

THE ECOLOGY ACTION CENTRE HEADQUARTERS

HALIFAX, NS

MARCH 9, 2018

EXECUTIVE SUMMARY

On April 22, 2016 the Ecology Action Centre (EAC) opened its revamped headquarters to their 40+ employees, 4500 members, countless volunteers, and the public at large. Designed and constructed through a three year community engagement process, this 5200 sf building is a showcase for environmentally-sensitive architecture and renovation in a tight urban setting. It is a reinvented building ready for its second century of life.

Located in Halifax's thriving North End neighborhood, the building stands as a beacon for the group's values and goals. This accessible space features world-class energy efficiency and a creative use of salvaged, recycled and natural materials. Most importantly it is a welcoming and inspiring space for community members, volunteers, and staff to connect, learn, and work together.

From conception through to operation this project shows a deep commitment to building greater public and industry buy-in for sustainable design and renovation. Through the dedicated educational efforts of the owners and extensive community involvement, including during construction, this building is an active showcase for what is possible in a deep-energy retrofit on a tight budget.

The final result, a fully renovated three-storey, century-old building that uses 50% less energy than its former two-storey structure, even though building area was increased by 50%. In fact, as of 2017, it is the most energy-efficient commercial office retrofit in Canada.

STRATEGIC DECISIONS

In 2014, the EAC driven primarily by an increase in the size of the organization, they decided to renovate their saltbox style home, originally built in 1915. Ecological factors in this decision included a desire to showcase to Nova Scotians what is possible with old building stock. Social factors in this decision included the importance of neighbourhood connections and the organization's efficacy.

Embedded in the design are the key environmental and community issues that arose through a careful consultation process: 1. Reinforce the connection to the street and neighborhood and improve accessibility and flexibility; 2. Optimize energy efficiency and occupant comfort; 3. Promote ecologically-sound processes and materials,

particularly local, salvaged, durable and natural materials 4. Improve indoor environmental quality, natural ventilation and daylight; 5. Create a showcase of what's possible in a ecological renovation to inspire experts and the public alike. To accomplish these goals the design team followed three principles to guide their decisions: energy reduction before supply, passive systems before active ones, and simplicity.

COMMUNITY

The EAC had a clear wish to reinforce a strong connection with their north-end Halifax neighbourhood and reflect the organization's broad commitment to community engagement. Through lowering the western half of the main floor 42" to sidewalk level, a new accessible 300-square foot community gallery and meeting space boasts twelve-foot ceilings and a more welcoming, dramatic and accessible street presence. Large street level windows opens the interior activities to passersby.

Building the project was a community effort in itself. In addition to the hours dedicated to the community consultation process, there were over 1400 hours of volunteer labour on the construction site. This participatory process gave the organization a tangible way to share a deep understanding of green buildings practices. It also increased the organization's profile, effectiveness and sense of community.

Aside from one accessible parking space, there is no onsite car parking. Instead, the EAC encourages the use of alternative transportation such as walking, cycling and bus access. A dilapidated alleyway was converted into a landscaped bike corral with ample spaces for staff and visitors and a shower is available in the building.

SITE ECOLOGY

Responsible urban density was a key focus of the project. In fact, the building provides over 50% more space than the previous structure without increasing the building footprint. This minimized site disturbance on and off-site, through the preservation of greenspace and the reuse of existing infrastructure including water supply lines, perimeter drainage, sewage lines, etc. All existing green spaces on-site were maintained and planted with low-maintenance native and edible species.

LIGHT AND AIR

The renovation took advantage of the original building's orientation and elongated form to maximize daylight, views and natural ventilation strategies. All common and work spaces are within 7 meters of at least one operable window, providing day-lit spaces that maximize natural ventilation and visually connect occupants to the outdoor environment. Low-emitting materials were used wherever possible for paints, adhesives, flooring, ceilings, composite wood and laminates.

WELLNESS

Project teams are spread throughout the building in day-lit group offices. Each space is finished with clay or milk paints and earth clay plasters. These finishes are VOC-free and help regulate occupant comfort through absorbing or releasing latent humidity. Finished by hand, they also bring a crafted beauty and sense of calm to each space. Interior windows help bounce light into the wide central halls and a day-lit stairwell offers a bright spot for chance encounters between staff or community members.

New phone booths, breakout and meeting rooms of various sizes allow project teams increased flexibility for group meetings or private conversations. This reduces acoustic distraction in the each workspace. Additionally, a outdoor meeting space allows the sun seekers the chance to move work outdoors.

WATER CONSERVATION

The new structure reduces the use of municipal potable water use through a combination of low-flow or waterless plumbing fixtures. Additionally, native and adapted plantings were selected to eliminate the requirement of an irrigation system.

To determine the reduction in potable water usage for the building, calculations were completed following LEED NC 2009 criteria for baseline fixtures and building occupant water usage. The water consumption is 33% lower than the reference building defined by LEED NC 2009.

ENERGY PRESENT AND FUTURE

The entire building was wrapped in a new airtight weather barrier and an exterior insulation package that improved the walls to R-32. A minimum of two feet of cellulose insulation was added to the roof (R-75). Insulated steel door cut-outs were diverted from the waste stream and the polyurethane foam component was used as sub-slab insulation (R-

16). The resulting reduced energy consumption meant the size of the air-to-water heat pump was correspondingly minimized. A smaller, appropriately sized unit was cost-effective and reduced required refrigerants.

The post-construction results were dramatic. Whole building air tightness was measured at 1.4 ACH50 surpassing the R-2000 certification target of 1.5 ACH50. Total building energy use is calculated to be 31.7 kWh/sq.m per year. This represents a 63% reduction in energy use when compared with an NECB 2011 reference building.

A 7.9kW photovoltaic array is to be installed in September 2018. While not included in the submitted energy model figures, it stands to further reduce the buildings energy demands by 50%. Translating into an estimated whole building Energy Use Index of 9.9 kWh/sq.m per year - an incredible result for a 103 year old building! For perspective, the typical upset limit for heating demand in a Passive House is 15 kWh/sq.m per year.

MATERIALS AND RESOURCES

The interior and exterior palate promotes the values of the organization through the use of local, durable and recycled materials. The project team salvaged an interesting array of materials including floorboards from the existing building which became a feature wall in the community gallery, beautiful oak doors from a recently demolished building, 400 steel door cut-outs for use as insulation and high-density fibre cement panel off-cuts from another project. 100% of the walls feature natural wall finishes that are made with local materials including clay, sand and straw. These finishes are beautiful, functional, and free of volatile organic compounds (VOCs). A local supplier and mill practicing sustainable harvest practices supplied all the knotty spruce board and batten.

Keeping the existing walls, floors and roof saved an additional 40 tonnes of wood, 3 tonnes of metal, 20 tonnes of "mixed waste", and 7 tonnes of drywall/plaster. While the foundation reuse saved approximately, 90 tonnes of concrete. This amounts to 527,208 MJ of embodied energy saved by reusing the foundation and building, representing over 9 and a half years of operating energy.

BUILDING LIFE CYCLE CONSIDERATIONS

The envelope was carefully designed to maximize longevity and environmental impact. A vapour profile evaluation and careful material selection ensured the wall won't trap moisture between the new exterior insulation package and the two inches of existing impermeable rigid foam insulation on the inboard side of the existing wall. Window and door details accommodated both new and those existing units with ample service life remaining. Insulation materials were selected for their potential climate impact *and* embodied global warming potential, with spray and extruded polystyrene not used (with the exception of sealing fenestration).

EDUCATION AND INFORMATION SHARING

The three key players in the project - owners, architects and construction team - brought unique sustainability expertise and consistently pushed each other to raise the ecological and community-engagement standards. A striking example of this was the inclusion of 150 hands-on volunteers throughout the demolition and construction process - a powerful way to create action-learning and increase public awareness.

In the end, the building is a highly effective showcase. On average, the EAC provides a guided building tour every week to a diverse variety of groups and organizations. Visitors are also able to take a self-guided tour through the aid of a comprehensive signage program or visit virtually through an online tour. The team was committed to carefully documenting the renovation process and has published a Green Building Encyclopedia, that is available on the organizations website. Monitoring, measurement and verification is ongoing, with a web based interface being an important part of the process to help inform occupant usage and public education.

PHOTOGRAPHS

All photos credited to Adam Cornick except:

By EAC:

20. Before

22. Construction - Natural Finishes

24. Construction - Unloading Steel Door Cut Outs

25. Stats

By Architect:

17. Stair

21. Construction - Exterior

23. Construction - Demolition