BATA SHOE FACTORY

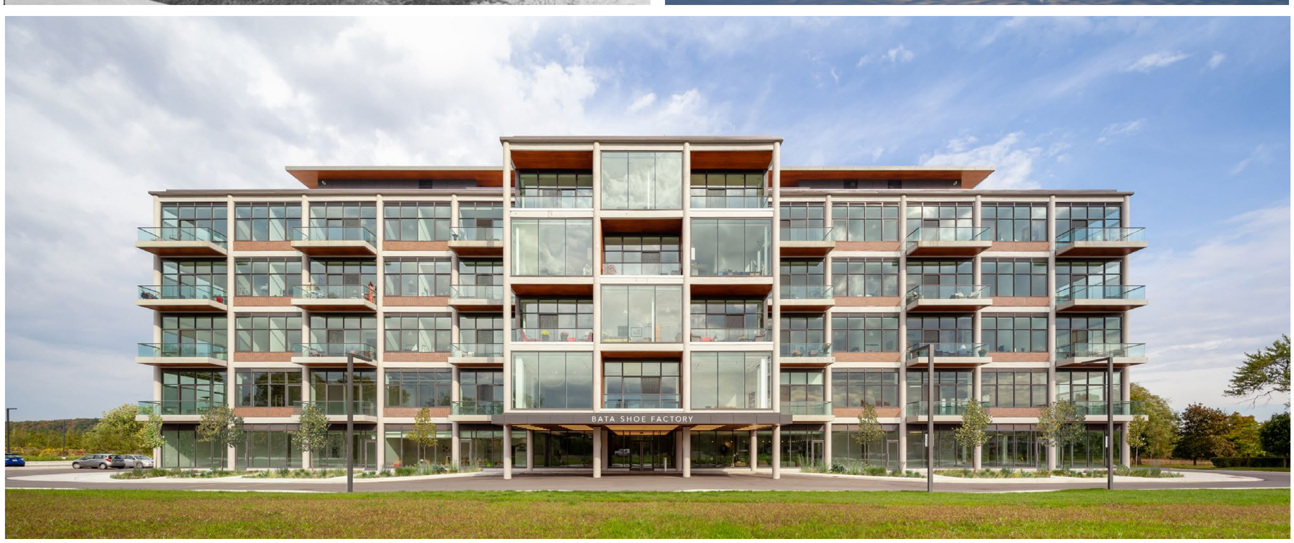
Batawa, Ontario

CANADIAN GREEN BUILDING AWARDS 2020

PROJECT SUMMARY

The late Sonja Bata pursued her passion for architecture and the built environment through the revitalization of the town of Batawa, located 30km east of Belleville on the Trent river. As a sustainable community and satellite town adapted to 21st century living, where residents could live close to nature but maintain a connection to work through broadband, she envisioned Batawa as a model community for social and environmental sustainability.

The renovation to the Bata Shoe Factory is an ambitious adaptive re-use project located at the gateway to Batawa. Central to Mrs. Bata's vision for Batawa was the conversion of the manufacturing facility built by her family's shoe empire during WWII (1939) into a modern mixed use residential, commercial and community building with a light environmental footprint and a social mandate. With a focus on integrating the most sustainable approaches – the renovated building retains the original 1939 concrete structure, saving close to 80% of the embodied carbon from the original building; the HVAC systems are powered entirely through a geothermal energy source; and any new materials or systems are as sustainable as possible – the resulting renovated building is a model for increased housing density in a rural setting with the lightest impact on the environment and a focus on community and social sustainability.



STRATEGIC DECISIONS

Aside from not building at all, the lightest impact on the environment is accomplished through adaptive re-use strategies – retention and rehabilitation of existing buildings. With close to 80% of a building's embodied carbon found in the structural components, retaining and highlighting the existing concrete structure of the building in combination with new sustainable materials and systems was one of the key strategic decisions for this adaptive re-use project.

Another key decision was to revive cultural values and sustain the local community – the original shoe factory, when it was in operation, provided jobs for the town, a sense of community and even fitness and education programs; it was the force that bound and oriented the local community. The same philosophy was taken in the revitalization of the building, through the creation of community spaces, new retail spaces, a daycare, and 47 high-quality rental residential units on the upper floors of the building. The residential units are of varying sizes to provide both affordability and flexibility as families grow and contract, and to promote aging in place for residents who want to stay connected with the community but without the responsibility of the maintenance of a single family property.

The decision to use onsite geothermal energy for 100% of the HVAC needs of the building and the omission of natural gas as an energy source was a key factor in energy savings and minimizing long-term CO_2 emissions from building operations.

COMMUNITY

In its heyday, the shoe factory employed close to 1,900 people and supported an entire community, which included two schools, two churches and sports facilities. Critical to Mrs. Bata was the often-overlooked issues of social and cultural sustainability. The design process for the revitalization of the factory building began with community, in the form of an inclusive consultation process, allowing local residents and other local stakeholders to have input in shaping the future of Batawa and the factory redevelopment. Key to returning the building to its former foundation of purpose, the uses were specifically selected and balanced to enhance the character of the community and provide resources for locals. The space is now home to a daycare with an outdoor playground, an exhibition/community space, multi-purpose rooms for meetings or lectures, educational incubators, ground floor retail and café as well as other amenities open to both residents and community-at-large, including an accessible rooftop terrace. A rarity in rural areas, the building is equipped with hi-speed fibre internet service which opens opportunities for growing a local knowledge-based work economy and gives residents the option to work remotely rather than commute great distances to a workplace.

The building sits on the main access road to the town and across from the local community centre, allowing easy access on foot. It is also located in the centre of a frequently used network of bike and walking trails connecting to the natural surroundings.

To further enforce the idea of 'community investment', during the construction period the selected contractor utilized the services of as many local trades as possible, despite the difficulties of doing so. With a community-centred procurement focus, the project was designed to optimize the social and economic benefits for those living and working within a 100-mile radius of the site; it provides a reminder that successful community architecture is as much about process as it is about the final product. Last but certainly not least, the decision by the owner and operator to develop this project as an affordable rental model rather than a condominium shows further long-term commitment to fostering community.

COMMUNITY

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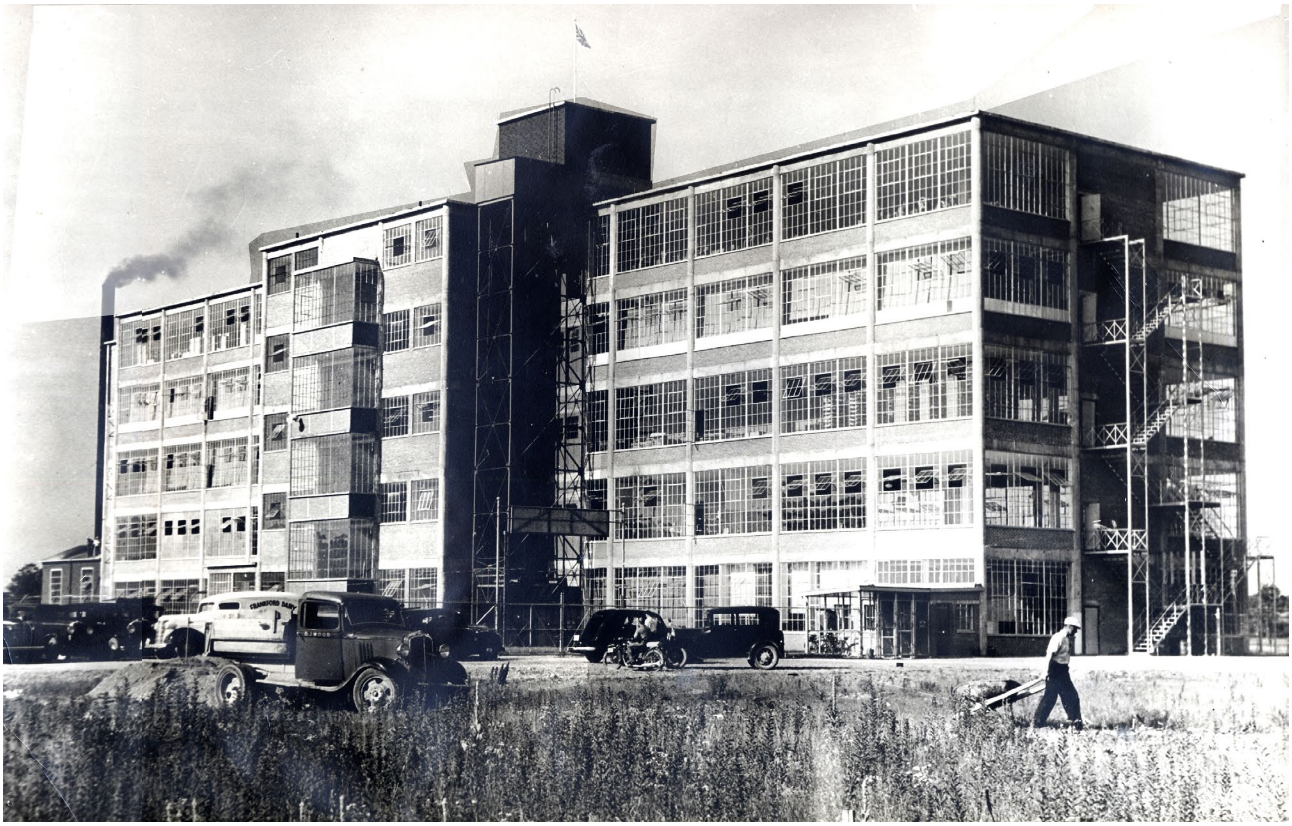
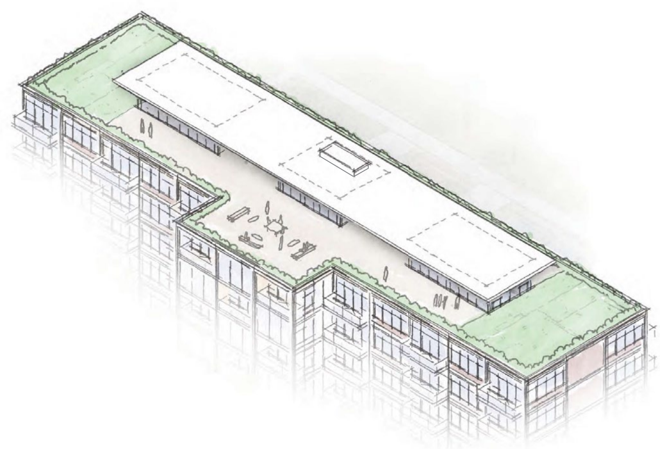
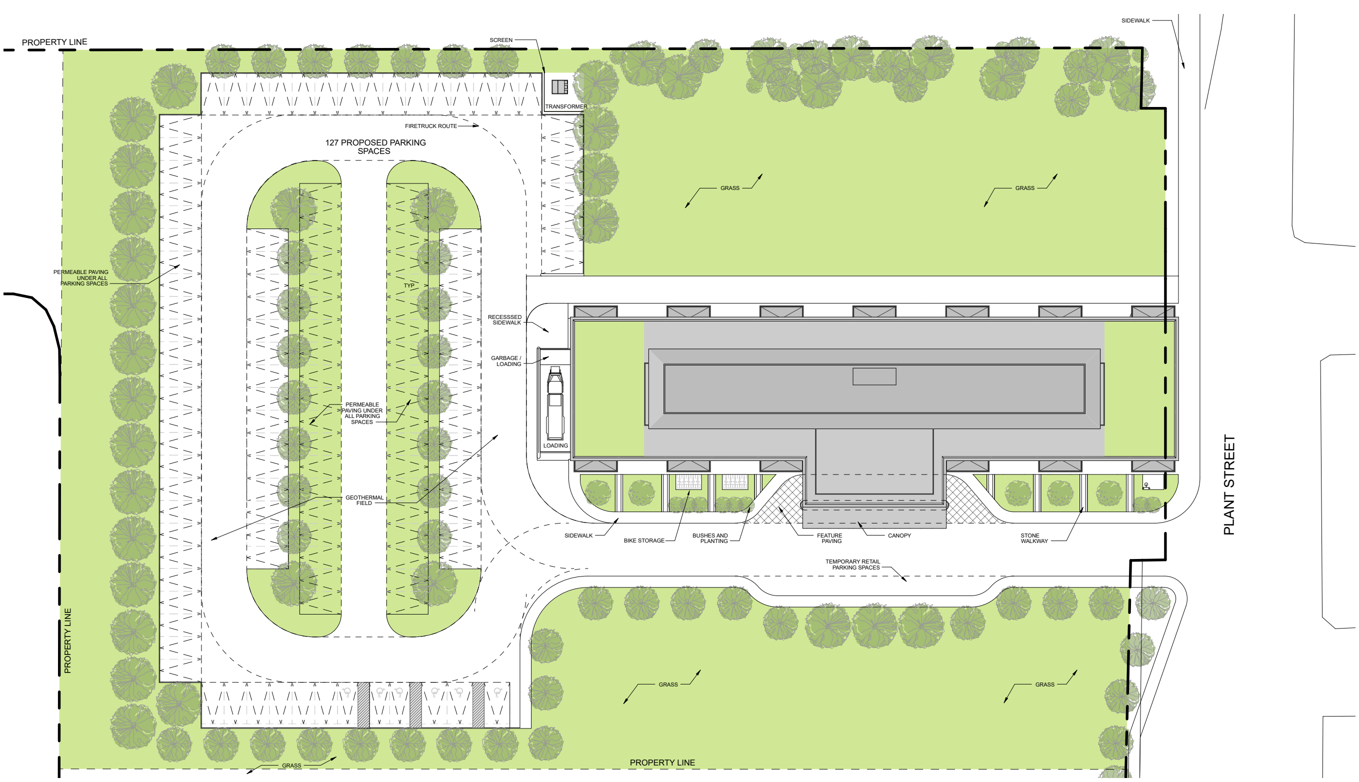


SITE ECOLOGY & WATER CONSERVATION

The existing site was comprised of the factory building surrounded by a sea of concrete paving on three sides. All the concrete paving was removed and recycled for gravel, and a new parking area over the geothermal field with ample greenscape was introduced. Storm water management is handled primarily through a large bio swale that runs north-south along the west end of the site and captures and retains a significant amount of the site's storm water while it gets absorbed into the earth. There is no permanent irrigation equipment needed for the facility's green spaces, as the landscape includes native, drought-tolerant species that will not require irrigation once established. A significant portion of the roof will be planted with a green roof which will not only serve to mitigate water run-off but also as improved insulation.

Water conservation was a priority for this project as the town is fed from its own water supply and not municipal or township. Low flow plumbing fixtures (toilets, faucets and shower heads) were used throughout. The actual annual potable water consumption in the first year of occupancy was 28,384 L per occupant/annum. This translate to 3.46 L/ m^2/occupant/annum (taken from the building water bills).





SITE ECOLOGY & WATER CONSERVATION

Photos of site with building under construction

LIGHT AND AIR

Due to the long and narrow floorplate of the existing building, the residential units and other community spaces are not deep and are oriented toward the exterior. The exterior façade is comprised of ample fenestration as a reference to the original factory character of the building. With 13 foot high ceilings, natural light floods deep into the interior of every unit, producing an interior that is awash in natural light, reflecting off the white walls and bouncing further into the units. All residential units as well as community and retail spaces on the ground and second floor are within 7m of an operable window. The operable windows in the upper floor residential units are located at a low height and draw in cool air, with warmer air exhausted through intake ducts near the ceiling, providing effective natural ventilation.

High efficiency LED lighting is used throughout, with the actual energy consumption from Hydro bills being 5,895 kWh per annum. The EUI of the building calculated from a year's worth of Hydro bills is 101.3 kWh/m^2.

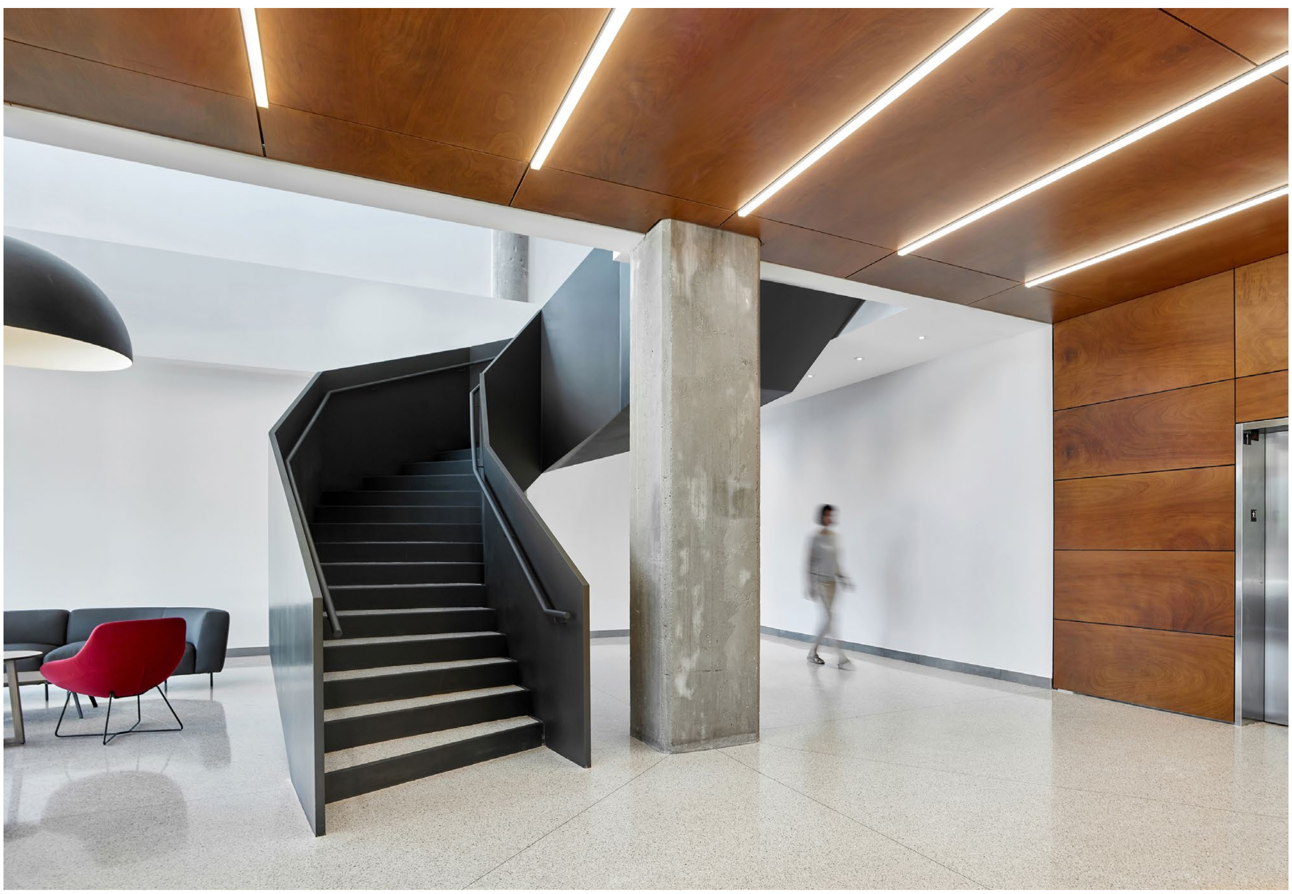
LIGHT AND AIR

WELLNESS

The building is organized with retail, daycare and community spaces on the ground floor, as well as exhibition space, a lecture hall and additional community spaces on the second floor. These two levels of public space are connected by a central sculptural steel and terrazzo stair in a double height space; its wide, playful and inviting steps encourage people to use them rather than the elevator. The generously sized, well-lit and easily accessible exit stairs also make it more enticing for residents to take the stairs, given it is only a five-storey building, thereby injecting physical activity into the daily lives of the occupants and visitors.

With the trending growth in the aging population and a mindfulness to the benefits of inter-generational connections, the decision to house a daycare in the building encourages young families and children to share the space with seniors and effectively facilitates a blending of social, cultural and community values.

Natural material choices are evident throughout the public and private spaces of the building including wood flooring, red brick and wood veneer fibre cement panels in the lobby and on the exterior of the building that introduce warmth to the otherwise crisply defined concrete structure. Natural daylighting is optimized with ample glazing to permeate the interior spaces with a sense of well-being and allow for views of nature and greenery outside. The easily accessed exterior spaces such as generous balconies and the roof terrace with green roofs provide further biophilic connections to nature, while the building itself enjoys proximity to parks, walking trails, the Trent river and other natural features.



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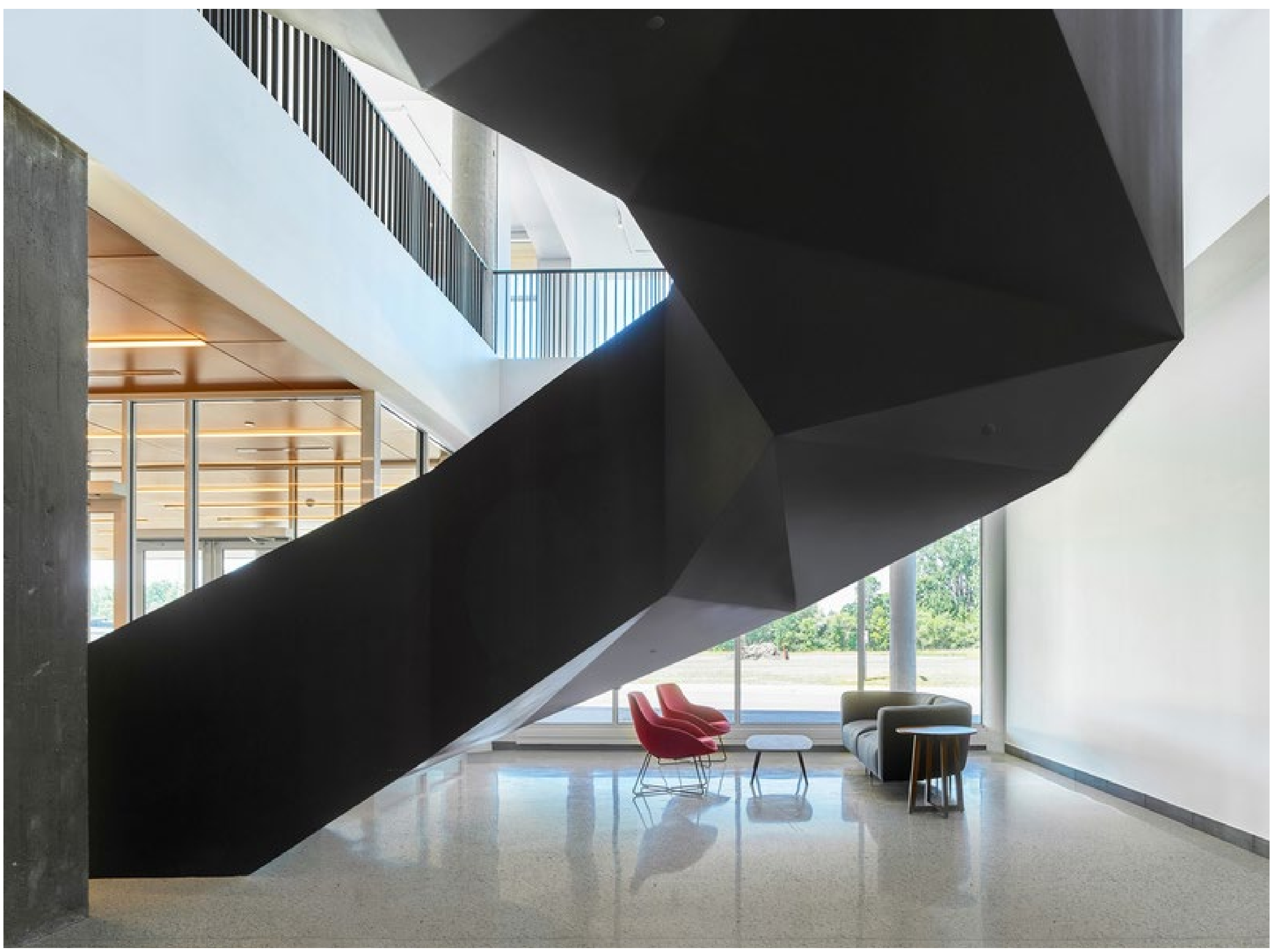

ENERGY PRESENT AND FUTURE

Among the key priorities that the client outlined for the project was the integration of sustainable energy systems. As a result, The Batawa Development Corporation made a significant investment into geothermal technology to power the building's heating and cooling systems. The installation of this geothermal system involved drilling 63 holes at a depth of 600 feet, connected to and supplying 100% of the buildings HVAC needs. There is no natural gas utilized in the building, thereby reducing operating CO_2 emissions to near zero and ensuring it will respond well to potential future shortages and price increases of fossil fuels. Electricity is consumed only for pumps, lighting and general occupant consumption (ie. appliances and electronics) ensuring even the hydro demand is well below average.

The building envelope wall assembly is comprised of continuous insulation on the exterior (no interior insulation) and the cantilevered balconies are thermally broken, ensuring no thermal transfer through the structure. Both strategies significantly improve the effective R-value of the wall.

The actual energy consumption (EUI) for the building based on first year of operations is 101.3 kWh/m_2/yr (calculated from a year's worth of Hydro bills).

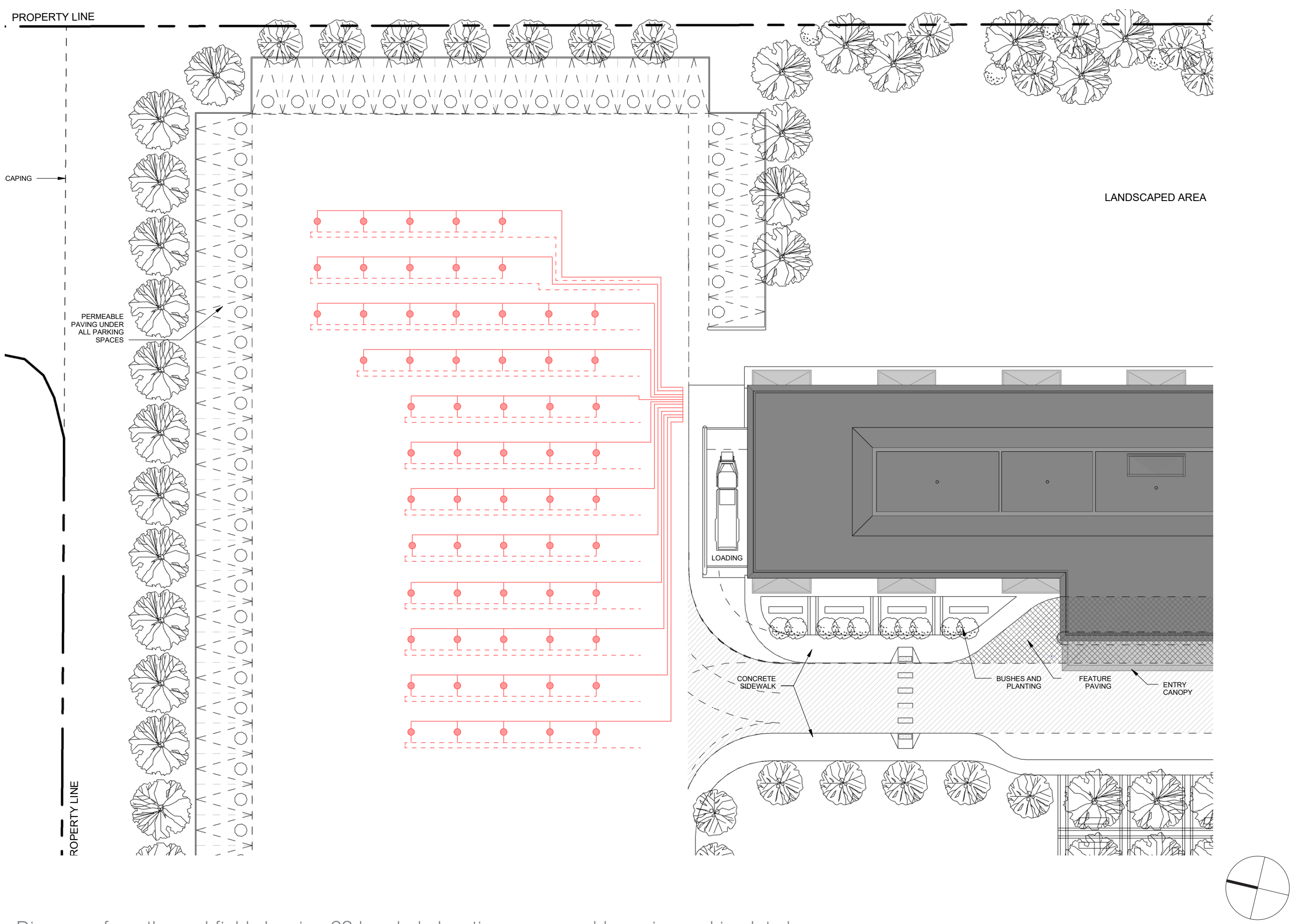

Diagram of geothermal field showing 63 borehole locations - permeable paving parking lot above

ENERGY PRESENT AND FUTURE

MATERIALS AND RESOURCES

With close to 80% of a building's embodied carbon found in the structural components of a building and with concrete production alone representing an estimated 5% of global greenhouse emissions, retention of the building's slabs, beams and columns was determined to yield the highest carbon emissions savings ratio. This strategy retained 5,200 m^3 of concrete from the original structure representing a savings of approximately 2 million kg of CO_2 emissions and roughly 900 cement truck deliveries (avg 6m^3 capacity per truckload).

New building materials were selected for long life-spans, durability and eco-friendly characteristics right down to the carpet tiles made from recycled fishing nets and low VOC finishes. Millwork for kitchens and bathrooms were specifically selected for their low formaldehyde materials to ensure better interior air quality and occupant health. On the exterior, brick, aluminum-framed windows and Parklex wood veneer fibre-cement panels were utilized. The Parklex panels are EPD and FSC certified and are made of 10% recycled materials. The energy that Parklex uses to fabricate the panels comes from a 100%-renewable source. The wood panel layouts were also studied to minimize the amount of off-cuts and material waste achieving an almost 10% reduction in waste.

MATERIALS AND RESOURCES

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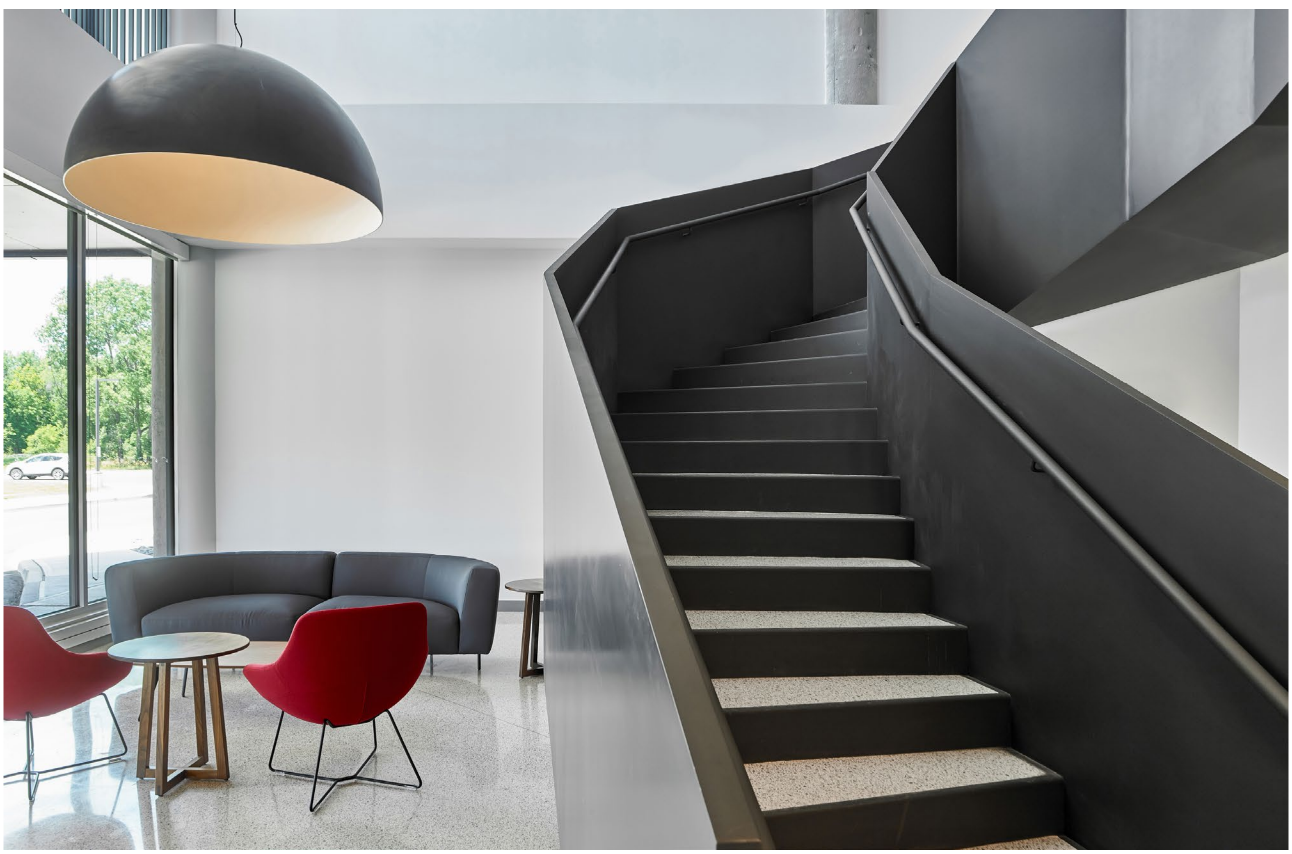

BUILDING LIFE CYCLE CONSIDERATIONS

The original Bata Show Factory originally built in 1939 reached the end of its serviceable life in 2000 when the factory was decommissioned. The adaptable reuse design strategy utilized in conjunction with an ongoing owner-management approach ensures the building will continue to service its new use for another 70+ years, preserving the embodied carbon and striving for new energy reduction goals. One of the most important takeaways from whole-building LCA is that structural systems almost always comprise the largest source of embodied carbon in the building, so the first goal when looking to reduce the embodied carbon of a project is to target the structural system. The retained concrete 20 ft x 20 ft grid, columns and large structural spans allow for flexibility of future use and allow the interior of the building to continue to be reconfigured and repurposed for generations to come. The geothermal energy source will service the building well into the future and will limit the reliance of fossil fuels in the future.

EDUCATION AND INFORMATION SHARING

As part of the initial community consultation, there was a notable amount of information sharing and education involved to help local residents and community stakeholders understand the short and long-term benefits of considering both a socially and environmentally sustainable strategy for this development. New tenants to the building receive an information package sharing the unique features and history of the building as well as best practices for a healthy building and healthy planet. The project has found both local and regional press eager to share its “down-to-earth-friendly” and community-oriented approaches with the goal of raising awareness. It is important to note that while this project did not pursue a formal rating or accreditation, project stakeholders were committed to incorporating as many sustainable strategies as possible with considerations for both the initial retrofit construction and the longer-term building operation (rather than trying to achieve credits on a checklist).


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