Introduction

The Regional District of Nanaimo commissioned Hughes Condon Marler: Architects in May 2005 to organize and conduct a tour of green buildings in the Vancouver and Victoria areas. The tour is intended to help fulfill the objectives of the RDN's Green Buildings Project.

The objectives of the Green Building Project are for the RDN to become more informed about green buildings and for the RDN to make a decision regarding the advancement of future phases of a green building program for the region.

"Green Building Case Studies" highlights sustainable design features and performance for 16 different buildings, ranging from such diverse projects as a new aquatic centre, a city hall facility, an elementary school and municipal operations centre.

Each case study documents key green building strategies within seven key categories: Sustainable Site, Materials & Resources, Water Efficiency, Energy & Atmosphere, Green Performance, Indoor Environmental Quality, Innovation & Design. Five of the featured buildings are LEED® Certified and include a LEED® Score Card outlining the points awarded. This "Green Building Case Studies" serves as a valuable pre-tour and companion document for tour participants as well as a resource document for future reference.

During the preparation of this pre-tour publication two key findings emerged:

- A successful green building must address basic architectural quality and design excellence in addition to green building performance targets. This will ensure the facility meets the long term needs of its users and continues to inspire its occupants for years to come.

- Standardized green building performance indicators and measurements (such as LEED®) play and will continue to play a critical role in furthering the advancement of sustainable design. Such standardized measurements make it easier for municipalities, developers, architects, contractors, manufacturers and the building industry itself to mutually adopt and implement green building technology.

It is helpful to consider these two key findings as you review the case studies presented here and tour the selected facilities.

The "Green Building Case Studies" reflect the contributions and cooperation of numerous architectural firms and individuals, to whom we are thankful. We trust readers will find valuable knowledge and inspiration in the 16 projects highlighted here, and begin to establish some ideas for the future phases of a green building program for the Nanaimo Regional District.

Michel Labrie
Director of Sustainable Design
Hughes Condon Marler : Architects

Disclaimer

Green Building Case Studies

HCMA Office Renovation HUGHES CONDON MARLER : ARCHITECTS

CLIENT
Hughes Condon Marler : Architects
DATE OF COMPLETION
January 2005
BUILDING TYPE
Commercial Interior
LEED® CERTIFICATION
LEED-CI Silver

HCMA Office Renovation

LEED® for Commercial Interiors (LEED-CI) is a rating system that addresses the specifics of tenant spaces primarily in office and institutional buildings. LEED-CI is designed to complement the LEED Green Building Rating System, Version 2.1. The USGBC is also developing a companion rating system called LEED for Core & Shell or LEED-CS. Together, LEED-CS and LEED-CI will establish green building criteria for commercial office real estate for both developers and tenants.

HCMA Office Renovation

The existing building is a three storey concrete block and wood frame structure with a heavy timber roof containing both office and retail space. The original two-storey building was built in 1968. The predecessor firm added a third floor in 1986. Most recently Hughes Condon Marler: Architects participated in the LEED for Commercial Interiors Pilot Project during an expansion in 2003.

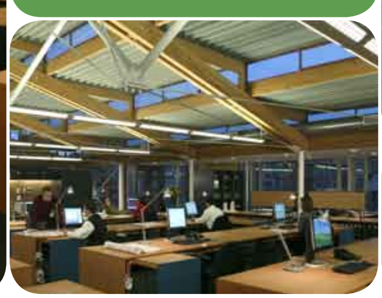
A significant portion of the office renovation consisted of custom designed workstations and reception desk. Extensive research on sustainable panel materials resulted in the choice of Medite II, an SCS certified no-added-formaldehyde MDF panel engineered for non-structural applications. This product can be used in place of plywood and solid wood. Used for all of the workstations and millwork, provides the flexibility of a composite panel with the emissions of solid wood. Made from wood chips and sawdust reclaimed during the milling process, it is 100% recovered and recycled wood fiber, from farmed or second growth timber. The millwork was produced by a local manufacturer with a workshop within 10km of the job site.

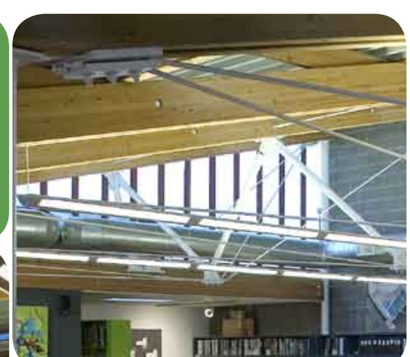
This office space features an open concept design without the need for floor-to-ceiling interior walls. The use of interior load bearing and partition walls has been reduced and any new construction made use of framing reclaimed during the demolition process.

The use of natural ventilation and natural daylighting strategies decrease dependence on HVAC equipment and artificial lighting. The total exterior wall area, including clerestory windows, is more than 55% glass. When artificial lighting is required the fixtures are high efficiency fluorescent fixtures developed by a local lighting manufacturer. Operable windows offer fresh air and thermal comfort. The natural effect of wind, stack effect and interior/exterior temperature differentials help to induce air circulation and replacement.

Millwork is made from 100% recovered and recycled wood fiber and contains no added formaldehyde

100%
of workstations have natural light and views to the outside





Coating added to clerestory windows filters the sunlight and reduces glare on computer monitors



Sustainable Site

- 75% of existing interior walls and ceilings are retained
- A secure bicycle storage, new shower and changing room were added to encourage alternative modes of transportation
- An agreement made with the City of Vancouver relaxed parking by-law in recognition of alternative transportation amenities
- Deck landscaping is predominantly native and edible plants in organic soil

Materials & Resources

- Any new construction used framing reclaimed during the demolition process
- 13% of construction materials contain some recycled content
- 22% recycled content in furniture and construction materials
- 16% of construction materials and furniture manufactured and extracted locally
- All millwork panels made from 100% recovered and recycled wood fiber with no added formaldehyde
- The carpet is 20% post-consumer recycled PET products (e.g. soda bottles)
- All drywall, carpet, lumber, countertops, and steel door frames were recycled or re-used to divert waste from landfill
- 84% of existing furniture and furnishings retained for re-use

Water Efficiency

- Low flow fixtures installed in the office kitchen, WC, sink, and shower
- Requires no permanent irrigation system for deck landscaping
- A rainwater collection system established for watering plants and trees on deck garden

Energy & Atmosphere

- 90% of all eligible equipment is Energy Star rated
- All workstations upgraded with new Energy Star computer monitors
- Individual energy metering of tenant spaces enables accurate measurement of energy use and savings
- 100% of energy requirements fulfilled by Green Power Certificates, exceeding LEED requirements
- HVAC system reviewed, balanced and adjusted by commissioning agent to ensure optimal operation

Green Performance

Water

- **0%** potable water used for irrigation

Materials

- **80%** of construction waste was diverted from the landfill
- **22% recycled content** in furniture and construction materials

Energy

- **100% of energy** requirements fulfilled by Green Power Certificates, exceeding LEED requirements

IEQ

- **100% of workstations** have natural light and views to the outside
- **100% workstations** have access to operable windows

0%
permanent irrigation system for landscaping

80%
of demolition waste diverted from landfill

100%
of energy requirements fulfilled by Green Power Certificates

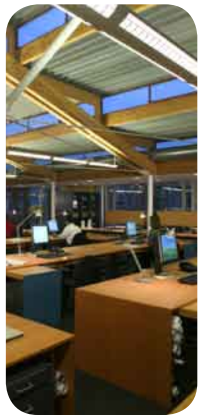
Indoor Environmental Quality

- Clerestory windows maximize daylight and reduce need for artificial lighting
- A coating added to the clerestory windows filters light to reduce glare on computer monitors
- Low VOC (Volatile Organic Compound) paints, carpet, adhesives, and composite wood products are used to improve air quality
- An indoor air quality management plan reduced worker's exposure to contaminants during construction

Innovation & Design

- Out of date lighting systems were replaced with prototype adjustable high-efficiency fluorescent fixtures
- A green cleaning/housekeeping plan protects employees and cleaning staff from toxic chemical exposure
- All cleaning products are non-hazardous, have a low environmental impact, and meet the Green Seal Standard





LEED Scorecard

LEED™ Commercial Interior Scorecard

29.0			**Total Project Score**	Possible Points **56**

Certified 21 to 26 points **Silver** 27 to 31 points **Gold** 32 to 41 points **Platinum** 42 or more points

4.0			**Sustainable Sites**	Possible Points	7
Y	?	N			
		N	Credit 1	**Site Selection \ LEED Building**	3
		N	Credit 1.0.2	**Site Selection**, Ozone Depleting Materials	0.5
		N	Credit 1.0.3	**Site Selection**, Non-polluting Source-renewable Energy	0.5
		N	Credit 1.0.4	**Site Selection**, Operable Windows	0.5
		N	Credit 1.0.5	**Site Selection**, Brownfield Site	0.5
		N	Credit 1.0.6	**Site Selection**, Heat Island Effect, Roof	0.5
		N	Credit 1.0.7	**Site Selection**, Light Pollution Reduction	0.5
		N	Credit 1.0.8	**Site Selection**, Heat Island Effect Non-roof	0.5
		N	Credit 1.0.9	**Site Selection**, Water Efficent Landscaping , Reduce by 50%	0.5
		N	Credit 1.0.10	**Site Selection,** Innovative Wastewater Technologies	0.5
		N	Credit 1.0.11	**Site Selection**, Water Use Reduction, 20% reduction	0.5
		N	Credit 1.0.12	**Site Selection**,	0.5
		N	Credit 1.0.13	**Site Selection**, Parking Reduction	0.5
		N	Credit 1.0.14	**Site Selection**, Exeptional Parking Reduction	0.5
		N	Credit 1.0.15	**Site Selection**, Natural Ventilated Building	0.5
1			Credit 2.0	**Development Density**	1
1			Credit 4.1	**Alternative Transportation,** Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation,** Bicycle Storage \ Changing Rooms	1
1			Credit 4.4	**Alternative Transportation**, Parking Availability	1

			Water Efficiency	Possible Points	2
Y	?	N			
		N	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
		N	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

3			**Energy & Atmosphere**	Possible Points	13
Y	?	N			
Y			Prereq 1	**Fundamental Building Systems Commissioning**	
Y			Prereq 2	**Minimum Energy Performance**	
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	
		N	Credit 1.1	**Optimize Energy Performance**, Ligthing Power	3
		N	Credit 1.2	**Optimize Energy Performance**, Lighting Controls	2
		N	Credit 1.3	**Optimize Energy Performance**, HVAC	2
1			Credit 1.4	**Optimize Energy Performance**, Equipment + Appliances	2
		N	Credit 3	**Additional Commissioning**	1
		N	Credit 5.1	**Measurement & Verification**, Sub Metering	1
1			Credit 5.2	**Measurement & Verification**, Energy Cost Paid by Tenant	1
1			Credit 6	**Green Power**	1

9			**Materials & Resources**	Possible Points	14
Y	?	N			
Y			Prereq 1	**Storage & Collection of Recyclables**	
		N	Credit 1.1	**Building Reuse**, Long Term Lease	1
1			Credit 1.2	**Building Reuse**, Maintain 50% of Non-Shell	1
1			Credit 1.3	**Building Reuse**, Maintain 75% of Non-Shell	1
1			Credit 2.1	**Construction Waste Management**, Divert 50%	1
1			Credit 2.2	**Construction Waste Management**, Divert 75%	1
		N	Credit 3.1	**Resource Reuse**, Reuse 5%	1
		N	Credit 3.2	**Resource Reuse**, Reuse 10%	1
1			Credit 3.3	**Resource Reuse**, 30% Furniture and Furnishings	1
1			Credit 4.1	**Recycled Content**, 5% (Post-consumer + 1/2 Post-Industrial)	1
1			Credit 4.2	**Recycled Content**, 10% (Post-consumer + 1/2 Post-Industrial)	1
1			Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
1			Credit 5.2	**Local/Regional Materials**, of 10% Extrated and Manufactured Regionally	1
		N	Credit 6	**Rapidly Renewable Materials**	1
		N	Credit 7	**Certified Wood**	1

8			**Indoor Environmental Quality**	Possible Points	15
Y	?	N			
Y			Prereq 1	**Minimum IAQ Performance**	
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	
		N	Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
		N	Credit 2	**Increase Ventilation Effectiveness**	1
		N	Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
		N	Credit 3.2	**Construction IAQ Management Plan**, After Cons. / Before Occupancy	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
		N	Credit 4.5	**Low-Emitting Materials**, Furniture and Furnishings	1
		N	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1			Credit 6	**Controllability of Systems**	1
1			Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
		N	Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

5			**Innovation & Design Process**	Possible Points	5
Y	?	N			
1			Credit 1.1	**Innovation in Design**: Education	1
1			Credit 1.2	**Innovation in Design**: Exemplary use of Green Power	1
1			Credit 1.3	**Innovation in Design**: House Keeping Plan	1
1			Credit 1.4	**Innovation in Design**: Exeptional Reuse of Furniture	1
1			Credit 2	**LEED™ Accredited Professional**	1

Notes

West Vancouver Aquatic Centre

Hughes Condon Marler : Architects

CLIENT
District of West Vancouver
DATE OF COMPLETION
January 2004
BUILDING TYPE
Community Recreation Facility

West Vancouver Aquatic Centre

The renovation and expansion of the West Vancouver Aquatic Centre breaks new ground as a dramatic revitalization of a 30 year old aquatic and recreation facility. The sensitive reorganization of existing facilities and the introduction of an expressive new form breathes new life into this previously aging civic precinct.

Situated along a major artery in the district of West Vancouver, the renewed facility is a demonstration of the aspirations of the community: to provide a revitalized and exciting recreation facility, to reclaim an important site for public use and to demonstrate environmental stewardship.

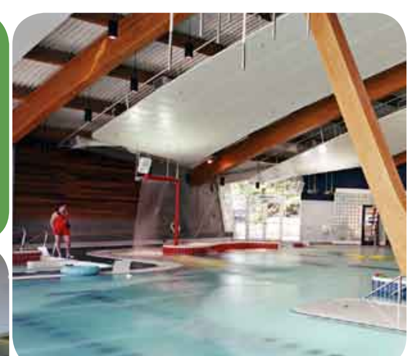
While the site has undergone significant reorganization and upgrade, key landscape elements have remained. Also, the adaptation and reuse of the existing structure is both resource efficient and respectful of the community's investment in the facility. The expressive new forms added to the existing building demonstrate a sensitivity to existing site conditions, by maintaining and creating new sight lines, reorganizing civic focal points, and exploiting site potential - such as available sunlight, site grading and desirable views.

The project incorporates a wide array of sustainable design initiatives. Critical to the sustainability of this project is the innovative retention of the existing pool tank and building, opened up by generous natural lighting. The facility's custom glulam glazing system affords abundant day light and reduces the need for artificial lighting. Energy is provided by a ground source geothermal system coupled with high efficiency boilers that share heating and cooling loads amongst adjacent existing and future community facilities.

The indoor environment of an aquatic facility demands special attention to material selection. With this in mind, the renovation and addition minimizes the use of gypsum wall board and other composite materials by exposing structure wherever possible, and using composite assemblies sparingly. The design utilizes a palette of durable materials including reinforced concrete, concrete masonry, glass curtain wall and wood. The new leisure pool area can be naturally ventilated through the use of large overhead glazed doors. Pool water is sterilized with a secondary ozone disinfection system which significantly reduces the chlorine levels in the pool water. The result is a facility with exceptional water and indoor air quality.

Incorporates mechanically operated sunscreens to control glare on the water surface

100%
of the existing pool and building structure are retained



An ozone water treatment system is used, minimizing the use of chlorine

Sustainable Site

- Existing pool and building structure are retained
- Site potential is maximized: such as available sunlight, site grading and views
- Existing landscaping such as mature trees retained to minimize site disturbance

Energy & Atmosphere

- Daylighting strategy incorporates mechanically operated sunscreens to control glare on water surface
- Solar screens incorporate public art and contribute to the community success of this facility
- Large operable glazed doors offer abundant natural light and natural ventilation
- Ground source energy is harnessed by a geothermal field made of vertical wells
- Energy is transferred between adjacent civic facilities to maximize efficiency and exploit synergies between buildings
- All buildings on the site are part of a energy management plan that recovers waste energy when available
- The facility uses very high efficiency boilers with built-in heat recovery systems

Water Efficiency

- Low flow and durable fixtures are used throughout the facility to minimize maintenance and water usage
- Landscape design incorporates native and drought resistant plants to reduce water consumption
- Water efficient irrigation system

Materials & Resources

- Use of gypsum wall board and other composite materials minimized to improve durability and air quality
- Makes use of durable materials such as reinforced concrete, concrete masonry, glass curtain wall and wood
- A significant amount of the existing building was retained to minimize the waste associated with deconstruction

Green Performance

By focusing on the quality of the indoor environments with ample daylighting, views to the outside as well as water and air quality, the building is not only well received by the community but offers innovative green building strategies for improved building performance.

Water

- Low flow fixtures
- Water efficient irrigation
- Native and drought resistant plants

Materials

- 100% of existing facility retained
- Use of durable materials

Energy

- Recovers waste energy
- High efficiency boilers

IEQ

- secondary ozone disinfection system which significantly reduces the chlorine levels

Indoor Environmental Quality

- Natural ventilation in the pool area promotes a healthy indoor environment
- An ozone water treatment system is used, minimizing the use of chlorine for improved water and air quality
- Public art is integrated into the glare reduction strategies, improving the safety and comfort of the facility

Innovation & Design

- Heat recovery energy harvesting via adjacent arena facility
- Integration of public art into solar control strategies
- Pool design incorporates many therapeutic aspects and allows the facility to be used for community health and wellness programs

Gleneagles Community Centre PATKAU ARCHITECTS

PATKAU ARCHITECTS

CLIENT
District of West Vancouver
DATE OF COMPLETION
March 2003
BUILDING TYPE
Community Recreation Facility

Gleneagles Community Centre

The Gleneagles Community Centre is located in West Vancouver adjacent to the Gleneagles Golf Course. The project is 24,000 square feet in area, organized on three levels. Program components include a gymnasium, multipurpose room, community living room, and fitness, childcare, and administrative facilities.

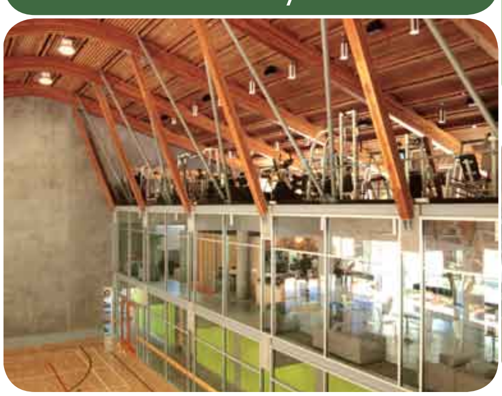
By adjusting the cross-sectional topography of the site, the majority of program components have direct access to complimentary outdoor spaces. The gymnasium volume is a unifying space that rises through all three levels of the building. Glazed walls allow visual connection between the major program components so that the interior of the community centre is animated by the complex variety of simultaneous activities that comprise the social life of the building.

The building utilizes highly innovative structural, mechanical and electrical systems to foster environmental sustainability while minimizing operating costs. Heating and cooling is provided by a thermo-active slab system, consisting of water piping embedded within the concrete structure. Heated and cooled water passes through the piping, allowing the walls and floors to act as radiant surfaces.

Ventilation is accomplished using a displacement system. Fresh air is tempered and supplied at low velocity and at low levels. This air rises, flushing contaminants upward where it is then captured and exhausted. As air is not being used for heating or cooling, operable doors and windows may be used at any time without affecting the performance of the system. Heating and cooling for the mechanical systems is provided by heat pumps in combination with a ground source heat exchanger-- a clean energy source.

With a comparable installation cost as compared to a conventional heating and cooling system, this system will reduce energy use by as much as 50%.

The building ventilation is provided by a “displacent ventilation system”



Reduced energy use by as much as

50-60%

Natural ventilation eliminates the need for mechanical cooling



Sustainable Site

- The building roof drainage and hard surface storm water runoff is used as a "designed water feature" collected by a fountain in the plaza of the building
- The overflow from the fountain and the possible runoff from the gravel parking lot is directed to a bio-swale
- This system then flows into a wetland in the neighboring golf course for treatment, and eventually feeds into Larson Creek, a local salmon bearing stream, with no impacts on the ecosystem

Energy & Atmosphere

- Heating and cooling is provided by a low intensity radiant temperature control system incorporated into the concrete walls and floors of the building
- In order to enhance the reduced energy use of the facility, a geothermal heat exchange system serving two water-to-water heat pumps was used as the main heating and cooling plant for the building
- Energy-efficient lighting, multiple switching options and occupancy lighting sensors provide a reduced energy demand
- Heat absorption capacity of concrete slabs reduces instantaneous peak heating and cooling loads
- A large portion of the energy from the exhaust air is recovered to preheat the ventilation air being delivered to the building

Water Efficiency

- Low flow plumbing fixtures throughout the facility minimize potable water use
- Use of native and drought resistant plants reduce irrigation demand for potable water

Materials & Resources

- The exposed concrete walls and floors serve double duty as finished interior surfaces, thus reducing the total materials used in the project, and lowering the building's VOC level

Green Performance

Water

- **100% of stormwater is managed on-site** to increase infiltration and protect local fish baring streams

Energy

- Reduced overall annual energy requirements allows for a **mechanical plant size less than 40%** than would be required for a conventional building

- The **energy use of the building is currently being tracked and is estimated to be at least 60% less** than a conventional building system approach, which in turn reduces CO^2 emissions, and provides low operating costs over the life of the building

100%
of stormwater managed on-site

40%
less area for mechanical plant

60%
less energy use than a conventional building system

Indoor Environmental Quality

- The building ventilation is provided by a "displacent ventilation system" where fresh air is driven upwards by buoyancy forces around heat sources, and then removed by the central air exhaust system

- Large soffit design provides the solar protection for the exterior glazing for increased thermal comfort

- Sky lights and clear story glazing provide natural lighting to areas that would normally be illuminated with conventional lighting systems

Innovation & Design

- This project represents the first and only "Batiso" geothermal building currently operating in North America

- Plastic tubing was cast into the tilt-up concrete wall panels, as well as the floor slabs and elevated structural floor slabs, through which warm or cool water is constantly circulated to maintain the interior space temperature by radiant heat exchange

Telus / William Farrell Building Revitalization BUSBY + ASSOCIATES

CLIENT
Telus Accommodation Services
DATE OF COMPLETION
2001
BUILDING TYPE
Office Building

Telus / William Farrell Building Revitalization

The William Farrell Project was conceived by Telus to satisfy a number of internal business needs and in doing so revitalize an existing resource in a high profile location in downtown Vancouver.

The project scope included extensive interior and exterior renovations to the 1940s Robson Street section of the building. Telus mandated that the existing building be retained, and that green strategies be incorporated.

The exterior of the building needed to be revitalized. The approach was to add a new facade over the existing wall. The new skin needed to update the building to meet the client's mandate, be cost effective, and exceed the energy by-law. The new facade and exterior air plenum created a dramatic new exterior face complete with fibre optic lighting and a naturally ventilated, energy efficient, insulated perimeter plenum.

The exterior revitalization is both futuristic and technically advanced - an open, layered and sophisticated new 'skin' envelopes the old building shell. A new double glazed, fritted and frameless glazing system with operable windows is suspended from the existing building face, providing opportunities for a sophisticated natural ventilation system.

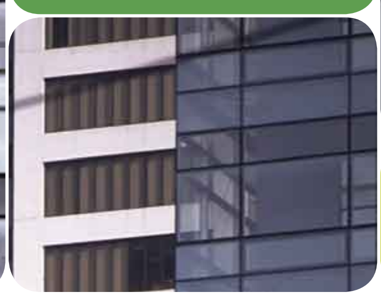
The conversion of old equipment space with 4.5 meter floor to floor heights allowed for the incorporation of a raised access floor with underfloor air and wiring plenum. Telus was prepared to take advantage of the extra height by also removing the existing suspended ceiling, thereby exposing the existing structure to provide dynamic thermal storage. The existing steam heating is eliminated with a new heat recovery system.

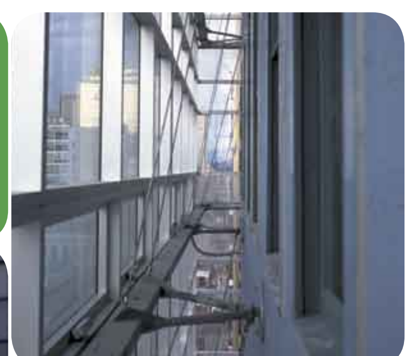
New building skin provides for natural ventilation and operable windows

Retaining the original building saved

16000

tones from the landfill





Double skin building has many advantages for controlling the energy



Sustainable Site

- Located in Vancouver's downtown core: the building is easily accessible by transit, bicycle or on foot
- By retaining the original building the lifespan is extended and the project eliminates the detrimental environmental impacts related to new construction

Energy & Atmosphere

- This unique double skin feature helps to control the energy use within the building by contributing to natural ventilation and acting as a buffer for the very hot or cold exterior temperatures
- The exposed concrete structure absorbs and then slowly releases the heat. This time delay shifts and reduces peak cooling load – a process referred to as "peak shaving"
- Light shelves on the south-west elevation increase lighting levels by reflecting natural light deeper into the interior floor. This reduces the demand for artificial lighting and saves energy
- The supply air plenum for displacement heating, cooling and air distribution is through floor-mounted diffusers which can be controlled individually by the occupants

Water Efficiency

- Existing washroom were minimally upgraded

Materials & Resources

Many items were salvaged from the existing building and reused in the new facility such as:

- Air handling units and piping
- Stone and granite base facade
- Copper bus bars are reconfigured into guardrails
- Elevator shaft, cabs and machinery
- Existing structure, windows, doors, frames, hardware
- Stairs, guardrails, light fittings, marble water closet partitions
- Office furniture

Green Performance

Site

- Replacement of the structure **would have produced 15,600 tons** of greenhouse gas emissions

Materials

- The pored in place concrete **uses 27% fly ash content** in concrete cement mix
- Retaining the original building avoided **16,000 tons** of construction waste

Energy

- The building is projected to **reduce greenhouse gas emissions by 55,000 tons** over a **75 year** lifespan, **(520 tons per year)**
- Energy consumption of 34% better than the MNECB
- $23,373 predicted annual energy savings

16,000

tons of construction waste avoided

520

tons greenhouse gas emissions reduction per year

34%

better energy efficiency than the Model National Energy Code

Indoor Environmental Quality

- The new building skin allows for natural ventilation and operable windows
- Light shelves reflect daylight deep into the space and reduce the need for artificial light
- The raised access floor acts as an air plenum for displacement heating and cooling. Air distribution is through floor-mounted, individually controlled diffusers
- The raised floor provides flexibility and simplicity of servicing for reconfiguring work stations - "hoteling" concept

Innovation & Design

- Photovoltaic cells sandwiched in laminated glass panels are integrated into the new skin. This on-site generated power is provided to fans during hot sunny periods to assist in cooling the new external cavity


Fred Kaiser Building
OMICRON / ARCHITECTS ALLIANCE

CLIENT
UBC Properties Trust
DATE OF COMPLETION
May 2005
BUILDING TYPE
Institutional

Fred Kaiser Building

The recently completed Fred Kaiser Building at the University of British Columbia houses the Faculty of Electrical and Computer Engineering as well as the offices for the Dean of Applied Science. The building provides for flexible lab space, offices, meeting rooms and a large seminar facility. Given a very limited site, the program of 9,000m^2 was built over an existing building while it remained in operation. The building demonstrates that sustainability does not come as a premium to the capital cost even in these times of rapid escalation.

The Fred Kaiser Building is substantially different than a traditional building. The design is the result of an integrated design process that considered and prioritized all aspects of the building before establishing a design direction.

As the concept of sustainable buildings is relatively new to some, there is a natural tendency to see perceived difficulties rather than enlightened solutions. To offset this perception, the design team needs to take additional time at the beginning of a project to explain the concepts of sustainable design. Once the users feel comfortable with the design and engineering of a sustainable building the next and sometimes most challenging task is to allay their concerns that a 'green' building will be more expensive than a traditional building.

The building envelope controls the exterior environment reducing solar gain and thus dramatically reducing the requirement for elaborate mechanical systems. The facility has operable windows and atriums instead of ductwork and complicated mechanical systems. A weather station on the roof allows the building main doors to be held open during good weather, as well as enabling the motorized atrium windows when it is not raining.

Motion sensors turn off the lights if a room is not occupied. Diffused natural light floods into the building filtered by shading devices. The building's emergency lighting is charged from roof top photovoltaic cells. The exposed concrete ceilings radiate heat in the winter and cool in the summer. Millwork has replaced unsightly cable trays and mechanical grillwork.

Solar gain is controlled with a 70% ceramic frit pattern

The building is naturally ventilated through the use of operable windows in all perimeter rooms

Natural ventilation eliminates the need for mechanical cooling

Sustainable Site

- Constructed over top of an existing lab facility, dramatically reducing the impact on neighboring green field sites

- Public transit services the campus reducing the impact of motor vehicles. Changing facilities are provided to encourage alternative forms of transportation

- A light colored roof stone reflects solar energy and reduce internal heat gain

Energy & Atmosphere

- Solar gain is controlled with a 70% ceramic frit pattern applied to the exterior glazing, shading canopies installed above the 5th floor office glazing

- Motion and daylight sensors used throughout

- Ceiling slab radiant heating and cooling system reduces mechanical equipment, ductwork, and building envelope

- Exposed concrete ceilings offers thermal storage of heat given off by users and equipment and offsets daytime cooling requirements to night

- A 4-pipe fan-coil system provides penthouse offices with a "two-speed" mode for energy efficiency

- Large existing deciduous trees on west façade shade the bottom two floors during summer and allow light penetration in winter

- High efficiency light fixtures and LED exit signs used throughout the facility

Water Efficiency

- Waterless urinals and low flow dual flush toilets are used throughout the project

- Lavatory taps are equipped with infrared sensors and a single temperature mixing valve

- Domestic hot water is generated by point of use electric heaters to minimize water pipe materials and standby losses from a conventional domestic hot water system

Indoor Environmental Quality

- The building is naturally ventilated through the use of operable windows in all perimeter rooms, along with motor operated windows and two-speed back up fans at the top of atriums

- CO^2 sensors are used in all the lab areas to operate the local lab exhaust fans at low and high speed as required to maintain the desired CO^2 levels

- Formaldehyde-free adhesives are used in all the mill-work

- Washrooms, showers, and work areas such as photo-copier rooms have direct ventilation to the outside

Green Performance

Water

- **Over 40%** reduction in building potable water usage

Material

- The use of **high volume fly ash** in the concrete reduces greenhouse gas emissions

Energy

- Approximate annual energy cost **savings of $22,000**
- Reduced annual greenhouse gas emissions by **more than 4,500 tons CO^2**
- Energy consumption of **35% better** than the MNECB, **45% below ASHRAE 90.1** standards

IEQ

- Use of water-based, non-toxic adhesives and **low VOC** paints

40%
reduction in potable water use

4,500
ton reduction of green-house gas emissions

35%
better energy efficiency than the Model National Energy Code

Materials & Resources

- Preference was given to reused, recycled, and locally produced materials for interior and exterior construction
- A recycling program is in place as part of the University's operating policy
- The PEX tubing used for the radiant system is Canadian made (Calgary), and as locally available as possible
- Air handling equipment serving the existing space is retained and re-used

Innovation & Design

- Unique to North America at this time, facility features a concrete core conditioning system, and includes a night time operated cooling tower for slab cooling
- Demand-controlled natural ventilation
- Built "on top" of an existing building to minimize green space impact
- Photovoltaic panels mounted on atrium skylight provide DC power for emergency lighting and DC experiments in the Power Lab


CK Choi Building
MATSUZAKI WRIGHT ARCHITECTS

CLIENT
University of British Columbia
DATE OF COMPLETION
April 1996
BUILDING TYPE
Institutional

CK Choi Building

The C.K. Choi Building for the Institute of Asian Research is a 35,000 sq.ft. educational building located at the University of British Columbia. The building has five research centres focusing on China, Japan, Korea, Southeast Asia and India. Each centre has a designated office and reception space, as well as flexible areas for research projects. The centres are organized around five atria, which provide dynamic spaces for displays that are intended to enrich and identify the centres.

UBC wanted the C.K. Choi Building to be an environmentally responsible building with its three primary goals being to set new standards for sustainable design, establish benchmarks for state of the art collaborative research, and express the character of the cultures participating in the research.

The C.K. Choi building has been conceptualized, designed, constructed and operated following the concepts of green engineering and sustainable design. Using these guiding principles, the mechanical systems incorporate natural ventilation, a graywater system, composting toilets, and the use of stored rainwater for irrigation. The graywater from lavatory fixtures and the compost toilet liquid effluent, which would normally be deposited into UBC's sanitary system, is instead sent to a constructed wetland for purification. The water is then re-used for plant irrigation on-site. Thus the need for a sanitary connection is eliminated and the resultant compost from the toilet bins can be used for plant fertilization on the campus.

More than half of the building's structural timber was salvaged from a building demolished adjacent to the facility. The facility's connections are bolted, with ultimate deconstruction and re-use in mind. The exterior brick, as well as many interior components, such and doors and handrails, have been re-used. Approximately 95% of construction waste was diverted from the landfill.

Building cooling and ventilation occurs naturally. The building form optimizes air flow through cross and stack ventilation. All offices have operable windows and vents. Small fans in the high atrium spaces assist internal air flow when required. The natural cooling system eliminates the need for ozone-depleting refrigerants and offers continuous air exchange of the building to promote optimum indoor air quality.

Wastewater from sinks is filtered through a graywater trench along the front of the building

The roof is designed to be retrofit-ready to add photovoltaic panels when the technology becomes economically feasible

Natural ventilation eliminates the need for mechanical cooling

Sustainable Site

- The extensive tree coverage on the site is preserved and new trees offer light filtration
- The forest adjacent to the building is judiciously pruned for filtered light; the lower plant life is enhanced with indigenous plants that support insects and birds
- Waste water from sinks is filtered through a graywater trench along the front of the building; pea gravel, plants and microbial life clean the water naturally
- Water is reused for plant irrigation; compost from the toilet bins is used for plant fertilization

Energy & Atmosphere

- Low energy requirements eliminated the need for a high voltage power transformer
- Daylight and occupancy sensors reduce the use of artificial lighting; lighting load designed for 0.7 watts per square foot
- The roof is designed to be retrofit-ready to add photovoltaic panels when the technology is economically feasible
- Low-e, double-glazed windows, and exterior insulation reduces thermal bridging
- Building cooling and ventilation occurs naturally
- Efficient water use creates energy savings in filtering, pumping and treatment
- Building form optimizes air flow through cross and stack ventilation
- Direct venting of photocopying machines

Water Efficiency

- A constructed wetland cleans graywater eliminates and the need for sewer connection
- Low flow lavatory fixtures are used throughout the building to conserve water
- The Vancouver Health Dept. has tested the fecal coliform of the water and found it to contain 10 parts per 100 ml
- The final discharge from the trench is used to irrigate the forest on the west side of the building
- A 7,000-gallon cistern below the south stair collects all roof rainwater to reduce flooding during peak rainfalls and to provide irrigation for summer months

Materials & Resources

- Seventy year old timbers salvaged from a building demolished across the street make up approximately 65% of the heavy timber structure
- Heavy timber structure uses bolted connections for ultimate deconstruction and reuse
- Exterior brick is reused material from old Vancouver city streets; the main interior stair handrail and atrium guardrails, all doors, sinks, toilet accessories and some electrical conduit are also reused
- Recycled content includes: structural steel 90%, insulation 100%, drywall 20%, and ceramic tile 75%, carpet underlay 100%

Green Performance

Water
- Waterless composting toilets (Clivus Multrum) reduce water consumption by as much as **5,680 litres of water a day**

Materials
- GVRD studies show that roughly **95% of the construction waste was diverted** from the landfill

Energy
- The building **consumes** approximately **40% less energy** than ASHRAE 90.1

- Annual energy costs **save $6,600 a year over ASHRAE prototype**

- The building is served by **100% natural ventilation** all year round. There is no central air handling system

Cost
- The project came in **under the original UBC budget** (established as if for a standard building) **$150/sq.ft.**

87%
reduction in potable water use

95%
of demolition waste diverted from landfill

40%
less energy consumption than ASHRAE 90.1 prototype

Indoor Environmental Quality

- Air pollutants are reduced through material selection (adhesives-free carpets, formaldehyde-free millwork, solvent-free finishes)

- All workstations and offices have access to operable windows and vents for health and comfort

- The heating system has valves located approximately every 10 ft for individual control

- Natural light is maximized with north facing clerestories, extensive glazing; tall coniferous trees offer westside shading

Innovation & Design

- The specifications for the public bid included construction site materials separation and recycling program as a requirement of contract

- Almost all sections of the specifications included a statement of Environmental Principles and Goals. Many sections addressed the use of reused or re-cycled alternatives

- Commissioning strategies were discussed early and often with UBC maintenance and planning personnel

Liu Centre for the Study of Global Issues

ARCHITECTURA WITH ARTHUR ERICKSON

CLIENT
University of British Columbia
DATE OF COMPLETION
September 2000
BUILDING TYPE
Institutional

Liu Centre for the Study of Global Issues

The Liu Centre for the Study of Global Issues was established as a policy and conference centre dedicated to current cross-disciplinary issues such as global environment change, population growth and immigration. The 18,800 sq. ft. Liu Centre has two distinct components: a one-storey Seminar Wing with public spaces for receptions, exhibitions and conferences; and a three-storey Research Wing with private offices, study rooms, library and board room.

Separate structural, mechanical and cladding systems respond to the different functions, topologies and environmental requirements of the two wings. The arrangement of building wings connected to a glazed lobby creates two outdoor spaces - an entry courtyard sheltering a rare katsura tree and a large south facing courtyard for outdoor events. Breathing glass facades face the surrounding forest, which provides cool, fresh air and beautiful views. Narrow building widths allow for maximum daylight penetration and cross ventilation.

Building materials and systems for the Liu Centre were evaluated based on durability, efficiency, embodied energy, environmental impact, contribution to a healthy environment and economic feasibility using a forty-year life cycle cost analysis method.

A high performance low-e argon filled glass curtain wall with operable windows and trickle vents, efficient lighting fixtures on occupancy and daylight sensors, and electrical load sharing with neighboring buildings offers significant energy savings. The heating system is tied to the centralized campus steam line with heat exchanger. The exposed heavy timber roof of the seminar wing was built of salvaged glulam beams and structural decking from the previous building demolished on the site.

The Liu Centre is the first Canadian non-industrial building to use a High Volume Fly Ash (HVFA) concrete mix in its construction. Fly ash is a waste by-product of the coal industry with few other uses. In fact, Vancouver's two cement plants produce as much $C0^2$ emissions as 80% of the city's automobile traffic. The substitution of fly ash for a portion of the cement – in this case, 50% – reduces $C0^2$ pollution (which reduces global warming). If it becomes a standard construction material, HVFA concrete has the potential to reduce world $C0^2$ emissions dramatically.

High-performance, low-e, argon filled curtain wall system offers unique energy savings

Reduced costs by **50-60%** by using recycled building materials

Natural ventilation minimizes energy consumption, capital & operating costs



Energy & Atmosphere

- High-performance, low-e, argon filled curtain wall system for facility's office spaces
- Electrical load sharing with neighboring buildings makes building a new substation unnecessary
- Low energy lighting fixtures with room sensors
- Air-to-air heat exchanger for seminar room

Sustainable Sites

- Minimal building width maximizes daylighting penetration
- Built on the footprint of an existing structure facility reduces site disturbance and minimizes peak stormwater runoff
- The building is positioned to protect a rare Katsura tree at the entry courtyard
- The use of heavy machinery was restricted during construction to avoid excessive soil compaction
- Covered bicycle stalls and on-site shower facilities promote sustainable commuting
- Incorporated High Volume Fly Ash (HVFA) into concrete mix to reduce GHG emissions

Water Efficiency

- Ultra low-flush toilet fixtures reduce water use
- Native plants, such as ferns and wild grasses, restore the forest floor and minimize irrigation requirements

Materials & Resources

- High quality salvaged materials were collected from previously demolished buildings at UBC and elsewhere: bricks, pavers, glulams and structural decking
- A waste management system for construction and operation was implemented
- Exposed building systems reduce the amount of interior finishing required: concrete floors, timber and concrete ceilings, cable trays, sprinklers and mechanical ducts
- Board room chairs and carpet are made from recycled pop bottles

Green Performance

Materials

- Large quantity of salvaged materials used in the construction of the new building
- **93% of the materials** by volume found another use, which equated to 1,263 cubic yards that were diverted from local landfill sites

Energy

- Predicted annual **energy savings of $4,329**
- The building performs **25% better** than the MNECB

Cost

- Use of recycled building materials resulted in **50-60% cost savings** over using new materials of the same type

50-60%

of cost savings by using salvaged building materials

$4,329

predicted annual energy savings

25%

better energy efficiency than the Model National Energy Code

Indoor Environmental Quality

- This building has no mechanical ventilation system
- Natural ventilation minimizes energy consumption, capital and operating costs
- Non toxic paints and adhesives were used to increase the quality of the indoor environments
- Selected furniture and finishes based on recycled content, low VOC emissions, and environmental standards/practices of suppliers

Innovation & Design

- This building was built with significant amount of salvaged material from the site's previous building. The design team carefully designed this building with on-site available materials as well as building products that were purchased from salvaged contractors
- The minimal site disturbance is exceptional. The proximity of many mature trees to the building provides unique spaces within the facility

City of Vancouver National Works Yard

OMICRON ARCHITECTURE ENGINEERING CONSTRUCTION SERVICES LTD.

CLIENT
City of Vancouver
DATE OF COMPLETION
March 2004
BUILDING TYPE
Light Industrial
LEED® CERTIFICATION
LEED® Gold (44 Points)

City of Vancouver National Works Yard

The new 12 acre City of Vancouver National Works Yard serves a Engineering Operations Facility with a technically complex program including an administration centre, garage and radio shop, parking operations, warehouses, car wash and fuelling station. The project is the City of Vancouver's pilot initiative to promote sustainable design practices.

The City's leadership and level of commitment to sustainable principles is reflected in the design expertise employed and the application of sound environmental building practices, which culminated in two of the facility's buildings achieving LEED™ Gold Certification.

The National Works Yard Administrative Centre and Parking Operations Building are the first buildings in Canada to receive LEED™ Gold Certification from the Canadian Green Building Council.

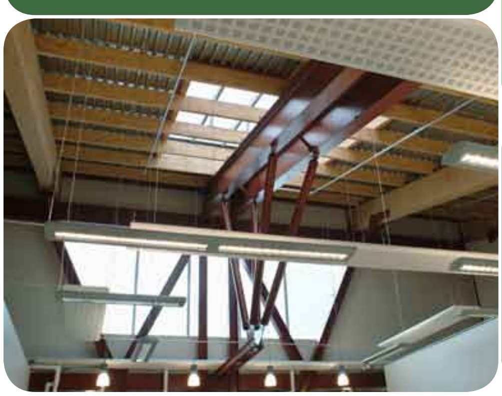
The new yard incorporates the operations of eight City branches along with associated administrative support for the facility. Approximately 400 employees will be based at the facility and its design has the capability to accommodate reasonable growth of the respective operations over the next 10 to 20 years.

The Manitoba Yard will remain in operation, continuing as the centre for Equipment Services, Sewer, Water and Sanitation Operations along with an Administrative Centre.

The new yard replaces the existing Cambie Works Yard, which has been in operation for over ninety years and has outgrown its existing location. The new site is industrial land made vacant with the removal of freight railway facilities. Imagery for the administrative building is drawn from the historical industrial and railway uses previously located on the site.

The design of the National Works Yard addresses the City's two principal goals of functionality and sustainable design. The large site is laid out to maximize operational efficiencies, with the buildings designed to minimize energy consumption while emphasizing a healthy environment for the occupants.

Operable windows and lighting control zones included every 200 sq. ft. of perimeter area



75% of the materials used on the project were locally manufactured

A green roof provides stormwater management and reduces heat island effect

Sustainable Site

- Building site is located close to SkyTrain station for reduced dependence on cars
- Bicycle storage and showers are provided for occupants supporting alternative modes of transportation
- Gravelpave porous paving and green vegetated roofing are used to reduce heat island effect and stormwater runoff
- Cut-off site light fixtures reduce light pollution

Indoor Environmental Quality

- Operable windows and lighting control zones for every 200 sq. ft. of perimeter area provide occupants with control over their own work environment
- Displacement ventilation systems provide fresh air directly through occupant's breathing zones
- Temperature and humidity is monitored and controlled to provide comfortable conditions for occupants
- Low VOC materials include paints and adhesives, carpets, sealants and composite wood products

Water Efficiency

- Landscape swales and sediment ponds collect stormwater runoff from construction activities
- Rainwater is collected, treated and used to flush toilets in the building
- Waterless urinals, low flow faucets and dual flush water closets combine to reduce water consumption
- Drought resistant landscaping eliminates the need for permanent irrigation systems

Energy & Atmosphere

- A ground source heat pump (GSHP) system uses the constant temperature of the earth to heat and cool the buildings
- Twenty-four 400 ft deep boreholes are installed in the staff parking lot as part of the GSHP system
- Radiant panels provide cooling/heating more efficiently than traditional systems

Green Performance

Site

- The project provides a 7,500 litre propane storage tank with a refueling capacity for over **75% of the total Works Yard fleet**

Water

- The combination of high efficiency fixtures and rainwater collection results in a **75% reduction in potable water use** -- a savings over **2,000,000 litres of water annually**

Materials

- **90% of construction waste was recycled** rather than sent to the landfill
- **75% of the materials** used in the project are **locally manufactured**
- **23% of** the materials are **locally harvested**

Energy

- The high efficiency mechanical system design allows for a predicted **$27,186 annual energy savings**
- Building performs **63% better than MNECB**

75%
reduction in potable water use

90%
of demolition waste diverted from landfill

63%
better energy efficiency than the Model National Energy Code

Materials & Resources

- Concrete walls and slabs contain high-volume fly ash (up to 60%) depending on the application
- The steel structure contains up to 100% recycled content
- Parallam roof beams were sourced locally and are resource efficient

Innovation & Design

- Facility achieves an efficient displacement ventilation system without the use of a raised floor system
- Photovoltaic cells are located in the skylight of the lobby to provide shading and to produce a small quantity of on-site electricity

LEED Scorecard

LEED
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

City of Vancouver Works Yard
LEED Project #1
LEED BC Version 2.1 Certification Level: Gold
Monday, June 14, 2004

44	**Points Achieved**	**Possible Points: 69**

Certified 26 to 32 points   **Silver** 33 to 38 points   **Gold** 39 to 51 points   **Platinum** 52 or more points

8	Sustainable Sites	Possible Points: 14
Y	Prereq 1	**Erosion & Sedimentation Control**
Y	Prereq 2	**Riparian-wetland protection**
1	Credit 1	**Site Selection**
	Credit 2	**Development Density**
1	Credit 3	**Redevelopment of Contaminated Site**
1	Credit 4.1	**Alternative Transportation,** Public Transporation Access
1	Credit 4.2	**Alternative Transportation,** Bicycle Storage & Changing Rooms
1	Credit 4.3	**Alternative Transportation,** Alternative Fuel Vehicles
	Credit 4.4	**Alternative Transportation,** Parking Capacity
	Credit 5.1	**Reduced Site Disturbance,** Protect or Resore Open Space
	Credit 5.2	**Reduced Site Disturbance,** Development Footprint
	Credit 6.1	**Stormwater Management,** Rate and Quantity
	Credit 6.2	**Stormwater Management,** Treatment
	Credit 7.1	**Heat Island Effect,** Non-Roof
1	Credit 7.2	**Heat Island Effect,** Roof
1	Credit 8	**Light Pollution Reduction**

5	Water Efficiency	Possible Points: 5
1	Credit 1.1	**Water Efficient Landscaping,** Reduce by 50 %
1	Credit 1.2	**Water Efficient Landscaping,** No Potable Use or No Irrigation
1	Credit 2	**Innovative Wastewater Technologies**
1	Credit 3.1	**Water Use Reduction,** 20% Reduction
1	Credit 3.2	**Water Use Reduction,** 30% Reduction

10	Energy & Atmosphere	Possible Points: 17
Y	Prereq 1	**Fundamental Building Systems Commissioning**
Y	Prereq 2	**Minimum Energy Performance**
Y	Prereq 3	**CFC Reduction in HVAC & R Equipment**
2	Credit 1.1	**Optimize Energy Performance,** 20% New / 10% Existing
2	Credit 1.2	**Optimize Energy Performance,** 30% New / 20% Existing
2	Credit 1.3	**Optimize Energy Performance,** 40% New / 30% Existing
2	Credit 1.4	**Optimize Energy Performance,** 50% New / 40% Existing
1	Credit 1.5	**Optimize Energy Performance,** 60% New / 50% Existing
	Credit 2.1	**Renewable Energy,** 5% Contribution
	Credit 2.2	**Renewable Energy,** 10% Contribution
	Credit 2.3	**Renewable Energy,** 20% Contribution
1	Credit 3	**Additional Commissioning**
	Credit 4	**Elimination of HCFCs and Halons**
	Credit 5	**Measurement & Verification**
	Credit 6	**Green Power**

6	Materials & Resources	Possible Points: 13
Y	Prereq 1	**Storage & Collection of Recyclables**
	Credit 1.1	**Building Reuse,** Maintain 75% of Existing Shell
	Credit 1.2	**Building Reuse,** Maintain 95% of Existing Shell
	Credit 1.3	**Building Reuse,** Maintain 95% Shell & 50% Non-Shell
1	Credit 2.1	**Construction Waste Management,** Divert 50%
1	Credit 2.2	**Construction Waste Management,** Divert 75%
	Credit 3.1	**Resource Reuse,** Specify 5%
	Credit 3.2	**Resource Reuse,** Specify 10%
1	Credit 4.1	**Recycled Content,** Specify 5%
1	Credit 4.2	**Recycled Content,** Specify 10%
1	Credit 5.1	**Regional Materials,** 20% Manufactured Regionally
1	Credit 5.2	**Regional Materials,** 10% Extracted Regionally
	Credit 6	**Rapidly Renewacble Materials**
	Credit 7	**Certified Wood**

10	Indoor Environmental Quality	Possible Points: 15
Y	Prereq 1	**Minimum IAQ Performance**
Y	Prereq 2	**Environmental Tobacco Smoke (ETS) Control**
	Credit 1	**Carbon Dioxide (CO2) Monitoring**
1	Credit 2	**Increase Ventilation Effectiveness**
	Credit 3.1	**Constuction IAQ Management Plan,** During Construction
	Credit 3.2	**Constuction IAQ Management Plan,** After Construction
1	Credit 4.1	**Low-Emitting Materials,** Adhesives & Sealants
1	Credit 4.2	**Low-Emitting Materials,** Paints & Coatings
1	Credit 4.3	**Low-Emitting Materials,** Carpet
1	Credit 4.4	**Low-Emitting Materials,** Composite Wood
1	Credit 5	**Indoor Chemical and Pollutant Source Control**
1	Credit 6.1	**Controllability of Systems,** Perimeter
	Credit 6.2	**Controllability of Systems,** Non-Perimeter
1	Credit 7.1	**Thermal Comfort,** Comply with ASHRAE Standard 55-1992
1	Credit 7.2	**Thermal Comfort,** Permanent Monitoring System
	Credit 8.1	**Daylight and Views,** Daylight 75% of Spaces
1	Credit 8.2	**Daylight and Views,** Daylight 90% of Spaces

5	Innovation & Design Process	Possible Points: 5
1	Credit 1.1	**Innovation in Design:** Exemplary Water Use Reduction
1	Credit 1.2	**Innovation in Design:** Exemplary Recycled Content
1	Credit 1.3	**Innovation in Design:** Exemplary Local Materials
1	Credit 1.4	**Innovation in Design:** Pilot Project Education
1	Credit 2	**LEED™ Accredited Professional**

Notes

Richmond City Hall

Hotson Bakker Architects and
Kuwabara Payne McKenna Blumberg Architects

CLIENT
City of Richmond
DATE OF COMPLETION
March 2000
BUILDING TYPE
Municipal Hall

Hotson Bakker Architects & Kuwabara Payne McKenna Blumberg Architects

Richmond City Hall

The City of Richmond's eight-storey office tower with a two-storey multi-purpose wing and circular council chambers reflects a civic commitment to sustainable design practices, durability and energy efficiency, while providing a healthy and effective work environment.

The administration tower employs daylighting strategies through the use of continuous dimming daylight sensing controls that adjust the lighting level in response to the amount of available natural daylight. The harvesting of daylight is enhanced through the use of exterior and interior light shelves that reflect daylight further into the building.

The tower and the low-rise wing each contain two highly efficient condensing boilers that operate at seasonal efficiencies above 90%. A four-pipe fan coil system provides space conditioning for most of the building. Exceptions are in the computer, archival and electrical rooms, which are cooled by direct expansion cooling.

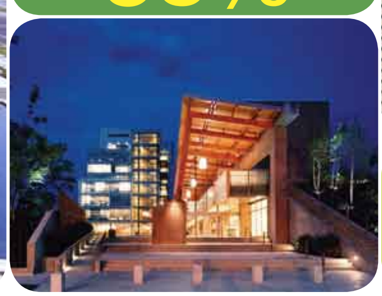
The building ventilation is provided by two central make-up air units (MAUs), one serving the tower and one serving the low-rise and council chambers. The low-rise MAU has a variable speed drive for demand ventilation when the meeting rooms are occupied. The MAUs deliver twice as much outside air than specified by the MNECB defaults, offering significantly improved air quality.

Ambient lighting in most spaces is provided by a direct/indirect lighting system with T-8 fluorescent lamps and high-efficiency hybrid ballasts. The meeting and exercise rooms are controlled by occupancy sensors that automatically turn off the lights whenever the room is unoccupied.

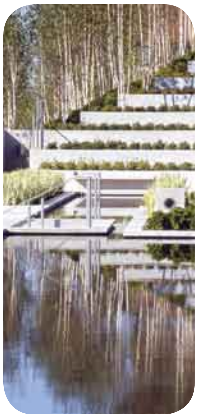
Low-maintenance plants were selected to reduce irrigation needs

Lower lighting loads, daylighting and occupancy controls reduce energy consumption by

38%



Low-e windows and ceramic frit reduce heat gain



Sustainable Site

- A green roof above parking contributes to on-site management of stormwater and reduces heat island
- 30 bicycle parking spots are provided to encourage employees to cycle to work
- The site is adjacent to a transit corridor giving employees access to bus service

Energy & Atmosphere

- The massing and solar orientation of the tower provides landmark proportions, a healthy and light-filled workplace, and minimizes energy use
- Overall lighting levels were lowered with the use of task lighting for each work station
- High performance glazing system with low-e windows and ceramic frit reduces heat gain
- Ambient lighting in most spaces is provided by a direct/indirect lighting system with T-8 fluorescent lamps and high-efficiency hybrid ballasts
- The meeting and exercise rooms are controlled by occupancy sensors that automatically turn off lights whenever the room is unoccupied

Water Efficiency

- Low maintenance plants were selected to reduce irrigation needs
- Water conserving fixtures are used in the building

Materials & Resources

- An on-site recycling program was established
- Cost savings of $7,820 (1999) were realized through reuse or recycling of 75% of the construction waste

Green Performance

Materials

- **75% of construction waste** was diverted from the landfill

Energy

- Actual energy use is **85% of an average** office building in British Columbia

- Lower lighting loads, daylighting and occupancy controls **reduce annual energy consumption by 951 GJ, or 38%**

- Predicted **annual energy cost savings of $32,674**

- A projected **26%** savings when **compared with MNECB**

75%

of construction waste was recycled

85%

of actual energy use for average office building in BC

26%

better energy efficiency than the Model National Energy Code

Indoor Environmental Quality

- Natural daylighting is incorporated in the meeting rooms

- Operable windows are interlocked with fan coils

- Carbon dioxide intensity is 25.5 $kgCO^2/m^2$

Innovation & Design

- The landscaping and topography of the site play a pivotal role in establishing the public domain of this project. The landscape preserves existing heritage trees and maximizes the use of low maintenance local plant materials

- The overall integration of architecture and landscape transforms the site into an urban oasis and minimizes the environmental impacts of the facility

Semiahmoo Library & RCMP Facility MUSSON CATTELL MACKEY PARTNERSHIP

CLIENT
City of Surrey
DATE OF COMPLETION
August 2003
BUILDING TYPE
Institutional
LEED® CERTIFICATION
LEED® Silver

Semiahmoo Library and RCMP Facility

This unique dual-purpose facility was developed by the City of Surrey through a design-build competition. MCMP, in collaboration with Darrell J Epp Architect Ltd and Norson Construction, produced a winning design that combines cost effectiveness, green building design, and functional efficiency for two distinctively different purposes. The design provides an abundance of natural light, energy efficiency, and exceptional air quality. The new 30,000 sq.ft. Semiahmoo Library and RCMP facility has received LEED Silver Certification from the US Green Building Council.

The building features a raised access floor system for optimum flexibility and an open ceiling free of mechanical systems. It is constructed primarily of concrete, glass, and steel, which are cost-effective as well as durable materials appropriate for a community resource.

This building achieved an impressive level of energy performance. At completion, it was estimated that the Semiahmoo Library and RCMP District Office would consume about 45% less energy than a similar building constructed to the Model National Energy Code for Buildings. The City of Surrey also invested in Additional Commissioning for this public project to ensure that the installed systems perform to the standard specified in their design.

The facility's water use was reduced by 30% compared to similar buildings constructed to the MNECB. The incorporation of waterless urinals is expected to save 160,000 litres of water per fixture annually.

Although security requirements precluded windows that opened, the indoor air quality and thermal comfort of this building is excellent. Also, the system is very quiet, an important factor for both the RCMP and the library functions. A carbon dioxide monitoring system acts as an additional measure to ensure consistently good air quality.

For this building, preference was given to low-emitting materials, including adhesives, sealants, paints, and carpets. For example, solid wood blocking was used instead of plywood (made with glues) to anchor all units that required wall mounting.

Low VOC finishes used for increased indoor environmental

Clearstory windows provide daylight to the

Raised floors provide quiet and efficient ventilation



Water Efficiency

- The use of native plants require little to no maintenance means there is no need for a permanent irrigation system thereby reducing potable water use

- Low flush toilets and waterless urinals are installed to maximize water efficiency within the building and reduce the burden on municipal water supply and wastewater systems

Sustainable Sites

- Strategies for prevention of soil erosion and sedimentation control of storm sewer and streams were in place during construction

- Close proximity to transit, minimum parking capacity (not exceeding local zoning requirements) and preferred parking spaces reserved for carpool vehicles all help to reduce pollution and land development impacts from automobile use

- A combination of shaded parking and underground parking, along with the use of a highly reflective roofing material helped to reduce heat islands and minimize the impact on microclimate and human/wildlife habitat

- Interior and exterior lighting does not extend beyond the boundaries of the site or contribute to light pollution

Energy & Atmosphere

- The building envelope and systems are designed to maximize energy performance

- A CFC-free HVAC system

- Energy efficient lighting technology

- Excellent daylighting reduces demand on artificial lighting

- HVAC system and building envelope optimizes air change effectiveness and maximizes fresh air for health, safety and comfort of occupants

Materials & Resources

- A recycling collection room is designated to store paper and other recyclable products prior to being removed from the building

- The use of high volume fly–ash concrete reduces GHG emissions

- The use of durable and low maintenance materials such as exposed concrete reduces the need for interior finishes

Green Performance

Water

- The incorporation of waterless urinals is expected to **save some 160,000 litres** of water per fixture **annually**
- Potable water use within the building is reduced by **more than 40%**

Materials

- **88%** of construction waste **was recycled** or salvaged
- At least **5%** of the building is comprised of **recycled content**
- **62%** of the building materials were manufactured within a **800 km radius of the site**

Energy

- The high efficiency mechanical system design allows for a **predicted $15,573 annual energy savings**
- Building performs **44% better than MNECB**

41%
reduction in potable water use

88%
of construction waste was recycled or salvaged

44%
better energy efficiency than the Model National Energy Code

Indoor Environmental Quality

- A no smoking policy for the entire building increases the indoor air quality for workers
- A CO^2 monitoring system was installed to enhance efficiency of the air exchange system
- Uses VOC-free paint, carpet and composite wood products
- The building allows a high level of occupant control for heating, lighting and ventilation systems with a permanent monitoring system to automatically adjust conditions

Innovation & Design

- The building uses an innovative ultra quiet mechanical system improving the quality of the work environment
- Large wall areas combined with ample daylight provides the staff with usable display space that does not require artificial lighting

LEED Scorecard

LEED — LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

Semiahmoo Library and Community Policing Station
LEED Project # 0504
LEED Version 2 Certification Level: Silver
January 22, 2004

33	Points Achieved		Possible Points:	69

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

6	Sustainable Sites		Possible Points: 14
Y			
Y	Prereq 1	**Erosion & Sedimentation Control**	
1	Credit 1	**Site Selection**	1
	Credit 2	**Urban Redevelopment**	1
	Credit 3	**Brownfield Redevelopment**	1
1	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	Credit 4.3	**Alternative Transportation**, Alternative Fuel Refueling Stations	1
1	Credit 4.4	**Alternative Transportation**, Parking Capacity	1
	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
	Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
	Credit 6.1	**Stormwater Management**, Rate and Quantity	1
	Credit 6.2	**Stormwater Management**, Treatment	1
1	Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1
1	Credit 7.2	**Landscape & Exterior Design to Reduce Heat Islands**, Roof	1
1	Credit 8	**Light Pollution Reduction**	1

4	Water Efficiency		Possible Points: 5
Y			
1	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
	Credit 2	**Innovative Wastewater Technologies**	1
1	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

7	Energy & Atmosphere		Possible Points: 17
Y			
Y	Prereq 1	**Fundamental Building Systems Commissioning**	
Y	Prereq 2	**Minimum Energy Performance**	
Y	Prereq 3	**CFC Reduction in HVAC&R Equipment**	
2	Credit 1.1	**Optimize Energy Performance**, 20% New / 10% Existing	2
2	Credit 1.2	**Optimize Energy Performance**, 30% New / 20% Existing	2
2	Credit 1.3	**Optimize Energy Performance**, 40% New / 30% Existing	2
	Credit 1.4	**Optimize Energy Performance**, 50% New / 40% Existing	2
	Credit 1.5	**Optimize Energy Performance**, 60% New / 50% Existing	2
	Credit 2.1	**Renewable Energy**, 5%	1
	Credit 2.2	**Renewable Energy**, 10%	1
	Credit 2.3	**Renewable Energy**, 20%	1
1	Credit 3	**Additional Commissioning**	1
	Credit 4	**Ozone Depletion**	1
	Credit 5	**Measurement & Verification**	1
	Credit 6	**Green Power**	1

5	Materials & Resources		Possible Points: 13
Y			
Y	Prereq 1	**Storage & Collection of Recyclables**	
	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell	1
	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
1	Credit 2.1	**Construction Waste Management**, Divert 50%	1
1	Credit 2.2	**Construction Waste Management**, Divert 75%	1
	Credit 3.1	**Resource Reuse**, Specify 5%	1
	Credit 3.2	**Resource Reuse**, Specify 10%	1
1	Credit 4.1	**Recycled Content**	1
1	Credit 4.2	**Recycled Content**	1
1	Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
	Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally	1
	Credit 6	**Rapidly Renewable Materials**	1
	Credit 7	**Certified Wood**	1

8	Indoor Environmental Quality		Possible Points: 15
Y			
Y	Prereq 1	**Minimum IAQ Performance**	
Y	Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	
1	Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
1	Credit 2	**Increase Ventilation Effectiveness**	1
	Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1	Credit 4.2	**Low-Emitting Materials**, Paints	1
1	Credit 4.3	**Low-Emitting Materials**, Carpet	1
1	Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
	Credit 6.1	**Controllability of Systems**, Perimeter	1
	Credit 6.2	**Controllability of Systems**, Non-Perimeter	1
1	Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
1	Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
	Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

3	Innovation & Design Process		Possible Points: 5
Y			
1	Credit 1.1	**Innovation in Design**: Exemplary Performance WEc3	1
1	Credit 1.2	**Innovation in Design**: Exemplary Performance MRc5.1	1
	Credit 1.3	**Innovation in Design**:	1
	Credit 1.4	**Innovation in Design**:	1
1	Credit 2	**LEED™ Accredited Professional**	1

Notes

Semiahmoo Library & RCMP

MUSSON CATTELL MACKEY PARTNERSHIP


White Rock Operations Centre
BUSBY + ASSOCIATES ARCHITECTS

CLIENT
The City Of White Rock
DATE OF COMPLETION
May 2003
BUILDING TYPE
Institutional
LEED® CERTIFICATION
LEED® Gold (44 Points)

White Rock Operations Centre

The City of White Rock Operations Centre is the first new building in Canada to achieve a LEED Gold rating. It is built on the site of the original operations building, using an abandoned wastewater treatment plant's concrete clarifiers and pump house as a foundation.

The mandate of the City of White Rock was to make their new Operations Building as environmentally sustainable as possible, in accordance with the City's own policy of promoting Green Strategies in all their developments and planning initiatives.

A green roof reduces heat gain in the environment, and solar hot water tubes provide heat for the building. The thermal energy within the stormwater is diverted into a detention tank from city streets and then used to augment heating and cooling for the facility. The City purchased green power certificates to supplement its onsite photovoltaic power generation. Extensive daylighting reduces electricity use and connects occupants to the outdoors.

Materials were selected for their low impact on the interior environment, regional manufacturing, recycled content, and long-term viability. 98% by weight of the demolition waste was diverted from the landfill.

Waterless urinals and low flow faucets are used throughout the facility. Stormwater is collected and used for flushing toilets and washing City vehicles. A pervious parking lot allows infiltration of water into the ground.

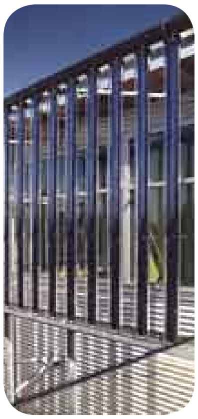
The White Rock Operations Centre contains simple mechanical, electrical, and building systems. Conventional mechanical cooling is completely eliminated. Operable windows are provided for natural ventilation. The mechanical system components are readily available stock items that are easily serviceable by the City's own crew. The operating costs are considerably less than a similar building of standard design and usage. The facility's energy efficiency and major reduction in potable water use significantly reduce capital and operating costs.

Existing clarifier tank retained and used for stormwater storage

Potable water use for city vehicles and irrigation reduced by

100%

Natural ventilation eliminates the need for mechanical cooling



Sustainable Site

• The large concrete clarifier tank retained from the abandoned building provides on-site water storage

• Porous paving materials as well as a green roof increases on-site filtration, promotes rain water evaporation and helps manage stormwater run-off

• Roof overhangs, exterior window shades, reflective roofing, and deciduous trees help to reduce the amount of heat absorbed by site surfaces

• Security lights use low wattage metal halide and compact fluorescent luminaries to minimize light pollution

Energy & Atmosphere

• Optimization of building orientation, wall openings, insulation levels and glazing parameters all help reduce energy use

• The green roof provides additional insulation to the building

• Solar hot water tubes provide heat for the building and the domestic hot water system

• Thermal energy in stormwater, diverted into a detention tank from city streets, is used to augment heating for the facility during the winter and assist in cooling during the summer

• Photo-voltaic panels allow for on-site electrical power generation

• Occupancy sensors in rooms help conserve energy

• Operable windows provide natural ventilation, allow staff to control their personal environment and optimize cross-ventilation

Water Efficiency

• Existing storm draining lines were redirected to discharge approximately 3.1 million gallons of rainfall per year through the stormwater storage tank

• A water source heat pump extracts heat from stored water for space and domestic water heating

• Collected stormwater is used for washing the fleet of civic utility vehicles, and as supply water for city street sweepers

• Waterless urinals and low-flow faucets are used throughout the facility and stormwater is used for flushing toilets

Materials & Resources

• Materials were selected for their low impact on the interior environment

• Preference was given to regional products and materials with high recycled content

• Durability and longevity of the materials selected will contribute to the durability of the building

• Internal glass walls and transoms above doors maximize natural light penetration

Green Performance

Water

- Domestic water use for the City's vehicle fleet and irrigation reduced by **100 percent** (1.5 million litres/year)
- Domestic water usage reduced by **over 36%**
- Stormwater collection reduced annual potable water use from 1,940,000 litres to 250,000 litres, an **87% reduction**

Materials

- **98% of demolition waste** diverted from the landfill

Energy

- Energy consumption is **58% better** than the Model National Energy Code Building
- Projected annual energy **cost savings of $4,490 a year,** based on the current energy rates
- Total elimination of mechanical cooling
- Annual greenhouse gas emissions reduced by **more than 5,000kg** CO^2

87%
reduction in potable water use

98%
of demolition waste diverted from landfill

58%
better energy efficiency than the Model National Energy Code

Indoor Environmental Quality

- A customized ventilation system saves energy and offers excellent air quality
- Water-based, non-toxic adhesives and low VOC paints, sealants, coatings and carpet improves indoor air quality
- Direct ventilation of washrooms, showers and work areas such as photocopier rooms improves air quality
- The installation of entranceway grates reduces the dirt and pollutants tracked into the facility

Innovation & Design

- Existing clarifier tank retained and used for stormwater storage
- Stormwater management and water conservation
- Extraction of heat energy from stormwater
- Reduction of potable water use through effective stormwater use



LEED Scorecard

LEED
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN

Green Operations Building, LEED Project # 0225
LEED Version 2 Certification Level: GOLD
July 28, 2003

44 Points Achieved — Possible Points: **69**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

8 Sustainable Sites — Possible Points: 14

Y			
Y	Prereq 1	**Erosion & Sedimentation Control**	
1	Credit 1	**Site Selection**	1
	Credit 2	**Urban Redevelopment**	1
	Credit 3	**Brownfield Redevelopment**	1
1	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	Credit 4.3	**Alternative Transportation**, Alternative Fuel Refueling Stations	1
1	Credit 4.4	**Alternative Transportation**, Parking Capacity	1
	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
	Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
1	Credit 6.1	**Stormwater Management**, Rate and Quantity	1
	Credit 6.2	**Stormwater Management**, Treatment	1
1	Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1
1	Credit 7.2	**Landscape & Exterior Design to Reduce Heat Islands**, Roof	1
1	Credit 8	**Light Pollution Reduction**	1

5 Water Efficiency — Possible Points: 5

Y			
1	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
1	Credit 2	**Innovative Wastewater Technologies**	1
1	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

11 Energy & Atmosphere — Possible Points: 17

Y			
Y	Prereq 1	**Fundamental Building Systems Commissioning**	
Y	Prereq 2	**Minimum Energy Performance**	
Y	Prereq 3	**CFC Reduction in HVAC&R Equipment**	
2	Credit 1.1	**Optimize Energy Performance**, 20% New / 10% Existing	2
2	Credit 1.2	**Optimize Energy Performance**, 30% New / 20% Existing	2
2	Credit 1.3	**Optimize Energy Performance**, 40% New / 30% Existing	2
2	Credit 1.4	**Optimize Energy Performance**, 50% New / 40% Existing	2
	Credit 1.5	**Optimize Energy Performance**, 60% New / 50% Existing	2
1	Credit 2.1	**Renewable Energy**, 5%	1
	Credit 2.2	**Renewable Energy**, 10%	1
	Credit 2.3	**Renewable Energy**, 20%	1
	Credit 3	**Additional Commissioning**	1
1	Credit 4	**Ozone Depletion**	1
	Credit 5	**Measurement & Verification**	1
1	Credit 6	**Green Power**	1

6 Materials & Resources — Possible Points: 13

Y			
Y	Prereq 1	**Storage & Collection of Recyclables**	
	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell	1
	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
1	Credit 2.1	**Construction Waste Management**, Divert 50%	1
1	Credit 2.2	**Construction Waste Management**, Divert 75%	1
1	Credit 3.1	**Resource Reuse**, Specify 5%	1
	Credit 3.2	**Resource Reuse**, Specify 10%	1
1	Credit 4.1	**Recycled Content**	1
	Credit 4.2	**Recycled Content**	1
1	Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
1	Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally	1
	Credit 6	**Rapidly Renewable Materials**	1
	Credit 7	**Certified Wood**	1

11 Indoor Environmental Quality — Possible Points: 15

Y			
Y	Prereq 1	**Minimum IAQ Performance**	
Y	Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	
1	Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
	Credit 2	**Increase Ventilation Effectiveness**	1
	Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
1	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1	Credit 4.2	**Low-Emitting Materials**, Paints	1
1	Credit 4.3	**Low-Emitting Materials**, Carpet	1
1	Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
1	Credit 6.1	**Controllability of Systems**, Perimeter	1
	Credit 6.2	**Controllability of Systems**, Non-Perimeter	1
1	Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
	Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1	Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

3 Innovation & Design Process — Possible Points: 5

Y			
1	Credit 1.1	**Innovation in Design**: Exemplary Performance in 98% CWM	1
1	Credit 1.2	**Innovation in Design**: Exemplary Reduction of Water Use	1
	Credit 1.3	**Innovation in Design**:	1
	Credit 1.4	**Innovation in Design**:	1
1	Credit 2	**LEED™ Accredited Professional**	1

White Rock Operations Centre

BUSBY + ASSOCIATES ARCHITECTS

Notes

Rogers Elementary School

HUGHES CONDON MARLER : ARCHITECTS

CLIENT
Greater Victoria School District
DATE OF COMPLETION
1991
BUILDING TYPE
Elementary School

Rogers Elementary School

Rogers Elementary School was built in 1991, on a site which was both rural and suburban in context. The design process began with a survey of the literature on school design over the last 30 years, and interviews with educators about the current philosophy of elementary education. The themes which were at the forefront of the discussions were the increasing role of technology in elementary education and a desire for the integration of schools within their community. Most significantly, the elementary school was identified as a place where responsibility toward that environment could first be established.

Rogers Elementary School is sited to integrate with the natural features of the site and to anticipate the demands for future expansion and growth. It has internal flexibility that allows classroom space and adjoining support space to be altered easily to suit new requirements, as well as external flexibility that permits its expansion in modular increments to accommodate twice the initial population. It was, in fact built in two phases, the first accommodating 250 students and the second providing for up to another 250. Site servicing to accommodate the capacity of the future expansion was accounted for and built into the existing school.

The existing electrical room was located at the south end of the School in order to be in a central location after the completion of the second phase of the project.

The dramatic central "V" roof is supported independently by free standing composite concrete and steel columns. The school was conceived as a series of spaces serviced by a central circulation spine and incorporates innovative features to encourage flexibility and energy efficiency, while minimizing maintenance concerns. Natural light reflected off sloping ceilings and natural cross ventilation from clerestory windows makes Rogers Elementary an environmentally innovative educational facility.

Durability and longevity are ensured through the extensive use of masonry construction and metal roofing. The natural setting is visible from a multitude of interior viewpoints, and the environmental programs in the curriculum further support students' respect for sustainability and nature.

Minimal site disturbance

Daylighting and natural ventilation

Durable materials

Sustainable Site

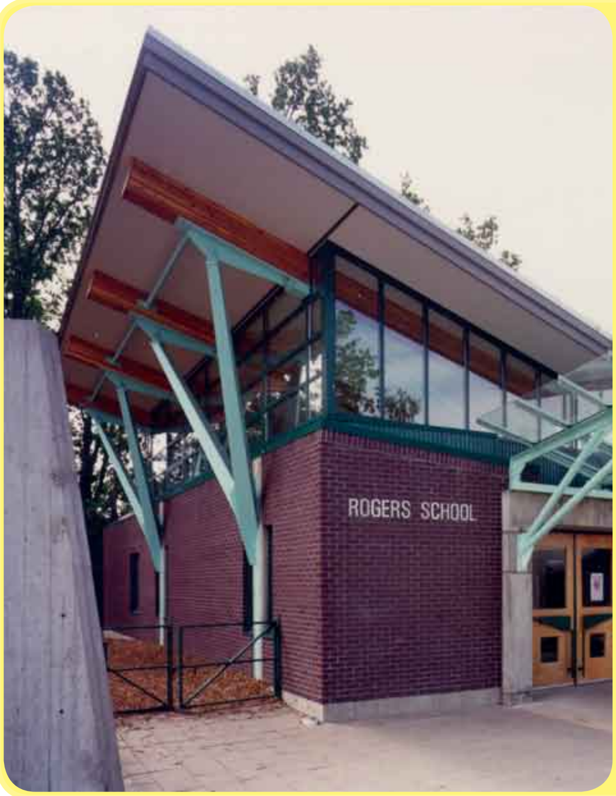
• Takes advantage of natural features such as solar orientation, relationship to existing vegetation and views to park-like setting

• Many existing mature trees are incorporated into the design of the school; a central courtyard with its mature Gary Oaks offers a natural play area for students

• Built-in flexibility prolongs the useful life of the existing building and enables expansions even after the capacity of the original design is exceeded

• Use of native, low maintenance, low irrigation plants

Energy & Atmosphere



• The school was originally designed with a geothermal de-centralized system serving every second classroom. This very efficient system was modified to eliminate the geothermal aspects which was in the past perceived to have a too long pay back period of 10 years

• Energy efficient indirect lighting offers a very comfortable indoor environment for staff and student alike. Due to value engineering, the second phase of the school uses a direct lighting system which is less appreciated by the users

• Daylighting and natural ventilation are contributing to the energy conservation strategies of the building

• Natural ventilation and innovative glazing eliminate the need for mechanical cooling

Water Efficiency

• No irrigation required for the landscaping around the building

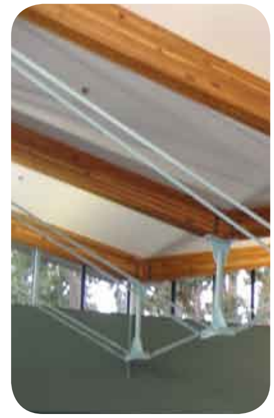
• On-site storm water infiltration uses minimal amount of impervious surfaces around the building; modification to the original intent introduces some asphalt paving on the site

Indoor Environmental Quality

• Natural cross ventilation from clerestory windows and user level operable windows offer thermal comfort

• Natural light reflected off sloping ceilings increases daylight penetration deep into interior spaces

• Low emitting materials such as concrete blocks, steel and glass are used in the construction of the school

Green Performance

At the time of completion Rogers Elementary School integrated innovative green design with ground breaking educational programming. The original facility demonstrates how a seamless integration of green building and programming, along with a commitment to design excellence, can result in a highly successful and cost efficient facility. The quality of the spaces provided by the original building was difficult to duplicate in the addition, given a limited budget and a less integrated approach. Although it does not offer a decisive answer to this common challenge, the case study contributes to the ongoing discussion of capital cost, operational cost and longterm benefit.

Materials & Resources

- Durability and longevity are ensured through the extensive use of masonry construction and metal roofing
- Whenever possible, high maintenance and low durability interior finishes were omitted to reduce the demand on natural resources required to manufacture interior finishes

Innovation & Design

- The innovative design features of this building include decentralized mechanical system, significant access to daylight and integration of existing landscape into the planning of the school
- The unique plan configuration allows teachers and specialized support staff to work together with a diversity of students, including special need students. This flexible plan provides a facility that remains relevant and contributes to the greater health of the community

Vancouver Island Technology Park IDEALINK ARCHITECTURE: BUNTING COADY ARCHITECTS

CLIENT
British Columbia Building Corporation
DATE OF COMPLETION
May 2003
BUILDING TYPE
Commercial
LEED® CERTIFICATION
LEED™ Gold (41 points)

Vancouver Island Technology Park

The Vancouver Island Technology Park (VITP) of an existing 185,000 square foot long-term care hospital built over 30 years ago. While the site and existing facility offered an exceptional natural setting, a robust concrete structure, and an early but serviceable rainscreen wall system, it was deficient with respect to current life safety codes and had a tired-looking and dated institutional appearance.

The goal was to bring the building back to life in a cost-effective manner as a serviced shell building for high technology tenants. Objectives included larger floor plans, upgraded life safety systems, and a rejuvenated appearance.

VITP 35.1 acre site is adjacent to Camosun College and the Horticulture Centre in the District of Saanich. VITP development objectives focus on site improvements to accommodate 165,000 square feet of renovated, high tech office buildings and 235,000 square feet of new office buildings.

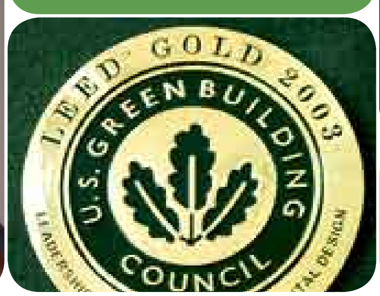
One major objective of the park is to support technology transfer activities that generate lucrative economic growth. As such, the architectural design showcases innovative green design strategies and sustainability.

Buildings are oriented to take advantage of sun and shade. The facility features high performance envelopes and systems, integrated photovoltaic panels, water conservation systems and LED lighting and controls. Healthy levels of fresh air and carefully selected materials contribute to occupancy comfort. VITP is designed to a LEED Gold standard of sustainability.

This building is Canada's first refurbished LEED-Gold building. It is an excellent example of exceptional green performance for a retrofit building. It serves as a showcase for the retrofit of existing buildings which were not originally designed with the environment in mind.

Daylighting and energy efficient glazing system

First refurbished LEED Gold building



Indirect lighting for increased comfort and efficiency



Water Efficiency

• Native plants and natural meadows require no permanent irrigation

• Water consumption reduced by 33% through use of dual flush toilets, waterless urinals, electronic sensors on faucets and low flow shower heads

Sustainable Sites

• Redeveloping this abandoned hospital facility involved checking for soil contamination and removal of asbestos and underground storage tanks

• Negotiated extensions of several bus routes to site; bicycle parking and showers for 18% of users; negotiated reduction of municipal parking requirements by 50%; showers and bicycle storage facilities provided and designated carpool parking is available

• 98% of degraded habitat was restored by allowing previously irrigated turf area to restore itself naturally and planting native plants and trees. A no-build covenant protects surrounding trees

• 100% of stormwater is treated and infiltrated on site through the use of grass swales, grass/gravel pave systems and stormwater treatment and retention ponds

Energy & Atmosphere

• Exceeds ASHRAE/IESNA 90.1-1999 by 28%; strategies include occupancy sensors to control lighting, CO2 demand ventilation control and Optimal Start system to control fan start times

• Daylighting and energy efficient lighting fixtures are in place to reduce energy demand

• High performance windows and envelope designed to reduce the size of the mechanical systems

• Building integrates photovoltaic panels and LED lighting and controls

Materials & Resources

• Salvaged materials comprises 8% of total materials

• 33% of materials, measured by LEED's weighted cost value, contain post-consumer and/or post-industrial recycled content (e.g., rebar, millwork, insulation, aluminum panels and rubber flooring)

• 31% of materials were manufactured within 500 miles, including grass/gravel pavers, concrete, wood, aluminum panels, roofing, siding, windows, wallboard, carpeting and paint

Green Performance

Site

- **98% of degraded** habitat was **restored**

Water

- Potable water consumption **reduced by 33%**
- **100% of stormwater is treated and infiltrated on-site** through use of grass swales, grass/gravel pave system and stormwater treatment and retention ponds

Materials

- **99% of construction waste** was salvaged or recycled saving $600,000 and costing 60% less than other contractor bids
- Reused **100% of existing structure** and **91% of existing shell**

Energy

- **Exceeds** ASHRAE/IESNA 90.1-1999 **by 28%**

33%
reduction in potable water use

99%
of demolition waste diverted from landfill

28%
better energy efficiency than the ASHREA 90.1

Indoor Environmental Quality

- Materials used in the project were carefully selected to emit low or no VOC's offering excellent indoor air quality and occupant comfort
- All adhesives, sealants, paints, carpets and composite wood emit low or no volatile organic compounds

Innovation & Design

- Integrated Site Water Management Plan and Salmon Bear Creek
- Rehabilitation treats stormwater from other sites and provides for rehabilitation of a local creek
- The project participated in a transportation program to promote alternative transportation
- Green building guidelines and educational program for tenants were developed to ensure green performance for all tenants



LEED Scorecard

Vancouver Island Technology Park
LEED Project # 0113
LEED Version 2.0 Certification Level: GOLD
February 3, 2002

41 Points Achieved — Possible Points: **69**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

10 Sustainable Sites — Possible Points: 14

Y			
Y	Prereq 1	**Erosion & Sedimentation Control**	
1	Credit 1	**Site Selection**	1
	Credit 2	**Urban Redevelopment**	1
1	Credit 3	**Brownfield Redevelopment**	1
1	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1	Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
	Credit 4.3	**Alternative Transportation**, Alternative Fuel Refueling Stations	1
1	Credit 4.4	**Alternative Transportation**, Parking Capacity	1
1	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
1	Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
1	Credit 6.1	**Stormwater Management**, Rate and Quantity	1
1	Credit 6.2	**Stormwater Management**, Treatment	1
1	Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1
	Credit 7.2	**Landscape & Exterior Design to Reduce Heat Islands**, Roof	1
	Credit 8	**Light Pollution Reduction**	1

4 Water Efficiency — Possible Points: 5

Y			
1	Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
	Credit 2	**Innovative Wastewater Technologies**	1
1	Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1	Credit 3.2	**Water Use Reduction**, 30% Reduction	1

6 Energy & Atmosphere — Possible Points: 17

Y			
Y	Prereq 1	**Fundamental Building Systems Commissioning**	
Y	Prereq 2	**Minimum Energy Performance**	
Y	Prereq 3	**CFC Reduction in HVAC&R Equipment**	
2	Credit 1.1	**Optimize Energy Performance**, 20% New / 10% Existing	2
2	Credit 1.2	**Optimize Energy Performance**, 30% New / 20% Existing	2
2	Credit 1.3	**Optimize Energy Performance**, 40% New / 30% Existing	2
	Credit 1.4	**Optimize Energy Performance**, 50% New / 40% Existing	2
	Credit 1.5	**Optimize Energy Performance**, 60% New / 50% Existing	2
	Credit 2.1	**Renewable Energy**, 5%	1
	Credit 2.2	**Renewable Energy**, 10%	1
	Credit 2.3	**Renewable Energy**, 20%	1
	Credit 3	**Additional Commissioning**	1
	Credit 4	**Ozone Depletion**	1
	Credit 5	**Measurement & Verification**	1
	Credit 6	**Green Power**	1

7 Materials & Resources — Possible Points: 13

Y			
Y	Prereq 1	**Storage & Collection of Recyclables**	
1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell	1
	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
1	Credit 2.1	**Construction Waste Management**, Divert 50%	1
1	Credit 2.2	**Construction Waste Management**, Divert 75%	1
1	Credit 3.1	**Resource Reuse**, Specify 5%	1
	Credit 3.2	**Resource Reuse**, Specify 10%	1
1	Credit 4.1	**Recycled Content**, Specify 25%	1
	Credit 4.2	**Recycled Content**, Specify 50%	1
1	Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
1	Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally	1
	Credit 6	**Rapidly Renewable Materials**	1
	Credit 7	**Certified Wood**	1

9 Indoor Environmental Quality — Possible Points: 15

Y			
Y	Prereq 1	**Minimum IAQ Performance**	
Y	Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	
1	Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
1	Credit 2	**Increase Ventilation Effectiveness**	1
	Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
1	Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1	Credit 4.2	**Low-Emitting Materials**, Paints	1
1	Credit 4.3	**Low-Emitting Materials**, Carpet	1
1	Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
1	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
	Credit 6.1	**Controllability of Systems**, Perimeter	1
	Credit 6.2	**Controllability of Systems**, Non-Perimeter	1
1	Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
	Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1	Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1

5 Innovation & Design Process — Possible Points: 5

Y			
1	Credit 1.1	**Innovation in Design**: Integrated Site Water Management Plan	1
1	Credit 1.2	**Innovation in Design**: Sustainable Transportation Study	1
1	Credit 1.3	**Innovation in Design**: Exemplary Performance	1
1	Credit 1.4	**Innovation in Design**: Green Building Tenant Guidelines	1
1	Credit 2	**LEED™ Accredited Professional**	1

Notes

Hickman Building UVIC TERRANCE WILLIAMS ARCHITECTS

CLIENT
Hickman Building UVIC
DATE OF COMPLETION
1997
BUILDING TYPE
Institutional

Dr. W. Harry Hickman Building UVIC

The Dr. W. Harry Hickman Building at the University of Victoria is an innovative and advanced academic building. This single story structure includes seminar rooms and classrooms devoted to teaching and learning in one wing and a second wing devoted to office space and conference rooms. The building's "hub" features a multi-functional interactive auditorium. This is a demonstration room for sophisticated audio-visual presentations, and is capable of broadcasting for distance learning and receiving from remote locations. The building is energy-efficient, and incorporates numerous green building principles.

The 210 seat auditorium is organized for direct sight lines and clear natural acoustics for all seats. It is equipped with extensive state of the art electronic and audio visual technical systems to enhance the scope and the flexibility of uses of this futuristic lecture theatre. The theatre interior is enhanced with hardwood and acoustical paneling, a variety of automated projection screens and remote controlled window shutters. Rotating theatre seating was specified to enable intensive learner interaction. Disabled access was a fundamental premise for the project.

This building illustrates many fundamental green building concepts. The landscaping offers lush quality spaces and uses native plants that are irrigated using rainwater collected on the roof. The building operates with efficient mechanical and lighting systems. Ample access to daylight, views and operable windows reduce the demand on mechanical and electrical systems. The interior of the building showcases low emitting materials for increased indoor environmental quality. Additionally, finishes were selected for their long term durability.

This building achieves, with simple off the shelves technologies, a remarkable level of 'green' performance. It illustrates that regardless of the size and agenda of a building, successful green strategies can be implemented for the benefit of the owners, building users and the environment.

Daylighting in teaching areas

Low VOC materials and indirect efficient lighting

High performance glazing with solar shading



Sustainable Site

- Public transit services the campus reducing the impact of motor vehicles
- The heat island effect is reduced with landscaping and high albedo materials

Energy & Atmosphere

- This building has no mechanical cooling. Cooling is achieved with natural ventilation and strategies to reduce solar heat gain
- The high performance glazing system incorporates mullion extensions for solar control and thermal comfort of building occupants
- Highly insulated exterior envelope and high performance tinted glazing system with low-e coating offers additional energy savings

Water Efficiency

- Low flow fixtures are used for water conservation
- Rainwater is used for irrigation of the native landscaping around the building

Materials & Resources

- Preference was given to locally produced materials for interior and exterior construction
- Fly ash is used in the concrete to reduce green house gas emissions
- A recycling program is in place as part of the University's operating policy
- Exposed pored in place concrete reduces the need for additional interior finishes and exterior cladding reduces the demand on natural resources

Green Performance

The importance of this project lies in its simple environmental strategies integrated with a highly innovative facility program. By installing multi-media communication strategies into an energy efficient building, it facilitates remote teaching and linkages to other universities while significantly reducing the need for travel and commuting. When looking at the global impact of transportation to and from buildings; a project like the Hickman building sparks an important discussion about how we design our post-secondary buildings, campuses and communities.

Indoor Environmental Quality

- The use of water-based, non-toxic adhesives and low VOC paints improve air quality
- High level of control for the occupants with lighting, and ventilation control for offices and work stations
- Energy efficient indirect 'up lighting' provides a comfortable indoor environment for building users
- Daylighting is introduced into the large auditorium, providing a better learning environment for students

Innovation & Design

- Building combines users' focus strategies such as daylighting, excellent thermal comfort and space flexibility with advanced technological teaching techniques
- Unlike most post-secondary facilities, this building requires no mechanical cooling. Cooling is achieved with natural ventilation and strategies to reduce solar heat gain

Medical Sciences Building UVIC

CHERNOFFTHOMPSON ARCHITECTS

CLIENT
University of Victoria
DATE OF COMPLETION
September 2004
BUILDING TYPE
Institutional
LEED CERTIFICATION
Expect LEED Gold Certification (43 points)

Medical Sciences Building UVIC

The University of Victoria Medical Sciences Building is a 4,000 square meter medical teaching and research facility. The building comprises lecture theatres, laboratory, and gross anatomy lab facilities, equipped for interactive distance education. Lectures may be broadcast from remote sites to students in this facility, and classes from this facility may be broadcast to other sites.

The building footprint has been minimized, and no new parking was created. Grass-pave systems are used for a majority of hard surfaces, reducing the heat island effect. Stormwater is managed through bioswales, and natural retention integrated with the campus natural storm water system. The landscaping has no permanent irrigation system, and low-flow fixtures are used for water use reduction. Plumbing and infrastructure is included to allow for use of graywater from a nearby aquatic research centre.

Materials and products were chosen for their recycled content, ease of reuse, and proximity to site of the manufacturing location. Through careful monitoring, 87% of construction waste was diverted from the landfill.

The use of low VOC adhesives, paints, and carpets offer users a healthy indoor atmosphere. The project made no use of plywood inside the building to further reduce toxic glues. Natural daylight reaches 77% of the interior building spaces, and 98% of occupied spaces have views to the outside.

The School of Environmental Studies has chosen to include this building and LEED as part of their curriculum. The building is expected to qualify for LEED Gold.

Alternative modes of transportation supported by the building

100%
on-site stormwater management

Healthy indoor environments with low VOC products



Water Efficiency

- Contrary to current UVIC requirements, the project avoided installing a permanent irrigation system in order to reduce water use

- Low flow fixtures are installed for water conservation

- Plumbing and infrastructure is included to allow for use of graywater from a nearby aquatic research centre. This campus wide synergy provides potential water savings of a magnitude not attainable for a single building approach

Sustainable Sites

- Site selection was supported by an environmental report, on the part of the campus the site is not designated as a maintained forest area

- The design team carefully minimized the building footprint to reduce site disturbance

- Together, the provisions for bike storage and showers with easy access to public transit, helps reduce reliance on automobiles as a major transportation mode

- To discourages automobile usage the facility offered no net increase to campus parking

- Stormwater runoff was managed through constructed bioswales, and natural retention areas that integrate with the campus' natural storm water system

- Where possible, hard surfaces used grass-pave systems to reduce the heat island effect and increases on-site water filtration

Energy & Atmosphere

- The development of whole building commissioning increased the HVAC systems performance and helped in the training of maintenance staff

- HVAC equipment reduces the use of CFC refrigerants

- Demand control of fumehoods and heat recovery systems in the laboratory help reduce energy use

- Green power certificates supply environmentally-friendly power to the facility

Materials & Resources

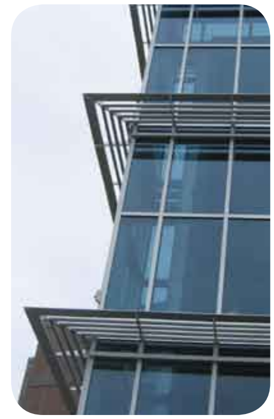
- 10% of building products used during construction were previously used on other building projects

- 23% of the installed products have some recycled content and helps reduce the demand for raw natural resources

- 100% of the demolished asphalt was recycled

- 100% of topsoil was reused for improved organic content of the landscaping features

- Many of the materials normally considered waste, such as reinforcing steel, steel deck, insulation, sheet metal scraps, steel studs, were recycled



Green Performance

Water
- Over **40% reduction of potable water** for the building
- **0% potable water** use for irrigation

Materials
- **87% of construction waste** was diverted from landfill
- **63% of all materials** are **locally** manufactured

Energy
- Energy study predicts energy performance to be **36% better than the Model National Energy Code**

IEQ
- **77% of the building** is lighted using natural **daylighting strategies**
- Of the areas that are regularly occupied, **98% of these have direct views** to the outdoors

+40%
reduction in potable water use

87%
of demolition waste diverted from landfill

36%
better energy efficiency than the Model National Energy Code

Indoor Environmental Quality

- Use of low VOC adhesives, paints and carpets helps increase the health and well being of all building occupants
- There is no interior use of composite wood product such as plywood (containing toxic glues)
- CO^2 monitoring throughout the building improves indoor air quality
- Independently controlled ventilation for many rooms improves thermal comfort and energy efficiency of systems

Innovation & Design

- The School of Environmental Studies at UVIC is to include this building and the LEED green building rating system as part of their curriculum
- LEED training sessions were provided to all sub-contractors which has helped to contribute to incremental changes in the local building industry
- The LEED consultant is also the cost consultant, improving cost effective decisions related to green building products and designs

Engineering Laboratory Wing UVIC
WADE WILLIAMS YOUNG + WRIGHT ARCHITECTS

CLIENT
University of Victoria
DATE OF COMPLETION
July 1995
BUILDING TYPE
Institutional

Engineering Laboratory Wing UVIC

The Engineering Laboratory Wing built for the University of Victoria demonstrates that energy-efficient buildings need not cost more than conventional facilities to construct. Although the building's computers and equipment generate a significant amount of heat load, the building envelope and systems are so efficient that only night time ventilation is required for cooling. Almost no supplemental heat is necessary for the perimeter offices due to Victoria's temperate climate.

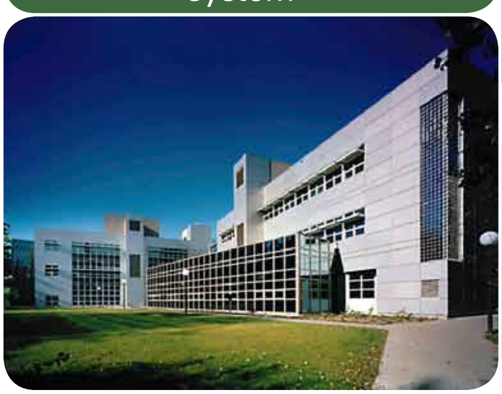
Through observing the energy performance of the adjacent Engineering Office Building constructed five years earlier, it was possible to eliminate the Engineering Laboratory perimeter heating system. Instead, heating coils in the ventilation system provide a small amount of supplemental heat when necessary. The result is huge savings in construction and annual costs.

The building has a light green tinted glazing system, with two low-e-coated suspended films in between the inner and outer glass. Light shelves are used on the interior and exterior of the building to provide shade or to reflect daylight further into the building. These shelves also serve to carry cable trays and perimeter light fixtures.

While the windows are operable, they are not relied upon for cooling the perimeter labs. Instead a high-volume and low-velocity (HVLV) ventilation system operates at night to cool the building, when both air temperatures and electric rates are low.

High-efficiency lighting with automated controls and motion sensors help to control cooling loads and conserve energy. Concrete shear walls located throughout the building effectively serve as internal thermal mass for the facility.

High performance envelope and glazing system



Operable Windows increase thermal comfort

Durable materials and indirect lighting

Sustainable Site

- A narrow east-west building plan maximizes access to daylight for building occupants
- Minimal site disturbance strategies were in place during the buildings design and construction
- Existing trees and plants were carefully retained during construction
- Native plants requiring minimal water were used whenever possible

Energy & Atmosphere

- Highly insulated exterior metal panels and a high performance glazing system with low e glass and thermally broken frames eliminate the need for perimeter heating
- A high performance envelope reduces solar gain during the day and eliminates the need for a cooling system
- Exterior light shelves provide shading to reduce heat gain
- A passive fresh air system provides ‘free’ cooling at night when the ambient outside temperature is cold enough to cool the building
- High efficiency direct and indirect lighting with automated controls and motion sensors maximize energy savings
- The building incorporates a very low interior power density of 0.78 Watts per sq. ft.
- The building envelope is insulated to R-30 in the roof and R-22 in the walls

Water Efficiency

- Low flow fixtures are used for potable water conservation
- Rainwater is used for landscaping irrigation around the building
- On-site infiltration of groundwater is increased with pervious paving material in the drop off area in front of the building. This reduces the demand on municipal infrastructure for stormwater management

Indoor Environmental Quality

- The building occupants have access to operable windows
- Light shelves and reflective ceiling tiles reflect daylight further into the building increasing the level of daylight deep into the work areas
- Exterior high-performance tinted float glass blocks 76% of UV light and transmits 66% of visible light
- A high-performance triple glaze curtain wall system also insulates against noise from the adjacent Ring Road and improves acoustical comfort of the building occupants

Green Performance

Already 10 years old, this building is withstanding well the test of time. Moreover, it is interesting to compare this building with more recent green buildings. Two main observations are notable of more recent green buildings: new facilities are addressing a multitude of issues such as site impacts, water, material selection and indoor environments in addition to energy efficiency; and new facilities take advantage of benchmark systems, such as LEED, offering more accurate performance indicators of the 'sustainable' performance of green buildings.

Materials & Resources

- Preference was given to locally produced materials for interior and exterior materials
- Fly ash is used in the concrete to reduce greenhouse gas emissions
- Exposed pored in place concrete reduces the need for additional interior finishes
- The curtain wall system is very efficient , providing high energy and acoustical performance. Installing this Alberta manufactured product supports the Canadian building industry

Innovation & Design

- This building boasts highly innovative energy efficient strategies far ahead of its time
- The facility uses heat generated by its occupants, lights, as well as by computers
- Combined with its high performance envelope the building was at the time of its completion, one of the most energy efficient buildings in British Columbia and perhaps even in Canada

Notes