



CANADIAN CONSULTING ENGINEERING AWARDS 2015

Meridian Centre

project category:
BUILDINGS

Project Information

Project name: Meridian Centre

Location of project: 55 McGuire St, St Catharines, ON

Category: Buildings

ENTERING FIRMS

Firm name: WSP Canada Inc.

Firm address: 600 Cochrane Drive, 5th Floor, Markham, ON L3R 5K3

Role in the project: Prime consultant

Member of the Association of Consulting Engineering Companies of Canada? : Yes

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Project Outline

The St Catharines Meridian Centre is a flexible configuration, multi-purpose spectator facility providing 5,200 seats for hockey and up to 6,500 seats for end stage concerts. This state-of-the-art facility is a key component of a multi-project, multi-faceted strategy to re-energize the downtown area. The two pedestrian bridges connecting the brownfield site, where the well and canal once ran to the downtown area, symbolize a link to the city's heritage.

INNOVATION

WSP provided structural, mechanical and electrical engineering services as part of the winning design-build team for the recently opened \$50 million Meridian Centre in St Catharines, Ontario.

The structural engineering technical challenges arose largely as a result of poor site geotechnical conditions created by deep unconsolidated soil filling at the original well and canal. A number of foundation alternatives were considered, including soil improvement strategies. However, to provide cost and schedule certainty, a driven steel pile solution was selected. The need for time consuming field splices was eliminated by driving 100-foot length piles to competent bearing. Further savings in time and cost were realized by integrating the pile cap into the framed ground floor structural system. A variety of framing systems, including super joists and two-way trusses were considered for the long span roof; however, the most cost-effective response to the desired curved architectural form of the spectator facility roof was ultimately determined to be one-way trusses with purlins.

The objectives for the mechanical engineering design were energy efficiency, optimum thermal comfort and indoor air quality, system simplicity and reliability, and minimizing life-cycle cost, all while respecting the constrained construction budget. The energy modelling projection of a 32.4% energy savings and a 26.1% energy cost savings, as compared to OBC 2006 (ASHRAE 90.1-2004) is achieved through a variety of strategies. This includes the use of a hybrid central and decentralized standalone packaged heating and cooling system, together with recovery of the rejected heat from the Ice Plant Refrigeration Equipment used with the snow melt pit heating system, the domestic hot water pre-heat, the heat below the ice rink slab, as well as the building heating water loop. For energy conservation, sensors monitor the contaminant gas levels and control/modulate the volume of outdoor air delivered to the various areas of the building in order to maintain acceptable levels. Water use efficiency is achieved through low flow plumbing fixtures with electronic hands-free auto-flush/auto on-off in change rooms and public washrooms to conserve domestic water and reduce the grey/black water volume.

The drivers of the electrical engineering design were energy efficiency, flexibility and scalability. Energy efficient lighting with automatic control is utilized throughout the facility and for site lighting. The event lighting is designed to provide the horizontal and vertical illumination levels required for professional hockey video broadcasting, as well as the programmable flexibility for the facility to be used for gaming, gymnastic, recreation, theatre, and concert events. A two-stage state-of-the-art addressable fire alarm system was provided. The structured cabling system utilizes fiber optics cable as the backbone, high speed horizontal category 6A cables to voice/data outlets, and access points for wireless and Wi-Fi data transmission. IP based surveillance cameras are strategically located to optimize interior and exterior surveillance coverage.



COMPLEXITY

The challenge of the new Meridian Centre was not so much in the level of complexity of the design and construction, although there were some unique and challenging project issues in trying to achieve the desired program within the budget imperative. The facility itself, while cutting-edge, utilizes standard engineering systems across disciplines. To be sure, the poor site geotechnical conditions required thoughtful consideration in developing a cost-effective foundation solution for the building, and the framing for the long span roof required rigorous investigation of alternatives.

Achievement of energy efficiency, simplicity, technical requirements, flexibility and durability of the mechanical and electrical systems required knowledge of best practice in spectator facility building systems. A range of alternatives was investigated to inform selection of the energy efficient mechanical and electrical systems utilized to achieve a building performance which exceeds the requirements of the National Energy Code.

We submit that the most significant project complexity arose from the need for the design and construction team to actively and collaboratively seek solutions across disciplines to maximize project benefit while controlling cost. The fixed maximum cost and ambitious programme required ongoing value-engineering and collaboration between all of the stakeholders to achieve the resulting acclaimed Facility within the project imperatives. It is this disciplined integrative design approach incorporating tried and tested engineering systems successfully knitted together to create a state-of-the-art dynamic spectator facility which distinguishes the Meridian Centre project.



Photo courtesy of Vaughan Ridley

SOCIAL AND/OR ECONOMIC BENEFITS

The new Meridian Centre is both a much needed replacement for the existing outdated arena, and a key component of a \$150 million investment by the City of St. Catharines to re-energize the downtown area. Together with the new Performing Arts Centre and School of Performing Arts, the new spectator facility is expected to serve as a catalyst in the development of a new sport and cultural district by significantly increasing the volume of people in the downtown area, particularly on evenings and weekends.

This increased pedestrian traffic will provide crucial economic stability to support the vigorous and varied compliment of restaurants and shops necessary to realize the aspiration of a dynamic and engaging people-focused and friendly revitalized downtown area. The new spectator facility itself is essential to provide the City of St. Catharines with a venue both large enough to support a financially viable Ontario Hockey League (OHL) team, and with the capacity and flexibility necessary to host concerts and other special events.

The new Meridian Centre is respectful in design to the historic core district, while at the same time providing a dramatic anchor to the City on a high visibility but formerly neglected brownfield site in immediate proximity to the downtown area. The excitement and activity generated from the first few events at the recently opened Meridian Centre offer strong assurance of achievement of the goals of the thoughtful and ambitious downtown revitalization strategy undertaken by the City of St. Catharines.

ENVIRONMENTAL BENEFITS

The environmental benefits of the project began with the thoughtful and conscious selection by the City of St Catharines of a brownfield site, where the well and canal once ran, as the location for the new Meridian Centre. While the poor geotechnical conditions presented challenges in developing a cost-effective foundation solution for the building and the methane gas seepage required consideration, the location adjacent to the historic St Paul Street provided the opportunity to create maximum impact on the downtown area. The new facility addresses environmental issues of a highly visible but underutilized site.

The two pedestrian bridges linking St Paul Street with the new spectator facility was an ingenious and resourceful solution to avoiding construction of significant parking lots on site. The bridges are near existing City-owned parking garages. The bridges also help facilitate significant volumes of people moving through the downtown area on their way to and from events at the Meridian Centre without motor vehicle congestion.

While LEED certification for the project was not sought, implementation of sustainable strategies within the context of cost-effectiveness was a focus of the design-build team. Energy efficient mechanical and electrical systems were utilized to achieve building performance which exceeds the requirements of the National Energy Code.



Photo courtesy of Vaughan Ridley



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MEETING CLIENT'S NEEDS

The new Meridian Centre is a key component of a multi-project, multi-faceted strategy to re-energize the downtown area of St Catharines. The objective was to utilize a high visibility brownfield site in the valley below the historic core to create a dramatic addition to the city's urban fabric which would have maximum impact in generating significant additional downtown pedestrian activity. This objective was challenging by the original lack of direct convenient connection from the downtown to the site. However, the two pedestrian bridges which link the new Meridian Centre to St Paul Street act as both critical physical links to the downtown area and as symbols to the prospect of a re-vitalized historic core.

The design-build team's mandate was to design and construct a new state-of-the-art spectator facility with the features and amenities typical of a much larger arena within a constrained and firm budget. The structural, mechanical and electrical engineering systems reflect best practice design for spectator facilities, informed by the site and facility program, within the context of the cost imperative. Achievement of a spectator facility with the provided number of seats, the configuration flexibility, the amenities and the technical features within the fixed maximum budget of \$50 million required focus, determination, ingenuity and collaboration from the design and construction team.

While the lessons learned highlighted opportunities for improvement in the team's integrated design process on future projects, all agree that the commitment to open and inclusive communication was imperative to the success of the realization of the acclaimed new Meridian Centre.



ANNEX 1

CONSENT FORM

ANNEX 2

OFFICIAL RECEIPT - ONLINE ENTRY FORM



Photo courtesy of Vaughan Ridley

