Bellini Life Sciences Centre, McGill University

Energy conservation, small ecological footprint go hand-in-hand

Jim Taggart

Campuses and research institutions worldwide acknowledge the need to facilitate the convergence of disciplines as traditional boundaries continue to dissolve. There is also recognition that informal or chance encounters between university faculty, research personnel and students can be of great value. This intangible feature fosters a high quality workplace capable of attracting the best faculty, researchers and students.

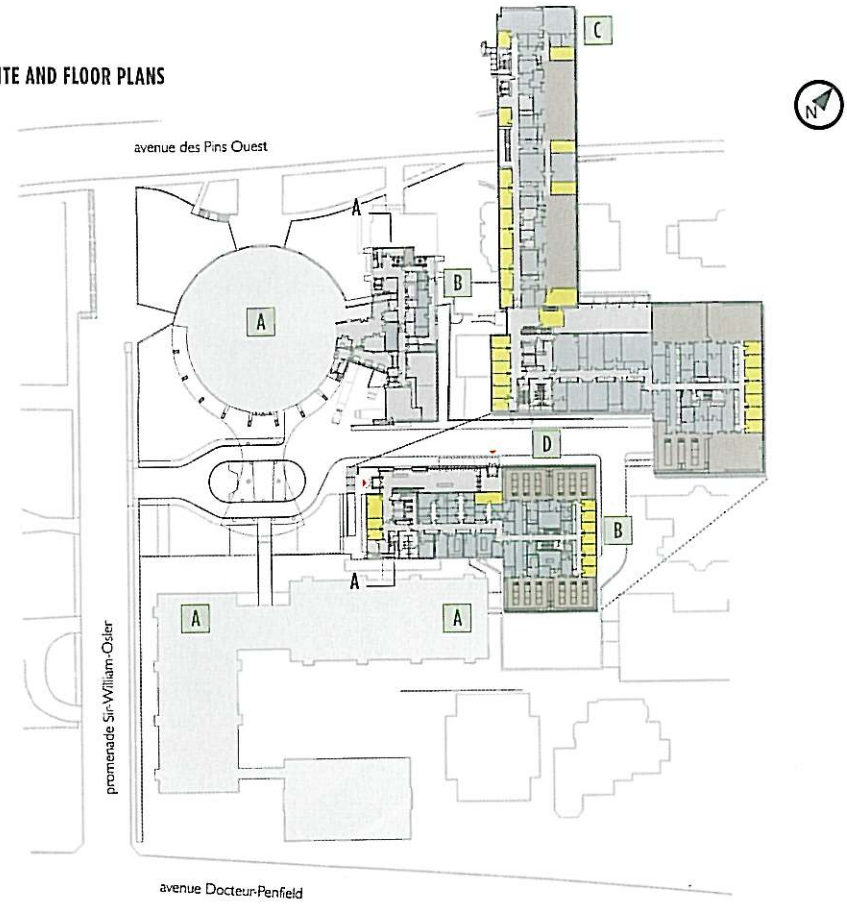
The new Life Sciences building sits on a tight site between two existing structures. The building bridges over existing service roads to create a single complex while maintaining vehicular access and circulation [1].

OWNER McGill University ARCHITECTS Diamond Schmitt Architects Inc., Provencher Roy + Associés Architectes STRUCTURAL ENGINEER Saia Deslauriers Kadanoff Leconte Brisebois Blais MECHANICAL AND ELECTRICAL ENGINEERS Pageau Morel et associés inc. GENERAL CONTRACTOR Pomerleau inc. LANDSCAPE ARCHITECT Claude Cormier architecte paysagiste Vibration: RWDI PHOTOS Marc Cramer, Tom Arban, Jean Guy Lambert

Functionally, the rapidly changing nature of research regimes means that laboratories must be designed in such a way as to permit reconfiguration without extensive changes to either the structure or main service distribution systems.

The challenge facing the design team on this project was to achieve these goals while maintaining and enhancing service vehicle access and circulation on a tight urban site. Located next to one of the most cherished green spaces in Montreal, and constrained horizontally by adjacent buildings, and vertically by an underground parking lot, solid granite below grade, and view planes from nearby Mount Royal.

SITE AND FLOOR PLANS



A Existing buildings
B First level
C Second level, spans service access road
D Service road

Second level is enlarged for clarity.

The solution lay in careful organization of the program: the connections between new and old buildings became meeting places; the vivarium, a large 'back of house' program element was inserted into the mountainside to the rear of the site, freeing space for research and office accommodation toward the front. Bridging over the service lane maintained access for vehicles.

The new 17,000m² [180,000sf] facility is home to 60 principal investigators and 600 researchers, and connects with the renovated Stewart and McIntyre buildings which accommodate a further 2,000 researchers, technical personnel, graduate students and postdoctoral fellows.

An integrated design approach, including design charettes and value management sessions, was used to ensure architectural integration of sustainable design features and to fully understand the impact each decision would have on operating and maintenance costs during the life of the building. [continued on page 36]

The building uses transparency to communicate inner activities to the campus outside, with particular emphasis on horizontal and vertical circulation and informal meeting places [2].

GREEN STRATEGIES

ENERGY CONSERVATION MEASURES INCLUDE THE FOLLOWING:

Heat Recovery
- Glycol runaround coils for all fresh air systems
- Enthalpy wheels to capture sensible and latent waste heat

Water Conservation
- 50,000 litre cistern, recovering roof water to feed toilets and urinals
- Green roof to further limit surcharging city storm water system

Fumehood Efficiency
- Night setback system whereby air change rate is lowered to acceptable minimum for unoccupied space
- Presence sensors amplifying setback at times during the weekday or weekend when space is unoccupied

Lighting Efficiency
- All occupied research spaces benefit from natural daylight
- Light shelves with integrated heating coils drive light deeper into building
- Artificial lighting is zoned to take full advantage of natural daylight

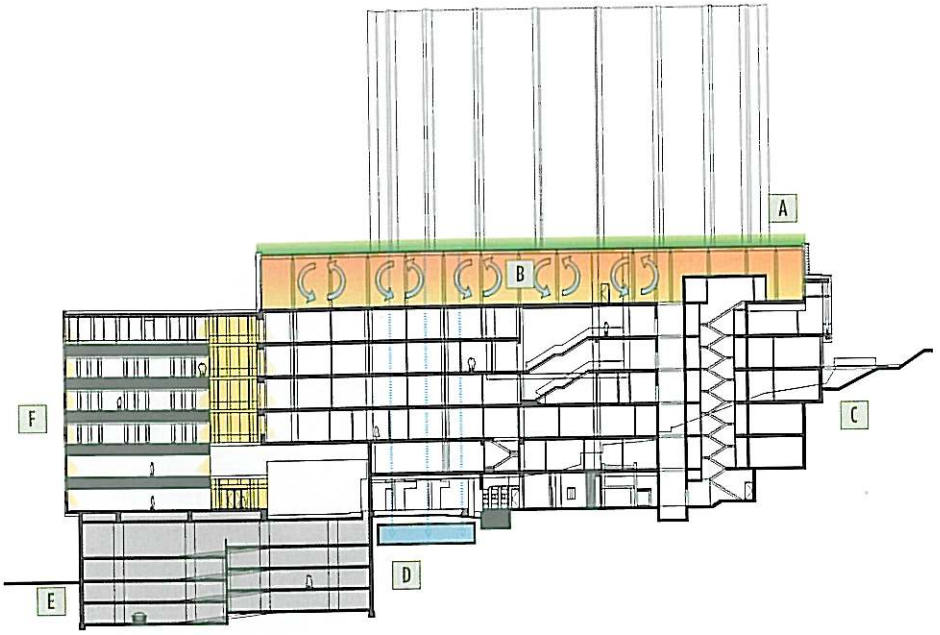
HVAC System
- Variable speed drives (VSDs) for all variable air volume (VAV) fan systems
- Cascading of relatively clean return air from non-lab zones to lab zones to enhance laboratory containment

MATERIALS

Structure
Steel and concrete

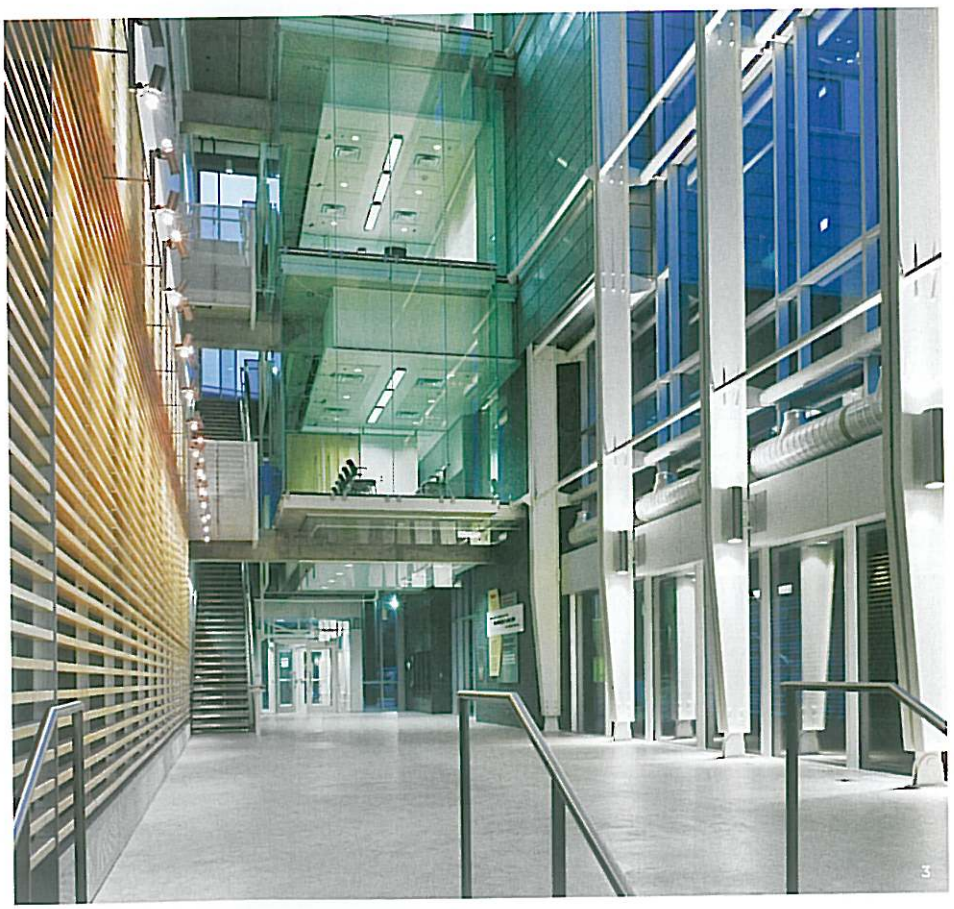
Exterior
Masonry, curtain wall of insulated glazing, and zinc cladding, built-up roofing and vegetated roof

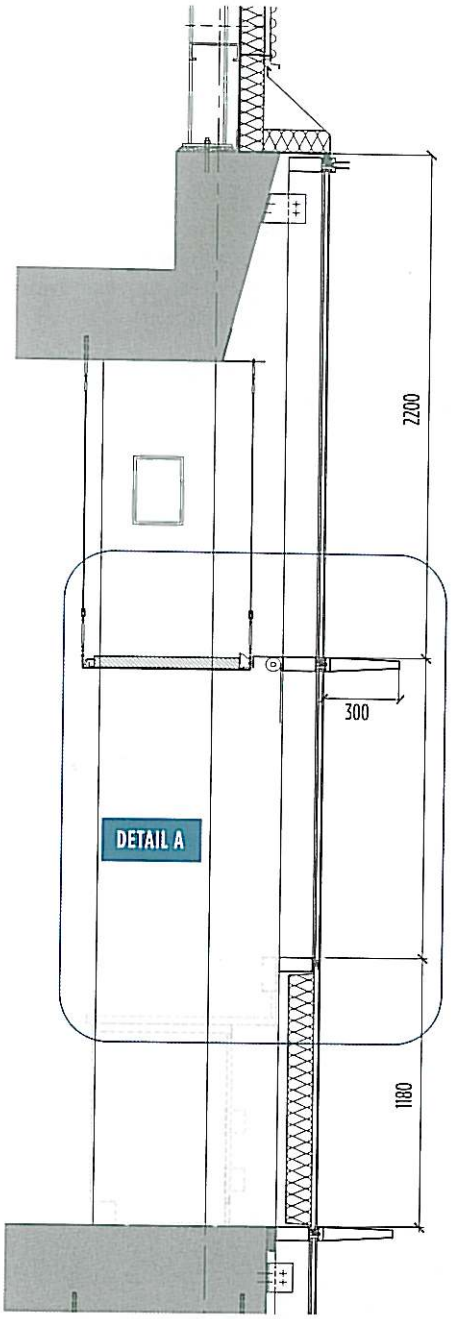
Interior
Acoustical ceilings, low-VOC paints and stains, flooring resilient and carpet, water-conserving toilets, urinals, 50,000 litre cistern recovers roof water for use in toilets



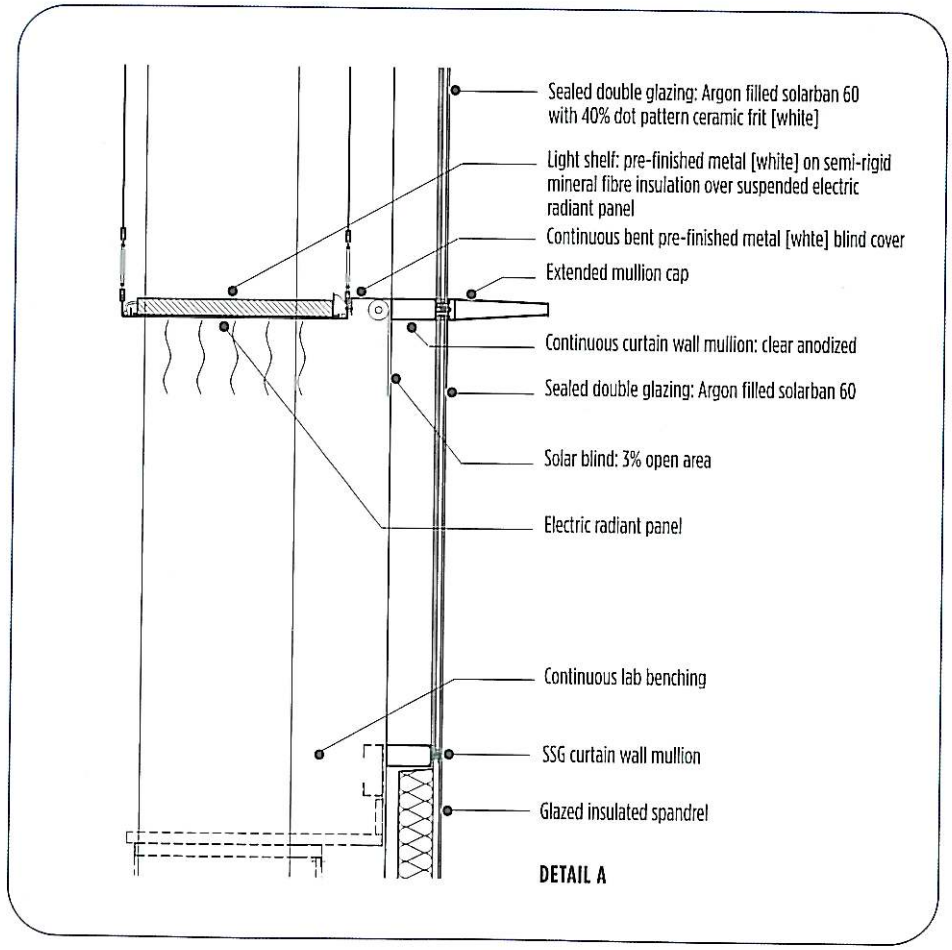
BUILDING SECTION A-A

A Green roof
B Heat recovery enthalpy wheels
C Tight urban site
D 50,000 litre cistern recovering roof water
E Existing parking structure
F Frit glass on south face





EXTERIOR WALL, PARTIAL SECTION AT FLOOR SLABS



The multi-storey atrium provides a social focus for the building and acts as a programmatic hub around which laboratory and academic spaces are arranged. It also brings in daylight and acts as an integral part of the natural ventilation system [3]. Many laboratory spaces have a strong and direct connection to natural light and views [4].

Providing abundant natural light in the laboratories was the foundation of creating a satisfying work environment. Strategically located meeting places and pedestrian crossroads [both vertical and horizontal] enhance the probability of chance meetings. By maintaining a low profile, the scale of the building on Pine Street is consistent with that of the historic context. The design of the complex also ensures that the park setting was not infringed upon.

Architecturally, two volumes interlock on the site, each with its own research program identity. Subtle variations of expression are used to distinguish one from the other based on exposure, interior program or composition.

Movement paths through the building are visible from the exterior and consequently have abundant natural light. Entrances and exits to these paths are clearly signaled.

To emphasize the discrete nature of each material, special attention was paid to the junction between them. The transition from glass to zinc is flush and the curtain wall glazing is either capless or creates solar shading through the use of razor sharp horizontal mullion extensions. In juxtaposition to the light volumetric expression, the base is clad in black brick, echoing the Canadian Shield granite upon which it rests.

Solar shading and other energy conservation measures were considered individually, based on a 10-year payback benchmark. Overall, the total building will use 2053MJ/m² [53kwh/ft²] annually, 36% more efficient than the Canadian National Model Energy Code reference building.

Planning for laboratory flexibility was addressed using three approaches: open concept wet bench areas with adjacent support alcoves; modular reconfigurable lab casework that allows components to be easily relocated by the users as their requirements change; and a core equipment facility centrally located between the two wings of the complex that is configured to allow the users to share access to expensive equipment. These core spaces are provided with electrical and mechanical service that will allow upgrades to equipment to take place with a minimum of disruption to other ongoing research activities.

Linking elements and informal social spaces ties the new facility to both adjacent buildings. At the upper levels, this allows for research interconnectivity. At the lower, more public levels, these spaces encourage casual interaction between users during breaks. The four-storey interior atrium space doubles as a pedestrian passage, leading to vertical circulation into the complex, which allows for an enhanced social and academic campus life.

Despite the challenges of a complex program and a constrained site, the Life Sciences Complex achieves efficiency and clarity in its internal organization, and strong and legible connections to its urban context. ◂

JIM TAGGART, MRAIC IS EDITOR OF SABMAG. THIS ARTICLE WAS PREPARED FROM MATERIAL SUPPLIED BY DIAMOND SCHMITT ARCHITECTS/ INC. AND PROVENCHER ROY + ASSOCIÉS ARCHITECTES.

Constrained by bedrock below, and view planes from Mount Royal above, the building takes on a low, horizontal character that does not overwhelm its historic context [5].