SUMMARY
The Tsawwassen First Nation (TFN) Youth Centre is a community centre for young people and their families , providing spaces for drop-in and scheduled programs and community gatherings. The two-storey exposed Dowel-Laminated Timber (DLT) wall, floor and roof structure is supported on a Western red-cedar pole-and-beam frame. It is on TFN treaty lands adjacent to Tsawwassen (a Hun'qum'i'num word that means "Land Facing the Sea), a suburb of metropolitan Vancouver. Fronting the Salish Sea, the site is a cultural and ecological ecotone, the meeting place of cultures and ecologies.

The Youth Centre design brings together ancient cultural histories with a modern treaty addressing reconciliation. The building tells this ecological/ cultural story through form; pole-and-beam structure; exposed local woods (mass timber); and imagery on floors, poles, and windows. The design teaches future leaders 4000 year old lessons about looking after the land and sea.

Sustainable design strategies:
Negative Greenhouse Gas Emissions: Net Carbon Benefit 194 metric tonnes
Kinship ecology: provide safe habitat for native plants and birds
Cultural sustainability: design building to facilitate environmental and cultural leadership
Wellness: Biophilic design and kitchen designed for preparing nutritious foods.
Fully recyclable and demountable wood structure made from locally harvested/ manufactured wood

MAIN PROJECT DESCRIPTION

1. Strategic Decisions

Interactive meetings with children, teens, leadership, and artists guided program and design. Climbing walls, art and music studios, MMA and weight room options, activity-filled teen lounge and an outdoor-oriented activity space for the younger set resulted from collaborative meetings.
All ages of TFN citizens expressed their commitment to keeping their traditional lands healthy. Materials had to be ecologically practical and long lasting. DLT and poles for the structure ensured minial waste. The 40 foot high building walls, and forty foot spans for the roof, fit DLT perfectly as 40 feet is the optimal length for fabricating and transporting mass timber panels. DLT is 100 percent BC sourced and sustainably harvested wood, no glues, and sequesters about~3650lbs CO_2 per ton. The pole and beam structure addresses TFN's ancient tradition of mono-slope pole and beam buildings, the first curtain wall buildings in the world. Coast Salish legend says ancestors learned construction skills from avian ancestors, who first came to earth as birds, then changed into people.

2. Community

The Youth Centre is designed for school bus drop-off and pedestrian/ bicycle transportation. There is no onsite parking. The park to the northwest provides shared parking for staff and visitors..

3. Site Ecology

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Since the site is centered on the Pacific Flyway where sea and sandflats provide food and habitat for millions of migratory birds, preservation and enhancement of natural ecosystems is a key design determinant. Glazing is bird-friendly. Tiny hummingbirds on a 2”X4” grid provide child-sized reminders of connectedness to the natural world. The Youth Centre landscape reminds future leaders of their role in protecting biodiversity by attracting birds to the site. Microhabitats offer avian food while forming a woven blanket of colours at different times of the year.

Native plantings offer feeding and nesting opportunities at different times of the year. Red, orange, and purple native wildflowers and magenta-flowered *Fuchsia Magellanica “*Aurea” provide nectar and insects for hummingbirds; coneflowers offer seeds; and Pacific crabapple offer autumn fruit. The site retains native grasses and trees that provide cover for nesting Western sandpipers and insects to supplement their mollusk diet.

4. Light and Air

All spaces have operable windows and provide glazing to optimize day lighting and are within 7 meters of an operable window. All power is hydro-electric.

Interior Spaces

5. Wellness

In the centre of the main floor is a kitchen is designed for the young people to learn cooking and nutrition. A health-driven menu determined kitchen design and specification. Raised planters outside the kitchen provide vegetables and traditional medicines. Multiple handwashing stations are positioned at entrances to the kitchen/ eating space.

Physical activity is encouraged by its site next to the sportsfield . The multi-purpose activity room and weight room have athletic flooring. The climbing wall took advantage of plywood shear walls. Finished DLT surfaces provide resilient walls for sports areas. Acoustic floor assemblies for sports areas were project-tested for AIIC (Apparent Impact Insulation Class).

Biophilic design adds health benefits. WRC Pole and mass timber detailing suggest forests throughout interiors and exteriors. DLT hem-fir is chemical-free and glue-free, being made of 100 percent wood. The absence of glues improves air quality. Large-scale, 24” high WRC shingles form the exterior cladding, with a clear finish that retains the naturally varied colouration of cedar. Exterior WRC poles are painted by TFN artists in a rippling water design.

6. Water Conservation

Summary for Design and Construction Rating Systems

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Refresh Groups

Group Name	Baseline Case (liters/year)			Design Case (liters/year)		
	Annual Flush Volume	Annual Flow Volume	Annual Consumption	Annual Flush Volume	Annual Flow Volume	Annual Consumption
Whole Building	104,390.00	36,408.75	140,798.75	57,086.00	29,338.70	86,424.70
Group 1	0.00	0.00	0.00	0.00	0.00	0.00

Annual baseline water consumption (liters/year)	140,798.75
Annual design water consumption (liters/year)	86,424.70
Percent water use reduction (%)	**38.62%**

Water consumption is shown in the chart above. Rainwater collection for irrigation is part of the overall landscape plan, which also includes rain gardens for natural treatment of stormwater. Water consumption is reduced to 18% lower than LEED v4.

7. Operating Energy Present and Future

The youth centre uses a variable refrigerant flow and heat recovery ventilators. High-performance exterior walls use continuous insulation on the exterior of the DLT and advanced rainscreen systems with four-foot roof overhangs to protect cedar-clad walls from the temperate rainforest climate. Room orientation is carefully considered according to the qualities of light desired in each room. Energy intensity, base building is 147.2 KW/ hr/ m2/ year. Energy intensity, process energy is 33 KWhr/m2/year. These are lower than ASHRAE 90.1 2010. All annual energy consumption is from non-polluting renewable sources (hydro-electric power) so shortage of fossil fuels is not a concern.

8. Materials and Resources

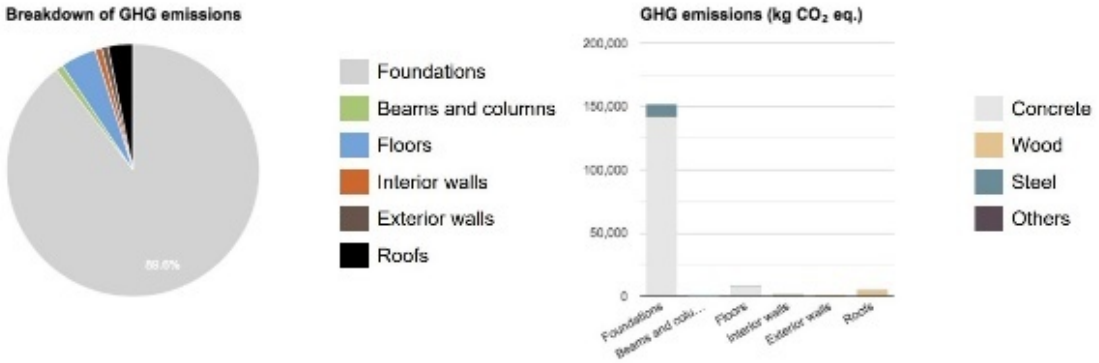
Employing locally- and sustainably- harvested materials from Coast Salish tradition, the Western red-cedar poles retain their natural flare. Hem-fir dowel laminated timber (DLT) is exposed throughout the building interiors and exterior soffits. Because of the exposed DLT, there is little drywall in the building and few coatings. Any coatings are very low VOC. Prefabricated poles-and-beams and Dowel-laminated Timber panels provide a new structural solution not used elsewhere.

9. Building Life Cycle Considerations

The wood structure is fully demountable. Dowel-laminated timber (DLT) panels are screwed (no glues) into place and can be unscrewed and reused. All of the logs are also fit together with screwed-on plates and mortise and tenon joinery. Western red-cedar cladding can also be pulled off and reused at the end of the building's life, which we anticipate to be 50 or more years.

All woods were harvested and crafted/ machined in southwest British Columbia.. GHG modeling (by Canadian Wood Council) shows that the youth centre structure of locally-sourced, minimally-manufactured WRC tree-poles, Hem-fir DLT, WRC shingles, and hem/ fir framing lumber sequester almost 3 times the CO2e than is emitted during fabrication of all structural elements combined. About 170,000 CO2e is emitted during production and transport of the structural components. Total Greenhouse Gas Emissions (GHG) sequestered in the building structure for the life of the building is 488,000 CO2e, indicating that the building significantly mitigates climate change impacts.

TFN CTR Cedar columns GHG emissions (kg CO_2 eq.)		Materials				Total	%
		Concrete	Wood	Steel	Others		
Construction systems	Foundations	141 600	0,00	10 050	0,00	151 650	89,61
	Beams and columns	0,00	0,00	1 580	0,00	1 580	0,93
	Floors	7 747	0,00	0,00	0,00	7 747	4,58
	Interior walls	0,00	1 236	227	0,00	1 463	0,86
	Exterior walls	0,00	1 382	0,00	0,00	1 382	0,82
	Roofs	0,00	5 261	157	0,00	5 418	3,20
	Total GHG (kg CO_2 eq.)	**149 347**	**7 878**	**12 015**	**0,00**	**169 240**	**100%**
	GHGs per m^2	**128**	**6,73**	**10,26**	**0,00**	**145**	



10. Education and Information Sharing

Oral histories about ecological and cultural diversity are pictorially retold on windows and walls, in the oral history tradition of the Coast Salish peoples. Flared and crenellated bases left on Western red-cedar structural poles tell of the struggles of trees to balance on windy hillsides. Signage is in Hun'qum'i'num, further retaining ancient ecological and cultural wisdom.