



UNIVERSITY OF BRITISH COLUMBIA WATER PUMP STATION

Buildings



Project Summary

Stantec's multi-disciplinary engineering and architecture team provided the feasibility study, design, construction, programming and commissioning services for a new Water Pump Station to deliver potable and firefighting water supply to the University of British Columbia Vancouver campus. The building systems and hybrid steel and mass timber structure are designed to post-disaster standards, and further resiliency in both the process and the electrical systems ensure continuous operation of the facility.



Project Highlights

Q1 INNOVATION

As the largest and oldest university in British Columbia, the University of British Columbia (UBC) saw a need to renew its existing pump station. The existing pump station was at the end of its life and an increased supply of water was needed to serve the growing campus of nearly 60,000 people.

Stantec's multi-disciplinary engineering and architecture team provided the feasibility study, design, construction, programming and commissioning services for a new pump station to provide stable water supply to the campus for both consumption and firefighting needs. The building systems and hybrid steel and mass timber structure were designed to post-disaster standards, and further resiliency in both the process and the electrical systems ensure continuous operation of the facility. For ease of operations, a crane was situated permanently in the Pump Station's high headroom, allowing for future installation and movement of large components and equipment.

Pump stations are usually housed in simple windowless structures, designed to be robust and cost-effective. In contrast, the UBC Water Pump Station was always intended to highlight the critical infrastructure it contains. Blending in with the context of the University, the pavilion-like building was designed to integrate within the urban fabric of its location on a pedestrian thoroughfare at the heart of the UBC Campus. Extensive glazing was used at the ground level to showcase the engineering systems that provide essential services to the University. The result was a design that transforms a heavy-duty operational building into a visually appealing facility which educates the community on its critical function as part of the campus infrastructure.

With large windows at ground level to reveal the purpose of the building, it was important that the engineering systems looked good in addition to performing well. Stantec's team put a great deal of effort into coordinating and detailing the design in the 3D BIM environment to ensure this was achieved.

Stantec's involvement did not end when the design documentation was completed. Stantec's team was actively involved throughout the construction process, working alongside the contractor's team to resolve issues as they arose. Stantec also completed programming and commissioning of the PLC system which controls the variable speed drives for the pumps and stages them on and off to meet the widely varying flow demands of the campus and the daily variations in supply pressure from Metro Vancouver.

Q2 COMPLEXITY

Site Constraints

The site selected for the pump station was constrained on three sides by existing roads and on the fourth by an existing building. An Integrated Design Process with the entire team working in a common 3D BIM environment was essential to design a facility which could fit within the limited footprint and accommodate the equipment needed with adequate maintenance access.

Flow and Pressure Variation

The system operating demand can increase from 80 l/sec to over 200 l/sec in a matter of seconds, and then return to normal nearly as quickly, due to the diverse range of systems and activities on the campus. The pressure of the Metro Vancouver feed varies between 50 and 100PSI, almost on a daily basis. The Stantec team designed and commissioned a pumping system which could respond to these challenging demands and provide stable and efficient operation.

Structural Engineering

Mass timber glulam beams and columns were used as the main components in the hybrid timber/steel structural system for the building. These are visible through the large areas of glazing. It was important to UBC to use Low Carbon building materials where appropriate for this infrastructure project.

Civil Engineering

The project included the installation of 600mm and 500mm water mains to connect the new pump station to the existing campus water distribution system. Careful consideration of construction phasing was needed to allow the new system to be brought into service and the existing pumps taken off-line without any interruption to the water supply to the campus.



Q3

SOCIAL AND/OR ECONOMIC BENEFITS

Blending in with the context of the University, the pavilion-like building was designed to integrate with the urban fabric of its location on a pedestrian thoroughfare at the heart of the UBC Campus. The chosen site for this facility coordinated with the buried distribution network that it serves, but also occupies a prominent location, at the 'ceremonial' end of University Boulevard past the Nest and northwest of the iconic UBC circular fountain. Extensive glazing was used at the ground level to showcase the engineering systems that provide essential services to the University.

The result was a design that transforms a heavy-duty operational building into a visually appealing facility which educates the community on its critical function as part of the campus infrastructure. UBC have added graphics to the glazing to provide information on the pump system and the campus water distribution.





Q4 ENVIRONMENTAL BENEFITS

The pump station delivers water to the campus with minimal energy consumption through energy efficient pumps and a control system which responds accurately to the varying flow and pressure requirements. Heating for the building uses low carbon electricity from BC Hydro.

Mass timber Douglas Fir glulam beams and columns were used as the main components in the hybrid timber/steel structural system for the building. These are visible through the large areas of glazing. It was important to UBC to use Low Carbon building materials where appropriate for this infrastructure project.





Q5

MEETING CLIENT'S NEEDS

The existing pump station was nearing end of life and was located in the Power House, a building that had become redundant following the completion of the new Academic District Energy System and was at a high risk of failure in a seismic event. The objective for the project was to construct a new pump station in a new standalone post-disaster building.

UBC needed a pump system which could maintain stable distribution line pressure to meet potable water, irrigation and fire flow

requirements for the campus. Beyond the functional requirements, UBC also wanted a building which would integrate with the urban fabric of its location on a pedestrian thoroughfare at the heart of the UBC Campus. The new pump station was to be designed to complement the other recent infrastructure buildings and to help the campus community to understand the critical function that it provides. The resulting building successfully met these goals.

"UBC is very pleased that the Water Pump Station has been designed in such a way that it fits well with our academic campus. The pumps and operating systems have worked extremely well through a number of operating scenarios. Stantec has provided an integrated project team that has covered the Architectural, Mechanical, Civil and Electrical designs areas which have come together well as an integrated project."

**– Doug Doyle, Senior Manager of
Mechanical Utilities, UBC Energy and
Water Services**





Design with
community in mind