University of Victoria | Campus Planning & Sustainability

New Student Housing & Dining Project

CASE STUDY

December 2022

Design and construction of the new buildings are designed to meet Leadership in Energy and Environmental Design (LEED) V4 Gold and Passive House standards, the most rigorous global building standards for sustainability and energy efficiency.

Work on the site of the Student Housing and Dining project began in summer 2019, with an Indigenous land blessing ceremony the first in the university's history taking place in January 2020. Deconstruction of the Cadboro Commons and two older residence buildings (Emily Carr and Margaret Newton) took place in summer 2020. Civil work began on site in winter 2020, with building construction getting underway in spring 2020. The installation of the Modular Dining Facility (MOD) allowed the construction schedule to be expedited so that work progressed on both buildings simultaneously, saving 18 months on the original construction schedule.

Location, landscaping and active transportation

To protect greenspace while accommodating more students living on-campus, buildings were designed within an efficient footprint and will be the tallest buildings on campus.

The Campus Greenway extends though the site, strengthening the east-west connection across campus, and improving pedestrian connectivity to key destinations for students on campus.

The project also provides a new pedestrian pathway connection to the UVic Transit Exchange, which is a major transportation hub. Users have access to quality transit with eleven bus routes that have more than 450 weekly

The landscape design is an extension of the east-west Campus Greenway and incorporates native species to help create an educational and adaptive landscape rooted in the history of the site. The design was developed working with the local Indigenous community.

Building 1

Location	South of the Student Union Building (SUB)
Size	16,589 m2
No. student beds	398
Other features	Includes the Cove dining hall and severy on levels one and two

Building 2

Location	Adjacent to Building 1
Size	15,899 m2
No. student beds	385
Other features	Includes an Indigenous student lounge, conference, meeting and academic spaces

Heat and domestic hot water

In any building or household, there is waste heat emitted from various sources, such as showers or rejected refrigerator/freezer heat.

The new buildings capture this waste heat using Heat Recovery Ventilation (HRV) devices, and re-use it to warm incoming fresh air, significantly reducing the energy used for space heating in each building.

Electric Air Source Heat Pumps are being used to heat water in both buildings instead of natural gas energy from the District Energy System. In addition, the pipes transporting water will be shorter in length and have increased insulation to minimize heat loss. The combination of these strategies will result in an 88% reduction of GHGs associated with the process of heating water.

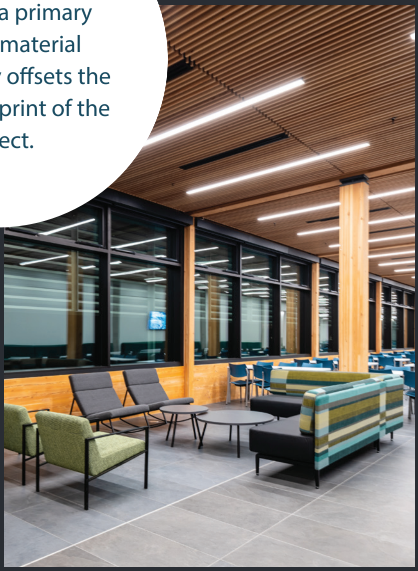
Materials and resources

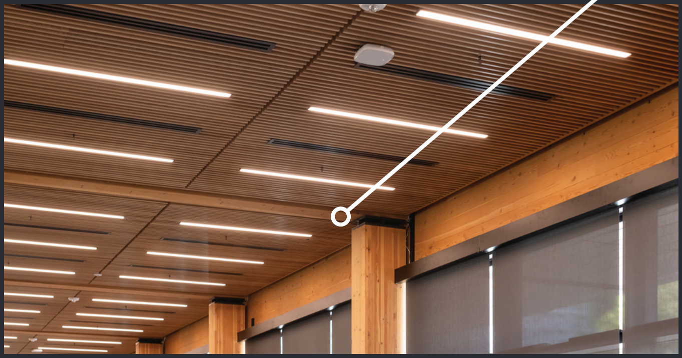
Between May 2020 and October 2022, construction of the project achieved a total waste diversion rate of 91.7%.

This was acheived through the implementation of the project's Waste Management Plan. Subcontractors, trade contractors, suppliers, and service providers were oriented on waste reduction, recycling, reuse, disposal, and documentation procedures. Signage was used to communicate acceptable types of materials for each waste container.

These practices helped ensure that construction and demollition waste was diverted from the landfill as much as possible.

The use of mass timber as a primary building material significantly offsets the carbon footprint of the project.





Mass timber wood used for Building 1 was sourced from a BC company that uses wood grown, harvested, and processed in the Kootenay region.

Mass timber is a structural engineered product that takes large solid wood panels and glues them together in a way that creates a solid structural project.

It has lower cradle-to-grave emissions compared to alternative building materials, such as steel or concrete, and mass timber buildings have the potential to store carbon over long product lifecycles.

Indoor environmental air quality

The project has specified materials with Environmental Product Declarations (EPDs), and Health Product Declarations (HPDs) to avoid introducing harmful substances into the space.

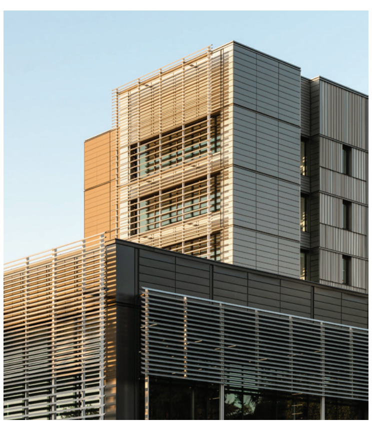
Environmental product declarations (EPDs) are a standardized way of communicating the environmental effects associated with a product of system's raw material extraction, energy use, chemical makeup, waste generation, and emissions to air, soil, and water. Health Product Declarations (HPDs) are a standardized way of reporting the material contents of building products, and the health effects associated with these materials.

To avoid short-term and long-term health problems, the project has specified Low-emitting materials in terms of Volatile Organic Compounds (VOCs). VOCs are chemicals that are released into the air from numerous materials.

Even with the windows closed, student bedrooms receive 100% filtered outdoor air, resulting in superior air quality, and minimizing airborne contaminants.

Prolonged exposure to high concentrations of some VOCs has been linked to a wide range of chronic health problems such as asthma, chronic obstructive pulmonary disease, and cancer. Short-term exposure to VOCs can also cause acute reactions, such as eye, nose, and throat irritation.

To optimize access to daylight and energy efficiency, window ratios are balanced to meet thermal performance targets, allowing for generous floor-to-ceiling windows in public areas.



Enhanced thermal insulation also provides acoustic separation from exterior noise, and mechanical equipment noise is kept to a minimum. The inherent beauty of the mass timber structure and wood finishes offers warm, welcoming interior spaces.

Podium spaces consist of dining areas, lecture theatres, and a banquet hall, which have highly variable occupancy profiles throughout the day. Combined occupancy, temperature, and CO2 sensors will adjust the airflow based on demand.

Passive House component

Thermal confort for now and the future

Cooling

Using custom combinations of passive (natural ventilation from windows) and mechanical cooling strategies (air distri bution equipment and cooling systems) in different areas of the buildings (e.g. dining hall, student dorms, etc.), energy consumption is dramatically reduced while maintaining thermal comfort.

Thermal comfort analysis identified potential savings in annual cooling energy by up to 80% using this mixed-mode ventilation approach compared to conventional fully me chanical approaches. For example, like all spaces, the dining hall in Building 1 has openable windows, as well as strategic solar shading, and mechanical cooling available when necessary.

Bedroom windows, however, do not require solar shades because of the window size, high-performance, and depth of surrounding walls – which manage/counteract the incoming solar heat gains.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Commercial kitchen

The new dining hall sets an exemplary precedent as it is the largest commercial kitchen in North America designed in a Passive House building.

This kitchen has a waste heat recovery system from induction cooktops for better efficiency.

-80% emissions

By adopting a robust energy reduction strategy and using electric kitchen equipment (rather than the industry standard gas-based equipment), this kitchen is five to six times more energy efficient than conventional commercial kitchens – and decreases projected GHG emissions by 80% for the entire building.

Serving approximately 8,700 meals per day, the commercial kitchen represents a significant amount of the building's energy use - roughly 27,750 liters of domestic hot water per day.

To respond to this challenge, a waste heat recovery system from the refrigeration system, kitchen exhaust, dishwasher's wastewater heat recovery, and shower drain water heat recovery, is used to pre-heat water.

Captured heat from kitchen also preheats supply air to the servery and dining area, resulting in an 82% reduction in heating demand for the podium space.

The cooking exhaust includes a responsive and flexible demand control ventilation system that monitors the cooking equipment status (on/off, heating to cooking temperatures, cooking). This enables the adjustment of the exhaust flow rates according to the cooking equipment status at each exhaust hood.

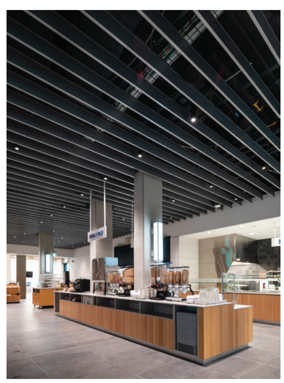
This means that they will only ramp up when cooking activity is occurring beneath them.

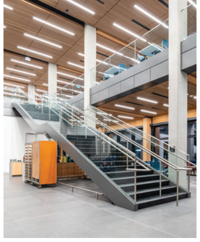
Appliances that have a similar design and cooking schedules are grouped together beneath the hoods to minimize usage.

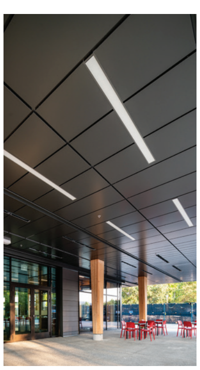
The hoods will also be shielded on three sides to reduce the volume of air being exhausted.

This will result in less new air entering the building to replace exhausted air, and therefore less energy needed to heat/cool new air entering the building.

The servery hours in the new facility have been condensed to 7:30 am-10pm (compared to 7:30 am to 11:00 pm) which limits the time that front-of-house equipment is required to run, reducing the energy consumption.







Additional information

Architect: Perkins & Will
Construction manager: EllisDon Kinetic

Visit the project website:
https://www.uvic.ca/campusplanning/current-projects/new-student-housing/