

HEALTHY, DURABLE AND NATURALLY BEAUTIFUL, WOOD ENHANCES OUR  
LEARNING ENVIRONMENTS BOTH PHYSICALLY AND PSYCHOLOGICALLY

# WOOD IN EDUCATION



## Wood in Education



*Samuel Brighthouse Elementary School, Canada*



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People spend as much as 90 per cent of their time inside buildings, and for children, adolescents and an increasing number of young adults, most of this time is spent either at home or in school. Given this situation, it is clear that the design of our indoor environments is of critical importance to human health—an intuitive conclusion that is now supported by an increasing body of scientific evidence.

As this evidence has accumulated, so the mandate of the sustainability movement has expanded, from its initial focus on energy conservation and other environmental impacts, to include broader issues of human health.

## HUMAN HEALTH AND WELL-BEING

At the same time, the understanding of human health has also expanded, from a purely quantitative physical concept, to one that also embraces the more qualitative psychological aspects of human performance that contribute to our sense of well-being.

Over the last few decades, physical issues that affect the quality of the indoor environment have been dealt with incrementally through government legislation and international protocols. These measures have eliminated the use of many toxic or otherwise dangerous substances in buildings. In addition, we have seen the introduction of new standards to ensure adequate ventilation, reduce condensation and inhibit the growth of moulds and mildews.

## WOOD AND INTERIOR AIR QUALITY

Solid wood products, particularly flooring, are often specified in environments where the occupants are known to have allergies to dust or other particulates. Wood itself is considered to be hypo-allergenic, and its smooth surfaces prevent the build up of particles (common in soft finishes like carpet) and are easy to clean.

In the past, interior wood panel products, such as particleboard, medium density fibreboard (MDF), plywood and hardboard, were often identified as having a negative impact on indoor air quality because of their use of urea-formaldehyde (UF) glues.

Now, low and ultra-low formaldehyde panel products of all types are available for interior use. These products have been third-party certified as complying with the environmental criteria referenced in the U.S. Environmental Protection Agency's Guidelines for Environmentally Preferable Purchasing (EPP), as well as other international market standards such as Japan's F\*\*\*\* program.

The use of wood products can also improve indoor air quality by moderating humidity. Acting like a sponge, wood absorbs or releases moisture in order to maintain equilibrium with the adjacent air. This has the effect of raising humidity when the air is dry, and lowering it when the air is moist—the humidity equivalent of the thermal flywheel effect.





*Kingsdale Foundation Secondary School, England*

## **DESIGNING FOR HUMAN WELL-BEING**

The architecture of the 20th Century was dominated by an international preoccupation with function. The result was successive generations of buildings that were essentially machines, constructed using industrial products, sealed off from the outside world, conditioned with mechanical systems and largely dependent on artificial light. While many users found these buildings unpleasant to be in for prolonged periods, it is only recently that we have begun to rediscover the value of a more human-centred approach to design.

It is widely accepted that such an approach should include the elimination of toxins and contaminants from indoor environments as well as access to fresh air and daylight. Many studies have concluded that improving indoor environmental quality has direct benefits to human health and translates into greater productivity through improved concentration and lower levels of fatigue for building occupants.

While material choice is widely accepted as having a significant impact on indoor environmental quality, the idea that it might be equally important for psychological reasons has remained unproven until recently.

Research carried out at the University of British Columbia and FPIInnovations<sup>1</sup> has concluded that the visual presence of wood in the interior of buildings helps reduce stress levels in occupants.

These conclusions simply serve to emphasize the value of wood in creating humane, supportive and inspiring educational environments, such as those included here.

<sup>1</sup> Fell D.2002. Consumer Visual Evaluation of Canadian Wood Species. FPIInnovations, 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



*Samuel Brighthouse Elementary School, Canada*

*“The visual presence of wood in a room lowers sympathetic nervous system (SNS) activation—which is the way human bodies prepare themselves to deal with stress—further establishing the positive link between wood and human health.”*

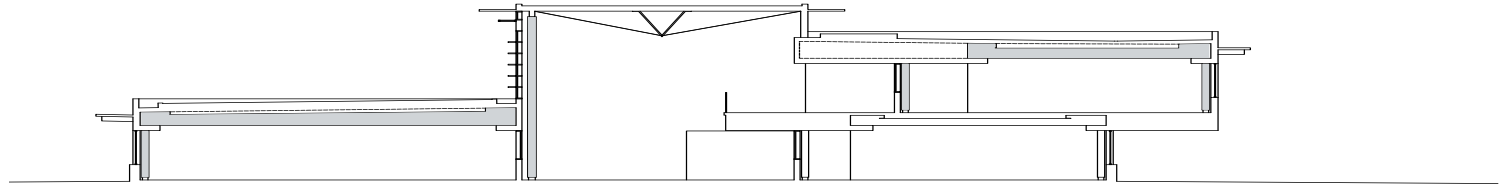
DAVID FELL, SUSTAINABLE BUSINESS MANAGEMENT LAB, FACULTY OF FORESTRY, UNIVERSITY OF BRITISH COLUMBIA





*“Learning is fostered in every facet of student education including, not only the people they interact with, but the structures that make up their physical environment as well. As a design driver, the expressive use of wood in new school construction has the potential to heighten the relationship students have with the building where they go to school.”*

ROBERT DREW, PROJECT ARCHITECT, PERKINS+WILL CANADA ARCHITECTS CO.



### **SAMUEL BRIGHOUSE ELEMENTARY SCHOOL** **RICHMOND, BC, CANADA**

The new Samuel Brighthouse Elementary School replaces an existing facility on the same site. The K-7 elementary school is planned to accommodate a future enrollment of 505 students.

The new school includes flexible and adaptable learning spaces that can accommodate varying needs, and promote collaborative and interactive learning experiences for the students. It also hosts a neighbourhood learning program that will support community-based needs and is home to a municipal adult literacy program.

The school district identified the project as an opportunity to promote sustainability and utilize the school as a teaching tool. The design team pursued both passive and active strategies including natural ventilation, daylight harvesting, triple-glazed classroom windows, geo-exchange energy, solar hot water heat, trickle vents, low volatile organic compound (VOC) materials, green roofs, carbon sequestration, and low maintenance landscaping materials.

The southern building, constructed entirely of wood, provides a single storey of classrooms, office and multipurpose spaces wrapped around an existing gym and stage. The northern block consists of a timber-frame second storey above a concrete main floor structure. Heavy timber construction was chosen as it would allow for an expressive structure yet still meet the requirements of the building and fire code.

The use of locally harvested wood figures prominently in the new school. British Columbia's *Wood First Act* was introduced in 2009 to “*facilitate a culture of wood by requiring the use of wood as the primary building material in all new provincially-funded buildings, in a manner consistent with the British Columbia Building Code.*” At Samuel Brighthouse, wood is the primary building material and was used for the post-and-beam structure of the building (which is visually expressed), wall framing, roof decking, millwork and interior doors, as well as the protective wall panels.

The undulating wood roof in the atrium is the signature architectural feature of the school, and demonstrates the beauty and structural capacity of dimensional lumber. The prefabrication of the wood roof panels permitted an accelerated construction schedule with shop and field construction proceeding concurrently. The panelized roof also enabled the building to be covered in more quickly than with a site built roof.

Much of the wood has been harvested from tracts of forests affected by the mountain pine beetle (MPB). This wood is easily identifiable by the blue appearance of many of the boards used for the roof deck, thus creating another optimal learning opportunity for the students of the school.

The use of wood in this school has been greatly admired by students and staff, and is a popular topic of discussion. These discussions go beyond the aesthetic qualities of the material and include the importance of forestry to the provincial economy and its role in the mitigation of climate change.

SIZE: 50,590 FT<sup>2</sup> (4,700 M<sup>2</sup>)

STUDENT CAPACITY: 505

COMPLETED: 2011





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SIZE: 75,350 FT<sup>2</sup> (7,000 M<sup>2</sup>)

STUDENT CAPACITY: 900

COMPLETED: 2011

**THE JIM PATTISON CENTRE OF EXCELLENCE IN SUSTAINABLE  
BUILDING TECHNOLOGIES AND RENEWABLE ENERGY  
CONSERVATION AT OKANAGAN COLLEGE  
PENTICTON, BC, CANADA**

The Centre of Excellence, which opened for classes in September 2011, was conceived to meet the urgent need for trades people, site managers, and construction workers who are skilled in the practices of sustainable building.

The 75,350 ft<sup>2</sup> (7,000 m<sup>2</sup>) facility, which uses its many innovative features to teach students about sustainable building techniques, has been designed to meet the Living Building Challenge and Leadership in Energy and Environmental Design® (LEED) Platinum standards.

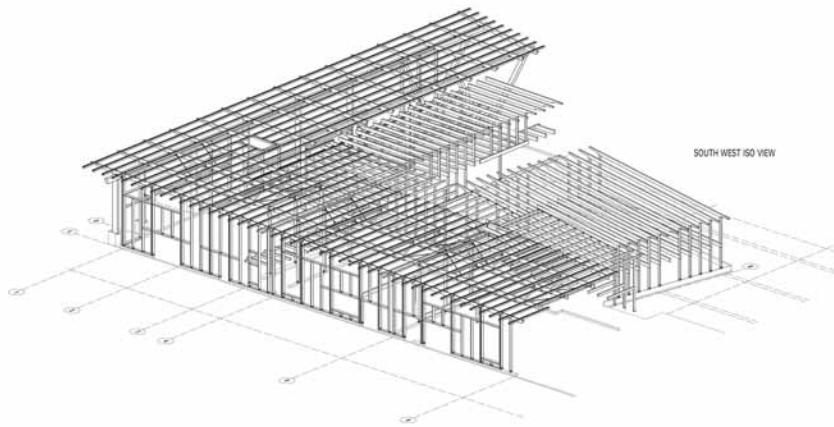
Site restrictions, together with the requirements for daylight penetration, meant that the building, which includes classrooms and workshops, administrative offices and student spaces, had to be arranged in linear fashion along a north-south axis. To improve passive solar performance and to define outdoor courtyard spaces projecting wings were added to the west.

The majority of the building is of wood-frame construction, using floors finished with a concrete topping that incorporates piping for radiant heat. The one exception is the gymnasium, where the requirement for a resilient floor precluded the use of concrete as a finish.

This resulted in the introduction of an innovative construction technique. Here, the walls are of composite wood and concrete construction, with glulam frames supporting an inner leaf of concrete in which radiant piping is embedded. This is believed to be the first application of this technique in North America.







*“The Centre of Excellence represents a fundamental change in the way we live, work and learn.”*

CORY NELMES, FINANCIAL COORDINATOR, OKANAGAN COLLEGE STUDENTS' UNION

Among the stringent prerequisites of the Living Building Challenge was the requirement to use environmentally responsible materials. British Columbia's mountain pine beetle wood was accepted by The Living Building Challenge as equivalent to salvaged material on the condition that it came from third-party certified sources and had chain of custody labeling. This created a win-win solution because much of B.C.'s forests have been affected by the mountain pine beetle infestation, and the wood needed to be harvested within a given time frame to be structurally viable.

In addition to capturing economic value, carbon continues to be stored in long-term wood products. Trees left standing are susceptible to fire and decay, both of which would result in the sequestered carbon being released to the atmosphere.

Using this wood also supports local communities dependent on the forest industry and so helps to mitigate the devastating socio-economic impact of the pine-beetle epidemic.





*“Building involves responsibility to the future—the use of wood is ideally suited to the making of humane, ecologically-oriented and economically-based environments.”*

MARK OSTRY, PRINCIPAL ACTON OSTRY ARCHITECTS

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SIZE: 105,250 FT<sup>2</sup> (9,500 M<sup>2</sup>)

STUDENT CAPACITY: 155

COMPLETED: 2005

### **KING DAVID HIGH SCHOOL VANCOUVER, BC, CANADA**

King David High School is a Jewish day school that fuses the traditions of Judaism with educational requirements of the Province of British Columbia. All the elements of the building are linked symbolically and functionally, with the intent of promoting educational, environmental and cultural values within the broader community.

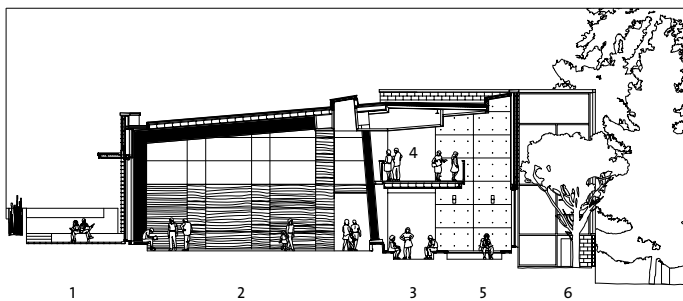
The internal organization of the school is distinctly linear with functional spaces distributed over two levels: an administration wing and library to the west, a classroom wing to the east and a large two-storey multipurpose gathering area that anchors the school and around which the circulation wraps.

The multipurpose space is the heart of the building, in location and in purpose, both symbolically and functionally. The space serves as a sanctuary, assembly hall and student lounge. The expansive room is open to the surrounding circulation system to reinforce the sense of a unique cultural and spiritual place and to strengthen the sense of connectivity and belonging of the student body to the school, their culture and the community.



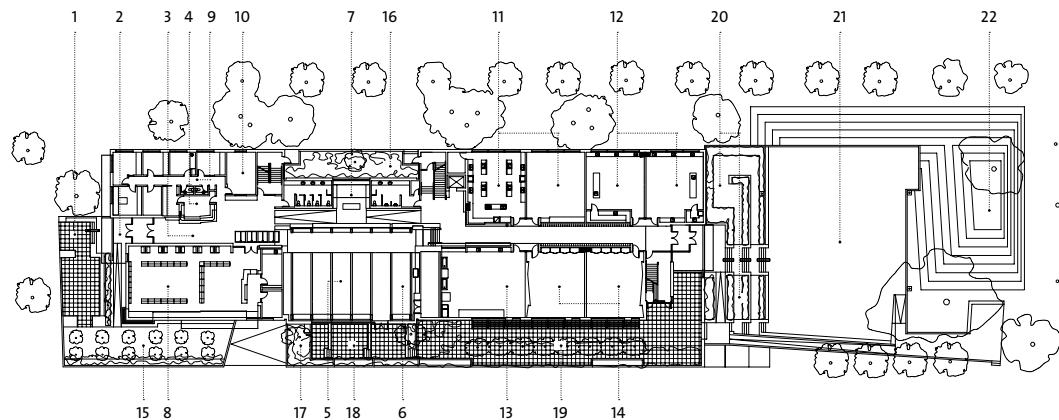
#### KEY

- 1 South Terrace
- 2 Multipurpose + Sanctuary
- 3 Ramp
- 4 Bridge
- 5 Lounge
- 6 Moss Garden



#### KEY

- |                            |                   |                           |
|----------------------------|-------------------|---------------------------|
| 1 Forecourt                | 9 Administration  | 17 Water Garden           |
| 2 Main Entrance            | 10 Meeting        | 18 West Terrace           |
| 3 Dedication               | 11 Applied Skills | 19 South Terrace          |
| 4 Reception                | 12 Science        | 20 Grains and Herb Garden |
| 5 Multipurpose + Sanctuary | 13 Arts           | 21 Sports Court           |
| 6 Ark                      | 14 Music + Drama  | 22 Mount                  |
| 7 Lounge                   | 15 Orchard Garden |                           |
| 8 Library                  | 16 Moss Garden    |                           |



Sustainability principles have been integrated throughout the facility. The long narrow footprint addresses solar orientation considerations while skylights and abundant natural daylight reduce reliance on electrical lighting throughout much of the day.

Construction materials are sparse and durable to convey a sense of permanence: poured-in-place concrete, integrally coloured concrete block, Jerusalem stone, western red cedar siding, heavy glulam columns and beams. The use of structural components as finishing materials, combined with large expanses of wood paneling and pin-up surfaces, results in a reduction of the use of gypsum board as a finish material.

There is a strong relationship between the mixtures of materials, but wood is the most important—injecting warmth and humanizing the building through its measured use, while appealing to people's senses, psyche and imagination.

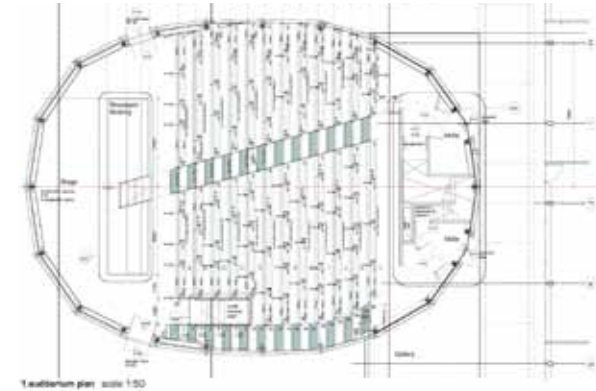
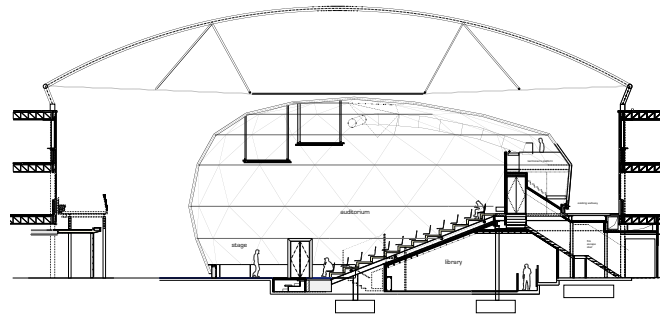




*"The (Sports and Music buildings at Kingsdale) can be seen as a demonstration project for the future delivery of fast, economic and ecologically sound education buildings."*

ALEX DE RIJKE, PARTNER DRMM ARCHITECTS





SIZE: 33,450-FT<sup>2</sup> (3,200-M<sup>2</sup>) (TRANSFORMATION) /  
22,600 FT<sup>2</sup> (2,100 M<sup>2</sup>) (MUSIC & SPORTS BUILDING)  
STUDENT CAPACITY: 1,100  
COMPLETED: 2003 (TRANSFORMATION) / 2007  
(MUSIC & SPORTS BUILDING)

## KINGSDALE FOUNDATION SECONDARY SCHOOL LONDON, ENGLAND

The Kingsdale School project challenges the conventions of school buildings, seeking to positively inspire academic standards and the self-esteem, morale and pride of the school community with radical architecture. The architects sought to build a provocative corollary between design and pedagogy: a three-dimensional catalyst.

When the UK's Architecture Foundation initiative 'School Work's' asked the architectural and educational communities how the quality of school buildings related to behaviour, morale and learning standards, Kingsdale, a failing comprehensive school, offered itself as a site for research and experimentation.

The design team's decision not to replace but to creatively recycle the existing school, ultimately transformed the campus. The radical re-design and parallel changes in management structure and style created fundamental and sustainable improvements to both the design of educational facilities and the academic performance they foster.

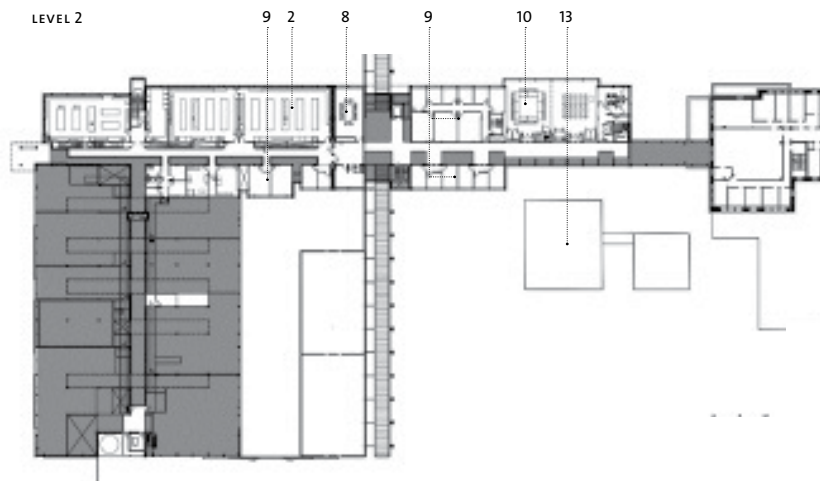
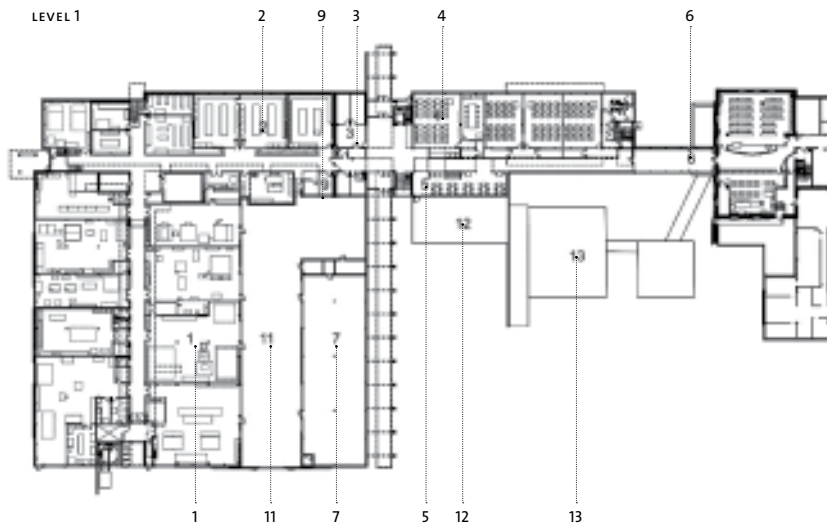
The existing 1960's building was judiciously 'edited' and then redefined by strategic additions, with the result unified under a variable-skin fabric roof. This Teflon coated plastic solar controlling canopy spans across the 33,450-ft<sup>2</sup> (3,200-m<sup>2</sup>) indoor/outdoor courtyard, the largest enclosed school space in Britain.

The resultant open-plan volume is naturally lit, heated, cooled and ventilated, and facilitates mixed-uses including dining, circulation, assemblies and an engineered wood-clad geodesic auditorium, the new heart of the campus.

This is a 3D engineered-timber prefabricated structure, a form made possible by computer controlled cutting machines. The structure consists of an asymmetrical geodesic softwood primary structure, with a sandwich panel acoustic secondary structure as finish. The auditorium is used for performances, presentations, meetings, films, local community church meetings, and it can seat more than 300 people.

The new Music & Sports Buildings are positioned to the east, their distinct volumes forming a gateway to the adjacent community. The structures are of cross-laminated timber (CLT), whose multiple attractions include shorter erection times, sustainability, omission of wet trades, factory quality finishes, and the good health connotations of using wood. The superstructure was substantially erected within a 10-week period, with structure and internal finish as one process and requiring only an external sheet-based weatherproof cladding.

The Kingsdale School epitomizes the architects' philosophy of choosing materials and products which fit ecological and expressive intentions. The resultant architecture speaks of form, content and style, born out of a passion for the art of making buildings.



KEY

- |                      |                        |
|----------------------|------------------------|
| 1 Research Workshops | 8 Meeting room         |
| 2 Laboratories       | 9 Offices              |
| 3 Administration     | 10 Conference Room     |
| 4 Classrooms         | 11 Wood Yard           |
| 5 Rest Area          | 12 Terrace             |
| 6 Bridge             | 13 Existing Greenhouse |
| 7 Storage            |                        |

## EUGENE H. KRUGER BUILDING, LAVAL UNIVERSITY, QC, CANADA

Incorporating both research facilities for the wood industry and undergraduate teaching space for 200 students and faculty, the 86,100 ft<sup>2</sup> (8,000 m<sup>2</sup>) all-wood Kruger Building is located on the University of Laval's campus and linked to the existing buildings of the Faculty of Forestry and Geomatics.

In commissioning this facility, the University of Laval had two special objectives. To begin with, the facility needed to demonstrate the potential of all-wood construction in a large scale building, expanding its use beyond the residential market to which it has been largely confined in the east of the country. And secondly, the design of the university's first building had to incorporate the principles of sustainability, reducing operating costs, especially energy consumption, over the building's lifetime.

In response, the architects focused on expressing the modern technological nature of eastern wood. Due to the small size of available trees, the raw material is typically reduced to particles, chips and strips, and then assembled into manufactured components. The product is therefore more uniform and stable, allowing thinner sections than unprocessed wood.

The building rationally assembles standard materials [wood joists, panels and siding] in repetitive modules within a primary glulam frame. Rustic materials such as stone are avoided, and the wood is associated with other manufactured materials such as thin metal components and glass.

Additionally, the principles of bioclimatic design—the use of natural energy, sun and wind to reduce reliance on fossil fuels and grid energy—are employed to achieve basic sustainability goals. Together the visual warmth of the exposed wood, plentiful natural light and ventilation increase the users' sense of comfort and well-being.

Extensive operable glazing in occupied rooms, activity and circulation spaces creates a sociable environment in contact with the wooded site. Thus, light is married with wood and the building with the material that shapes it.

The exterior wood siding is the same grey as the predominately limestone campus, monochrome-like weathered wood and tree bark. Analogous to the warmth of trees, the building interior is honey coloured, transparently-coated exposed wood.



*"The design of the Kruger building seeks to provide a pleasurable experience by the greatest possible exposure to natural elements such as sunlight, wind and wood."*

PAUL GAUTIER, GAUTIER, GALLIENNE MOISAN ARCHITECTS



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SIZE: 86,100 FT<sup>2</sup> (8,000 M<sup>2</sup>)

STUDENT CAPACITY: 200

COMPLETED: 2005







### MIANYANG SPECIAL EDUCATION SCHOOL, MIANYANG, CHINA

This school is located close to the site of the 2008 Sichuan earthquake, which had a devastating impact on the Mianyang Municipality. It claimed the lives of more than 20,000 people, injured another 180,000, and left more than 13,000 children and adults permanently disabled.

This school was designed to meet the needs of 210 students with a wide range of disabilities, and was donated to the community as a gesture of goodwill by the Government of Canada and the Government of British Columbia. It also serves as a showcase for Canadian wood products and construction techniques that are highly effective in areas subject to high levels of seismic activity.

The lightness, flexibility and consistent quality of site built wood-frame construction makes it far less susceptible to catastrophic failure under earthquake conditions than the concrete construction generally used in the developing world. As a demonstration project, this school was designed by Canadian consultants and constructed by local workers supervised by Canadian site personnel.

The lightweight frame construction also minimized excavation and disruption to the hydrology of the site—a former fruit farm with a sloping topography, thin topsoil and a subsoil layer that is mainly of clay.

The building follows the sloping site so that its various components can be reached and connected by ramps. It is possible to travel by wheelchair from the student dormitories at the highest point of the site, via the classrooms, auditorium and dining hall, to the football field at the lowest point.

In an effort to minimize future seismic damage, the building has deliberately been broken down into small blocks that are interrupted by and connected to, concrete stair towers. This structural concept results in a rhythm of horizontal and vertical elements that becomes the architectural vocabulary of the building.

Cross ventilation is achieved by roof vents on the top floor and in each classroom. Methane gas is obtained from the local farmers and used for cooking, and animal waste is used to fertilize the vegetable garden.

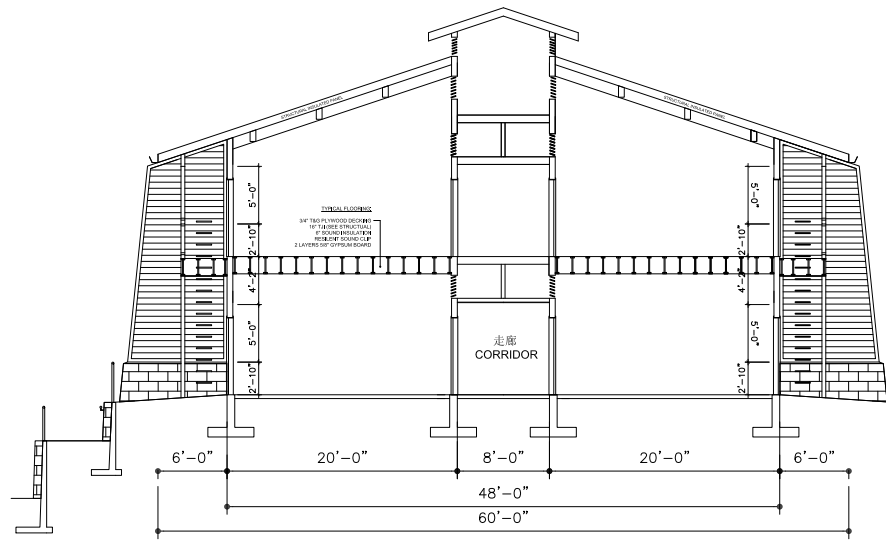
In August 2011, Mianyang Special Education School was awarded a gold medal in a major Chinese architectural competition.

SIZE: 57,000 FT<sup>2</sup> (5,300 M<sup>2</sup>)

STUDENT CAPACITY: 210

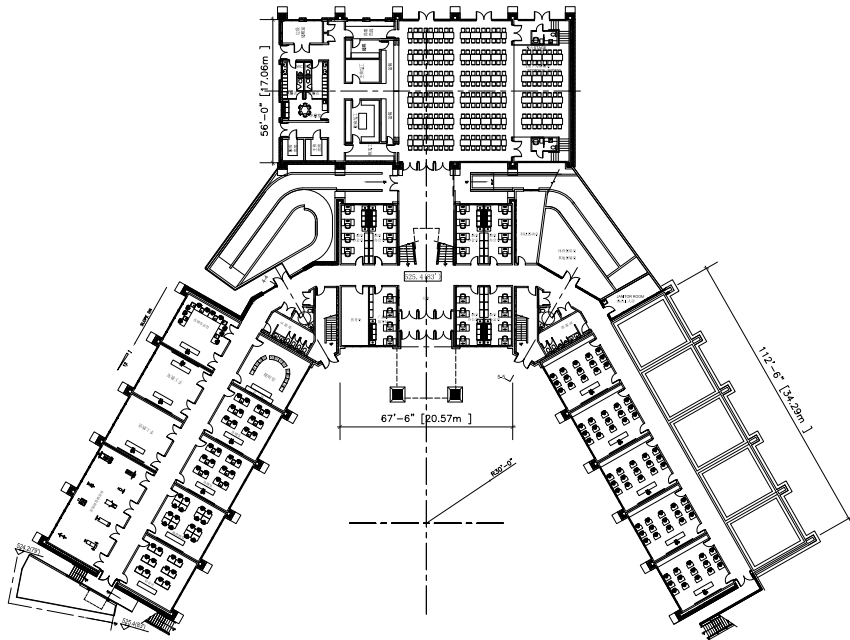
COMPLETED: 2011





*"It is the best school in the city. It is so beautiful."*

MIANYANG SPECIAL SCHOOL PARENT





### **ROSA PARKS ELEMENTARY SCHOOL REDMOND, WA, US**

SIZE: 66,000 FT<sup>2</sup> (6,100 M<sup>2</sup>)

STUDENT CAPACITY: 550

COMPLETED: 2006

Rosa Parks Elementary School is a focal point of community activity within a new planned neighbourhood in the municipality of Redmond, which lies close to the Cascade Mountains on the outskirts of Seattle.

The school responds to surrounding parks, greenbelts and undisturbed forest with classroom clusters that are oriented to capture daylight and views of nature. The design of both site and building reinforce the identity of this dense, walkable neighbourhood, located within a remarkable natural setting.

The building is organized around a central gallery running north-south through the building. The main public and shared spaces—gym, library, administration and commons—lie to the west of the gallery and appear as a series of separately delineated masses. These spaces are designed to be accessible to the community after regular school hours. To the east of the gallery are three classroom wings—one a single storey in height, the others two storeys—that alternate with landscaped courtyards.



*"The teachers and staff are excited and happy to be a part of this school. We have two boys who currently attend Rosa Parks and we can't be happier... it's a beautiful school and a wonderful, caring community."*

ROSA PARKS PARENT

There is a discernible rhythm as one moves along the gallery, with views into intimate learning environments juxtaposed with distant views of nature that invite students and their families to engage with the many layers of this dynamic place. The building form and materials synthesize simple massing, shed roofs and a transparent circulation volume with a restrained natural material palette, saturated with colour.

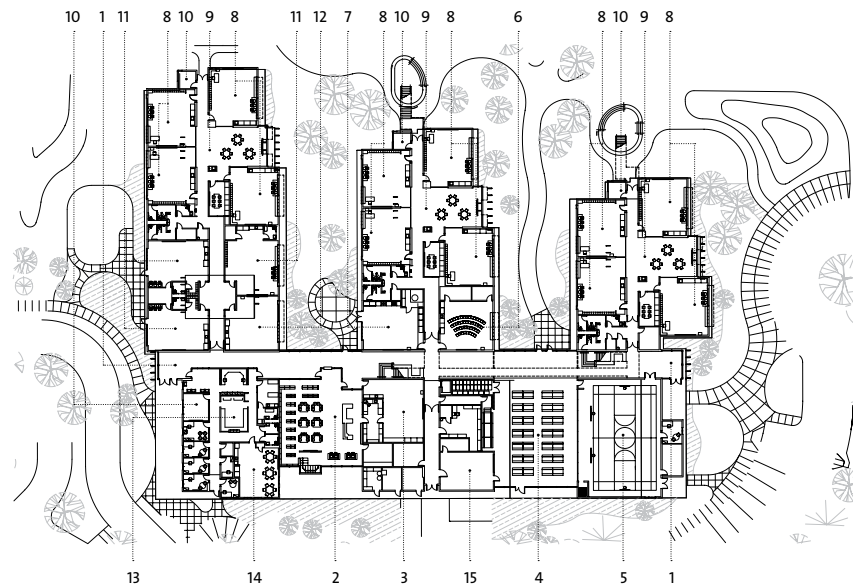
Before embarking on this project, the Redmond School District had a tradition of building in steel. However with Rosa Parks, the desire to connect the school visually to its setting naturally led to the introduction of wood as the dominant material expression for the building.

Apart from steel columns and composite wood and steel roof trusses, the school is constructed of wood, including exposed roof purlins and decking, and exterior and interior frame walls. Internally, clear finished wood products are in evidence everywhere, including window frames, millwork and perforated acoustic paneling.

The use of wood has both a practical purpose and a psychological one, providing durable, self-finished, low maintenance and nontoxic surfaces for ceilings, walls and floors, as well as creating a sense of connection to the outside world. The exposed wood juxtaposed with a palette of rich natural colours—charcoal gray, deep browns, and vibrant green—engages in a spirited dialogue with this rich natural environment.

#### KEY

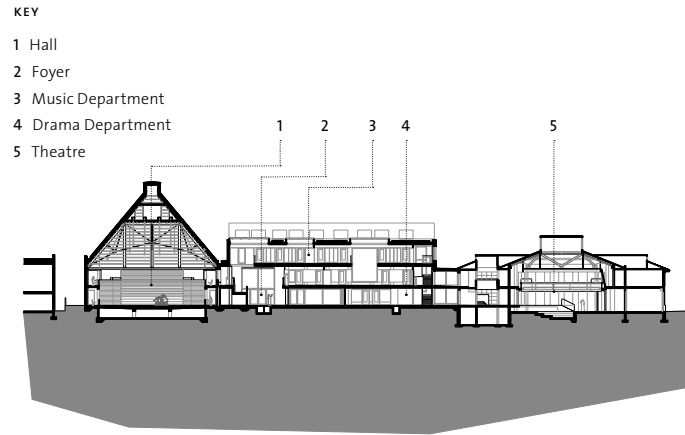
- |               |                   |
|---------------|-------------------|
| 1 Gallery     | 9 Activity        |
| 2 Library     | 10 Conference     |
| 3 Technology  | 11 Kindergarten   |
| 4 Commons     | 12 Resource Room  |
| 5 Gym         | 13 Administration |
| 6 Music       | 14 Staff Room     |
| 7 Art/Science | 15 Kitchen        |
| 8 Classroom   |                   |











SIZE: 29,000 FT<sup>2</sup> (2,700 M<sup>2</sup>)

STUDENT CAPACITY: 1000

COMPLETED: 2010

## SEVENOAKS SCHOOL PERFORMING ARTS CENTRE SEVENOAKS, KENT, ENGLAND

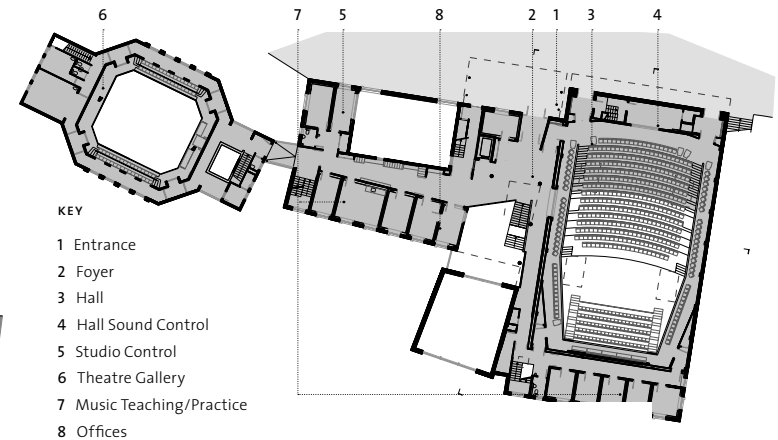
Sevenoaks School is a highly successful international coeducational school, with an exceptional standard of music and drama. The structure for its new performing arts centre comprised a 450-seat concert hall for orchestra and choir, a recital room for 100, a flexible drama studio, 24 music and drama teaching spaces, technical spaces and offices, and improvements to its existing theatre.

Wood is used extensively throughout the building to provide the warmth and acoustic response conducive to music. Douglas-fir was chosen for its colour, vitality and strength, and is used for roof structures, windows and doors, joinery, paneling and handrails—all except flooring where the hardness of oak was needed. Wood is complemented by pale concrete and a pinkish-textured brick. Construction is unadorned, allowing the quality of craftsmanship to be revealed and appreciated.

Spaces are arranged to exploit the site's slope and views to the east, and to make an aggregation of forms of scale and complexity to complement older school buildings.

Acoustic considerations underlie every aspect of the design, and the acoustics result from the actual construction of the building—using the volumes, geometry, materials and construction details, rather than by addition of remedial elements.

The hall's large open roof structure with low eaves gives volume yet intimacy. Douglas-fir trusses with steel tension rods span across the 59-ft



(18-m) width, supporting Douglas-fir purlins and decking. Above this, another 11 layers of construction create a roof which is lightweight but highly sound proof.

The recital room is a space made entirely of wood, with an expansive view of greenery and a scale suited to smaller music ensembles. For acoustic reasons the room has non-orthogonal geometry and an asymmetric pyramid roof, the timber junctions of which were site-crafted. The exposed rhythm of rafters and purlins and the timber battened wall linings naturally reflect and diffuse sound to provide optimal acoustics.

Smaller music rooms have purpose-made Douglas-fir windows with fixed glazing, solid timber ventilator panels and deep timber window seats.

Environmentally the building is much more innovative than it might appear, with comprehensive day lighting, groundwater cooling and solar water heating. The auditorium is naturally ventilated—an unusual and impressive feat for an acoustically sensitive space.

The building has great appeal—people love the warmth, colour and variety in the grain of the wood. The school has seen a great increase in numbers of students eager to perform, and is delighted with its impact. It is built to withstand the rigours of life in a busy arts building and age beautifully.

PETER YOUNG, CONDUCTOR

ON THE INAUGURAL CONCERT AT THE CENTRE



*The Jim Pattison Centre of Excellence in Sustainable Building Technologies and Renewable Energy Conservation, Canada*

### **CARBON ACCOUNTING FOR BUILDINGS**

The carbon cycle affects the amount of energy trapped in the atmosphere. Plants absorb carbon dioxide and emit oxygen during photosynthesis. Carbon dioxide is emitted when substances decompose or burn.

When a tree is cut down, 40 to 60 per cent of the carbon stays in the forest, and the rest is removed in the logs, which are converted into forest products.

Once the harvested area is regenerated, either naturally or by planting seedlings, the forest begins to store carbon again. This combination of harvest and re-growth, along with the fact that most wood products have a lighter environmental footprint and store carbon for long periods of time, means that sustainable forest management practices can lower greenhouse gas emissions.





## PROJECT CREDITS

### SAMUEL BRIGHOUSE ELEMENTARY SCHOOL

#### CLIENT

School District No. 38 Richmond

#### ARCHITECT

Perkins+Will Canada Architects Co.

#### JOINT VENTURE ARCHITECT

Perkins+Will Los Angeles Office

#### STRUCTURAL ENGINEER

Fast + Epp Structural Engineers

#### FABRICATOR

Western Archrib

#### PHOTOGRAPHS

Courtesy Perkins+Will Canada Architects Co.  
Photographers: Latreille Delage Photography  
and Nic Lehoux

### THE JIM PATTISON CENTRE OF EXCELLENCE

#### CLIENT

Okanagan College

#### ARCHITECT

CEI Architecture Planning Interiors

#### STRUCTURAL ENGINEER

Fast + Epp Structural Engineers

#### COMPOSITE WOOD PANELS FABRICATOR

StructureCraft Builders Inc.

#### GLULAM FABRICATOR AND ISO DRAWING

Structurlam Products Ltd.

#### PHOTOGRAPHERS

Okanagan College, Ed White

### KING DAVID HIGH SCHOOL

#### CLIENT

King David High School

#### ARCHITECT

Acton Ostry Architects Inc.

#### STRUCTURAL ENGINEER

Glottman Simpson Consulting Engineers

#### FABRICATOR

Western Archrib

#### PHOTOGRAPHER

Martin Tessler

### KINGSDALE FOUNDATION SECONDARY SCHOOL

#### CLIENT

Kingsdale Foundation School

#### ARCHITECT

dRMM (de Rijke Marsh Morgan Architects)

#### STRUCTURAL ENGINEER

Michael Hadi Associates

#### PHOTOGRAPHERS

Alex de Rijke, Jonas Lancer, Michael Mack

### EUGENE KRUGER BUILDING

#### CLIENT

Laval University

#### ARCHITECT

Gautier Gallienne Moisan, architects

#### STRUCTURAL ENGINEER

BPR Inc

#### FABRICATOR

Nordic Engineered Wood

#### PHOTOGRAPHER

Laurent Goulard

### MIANYANG SPECIAL EDUCATION SCHOOL

#### CLIENT

Mianyang Special Education School

#### ARCHITECT (CANADA)

James Lee

#### DESIGN CONSULTANT (CHINA)

Haichen Project Design and Research Co., Ltd.

#### STRUCTURAL ENGINEER

Thomas Luang

#### PHOTOGRAPHER

James Lee

### ROSA PARKS ELEMENTARY SCHOOL

#### CLIENT

Lake Washington School District

#### ARCHITECT

Mahlum

#### CIVIL & STRUCTURAL ENGINEER

Coughlin Porter Lundeen

#### PHOTOGRAPHS

Courtesy of Mahlum  
Photographer: Benjamin Benschneider

### SEVENOAKS SCHOOL PERFORMING ARTS CENTRE

#### CLIENT

Sevenoaks School Foundation

#### ARCHITECT

Tim Ronalds Architects

#### STRUCTURAL ENGINEER

Price & Myers

#### THEATRE CONSULTANT

Carr & Angier

#### ROOF TRUSSES

Constructional Timber

#### PHOTOGRAPHER

David Merewether Photography



*Eugene H. Kruger Building, Laval University, Canada*

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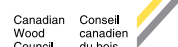
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