# Meadows Community Recreation Centre and Library

Canadian Wood Council
Conseil canadien du bois

WOODWORKS!
Program of the Canadian Wood Council

Cover Photo: Entrance plaza

Photo Above: Library

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# Introduction

Located in a fast-growing area of south-east Edmonton, the new Meadows Community Recreation Centre, and associated Meadows Branch Edmonton Public Library, provides year-round recreational and cultural opportunities for the surrounding neighbourhoods.

Design began in February 2010 and the facility was opened to the public in November 2014. Planning focused on creating relationships between indoor and outdoor programs. Transparency between indoors and outdoors maximizes natural light and materials to create a warm and inviting atmosphere.

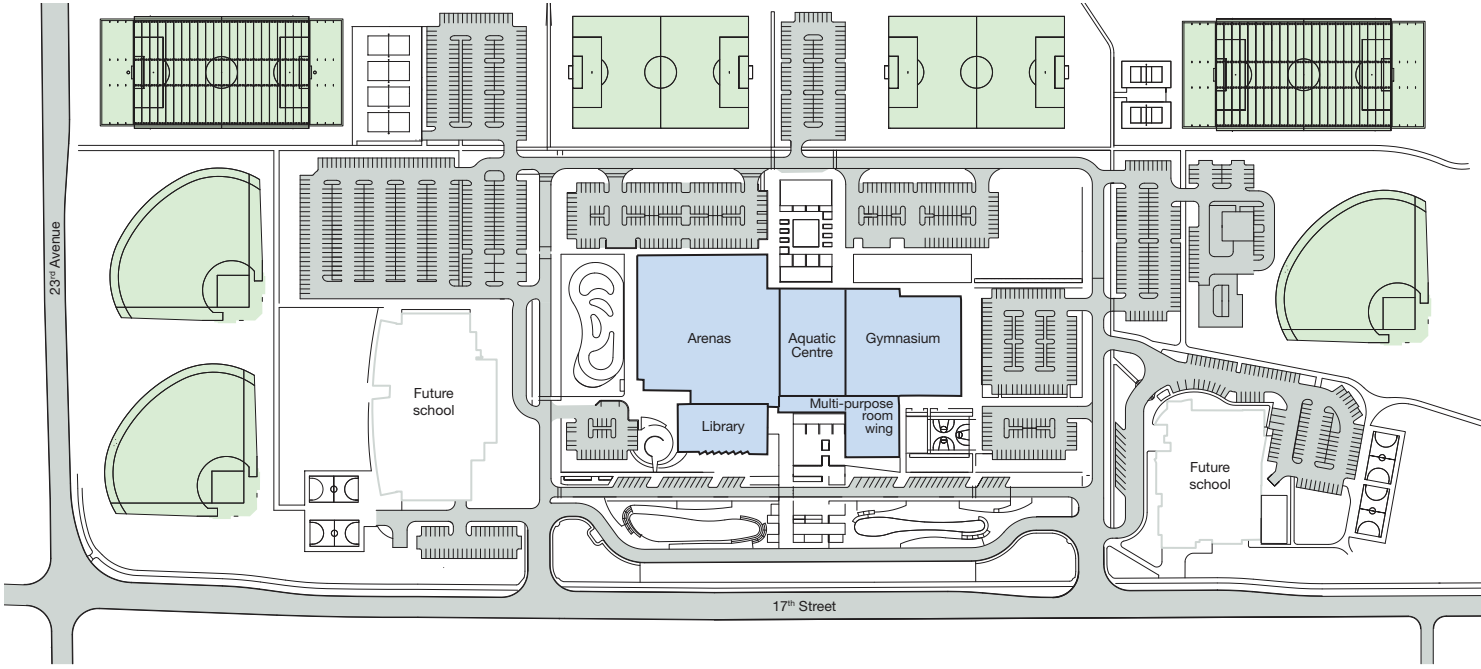
Wood is used throughout as both a structural and finish material. Because wood is a renewable resource with low embodied energy, its use supports the project's sustainability goals. Different kinds of wood are used for different purposes, from glulam roof beams to maple slat finishing for the walls. Using wood allows the structure of the building to be expressed and celebrated. The programs and activities are united by the undulating roof. The warmth of the wood and its rich colour and texture provide a welcoming ambiance.

In keeping with Province of Alberta's legislation for public buildings, the Centre is seeking LEED Silver certification. The use of locally-sourced glulam and other wood products contribute to meeting this sustainable design standard.

# The Facility

The Meadows Community Recreation Centre and Library is located on a site (**Figure 1**) surrounded by sport fields, ball diamonds, a water-spray play area, multi-use trails, a transit loop, a leisure ice skating surface, a multi-use court with basketball, vehicle and bicycle parking (1,087 parking stalls), and development areas for future schools.

**FIGURE 1** Site Plan

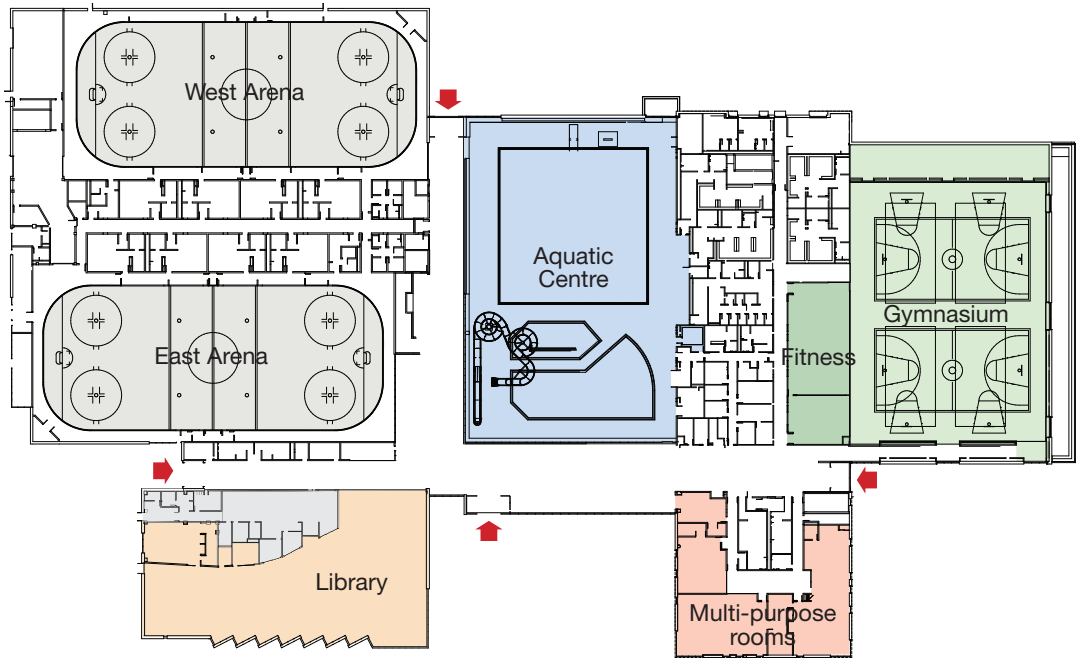


The building (**Figure 2**) has an area of 21,790 $m^2$ (234,419 $ft.^2$) and houses:

- An aquatic centre with leisure pool, 25-metre 10-lane pool, 1-, 3- and 5-metre diving platforms, waterslide, whirl pool, steam room, spectator seating and change rooms.
- A fitness centre with cardio area, fitness studios and a walking/jogging track.
- A gymnasium with an 11-metre high ceiling, spectator seating, locker alcove and divider curtain.
- Multi-purpose rooms with indoor playground, child minding area, party rooms, program rooms, and community rooms.
- An administration area.
- Two NHL-sized indoor rinks with spectator seating and change rooms.

The Meadows Branch Library, integrated into the Meadows Community Recreation Centre, is approximately 1,395 $m^2$ (15,000 $ft.^2$) and features an outdoor reading garden. Other library highlights include: public computer stations; a community program room; a study room; children's, teen's and adult's reading areas; a freshwater aquarium and fireplace; and express checkout stations.

**FIGURE 2** Floor plan



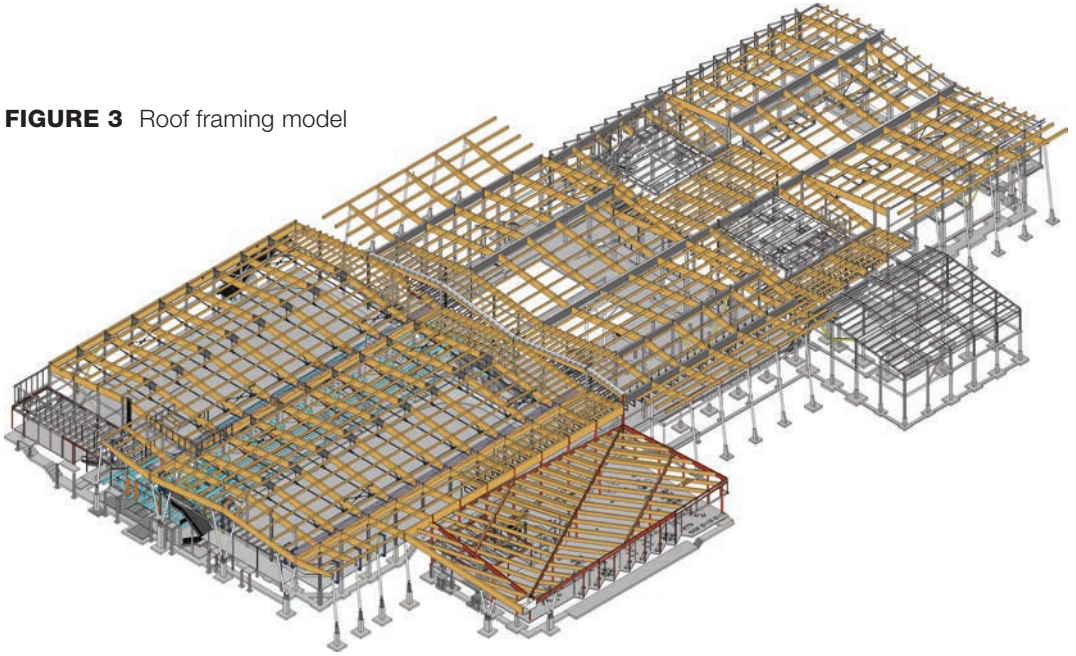

Library

# Structural Wood Use

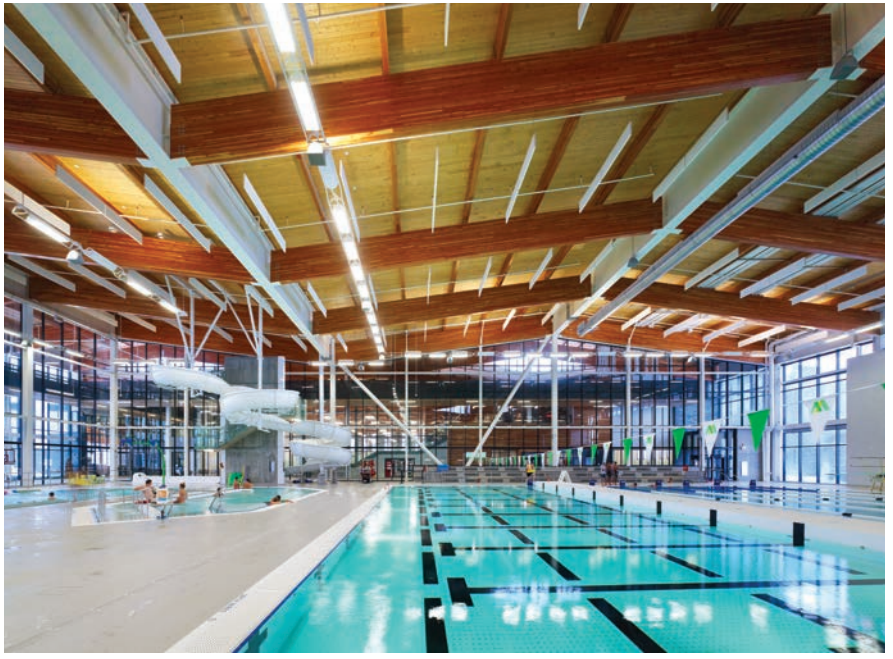
The use of wood for the roof structure was proposed by the architects and accepted by the City of Edmonton, which had had positive results from using wood in other primary recreational facilities including the Queen Elizabeth Outdoor Pool and the Valley Zoo Pinniped Exhibit. The cost implications of using wood were reviewed by a local cost consultant and were found to be reasonable and within budget.

Wood was used for the roof in all locations except the multi-purpose areas, where the underside of the roof is concealed (**Figures 3, 4 and 5**). The design team had extensive experience using wood and knew that it performs well in public buildings, and gives visitors an immediate connection with the indoor environment.

**FIGURE 3** Roof framing model



West entrance



Aquatic Centre

The roof system is comprised of:

- a 2-ply modified bituminous membrane;
- 6 mm protection board;
- 152 mm polyisocyanurate insulation;
- a continuous air/vapour barrier membrane;
- 19 mm plywood sheathing;
- Spruce-Pine-Fir (SPF) select grade 64 x 130 mm double tongue and groove wood roof decking (Forest Stewardship Council (FSC) certified); and
- Douglas fir glulam wood purlins and beams supported by steel girders and steel columns.

The roof system provides R-40 insulation.

The glulam beams in the aquatic centre are typically 310 x 1555 mm and are 19.7 m long. The purlins are typically 175 x 529 mm and are 7.5 m long.

Composite glulam/steel trusses are used for the arena roofs. The glulam top chords are typically 355 x 1327 mm and 25.6-m long. The glulam purlins are typically 265 x 415 mm and 7.2-m long. The tension members are Macalloy rods, cross-bracing, struts and turnbuckles.

**FIGURE 4** Section through aquatic centre

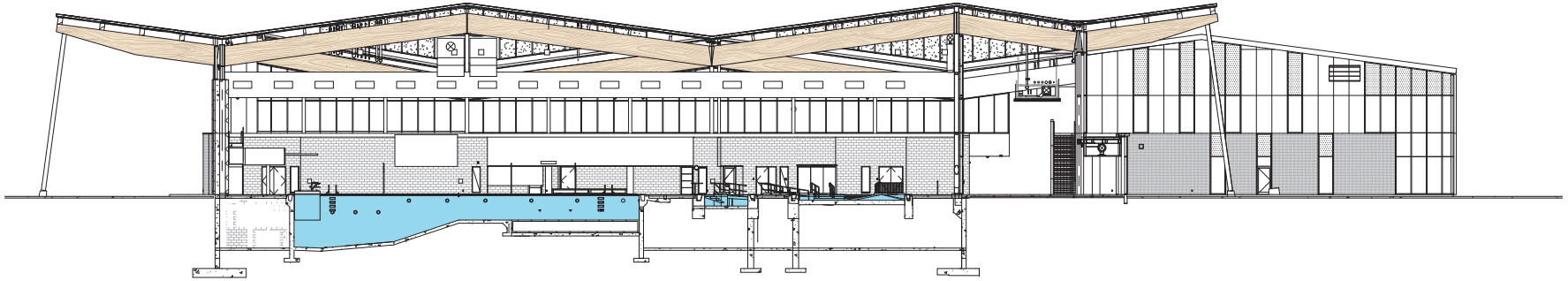
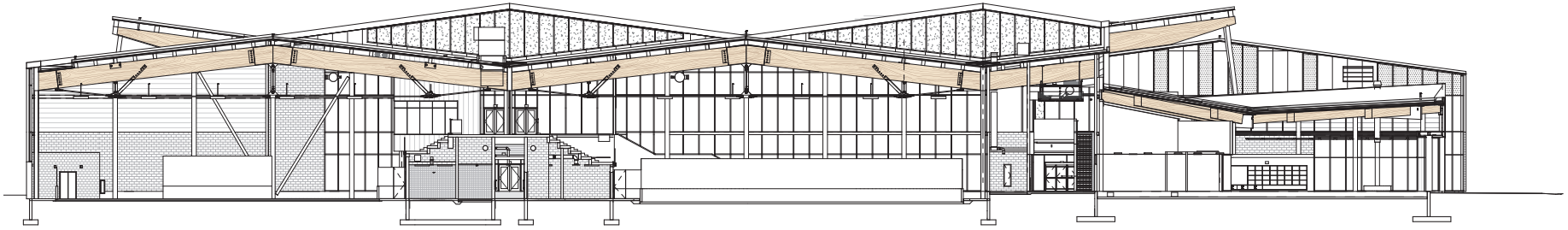


**FIGURE 5** Section through the arenas and library



The glulam fasters and connections for exterior areas, and high-humidity interior areas are galvanized.

The ends of all structural glulam members were factory treated with three coats of end sealer. All other glulam surfaces were factory treated with three coats of polyurethane for interior exposures and five coats for exterior and aquatic area exposures. The underside of the structural wood decking was treated with two coats of polyurethane finish applied on site.

All columns are steel and there are some steel beams and girders. All structural steel is galvanized and painted.

**FIGURE 6** Typical truss geometry

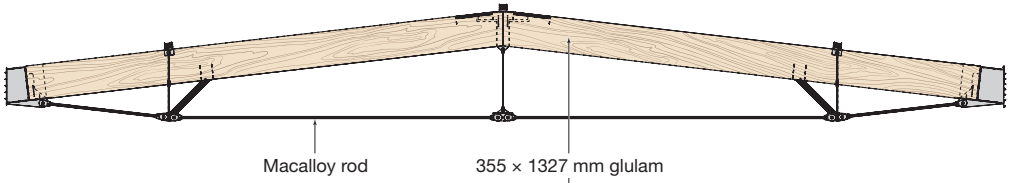
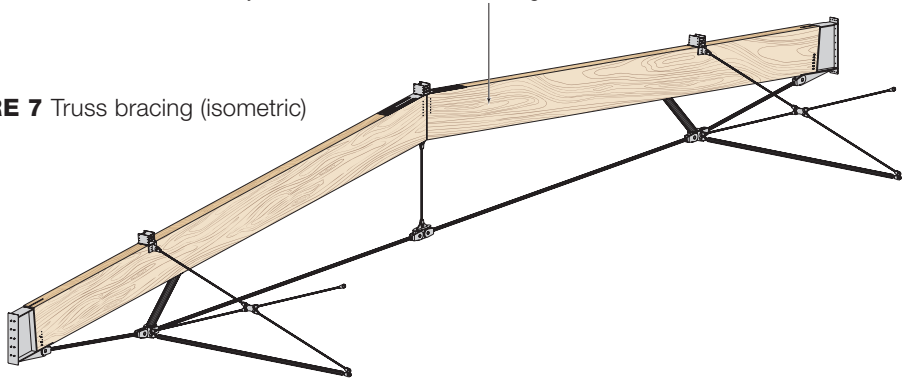
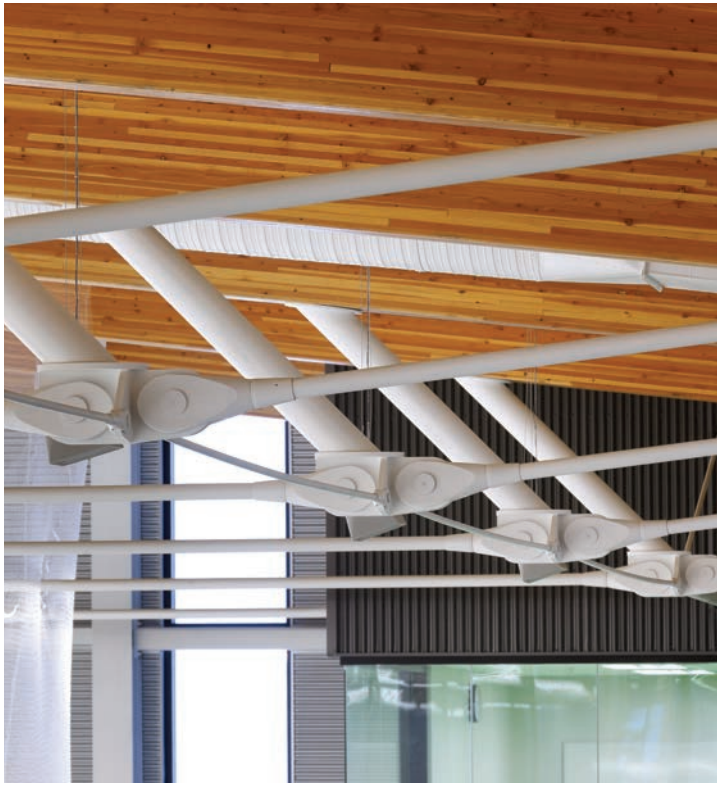



**FIGURE 7** Truss bracing (isometric)





Arena truss connections

Arena roof

Feature Stair

## Finish Wood Products

The guardrail for the feature stair adjacent to the information desk is made of Douglas fir glulam.

All the millwork includes FSC-certified wood components. Butcher block-clad millwork was used in the library, fitness centre, and for the main information desk. The interior doors are FSC-certified solid-core wood doors.

The acoustic wall claddings in the arena and gym areas are FSC-certified 19 x 90 mm maple horizontal slats.

In the library, the acoustic wall cladding is comprised of 19 x 19 mm vertical maple slats. The acoustic ceiling in the public circulation areas and over portions of the track is an FSC-certified 19 x 35 mm Geometrik Geopanel, solid maple grill.

## Fire Safety

The design of the Meadows Community Recreation Centre and Library was based on the 2006 edition of the Alberta Building Code. There are two major occupancies: Group A, Division 2 Assembly Occupancy (Library, Multi-purpose Sport Hall); and, Group A, Division 3, Assembly Occupancy (Arenas, Swimming Pool). The building is sprinklered throughout. The A2 and A3 major occupancies are separated from each other by walls with 1-h fire-resistance ratings.

In a building with more than one major occupancy, the requirements for the most restricted major occupancy apply to the whole building. This means that the floor assemblies are fire separations with a fire-resistance rating not less than 2h. The mezzanines have a fire-resistance rating of not less than 1h, and loadbearing walls, columns and arches have a fire-resistance rating not less than that required for the supported assembly. The wood roof is permitted under ABC and NBCC 3.2.2.16. whereby a roof assembly in a building up to 2 storeys in building height is permitted to be of heavy timber construction regardless of building area or type of construction required, provided the building is sprinklered throughout.

## Durability

The ambient conditions in swimming pool enclosures are very challenging for building materials for two reasons. First, the chemicals required to maintain hygiene in swimming pools are corrosive to many materials. Wood is not affected by swimming pool water purification chemicals. Second, the humidity level in aquatic environments, even when controlled, is still elevated. Wood has a long track record of performing well in pool environments where the moisture load is high and water purification chemicals are present.

The air quality management strategy for swimming pool enclosures needs to control the relative humidity both for occupant comfort and to reduce condensation and high

humidity that is damaging to many building materials and assemblies. Most modern swimming pools use mechanical dehumidification to manage moisture. The ASHRAE Handbook cites a deck-level relative humidity of 50–60% to fulfill these requirements. Because warm air rises, the relative humidity tends to be somewhat higher at the roof level.

At roof-level relative humilities below 80%, wood products will remain well below the moisture content that would support decay or mould growth. At a relative humidity of 75% and a temperature of 21 °C (70 °F), the equilibrium moisture content (EMC) of glulam will remain at about 15%, its approximate moisture content at the time of manufacture.

In the case of the aquatic centre at the Meadows Community Recreation Centre, humidity control in the aquatic centre is handled by a roof-mounted air handling unit. Dry, Alberta air is used to lower the interior humidity level without the need for dedicated dehumidification equipment.

Details were deployed to provide air-sealing wherever glulam structural members penetrated the building envelope. Air-flow in the aquatic centre is kept under negative pressure relative to neighbouring areas of the building. This prevents moisture from the pool area migrating to other areas.

The other challenging indoor environment is in the arenas. The ice rinks create a severe environment for structural components, due to moisture and condensation. There are many examples of the successful performance of wood roofs in arenas, including the Richmond Olympic Oval built for the 2010 Olympics in Vancouver. The high insulating value of the wood roof over the ice surfaces at the Meadows Community Recreation Centre means that a low-emissivity ceiling typically used in many arenas was not required. The wood-deck ceiling provides the necessary thermal performance as well as a warm ambiance not often achieved when low-emissivity materials are used.

Waste heat from the arenas' cooling system is used for space heating in the arena change rooms through radiant in-slab-heating.

Gymnasium

Running track above gymnasium

## Carbon Summary

### Results

Volume of wood products used:
4146 cubic meters (146410 cubic ft) of lumber and sheathing

U.S. and Canadian forests grow this much wood in:
12 minutes

Carbon stored in the wood:
3230 metric tons of carbon dioxide

Avoided greenhouse gas emissions:
6589 metric tons of carbon dioxide

Total potential carbon benefit:
9819 metric tons of carbon dioxide

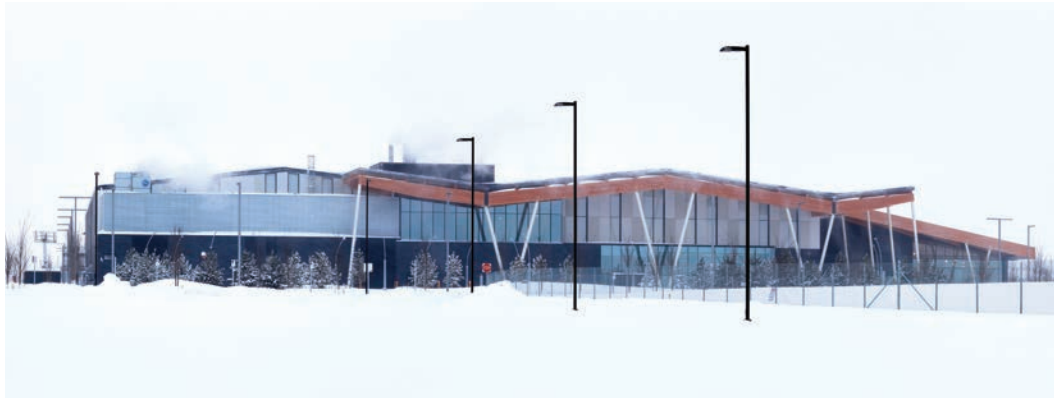
Project Name: Meadows Community Recreation Centre
Date: February 2, 2015

Results from this tool are estimates of average wood volumes only. Detailed life cycle assessments (LCA) are required to accurately determine a building's carbon footprint. Please refer to the References and Notes' for assumptions and other information related to the calculations.

### Equivalent to:

1875 cars off the road for a year

Energy to operate a home for 835 years



South façade

# Environment

Using sustainably harvested wood products that store carbon, instead of non-renewable, energy-intensive building materials that require large amounts of fossil fuels to manufacture, can help slow climate change. Trees provide the only major building material grown by energy from the sun.

Though processing the wood into building products does require energy, albeit less than competing materials, the needs of the mills are often supplied by using the biomass waste generated by the manufacturing process. At the end of their service lives, forest products can be reclaimed for reuse, recycled or used as a carbon-neutral source of energy. The volumes of wood products used for the Meadows Community Recreation Centre and Library were:

| | |
|---|---|
| Glulam | 3,003 $m^3$ |
| Wood decking | 866 $m^3$ |
| Plywood roof sheathing | 277 $m^3$ |
| **Total** | **4,146 $m^3$** |

The on-line Carbon Calculator tool (http://www.woodworks.org/design-and-tools/design-tools/online-calculators/) calculates the amount of carbon that is not released to the environment when wood construction is used instead of other major building materials. The carbon calculation for the Meadows Community Recreation Centre and Library is shown on the left. The carbon benefit of the wood structure is equivalent to taking 1,875 cars off the road for one year or, expressed differently, the energy to operate a home for 835 years.

For more information about the benefits of using Canadian forest products visit: **http://cwc.ca/green/canadian-forest/**


South entrance

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Entrance plaza

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