The Integrated Learning Centre

LOCATION: Kingston, Ontario
FLOOR SPACE: 72,100 ft² (6,700 m²)
BUDGET: $17.3 million CAD
CONSTRUCTION DATES: 2002-2004
OWNER: Queen's University
ARCHITECT: B+H Architects
STRUCTURAL ENGINEER: Halsal Associates Ltd.
MECHANICAL ENGINEER: Smith & Anderson
ELECTRICAL ENGINEER: Crossey Engineering
ENVIRONMENTAL ENGINEERS: Allen Kani & Associates
LANDSCAPE: Janet Rosenberg & Associates
CONTRACTOR: Bondfield Construction

Rated Four Globes
Out of Five

*Please note that Green Globes™ uses a four globe scale in the U.S.
Four Globes in Canada is the same as 3 in the U.S.

PROJECT NOTES

PROJECT MANAGEMENT

Integrated Design Process (IDP)

- Strong emphasis on integrated design in the project brief
- Evidence of good client and design team participation at all stages of design

Environmental Purchasing

- National Master Specifications (NMS) green construction materials, components, systems, elements and work practices
- Locally produced materials sourced for interior finishes
- Energy-saving, high-efficiency equipment

SITE

Development Area

- Located on an urban service site previously used for parking

Minimization of Ecological Impact

- Outdoor lighting limited to paths and walkways, with cut-off angle shading to minimize the impact on the night sky

Enhancement of Site Ecology

- Native plantings

ENERGY

Energy Demand Minimization

- Net/gross area ratio of 1:1.65
- Numerous multipurpose spaces
- Effective space utilization achieved in an iterative process that involved client consultation, resulting in reduction from four stories to three, without affecting functionality

Integration of Daylighting

- Orientation that maximizes daylight at the south west side of the building
- Effective shading from adjacent buildings that avoids excessive heat gain
- Glazed sawtooth roof section that allows large amounts of daylight into interior atria
- Light shelves to reduce glare and disperse light

Building Envelope

- The western elevation was designed as a learning/test area, featuring several glazing types, including spectral glazing, varying transmittance ratings (75 to 4), high-performance, clear, grey and green spectral glass, and silver, gold or bronze mirroring
- U factor of 1.7 for the majority of window glazing

- Positive air and moisture leakage control
- Modified bituminous fluid membrane waterproofing

Energy-Efficient Systems

- Building Automation System (BAS) including lighting controls that enable occupants to dim the lights from their PC's
- High efficiency T-8 lamps and luminaries with electronic ballasts combined with lighting controls and occupancy sensors
- Radiant floor heating in atria
- Heat recovery ventilators for all exhaust (with exception of pollution exhaust fans)
- Minimal energy for vertical circulation by maximizing ramps
- Photovoltaic (PV) panels added to the connected building in the complex

Energy-Efficient Transportation

- Public transport accessible within 500 yards, with service at least every 30 minutes
- Secure parking for 120 bicycles

WATER

Water Conserving Features

- Water-saving devices or proximity detectors on urinals, low flush toilets (less than 1.5 gallons/flush) and proximity sensors on faucets
- Air-cooling towers
- No irrigation system for landscaping needed due to hardy, native plantings

INNOVATIVE INFILL

The Integrated Learning Centre is an infill project located between two existing buildings on the site of a former parking lot. B+H Architects responded to the context by integrating the existing facades into the new structure, thereby limiting the number of new elevations. Sandwiching the new construction between existing structures shelters it from the elements and helps to reduce energy demand. Limestone was salvaged from an existing building that was being demolished on the campus.

RESOURCES

Systems and Materials with Low Environmental Impact

- Material selection based on life cycle assessment

Materials that Minimize Consumption of Resources

- Concrete consisting of about 10% fly-ash and 15% slag
- Reused limestone from walls of an existing building that was being demolished on the campus at time of construction
- High-recycled content gypsum drywall

- Durable and low maintenance materials such as steel and concrete (anticipated life of the building is 100 years)

Reuse of Existing Buildings

- Existing buildings directly linked, forming the sides of the new structure

Building Adaptability

- Wide span structural bays (approx. 30' x 30') that enhance building adaptability

Building Disassembly

- Steel construction frame to be disassembled at the end of building's lifespan

Facilities for Recycling and Composting

- A large recycling room (50 ft^2) to accommodate sorting facilities and 8 recycling bins
- Dedicated outdoor space for 3 waste streams
- Dedicated room for toxics and ventilated battery storage area

EMISSIONS, EFFLUENTS

Minimization of Ozone-Depletion

- 250-ton air cooled chiller, using R134A refrigerant with an ozone depleting potential (ODP) of 0 and a global warming potential (GWP) of 420

Prevention of Sewer Contamination

- Oil and grit interceptors to prevent suspended materials from entering sewers and waterways

THE LIVING WALL

A three-story Living Wall is located in the main entrance of the building and purifies the air for three office clusters. Living Walls are capable of removing up to 90% of common pollutants, significantly improving indoor air quality in an environmentally sustainable manner. The microorganisms that live in the wet wall material continually ingest airborne contaminants until they become non-toxic. As part of the learning experience, students collect information from humidity and carbon dioxide sensors located in the Living Wall to monitor its filtration effects.

INDOOR ENVIRONMENT

Effective Ventilation System

- Some operable windows
- Fresh air intakes located on the roof are recommended distances from sources of pollution
- "Living wall"
- Bag filters estimated at >60% efficiency
- Easy access for cleaning and inspecting filters as a part of the learning experience of students

Source Control of Indoor Pollutants

- Dehumidification of outside air to minimize moisture within the building and prevent the growth of fungus, mold, and bacteria on building surfaces
- Easy access to air-handling units (AHUs) to facilitate maintenance and drainage
- Steam humidification
- Specialized, isolated and separately ventilated storage areas for cleaning and hazardous materials

Lighting

- Interior spaces with maximum lighting intensity of 50 foot candles
- Ambient lighting supplemented by task lighting at benches
- Daylighting optimized by heights, depths and surface treatments
- Large diagonal skylight that runs the length of the building
- Soffit coated with highly reflective material to bounce the light into the cascading interior plazas

Thermal Comfort

- Occupant thermal controls

Acoustic Comfort

- Avoidance of negative acoustic effects from site circulation, loading area, drop-off and vehicular access on noise-sensitive occupancies
- Trapezoidal room shapes, acoustic controls and choice of interior wall materials for positive acoustic experiences
- Space relationships and circulation strategies to minimize occupancy-related acoustic problems
- Stairway and vertical transport systems designed and located to avoid acoustic problems in adjacent spaces
- Noise attenuation of the structural systems, and insulation of primary spaces from impact noise through floating mechanical floor

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