpretive information on the history of the area is borne through engagement with Indigenous communities, specifically the Algonquin Anishinabeg Nations.
- ab. Indigenous design must be done in consultation with, under supervision by, and/or directly by Indigenous peoples, communities, Elders, knowledge-holders and practitioners.
- ac. Schedule frequent engagement sessions and conversations with local Indigenous Peoples, representatives and communities including the Pikwakanagan, Tungasuvvingat Inuit and the Kitigan Zinbi, and groups such as Carleton University's Strategic Indigenous Initiatives Committee, as campus development occurs.
- ad. Use Indigenous design to provide opportunities for social interaction and active and healthy lifestyles, as well to teach Indigenous and non-Indigenous people about the cultures and customs of the Anishinaabeg Algonquin Nation and other Indigenous Nations across Turtle Island.
- ae. In projects developed for and with Indigenous Peoples, establish programming and engagement strategies to promote use of the Indigenous spaces. Provide opportunities to learn about Indigenous cultures, histories, and the importance of the natural environment within these spaces.
- af. Provide appropriate services and programming at Carleton University to support the existing and growing Indigenous population.
- ag. Provide educational material on campus to better inform the campus community of Indigenous cultures and histories and how they relate to Carleton University.



Glass panels dividing the office are decorated with custom geometric decals portraying the story of the Thunderbird. This is the origin of the name Waakebiness. In the Anishinaabemowin language, it means Radiant Thunderbird from the South. (Waakebiness-Bryce Institute for Indigenous Health, Dalla Lana School of Public Health, University of Toronto; Brook McIlroy © David Whittaker)



## 6.3 Culture and Inclusion



(© Carleton University)

Carleton University is committed to fostering a campus that celebrates and supports the diverse cultures, ethnicities, and peoples at the university. The university aims to create a campus community that is welcoming, equitable, safe, and inclusive for people of all backgrounds, faiths, sexualities, genders, and abilities. As part of the university's ongoing work towards developing services and programs to meet the needs of the evolving population, an action plan and accessibility strategy were created. The Equity Diversity and Inclusion (EDI) Action Plan outlines the university's commitments to cultivating, encouraging, and supporting differences

on campus. The Coordinated Accessibility Strategy (2021-2022), creates a platform for Carleton University to be a catalyst for creating a more accessible and inclusive society.

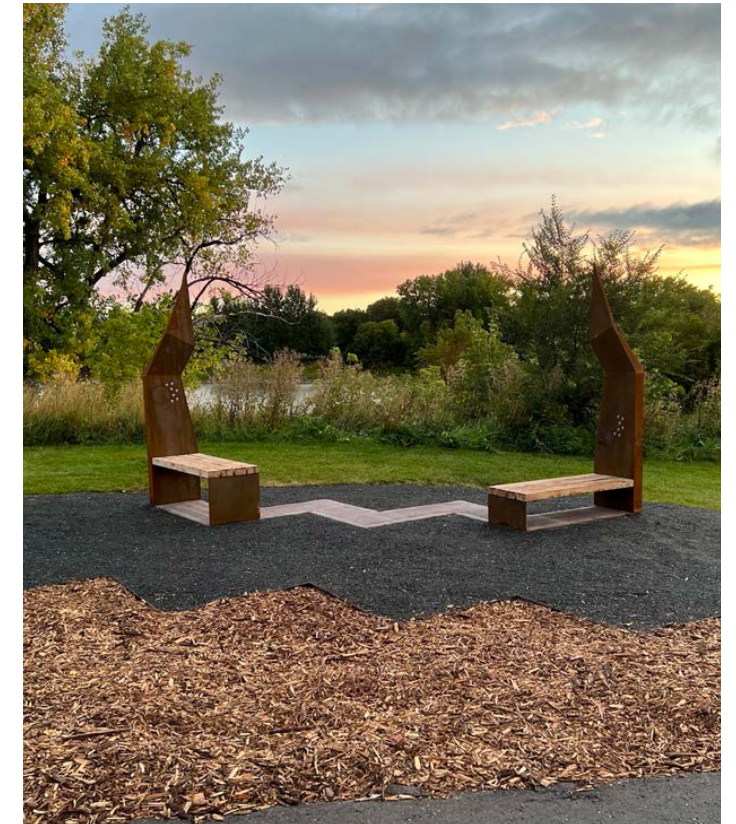
The Campus Master Plan Update acknowledges the significant role that the built environment plays in supporting inclusivity on campus. The plan details components relating to barrier free access, legible and accessible wayfinding, displaying diverse forms of art, and creating spaces on campus that meet the needs of the campus community.



International flags on display at Carleton University's Nideyinàn. (© Brook McLroy)

### General

- a. Ensure that the entire campus community can fully participate and feel welcome on campus, regardless of age, ability, and means.
- b. Ensure the needs of diverse equity-seeking groups and individuals are considered in the design of campus environments.
- c. Use multilingual signage to create an inclusive wayfinding experience that allows users to experience the environment in their preferred language. Ensure wayfinding and signage is inclusive and accessible for people of all abilities.
- d. Ensure that future development on Carleton University is informed and supported by its current and projected diverse population i.e., international students and Indigenous population.
- e. Incorporate and enhance visual representation of cultures and underrepresented groups across the campus through artwork, murals, and multi-language wayfinding. This will also promote Carleton University's brand as one that values EDI.
- f. Ensure diverse voices are reflected in buildings, outdoor spaces, landscapes, and the naming of spaces.

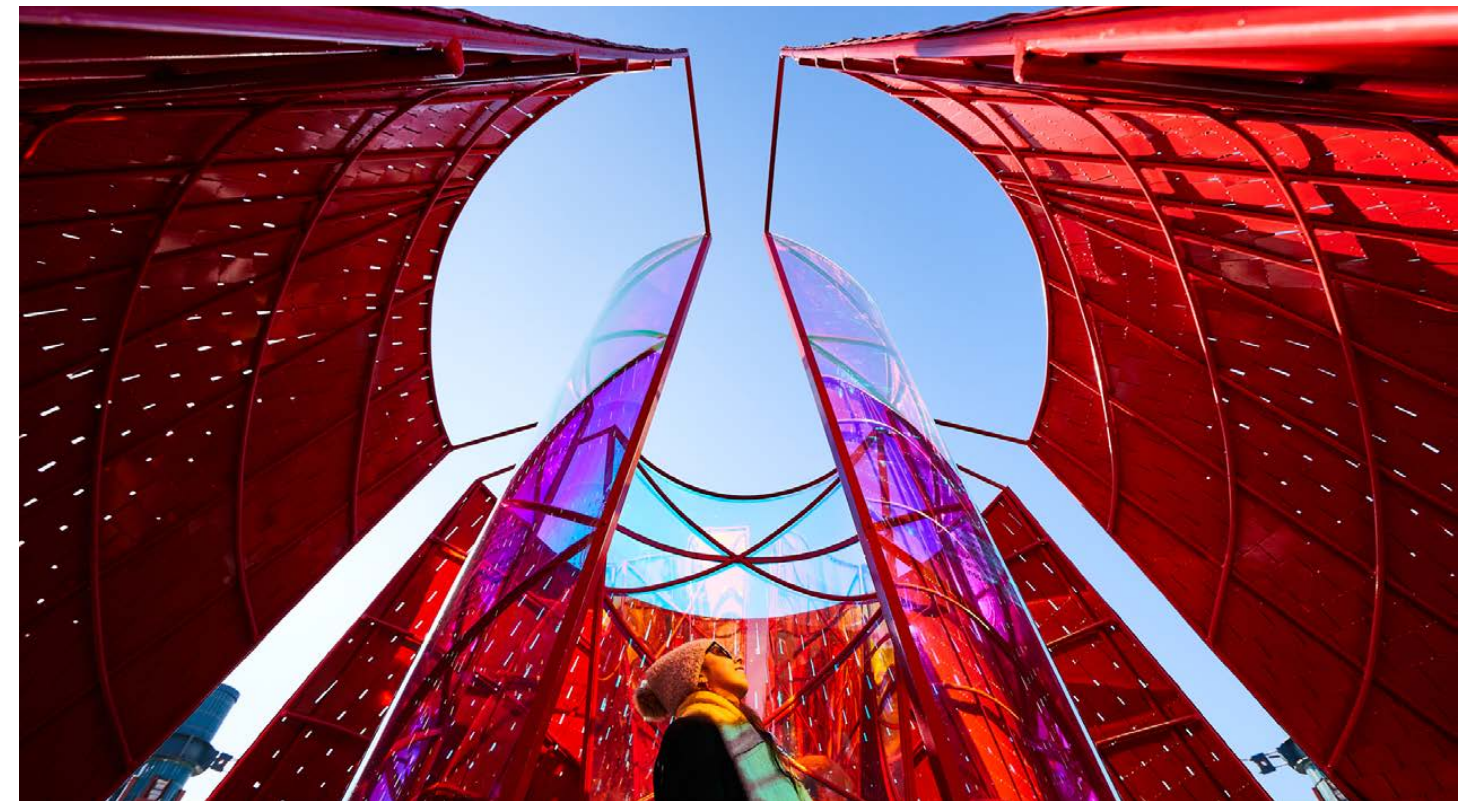


Bizindaadiwag is part of the Speech Act Project and aims to advance the knowledge of Indigenous language, and encourages people to listen and learn in the context of the land. (Point Douglas's Michaëlle Jean Park, Winnipeg © Ryan Gorrie and Suzy Melo)





The implementation of gender-neutral washrooms has become increasingly prevalent. Gender-neutral washroom designs have been successful in maintaining the privacy and safety of the user, and reduces discomfort. (Rhode Island School of Design Student Center; WORKac © Bruce Damonte)



The Rainbow Butterfly, Red Dress Warming Hut is dedicated to the lives and memories of Indigenous women, girls and Two-Spirit People. The structures flowing red form and iridescent interior commemorates the experiences and memories of victims and survivors while humanizing their resiliency in an uplifting way. (© Brook McIlroy)

### Inclusive and Accessible Buildings and Spaces

- g.** Provide multi-purpose and safe places on and across campus that respond to the diverse cultural needs through welcoming spaces, reflection spaces, prayer rooms and ceremonial spaces.
- h.** Provide diverse food offerings on campus that is reflective of the campus community i.e., increasing international student population.
- i.** Ensure spaces on campus are flexible, accessible, welcoming and can accommodate a wide range of uses.
- j.** Provide gender-neutral and accessible bathrooms and change rooms in every building across campus.
- k.** Ensure provisions for privacy, security, and safety are equally available for all visitors, staff, faculty, and students.
- l.** Ensure all disabilities are considered in the design of spaces i.e., hearing, visual and physical impairments.

### Programs and Services

- m.** Ensure that Carleton University's programs and facilities continue to adapt to meet the needs of all cultures and peoples on campus.
- n.** Engage and consult with traditionally underrepresented students, staff and faculty to better understand their needs and wants.
- o.** Increase strategic outreach to, and recruitment of, students from historically underrepresented communities.
- p.** Ensure that hiring practices and policies align with EDI goals and directions and ensure that senior positions accurately reflect the diversity on campus.
- q.** Improve data collection methods to enhance the accuracy of demographic statistics to better identify and address existing servicing and programming gaps on campus.
- r.** Accommodate flexible use of space over time to actively support current and future EDI programming.

### Inspire Learning and Connecting

- s.** Develop resources with and for students, faculty, and staff to increase competencies and knowledge regarding EDI.
- t.** Ensure EDI initiatives follow the frameworks outlined in the EDI Action Plan and the Coordinated Accessibility Plan.
- u.** Highlight Carleton University's efforts to promote EDI on campus.
- v.** Share and promote EDI resources and publish and showcase reports on EDI initiatives.
- w.** Increase formal and informal opportunities for students, staff and faculty to participate in intercultural and intracultural learning on campus.



## 6.4 Health, Wellness, and Campus Safety



Reflective surfaces can be designed to highlight architectural and natural beauty of its surroundings. Interventions such as the urban mirror can be used as a tool to transform traditional outdoor spaces into meeting points to support culture and wellbeing. (Urban Mirror © Metalco)

Health, wellness and campus safety are key factors in the long-term success of Carleton University. They should be viewed with a holistic lens and consider the social, physical, mental, emotional and spiritual wellbeing of the campus community. This approach is rooted in the understanding that all these elements affect one's overall wellbeing.

Supporting and promoting a culture of wellbeing for those who work, live, play, and learn at Carleton University contributes to a happy and productive campus community for all. Providing a safe and secure campus environment encourages students, faculty and staff to spend more time on campus, beyond work and education.

Carleton University developed a Student Mental Health Framework (SMHF) in 2016. This framework builds a holistic, campus wide approach to mental health and wellbeing and contains 38 recommendations under six areas of focus.

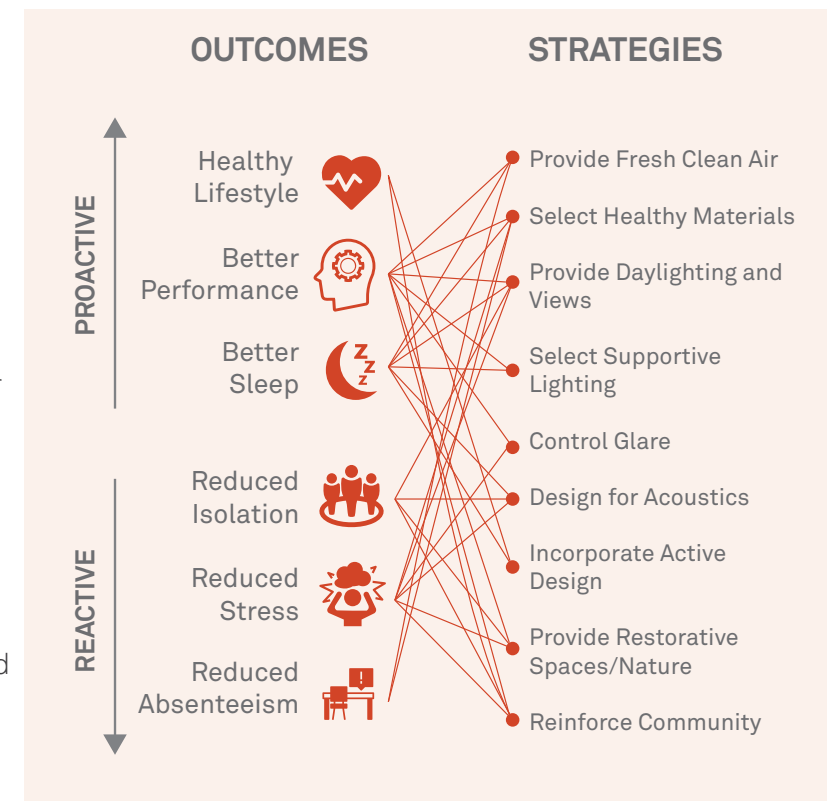
The design decisions for this Campus Master Plan Update will assist in reinforcing health, wellness, and campus safety as a priority on campus and looks to the SMHF for specific directions for these guidelines.

### General

- a. Buildings, open spaces and streetscapes on campus should promote and support health and wellness through design, campus greening, and lighting that illuminates the campus setting.
- b. Buildings should be integrated with outdoor green space to enable natural flow from the interior of buildings to the exterior. Enhancing interior and exterior connections improves lighting and views inside buildings and creates a flow into outdoor spaces, promoting wellbeing through connections to nature.
- c. Enhance connections to the waterfront and existing green space on campus. Additionally, incorporate native planting on campus where feasible.
- d. Create supportive, comfortable and inclusive spaces and conditions on campus for students to collaborate, engage and relax. Provide a range of environments with varied acoustic qualities—quiet to active.
- e. Additional support should be provided to Carleton's existing Attendant Services Program and the Paul Menton Centre (PMC) to enhance disability services on campus.
- f. Work collaboratively with students, the broader campus community and campus partners to establish health and wellness policies and programs that work to foster and increase health and wellness on campus and beyond. Increase discussion around mental health within faculties and the broader campus community to aid in reducing stigma associated with mental health.
- g. Increase and enhance health and wellness services on campus. Carleton should embed opportunities to teach students about the importance of sleep, proper nutrition, movement throughout the day, and connection with others in building lifelong healthy habits.
- h. Ensure that health and wellness services are located in prominent and easily accessible locations.
- i. Ensure food offerings and services on campus promote and support health and wellness. Include foods that nurture mental and physical health and provide spaces on campus for communal cooking and nutritional education.
- j. Provide educational programs, training and services for staff and faculty with an emphasis on understanding the intersections of health and wellness and equipping Carleton's faculty with tools to support the student population.

### Education and Training

- f. Work collaboratively with students, the broader campus community and campus partners to establish health and wellness policies and programs that work to foster and increase health and wellness on campus and beyond. Increase discussion around mental health within faculties and the broader campus community to aid in reducing stigma associated with mental health.



Research conducted by VMDO Architects on various strategies to promote proactive and reactive health outcomes. Strategies will vary based by building type, location, and occupancy. Diagram by Brook McIlroy.





Rendering of a potential Wellness Hub at Carleton University.  
©Perkins+Will

## Campus Safety and Wellbeing

- k. All buildings and open spaces should be designed to adhere to the principles of Crime Prevention Through Environmental Design (CPTED).
- l. Buildings and open spaces should be designed to create safe and animated spaces for year-round use.
- m. Strategically update, evaluate, and survey existing locations of red emergency and assistance phones throughout the campus.
- n. Ensure the placement of emergency phones have unobstructed sightlines from various points across the area. Emergency call stations should be vandal-resistant and coastings designed to resist extreme weather conditions and provide direct communication to first responders. These can extend security in parking lots, walkways, and open spaces on campus.
- o. Increase awareness of Carleton's Emergency Notification System (ENS) and work to establish an app that can further promote campus safety and that offers individuals the option to upload and report campus concerns or damages.
- p. Increase awareness of Carleton's emergency response team and establish additional measures to ensure the team is well supported.
- q. Provide opportunities for emergency housing on campus for Carleton community members. Further studies and consultations will be required to determine strategic locations and required facilities.
- r. Clear sightlines should be maintained to allow people to see and be seen. Ensure that future designs do not create blind corners, bends, grade changes, and other elements which may obscure views.
- s. Transparent materials should be used in potential parking garages, stairwells, and other isolated areas where feasible to improve visibility.
- t. Active uses such as social spaces, retail uses, and common areas are encouraged to be located along streets to provide opportunities for informal surveillance. Glazing along the ground floor of these spaces is encouraged to provide increased visibility.
- u. Building entrances should be well lit, defined, and visible from the nearby streets, paths, and open spaces to ensure ease of access in times of crisis.
- v. Ensure building uses such as common areas, entrances, pedestrian pathways and laneways provide clear visibility onto the surrounding areas. Pathways should create unobstructed sight lines and direct visual connections between buildings and open areas on campus.
- w. Provide adequate pedestrian-scaled lighting on all pedestrian pathways, open spaces, and bicycle and vehicle parking areas on campus to promote pedestrian safety and comfort.
- x. Light fixtures should be easily replaceable without the need for mechanical skyjacks.
- y. Access to building rooftops should be controlled, secured, and easy for maintenance staff. Publicly accessible rooftops should be designed with a combination of set-back guardrails, walls, and planted areas to prevent falls.



Public spaces should address community safety concerns, preserve the canopy of mature trees, contain pedestrian-scaled amenities and have active year-round use. (James Canning Gardens; Toronto, Canada; Janet Rosenberg & Studio © Michael Muraz)



Transparent and animated facades highlight uses within buildings, increase campus safety, and improve wayfinding. (University of British Columbia Bookstore, Vancouver, Office Of Mcfarlane Biggar Architects + Designers Inc. ©Ema Peter)



## 6.5 Building Design, Massing, and Site Integration



ECHO at Technical University of Delft was created as a future-proof, multi-functional and flexible inter-faculty building. Echo is centered on the adaptability and wellbeing of the user, programmed with a series of agile spaces that invite students and faculty to learn, collaborate and co-create. The building also harvests and produces more energy than it consumes. (Echo Energy-Generating Interfaculty Teaching Building, Delft, Netherlands, UNStudio © Plompmozes)

Excellence in building design and site integration will enhance Carleton's campus identity and contribute to a high quality, accessible, animated, and sustainable campus environment. Building design and massing support the establishment of a mixed-use and accessible campus that promotes active forms of mobility and living and that elevates the mental and physical wellbeing of the campus community.

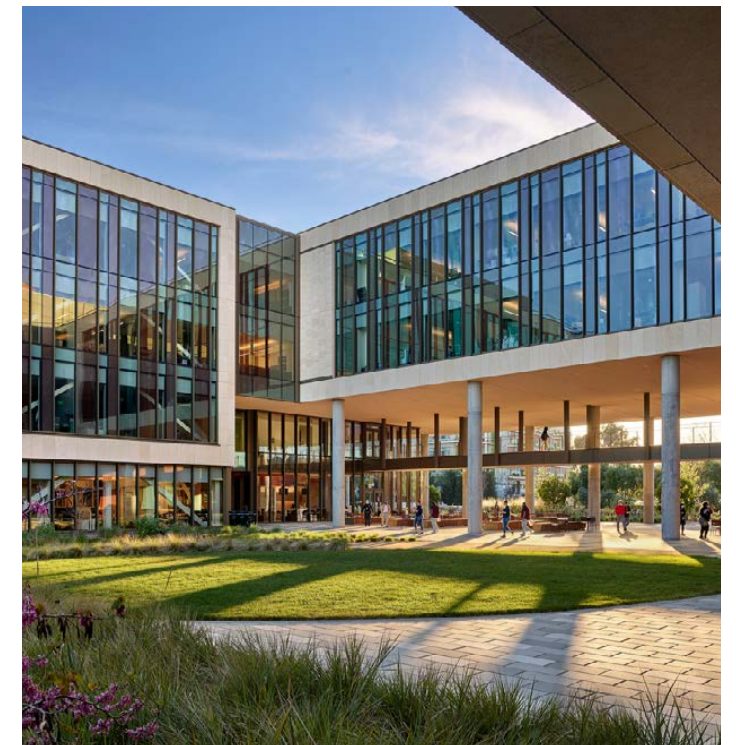
Proposed capital projects and physical plans should be executed at the highest possible design merit and should respect Carleton University's unique

physical character and surroundings. To encourage a connected campus, the university should continue to enhance the connection and relationship between the surrounding neighbourhood communities from Confederation Heights, Brewer Park, Dow's Lake, and Dominion Arboretum.

Buildings will continue to play a critical role in providing a mix of uses to enhance and promote an active, diverse, and tight knit campus community. The following guidelines intend to promote a healthy dialogue for buildings, landscape, and development of the campus.

### General

- a. The massing, scale, and shape of campus buildings should be compatible with adjacent buildings, land uses and contribute to a comfortable pedestrian experience on streets, pedestrian connections, and open spaces.
- b. Buildings should have an active and transparent ground floor to accommodate a flexibility of uses and create a synergy between the interior and exterior. Buildings should be tightly knit and frame green spaces to promote safety, weather protection, access to nature and an active public realm.
- c. Buildings should contain appropriate connections and circulation to outdoor spaces, natural settings (ie., Rideau River), nearby buildings, and transportation networks such as the LRT, bus routes and the tunnel system to promote active transportation and enhance campus integration.
- d. Buildings should be future proofed to maximize whole life value and to support campus programming and services.
- e. New buildings should be designed with contemporary building practices, and compatibility with the existing built form should be achieved through sensitive building placement, appropriate massing, and architectural excellence.
- f. Older buildings with historical significance that have unique materiality or features should be retained, conserved, and upgraded with identical elements as much as possible. Significant architectural features should be repaired rather than replaced where possible. Buildings with historical significance should also be renovated based on prior research related to the original design and construction method.
- g. The design of campus buildings should support and enhance the quality of the public realm. This can be done through the design and framing of green spaces, creating a compact campus, and providing flexible outdoor furnishings in open spaces throughout the campus.
- h. Building entrances should have clear and prominent architectural expressions to provide orientation and enhance the campus' identity.
- i. Employ on-site stormwater management systems to mitigate run-off and adapt for climate resiliency. The conveyance of water from rooftops to grade should be outlined in the rooftop design, especially where opportunities exist to connect to the Green Ribbon and overall stormwater management system.



A passive-first design approach takes full advantage of the site while reducing energy consumption. The sun, wind, and ecosystem can influence everything from the initial planning decisions to the building details. (Stanford University School of Medicine Center for Academic Medicine; HOK © Alan Karchmer)



## Building Materials and Façade Design

- j. Life cycle costs should be optimized using durable, low maintenance materials and finishes.
- k. Roofing materials should be selected for their low environmental impact, such as low embodied carbon, high emissivity, and durable components.
- l. Rooftop mechanical penthouses should be architecturally screened, fully enclosed, or integrated into the design of the overall building.
- m. Building materials should be complementary to the character of the area in which a building is located. Materials should promote quality, durability, sustainability, and permanence.
- n. High-quality façade materials are encouraged to promote visual diversity in texture and colour and to reduce maintenance.
- o. Long buildings should be articulated through design elements including recesses, projections, and the placement of doors and windows to break up the length of the façade and bulk of the building.
- p. Potential parking garages and/or structures should contain sustainable facades and explore the opportunity to integrate green roofs and/or multi-purpose facilities at grade, or on rooftops.
- q. Buildings should employ best practices in bird-friendly design, including bird-friendly glazing and site lighting practices.



Mass timber building constructed at Oregon State University, Corvallis, USA (Oregon Forest Science Complex, Michael Green Architecture; ©Josh Partee)



Building articulation and design assists in providing more natural daylight into the building. This also creates a strong urban edge and establishes a visual proportion, scale, and relationship to the street. (Laboratory Research Centre, Winnipeg, Number TEN Architectural Group © Stationpoint Photographic)

(TU Delft, Echo Energy-Generating Inter-faculty Teaching Building / UNStudio © Eva Bloem)





- r. When feasible, apply Ottawa's Bird-Safe Design Guidelines.
- s. Exterior lighting fixtures should be Dark Sky compliant. Rooftop and exterior facade architectural illumination should be directed downward and turned off between the hours of 10:00 pm and 6:00am.
- t. Building façades fronting onto street edges, pedestrian pathways or open spaces should reinforce pedestrian-scaled design and feature generous glazing with bird-friendly treatments and façade articulation that frames the space. This will establish a connection between the building's interior and exterior, provide day lighting, and promote safety.



Buildings framing green spaces should have generous ground floor setbacks filled with native planting and vegetation to create a comfortable micro-climate for pedestrians. (Oregon Forest Science Complex, Michael Green Architecture © Josh Partee)

## Building Heights

Existing buildings on Carleton University range in height from two to 11 storeys, apart from Dunton tower at 22-storeys. Future development is encouraged to maintain the existing mid-rise character and pedestrian scale of the campus.

- u. Buildings should appropriately transition to adjacent areas to ensure access to light, views, and privacy. This can be accomplished using landscape buffers and design interventions including setbacks and stepbacks, amongst others.
- v. Buildings exceeding 3-storeys should have shaped upper storeys, using stepbacks and terraces to emphasize lower portions of buildings and reduce scale at the pedestrian level.
- w. Position taller buildings at prominent locations to form view termini and to aid in wayfinding and landmarking.

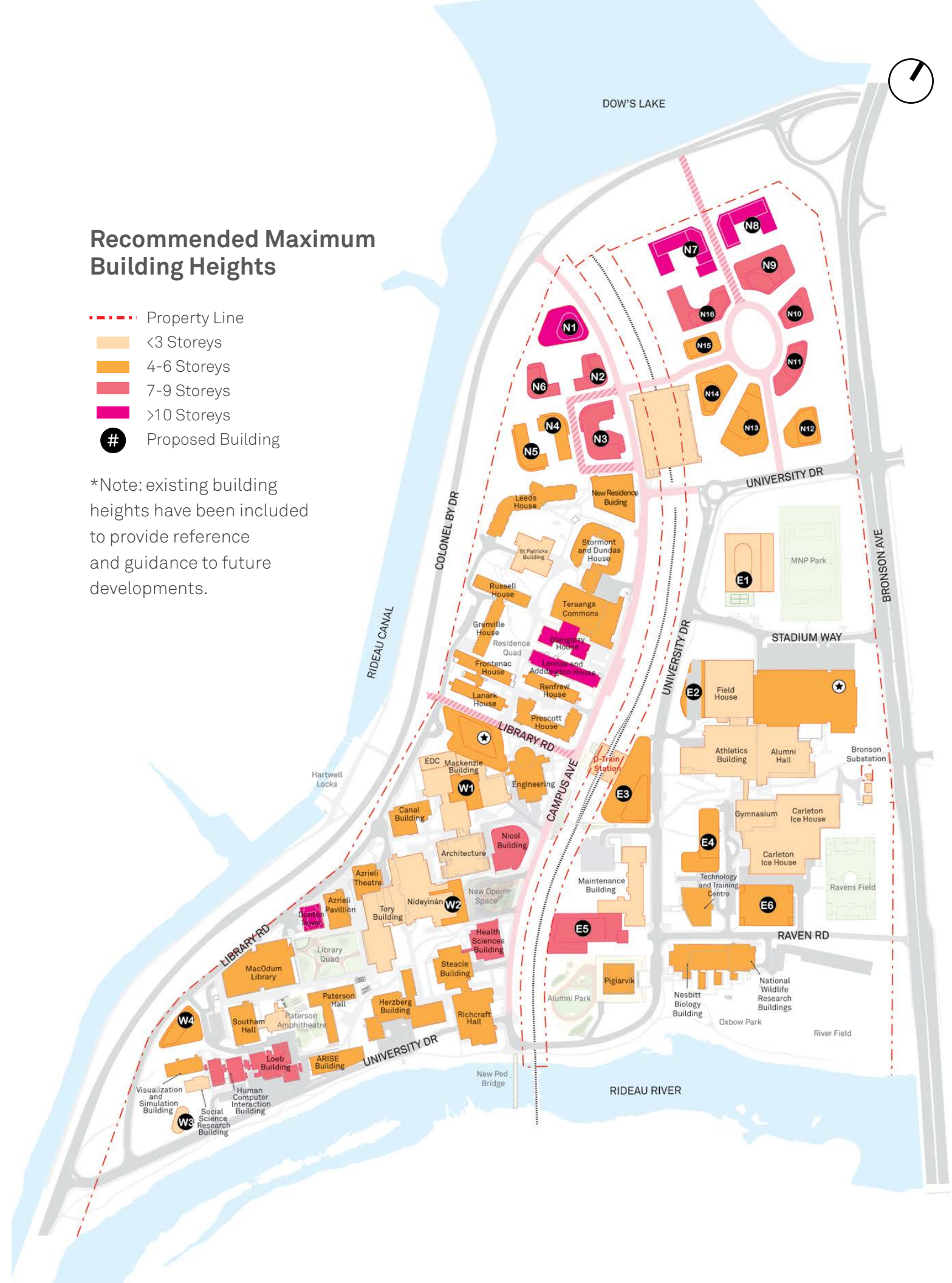


Nicol Building at Carleton University. (Hariri Pontarini Architects © Brook McIlroy)

## Recommended Maximum Building Heights

- Property Line
- Light Orange <3 Storeys
- Orange 4-6 Storeys
- Red 7-9 Storeys
- Dark Red >10 Storeys
- # Proposed Building

\*Note: existing building heights have been included to provide reference and guidance to future developments.





- x. Building heights should create appropriate built form, landscape, and natural area transitions to open spaces along the Rideau River, Rideau Canal and buildings located along Library Road, University Drive, and Raven Road.
- y. A minimum floor-to-floor height of 3.0-3.5 metres should be employed for new residential buildings above grade to accommodate flexible uses.
- z. A minimum floor-to-floor height of 4.0 to 4.5 metres should be employed for new academic and ancillary buildings above grade.
- aa. Developments that exceed mid-rise form would be subject to detailed studies with respect to implications of sunlight, access, shadow impacts, wind, and microclimate.

### Setbacks and Frontages

- ab. Setbacks along primary building frontages such as University Drive and Library Road should contribute to pedestrian-scaled design and comfortable streetscape conditions. Setbacks will also provide space for generous plantings and pedestrian clearways.
- ac. Consistent setbacks should provide sufficient distance from campus open spaces and green spaces to maximize sunlight penetration for trees and plantings, and for year-round use and enjoyment by the campus community.
- ad. Provide adequate space in the right-of-way and circulation networks to accommodate street tree planting, landscaping, and stormwater management features.
- ae. Future site-specific studies should be undertaken to inform building and outdoor space setbacks and further definition of site boundaries.

### Building Stepbacks

- af. Buildings should generally express a three-storey street wall base, and step back a minimum of three metres at the fourth storey to maintain a pedestrian-scaled primary façade, and to ensure sunlight access is maintained for streets, greenways, and open spaces.
- ag. Building facades facing green spaces should stepback a minimum of four metres at the fourth storey or below, to visually frame view corridors toward the Rideau River and Rideau Canal.

### Ground Floor Building Design

The ground floor design of a building has profound impact on the quality and use of the public realm, daylighting, and safety. The base of campus buildings should create visual interest and contribute to a vibrant campus environment.

- ah. The design of campus buildings should frame connections and open spaces and reinforce pedestrian-scale design.
- ai. Due to the Ottawa's harsh winters and varied climate, it is important that the ground level of buildings be transparent, and incorporate canopies, breezeways, and colonnades for pedestrian comfort.
- aj. Buildings should include active at-grade uses to animate streets and open spaces (e.g. cafes, common spaces, interactive lab spaces, etc.) and provide opportunities for casual surveillance. Where feasible, active uses at the ground-level of buildings should be complemented by outdoor spaces to improve synergies between indoor and outdoor activities.







Designed to provide daylight and fresh air through the roof, VELUX Modular Skylights help create healthy, comfortable and productive indoor spaces. The modular system can be configured to a range of different skylight solutions and offers several features for climate control, ventilation, and shading. (Trumpington Community College, Great Britain ©VELUX)

- ak.** The primary entrances of academic, residential, and mixed-use buildings should be oriented towards streets, open spaces, or main pedestrian connections. Primary building entrances should incorporate outdoor weather-protected areas including overhangs, canopies, and wind protection, as well as vestibules for minimizing heat loss.
- al.** Building entrances should have clear and prominent architectural expressions to aid in wayfinding and orientation, and to enhance campus identity.
- am.** Building porosity should be apparent in the ground floor design, particularly where interior connections form part of the larger campus pedestrian network.



Native plant species are a resilient choice for campus landscaping, and can provide educational and placemaking opportunities. (Saugeen First Nation Creator's Garden, Allenford, Brook Mclroy)

### Low-Carbon, Energy Efficient Building Design

Carleton University has undertaken initiatives to ensure that future development of the campus is sustainable and energy efficient. Carleton University's Energy Master Plan (2018-2021) includes a framework for the university's energy and carbon reduction initiatives. Additionally, the university released the comprehensive Sustainability Plan (2020-2025), which identifies key areas where the university can make the biggest sustainability impact. One of the key areas outlined in the sustainability plan aims to promote social, economic, and environmental sustainability in the development and operations of both built and natural environments. Carleton has a strong mandate to promote sustainability within their building design initiatives. The Campus Master Plan Update considers and incorporates Carleton's sustainability directions into the following guidelines.



Landscape and building materials improve visibility in spaces, such as circulation corridors and stairwells, that may otherwise be narrow and isolated. (Algonquin College, Ottawa, Canada, Brook Mclroy; © Doublespace Photography)

- an.** The design of campus buildings should comply with the goals set out in the Energy Master Plan (2018-2021), the Comprehensive Sustainability Plan (2020-25), and other relevant standards and guidelines.
- ao.** Utilize tools such as STARS (Sustainability Tracking and Assessment Rating System) certification program and Green Globes building assessment as laid out in the Energy Master Plan 2018-2021.
- ap.** Additional metrics for tracking energy and carbon emissions of buildings include:
  - Greenhouse Gas Intensity (GHGI): GHGI is affected by how much energy is used and the carbon intensity of the energy source.
  - Energy Use Intensity (EUI): The annual total energy consumed in a building. This metric is a useful management tool as data is readily available through energy bills and outcomes are in control of building operators and occupants.
- Standards like Passive House, Toronto Green Standard, Ottawa High Performance Development Standard, and the Canada Green Building Council Zero Carbon Building Standard .
- Thermal Energy Demand Intensity (TEDI): This measures the quality of a building envelope and is influenced by the efficiency of ventilation systems. A low TEDI supports resilience, occupant comfort and enables the use of low-temperature heating equipment that can best leverage low-carbon energy sources.
- aq.** The orientation, location and design of campus buildings should promote sustainability best practices (e.g., natural ventilation, daylighting, passive heating) to maximize energy performance and occupant comfort.
- ar.** Building design should contribute to reduced greenhouse gas emissions through clean energy, efficient energy distribution, and low levels of energy consumption.



- as.** Buildings should be designed with high-performance building envelopes and high efficiency building systems to minimize thermal bridging, air infiltration, and contribute to lowering the energy demand of a building.
- at.** Buildings should consider including sustainably harvested mass timber structures that add beauty, emphasize connections to nature from building interiors, and contain lower embodied carbon than other structural materials.
- au.** Carleton University should use high-efficiency equipment for heating and cooling such as electric heat pumps and heat recovery systems for exhaust air.
- av.** Buildings should have a higher proportion of solid area than glazing in facade design to minimize energy demand.
- aw.** Retrofits of existing buildings should employ passive design techniques and install energy and resource efficient materials, equipment, and fixtures.
- ax.** Buildings should be oriented to optimize the potential for solar energy generation from rooftops and facades (particularly south and west) by minimizing self-shading and shading from adjacent buildings. For example, building penthouses should be located at the northern portion of the building roof to maximize potential for solar-related productive roofscapes.
- ay.** Future climate change resiliency studies should be considered for major new construction or renovations.
- az.** Consider using sustainable building standard certifications for new buildings such as Passive House, LEED, WELL, BREEAM, and Zero Carbon Building Standard to measure and communicate the desired sustainability outcomes of building projects.



Building rooftops should be used for renewable energy production. (Echo Energy-Generating Interfaculty Teaching Building, Delft, Netherlands, UNStudio © Plompmozes)



Landscapes adjacent to buildings can serve as a critical stormwater and water mitigation feature. The Green Ribbon, bioswales, and LID features offer new opportunities for Carleton's campus community to engage with the local ecology via a network of paths, revitalized open spaces, and stopping points in the landscape. (Issy Coeur de Ville Apartments, France; Valode & Pistre © Jared Chulski)

## 'Circular' Buildings and Future Use

- ba.** Buildings should be future proofed to maximize flexibility in use over time.
- bb.** Structural systems should be robust to withstand future modifications to interior partitions and mechanical services. This flexibility allows for changes in tenancy and use and extends the life span of a building.
- bc.** Future studies should be undertaken to explore the potential of refurbishing existing parking garages into future academic and/or institutional uses.
- bd.** Floor-to-floor heights within buildings should be designed to accommodate a range of uses and mechanical systems above and below the occupied space. As technologies evolve, mechanical systems can be replaced and upgraded without requiring alteration to the core structure of the building, extending the building's life span.
- be.** Building components and systems with shorter life cycles should be readily accessible and installed for servicing, upgrading, and replacement, without requiring demolition of the core structure. From shortest to longest life span, these include: interior finishes and furnishings; interior partitions and space layouts; heating, ventilation, air conditioning, and plumbing services; and building envelope components.
- bf.** Design future campus infrastructure and buildings to support multiple life cycles through reuse and re-purposing. Strategies include: prefabrication to optimize construction, incorporating utility corridors for all systems to minimize disruption required for replacement, choosing reusable materials, designing adaptive buildings, and considering the replaceability of HVAC systems.

- bg.** Consider adaptive reuse options for built infrastructure on campus that have become severely underutilized. This process limits carbon output and conserves resources and the historic value that sites possess. Reusing and upgrading existing buildings opposed to their demolition and replacement would have a substantial immediate and long-term impact in achieving carbon emission reduction targets.



An example of an adaptive reuse project where a historic building was transformed into an innovation hub for Centennial College's Aviation and Engineering Technology program. (Centennial College; Toronto, Canada; MJMA in associated with Stantec Architecture Institutional © Doublespace Photography)



## 6.6 Energy and Carbon



Green roof with solar panels. (Town and City Hall in Viborg, Denmark, Henning Larsen© Thorbjorn Hansen)

Energy and Carbon play an important role in Carleton University's overarching sustainability vision. As stated in the 2021 Energy Master Plan: "Carleton University's carbon neutrality goal is an ambitious step forward that is in alignment with federal and local government policies and strategies toward climate change and its threat to our environment, health, economy and collective future. It demonstrates the university's leadership and commitment to our collective effort to mitigate and reduce the impact of climate change."

The Energy and Carbon guidelines build on the 2021 Energy Master Plan and address the following:

- Sources of low carbon energy such as renewable energy and sewage heat recovery systems that eliminate the need for fossil fuel combustion;
- Passive and active design measures reduce the buildings energy demand;
- Design strategies and material considerations to reduce embodied carbon, minimizing the whole life carbon of new developments.

This section is to be read alongside the 2021 Energy Master Plan. Refer to Section 4: Carbon Neutral Campus Strategy and Section 5: Next Steps, of the 2021 Energy Master Plan for the detailed campus decarbonization strategy and implementation framework.

### Low-Carbon Utility

Natural gas makes up over 85% of the university's carbon emissions, and therefore the Energy Master Plan focuses on transforming the existing utility infrastructure to a low-carbon, low-temperature hot water district energy loop served by electric boilers in three new nodal plants across campus. These Guidelines support connection to this system, and encourages the exploration of other low-carbon energy supply opportunities

- a. Evaluate expected building heating and cooling demands during concept design and locate buildings with complementary loads (e.g., an office and a student residence) to facilitate energy sharing between buildings.
- b. Consider including district system nodal plants within the building footprint of new developments and deep retrofits, designed with the necessary spatial and technical requirements.
- c. Explore the potential to use a sewage heat recovery system to supply supplementary thermal supply for design options that use low temperature hot water.
- d. Additional design guidelines are presented in Section 4: Carbon Neutral Campus Strategy and Section 5: Next Steps of the 2021 Energy Master Plan.

### Renewable Energy

- e. Assess the potential to generate carbon-free electricity on-site for new developments and major retrofits. Consider the implications for building design, including the architectural vision, structural capacity, electrical infrastructure, and available roof space. Both well-established technologies (e.g., rooftop and building-integrated solar photovoltaics, and small-scale vertical access wind turbines), and emerging technologies should be considered. For further information on the renewable energy Campus Solar Capacity refer to Section 5.2.3 Renewable System (PV) and Appendix G – Campus Solar Capacity of the 2021 Energy Master Plan.
- f. Evaluate the potential to incorporate roof-top solar panels when undergoing roof replacement or renewal projects, including structural capacity.
- g. Consider the cost of renewable power purchase agreements and carbon offsets when evaluating the feasibility of on-site renewable energy generation. A financial sensitivity analysis of future offset price is recommended whenever offsets are to be used. For further information on carbon offsets refer to Section 4.1.5 Carbon Offset of 2021 Energy Master Plan.
- h. New buildings should be oriented to optimize the potential for solar energy generation from rooftops and facades (particularly south and west) by minimizing self-shading and shading from adjacent buildings. For example, building penthouses should be located at the northern portion of the building roof to maximize potential for solar-related productive roofscapes.



## Efficient Buildings

- i. Perform periodic energy and/or carbon audits on all existing buildings to identify opportunities to reduce energy consumption and carbon emissions.
- j. Perform deep retrofit feasibility studies to evaluate and determine an energy performance target for different campus building types. For further details see Section 5.2.1 Existing Building Energy Retrofit of the 2021 Campus Energy Master Plan.
- k. Retrofit existing buildings to connect to the new district heating system which uses centrally supplied low temperature hot water. Consider conducting a steam conversion feasibility test to identify technical requirements and economics. For further details see Section 5.2.2 Steam to Hot Water Conversion Retrofit of the 2021 Campus Energy Master Plan
- l. Establish metrics for tracking energy and carbon emissions of buildings, including Greenhouse Gas Intensity (GHGI), Energy Use Intensity (EUI), and Thermal Energy Demand Intensity (TEDI). Use the latest Carleton Development Standards and Ottawa High Performance Development Standard to establish targets that are in-line with the most recent Energy Master Plan (see 2021 Energy Master Plan Appendix – Memo Report for details on building performance of future developments).
- m. High-efficiency equipment for heating and cooling should be provided, such as electric heat pumps and heat recovery systems for exhaust air.
- n. Buildings should have a higher proportion of solid area compared with glazing area to minimize energy demand and improve indoor thermal comfort.
- o. A digital building automation system should be provided for each building, including retrofits, to enable monitoring and control of building systems and equipment.
- p. For all new buildings that are designed to use on-site fossil fuel combustion, prepare a transition plan as part of the design process including a financial comparison of the capital cost premium and the operational cost savings over a 30-year period for a non-combustion alternative (e.g., heat pumps or other electric heating system).
- q. Specify energy efficient equipment and appliances, such as ENERGY STAR labelled products.
- r. Evaluate impact of new developments on the campus electrical infrastructure. For further details see Section 5.2.5 Electrical Infrastructure of the 2021 Campus Energy Master Plan.
- s. The siting and design of campus buildings should promote passive design measures (e.g., natural ventilation, daylighting, passive heating, self-shading) to maximize energy performance and occupant comfort.
- t. If possible, design buildings to maximize north and south exposure with a narrow floor plate to allow for better daylight conditions.

## New Buildings Performance Standards

- u. All building rooftops should be productive and used for a combination of renewable energy production, solar thermal technology, green/living roofs, and stormwater management.
- v. Buildings should be designed with high-performance building envelopes that minimize thermal bridging and air infiltration, to reduce energy demand and improve passive survivability.
- w. Use sustainable building standard certifications to measure and communicate the desired sustainability outcomes of building projects. Examples include Green Globe 4 Stars, City of Ottawa's High Performance Development Standard, Toronto Green Standard, Passive House, LEED, WELL, Living Building Challenge and Zero Carbon Building Standard. These should be considered when establishing metrics and targets for building projects.
- x. For further details see Section 4.1.2 New Developments and Section 5.2.4 New Building Performance Standard Development of the 2021 Campus Energy Master Plan.



New buildings should establish a vibrant sense of place and ecological stewardship. (Rogers Environmental Studies Magnet School, Connecticut, USA © Mikiyoung Kim)



## Embodied Carbon Reduction

Embodied carbon refers to the carbon emissions associated with materials and construction processes through the whole lifecycle of a building. As buildings become more efficient, the embodied carbon of a building becomes increasingly important source of emissions.

- y. Consider opportunities to repurpose buildings before demolition. Building retrofits that maintain a building's structure can significantly reduce embodied carbon. Similarly, consider whether space in an existing building can be reallocated to meet space use needs before building new.
- z. Use life-cycle embodied carbon assessments (LCA) to quantify building material and infrastructure that have the greatest contribution to embodied carbon emissions, set embodied carbon targets, evaluate alternative material selections, and measure outcomes.
- aa. Consider using performance-based specifications to procure low carbon solutions to large contributors of embodied carbon such as concrete, structural, steel, rebar, insulation, and glazing.
- ab. Specify locally sourced, reclaimed, and recycled products and materials, where possible, to minimize emissions. Maximize opportunities for the inclusion of traditional building practices, artisanship and craft. See Section 6.2 Indigenous Placemaking and Placekeeping for further guidance.
- ac. Consider use of sustainably harvested mass timber for structural building components to add beauty, emphasize connections to nature from building interiors, and reduce embodied carbon relative to other structural materials.



Using screens and opaque materials will reduce light pollution, sky glow, encourage a bird-friendly campus minimize energy demand and improve indoor thermal comfort. (Tracy Aviary, ajc architects ©Joseph Pollard)



Buildings should utilize a variety of innovative and low-tech climate concepts to minimize environmental impact. (Karl Miller Center, Portland State University, USA, Behnisch Architekten, SRG Partnership © Brad Feinknopf)

## Resilience

- ad. Design natural and constructed infrastructure systems to function in both the current and projected future climate with an appropriate level of service risk. Design systems with appropriate buffers to deal with changing climate (e.g. more intense rainfall events and temperature extremes).
- ae. Evaluate the location of critical infrastructure to reduce damage from climate related risks. For example, avoid below-grade placement of electrical servicing equipment.
- af. Refer to Section 5.5 Stormwater Management of the 2020 Outdoor Space Master Plan for low impact development strategies to manage stormwater including bioretention facilities such as rain gardens, bioswales, green roofs, and permeable pavement.
- ag. Design buildings for passive survivability by ensuring critical life-support functions remain operational during extended periods of absence of power, heating fuel, and/or water.
- ah. Consider thermal resilience so buildings can sustain liveable indoor temperatures in the event of a power outage or disruption in fuel supply for a prolonged period of time.
- ai. Design new and retrofitted buildings to include a refuge area with heating, cooling, lighting, potable water, and power. Determine which spaces are to be capable of functioning as a temporary shelter for vulnerable members of the community to gather to stay warm or cool, charge cell phones, access the internet, store medicine, refrigerate basic food necessities, access potable water and toilets.

- aj. Refer to Section 6.1 Universal design and Accessibility – Emergency Planning for further design details to be included in refuge areas.
- ak. Provide 72 hours of back-up power to the refuge area and to essential building systems.



Green roofs offer many environmental and human health benefits such as air purification, increased biodiversity, reduced building energy costs and urban heat island amelioration, and stormwater runoff mitigation. (Lawson Centre for Sustainability, Trinity College, University of Toronto ©RHDA and Mecanoo Architecten)



## 6.7 Circularity



The Natural Pavilion showcases innovative bio-based construction and circular design that can be easily disassembled and rebuilt in a different configuration at a different location. (The Natural Pavilion, Netherlands, DP6 architectuurstudio © Daria Scagliola & Stijn Brakkee)

Circularity addresses the university's desire to reduce physical waste—through construction, operations, and end-of-life options of various materials on campus. It is based on three principles:

1. Eliminate waste and pollution.
2. Circulate products and materials (at their highest value).
3. Regenerate nature.

The guidelines presented in this section enable circular practices – such as material reuse, products as a service, and adaptable buildings – to flourish. However, no one actor can achieve circularity. The success of the university's circularity will depend on collaboration with a variety of stakeholders including on and off campus businesses, the local community, government support, and most importantly, the students, staff and faculty.

### Zero-Waste Operations

- d. Establish protocols to track, measure, and report waste stream flows. Conduct periodic material flow analyses to map campus wide material inputs and outputs for different sectors (e.g., food waste, building construction and demolition materials) and identify potential for on-campus circular systems.
- e. Identify spaces in new buildings and retrofit projects that could be used to encourage reuse, repair, and the sharing economy. For example, a material exchange hub, a tool library, clothing swap and repair store, or bike repair station.
- f. Standardize on-campus waste collection spaces and signage to promote proper material sorting.
- g. Provide waste sorting stations for multiple material streams that are readily accessible to all occupants.
- h. Consider opportunities when designing new buildings or retrofitting existing ones to make waste infrastructure visible to building occupants to encourages them to think about where “waste” goes.
- i. Provide sufficient space for the storage of hazardous waste, electronic waste, and difficult to recycle materials.
- j. Work with on campus vendors to transition to zero waste models. For example, consider an on-campus refillery for cleaning products, personal care products, and food products.
- k. Work with food vendors to implement a take-out container reuse program to minimize food packaging waste.
- l. Work with food vendors to eliminate single-use plastic service ware.
- m. Consider a digital platform / marketplace to facilitate the exchange of materials within the community.
- n. Implement educational events that promote circular resource use.
- o. Refer to the Operations Section in the 2020-2025 Sustainability Plan for further information on strategic actions and targets regarding waste and recycling.

### Zero-Waste Construction

- p. Consider the ability of a building to be deconstructed at the end of its life when designing new buildings and preparing construction specifications. This can include minimizing the use of adhesives, glues, and other building techniques that prevent materials from being disassembled, avoiding the use of finishes that could damage the future usability of a product, and selecting materials that have a high reuse value.
- q. Encourage deconstruction companies to salvage materials during renovations or full deconstructions. Salvaged materials should be reused on-campus if possible.
- r. Where possible, reuse materials or incorporate salvaged materials into fit-outs, retrofits, and new construction projects.



- s. Track material resources used during construction and establish landfill diversion targets.
- t. Design buildings and infrastructure constructed for short-term uses to be fully relocatable. Relocatable buildings are modular buildings designed for deconstruction and made of durable, high-quality materials.
- u. Participate in material take-back programs (e.g., carpet and ceiling tile take-back programs), when available.

## Local Food

- v. Assess opportunities to participate in a local circular food system to minimize food waste.
- w. Establish a zero-waste food program to address surplus food from campus cafeterias, and campus event catering.
- x. Maintain campus-wide food waste composting program (see the Operations section in the 2020-2025 Sustainability Plan) and work with food vendors to ensure organic waste is minimized and separated from other materials.
- y. Implement educational food waste sessions.
- z. Source local, sustainably raised, and grown food.
- aa. Assess opportunities to expand on-campus food production. Consider rooftop space and interior spaces capable of accommodating vertical farms.

## Materials

- ab. Design buildings to maximize flexibility in use over time. Structural systems should be designed to be robust and stay in place while interior partitions and mechanical services are moved, rearranged, and replaced over time. This flexibility allows for changes in tenancy and use and extends the life span of the core building.
- ac. Design floor-to-floor heights within buildings to accommodate a range of uses and mechanical systems above and below the occupied space. As technologies evolve, mechanical systems can be replaced and upgraded without requiring alteration to the core structure of the building, extending the building's life span.
- ad. Design building components and systems with shorter life cycles to be readily accessible and installed in such a way that they can be serviced, upgraded, and replaced without requiring demolition of the core structure. From shortest to longest life span, these include: interior finishes and furnishings; interior partitions and space layouts; heating, ventilation, air conditioning, and plumbing services; and building envelope components.
- ae. Evaluate materials for impacts to human health across the material's entire lifecycle. Health is of the utmost importance for products intended for circularity as they will be potential circulating within the economy for many decades. Certifications such as Declare, and Cradle-to-Cradle can be used in addition to material ingredient disclosures such as a Health Product Declarations.

- af. Advocate for material transparency and health to suppliers and manufacturers when material information is not available,
- ag. Track data on materials throughout the campus by applying material passports and using building information modelling to support new life cycles.

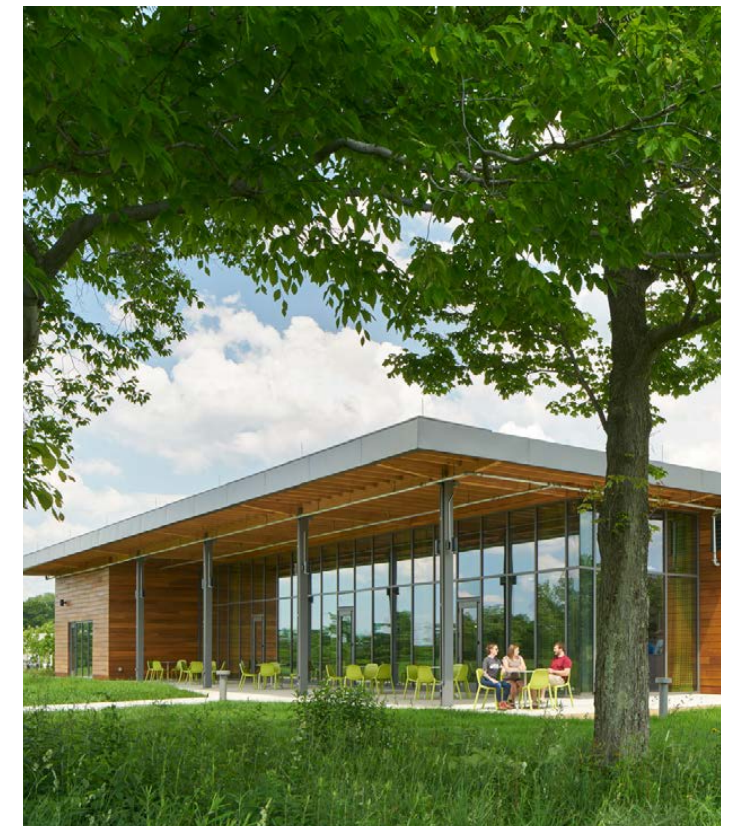
## Water Efficiency

- ah. Assess opportunities to pilot closed-loop water systems in which all water used for a defined area is captured, treated, used/reused, and/or released on campus.
- ai. Capture rainwater in cisterns or rain barrels to use for irrigation and toilet flushing.
- aj. Design all buildings to use greywater for toilet flushing.
- ak. Avoid the use of potable water for non-potable uses.

## Operations that Support a Circular Economy

- al. Demand for resources throughout the campus should be reduced by designing systems that make efficient use of material resources.
- am. Design campus infrastructure and buildings to support multiple life cycles through reuse and re-purposing. Strategies can include maximizing prefabrication to optimize construction, incorporating utility corridors for all systems to minimize disruption required for replacement, choosing reusable materials, designing adaptive buildings and considering the replaceability of HVAC systems.

- an. Apply a life-cycle view of costs to all development to account for impacts of design decisions on operating and maintenance costs.
- ao. Consider 'business as a service' or 'performance procurement' business models for products or materials that the university does not need to own. In these scenarios the service (e.g., lighting) is procured from a provider who maintains ownership of the product and responsibility for operations and maintenance costs.
- ap. Establish metrics for tracking the university's level of circularity. Tools such as Circulytics can be used to assist.



The Chatham University Eden Hall Campus exemplifies many sustainability and circular practices such as generating more energy than the campus uses, food production, recycling of nutrients, and enhancing biodiversity. (Pennsylvania, Mithun © Bruce Damonte)



## 6.8 Four-Season Design



Improvements to Alumni Park intend to provide active use of the space in all seasons. A proposed skating trail provides winter programming, while the park can be used for large events and as passive open space in the spring, summer, and fall. (Colonel Sam Smith Skating Trail, City of Toronto © PMA Landscape Architects)

The design of streets and connections, built form, open spaces, and public realm at Carleton University should create an overall attractive and comfortable campus that promotes year-round use. Providing comfortable facilities and programs in parallel with active transportation can help establish a year-round pedestrian-accessible campus.

A large portion of Carleton’s staff, faculty and students spend the majority of their time on campus during the winter months. Incorporating appropriate design interventions can enhance the winter experience for the campus community.

The location and orientation of buildings and outdoor areas have a direct impact on the quality and comfort of spaces. It is important that buildings and site components minimize any adverse microclimate impacts onto surrounding areas and sites to ensure pedestrian comfort. Winter design recommendations also provide a multitude of benefits, including safety, support for barrier-free movement, durability, and resilience of infrastructure.

The following guidelines aim to create an inviting campus that can be enjoyed year-round.

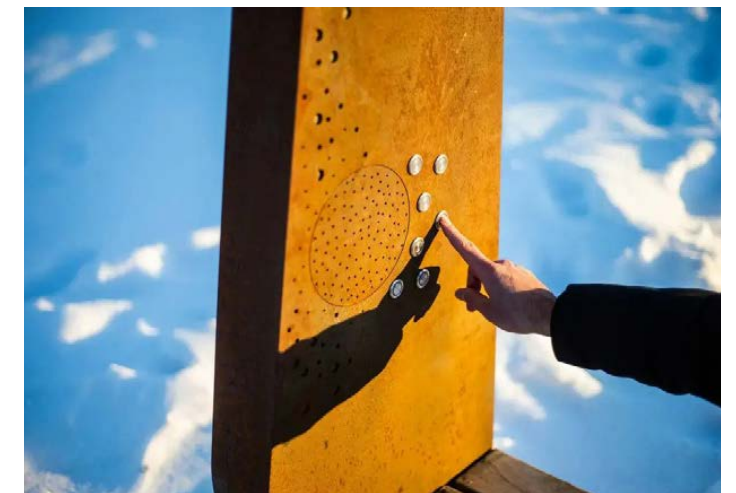
### General

- a. Outdoor space design should encourage winter programming, recreation, and general use, including sheltered or weather-protected and warming areas, equipped with Wi-Fi.
- b. Campus landscaping should allow for high-quality and attractive landscape design year-round, including plant species that flower, provide colour, and texture at different times of the year. Priority should be given to planting native and pollinator species.
- c. The use of colour should be employed in the design of the campus to brighten the winter environment, which may include building façade treatments, lighting, landscaping elements, seating, structures, and public art.
- d. Design high-quality and attractive open spaces that create visual interest and delight through all seasons.
- e. Use highly visible and distinctive surface markings, lighting and signage at road crossings and along prominent pedestrian and bicycle paths.
- f. Signage and wayfinding design and implementation should consider future proofing, durability, and account for weather-related demands.



### Infrastructure

- e. Infrastructure including shelters and structures, furniture, and walkways should be maintained and accessible during winter months. Use durable materials for furnishing that are thermally comfortable year-round (e.g. wood seating, high quality composite, or recycled materials).
- f. Incorporate and encourage outdoor winter activities, programming, and sports in outdoor public spaces.
- g. Incorporate slip-proof paving material along prominent pedestrian streets such as Library Road and Campus Avenue.
- h. Consider implementing heated walkways along prominent pedestrian streets such as Library Road and Campus Avenue.



Bizindaadiwag is an action to make audible Indigenous language present and publicly available. It provides a place where anyone on their language learning journey can pause to listen, perhaps speak and to meet others who have the same interest. (Point Douglas’s Michaëlle Jean Park, Winnipeg © Ryan Gorrie and Suzy Melo)





## Snow & Ice

Snow brings a magical ambiance to a campus and is highly reflective which can provide additional lighting during the winter months. It is important to consider snow and ice conditions in design interventions and future campus development as they require significant resources to clear. Additionally, although salting sidewalks is traditionally used to maintain snow clearance, it causes significant environmental hazards to groundwater, soils and surface water and should only be used when necessary.

- k. Campus paths and multi-use trails should be clear of snow, prioritizing heavily used pedestrian routes and bicycle lanes.
- l. Use environmentally friendly deicers in favour of plain rock salt and calcium chloride for snow clearing management.
- m. Building roofs should be designed to shed snow and ice away from entrances and walkways.
- n. Designate multiple snow storage areas on campus.
- o. Snow storage locations should be scattered across campus. A strategy should be explored to identify and designate these locations to minimize impacts to vegetation and reduce runoff.
- p. Use durable materials and paving that can withstand the use of salt, sand, and gravel and freeze-thaw cycles.
- q. Explore the opportunity to use electric vehicles in favour of snowplow/removal fleet in support of a more sustainable campus.
- r. Provide necessary charging stations and equipment to support an electric fleet.

Integrating innovative design features that capture and utilize rainwater in warmer months can act as a unique feature in the winter. (Algonquin College, Brook McIlroy; top image © Tom Ridout, bottom image © Jocelyn Squires)

## Sun

- s. Access to sunlight should be maximized through the orientation and design of buildings and site components, including maximizing southern exposure for open spaces where possible.
- t. Location and massing of buildings should allow for adequate sunlight onto open spaces, including streets, courtyards, green spaces, and pedestrian and bicycle paths.
- u. Site design should minimize shadow impacts onto adjacent streets, sidewalks, and open spaces, encouraging a comfortable and high-quality public realm for all seasons.
- v. The design of buildings, overhangs, canopies, and the incorporation of tree canopy should provide shade during warmer months of the year to improve outdoor thermal comfort.

## Trees

- w. Plant deciduous trees adjacent to buildings and exterior public spaces to allow access to sunlight during the winter.
- x. Incorporate coniferous plantings along the northern edges of open spaces and pathways to reduce the severity of the wind tunnel effect.
- y. Select plant species adjacent to roadways and paths that can withstand exposure to salt, gravel, and sand.
- z. Ensure plantings are set back a sufficient distance from sidewalks, road edges, and parking areas to accommodate snow storage.
- aa. Select plant species that are suitable and can withstand a four season climate.

## Wind

- ab. Building entrances should feature canopies and/or weather-protected areas for year-round shelter.
- ac. Buildings should be designed with breaks along frontages and should create mid-block connections to provide relief and shelter from wind conditions.
- ad. Consider windbreak panels at entrances or vestibules to protect against wind conditions.
- ae. Development on campus should incorporate design solutions that minimize pedestrian-level wind and microclimate conditions. Appropriately orientating and locating buildings, open spaces, public realm features, landscaping, and trees will aid in minimizing impacts from climate conditions.



Interactive art installations encourage people to be outdoors in the winter months and create visual interest around campus. (Sling Swing; Toronto, Ontario © WMB Studio)



## 6.9 Signage & Wayfinding



Using braille on wayfinding elements ensures a higher degree of accessibility. (University of Sydney Wayfinding Strategy, Australia © Minale Tattersfield Sydney Australia)



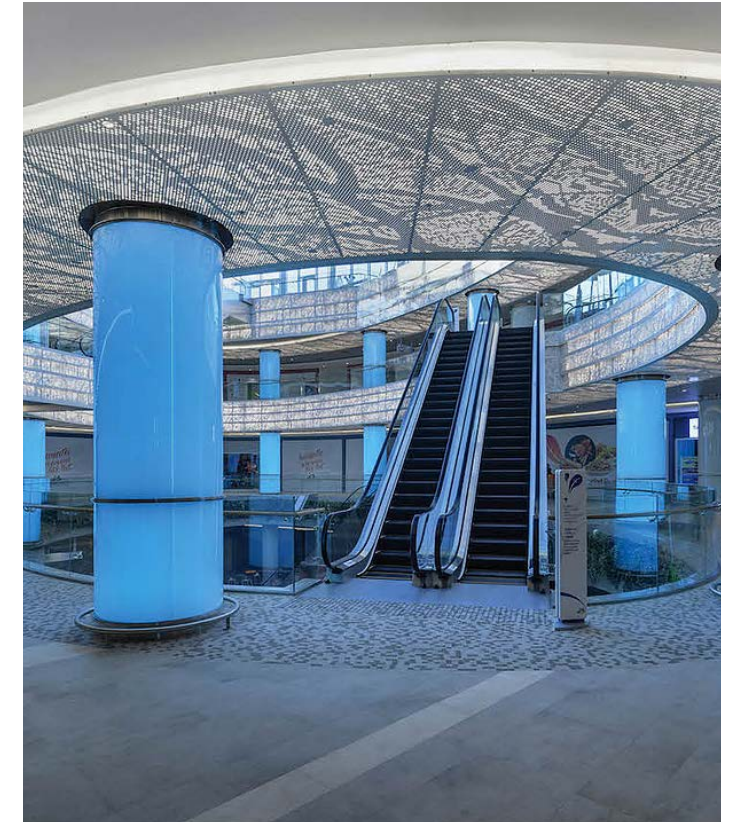
Signage and wayfinding are important features of the public realm that assist with campus navigation and orientation. They work to direct all forms of travel across and through spaces and assist in establishing a sense of arrival on campus. Wayfinding contributes to a more walkable campus by positioning gateways, landmarks, signage, and other visual cues at a pedestrian scale.

Signage and wayfinding can include components such as ground-related signs, wall signs, building signs, visual markers, and non-signage specific elements. They should be legible, intuitive, and

should conform with Carleton University's branding. It is important that signage and wayfinding elements are future proofed to allow for simple maintenance and alterations as the campus continues to evolve. Improvements to the wayfinding experience enhances mobility and cohesion on campus.

### General

- a. Circulation routes, signage, building entries, parking areas, and other public spaces should be adequately lit, using fixtures and materials to reduce shadows and glare.
- b. Ensure that signage and wayfinding is generally located at a consistent height along building façades. They should be visible and legible from the public realm.
- c. High transparency between indoor and outdoor spaces is encouraged in locations where key outdoor spaces are adjacent to or surrounded by buildings.
- d. In general, a colour temperature of 3,000K to 4,000K and a minimum Colour Rendering Index (CRI) of 85 is recommended for all indoor and outdoor lighting. Lighting choices should be balanced with the goal to reduce light pollution and maximize pedestrian and animal safety and well-being.
- e. Site and building signage and wayfinding should complement the existing character and design of the surrounding context.
- f. Universal symbols of accessibility should be integrated and used in conjunction with campus signage and wayfinding.
- g. Explore the installation of digital mobile map applications to provide navigation ease across campus. Maps should provide direction to emergency call centre locations, classrooms, accessibility areas, pedestrian paths and linkages and washrooms.
- h. Pedestrian and vehicular entrances on campus should be designed as visual gateways, featuring unique design treatments such as enhanced landscaping, paving, signage, and public art. Gateway designs should emphasize a sense of arrival on campus for motorists, cyclists, and pedestrians.



Multi perforated suspended ceilings offer design flexibility and customization available with LED lighting, heating and cooling, thermal insulation, and acoustic insulation. (Suspended Ceiling - Multi-Perforated Metal © Kasso)

- i. Differentiation in gateway signage design should be made to distinguish pedestrian gateways from vehicular gateways (e.g. gateway signage at Library Road and Campus Avenue, versus signage at University Drive and Colonel By Drive)
- j. Use durable material for outdoor signage that will withstand tampering, environmental deterioration and weathering.
- k. Install indoor digital kiosks to assist students and faculty in navigating through and across campus.



## Branding, Consistency and Accessibility

- l.** Site and building signage design should be future proofed and use a consistent palate of materials, colours, and fonts across Carleton University.
- m.** Incorporate signage at all campus gateways (pedestrian and vehicular), with consistent branding associated with Carleton University. The size of signage should be appropriate to its location and use.
- n.** Signage should clearly distinguish the university from the surrounding community.
- o.** Address discrepancies in building names – official, colloquial, donor, and/or historic as such discrepancies lead to confusion. Effort should be made to reconcile diversity in nomenclature and terminology.
- p.** Strategically position signage in locations to avoid visual obstructions. Follow wayfinding design best practice when designing and selecting locations for signage.
- q.** Expand the existing signage and wayfinding network to address existing navigation challenges and to create a more intuitive wayfinding experience.
- r.** Incorporate accessible formatting including larger print, recorded audio and tactile and visual braille indicators into building and open space design, including areas of high pedestrian activity such as intersections with shared and vehicle routes. This promotes safety of use by persons with visual and/or hearing impairments.
- s.** Accessibility signs should be clear at designated wheelchair-accessible ramps, entrances, and elevators.

## Indigenous Wayfinding Opportunities and Multilingual Signage

- t.** Include multilingual signage to foster an inclusive wayfinding experience on campus. This allows users to see themselves reflected in spaces, and to experience the campus environment in their preferred language.
- u.** Avoid information overload when including multiple languages on signage by removing unnecessary words and using pictograms.
- v.** Consult and engage with local Indigenous communities (Anishinaabe Algonquin Nation) to ensure that language on signage is accurately describing the location, destination, amenity, and/or other information that the signage is relaying.
- w.** Incorporate cultural wayfinding interventions into the public realm to act as landmarks and navigation tools. This includes native plantings, Indigenous cultural markers and diverse artwork. These elements provide a welcoming experience and communicate the values of Carleton University.



Placekeeping elements should be well integrated into their surroundings and contribute to the public realm. (Humber College Cultural Markers, Toronto, Brook McLroy © Tom Ridout)

## Wayfinding and Landscape Design

- x.** Visual markers and unique paving designs should be incorporated into campus wayfinding. These elements can serve a dual purpose by also acting as landmarks, aiding users with campus navigation and orientation.
- y.** Incorporate artistic and creative wayfinding interventions into the public realm, including landscaping, paving, visual markers and artwork to establish a more vibrant, inviting and welcoming campus experience.
- z.** Landscaping should support intuitive wayfinding by outlining paths of travel through plantings etc.
- aa.** Clearly identify campus trails and pathways with wayfinding and signage, including directional markers and information indicating distances to places and destinations.
- ab.** Primary signage, such as gateway identification signs, should be integrated into their surroundings through landscaping for an aesthetically pleasing and welcoming user experience.

## Public Art

Campus art should be incorporated into the design of buildings, sites, and open spaces to further liven and animate sites across and throughout Carleton University. Art contributes positively to place by adding culture and representation into spaces, enabling the Carleton campus community to feel reflected and represented on campus.

Campus art includes temporary installations and permanent pieces at a variety of scales, including monuments, markers, statues, murals, sculptures, and digital pieces. It provides the university with an opportunity to display diverse forms of artwork,

represent Indigenous cultures and history and display work from local community members. Scattering artwork across campus encourages natural interaction and introspective engagement to occur.

Art installations also contribute to wayfinding and campus navigation by acting as a distinctive and recognizable landmark on campus.

**ac.** Campus art should be located in areas on campus with high pedestrian activity. These include open spaces, campus focal points and commonly traveled pedestrian routes. Key areas for public art at Carleton University could include the Nideyinàn, the tunnel network, along the Green Ribbon path and at the potential Transit Hub and existing bus termini.

**ad.** Ensure that campus art is located and designed in a way that does not impose on pedestrian and/or vehicular movement and sight lines.

**ae.** Campus art should be incorporated into the design of public realm features such as signage and wayfinding, landscaping seating, planters, bus and bicycle shelters and paving.

**af.** Artwork for new development on campus should be located at prominent locations and should be identified during the planning and design phase.

**ag.** Ensure that campus art is diverse and reflective of the campus community. Ensure options exist for temporary installations, and permanent campus art pieces.

**ah.** Incorporate creative technology, colour, and lighting in the design of campus art to provide interactive site elements and to animate the public realm.



# 6.10 Mobility & Movement



Flexible and wide streetscapes allow users to feel comfortable and can facilitate a multiplicity of uses. (Brighton, UK © Gehl Architects)

The design of campus pathways, greenways, streets, and connections should ensure direct, safe, and comfortable access for all users regardless of age, ability, and form of travel. Carleton's proximity to natural amenities such as the Rideau River, Rideau Canal, Dow's Lake, Fletcher Wildlife Garden, Vincent Massey Park, and Brewer Park are major places of interest to students, staff, and visitors.

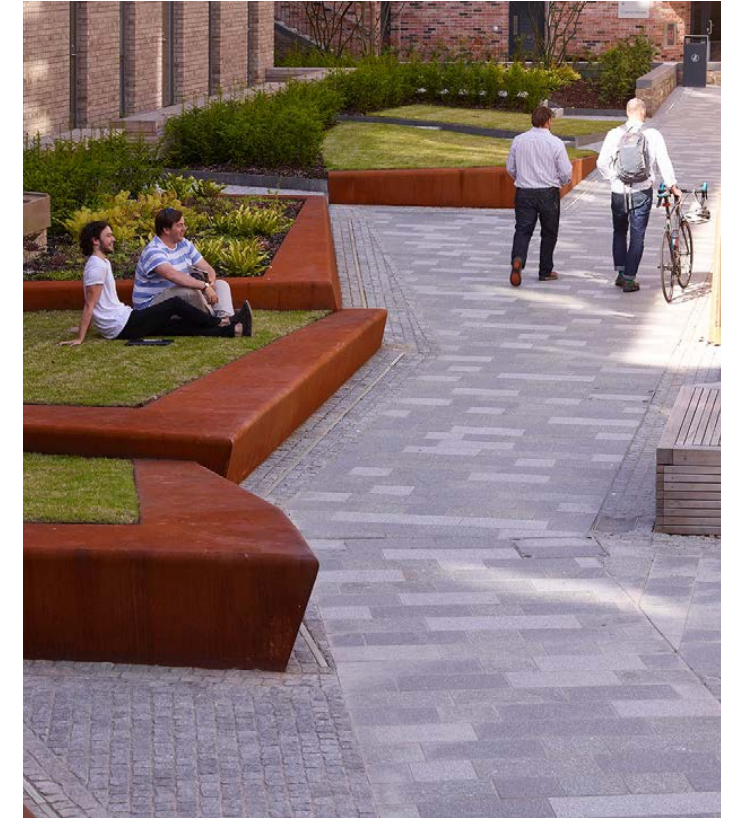
This Campus Master Plan Update reinforces recommendations made by Parsons in the 2019 Transportation Master Plan for Carleton University. One of the key strategies in the CMPU is to increase and enhance active forms of transportation on campus as it plays a vital role in reducing single

occupant vehicle usage which in turn reduces carbon emissions, promotes healthy and active lifestyles, and reduces congestion and parking demand. Considerations will also be made for enhancements to the well-travelled tunnel system, brightening and humanizing the network, as well as to other micro mobility options i.e., electric scooters, balance boards etc.

The strategic design of streets and pathways will enhance connectivity and circulation through and across the campus. The following guidelines encourage the development of a pedestrian oriented campus community that also positively contributes to the aesthetic quality of the campus.

## General

- a. Campus streets should accommodate multi-modal transportation, including designated travel routes for cyclists and pedestrians that are separate from vehicular traffic. Priority should be given to pedestrians along the future **pedestrian priority and flexible street**- Library Road and Campus Avenue, as they are intended to become pedestrian-oriented boulevards.
- b. Campus streets and connections should prioritize active forms of mobility through enhanced infrastructure design, including attractive walkways, sheltered bicycle parking areas, dedicated bicycle paths, and landscaping that enhances view corridors and provides natural beauty, as well as shade and shelter, supporting four-season use and enjoyment.
- c. An enhanced and continuous network of pedestrian and cycling connections should be pursued in the north-south and east-west directions. This will increase circulation and connection to and through campus buildings, streets, and open spaces, in addition to enhancing connections between the campus and surrounding neighbourhoods..
- d. The pedestrian circulation network should be designed to support barrier-free access and provide safe and convenient accessibility for all users.
- e. Ensure additional paths and trails, including multi-use routes allow for space to be shared between pedestrians and cyclists. The CMPU suggests paths, trails and routes that will permeate through the campus between buildings and across open spaces. In addition, consider separation of pedestrians and cyclists on high-volume multi-use routes.



(The Holyrood North in Edinburgh, Scotland ©HarrisonStevens)



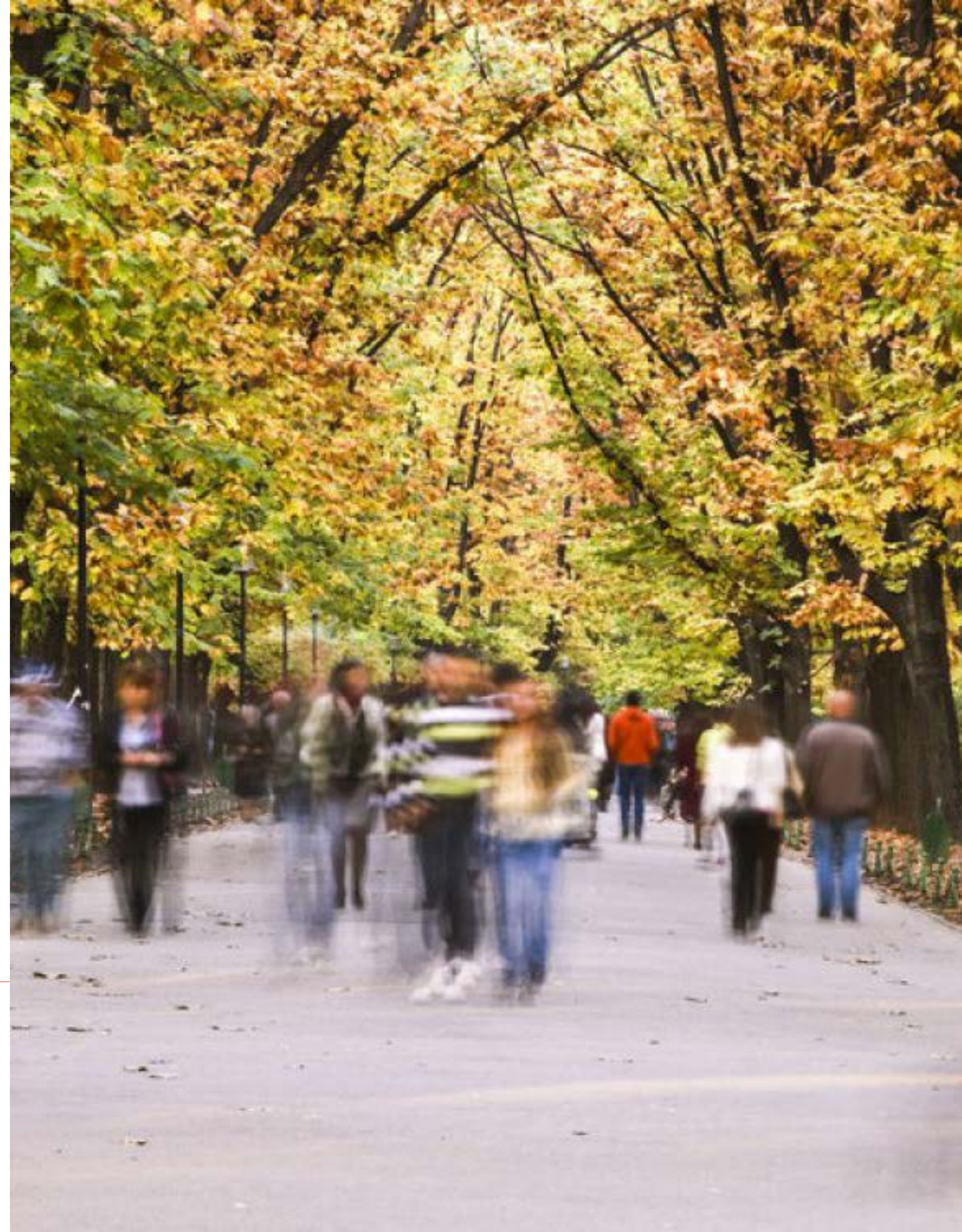
Teesside Park, UK (Macgregor Smith Landscape Architects)



- f. The design of pedestrian paths should encourage and promote a sense of community by cultivating casual encounters and interactions between passerbys on campus. This can be achieved through the strategic placement of pathways, furnishings, and open spaces.
- g. Main campus streets should be designed to prioritize pedestrians and cyclists, and slow vehicle movements (i.e., raised sidewalks at driveway entrances, narrow lanes, reduced curb radii, textured pavement materials, etc.).
- h. Where feasible, create dedicate facilities for cyclists. This Campus Master Plan Update proposes bi-directional, dedicated bicycle lanes along Campus Avenue, improving rider safety and comfort. In circumstances where dedicated facilities are not achievable, encourage reduced vehicle speeds through design interventions, and provide appropriate lane widths to support shared road usage.
- i. Explore the addition of a potential Transit Hub on campus, as a central arrival point for bus and LRT service at Carleton University. A mix of uses can be accommodated within the Transit Hub (i.e., social spaces, study spaces and food offerings).
- j. Reroute bus access to the East Campus to accommodate a potential Transit Hub and the transitioning of Campus Avenue into a flexible street.
- k. Explore the potential use of Raven Road beyond its current temporary use (only permits transit vehicles).
- l. Improvements to campus streets should minimize the removal of existing trees. If tree removal is required, ensure trees are re-planted in alternate locations to support health and wellness, and the wildlife habitat on campus.

- m. Service Laneways and Emergency Access Routes should be integrated into the overall design of the pedestrian-oriented boulevards. Vehicle access for servicing and emergency vehicles should be provided , while primarily functioning as a pedestrian-oriented street with integrated landscaping, and furnishings.
- n. Locations for truck deliveries, service vehicles and loading should be located close to the public right-of-way and within the building envelope wherever possible. Truck activities should be minimized within the campus.
- o. Beautification and illumination of campus streets and connections is encouraged and can be accomplish through updated furnishings, pedestrian-scaled lighting, street trees, landscaping, and paving material.
- p. Contiguous tree plantings should be incorporated along existing and redeveloped streets and connections, as appropriate.
- q. Ensure that shared spaces and streets provide direct, safe and comfortable access for all modes of transportation. Shared areas should avoid permanent street installations that may impede emergency vehicle access and pose a safety hazard.
- r. Select hardscape materials to reduce urban heat island i.e., light-colored, high albedo surface materials.

Street trees should be provided with appropriate soil volumes and spacing to ensure long-term growth and health. Tree-lined pathways should be planted in combination with other plant materials to improve the streetscape and biodiversity of the surrounding area.







## Streets and Pedestrian Connections

- s. Library Road and Campus Avenue should be designed as pedestrian priority and/or flexible streets that safely accommodate multi-modal transportation, including pedestrians, cyclists, and delivery and servicing vehicles. Motor vehicles are accepted along certain segments of Campus Avenue (North Precinct) but should operate at a lower speed. Appropriate interventions should be in place to slow traffic along these street segments.
- t. Pedestrian-oriented campus streets should feature curbless or low-profile roll-curb design, with bollards and raised pedestrian crossings at key locations and intersections for enhanced pedestrian safety.
- u. Pedestrian-oriented campus streets should feature attractive unit paving through visual and tactile means, reinforces the street's role as a pedestrian-priority space.
- v. Pedestrian-oriented campus streets should consider appropriate sidewalk widths based on the level of demand, and include opportunities for landscaping, street furnishings including lampposts with seasonal banners, garbage and recycling containers, and seating.
- w. The proposed Green Ribbon and Geological Time Trail network should enhance the campus' sense of place by highlighting view corridors to natural landscape elements of the Rideau River and Canal.
- x. The proposed Green Ribbon and Geological Time Trail should be lined with large-growing native tree species that frame views and provide seasonal shade.
- y. The proposed Green Ribbon and Geological Time Trail should function as a multi-use trail and should enhance connections to and throughout Carleton, as well as increase connections to the natural landscape and surrounding community.
- z. Design interventions should be made to humanize the beloved tunnel network i.e., daylighting, improved wayfinding and use of aesthetic materials.
- aa. Additional tunnel connections should be explored on campus to increase connectivity and provide protection during colder months.

Segments of the Green Ribbon could be filled with 'social infrastructure' from benches, small amphitheatres, and outdoor teaching areas with fully-enabled wifi. (The Goods Line, Sydney, Australia, Aspect Studios © Florian Groehn)



## Vehicle Parking and Access

Vehicle parking and access strategies provide opportunities to mitigate the impact of parking and vehicular movement on streetscapes and the public realm.

To support the Campus Master Plan Update's vision of being a pedestrian-oriented campus, a range of strategies are recommended to minimize vehicle usage on campus, while increasing active transportation and transit use.

Parking on Carleton University is predominantly provided through surface parking lots, which occupy a significant quantity of potential future developable lands (with the exception of new parking garage P16). With the opening of the LRT extension (2023) it is anticipated that parking needs will decline as individuals will opt to use the LRT.

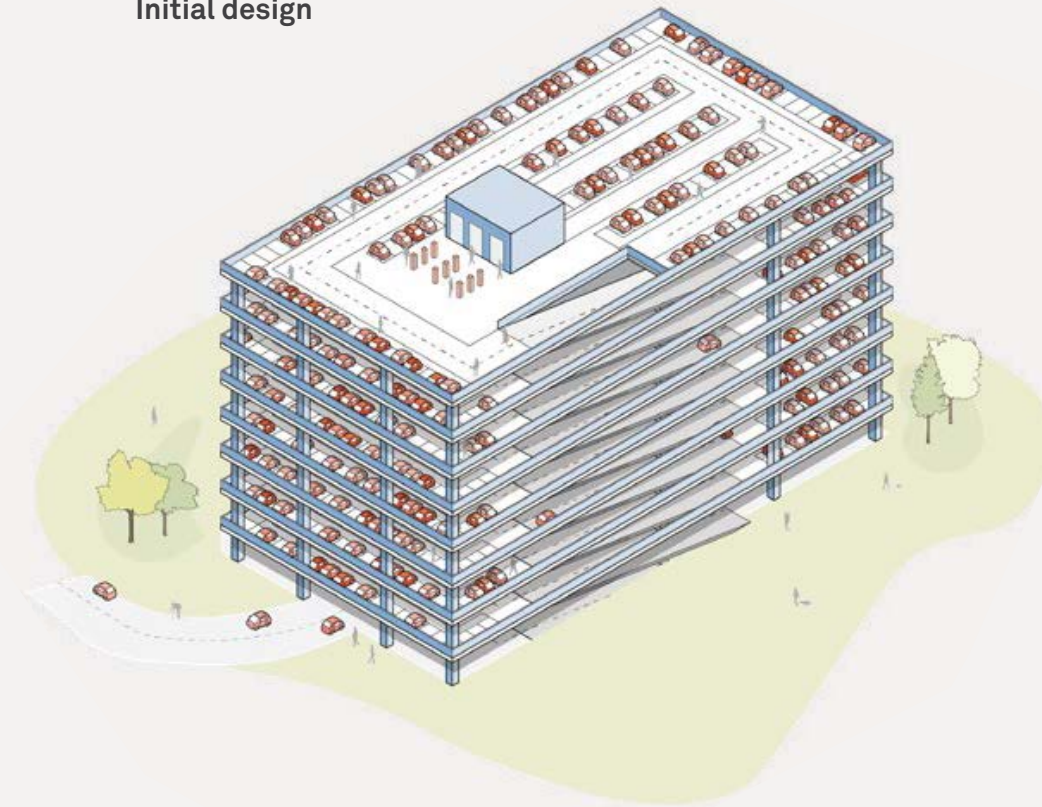
Through a variety of strategies, surface lots can gradually be redeveloped to support greater use, density and increase walkability. As the campus evolves, opportunities to incorporate potential parking facilities above ground in parkades similar to P16, or underground in new buildings where geological conditions allow, will arise.

The following guidelines aim to reduce vehicular and parking demands on campus and provide appropriate design directions that prioritizes pedestrian safety and comfort on campus:

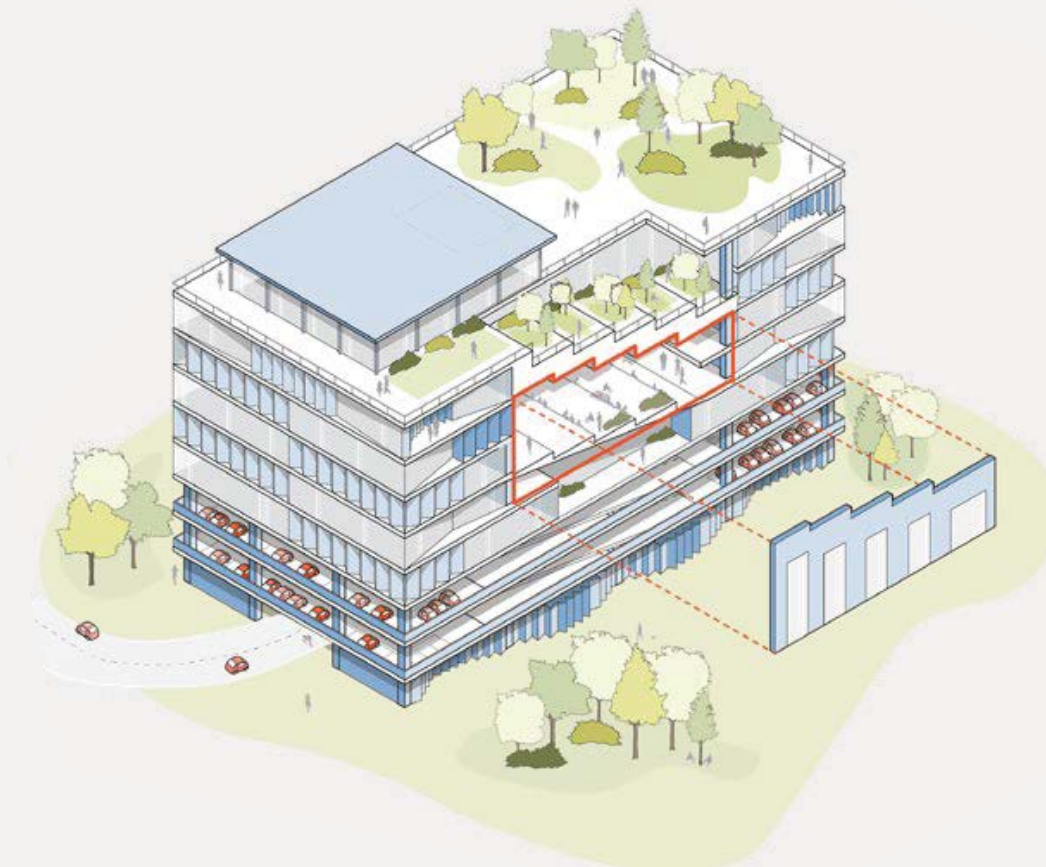
- ab.** Carleton University should encourage use of alternate modes of transportation by gradually reducing the existing vehicle parking supply. On street parking may be implemented at certain locations to ensure for accessibility (e.g. once LRT Stage 2 is complete and operational).
- ac.** Expanding or adding parking areas should be balanced with other modal opportunities, including strengthening access to public transit, walking, and cycling.

- ad.** Parking associated with new development or redevelopment should be integrated within building envelopes where possible.
- ae.** The creation of new surface parking lots should be minimized.
- af.** Required surface parking lots should be located at the side or rear of properties, not adjacent to streets or campus open space.
- ag.** Required surface parking should be visually screened from the public realm through low-level landscaping, fencing, and/or architectural elements.
- ah.** Carleton should continue to promote and support the use of electric vehicles (EV) on campus. As demand increases, EV charging stations should be integrated into existing parking lots through retrofitting and/or into potential new parking structures.
- ai.** Parking and charging stations for electric and carpool vehicles should be located close to building entrances. This would include allocating 10% of spaces for carpooling and 5% spaces for electric or green vehicles.
- aj.** Carleton should strive to reduce on-street parking over time beyond designated locations to accommodate priority visitors, pick-up and drop-off, and accessible users.
- ak.** Design new parking garages to be "EV-ready" by providing conduit and space for electric charging stations for all spaces that aren't provided a charging station initially, and sufficient sizing of transformer rooms.
- al.** Carleton should ensure that parking spaces closest to building entrances are designed as universally accessible and barrier-free.
- am.** Pedestrian walkways should be incorporated into surface parking lots to provide safe and direct connections to building entrances and open spaces. Ensure walkways are buffered by pedestrian-scale lighting and high-quality landscaping.

### Initial design



### Future adaptation



This diagram illustrates a potential opportunity to re-purpose above-ground parking garages in the future.

Potential parking structures could be strategically designed in a way that ramps and cores could be adapted and converted for academic, institutional and/or commercial use.

This would save significant economic and environmental costs rather than demolishing and rebuilding a structure at a higher cost.

(Flexible Parking Garage Graphic © SIDEWALK LABS)



- an.** Differentiate pedestrian walkway surfaces from vehicle routes. Utilize material such as permeable paving, patterned concrete, mega pavers, crushed limestone, and asphalt to create appropriate distinctions.
- ao.** Provide pedestrian level light standards along walkways and higher level light structures for security and vehicular circulation within parking lots.
- ap.** When structured parking locations are required, consider integrating a mix of uses, particularly when located adjacent to streets and/or open spaces.
- aq.** The creation of shared driveways is encouraged to minimize curb cuts and the interruption of the pedestrian boulevard.
- ar.** All potential future parking lots and/or garages should be designed to include softscape areas and trees to minimize the percentage of hardscape surface. Potential structured parking areas should be designed with high-quality building materials.
- as.** Carleton University should reduce the impact of impermeable surfaces through narrowed paved areas, use of permeable paving materials where possible, and generous landscaping.
- at.** Identify and locate areas for snow clearance and storage to ensure sufficient surface parking remains available for use throughout the winter months.
- au.** Existing surface parking areas should maximize the area of permeable paving to assist in on-site stormwater management (i.e., granular permeable surfaces oppose to asphalt paving).

## Bicycle Parking and Access

The accommodation of bicycle parking across Carleton University is critical to its future success as a cycling and pedestrian-oriented campus that prioritises health and wellness, sustainability, and accessibility. Bicycle parking on Carleton University should be conveniently located and appropriately designed to support a four-season climate.

Carleton currently contains three bicycle storage compounds on campus: one located beneath the pool deck at Athletics across from the Andrew Fleck Childcare Centre, one located at the Teraanga Commons and a newer facility located between Dunton Tower and Azrieli Pavilion on Library Road. In addition, Carleton supports cyclists by providing bicycle racks throughout the campus and by offering a bike share program called VeloGo. The following guidelines support active transportation on Carleton University:

- av.** Bicycle parking should be located near main building entrances, pedestrian walkways, and at key open spaces to increase convenience, visibility and security.
- aw.** Secure short and long term bicycle parking should be located at strategic locations throughout the campus, and should be made available for use by faculty, students, and staff.
- ax.** Bicycle parking/storage should contain weather-protected features suitable for a four-season climate.

- ay.** Carleton University should incorporate change rooms and shower facilities into new buildings, such as the potential Transit Hub, to encourage active transportation to campus.
- az.** The amenity zone located along streets and open spaces should incorporate bike parking, trees, landscaping, seating, and waste and recycling receptacles outside of the travelled way to ensure uninterrupted pedestrian mobility.
- ba.** The location of bicycle parking should not obstruct or adversely impact pedestrian traffic, accessibility, snow clearing, or any active programming at grade.
- bb.** Bike racks should be installed in groups and should be embedded into the ground where possible.
- bc.** Bike repair stations should be incorporated on campus within buildings and along key cycling connections, as feasible.
- bd.** Provide infrastructure for EV bicycles. Consider storage options for other micro mobility options (such as electric scooters).



Bike repair stand and bicycle pumps on campus encourage cycling. (© Cyclesafe)



Adding bike kiosks on campus would allow for community members to have access to sufficient services to make active transportation easier. (University of Manitoba Bike Kiosk; Winnipeg, Canada © UM Today Alumni)



Bike shelters encourage biking in varying weather conditions and provides identifiable spaces for bike storage. (University of Warwick, England © Broxap Street Furniture)



## 6.11 Landscape Design, Open Spaces, and Natural Systems



Catharijnesingel, Utrecht, Netherlands. (OKRA© Antoine Thevenet)

Landscapes, open spaces, and natural systems at Carleton University should respect and reinforce the campus' unique location, which is embedded within a beautiful natural environment. These spaces should also work to support community-building and learning, recreation, social gathering, research, access to the outdoors, biodiversity, and stormwater management.

### Flood Plain/Flood Risk Management

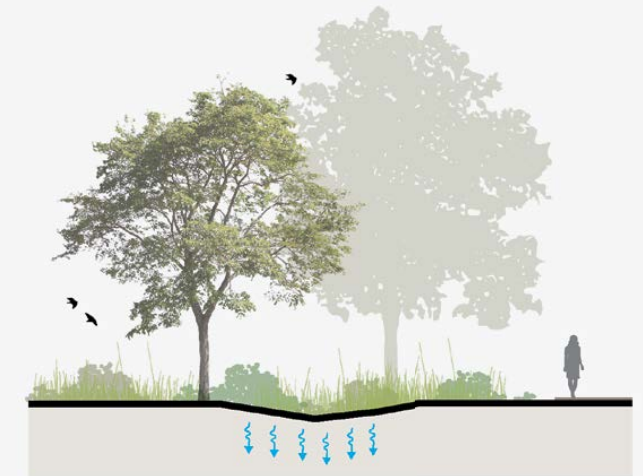
Flood risk management is an important component of this Campus Master Plan, as Carleton University is largely located within a flood plain (1-100 and 1-350 years). Campus development should ensure for maximum protection from potential flood risk and incorporate flood management interventions that provide protection to the campus.

The future potential Wellness Hub located within the East Precinct is located within a reduced flood risk zone, however, should incorporate flood management interventions to ensure for future protection.

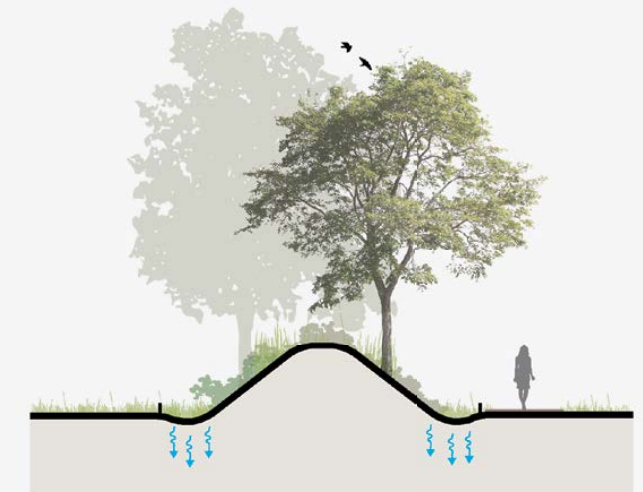
Carleton should work collaboratively with the various regional authorities including, Parks Canada, the NCC and RVCA to ensure the proposed designs and strategies ensures for health of the watershed as well as the protection of Carleton's investments in new developments.

- a. Existing plant species should be maintained and protected.
- b. Educational awareness, signage or wayfinding along the river to emphasize the 'high risk' levels of flooding
- c. Where new development, enhancements or repairs are required in the flood plain or riparian zone, an environmental impact assessment should be conducted and any species at risk must be identified and protected.
- d. New planting in riparian areas should include species from the Rideau Valley Native Shoreline Species List. Plants to be selected should contain the same requirements that the existing or proposed condition will provide, including moisture levels, sun exposure, and soil types.
- e. The RVCA's Transitional Procedures and Guidelines should be reviewed and followed for development in relation to flood risk management.
- f. Landscape design should be designed to future proof the campus from global climate uncertainty, including resilience to 100-year storm and flooding events and other storm related infrastructure, including increased snow storage.

### Naturalized Bioswale Typologies



Bioswale



Bermed Bioswale



Low Berm



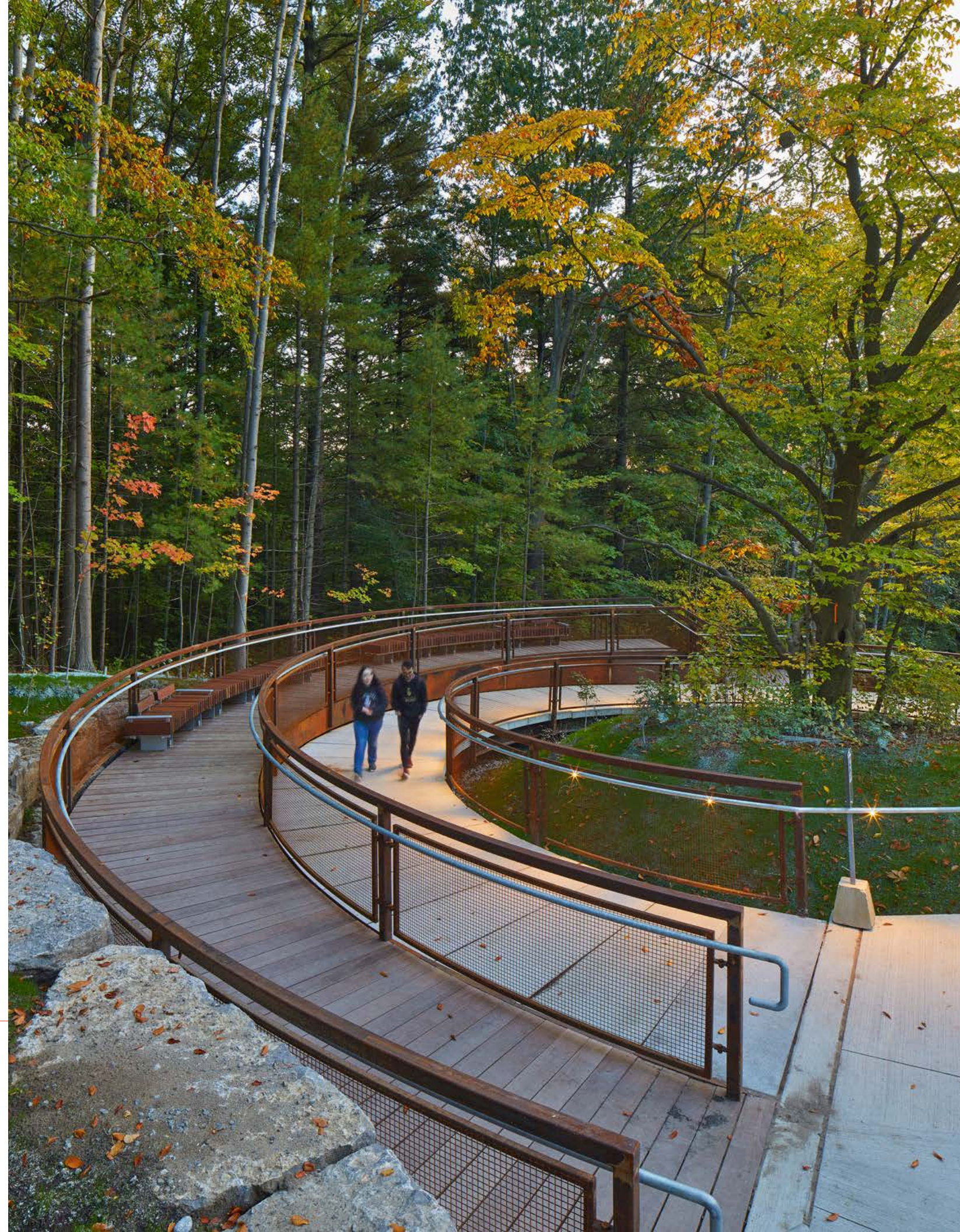
## Landscape Design

Landscape design contributes to a campus' identity and helps establish a sense of place, refuge, and comfort within spaces. Exterior spaces and landscapes should be designed to smoothly weave together the fabric of the campus by creating spaces with a variety of scales and characters. When feasible buildings should naturally flow into outdoor spaces, promoting use and activity and enhancing connections between areas on campus.

- g.** Soft landscaping should be diverse and include a mix of trees, shrubs, perennials, and grasses that provide all-season interest. Form, bloom colour, timing, as well as general structure and habit should be considered when designing a planting bed.
- h.** Tree planting areas should be robust and trees should be spaced relative to their mature size and be provided with ample soil volume (minimum 15 cubic metres per tree) to ensure healthy growth. If compaction is a concern or if available planting beds do not satisfy soil requirements, soil cells should be used.
- i.** Preserve existing mature trees on Carleton University where possible.
- j.** Include water features within gardens to support pollinators.
- k.** Plant pollinator gardens and encourage natural habitat areas where possible.
- l.** Special consideration should be given to plants commonly used by local Indigenous communities with medicinal or healing functions.
- m.** Planting of invasive species must be avoided. In areas where invasive species are known to exist, removal and remediation measures should be employed to ensure that species do not reappear.

- n.** Planting of mono cultures should be avoided. Diversity of species is beneficial in terms of aesthetics, habitat potential, and pest resistance. Groups of no more than 10 of the same plant species are recommended to be planted alongside one another.
- o.** Campus infrastructure such as shelters, structures, furniture, and walkways should be easy to use, comfortable and accessible year-round for people of all abilities, and should complement the surrounding context.
- p.** The design of built structures, including park pavilions, kiosks, and etc., should incorporate green infrastructure, green roofs, and sustainability measures to the greatest extent possible.
- q.** Landscape design should prioritize species that do not require permanent irrigation.
- r.** Establish a common vocabulary of landscaping materials (i.e., planting, furnishing, fences, etc.) that fulfill the physical needs of the campus and complement adjacent buildings and open spaces.
- s.** Refer to the OSMP (2020) guidelines for decisions relating to landscape furniture, pathway design, structures, and stormwater management to contribute to a unified campus identity.
- t.** Further develop a comprehensive palette of native plants that reflect local plant communities. Plants should be low maintenance, salt and drought tolerant, and tolerant of urban pollution.

The Valley Land Trail employed a comprehensive engagement strategy that involved faculty, students, conservation authorities and an Indigenous Elder. 600 native trees, 5000 shrubs, perennials, seed mixes and medical plants were integrated into the trail. The design is a successful example of creating a unique, accessible and memorable place that can be experienced and appreciated by all. (University of Toronto, Scarborough Campus © Schollen & Company)





- u. Special landscape treatments are encouraged to emphasize site access points and building entrances.
- v. Landscaping should be designed with consideration for future climate scenarios including increased precipitation events and related stormwater impacts.
- w. Select plants that will thrive in the conditions in which they will be planted. Sun and wind exposure, hardiness, growth rate, propagation style, pollution sensitivity, salt tolerance and use of irrigation should all be considered when selecting a plant species.

### Stormwater Management

Landscape design and the design of the campus hydrology should be intertwined in a unique and systematic way with the public realm. Bioswales, rain gardens, and stormwater ponds should be part of the public realm experience and be visibly connected to buildings, where appropriate. The Campus Master Plan Update's large scale landscape design strategy addresses stormwater management with surface run-off capture and storage, water mitigation, localized filtration gardens, and other sustainable measures.

- x. The Carleton University Stormwater Management Operating Plan recommends that more risk reduction be implemented on campus to minimize required sandbagging protocols for existing structures and sewer infrastructure.
- y. Stormwater should be considered as a resource in the design of new campus spaces.
- z. Stormwater should be slowed, stored, or infiltrated into the landscape through water reuse systems whenever possible.
- aa. Movement of stormwater should occur above ground as much as possible, through vegetated swales and other designed features.
- ab. Outlets of stormwater into municipal sewers should be minimized where possible.
- ac. Landscape design should contribute to on-site stormwater management plans and Low-Impact Development (LID) elements should be incorporated such as bioswales, rain gardens, rainwater collection tanks and green roofs.
- ad. Planting in vegetated swales or LID features should use species from the Rideau Valley Native Shoreline Species List as much as possible. Plants to be selected should have the same requirements that the proposed condition will provide, including moisture levels, sun exposure, soil types and general salt and pollution tolerance if needed.



Example of weaving Indigenous placemaking, landscape design, ecology, and stormwater management into a prominent public space. (© University of British Columbia)



## Open Space

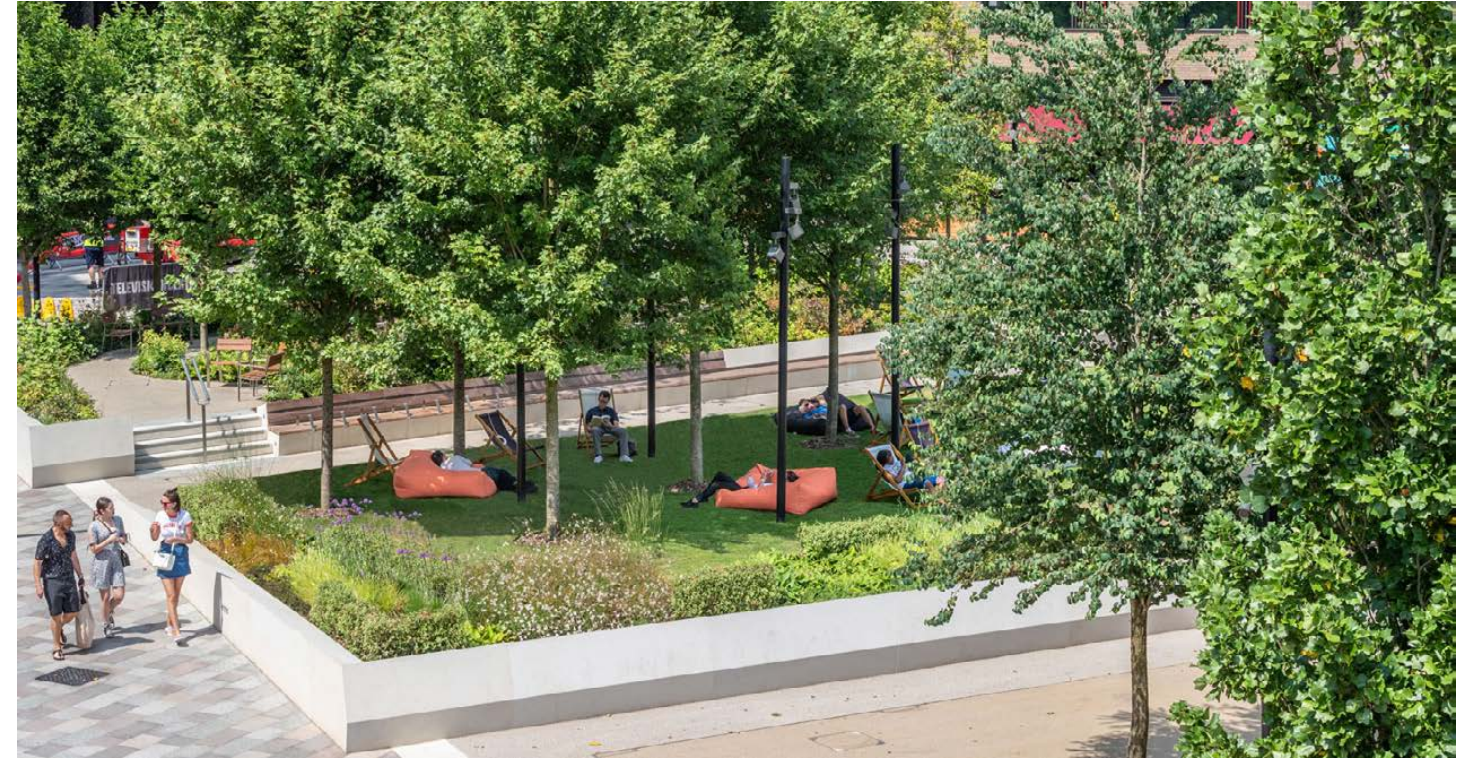
Open spaces on campus should foster a welcoming and animated public realm. The network of open spaces envisioned by the OSMP and the CMPU works to establish a strong sense of place and destinations for the campus community. Open spaces provide various opportunities to integrate Indigenous placemaking, campus art, and landscape treatments to enhance their use and programming.

Campus open spaces encompass quads, forecourts, green spaces, and gardens, and fill the in-between spaces of campus buildings, streets, and connections. The following guidelines will help shape open spaces across Carleton University, further promoting a strong and resilient natural ecosystem, with prevalent tree plantings supporting and enhancing the existing canopy.

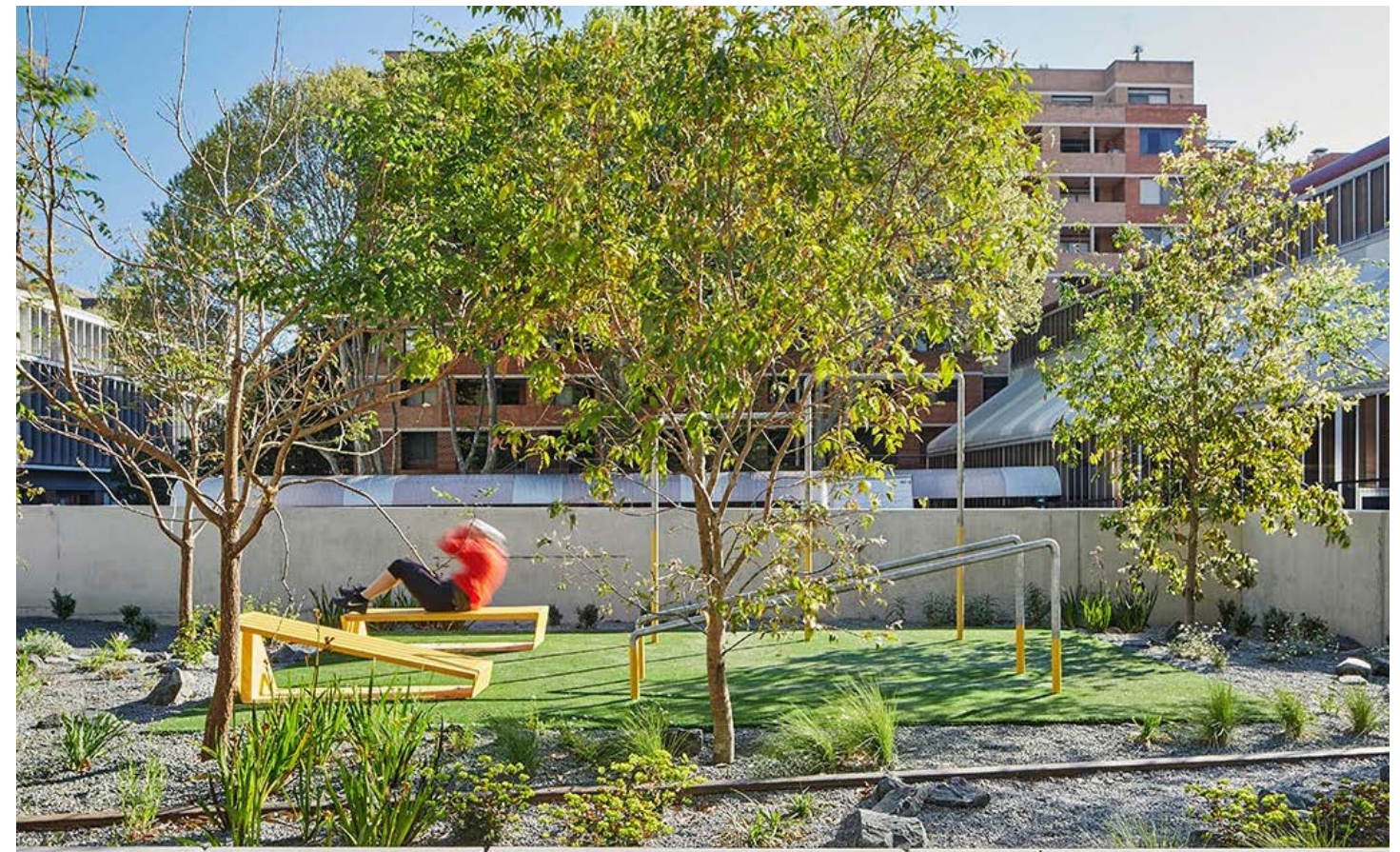
The CMPU suggests enhancements to existing outdoor spaces for flexible uses and recreational programming, and incorporates the Green Ribbon and Geological Time Trail as a multi-use pathway system that binds the campus together. This trail network will loop throughout the campus and provide a variety of functions and uses.

- a. Strengthen the existing network of open spaces on campus by enhancing existing open spaces (i.e., landscaping and pedestrian connections) and establishing new open spaces with suitable and appropriate landscaping treatments. Ensure new open spaces are equipped with appropriate linkages and connections.
- b. Open spaces should be visible and accessible from both public walkways and private buildings, increasing safety and permeability.
- c. Open spaces should vary in scale, character and feel to provide comfortable and usable spaces for all seasons and people of all abilities.

- d. Design open spaces to promote outdoor gathering, recreational activities, as well as increased passive activities including studying or reading.
- e. Ensure open spaces include a full range of complimentary site furnishings that help form a cohesive design aesthetic. Details such as seating, waste and recycling receptacles, bicycle parking, lighting, and weather protection should be cohesive in colour, form, and aesthetic.
- f. Indigenous and cultural placemaking should be considered in the design of open spaces. Elements such as gathering structures, native plant filled medicinal gardens, and aspects that express Indigenous languages, culture, and imagery (i.e., art and wayfinding features), should all be created in collaboration with Indigenous Elders and communities.
- g. Integration of electronic elements including Wi-Fi, GFCI receptacles, and other kinds of audio/visual connectivity are encouraged to support a diversity of uses and learning opportunities.
- h. Create areas for outdoor education to encourage land-based learning and to provide students, faculty and staff, as well as the larger community with places to learn about the geological and ecological characteristics of the campus.
- i. Open spaces should provide and enhance views and physical corridors into natural areas and riparian zones.
- j. Outdoor space design should support winter programming, recreation and general use. This may include warming areas, utilizing the sun for solar gain, or winter sports such as skating or skiing.
- k. Ensure open spaces are up-kept and maintained throughout the year to allow for activation and use.



Low Impact Development strategies such as rain gardens and bioretention zones should be considered in tandem with water management for new and existing buildings. (Television Centre, London, UK, Gillespies Landscape Architects © John Sturrock)



(The Goods Line, Sydney, Australia, Aspect Studios © Florian Groehn)





Integrated seating and lawns will help promote informal social gatherings and interactions. (Television Centre, London, UK © Gillespies Landscape Architects)

## Natural Systems

Carleton University's campus is uniquely situated in a natural and green setting bordered by the historic Rideau Canal to the west and Rideau River to the south. During the consultation process, students and faculty stressed the importance of having increased access to the natural environment and waterways during the consultation engagement process. Preserving existing trees, strengthening natural infrastructure, and renaturalizing banks of the river for habitat creation and riparian restoration are key ambitions of the Campus Master Plan Update.

The Master Plan Update encourages Carleton to continue to leverage, promote and protect the natural context that surrounds the campus. Implementing additional tree and other plantings through existing and proposed street networks and open spaces, the creation of the Green Ribbon and Geological Time Trail, and small and large design

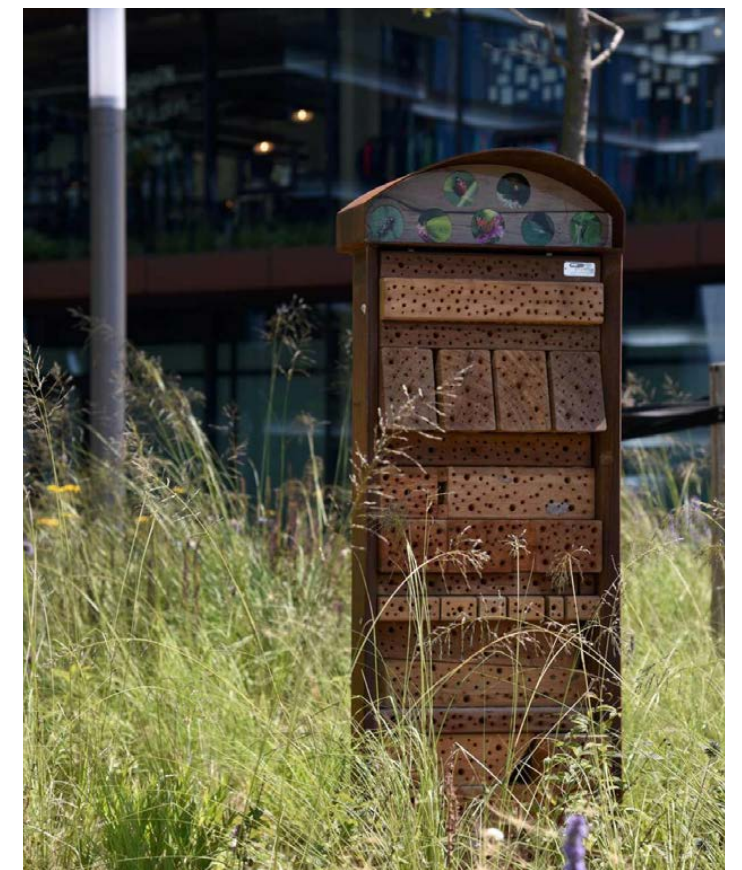
interventions that support sustainability and climate resiliency will further promote its natural setting and be a leader in the future of sustainability initiatives on campus. Carleton University should continue to build in harmony with existing natural systems on and surrounding the campus, as well those within the region.

The following guidelines support the preservation and function of natural systems:

- a. Opportunities to enhance the campus' ecological function should be pursued. Examples include planting native plants, removing invasive species, creating pollinator gardens and habitat hotels, as well as managing and enhancing natural forests and streams.

- b. Water run-off should be captured, stored and filtered in both natural and man-made structures such as bioswales and oil and grit separators. This helps help maintain the health of the Rideau River by preventing contaminated surface run off from entering.
- c. Riparian restoration ecology should be considered along the Rideau River. This may involve bank reinforcement, plantings, and invasive species removal.
- d. Retain and enhance existing natural woodlands, riparian conditions, and tree canopies. Continue to plant new trees and convert lawns to pollinator meadows as outlined in the OSMP.
- e. Retain and enhance connections to water features surrounding Carleton University. This can be achieved through lookouts, view corridors, and physical connections.
- f. Enhance awareness of underlying natural and ecological ecosystems by integrating new developments, pathways, educational plaques and student-led clean ups of natural areas.
- g. Actively help grow pollinator populations by building pollinator friendly planting and policies such as eliminating the use of pesticides and herbicides on campus.
- h. Create opportunities for nesting facilities such as insect hotels and areas of refuge for different insects including butterflies, native bees, birds, and bats, especially to accommodate winter month conditions.
- i. Natural areas should be enhanced and continuous around and through the campus, connecting it to the larger regional landscape matrix.
- j. New development should be integrated harmoniously with the existing site grading. The natural landforms should inform building siting, parking locations, etc.

- k. Planting diverse species of trees and other plants should be prioritized. Plants proven to be a significant habitat for insects and animals should be prioritized. For example, Ginkgo biloba trees have been widely criticized for their lack of habitat value in Southern Ontario, and should be avoided, while native species such as Oak, Maple, Beech, Birch, Pine, Fir, Spruce, etc. should be prioritized.
- l. Explore partnerships with the Rideau Valley Conservation Authority and faculty to restore habitat, monitor progress, and adaptively manage the riparian area in the future.



Excess wood from street furniture could be made into insect hotels. Projects like the Insect Hotel by Grijsen supports circular design and sustainability initiatives while improving local biodiversity and habitat creation. (© Grijsen)



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