2020 Canadian Consulting Engineering Awards

UNIVERSITY OF OTTAWA LEARNING CROSSROADS

BUILDINGS

wsp

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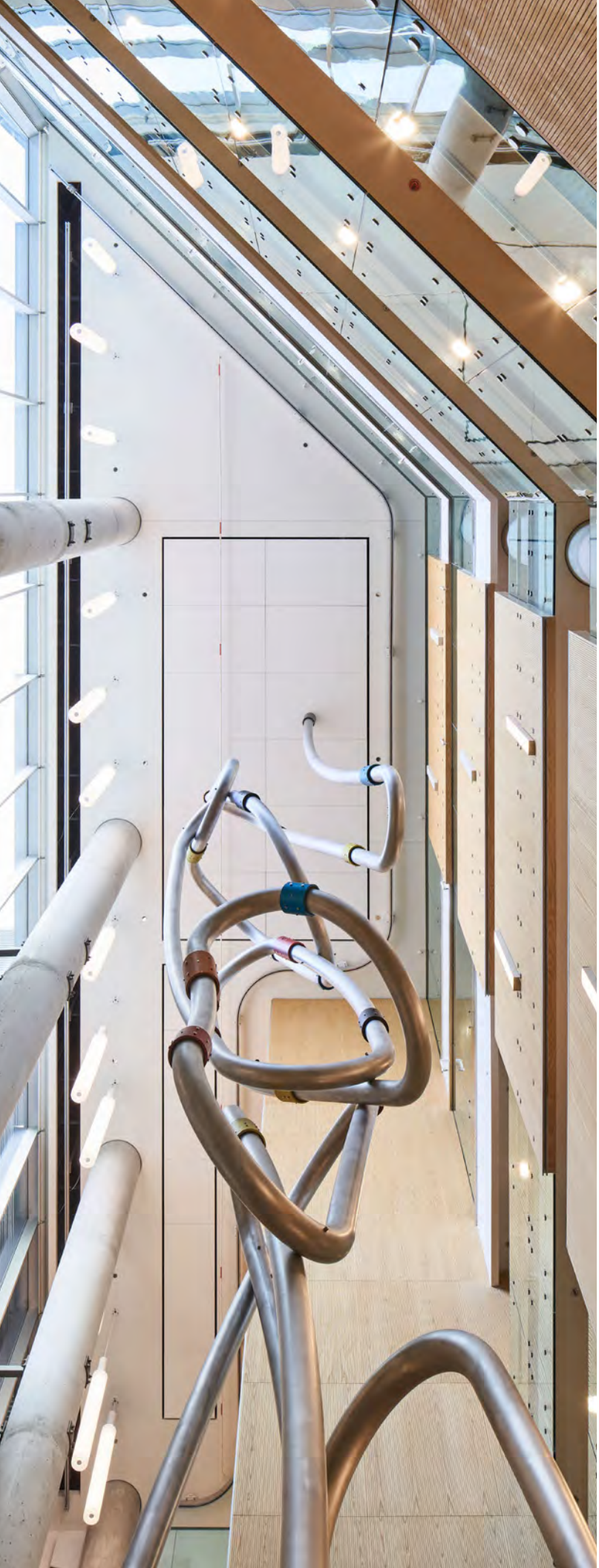

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The University of Ottawa is the largest bilingual (English-French) university in the world with more than 40,000 students and 450 programs in 10 faculties.

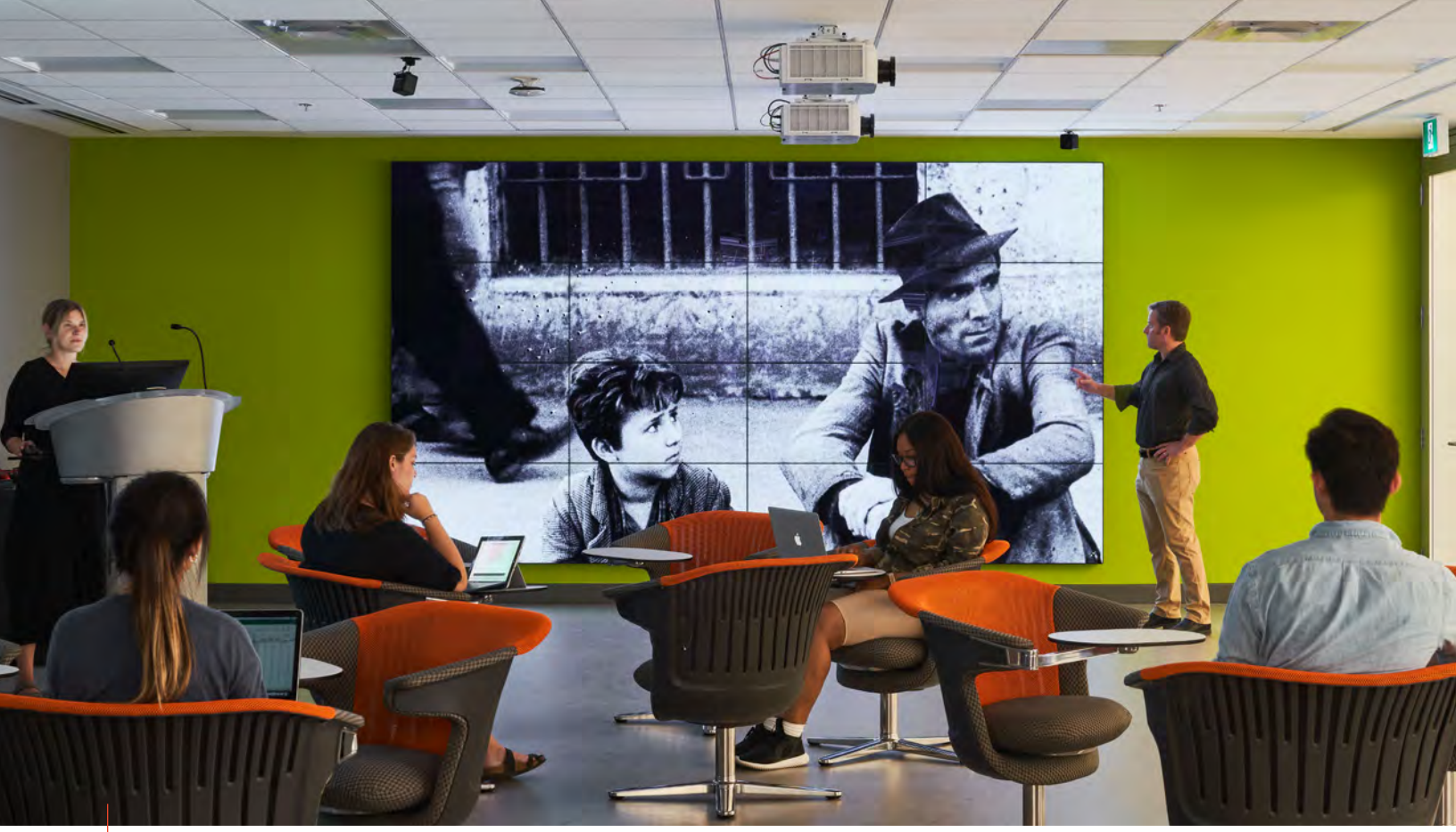
The recently unveiled Learning Crossroads building is creating a buzz around campus with students quickly taking advantage of the 1000+ new individual and group study spaces

PROJECT SUMMARY

The University of Ottawa is the largest bilingual (English-French) university in the world with more than 40,000 students and 450 programs in 10 faculties. Located at the heart of Canada's capital, the university has ready access to the great institutions of our country and is distinguished with cutting-edge research, transformative learning and a sustained commitment to the local and global community. The newly opened Learning Crossroads building (Carrefour des apprentissages), demonstrates uOttawa's commitment to advancing the student experience.

The Learning Crossroads is a 17,500 m² six-storey addition to the uOttawa downtown campus. The opening of the new Learning Crossroads building supports the university's objective of promoting modern teaching methods, providing improved student services, and fostering connectivity, flexibility, and adaptability through design. The building includes two amphitheatres, 20 classrooms and a 400 seat cafeteria, but it is the six-storey central atrium, 1000+ individual and group study spaces, and the variety of multimedia experiences that transform the space into a hub of student activity.

WSP is proud to have provided the Mechanical, Electrical, Sustainability, LEED and Food Service consulting to design state-of-the-art building systems that are optimized for energy performance and support the student needs for evolving technologies.



Classrooms at the Learning Crossroads feature cutting edge technology

PROJECT ACHIEVEMENTS

The University of Ottawa has four strategic pillars for its 2030 Transformation plan: More Agile, More Connected, More Impactful and More Sustainable. These pillars are at the heart of the design for the Learning Crossroads.

More Agile

Mechanical and electrical infrastructure is designed to be future-ready to accommodate innovations in teaching and learning. For example, spare capacity is designed into air distribution, chilled water, power and data pathways to suit future space plan uses.

More Connected

The building is designed to be a hub of student learning and engagement with interactive multimedia spaces to draw students together.

More Impactful

The Learning Crossroads provides the academic, cultural, recreational and social infrastructure to support today's students who will become tomorrow's world leaders.

More Sustainable

Energy and water use was optimized during system design, and several energy recovery strategies were developed to reduce the building's environmental footprint. The Learning Crossroads is currently under review by the CaGBC and is targeting a LEED Silver designation.

The 6-storey glazed central atrium promotes a feeling of community

SOCIAL CONNECTEDNESS

Research shows that social connectedness is waning at an alarming rate, and the experience of loneliness and social isolation can sometimes be heightened on post-secondary campuses. The design team addressed this challenge head-on by creating a welcoming building façade and an open ground floor space to create a community hub and a place for students to come together. The mechanical and electrical service risers were strategically located to encourage sight lines on the floor plate while also optimizing delivery of the building systems.

A central atrium connects all six above ground storeys, and glazed atrium walls ensure that upper floor study spaces remain quiet while providing a visual connection to the people and public floors below. Four active learning classrooms allow students to be face-to-face with subject matter experts or other students anywhere in the world.

The lower floors of the Learning Crossroads include high-tech, flexible teaching spaces, study suites, multimedia studios, bring-your-own-device (BYOD) Zone, Gaming Lounge, and collaboration spaces to support student engagement. WSP's electrical engineering team designed the power distribution and data/communications pathways that support these student multimedia experiences to be flexible by design to take into account future space uses and advancements in technology.

> "We want students to have access to individuals in other places so they can be exposed to many different perspectives and insights."

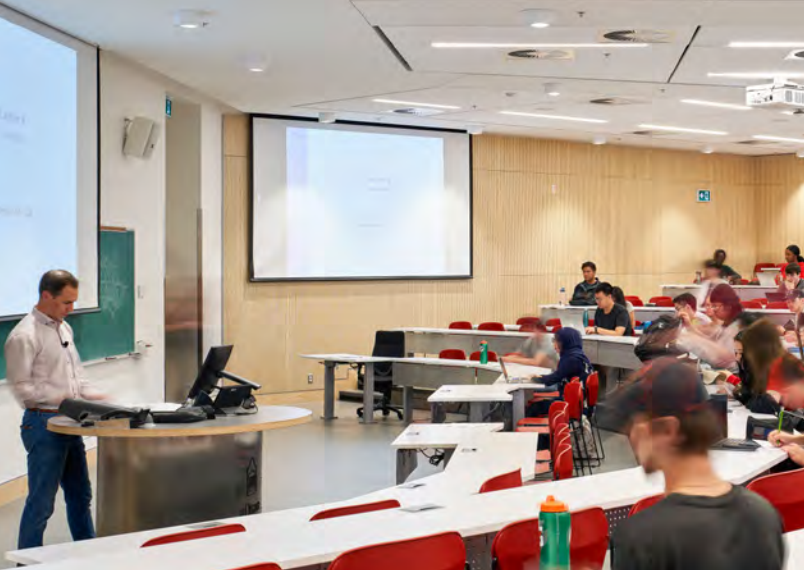
Aline Germain-Rutherford, Associate Vice-President of the Teachinc and Learning Support Service

The building is surrounded by pedestrian walkways and has quickly become a nucleus of student activity

SITE COMPLEXITY

The University of Ottawa's downtown campus is a cultural and intellectual hub, but like most downtown campuses real estate is at a premium and there are few opportunities to build on greenfield sites. The Learning Crossroads was built on a 'C' shaped parcel of land that wraps around three faces of the existing smaller four-storey Lamoureux Hall. This concept converted former perimeter offices into interior spaces with a grand view of the new Learning Crossroads central atrium, but it also posed a specific challenge to the mechanical design team.

The Lamoureux Hall ground level ventilation and exhaust openings were consumed within the new building. A novel solution needed to be found because the ground level building façade could not accommodate new large ventilation openings. The design team took this opportunity to re-think the original building ventilation system and convert return air service shafts into combined ventilation shafts. Heat recovery air handlers were installed on the roof of Lamoureux Hall to draw air from the floor plates, capture its energy, and direct pre-conditioned ventilation air down the shafts to the building air handlers located in the basement. Control sequences were developed to modulate the exhaust air fraction of the air handlers to allow the system to adapt to varying building pressure conditions, for example during operation of the cafeteria grease exhaust system.

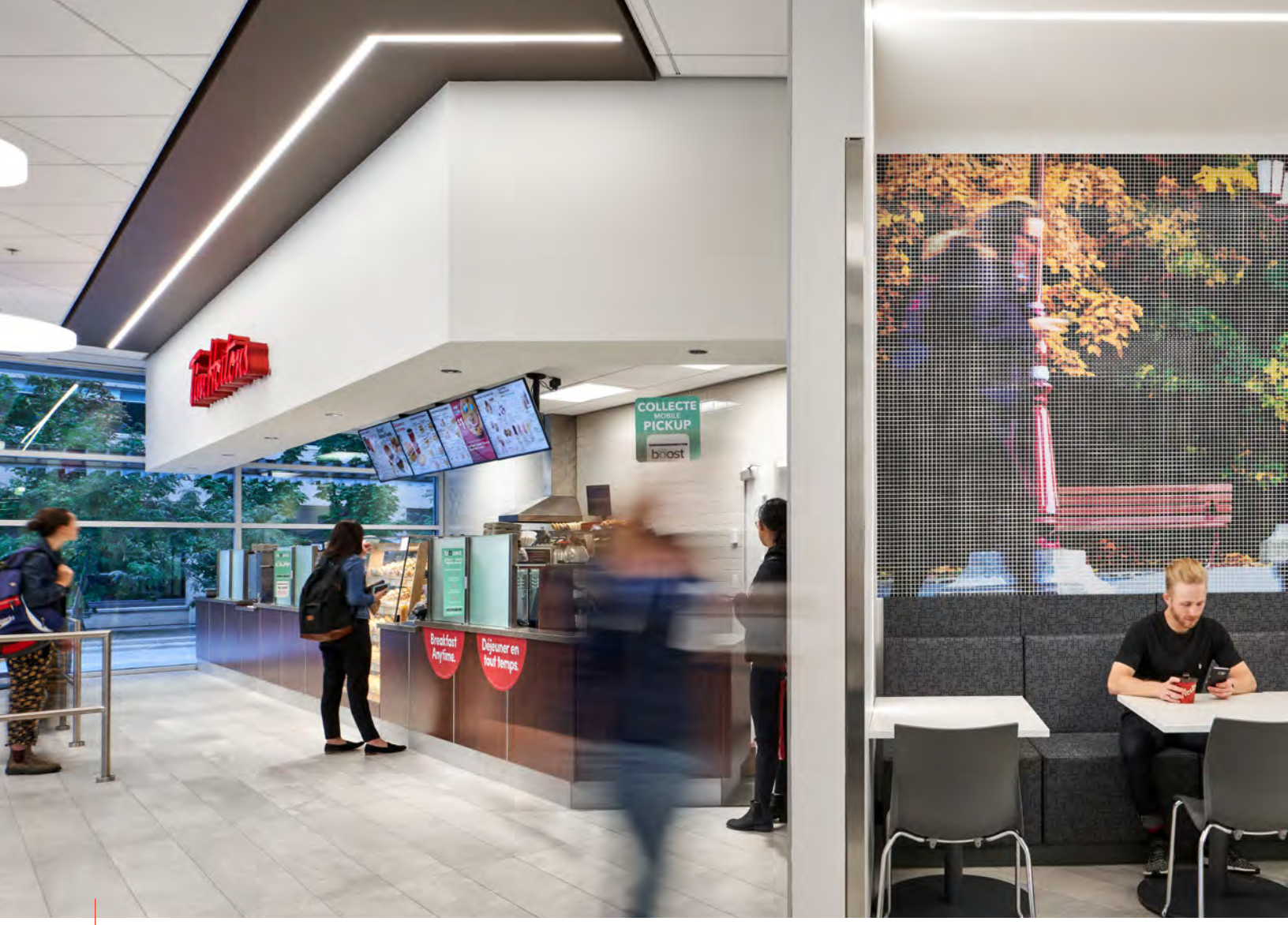


INNOVATIVE SYSTEM SELECTION

The building electrical design needed to be robust and flexible to accommodate the increasing power and data needed to support student learning. As an example, the Learning Crossroads offers several multimedia experiences for students, including augmented reality. The power and data requirements for these types of space are unlike traditional learning centres, resulting in an enhanced building electrical design. The design team also put an exceptional focus on lighting and glazing, through fixture selection, daylight harvesting, and controllability. The result is significant operational energy savings at relatively low capital cost, but the primary benefit is a space that is comfortable for students and adaptable to the different space uses. For occasions when privacy is needed, electrified switchable privacy glass was included at select classrooms that allows instructors to convert interior glazing from transparent to opaque by the flip of a switch.

The majority of heating and cooling water for the Learning Crossroads is generated at the campus central plant, but a dedicated heat recovery chiller was included in the design with a novel control strategy: the 30-ton chiller is operated as a first stage heating device that simultaneously generates chilled water for process cooling loads and also charges the campus district thermal network.

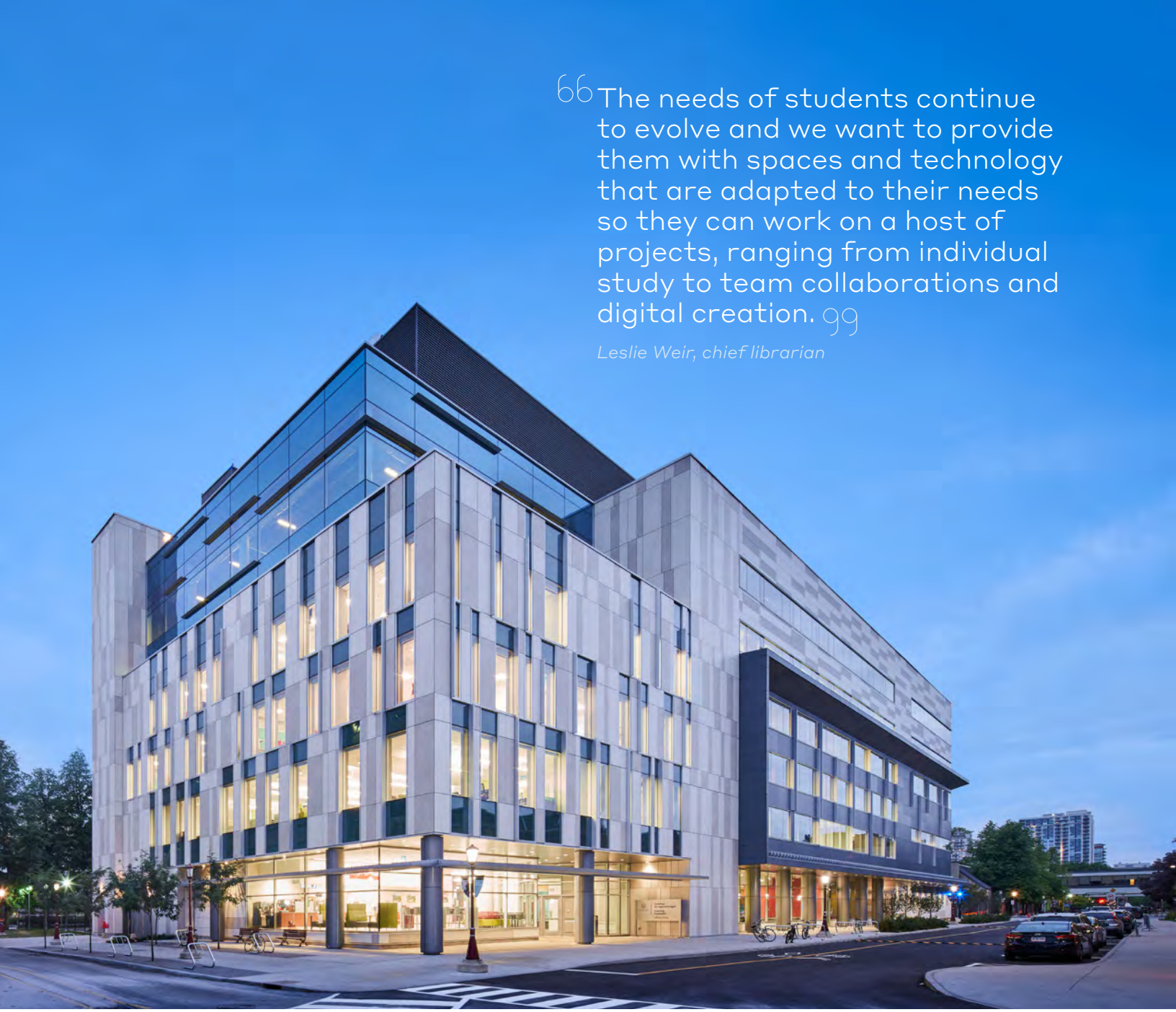
The HVAC system advanced the concept of a dual duct VAV air handling system design by incorporating a hybrid dedicated outdoor air concept with energy recovery. The cold deck air handlers are designed to deliver 100% of the ventilation requirement for the building based on space carbon dioxide concentration. Enthalpy wheels are located upstream of the cold deck air handlers to recover sensible and latent energy from the washroom exhaust airstream and the general exhaust airstream when the building is occupied.



Sustainability extends into the new cafeteria spaces, where the WSP Food Services team reduced waste through a variety of technologies, programs and practices

ENVIRONMENTAL STEWARDSHIP

The University of Ottawa is committed to sustainable growth of their infrastructure. For the Learning Crossroads project, WSP provided the expertise for sustainable design strategies to be incorporated into the design. Building energy modeling was used to validate and refine the selection of the main HVAC systems to optimize occupant comfort and total building energy performance. Heating and cooling water for the Learning Crossroads is generated at the campus central plant to increase the overall system energy efficiency and lessen the environmental footprint of the building. The centralized HVAC systems feature energy recovery and a dedicated heat recovery chiller to reduce energy use. Energy meters at major equipment measure and record total energy use, and the data is proactively used by the operations department to validate control changes. The Learning Crossroads is currently under review by the CaGBC and is targeting a LEED Silver designation.



> “The needs of students continue to evolve and we want to provide them with spaces and technology that are adapted to their needs so they can work on a host of projects, ranging from individual study to team collaborations and digital creation.”
>
> *Leslie Weir, chief librarian*

SUMMARY

WSP is proud to have provided Mechanical & Electrical, Sustainability, LEED, and Food Service consulting services for this challenging and exciting project. It was a privilege to work the University of Ottawa and the rest of the project team to create a truly world-class student learning centre. Every time that we are on campus, we take great satisfaction in seeing students interact and engage in this newest nucleus of community.

WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, architects, planners, surveyors and environmental specialists, as well as other design, program and construction management professionals. We design lasting solutions in the Transportation & Infrastructure, Property & Buildings, Environment, Power & Energy, Resources and Industry sectors, as well as offering strategic advisory services. With approximately 50,000 talented people globally, including more than 8,000 in Canada, we engineer projects that will help societies grow for lifetimes to come.