Wood Harbinger: Health Science and Student Resource (HSSR) Building, North Seattle College

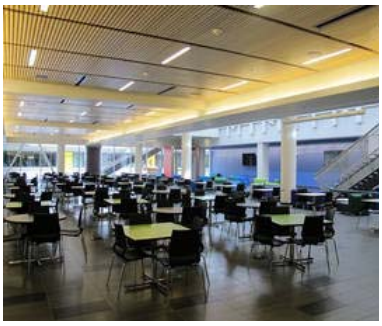
Addition to an educational facility; research facility/laboratory

Wood Harbinger
08/17/2015

Engineering firm: Wood Harbinger
2015 MEP Giants rank: 93
Project: Health Science and Student Resource (HSSR) Building, North Seattle College
Address: Seattle, United States
Building type: Educational facility; Research facility/laboratory
Project type: Addition to existing building
Engineering services: Automation, controls; Fire, life safety; HVAC, mechanical; Energy, sustainability; Plumbing, piping
Project timeline: 6/1/2010 to 4/30/2014
MEP/FP budget: $3,260,000

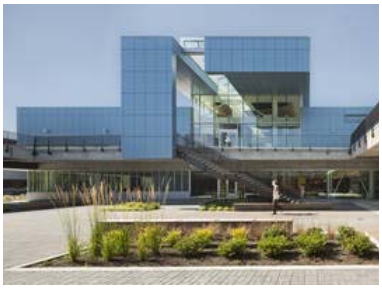
Challenges

North Seattle College's existing Allied Health and Technology Building underwent a major renovation that included a 22,900-sq-ft remodel and 23,100-sq-ft rooftop addition. The resulting 46,000-sq-ft multiuse Health Sciences and Student Resources (HSSR) Building is U.S. Green Building Council LEED Gold-certified and opened for classes in fall 2014. Maintaining the building environment while prioritizing energy efficiency was the primary mechanical challenge of this project and required detailed coordination between different HVAC systems.



The envelope design and diversity of the building's uses led to a variety of conditions in which the mechanical systems would need to operate. These interwoven complexities required comprehensive, upfront system planning and communication
with the project stakeholders to fully understand the nuances of the environment and the mechanical systems coordination to best serve the building's needs. Wood Harbinger also developed a 3-D BIM to ensure that all the systems were fully coordinated so that no surprises would come up in construction. The team's goals were to prioritize energy efficiency, maintain a balanced building environment, and support the building's aesthetic as a holistic, centralized hub by seamlessly integrating systems.

Wood Harbinger's first challenge involved the building's use of many glass walls and windows throughout the envelope as as roll-up doors on the ground floor to be used during the warmer months. While these elements provide ample daylightin help create an open and inviting space, this configuration affects heat losses
and gains throughout the day and depending on the season. These fluctuations must be managed by the mechanical syst to maintain overall comfort in the environment, which the designers addressed through strategic balancing of the systems to work together.



The building uses two distinct and different mechanical systems, operating on different HVAC principles: the existing built-up air-handling unit system was converted to a variable air volume (VAV) system to serve the first floor of the building. Chilled beams and a 100% outside air with heat-recovery system serve the new upper level, with heat-recovery and exhaust-pressurization controls for the specific needs of the cadaver lab spaces. Wood Harbinger's second challenge was to assure these two systems worked together seamlessly.

Through tightly written sequences of operations, strategic balancing of the systems, and carefully coordinated advanced building controls, the VAV and chilled-beam
systems are well-behaved and environmentally controlled, blending together in the background to serve the physical need

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the building without occupants being aware of any environmental difference from floor to floor. This level of coordination supports the holistic feel of the building environment and, true to the vision of the building, presents a seam and integrated user experience.

Solutions

Wood Harbinger participated in early project meetings with the architect and owner to examine ways to integrate the disparate uses of the new building, which includes a student commons area with general classroom spaces on the first floor and a specialty nursing and allied health education facilities on the second floor. Through open communication and collaboration, the team developed a plan for mechanical systems that serve the vision of the building as an integrated, centralized hub, and efficiently and sustainably support the building's functional needs in a seamlessly integrated way.

Detailed initial systems assessments helped optimize and expand the existing facility to serve the college's current and fu needs without starting from scratch. During the initial assessment phase, load calculations determined that with the additio space on the upper level, the campus chilled-water system could be used for cooling during certain times of the year. This solidified the approach for the loading of the campus chillers during peak times, and influenced the decision to provide a dedicated chilled-water system and a cooling tower for building precooling and priority cooling demand; the campus chille water is only used on an as-needed basis.

Analysis of the campus direct digital control system's operation and communication with the existing building led to the decision to provide an advanced control system for the building's chilled-water system. The chilled water system controls work in concert with the campus chilled-water system to coordinate when to provide campus chilled water and when to use the dedicated chilled-water systems and free cooling from the cooling tower.

In addition to the chilled-water coordination, the existing built-up air-handling unit system was converted to a VAV system to serve the first floor of the building. Chilled beams and a 100% outside air with heat-recovery system were used in the new upper level, with heat-recovery and exhaust-pressurization controls for the specific needs of the cadaver lab spaces. Chilled beams are known for their energy efficiency, and the first-floor VAV modifications increased the energy efficiency of the reused existing system without having to completely replace it, saving upfront cost. Together they provide better thermal comfort for building occupants and maintain a balanced environment within the building.

The project successfully achieved LEED Gold certification, earning all possible Innovation in design credits with recognize achievements including a minimum 40% water-use reduction and innovative wastewater technology. Central to these accomplishments is the building's rainwater-harvesting system, which uses three cisterns with a combined 15,000-gal wat storage capacity, to supply water for urinal and water-closet flushing in the building. The rainwater calculation verified that HSSR would never need to use city water for flushing purposes. Additional sustainable design considerations included the of new high-efficiency boilers dedicated to the building, the chilled-beam cooling system used on the building's upper leve the VAV modifications on the ground floor.

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