

Abbotsford Regional Hospital and Cancer Centre

A case study in design



British Columbia's Regional Hospital and Cancer Centre is a 645,000 ft², 300-bed acute care facility designed with innovative technology and facility management best practices.

Photos courtesy of Stantec Consulting and McQuay International

British Columbia's Abbotsford Regional Hospital and Cancer Centre (ARHCC) opened its doors in 2008. Greeted by a four-story atrium that is naturally ventilated by temperature sensors and automated windows, the 645,000 ft², 300-bed acute care facility

features technologically-advanced medical equipment, nine operating rooms, psychiatric care, pediatrics, maternity, inpatient isolation rooms, a radiation cancer treatment centre, support services and more. The facility showcases excellence in HVAC design

and engineering as well as facilities management. From the moment they enter the doors, visitors know they are in a carefully designed building.

Notably, ARHCC marks a number of firsts as it is BC's highest profile public-private partnership (P3), Canada's first P3 hospital, and Canada's first LEED Gold NC (new construction) hospital. ARHCC was planned using a fully integrated design process that involved a high degree of cross-functional collaboration. The owner, architects, engineers and user groups—including 140 physicians and other medical professionals—all provided design input.

Access Health Abbotsford (AHA) is the project company which has the long-term facilities contract with ARHCC. AHA is subsidiary of John Laing Investments and a part of the P3 responsible for the design, construction, financing and maintenance of the facility. According to ARHCC operations director Marcus Akhtar, who works for AHA, operations and maintenance personnel were fully involved in its design and construction process to ensure equipment was selected and installed to allow for safe maintenance and ensure system failure downtime would be minimized, noting, "In this contract, we are incentivized to make sure 100 percent of the facility is available 100 percent of the time. Every room has a value against it and if that room is unavailable, we get a penalty."

Challenging Sustainability Requirements

Paul Marmion, P. Eng, LEED, AP, senior principal at Stantec Consulting in Vancouver, also had a tall order in representing the firm hired by the P3 project architects Musson Cattell Mackey/Silver Thomas Haley for mechanical consulting services on the project. Stantec provided design of the HVAC, plumbing and fire protection systems at ARHCC.

"The facility had to meet defined sustainability standards such as to qualify for the LEED Silver green building rating with at least three energy credits and to obtain Natural Resources Canada's commercial building incentive program, all in a cost-effective manner," recalls Marmion.

Among the project requirements, Marmion says energy targets were the most difficult to meet, explaining, "It was necessary to rethink typical hospital design practice and create cost effective, energy-efficient design solutions. Operation, maintenance and reliability of the HVAC equipment was a major consideration."

Overall, hundreds of possible energy strategies were analyzed on simulation software to achieve the best energy savings and cost effectiveness with a reduced environmental impact.

Innovative HVAC

Ultimately, the chosen design of the HVAC greatly contributed to ARHCC's energy-saving strategy. HVAC design includes two high-efficiency gas-fired hot water boilers and a flue gas heat recovery system. A high-efficiency chilled water generation system, comprised of two McQuay 900-ton centrifugal chillers configured in series counterflow, allows for energy recovery on both chillers at peak efficiency throughout various load ranges.

HVAC at ARHCC also incorporates special air handling units (AHUs), which were custom designed and pre-tested prior to delivery to fit stringent indoor air quality requirements, as well provide make-up air in the mechanical room and heat recovery of exhaust air.

While the primary heating and cooling plant is housed in the ARHCC mechanical room in the lower level, other HVAC equipment was placed on the roof to support tight floor-to-ceiling design constraints, the fast-tracked construction schedule and to allow for easy access. This includes AHUs and HVAC piping for heating, natural gas and chilled water lines. "Placement on the roof was very unusual for a hospital, and attributed to the fast-tracked project because of phasing and the cost impact," Marmion says.

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Facility at a glance

Abbotsford Regional Hospital and Cancer Centre

Location: Abbotsford, B.C.

Size: 645,000 sq. ft.

Owner: Access Health Abbotsford Ltd. (AHA)

Architects: Musson Cattel Mackey Partnership, Vancouver,
with Silver Thomas Hanley of Australia

General Contractor: PCL Constructors Westcoast Inc.

Mechanical Engineering: Stantec Consulting

Mechanical Contractors: Lockerbie & Hole Contracting, Ltd.

Facilities Management: John Laing Investments through
AHA

Distinctions: LEED® Gold NC, 2010 ASHRAE Region XI
Technology Award

Going for the Gold in Energy Savings

While the P3 project aimed for Leadership in Energy and Environmental Design (LEED®) Silver certification from the USGBC, it exceeded that bar to achieve Gold certification. Other sustainable design elements include a high-performance building envelope, the use of an existing pond for storm water control and other "green" building materials.

"The end result of the integrated design process was to produce a hospital which will consume approximately 38 percent less energy as compared to a code-compliant hospital," says Marmion, adding, "All of this translates to 3,120 metric tons of CO2 savings annually and an equivalent energy operating cost savings of \$480,000 per year which can be redirected into providing healthcare."

Akhtar at ARHCC validates the savings, noting, "We come in under the upper utility limit that is specified in our project agreement."

Savings over time are, of course, significant when one considers the 30-year contract.

AHA/Laing Investments oversees ARHCC operations which includes monitoring quality and output relative to key performance indicators and subcontract administration for ARHCC's operations. These operations include subcontractors that provide a gamut of services, including 'help desk' core functions, which is a centralized dispatching and operations center; portering; housekeeping, including linen and laundry; patient and retail foodservice; materials services; plant services; security; and parking management.

Selected contracts at ARHCC such as with Johnson Controls Limited Partnership for plant services are for the long term (30 year) duration while others are "market tested" for shorter durations.

"There is no convenient time to have something not work. What makes a P3 of this complex nature successful is a unified culture that we work hard at. Housekeepers, doctors and mechanics all work together with a mutual respect for each other's role in the facility," Akhtar explains. "It comes down to relationships. The P3 is only as good as the relationship between the public sector and the private partner, in this case John Laing and all its partners." ■