PAUL REYNOLDS COMMUNITY CENTRE

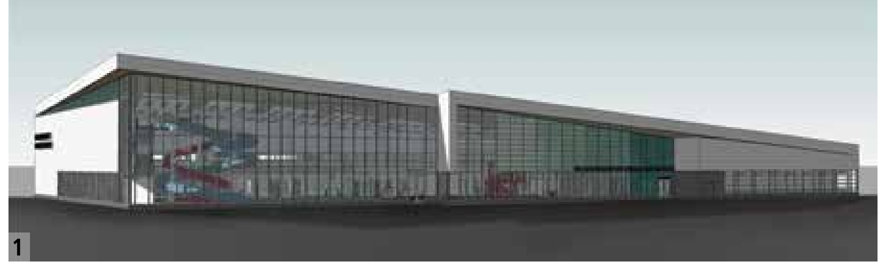
St John´s, NL

Background

Before amalgamating with the City of St. John's in 1992, Wedgewood Park was its own town and had the Wedgewood Park Recreation Centre built in 1972. The former Centre held a pool, gymnasium and the town administration offices, but had outgrown the City's needs. "The City of St. John's Recreation and Parks Master Plan 2008-2018" identified the need for a new facility, and the City consulted with the local residents about the facilities and programs the new Centre should have, and the user experience it should deliver. The new $30-million Centre was named after Paul Reynolds, who was mayor of the Town of Wedgewood Park before amalgamation. Reynolds also served on St. John's Council and was a lifelong advocate for his local community, recreation and active living.

"The City wanted a well functioning facility that people would take pride in, and enjoy using," said Gordon Tucker, Manager of Capital Works Buildings, City of St. John's. To this end, "the architects recommended Cross-Laminated Timber [CLT] be used for most of the roof".

Manufacturers' experience to date has shown that when effectively designed, a CLT roof system can be cost competitive with other materials when comparing completed systems, partly because the rapid installation time for the product supports the streamlining of the construction schedule.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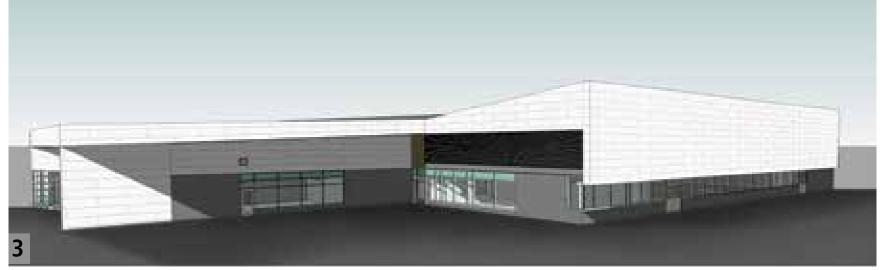
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1 - North perspective
2 - East perspective
3 - West perspective
4 - South perspective

The front [north] elevation with large glazed curtain walls. [Photo: Crockwell Photography].

The Project

The Paul Reynolds Community Centre in St. John's, Newfoundland and Labrador, is no ordinary recreation centre for the region. Featuring a six-lane lap pool, leisure pool, water slides, 622 sq. m [6,700-square feet] gymnasium, a daycare and seniors' area - each 140 sq. m [1,500-square feet], an outdoor playground and other multi-use spaces.

Fougere Menchenton Architecture [FMA] in St. John's collaborated with CEI Architecture [now HDR/CEI Architecture in Vancouver, Victoria and Calgary] to design the Centre with extensive public engagement, and with the intent of achieving a Green Globes environmental rating. Both the placement and massing of the new design is sensitive to its location adjacent to an older residential community, as described in the Architecture section.

PROJECT CREDITS

CLIENT City of St. John's
ARCHITECTURAL DESIGN AND RECREATION SPECIALISTS CEI Architecture [now HDR/CEI Architecture]
PRIME CONSULTANTS/ARCHITECTS Fougere Menchenton Architecture Inc.
MECHANICAL AND ELECTRICAL ENGINEERING Rowsell Appleby Newton Engineering Inc.
STRUCTURAL ENGINEERING DBA Consulting Engineers Ltd.
CIVIL ENGINEERING Kavanagh Associates
AQUATIC PLANNING Water Technology Inc. [WTI]
BUILDING CONTRACTOR EllisDon Corporation
PHOTOS DBA Consulting Engineers Ltd., EllisDon and Crockwell Photography

The community centre contains a lap pool, leisure pool, water slides, a gym and other multi-use spaces, all designed to give citizens a sense of pride and enjoyment. [Photos: Crockwell Photography].

Architecture

Wedgewood Park, where the building is located, is adjacent to an older residential community. Both the placement and massing of the new design is sensitive to the existing context.

The project's main design parameters were carefully considered in achieving the final result. They include staying true to the ideas generated in design charettes, being sympathetic to the quiet, low-rise suburban neighbourhood around the site, creating an exciting building that uplifts the community and interacts with the landscape, and orienting the building away from sun and wind and toward views.

The roof is a strong element both on the outside and inside. It slopes down towards the residential neighbourhood mediating the building's size, but also giving it an important public presence at the entrance. A new entrance to the site has been developed to minimize traffic through the existing residential neighbourhood.

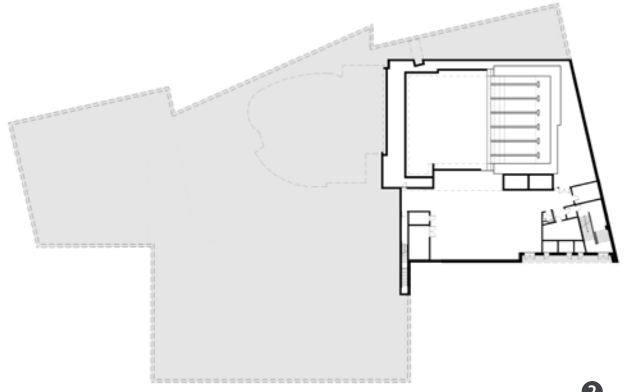
The building owner, the City of St. John's, was interested in using innovative and sustainable construction methods. Its goals, combined with the short construction season and volatile weather, made using cross-laminated timber [CLT] an easy choice for much of the roof.

The project team at CEI Architecture [now HDR/CEI Architecture] and Fougere Menchenton Architecture Inc. used the Revit 3-dimensional building information modelling software to create the construction documents, and to design the roof structure which does not slope simply in one direction. Modelling the building in this manner helped the team to visualize the space, to resolve some intricate connection details, and to communicate the design intent to the Client and the Consultant Team.

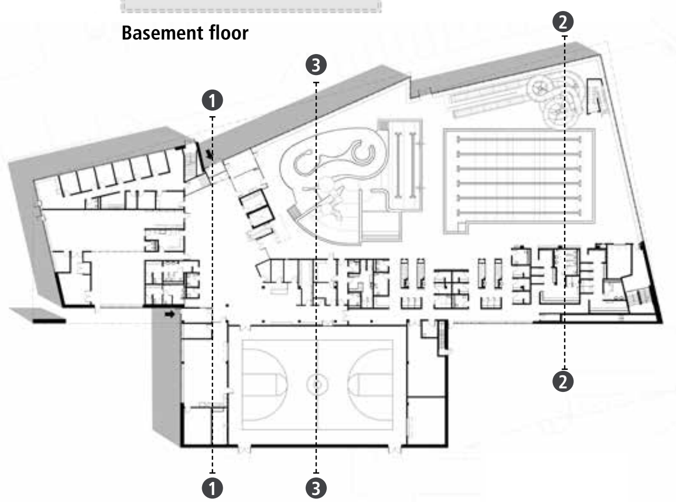
The modelling software was also instrumental in testing out design ideas. When used with physical paper models, it allowed the architectural team to look at every design detail in three dimension, to review how solar glare can be controlled in the pool area and the gym, and to calculate water surface areas and volumes for bather loads effortlessly.

The Centre incorporates a geothermal heat source combined with a high-efficiency heat recovery system. The unique design, which incorporates green space, modern materials and cutting edge structural engineering, results in an extremely efficient system that will save money in operating costs and reduce the City's energy consumption.

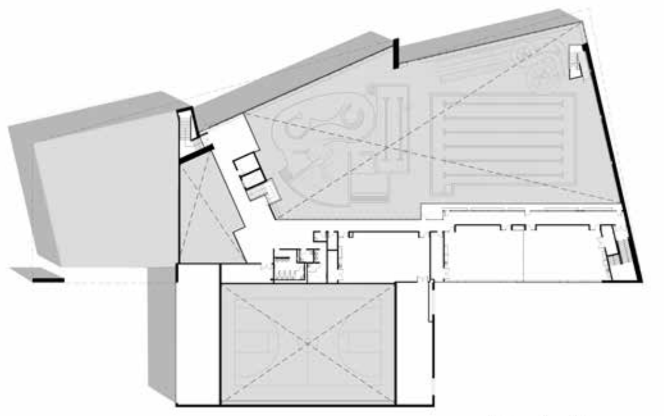
Made of cross-laminated timber, the roof is a strong element both inside, in the gym and pool areas, and outside, where it slopes down to mediate the building's size. [Photos: Crockwell Photography [top], and DBA Consulting Engineers [bottom].



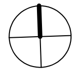
Basement floor



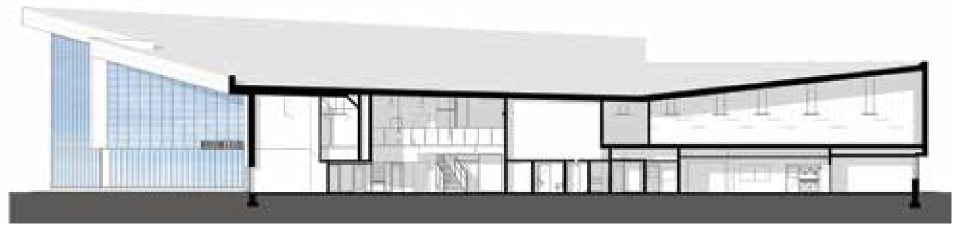
Main floor



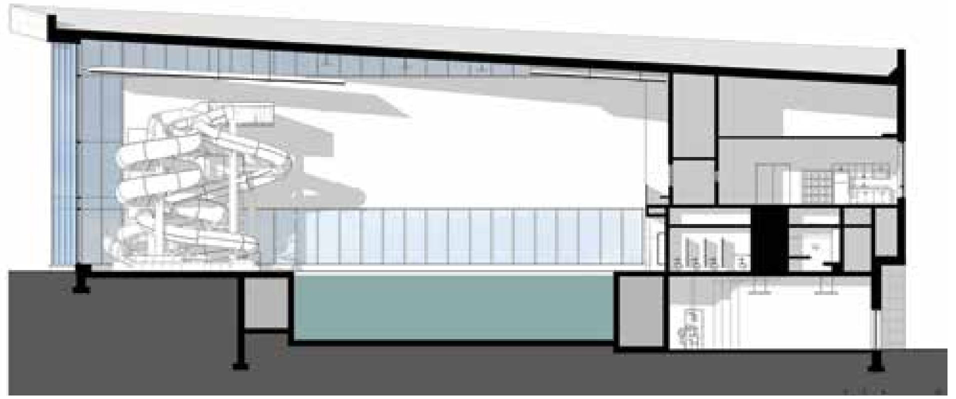
Second floor



Floor plans



Section 1: East-West through lobby



Section 2: North-South through natatorium

Section 3: East-West through natatorium

Structure

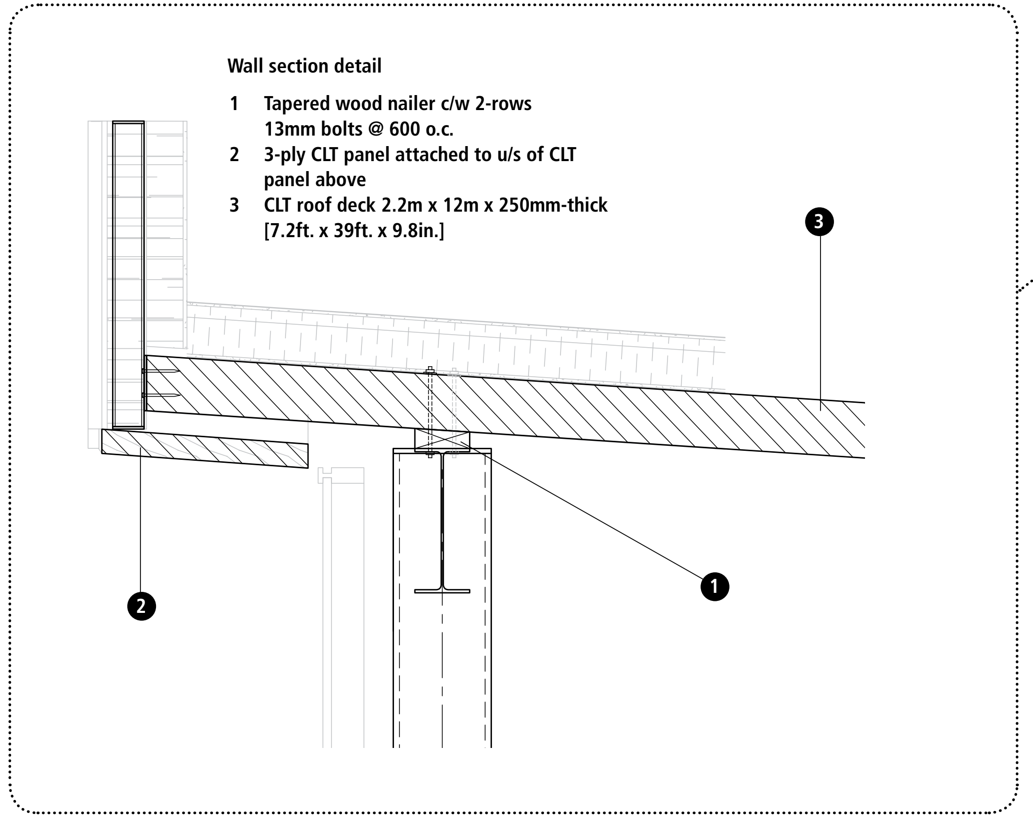
The structure is a hybrid system of steel and concrete with cross-laminated timber [CLT] for the roof deck, mainly for the largest areas of the gymnasium and pool. The cast-in-place concrete components consist of the foundation system, concrete columns and concrete mezzanine. DBA Consulting Engineers Ltd. was responsible for structural design of the building including the foundation system, concrete pool supporting structure, concrete mezzanines and the roof structure.

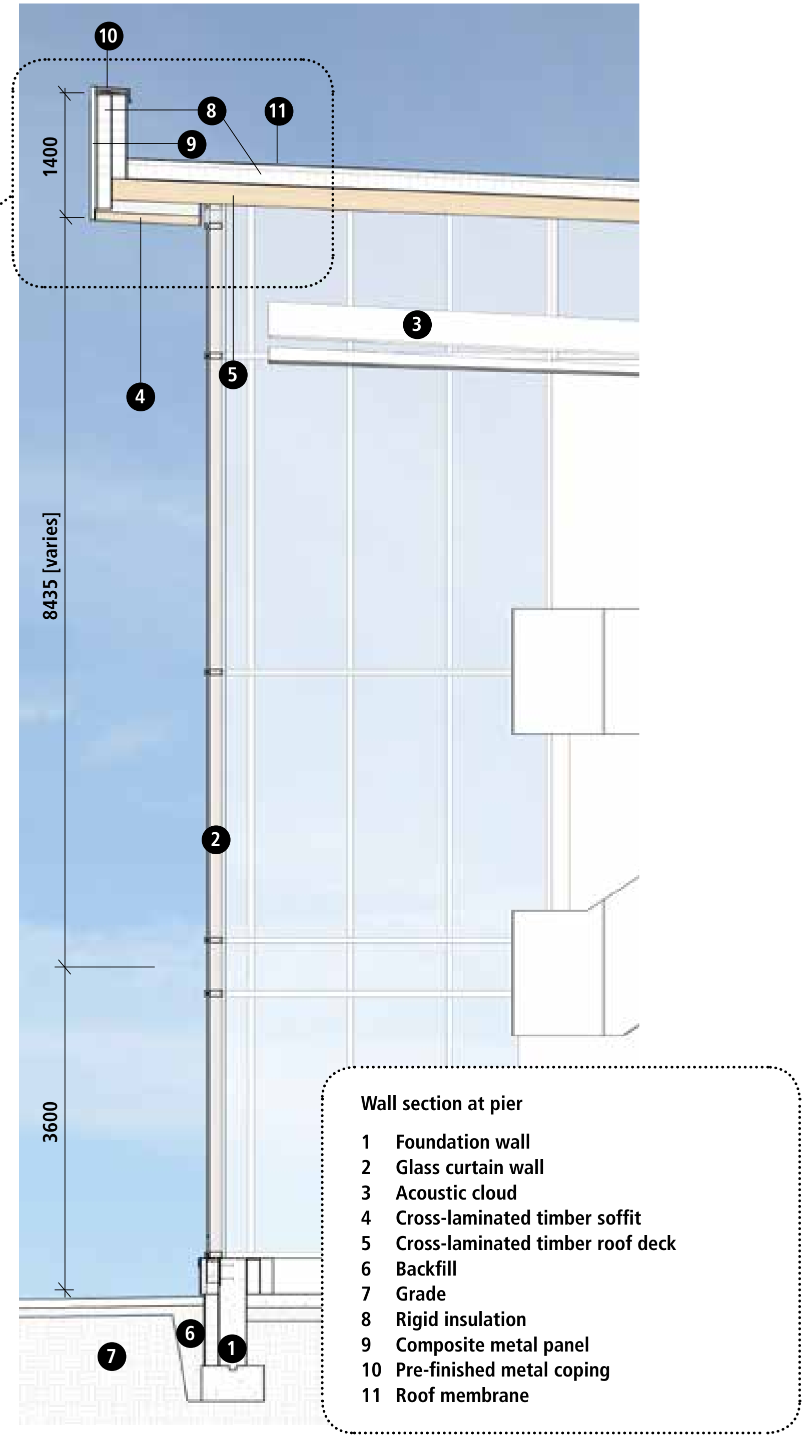
The CLT roof deck is made up of 200 panels approximately 2.2m x 12m x 250mm-thick [9.8ft. x 39ft. x 9.8in.], and supported by deep structural steel girders that span the pool space, the main lobby, and the gymnasium. Clean and simple roof slopes presented a unique design which DBA resolved by creating a 3D structural model of the entire building structure for analysis and design.

The steel frame was designed based on the Climatic Data for St. John's including allowance for the weight of the CLT panels and other dead loads carried by the roof structure. The CLT subcontractor, Ontario-based Timber Systems Limited, confirmed the specified design parameters were met by the CLT product during the shop drawing phase. The panels were fabricated off site to specific dimensions and shipped directly to the construction site for speedy installation.

"Steel to CLT connections were coordinated between the architects and structural engineers and noted on the Tender documents. Connections were detailed to maintain the architectural aesthetics of the building," notes Art Singleton of DBA Consulting Engineers.

The CLT panels during installation. [Photo: EllisDon Corporation] Detail at the roof eave. The lap pool during construction. The CLT roof deck fully installed on the steel frame. [Photos: DBA Consulting Engineers].





Construction

"Being on an island makes it a challenge to have materials arrive on site by barge or ferry at the right time," says Jeff Hopkins, project manager at EllisDon, the building contractor. A uniquely designed building, with the large, sloping roof incorporating CLT, a 10m to 12m-high [32.8 to 39.3 feet] glass curtain wall that essentially extends from floor to ceiling, and a steel and cast-in-place concrete structure, the project required close coordination and attention to logistics details.

EllisDon worked very closely with Timber Systems Ltd. [TSL] in Ontario to acquire, design fabrication, supply and install the CLT roof and CLT soffit system. The panels were carefully modelled by Timber Systems to accommodate the roof geometry.

The CLT panels were shipped in standard Sea-Cans. TSL inspected each panel for damage prior to installation. The method of organization and on-site storage was very deliberate, as the panels were sorted and stacked in the reverse order that they would be needed such that the installation of the roof was fast and efficient.

Use of wood

The design team recommended CLT for both technical and aesthetic reasons. CLT is produced with three to seven layers of softwood lumber or planks stacked one on the other at right angles, and either glued together in a hydraulic or vacuum press or nailed together. Panel thickness is usually in the range of 50 mm to 300 mm [2 in. To 12 in.] but panels as thick as 500 mm [19.6 in.] can be produced.

Panel size ranges from 1.2 to 3m [3.9 ft to 9.8 ft] in width and 5 to 15m [16.4 ft to 49.2 ft] in length. Openings within panels for windows, doors, stairs and services can be pre-cut in the factory, or cut on site. The resulting product is loadbearing, stable and can act as a diaphragm or shearwall, making it well suited to floors, walls and roofs used in mid-rise construction.

According to Ron Fougere, principal of Fougere Menchenton Architecture [FMA], "the exposed CLT lends an overall warmth to the interior of the building, and in the pool area has lower maintenance compared to that of painted steel from the effects of high humidity and pool chemicals. We also find that wood can perform better thermally to help minimize thermal bridging and the potential for condensation in a built-up roof assembly, and acoustically it can reduce sound reverberation which is important in large open spaces such as a gym and pool."

Building Code Analysis

The building is an Assembly A-3 occupancy [Arena Type]. A heavy timber roof is permitted in a one- or two-storey A-3 building, if sprinklered, as is the case here [NBCC 2010 3.2.2.16]. The construction overall is non-combustible. The occupancy load is 1,947 people, which requires 13 doors for egress. A number of 1-hour fire separations were required to compartmentalize the building such as around egress stairs and service rooms.

Acoustics performance was achieved using sound batt insulation in standard steel stud wall cavities. In some special instances, a double wall with airspace was used to provide additional sound insulation. The CLT roof deck has inherent sound properties meaning the large open spaces of the gymnasium and pool will have less echo compared with what may be the case with a steel deck.

The roof provides a warm aesthetic, resistance to high humidity conditions, and superior acoustic performance to reduce sound reverberation. [Photo: Crockwell Photography].

On site the CLT panels were organized and stored in the order in which they would be needed for fast installation. [Photo: EllisDon Corporation].

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