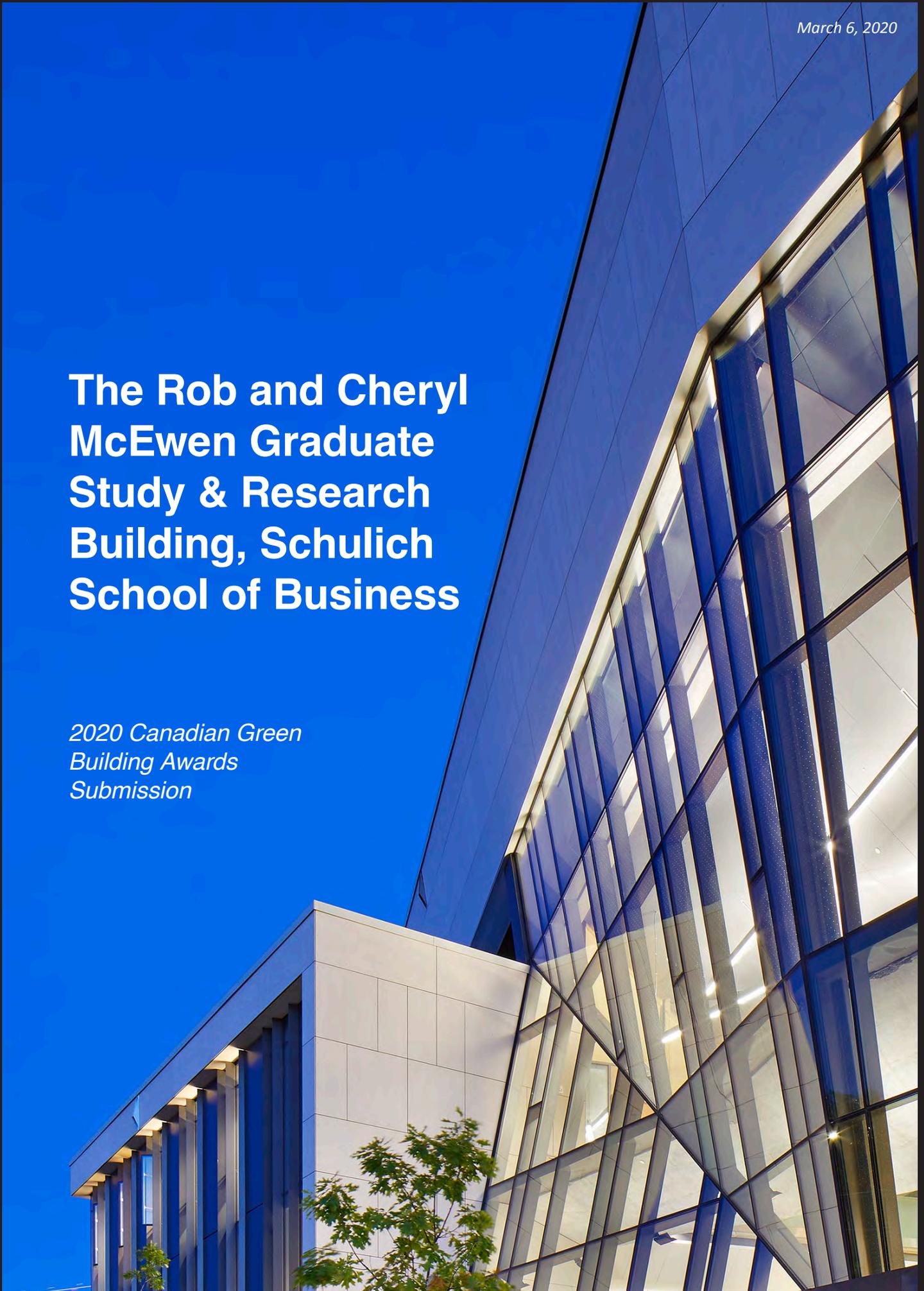


March 6, 2020

The Rob and Cheryl McEwen Graduate Study & Research Building, Schulich School of Business

*2020 Canadian Green
Building Awards
Submission*



The Rob and Cheryl McEwen Graduate Study & Research Building, Schulich School of Business

York University

PROJECT SUMMARY

This 65,000 square foot Graduate Study and Research Building for the Schulich School of Business is an academic building designed to promote progressive pedagogy and research. Its section and plan are arranged around an atrium that organizes access to a cafe, three large flat-floor classrooms and four seminar rooms, which are clustered with associated breakout rooms to allow various teaching and peer to peer learning formats. On the second and third floor, reconfigurable research laboratories are clustered with offices and two conference / seminar rooms to accommodate changing research needs. Lounges, meeting and support rooms provide complementary facilities for structured work and informal congeniality.

The building was conceived as a space that would support the school's distinct pedagogy. The building's atrium acts as a place for spontaneous meeting and programmed events. The atrium is also an air distribution collector for the building's hybrid natural-and-active ventilation system. The building's dynamic, climate-responsive design manifests the commitment of the Schulich School of Business to sustainability. Its 28-metre high solar chimney tower creates a tangible new campus landmark. The solar chimney is an exemplar of architectural and engineering integration, unprecedented in Canadian university architecture.



1. Strategic Decisions

The project's form synthesizes weather responsive design with urban design resolution of the highly-constrained site. An urbane block floating above a pedestrian colonnade lines the main campus entryway. The block splits where the folded glass skin of the atrium invites interior views. Such folds are used to "twist" the building from the street grid to reorient its south facade for optimal solar exposure, daylighting, and shade design. A curving single-storey wing of classrooms cradles a courtyard, buffering it from traffic.

2. Community

The building is conceived as a terrain for the exchange of ideas. That is expressed in its three-dimensional section and architectonic form. Its materialization melds architecture and engineering. The three-storey atrium is its performative heart: a theatrical place for gathering and programmed events, a welcoming movement hub and an air-distribution collector for the unique hybrid natural-and-active ventilation system. The sociability and climate-responsive design of the building manifests Schulich's commitment to social engagement and sustainability. The project is also sited within steps of a subway station.



Photo by Tom Arban

3. Site Ecology

The compact development site is configured to protect an adjacent woodlot. The building with extensive green roofs, drought-tolerant landscaping, and regional plants replaces a parking lot and adds habitat. Walkways and the central court are surfaced with permeable pavement feeding below grade storage galleries for onsite storm water management. Rain water recapture in a cistern provides irrigation to promote landscape sustainability.

4. Light and Air

The design of the hybrid passive-active environmental control system promotes wellbeing and sustainability. In natural ventilation mode, the solar chimney amplifies stack driven ventilation, enabling effective natural ventilation to all spaces for up to 160 days/yr. In winter preheat mode, it delivers air warmed by the sun to the air handlers. In summer active mechanical mode, the chimney idles. The energy efficient Dedicated-Outdoor-Air-System separates ventilation from heating and cooling, which are provided hydronically through active slabs and radiant ceiling panels.

Approximately 88% of the occupied areas are within 7 metres (and have access to) an operable window. Of the remaining space, more than half is in large classrooms and the atrium.

Energy consumption of the lighting system is reduced by:

- Effective and building-wide access to daylight and view, including the use of frosted glass partitions in corridors to provide natural light borrowed from adjacent offices.
- All LED low energy lighting
- Occupant and daylight sensor controls.

Energy consumption of the lighting system is modeled at 16.9 kWh/m²/yr.

5. Wellness

Human and environmental wellbeing are key goals of the building's bioclimatic design approach. The design connects occupants to the outdoors and involves them in building performance. Where it is practical for occupants to operate windows (in offices, labs and shared meeting spaces) local controls are provided. For larger collective spaces, controls are automated. All controls are fitted with a green light system connected to the weather station and BAS system.

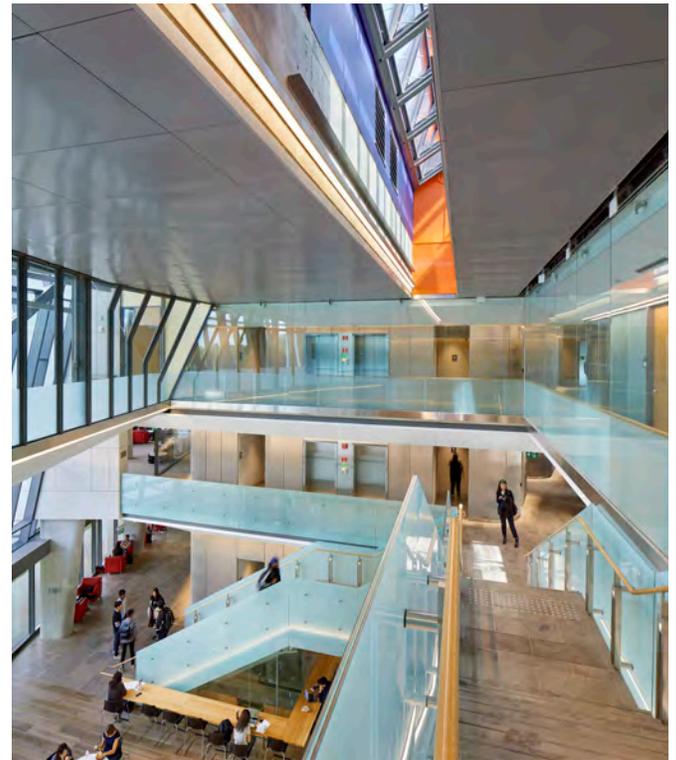


Photo by Tom Arban

6. Water Conservation

Managing water resources is part of a strategy to minimize site development impact. High efficiency fixtures minimize internal water use. The central court, surfaced with permeable pavement, is designed to detain rain water from major storm events. A basement cistern supplements its capacity and provides irrigation water green roofs, further enhancing site water management, natural cooling and local habitat

7. Energy Present and Future

Energy use reduction is modeled to 79.1% below Canada's Model National Energy Code for Buildings with energy use intensity at 72.4kWh/m²/yr. This represents an approximate 65% reduction in greenhouse gas emissions compared to the MNECB. An engineering study has been completed to bring the structure to net zero energy by addition of solar PV on rooftops, a small area of the open landscape, as well as a future geo-thermal field to eliminate remaining fossil fuel use from the current central plant connection.

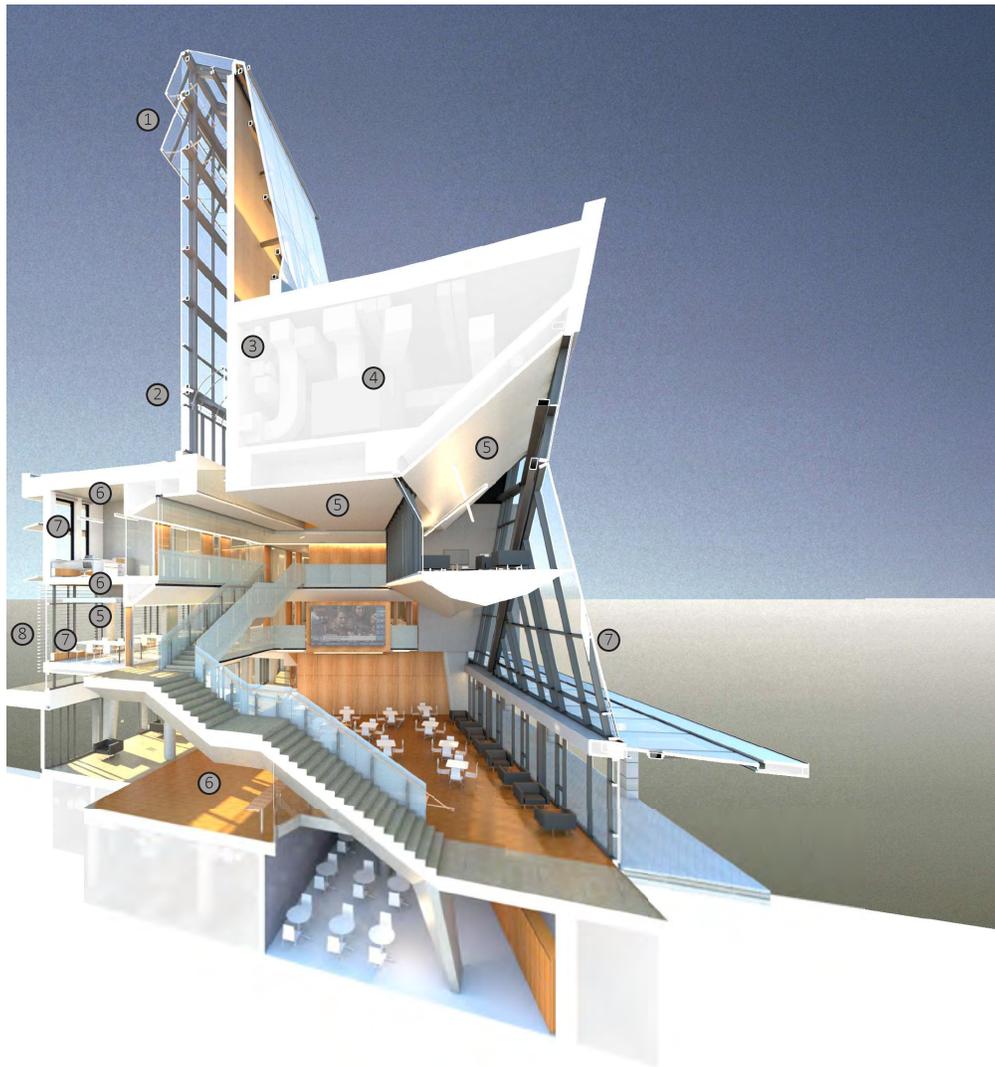
The envelope is calibrated to achieve "transparency" and "passive" design goals. Highly insulated opaque walls (R 30 / U 0.033 Btu/

hr.ft².°F) with areas of triple glazed aluminum curtain wall and punched fibre glass windows achieve a glazing to opaque wall ratio of 40%. Window distribution and shading design has been modeled to ensure effective daylighting throughout.

The building mass is part of the climate-responsive hybrid system design. It serves as a heat-sink to lag heat buildup and enhance efficiency of hydronic radiant heating and cooling imbedded in floor slabs or provided by ceiling panels. Separation of ventilation from heating / cooling is fundamental to the building's energy efficiency as pump energy is 10% of fan energy for the equivalent heating or cooling provided by a conventional system.

8. Materials and Resources

The construction has achieved 20.1% recycled materials content and diverted 88.5% of waste materials from landfill. Responsible sourcing, durability, occupant health, and thermal mass were priorities for material selections; which include low VOC materials and paints; certified FSC (LEED) wood; and recycled glass block aggregate within masonry blocks.



- 1: Solar chimney rack and pinion awnings for preheat intake and natural ventilation exhaust
- 2: Solar chimney rack and pinion skylight damper
- 3: Solar chimney mass wall with intake dampers to DOAS system
- 4: Mechanical Space with Dedicated Outdoor Air System (DOAS)
- 5: Radiant acoustical ceiling panels and baffles
- 6: Active slab radiant heating and cooling
- 7: Curtain wall and Fibreglass windows with triple glazed insulated glass and building automation system controlled operable vents
- 8: South elevation solar shading devices

9. Building Life Cycle Considerations

Concrete structure was selected for longterm durability and to complement the hybrid active / passive environmental system by providing thermal mass for passive solar harvesting and thermal lag during cooling cycles. Offices use double-glazed partitions that enhance daylighting of interior spaces and allow demountability.

Classrooms are flat-floored to support flexible programming and fitted out with robust digital technology to support a variety of teaching/learning arrangements. Research labs are similarly arranged in pods to allow for reconfiguration.

10. Education and Information Sharing

The building is designed to make evident its high performance natural ventilation system. The workings of the solar chimney can be seen from the interior and exterior. Inhabitants of the building are provided with control of opening windows and informed by a signal system when exterior weather conditions are conducive to effective use of natural ventilation mode. Inhabitants are also provided with small information cards to inform them of the hybrid system, how passive and active modes work, and their role in using it. The Schulich Business School is using the building as an exemplar of its commitment to sustainability and has been broadcasting how the building works.



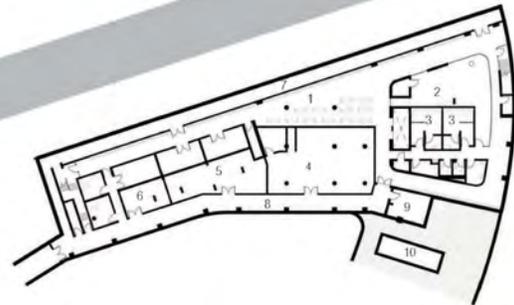
Photo by Tom Arban



Photo by Tom Arban

Ground

- 1: Main entry
- 2: Social Hub (Atrium)
- 3: Research Presentation / Teaching Spaces
- 4: Seminar Rooms
- 5: Small Group Breakout Rooms
- 6: Cafe
- 7: Student Engagement Office
- 8: Loading and Service
- 9: Link to Existing Building
- 10: Landscaped Courtyard
- 11: Covered Colonnade



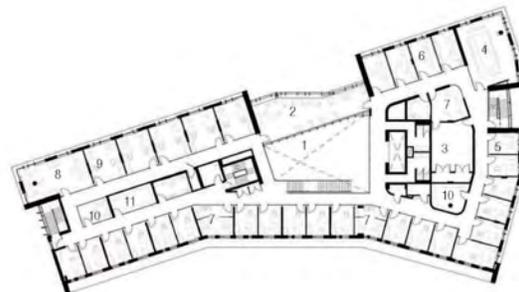
Basement

- 1: Student Lounge Space
- 2: Student Workout Room
- 3: Change Rooms / Showers
- 4: Mechanical
- 5: Electrical
- 6: Storage / Service Offices
- 7: Utility Corridor
- 8: Service Corridor / Tunnel
- 9: Communications Room
- 10: Rainwater Cistern



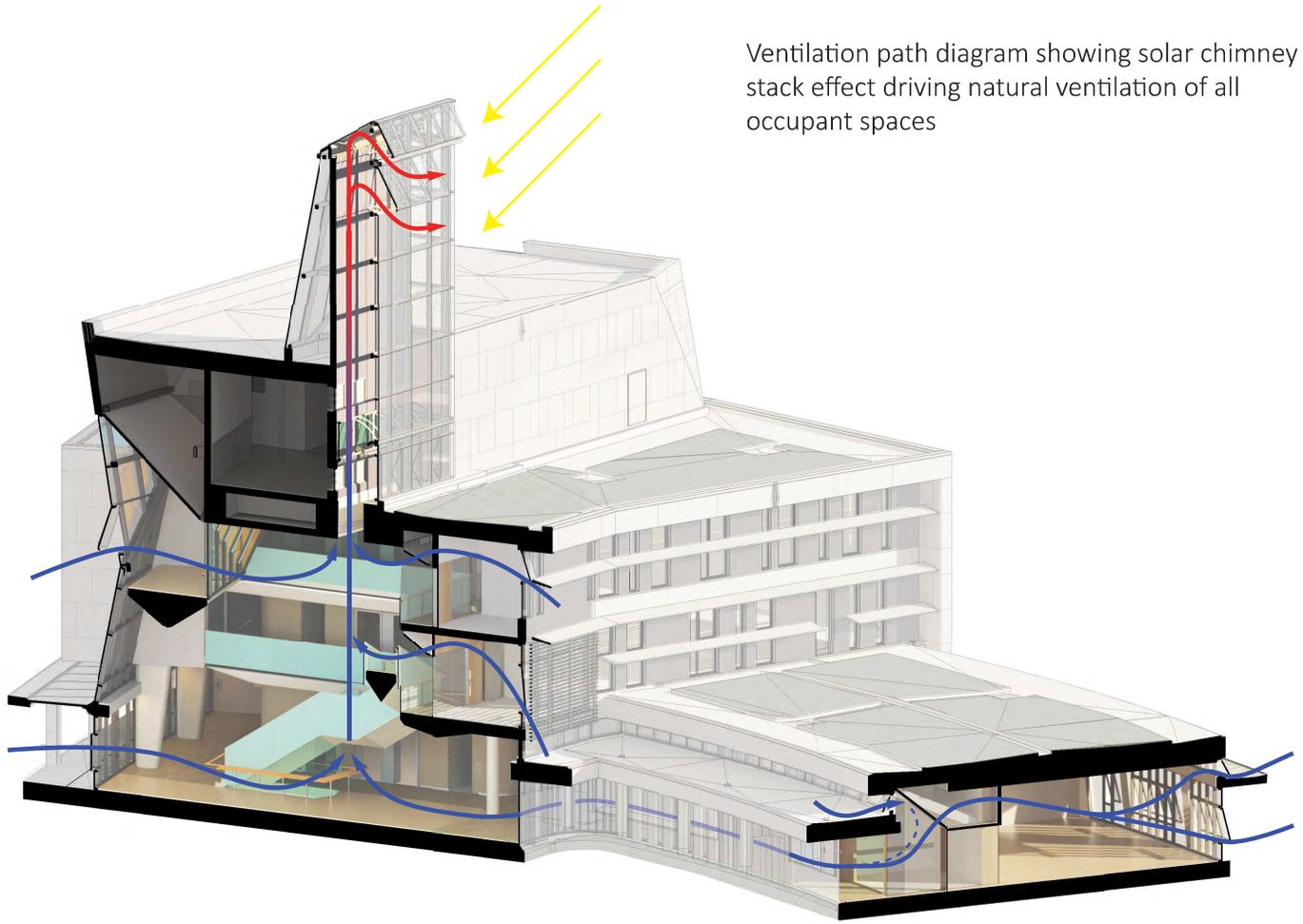
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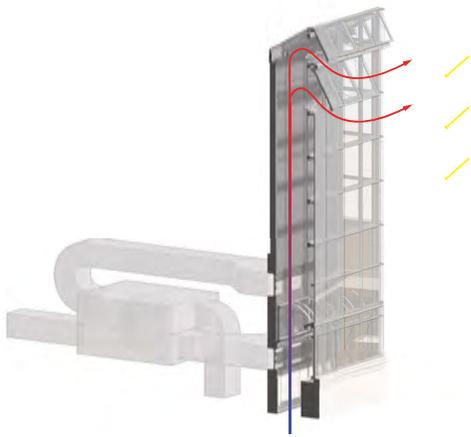
- 1: Social Hub (Atrium)
- 2: Graduate Lounge
- 3: Executive Seminar Room
- 4: Staff Office (typ)
- 5: Study Carrels
- 6: Reception
- 7: Research Lab
- 8: Research Office (typ)
- 9: Meeting Room
- 10: Storage / Support
- 11: Media Support Spaces
- 12: Green Roof



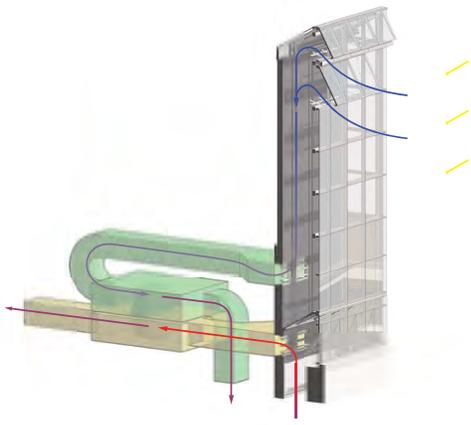
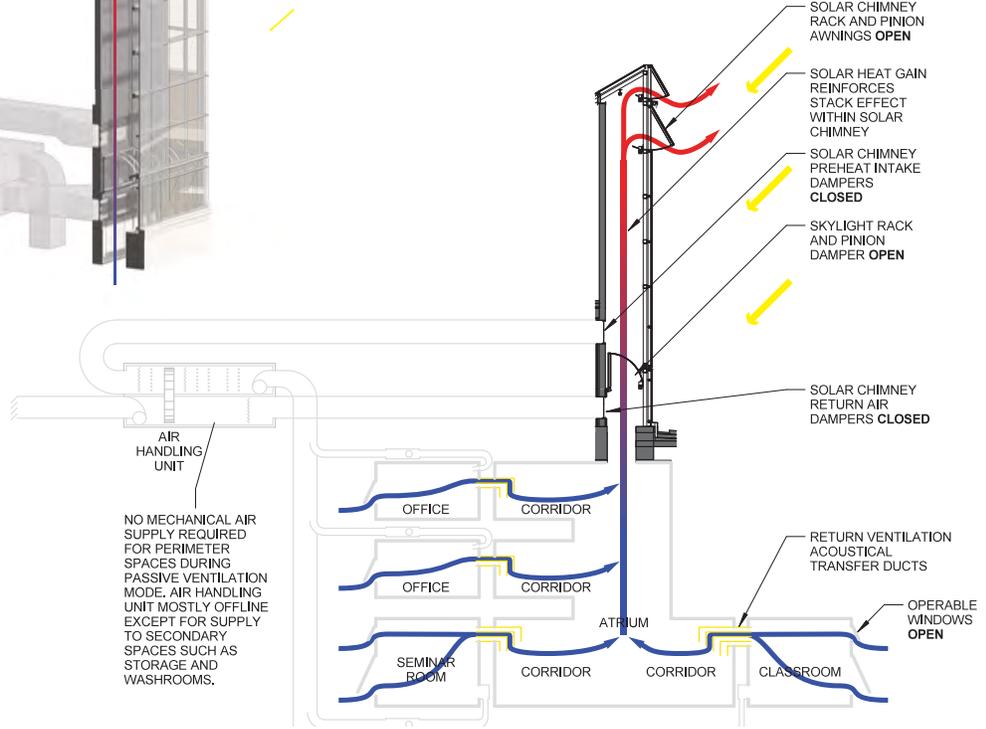
Third

- 1: Social Hub (Atrium)
- 2: Reception Lounge
- 3: Media Production
- 4: Executive Seminar Room
- 5: Staff Office (typ)
- 6: PhD office
- 7: Reception
- 8: Research Lab
- 9: Research Office (typ)
- 10: Meeting Room
- 11: Storage / Support

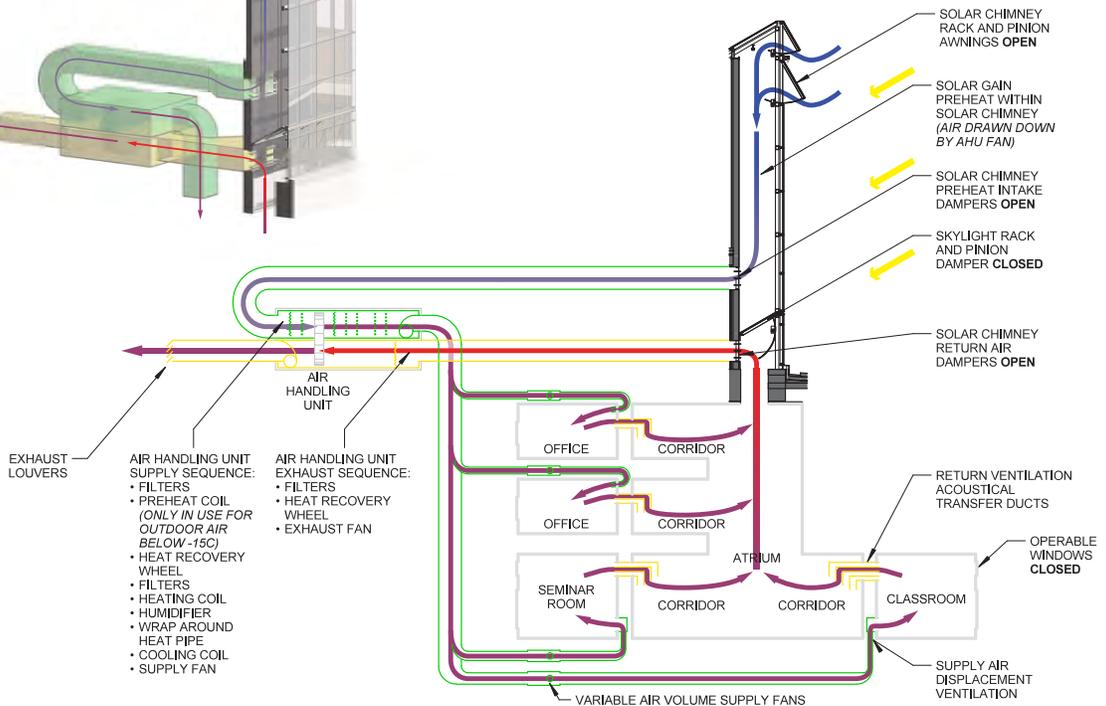


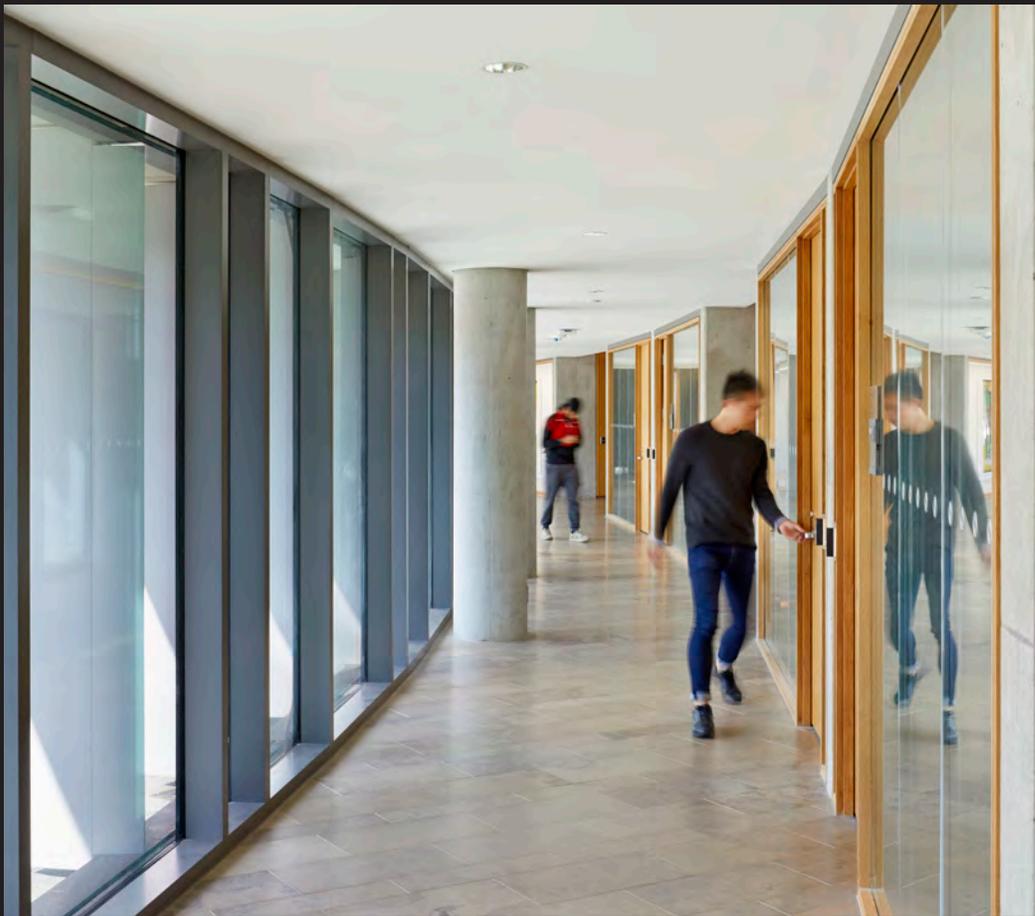


Solar Chimney Detail and System Schematic showing stack effect driving natural ventilation of all occupant spaces



Solar Chimney Detail and System Schematic showing passive preheat integrated with heat recovery and dedicated outdoor air system (DOAS)





Photos by Tom Arban



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