

A NATURAL CHOICE FOR ENHANCING HUMAN WELL-BEING

# WOOD IN HEALTHCARE



## Wood in Healthcare







*Critical Care Tower, Surrey Memorial Hospital, Canada*

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It is now generally accepted that the objectives of sustainable design are broader than just environmental effects and have come to embrace human health issues as well. As sedentary and service-related work becomes more prevalent in our society, so too the amount of time the average person spends indoors increases—a fact that makes the design of the interior environment ever more important.

Many factors contribute to a physically healthy indoor environment, including plentiful natural light, adequate fresh air ventilation, maintenance of comfortable temperatures and humidity levels and limited exposure to environmental contaminants such as dust and harmful vapours.

However, just as the definition of green building has expanded with time so has our understanding of human health expanded to include not only our physical condition but also our psychological well-being.

We have known intuitively for a long time that humans have an affinity for nature, and being in a natural environment—a forest, a park or simply our own garden—can make us feel more relaxed. The term 'biophilia' has been coined to refer to this phenomenon.

Scientists have now confirmed that this sensation of relaxation in the presence of nature is due to a reduction in stress reactivity in our sympathetic nervous system (SNS). This is both psychologically and physiologically beneficial for those in contact with nature.

## WOOD AND HUMAN HEALTH

Using an approach known as 'evidence-based design' (in which detailed analyses of occupant responses to a building's physical characteristics are used to inform the design of future projects), healthcare architects have begun to explore the physiological benefits of biophilia in the design of indoor environments. This has led to the greater use of natural daylight, access to views of nature, and the introduction of wood and other natural materials.

Wood in particular is visually warm and contributes to a socially positive experience for building occupants. People respond emotionally to wood and are attracted to its visual variety and natural expressiveness.

A recent study carried out by the University of British Columbia and FPInnovations<sup>1</sup> confirms the value of these attributes. The joint research project found that the visual presence of wood in a room lowers SNS activation in occupants, further establishing the positive link between wood and human health.

Among the physical requirements for human health, wood contributes naturally to humidity control by absorbing moisture from the air when the humidity level in a space is high and releasing it when the humidity level is low.

Wood products and finishes can also contribute to the control of air-borne contaminants as they are durable, easily maintained, dust-free after installation and emit few, if any, harmful vapours.

<sup>1</sup> Fell D. 2002. *Consumer Visual Evaluation of Canadian Wood Species*. FPInnovations, Vancouver, Canada.

Rice J, Kozak Robert A, Meitner Michael J, and Cohen David H; 2006 *Appearance Wood Products and Psychological Wellbeing*, Society of Wood Science and Technology



SIZE: 640,000 FT<sup>2</sup> (59,400 M<sup>2</sup>)  
BEDS: ADDITIONAL 249  
COMPLETED: SCHEDULED FOR  
FALL 2014





## CRITICAL CARE TOWER, SURREY MEMORIAL HOSPITAL SURREY, BC, CANADA

With an area of 640,000 ft<sup>2</sup> (59,400 m<sup>2</sup>), the Critical Care Tower is the largest healthcare project in the history of British Columbia. This expansion to the existing Surrey Memorial Hospital will serve the fastest growing community in the province with world-class family-centred care.

An evidence-based design approach has been implemented to ensure that the facility will support the highest standards of care. The project adds acute care beds, and a new emergency department (the biggest in Canada) with a specialized mental health and pediatric area. Other elements include an Adult Intensive Care Unit, a Neonatal Centre of Excellence, more space for the clinical academic campus of the University of British Columbia School of Medicine and a laboratory with the latest medical technology, specially designed for the region.

Patient and family care are at the core of the design, along with staff safety. All patient rooms have access to natural light and dedicated family space. Infection control, universal design and disaster preparedness are also key priorities for the project, which will provide expanded access to world-class healthcare for communities across the province.

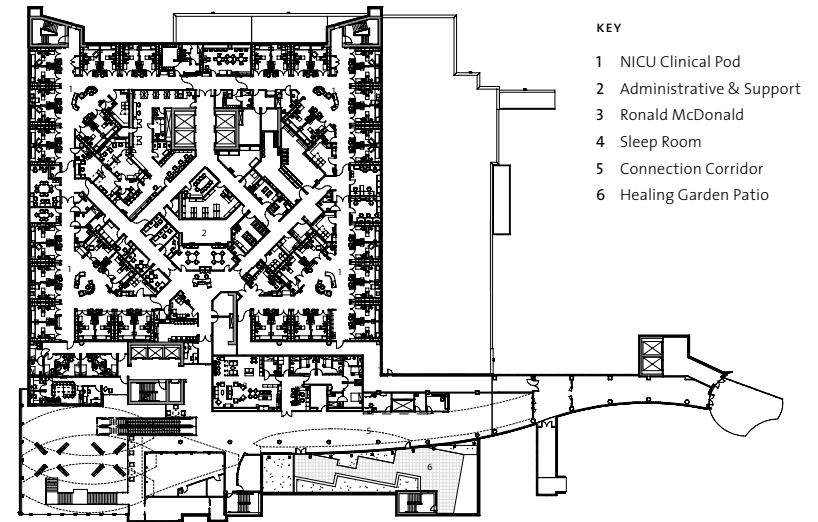
Reflecting the requirements of British Columbia's *Wood First Act*, the project has been designed to embrace innovative and appropriate uses of wood. The design features many visible wood elements—structural and decorative—resulting in a warm, natural aesthetic that supports the function of the building as a facility dedicated to healing.

Wood has been showcased in areas where it makes practical sense to use materials that respond well to rigorous maintenance procedures, require superior resistance to weather and UV damage, or contribute to infection control. These applications include structural components for canopies and cladding, and interior use for millwork, interior wall treatments and acoustic paneling.

Wood use is concentrated in the areas of public interface, including the exterior covered walkways, drop-off area, new west entrance and the link connecting the Critical Care Tower to the existing hospital. This use of wood is designed to reinforce the connection to nature and the outdoors, helping to reduce stress and anxiety.

The lobby, where families and loved ones will spend significant amounts of time, will feature exposed structural timbers, paneling and millwork.

LEVEL 2 NEONATAL INTENSIVE CARE UNIT



The roof will consist of prefabricated panels designed to achieve long spans with minimum connections.

Codes currently limit the use of heavy timber structure in large and tall buildings, which makes the use of wood a challenge in projects such as this. Because the lobby projects from the base of the tower, it has been possible to design it so that from a fire safety perspective it is considered a separate structure.

Wood will also be used for exterior soffits and, in composite form, for cladding the highly visible south façade of the tower and the exterior walls of the podium.

*"We wanted to create a sense of warmth and comfort which wood does. It's been proven throughout its base design that connection to nature actually does bring your body back down to a more balanced state. If you can bring your heart rate and blood pressure down in a calm space in a time of crisis that's a break for the family member who has to cope with what is going on. It's also great for the patient. The aspects that wood brings to a project I think are worth trying to find ways to overcome the challenges. Let's try to incorporate wood where we can because I think the benefits are known by the architects as well as us."*

MARCO BUCCINI, FRASER HEALTH AUTHORITY



## PRINCE GEORGE REGIONAL HOSPITAL REDEVELOPMENT PRINCE GEORGE, BC, CANADA

SIZE: 125,000 FT<sup>2</sup> (11,600 M<sup>2</sup>)

BEDS: 128

COMPLETED: 2005

This major project, located in the heart of northern British Columbia's largest city, involved the upgrading of an aging and outdated central hospital facility to meet contemporary healthcare delivery and building code requirements. Together with the addition of new accommodation for an expanding population and the enhancement of a range of community health services, it serves the needs of this burgeoning centre.

The upgrading of the existing main building expanded the ambulatory care clinics, renal unit, cancer and enterostomal care and the public lobby area; and included major renovations to pediatrics and maternity wards, child and family units, a laboratory, as well as the administration, human resources and finance departments.

The new four-storey addition provides 108 replacement in-patient beds on the top two floors, a 10-bed geriatric assessment unit, a 10-bed intensive care unit and an expanded emergency procedures unit. Extending through the full height of the new building is the day-lit circulation atrium, with a vertical structure consisting of eight glulam tree columns arranged along one side of the space, which support faceted glulam ribs and a series of translucent polycarbonate skylights.



The atrium is overlooked by continuous balconies at each floor level; these and other circulation areas in the building also feature Douglas-fir veneer acoustic panels, chosen for their warm appearance and durability compared to more traditional fabric-covered panels. These features give the public spaces of the hospital a non-institutional atmosphere that contrasts with the more clinical appearance of the other areas.

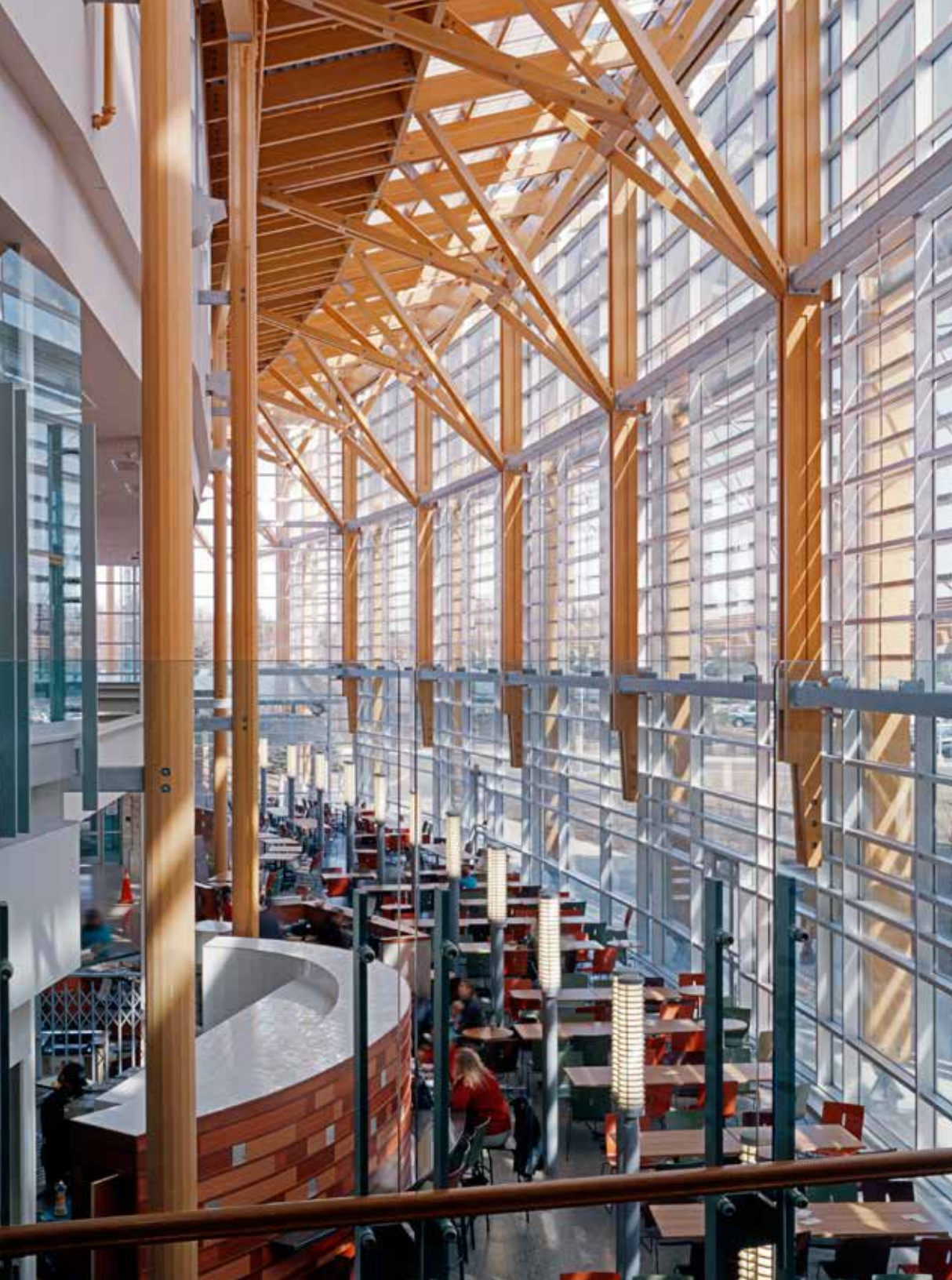
The use of heavy timber construction in an institutional building of this size was made possible through the negotiation of equivalencies, such as additional sprinklers being used to provide the required level of fire safety for the wood roof structure. Demonstrating the viability of wood as an alternate structural system in large scale applications like this has become more straightforward with the introduction of fire behaviour simulation software and the move to more objective-based building codes.

Externally, wood is used to clad the stair tower of the new building and on the soffit of the projecting entrance canopy. Though limited in area, these applications of wood serve to soften the appearance of the building, and offer a gesture of welcome to visitors.









*"Beyond the project's material aspects it is guided by humanism, the idea that concern for human values is of the utmost importance in the care of the sick, and manifests itself in visually pleasing environments consisting of natural materials, access to sunlight and the union of architecture and landscape."*

SEAN STANWICK, FARROW PARTNERSHIP ARCHITECTS

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SIZE: 680,000 FT<sup>2</sup> (63,000 M<sup>2</sup>)

BEDS: 375

COMPLETED: 2003

#### **THUNDER BAY REGIONAL HEALTH SCIENCES CENTRE THUNDER BAY, ON, CANADA**

Turning to nature as a first-order priority, the Thunder Bay Regional Health Sciences Centre embraces a philosophy of humanism in design, perhaps making it a seminal project in healthcare design. The 680,000 ft<sup>2</sup> (63,000 m<sup>2</sup>) facility includes acute care, a cancer centre, a maternity ward and forensic mental healthcare services.

The three-storey plan has a T configuration with a main concourse serving as the organizational element from which individual departments are accessed. Oriented north–south, patient wards are located on the east side with clinical departments to the west. A public plaza at the intersection point of the T accommodates the main entrance.

The Health Sciences Centre contains the first cancer centre in Canada to incorporate direct natural light, skylights and wood panel interior finishes within the radiation treatment rooms to enhance the therapeutic experience for patients.

The public concourse is a dramatic three-storey wood and glass walkway, measuring 25 ft (8.2 m) wide and 460 ft (140 m) long that curves gently in plan to follow the path of the sun. The structure is based on a repetitive 30 ft (9 m) module of glulam columns and inverted glulam trusses that provide support for a glass curtain wall. Translucent and transparent panels are strategically placed to emphasize views to the expansive natural wetland landscape that surrounds the building.



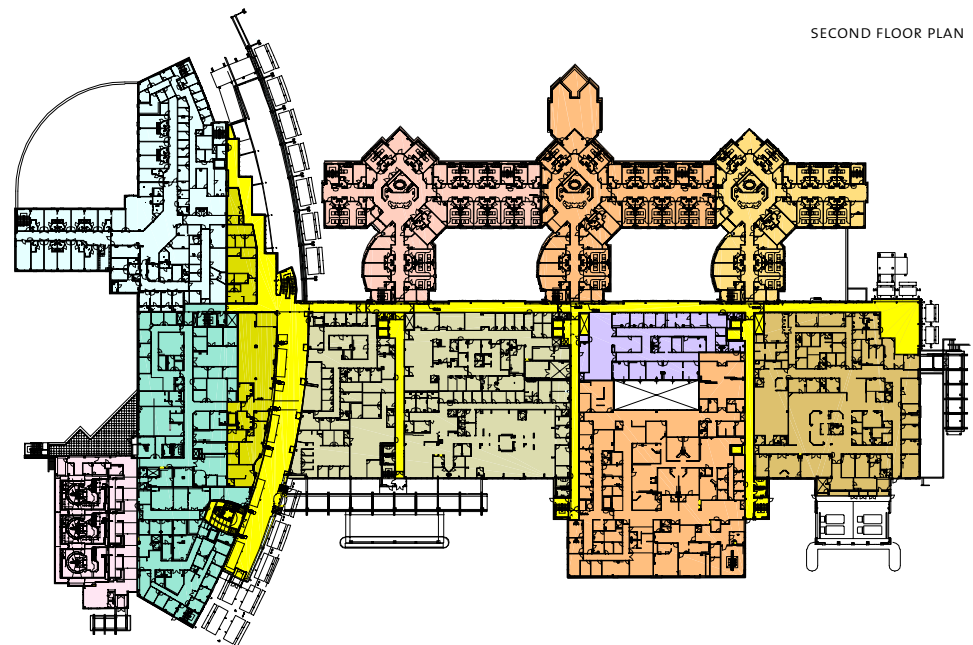


In all, the structure comprises more than 1,100 Douglas-fir glulam pieces, the largest of which are more than 65 ft (20 m) in length. Wood was selected for its warmth and its ability to reflect the rich railroad history and important forest economy of the Thunder Bay region.

To avoid a solid fire separation and maintain the sense of openness and connection between the heavy timber construction of the concourse and the non-combustible construction of the main building, it was necessary to demonstrate an equivalent level of fire safety. This was achieved through the installation of additional sprinklers positioned to protect the roof beams.

#### KEY

Mental Inpatient/Outpatient	Ambulatory Care/Renal	PCU South
Radiation Therapy Bunkers	Cancer Radiation & Admin	Retail/Volunteers
Diagnostic Imaging	PCU North	Cardio Respiratory
Emergency	PCU Central	



SECOND FLOOR PLAN









### GATEWAY LODGE COMPLEX CARE AND ASSISTED LIVING PRINCE GEORGE, BC, CANADA

SIZE: 148,000 FT<sup>2</sup> (13,750 M<sup>2</sup>)

BEDS: 172

COMPLETED: 2009

*"For the main spaces, we used structural glulam beams and post and beam approach. That allowed for large open spaces, large spans, lots of glass. A connection through to nature."*

JERRY DOLL, NSDA ARCHITECTS

Over the past several decades, gerontology research has clearly shown that the design of the physical environment of long-term care and retirement residences can have a profound impact on the physical, psychological and emotional well-being of elderly residents.

The Gateway Lodge Complex Care and Assisted Living building is an institutional healthcare facility located in northern British Columbia. It has 94 complex care beds for elderly residents who require 24-hour nursing care and 78 assisted living units for those who need some daily assistance to remain independent. Northern Health, the owner-operator, wanted to create a non-institutional environment that would foster social interaction, engage the community at large and reflect the unique qualities of the North.

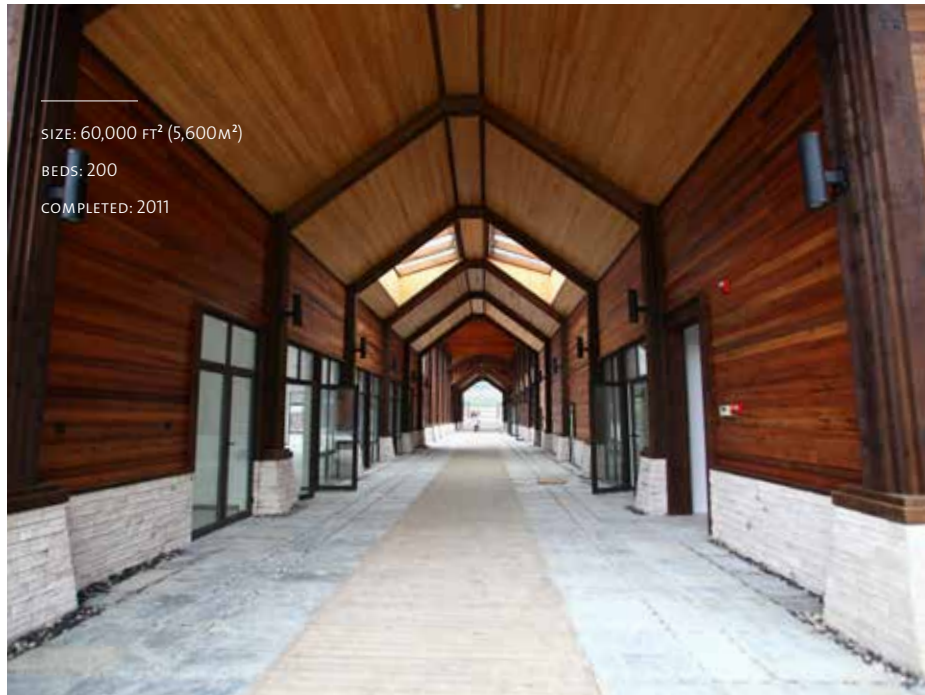
The building is organized into "households or homes," each comprised of a small grouping of 14 to 20 residents, similar to an extended family arrangement. Each home has its own dining, living, activity and bathing area, permitting the residents to live among familiar faces in an emotionally supportive environment.

A hierarchy of interior spaces creates a coherent yet varied domestic atmosphere with finely crafted public rooms and circulation spaces. The community hall, the heart of the facility, is a two-storey vaulted pavilion

with an exposed post and beam structure. Solid maple and maple veneer is used extensively on the interiors for millwork elements: reception desks, care centres, memory boxes, trims, handrails, interior doors and feature walls.

The unique qualities of wood, with its beauty and warmth, tactile character, durability and ease of construction together with its ability to create a welcoming domestic atmosphere made wood an ideal choice. Douglas-fir glulam beams and columns are used in the wood structures that mark the building entrances, the major social spaces, the community hall, communal decks, porches and courtyard pavilions. Horizontal wood slats counterpoint the expressive structural framework and exterior cladding.

To achieve the highest level of quality and reduce the overall project schedule—an important consideration working in the North as there is a limited window between spring thaw and the onset of a harsh winter—a prefabricated panelized wall system was utilized. Factory built walls were manufactured while extensive site and foundation work progressed. The panels were onsite, ready for installation as each foundation section was completed, thus ensuring the building shell was completed within six months and before the onset of winter.



SIZE: 60,000 FT<sup>2</sup> (5,600m<sup>2</sup>)  
 BEDS: 200  
 COMPLETED: 2011

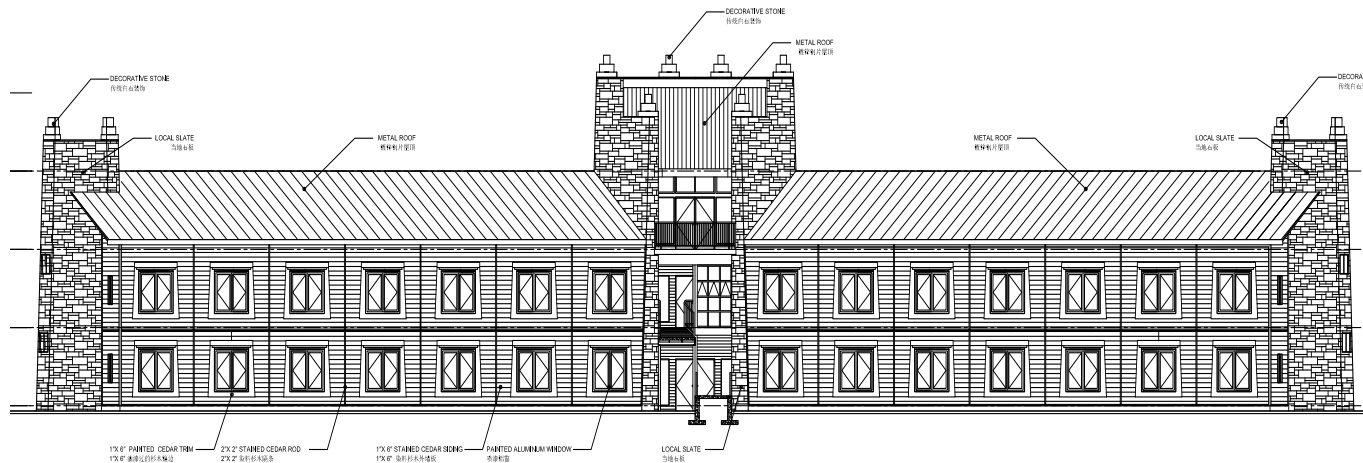
### **BEICHUAN QIANG MAPLE LEAF SENIORS HOME BEICHUAN COUNTY, CHINA**

The earthquake that struck Sichuan Province in May 2008 killed approximately 70,000 people, left 375,000 injured and more than 5-million homeless due to the collapse of many buildings. The town of Beichuan was most severely affected, with almost half its population perishing in the disaster. A series of aftershocks, together with repeated flooding in the area, delayed the rebuilding efforts for several months.






The Beichuan Qiang Maple Leaf Seniors Home was built using funds donated by the Government of Canada and the Province of British Columbia. These donations were part of a program set up to assist in the reconstruction of the devastated region and to showcase the advantages of wood-frame construction for seismic resistance and energy efficiency. These attributes of wood-frame construction are of particular importance in a country with climate extremes, and where more than 60 per cent of the population live in areas subject to seismic activity.





## ASSISTED LIVING NORTH ELEVATION



## ENVIRONMENTAL IMPACT OF WOOD USE FOR BEICHUAN QIANG MAPLE LEAF SENIORS HOME

-  Volume of wood products used:  
1140 cubic meters (40273 cubic ft) of lumber and sheathing
-  U.S. and Canadian forests grow this much wood in:  
3 minutes
-  Carbon stored in the wood:  
881 metric tons of carbon dioxide
-  Avoided greenhouse gas emissions:  
1872 metric tons of carbon dioxide
-  Total potential carbon benefit:  
2752 metric tons of carbon dioxide

## Equivalent to:

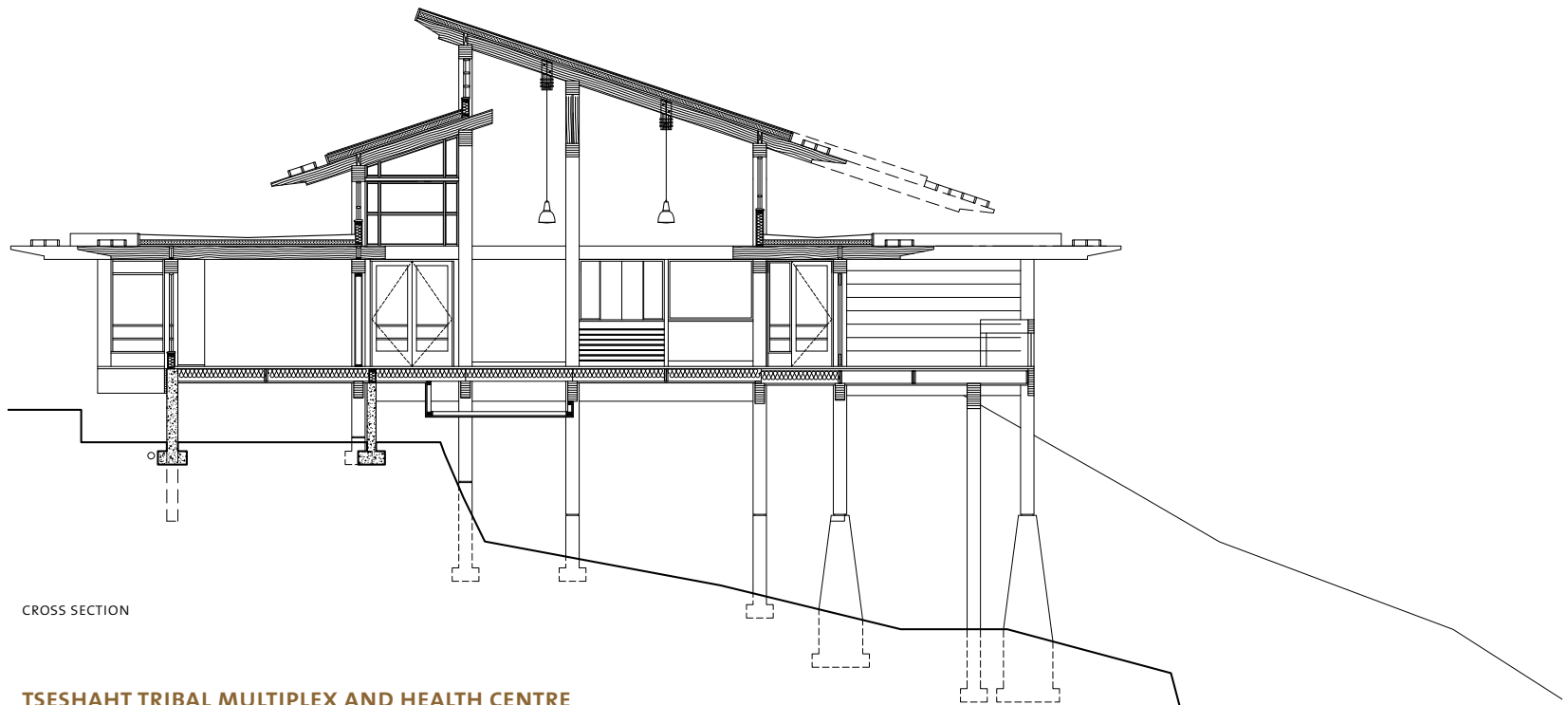
-  526 cars off the road for a year
-  Energy to operate a home for 234 years

China's senior population is growing and the national government has made building more senior care facilities a priority. The Beichuan Qiang Maple Leaf Seniors Home is a multi-purpose, multi-unit complex, comprising of four buildings of one- and two-storey construction with a total floor area of 60,000 ft<sup>2</sup> (5,600 m<sup>2</sup>). The building includes accommodation for more than 200 seniors, together with communal facilities.

The building incorporates standard dimension framing lumber and oriented strand board sheathing, with horizontal and vertical western red cedar and local stone cladding used on the exterior. The four freestanding buildings are connected by external walkways with pitched roofs supported on paired wood columns.

This seniors' facility is the first of its kind in China to be built in wood-frame construction and will help demonstrate this technology for multi-storey, multi-residential accommodation, specially designed for the elderly population.





CROSS SECTION

### **TSESHAHT TRIBAL MULTIPLEX AND HEALTH CENTRE PORT ALBERNI, BC, CANADA**

The important cultural heritage values of Canada's First Nations include their respect for and connection to nature, as well as their reverence for wood and its importance in many facets of their daily lives.

The crucial design ambition for this project was to embody these values in the creation of new accommodation for the Tseshaht First Nation in which to operate their multi-faceted businesses and fulfill community, health, cultural and social functions. The natural yet challenging character of the site—a large granite bluff above the salmon-spawning Somass River—offered a unique opportunity for an ecologically sensitive solution. Instead of disturbing the site with massive excavation and levelling operations, the building follows the contours of the rocky bluff as an elevated wood structure that appears to be floating and is at times cantilevered above the river's edge.

To maintain the symbiotic relationship between the internal spaces and the surrounding environment, including the dynamic quality of natural daylight, the sun is welcomed into the building as it travels its daily path. Striking the many wood surfaces, it creates a warm and positive ambiance within the high-volume areas as well as the small individual offices. Nature, in this way, can be appreciated as much inside as outside.

Located at the north tip of Alberni Inlet on the west coast of Vancouver Island, the site is subjected to considerable tidal fluctuations and is within the highest seismic risk zone. The structure is a combination of open-framed post and beam in-filled with glazing and a limited number of strategically placed sheer walls. It utilizes a multitude of engineered wood products and lumber products harvested and milled by the Tseshaht from their own forest reserves.






The design approach that exposes every element of the structure as an architectural feature required precision pre-manufacturing of each element, which was done on site prior to assembly and erection. This process was carried out very successfully by craftsmen and labourers who were mostly drawn from the Band itself.

Elevating the wood structure allows for the concealment of all of the large services and equipment underneath the floor. In addition, all of the small service distribution networks are incorporated within the roof assembly between the exposed ceilings and the surface of the roof.



Functionality and the embodiment of significant cultural values into the design were accomplished through a series of workshops with the participation of the Chief and Council, community members, elders and the future users of the building.



ENVIRONMENTAL IMPACT OF WOOD USE FOR  
TSESHAHT TRIBAL MULTIPLEX AND HEALTH CENTRE

-  Volume of wood products used:  
1051 cubic meters (37119 cubic ft) of lumber and sheathing
-  U.S. and Canadian forests grow this much wood in:  
3 minutes
-  Carbon stored in the wood:  
809 metric tons of carbon dioxide
-  Avoided greenhouse gas emissions:  
1436 metric tons of carbon dioxide
-  Total potential carbon benefit:  
2245 metric tons of carbon dioxide

Equivalent to:

-  429 cars off the road for a year
-  Energy to operate a home for 191 years



*“The extensive use of wood, as the structural and finishing material, reflects the cultural importance of wood in the Tseshaht’s history. Wood has always been central to every aspect of their daily domestic and spiritual lives.”*

LUBOR TRUBKA, LUBOR TRUBKA ARCHITECTS

SIZE: 16,400 FT<sup>2</sup> (1,520 M<sup>2</sup>)

COMPLETED: 2007







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SIZE: 20,000 FT<sup>2</sup> (1,860 M<sup>2</sup>)

BEDS: 20

COMPLETED: 2009

*“There must have been some spiritual guidance when this building was being designed.”*

HERRINGTON RECOVERY CENTER ALUMNI



## HERRINGTON RECOVERY CENTER MILWAUKEE, WISCONSIN, US

Green building practices and sustainable design have been embraced by the healthcare sector as a means to create supportive environments that are a positive influence on patients and the community as a whole. The successful incorporation of sustainability into a healthcare setting is one that has been embraced in the design of this facility for the not-for-profit Roger's Memorial Hospital.

Perched atop a wooded hill on a serene rural lake, the Herrington Recovery Center promotes healing, recovery and confidentiality. The facility is a 23,000 ft<sup>2</sup> (2,140 m<sup>2</sup>) 20-bed residential substance abuse treatment center whose focus is to serve the needs of those recovering from chemical addiction from across the country.

The building owner was committed to designing a serene environment sensitive to patient recovery which would have little impact on the environment. Natural day lighting and ventilation practices were utilized throughout to promote indoor air quality, while Energy Star® rated building systems were used to minimize energy consumption and operating costs.

The Department of Natural Resources was very involved in the design of the site, which included the removal of two non-compliant structures to re-establish the continuity of a major environmental corridor. The new building was situated on the site in such a way as to take full advantage of day lighting and lake views.

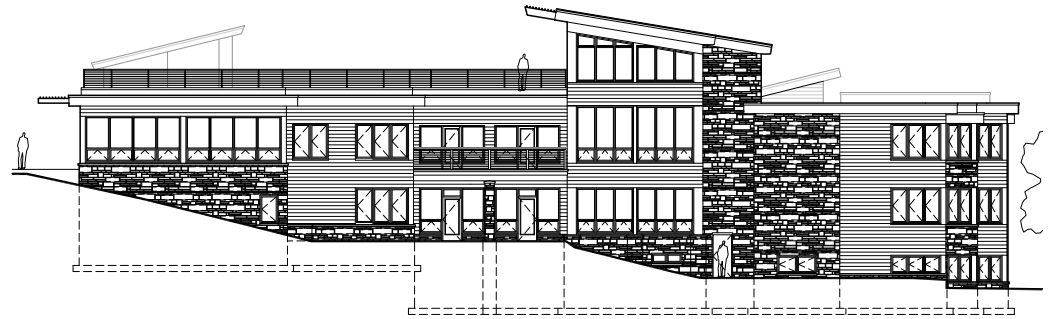
A natural contemporary exterior with intersecting pitched roof lines, warm western red cedar siding and Wisconsin Chilton natural stone set the tone for the new building. The dynamic exterior was designed to blend harmoniously into the surrounding natural forested setting.

The low cost of wood as a construction material and ability to harvest and manufacture locally, including high performance windows and doors, were major reasons why wood was used for this project. In addition, wood products come in smaller components which minimized the construction area thereby preserving the surrounding woods.

All of the major rooms were designed to maximize lake views. The interior mimics the exterior in its use of local natural stone and warm western red cedar woodwork. Wood ceilings and soffits in the recreation room, dining room and entrances to sleeping rooms create a warm feeling reflecting the rural Wisconsin landscape. These wood details bring down the scale of the space, making patients feel more comfortable.

As time ages the wood, future patients will feel a sense of history and connection to the many before them who passed through the center on their road to recovery.

EAST ELEVATION

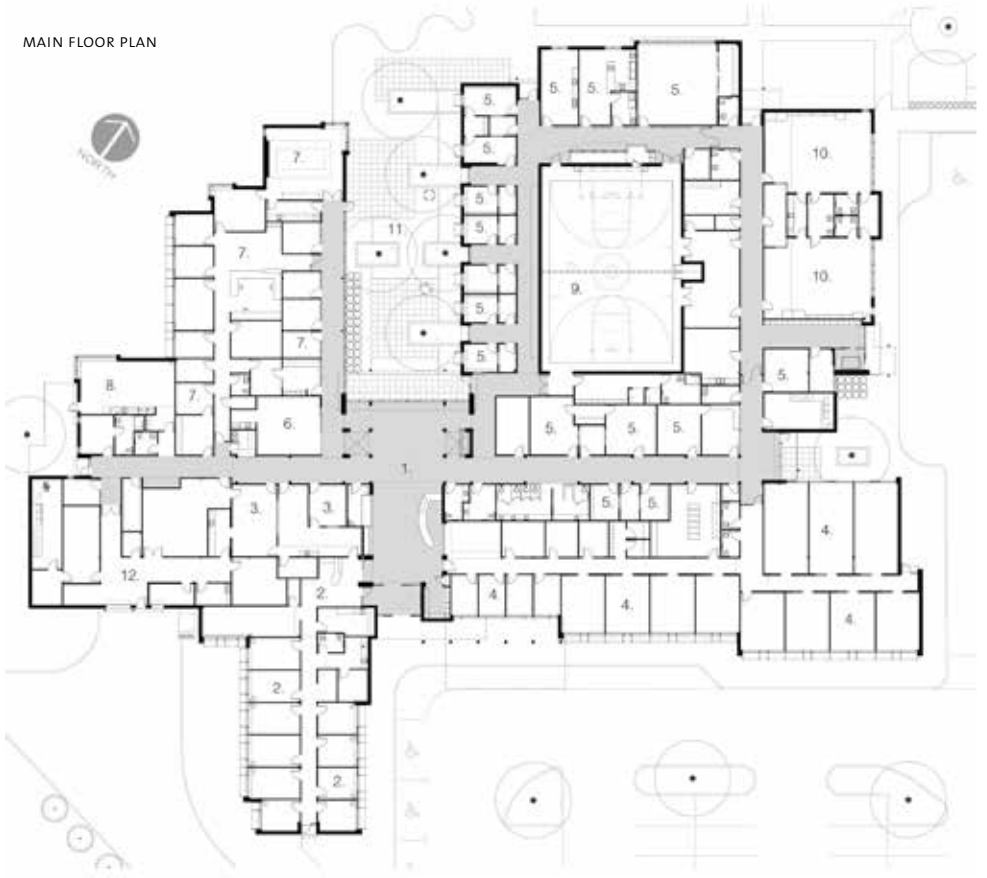




SECTION LOOKING EAST



MAIN FLOOR PLAN



KEY

- |                           |                        |              |
|---------------------------|------------------------|--------------|
| 1 Lobby/Waiting Area      | 5 Therapy Room         | 9 Gymnasium  |
| 2 Pediatric Care          | 6 Family Resource Room | 10 Classroom |
| 3 Day Clinic              | 7 Administration       | 11 Courtyard |
| 4 Therapists Workstations | 8 Staff Lounge         | 12 Services  |



## ONE KIDS PLACE CHILDREN'S TREATMENT CENTRE NORTH BAY, ONTARIO, CANADA

This facility in northern Ontario provides rehabilitation and support services for children with communication, developmental and physical needs. The range of services offered includes occupational therapy, physiotherapy, speech pathology, social work, therapeutic recreation and specialized medical clinics. The 41,292 ft<sup>2</sup> (3,836 m<sup>2</sup>) building is arranged on a single level into clusters of related rooms accessed from a main corridor that extends either side of the entrance lobby.

The building is of heavy timber construction with glulam columns and beams supporting structural tongue and groove decking. This conforms to the code requirement for non-combustible construction for an assembly occupancy of this kind.

The design team chose SPF (spruce-pine-fir) for the structure, as these species are native to the surrounding forests. Stained to enhance its natural beauty, the wood structure is exposed in all the main public areas of the building, contributing to the warm, welcoming and comfortable environment that was a key design objective.

Locally sourced maple was used extensively for interior millwork, doors, door frames, decorative paneling and furniture. To protect walls from damage by wheelchairs, the design team chose to use solid maple rails which will last a long time and sustain their warmth and beauty even when dented and worn.

The extensive use of low-formaldehyde wood panel products for interior surfaces also helped improve interior air quality by eliminating the need for vinyl products and other finish materials that contain volatile organic compounds (VOCs). In addition, an interior living green wall is used as an organic bio-filter.

The importance of wood to local cultural heritage is celebrated in a series of large scale multi-media panels by Sean Ledoux and his team of local artisans. The installation offers children a visual and tactile journey of discovery—a metaphor for the mystery and complexity of a walk through the northern forest.

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SIZE: 41,292 FT<sup>2</sup> (3,836 M<sup>2</sup>)

COMPLETED: 2009

*"Local wood species, brick, limestone and natural light comprise the palette of One Kids Place—a warm, welcoming place—the matrix in which colours dance and children thrive."*

PAUL MITCHELL, ARCHITECT









## ENVIRONMENTAL IMPACTS OF BUILDINGS

Research conducted independently in several countries, concludes that the use of wood helps to reduce the environmental impact of buildings. This research draws on sophisticated environmental impact criteria such as life cycle assessment (LCA) and the measurement of carbon footprint, both of which are beyond the scope of the most popular green building rating systems currently used in North America.

## LIFE CYCLE ASSESSMENT

Life cycle assessment is accepted worldwide as a means of evaluating and comparing the environmental impacts of building materials, products and complete structures—from resource extraction through manufacturing, transportation, installation, building operation, decommissioning and eventual disposal.

LCA studies consistently show that wood products yield clear environmental advantages over other building materials in terms of embodied energy, air and water pollution, and greenhouse gas emissions.

A comprehensive review of scientific literature looked at research done in Europe, North America and Australia pertaining to LCA of wood products. It applied LCA criteria in accordance with ISO 14040-42 and concluded, among other things, that:

- Fossil fuel consumption, the potential contributions to the greenhouse effect and the quantities of solid waste tend to be minor for wood products compared to competing products.
- Wood products that have been installed and are used in an appropriate way tend to have a favourable environmental profile compared to functionally equivalent products made out of other materials<sup>2</sup>.

<sup>2</sup> Source: Werner, F. and Richter, K. 2007. Wooden building products in comparative LCA: A literature review. *International Journal of Life Cycle Assessment*, 12(7): 470-479.







*Tseshahat Tribal Multiplex and Health Centre, Canada*

### **CARBON FOOTPRINT**

Trees and forest products play a critical role in helping to tackle climate change and reduce greenhouse gases. Using wood products that store carbon, as well as responsibly managing forests in a way that balances harvesting and replanting, can minimize our carbon footprint over the long term.

As trees grow, they clean the air we breathe by absorbing carbon dioxide from the atmosphere, storing the carbon in their wood, roots, leaves or needles, and surrounding soil, and releasing the oxygen back into the atmosphere. Young, vigorously growing trees absorb the most carbon dioxide, with the rate slowing as they reach maturity.

When trees start to decay, or when forests succumb to wildfire, insects or disease, the stored carbon is released back into the atmosphere. However, when trees are harvested and manufactured into forest products, the products continue to store much of the carbon. In the case of wood buildings, this carbon is kept out of the atmosphere for the lifetime of the structure—or longer if the wood is reclaimed and manufactured into other products.

In any of these cases, the carbon cycle begins again as the forest is regenerated, either naturally or by planting, and young seedlings once again begin absorbing carbon.



## Gateway Lodge Complex Care and Assisted Living, Canada



### PROJECT CREDITS

#### CRITICAL CARE TOWER, SURREY MEMORIAL HOSPITAL

##### CLIENT

Fraser Health Authority

##### ARCHITECT

CEI Architecture Planning Interiors  
and Parkin Architects in Joint Venture

##### STRUCTURAL ENGINEER

Bush Bohlman and Partners

##### WOOD SUPPLIER

StructureCraft Builders Inc.

##### DRAWINGS AND RENDERINGS

CEI Architecture Planning Interiors  
and Parkin Architects in Joint Venture

#### PRINCE GEORGE REGIONAL HOSPITAL EXPANSION

##### CLIENT

Northern Health Authority

##### ARCHITECT

DGBK Architects

##### STRUCTURAL ENGINEER

Read Jones Christoffersen Ltd.

##### WOOD SUPPLIERS

Artsy Contracting Co. Ltd. (Millwork)  
Structurlam Products Ltd. (Glulam)

##### PHOTOGRAPHERS

Wade Comer, Derek Lepper Photography,  
Structurlam Products Ltd.

#### THUNDER BAY REGIONAL HEALTH SCIENCES CENTRE

##### CLIENT

Thunder Bay Regional Health

##### ARCHITECT

Salter Farrow Pilon  
(later Farrow Partnership Architects)

##### STRUCTURAL ENGINEER

Michaelson/Cook Engineering Joint Venture

##### WOOD SUPPLIER

Western Archrib

##### PHOTOGRAPHERS

Salter Farrow Pilon  
(later Farrow Partnership Architects)  
Peter Sellar/Klik Photography

#### GATEWAY LODGE COMPLEX CARE AND ASSISTED LIVING

##### CLIENT

Northern Health Authority

##### ARCHITECT

Neale Staniszkis Doll Adams Architects

##### STRUCTURAL ENGINEER

Krahn Engineering Ltd.

##### WOOD SUPPLIERS

Mitsui Homes Canada Inc.  
(Prefabricated Panelized Wall System)  
Structurlam Products Ltd. (Glulam)  
iLevel Trus Joist by Weyerhaeuser (TJI Floor Joists)

##### PHOTOGRAPHER

Derek Lepper

#### BEICHUAN QIANG MAPLE LEAF SENIORS HOME

##### CLIENT

Beichuan County Government

##### ARCHITECTS

Initial Design: James Lee  
Final Design: FII China/ Sichuan Haichen Design  
Institute

##### STRUCTURAL ENGINEER

Thomas Leung and Associates

##### WOOD SUPPLIERS

Canadian Forest Products Ltd., Dunkley Lumber  
Ltd., Tolko Industries Ltd., West Fraser Timber  
Co. Ltd.

##### PHOTOGRAPHERS

FII China  
Canada Wood China

##### CARBON CALCULATIONS

US WoodWorks

#### TSESHAHT TRIBAL MULTIPLEX AND HEALTH CENTRE

##### CLIENT

Tseshaht First Nation

##### ARCHITECT

Lubor Trubka Associates Architects

##### STRUCTURAL ENGINEER

CWMM Consulting Engineers Ltd.

##### WOOD SUPPLIERS

Western Archrib (Glulam)  
Local Tseshaht Suppliers (Other Materials)

##### PHOTOGRAPHERS

Peter Powles  
Rastislav Zabka, Lubor Trubka Associates  
Architects

##### CARBON CALCULATIONS

US WoodWorks

#### HERRINGTON RECOVERY CENTER

##### CLIENT

Rogers Memorial Hospital

##### ARCHITECT

TWP Architecture

##### STRUCTURAL ENGINEER

Pujara Wirth Torke Inc.

##### PHOTOGRAPHER

RDImage  
Curtis Waltz

#### ONE KIDS PLACE CHILDREN'S TREATMENT CENTRE

##### CLIENT

One Kids Place Children's Treatment Centre

##### ARCHITECT

Mitchell Architects Inc.

##### STRUCTURAL ENGINEER

Anrep Krieg Desilets Gravelle Engineers Ltd.

##### WOOD SUPPLIERS

Timber Systems (Glulam)  
PC Custom Woodworking and Design  
(Millwork)  
Three H Furniture Systems Ltd.  
(Wood Case Goods)

##### PHOTOGRAPHER

Richard Johnson



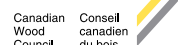
*Tseshah Tribal Multiplex and Health Centre, Canada*

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