2019 CANADIAN CONSULTING ENGINEERING AWARDS

Thompson Rivers University Industrial Training and Technology Centre

Category A – Buildings

Stantec

Thompson Rivers University
Industrial Training and Technology Centre

The Industrial Training and Technology Centre (ITTC) is a new educational facility developed to accommodate the growing demand for sought after industrial trades and technology programs. This facility not only enhances students' learning environments but also provide suitable training facilities to help prepare them for the trade and technology industries.

Project Highlights

Q.1 INNOVATION

Thompson Rivers University (TRU) was looking to attract and retain talented students through a new Industrial Training and Technology Centre (ITTC) and repurposing and renovating vacated space for expanding the Architectural & Engineering Technology (ARET) program at the TRU campus in Kamloops. This new facility accommodated the growing demand for sought after programs such as Industrial Electrician and Industrial Instrumentation, to not only enhance students' learning environment but to provide appropriate training facilities to help students become prepared to enter into the trade industry.

To make this project a reality, TRU tapped into federal funding available through the Strategic Infrastructure Fund (SIF) which constrained the project with strict financial controls and an aggressive schedule. An Integrated Project Design group was formed consisting of the design team, construction manager, project manager, and owner – through this team we were able expedite the design and construction by understanding the constraints from all angles, sequence the delivery and phasing of the construction, and implement iterative costing to ensure budgetary alignment.

Being a leader in sustainability, one of the project goals was to utilize a low carbon heating system and have a net carbon reduction to the campus by offsetting natural gas use from the adjacent (and existing) Trades and Technology Building. Additionally, TRU challenged the project team to innovate energy-efficient design solution for the mechanical and energy systems.

Through this collaborative process we were able to meet the requirements of the budget, schedule, and funding stipulations, while providing the greenest building on campus.

Entrance Atrium

Q.2 COMPLEXITY

This was not a simple project. The site conditions positioned the building tightly between a mountain of rock, and the existing Trades and Technology Building, making the massing of the building restricted to a long rectangular geometry, and the construction sequencing difficult.

Due to the funding sources, the construction had to be delivered within a fast-tracked 18-month schedule, which resulted in six different work packages including:

- Earth works and utilities
- Underground and Foundation
- Superstructure and Fit-out
- Existing Building Renovation #1
- Existing Building Renovation #2
- Energy Plant

Lastly, due to TRU's desire to innovate and reduce their carbon footprint, the mechanical systems designed for the building were not "business as usual" and had to interact with the existing adjacent building to meet the decarbonization goals of the project which is expected to have a 260,000 Kg of CO2e reduction, helping TRU meet their strategic goal of a 33% reduction in GHG emissions by 2033 compared to 2007 levels, and to have 10% of the campus be energized from renewable sources.

Industrial Training and Technology Centre on the hillside

Q.3 SOCIAL AND/OR ECONOMIC BENEFITS

This project is enabling the university to provide specialized training to the community that will have long standing benefits to our region for years to come. With the skilled-labor shortage that British Columbia is facing, this will help alleviate our bottlenecks and facilitate us to continue to develop our infrastructure. One particular trade this will be helpful to is Power Engineering – this facility will be only the second one in the province to offer a Power Engineering program where the students can learn on a live plant and contribute to their operator hours while in school.

Further to meet workforce demands and student needs, one of our main design themes for this project was creating a “living lab”, so that students and educators can ‘learn’ from the building, creating real-life experiences. This resulted in exposed services, oversized mechanical rooms for student learning, and measures to study the operations of the building. The intent is to allow educators to use the building they occupy as a learning tool.

In March 2019, the local ASHRAE Chapter hosted a building tour for both industry members and students. The focus was on the mechanical and energy systems and connecting students in the engineering field with industry leaders and promote green design.

Machine Millwright Shop

Q.4 ENVIRONMENTAL BENEFITS

Oversized Mechanical Room for “Living Lab” Concept

Sustainability was paramount in every decision for this project – from the use of an electric district energy plant, to following the “Wood First” materials strategy. The project is targeting LEED® Gold, including 15 points for energy use reduction. The energy plant for this project was also partially funded by BC Hydro as part of their new Electrification program, which is in response to the provincial sustainability goals to de-carbonize British Columbia. This was the first project in the province to qualify for the funding.

The cooling and ventilation system combined several different technologies and equipment such as active chilled beams, VAV terminal units, dual-core DOAS air-handling units, and distributed heat-pumps to formulate a truly unique solution.

50%

The expected energy savings compared to an ASHRAE 90.1 reference building.

260,000 kg

The expected offset of CO2e based on our renewables and district energy strategy.

The other unique combination that was used in this design was not material or equipment, but a combination of buildings. In collaboration with the University, we recognized that the adjacent building presented an opportunity to further de-carbonize the campus by utilizing our new energy plant to inject heat into the existing building and reduce the natural gas usage. We designed a low-carbon district energy system that heated our new building first, and then injected all the spare capacity into the existing building.

By implementing this design solution, we were able to significantly advance TRU towards their carbon reduction goals, renewable energy targets, and provide additional resiliency by interconnecting the buildings.

Light and Air

Glazing was strategically placed to provide natural daylight and view to over 95% of the classrooms and administrative spaces, and to allow for passive heating in the wintertime via the southern fenestrations. Daylight sensors were also utilized throughout to minimize the use of interior lighting.

Demand-controlled ventilation was utilized throughout to control the CO2 levels within the space and promote a high indoor air quality. Additionally, because of the use of an electric heating plant, there are no combustion emissions on site from the base building.

Wellness

The building is designed to carefully control CO2, humidity, and temperature throughout the space to exceed ASHRAE 55 and ASHRAE 62.1 in order to maintain a high degree of indoor air quality and to promote human comfort which is a key element in healthy learning environments. Additionally, the use of active chilled beams in the classrooms provides favorable acoustic by minimizing the background noise due to the HVAC system.

Q.5 MEETING CLIENT'S NEEDS

To meet current and future labour market demand, this 5,344 m^2 facility was built to accommodate an increase of 550 full-time-equivalent student spaces in TRU's industrial trades and technology programs, including for programs previously not offered. Programs such as industrial process technician, power engineering, HVAC/refrigeration technician and machinist.

This three-storey advanced centre features classrooms, lab and shop areas, and it connects to the adjacent Trades and Technology building via a covered walkway.

As some programs move from the Trades and Technology building to the ITTC, the Faculty of Science's Architectural and Engineering Technology (ARET) program will take their place in renovated spaces, leading to growth opportunities for ARET, including expanding the program to a fourth year. The changes made possible by the new building enable collaboration, applied research and training spanning the sciences and engineering disciplines.

Instrumentation Lab with Active Chilled Beams