

NORTHERN EXPOSURE

HIGH PRAIRIE NLC CAMPUS A LEADING EXAMPLE
OF NET-ZERO READY DESIGN

BY SHELLEY WILLIAMSON | PHOTOGRAPHY: COOPER & O'HARA





The Reimagine Architects team is never one to shy away from a challenge, so when the opportunity came up to design a new student building on Northern Lakes College's High Prairie campus in 2018, principal Vedran Škopac and his project partners jumped at it.

"The proposal call was heavily weighted on the design component, which we loved says Škopac, Reimagine Architects Principal and team lead for the NLC's High Prairie Campus Building project. Unusual for Alberta public institutions, NLC included a paid design competition in their procurement projects. "We brought a 3-D model to the interview, and we had Google glasses available so we would slide the model into them and allow clients to walk through and up and down the stairs."

The project was publicly funded, and exploring the feasibility of net-zero was a priority of the college's president. When Alberta Infrastructure's Technical Services groups got involved in reviewing the project, they were impressed that this project was well on its way to a full net-zero design," explains Škopac.

To fit net-zero readiness a building is designed and built with materials and systems to generate its own energy, from clean and renewable sources, to compensate for its own energy use. In this case, the building's design allows it to harness the power of the ground and the sun by incorporating both geothermal energy capture and more than 1,000 photovoltaic panels to attract solar power through the roof. "The geothermal system is something that uses the differential of the ground temperature. It helps your mechanical system by allowing it to work less, explains Škopac. "The implications are quite huge ... Photovoltaic panels not only cost money, but they also consume area. Our task was to design a net-zero ready building so that the PV (photovoltaic) component can be added and you basically plug them in and they perform."

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The college was committed to making the 3,161-square-metre building net-zero ready and LEED Silver®-certified. The latter was always part of his team's proposal, and the net-zero aspect came up in discussions. "In the design development stage we posed the question, 'What would it entail to do net-zero?' and the college president was interested," says Škopac. "We developed a feasibility study with several different options that included passive, active and hybrid strategies."

Originally slated for a different site, the team had to pivot when it became clear the High Prairie main campus was the best location. The shift brought challenges, including having to tear down the old building, change the elevation of the site and mitigate potential for flooding from a nearby creek. A former helicopter pad also had to be cleaned up to net-zero and LEED® Silver specifications.

"There is no storm sewer, so we had to design the site so that it naturally takes all the water around the building diagonally, and

to mitigate the risk of flooding, the solution was to raise the building on a plank that was about four feet tall," says Škopac. "Once you know this you might notice it. And it does make a difference on the experience of the outside of the building, with it raised ... you are sort of walking up to a temple of knowledge." The campus building was oriented on the site to maximize natural light and lend views of the dramatic ravine to the west, which now serves as a not only beautiful point of interest but also a source of visual and acoustic control for the building's occupants.

The post-secondary education facility, offering courses from health sciences to welding, was also planning to add a new program to its menu: culinary arts. Something important to the college's president, this program would also up the ante on cost and energy considerations, given the need to include a commercial kitchen. Mechanical, carpentry and welding bays also had to be included in the new structure, to facilitate practical learning spaces for students in the trades.

Now in operation since 2020, classroom and laboratory spaces in the new NLC campus building are open, bright, and flooded with natural daylight via overheard clerestory windows. In addition to its geo-exchange (geothermal) system and electric-based HVAC system, the building boasts a high-performance envelope with a rain-screen façade and operable fibreglass windows.

The building's impressive sustainability profile owes largely to the design team's collaborative and integrative process, says Škopac. Finishes, energy performance, fire-rating, and structural materials were each considered, along with cost. The design team implemented high-efficiency mechanical systems, which consist of a dedicated outdoor air system (DOAS) and local heat pumps, to distribute the energy through the building by communicating through the central building management system, to balance extreme temperatures between mechanical zones.

re The building is a “living learning laboratory,” showcasing its mechanical, plumbing and electrical and HVAC for students to learn from.

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Mass timber, or glulam, was chosen as the best structural material for the building, for its strength, availability and sustainability. “It is not only a truly Canadian product, but it’s also a way to reduce carbon,” says Škopac. “It’s the only real sustainable way to build, and it can be easily modified on site. You have much better chances of adjusting to the impact of something else, like the height of the ceilings, if you are using a malleable material such as wood than if you are using steel. For this particular application, including the welding bay, it was very easy to meet the (safety) requirements by using wood.”

The initial design also called for the inclusion of portables, or modular spaces, often used by schools to allow for future expansion. Though useful, they are not typically known for their aesthetic value. “They are generally designed as a shotgun approach to the market,” says Škopac. “What we designed in the proposal stage was to not put them on the ground, but to put them on the second floor on the terraces, that can otherwise be used by the students and be behind the veil. That was a trick to avoid having a negative appearance of modular classrooms, and to ensure flexibility.”

To help meet net-zero specifications, the college and design team realized a better approach was to build a larger envelope the college could grow into. The result was to go with a predominantly single-storey building with some taller points, and a two-storey



A large industrial workshop with a wooden ceiling, metal ductwork, and red safety barriers. The space is filled with various tools and equipment, including a blue workbench in the foreground and several red safety barriers in the background. The lighting is bright, and the overall atmosphere is one of a well-equipped, functional workspace.

“Mechanical, carpentry and welding bays, as well as a commercial kitchen, were needed to facilitate practical learning spaces for students in the trades.”

MAIN FLOOR PLAN LEGEND

- 1 Reception
- 2 Testing Room
- 3 Counselor
- 4 Teaching Kitchen
- 5 Gathering Space
- 6 Multi-Purpose Room
- 7 Distance Learning Room
- 8 E-Learning
- 9 Computer Sciences
- 10 Lab Storage
- 11 Nursing Simulation Lab
- 12 Shared Meeting Room
- 13 Server Room
- 14 Electrical Room
- 15 Sprinkler & Fire Pump Room
- 16 Loading Dock
- 17 Recycling Centre
- 18 Nursing Training
- 19 Women's Changeroom
- 20 Men's Changeroom
- 21 Mechanics Trades Lab
- 22 Welding Trades Lab
- 23 Utility Storage
- 24 Trades Storage
- 25 Trades Classroom
- 26 Carpentry Lab

SECOND FLOOR PLAN LEGEND

- 1 Admin Office
- 2 Space for Program Growth
- 3 Universal Washroom
- 4 Student Breakout
- 5 Space for Program Growth
- 6 Offices
- 7 Janitor Room
- 8 Space for Program Growth
- 9 Student Breakout
- 10 Student Breakout
- 11 Space for Program Growth
- 12 Multifunctional Room
- 13 Gathering Space
- 14 Mechanical
- 15 Service Roof

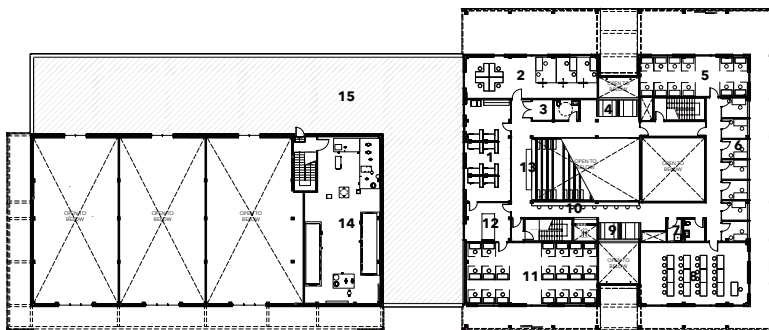
portion of the building. Now three years into its tenure as the new campus space for NLC in High Prairie, most of the “extra” space is already being used for classes and administrative staff.

The client wanted the new campus building to be not just sustainable, but also as a “living learning laboratory,” a factor which closely affected the design decisions, right down (or up) to where to place wires, lights and sprinklers without interfering with the cleanliness and open concept of the finished space. Not just a space for students to learn in classrooms, the building’s mechanical, plumbing and electrical design, as well as its HVAC systems, are equally designed as demonstration spaces for students to learn from. “To make it more elegant without elevating everything up, and impacting the height of the ceiling, we decided to drop the beam down and have the services installed directly above the beam,” explains Škopac. “We had to come up with a system that would transfer the load from a horizontal structure to the beams. We knew that it might be tricky, but it worked brilliantly.”

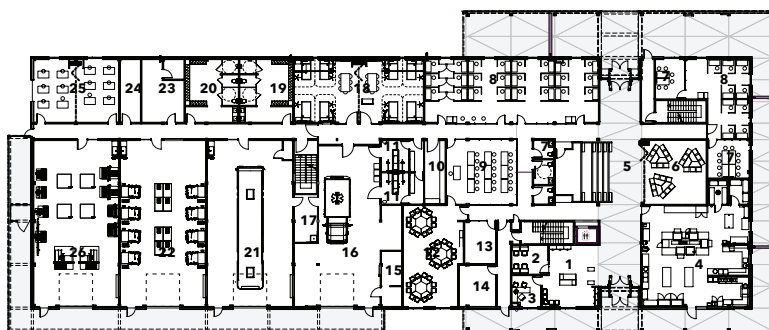
A unique feature of the campus building’s envelope is a slatted veil system to mitigate unwanted glare from the sun in certain spaces and at certain times of the day, while still allowing for ample daylight. The veil, which acts as a privacy filter, was carefully designed via energy model simulations, with the goal of saving energy and creating a comfortable interior environment free of heat gain and glare.

The added cost of making the NLC’s High Prairie campus net-zero ready was relatively inexpensive, adding about \$400,000 to the initial \$20-million budget. That’s a value the college will inevitably see a return for on its investment, when long-term operational and maintenance costs are factored in.

Crafted for a 200-plus-year lifespan, the Northern Lakes College campus building shines as a strong example of the sustainability and energy efficiency a net-zero ready building can bring. **re**



SECOND FLOOR PLAN



MAIN FLOOR PLAN

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