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University of Washington Life Sciences Building

Radiant Heating & Cooling
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REHAU

REHAU Radiant Heating and Cooling Helps University of Washington Handle Solar Loads of New Life Sciences Building

Transforming and modernizing the way biology students learn and interact is the primary reason the University of Washington embarked on constructing a new Life Sciences Building for its Seattle campus.

The biology department had outgrown its old space in Kincaid and Hitchcock halls, which were filled with small offices and cramped lab space. Toby Bradshaw, chair of UW's biology department, told the Seattle Times the department was unable to hire new faculty because it had nowhere to put them – despite a surge in students majoring in the field.

The $171 million, 207,000 ft^2 (19,231 m^2) Life Sciences Building, expected to be completed and ready for Fall 2018 classes, is on the site of the old greenhouses on the east side of Kincaid Hall, along the Burke-Gilman Trail, a popular biking and walking path for students and the public that draws thousands of regional users daily through the campus. The building comprises 167,700 ft^2 (15,580 m^2) of offices, labs and classrooms, as well as a new 20,000 ft^2 (1,858 m^2) greenhouse.

"The quality of these labs relative to what we have now is night and day," Bradshaw says in the Seattle Times article. "Students will be able to work at a much higher level." The open, flexible plan fosters a free flow of ideas in a collaborative atmosphere.

The new building has five stories above grade, plus a mechanical penthouse, with two stories below grade. The design strategy embraces three core concepts – science is a gateway + connections + engagement – that enhance the building's relation to the campus, students, faculty and environment. For the project, Architects Perkins+Will was awarded the 2016 Citation Award for civic design from the American Institute of Architects Washington Council.

Engineering efficient space conditioning

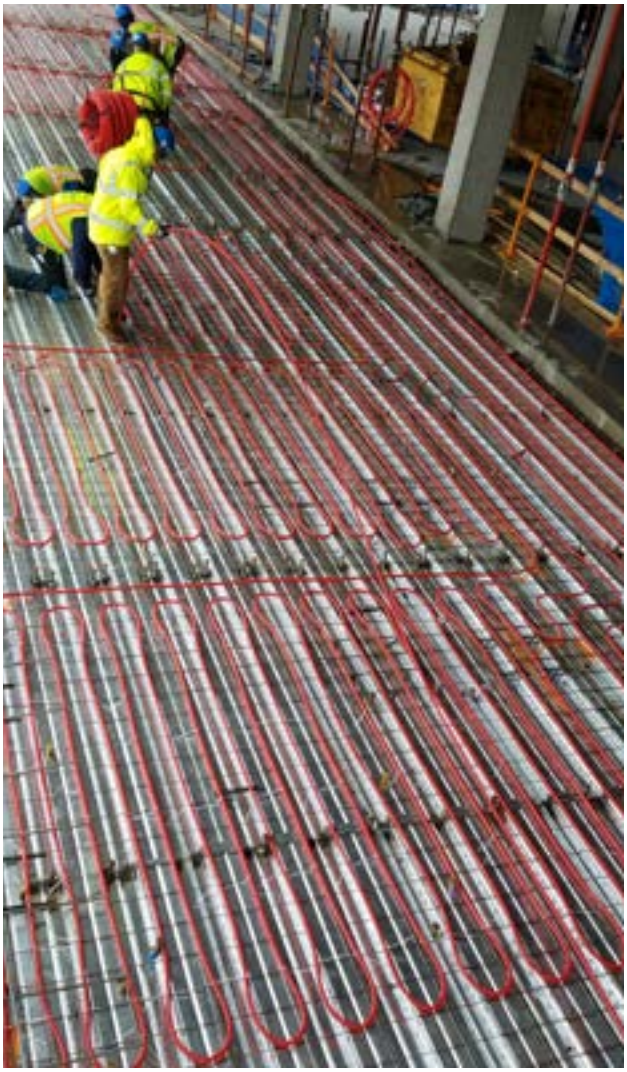
To help the University of Washington achieve greenhouse gas emission goals for the building, Seattle-based engineers Fareez Ismail and Martin de Vrieze at engineering firm Affiliated Engineers specified a variety of energy-efficient technologies for the heating and cooling systems. Included are a chilled beam ("wave") system by Barcol-Air USA, chilled sails, airside run-around (30 percent propylene glycol) heat recovery, natural ventilation and a radiant heating and cooling system by REHAU.

While hydronic radiant technology had not previously been installed on the University of Washington-Seattle campus, the engineers determined it was the best way to obtain the desired capacity for the project.

"Radiant heating and cooling systems are beneficial in terms of comfort, energy efficiency, meeting loads and cost savings," notes de Vrieze. "We try to hit our heating or cooling numbers without using much of the traditional types of overhead air systems that you normally see."

Pairing radiant with natural ventilation

Ismail adds that the firm usually pairs a radiant heating and cooling system with operable windows that facilitate natural ventilation. Hydronic systems such as radiant floor heating are more energy efficient because water is a better conductor of heat than air. Rather than large ductwork taking up valuable space and blowing warm air through floor or wall registers, radiant floor systems gradually warm the floor and objects closest to the floor, typically no warmer than 85 ˚ F (29 ˚ C), providing more even and comfortable heat to the occupied space.



Mechanical contractor McKinstry Co. was hired in a design-assist capacity during the pre-construction phase, as well as to install the system. The Seattle-based firm is known for undertaking large commercial projects with a focus on energy efficiency. It uses radiant-based solutions to address energy-efficiency goals on some of its projects.

Charles McNulty, McKinstry's pre-construction manager, worked with REHAU account manager Donna VanMeter and manufacturer's rep Ian Louthian of Suntoya Corp, to have REHAU radiant systems used on the project. REHAU provided radiant design drawings and the entire team – engineer, contractor and manufacturer – worked on a "constructability review," which allowed McKinstry to ensure that the radiant system fit properly and brought to light any concerns before installation of the radiant system began.

Addressing solar gains and air changes

Because of the high solar gains of floor-to-ceiling windows, the radiant system was installed in the concrete slab on the southern and northwestern sides of the building, primarily for main entrances, lobbies, coffee shops, seating areas, professors' offices and graduate student work areas. The 23,000 ft^2 (2,137 m^2) area covered six levels and used 49,000 ft (14,935 m) of 5/8 in. REHAU RAUPEX O_2 barrier crosslinked polyethylene (PEXa) pipe with 6 in. on center spacing, 146 circuits and 19 PRO-BALANCE manifolds. Overhead, chilled beams and radiant ceiling panels from other manufacturers provide additional hydronic cooling.

Supporting from the ground up

This is the first time McKinstry and Affiliated Engineers used REHAU radiant floor heating and cooling on a project, and they have high praise for the customer support from planning to installation.

"Pricing was competitive, but it came down to the customer service that Suntoya and REHAU provided during the precon stage that made it a 'no-brainer' to use REHAU on the project," said McNulty.

"Their customer service was great; they helped us through challenges, such as reconciling installation methods with the different deck types,"

recalls Matt Allen, project manager for McKinstry.

They even conducted a REHAU installation demo for our pipefitters-turned-radiant-installers. They were very supportive throughout the process and I would definitely recommend using REHAU again – especially now that I have one project under my belt."

Committing to sustainable building

The university is seeking LEED® Gold certification for the building. While no specific energy targets were set, the University of Washington is a signatory of the Carbon Commitment (formerly the American College and University Presidents' Climate Commitment), a network of colleges and universities who are committed to neutralizing their greenhouse gas emissions.

"This project is about comfort, efficiency and being able to implement a natural ventilation scheme with a challenging façade, and we were able to meet these criteria using the REHAU product," de Vrieze says.

"Radiant is more energy efficient over the life cycle of the building," explains Allen. "The benefit of working with large institutional clients is that they have a 50-year or 100-year vision of their buildings, so they recognize the operating expense and advantages of using radiant solutions for heating and cooling. I believe the focus on minimum ventilation, and then doing the heating and cooling through passive hydronic systems has long-term benefits and energy savings. It is better for the environment and your wallet in that sense."

Project: University of Washington Life Sciences Building
Construction Type: New construction, 2018
Project Scope: 49,000 ft (14,935 m) of RAUPEX pipe
Architect: Perkins+Will
Engineering firm: Affiliated Engineers
General contractor: Skanska
Mechanical contractor: McKinstry Co.
REHAU systems used: Radiant heating and cooling (RAUPEX® pipe, compression-sleeve fittings, PRO-BALANCE® manifolds)

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