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CANADIAN CONSULTING ENGINEERING AWARDS 2014

Bridgepoint Hospital & Administrative Building

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PROJECT SUMMARY

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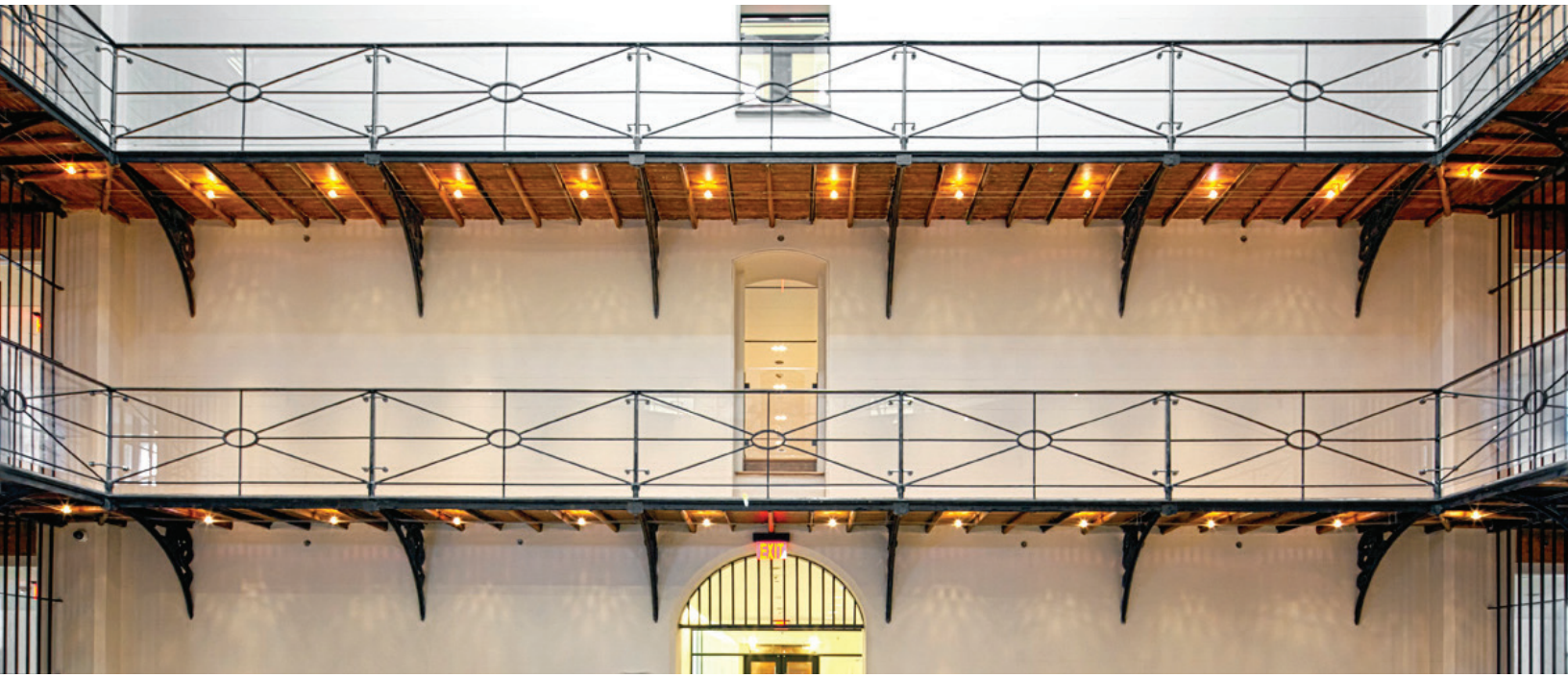

Bridgepoint Hospital integrates patient care, research and teaching into a new state-of-the-art and modern 464 bed rehabilitation hospital and administrative building. Smith + Andersen provided design solutions that met or exceeded the industry standard for healthcare fulfilling the present and future needs of the facility. The design incorporates clinical and operational functionality, reliability, economical operation, and energy efficiency while minimizing environmental impact and maximizing flexibility.

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INNOVATION

The central heating plant includes dual-fired heating water boilers with flue gas heat recovery systems to maximize the efficiency of the plant. The existing flue gas condensing was inefficient while firing boilers on diesel fuel. A robust solution to the flue gas recovery device was applied. Along with the implementation of building automation sequences, these solutions reset the heating water temperatures to prohibit this style of operation while using diesel fuel.

The historic Don Jail buildings floor-to-floor heights dated from a time when perimeter heating was the only mechanical system employed. In order to provide systems in compliance with current HVAC healthcare standards, minimizing the depth of the ductwork distribution was developed where terminal devices were provided at the zone level. This consequently heightened air change rates while only the cooling air required was delivered through the central air handling units.

By providing electrical systems in the penthouse level of the main hospital complex next to the emergency generator plant, Smith + Andersen was able to avoid a mid-level sub-electrical plant. This subsequently allowed for functional floor area for patient amenity space and clinical meeting areas.

The administration building's usable space was also electrically maximized by combining both the new building and the existing Don Jail's large distribution power systems into a common location, while sub-feeding secondary smaller distribution systems in the administration building. This resulted in an increased flexible office space within the old historic building environment. Facility operations personnel have the ability to monitor repair and maintain critical hospital plant systems centrally from a common location.

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COMPLEXITY

The high window-to-wall ratio on the building facade was created to produce a healing environment for the patients. The resulting impact on the mechanical building systems was that far more air circulation was required throughout the building in order to condition perimeter spaces than what would be prescribed by current healthcare standards. Heat recovery solutions on the air handling systems, high efficiency chillers and the aforementioned boiler systems flue gas heat recovery systems were required to recapture waste heat that would normally be released to the outdoors.

Early onset risk assessments involved input from Bridgepoint Health's personnel, the contracting team and design professionals. The team considered the at-risk patient populations and their locations within the building, the type of construction work, and the route of transmission to the patient (air intakes, doors, windows, personnel), while establishing preventative measures and infection control.

The refurbished historic Don Jail building's new lighting installation encountered design challenges of how to illuminate a contemporary, dark, jail environment and enhance the historical features of the old architecture, while remaining under budget.

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SOCIAL AND/OR ECONOMIC BENEFITS

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Smith + Andersen mechanical and electrical hospital system design provides a safe, comfortable, healing and productive indoor environment for patients, staff and visitors of the Bridgepoint Healthcare facility. The system takes full account of the proposed space uses and functions while providing conditions compatible with the operation of the functional program without compromising the operation of other building systems.

The historic Don Jail rotunda functionally is used as a welcoming connection for public visitors entering the site from the neighboring Broadview Avenue and Dundas Street East junction, it serves as a public gathering center for hospital events, public health-related announcements, facility emergency centre and a lecture hall. Featured prominently as the launching point for the Annual Doors Open Toronto campaign, Smith + Andersen's lighting design embraces the fine details of the newly renovated cell corridors, atrium and historic black iron archways along the curved rotunda catwalk support system.

Mechanical and electrical systems complement the facility's patient safety, security, and infection control measures while facilitating healthcare best practices. The systems have been fully coordinated with maintenance programs and the operation of other building systems.

To enhance indoor air quality, Heating, Ventilation, and Air Conditioning (HVAC) systems filter and clean recirculated and/or outdoor air with high efficiency rigid media filters to meet or exceed CSA Z317.2 and LEED® requirements. The HVAC systems are designed to maintain appropriate pressure relationships to mitigate the transmission of infection

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ENVIRONMENTAL BENEFITS

The new hospital is designed to be sustainable, and will be certified under the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System. Some of the features include:

- Approximately 30% less energy consumption compared to standard hospital designs;
- Reduction in the number of vehicles traveling to the site through alternative transportation methods for staff and visitors;
- A projected 30% reduction of potable water through the use of water-efficient plumbing fixtures;
- Storm-water run-off from the roof is collected and used for irrigation;
- Building and site lighting are designed to minimize light pollution;
- Building systems and operations are free of CFC-based and HCFC-based products;
- Enhanced building commissioning practices to ensure the building is constructed and operated as designed;
- Detailed planning to accommodate and encourage the use of regional and recycled materials;
- At least 75% of construction waste is diverted from landfills through recycling or reusing construction materials;
- Use of materials that emit low amounts of volatile organic compounds (VOCs);
- A strategy to ensure that the new hospital attains a high level of indoor air quality, including the adoption of voluntary industry guidelines, frequent changes of filtration media and the testing of air contaminants prior to building occupancy;
- A system to monitor and provide rapid feedback to the building operator for temperature, airflow and humidity levels throughout the facility providing maximum comfort to the staff, patients and visitors; and
- A high window-to-wall ratio was provided throughout the facility offering patrons natural light.

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MEETING CLIENT'S NEEDS

In addition to the environmental impact of the building, Bridgepoint Health identified several over-arching principles to be employed as the framework for the design of the new facility. Each is identified below with a short description of the mechanical and electrical systems contribution to each.

Clinical and Operational Functionality

Mechanical and electrical systems complement the facility's patient safety, security, and infection control measures while facilitating healthcare best practices. The systems are coordinated with maintenance programs and the operation of other building systems.

Reliability

The mechanical and electrical systems were designed with the standby capacity and redundancy measures specified in Project Specific Output Specification and as prescribed by current healthcare codes and standards.

Economical Operation

Life cycle cost analysis is critical in the determination of the most appropriate mechanical and electrical system design. Developed in conjunction with the contracting team and facility operator, the building design was completed with full consideration of the capital, operation, maintenance, and replacement costs.

Maintainability and Serviceability

Mechanical and electrical systems are centralized away from patient care areas in secured and dedicated rooms providing a modular approach for ease of maintenance and repair without disruption to patients and staff. With the exception of some specialized exhaust fans and cooling towers, all systems are located indoors for improved serviceability.

Flexibility

The mechanical and electrical design offers an adaptable solution that accommodates future increases in load and anticipates the demands of future expansion including department renovations, shelled spaces internal expansion, soft space internal expansion and incremental building expansion.