

Evaluation of a Movable, Modular Affordable Housing Project

A post-occupancy evaluation under the Canada Mortgage and Housing Corporation (CMHC) Affordable Rental Housing Innovation Fund (ARHIF) of the building located at 220 Terminal Ave., Vancouver, B.C.

Figure 1: Front view of the 40-unit movable, modular building



Image source: Horizon North

- A collaborative partnership model that encourages the participation and investments from a broad range of partners and stakeholders (municipal government, CMHC, and credit union).
- A cost-effective housing development strategy that temporarily makes use of underutilized city-owned land—particularly that pending redevelopment in regions where land is prohibitively expensive.
- An expedient housing solution that reduces the strain on existing single-room occupancies by quickly providing units for low-income residents.
- Socially inclusive housing that is designed to be safe and responsive to the diverse and changing needs of tenants, in close proximity to support services.
- Lower construction costs compared to similar housing options.

Figure 2: Standard apartment—kitchen, bed, sitting area and under-window heating unit



Image source: Horizon North

INTRODUCTION

With increasing strain being placed on the supply of affordable rental housing in Canadian cities, there is an immediate need to increase the supply of housing, especially at below-market rental rates for low-income residents in core housing need. Consequently, affordable housing developers are seeking strategies that increase capacity through unique partnerships, innovative building designs, and quick construction methods. An innovative response to Vancouver's immediate housing needs was the rapid construction of a 40-unit building on previously unused city land by the Vancouver Affordable Housing Agency (VAHA). The project had the following goals:

- A movable building with an adaptable foundation that permits the entire building to be disassembled and relocated to other sites with little to no impact on the land itself.
- Quickly constructed housing enabled by factory-built housing that could be easily replicated on a scale that would rapidly increase the number of affordable housing units available to those in need.

VAHA is a legally independent agent of the City of Vancouver that leverages city- and partner-owned land to create new housing projects that offer greater diversity of home options and greater affordability by securing innovative funding sources, building techniques and unique partnerships. This pilot project was developed with financial support from CMHC's Affordable Rental Housing Innovation Fund (ARHIF) to explore the feasibility of temporary modular housing as a quick, and potentially replicable, affordable housing solution for low- and fixed-income residents. The ARHIF is an initiative that fosters the development and testing of innovative financing and business models while incorporating social inclusion, accessibility and resource efficiencies.

To broaden awareness and knowledge of the results and impacts of this project, a comprehensive post-occupancy evaluation was commissioned by CMHC. The following areas were analyzed to assess the initial outcomes and extent to which the project objectives were met in terms of affordability, tenant satisfaction, social inclusivity, accessibility, energy use, replicability, and enhancement opportunities. A team of research consultants collected data and explored the social, financial and technical elements of the project by documenting the building's physical characteristics, building operations and energy consumption, undertaking a tenant survey and building-management interviews, and characterizing accessibility, construction and operating costs.

Figure 3: On-site construction phase—first modular unit lifted onto the movable foundation



Image source: CMHC

KEY FINDINGS

- Units rented at 70% below average market rent for a bachelor unit. A subsidy from the City makes up the difference between the operating costs and revenues (\$375/month rental revenues).
- Per-unit capital and operating costs are comparatively favourable to similar new housing options.
- The ability to make temporary use of “free” unused municipal land was a major cost savings.
- The modular approach resulted in a significantly faster construction schedule than usual.
- The building achieved 12% energy-use and greenhouse-gas-emissions reductions over the 2011 National Energy Code for Buildings.
- The well-located City-owned site gives tenants access to transit and services.
- 75% of respondents indicate a sense of ownership over their unit, despite knowledge of the temporary nature of the housing project.
- 84% of tenants indicate that they are satisfied or very satisfied with the building (93% survey response rate).
- Based on the success of this pilot project for VAHA, this model is being replicated across British Columbia under other initiatives outside of the ARHIF, with investments to construct an additional 2,000 dwelling units.

Figure 4: Accessible unit floor plan

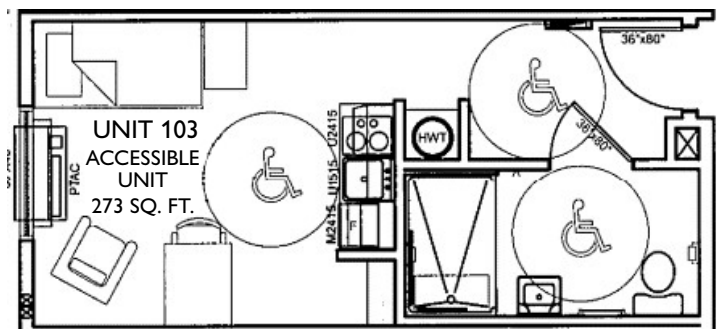


Image source: Horizon North

Fast Facts

- **Project developer:** Vancouver Affordable Housing Agency
- **Funding partners:** CMHC, Vancity credit union and a private donor
- **Land:** unused, cleared site, City-owned, waiting for permanent development
- **Design:** factory-built, modular, wood-frame, unheated crawlspace, all-electric design
- **Development cost:** \$3 million or \$2,142/m² (\$199/ft.²)
- **Units:** 40 single-person occupancy with indoor-outdoor amenity spaces
- **Standard size:** 23 m² (250 ft.²) and four larger accessibility designed units
- **Foundation:** “floats” on the ground and can be moved
- **Rent:** is at the provincial income-assistance shelter rate and 70% below average market rent for a comparable bachelor unit
- **Construction time:** three months (compared to 14–16 months for a similar site-built project)

Tenant Survey Responses

“It is amazing how solid the unit is... everything fits, and the design, colour patterns are mellow, pleasant. The door is solid with a peephole... very secure. The bathroom is a gem. The shower has a great water flow.”

“There is room to move around, more than one place to sit. I spend almost all of my time here. My mental health has never been better.”

“Great management, good neighbours, and good, new, clean building that is situated well in a part of the city that is on the up and up make it desirable.”

IMPLICATIONS FOR THE HOUSING INDUSTRY

This research project helps to demonstrate the viability of the use of a temporary, modular multi-unit building model to more quickly meet housing needs. The research shows that this approach can offer cost-effective, energy-efficient, socially inclusive housing that is healthy to live in and that meets the needs and expectations of the people who call it home. The research also points to opportunities to improve on the model for future affordable housing projects.

Figure 5: Diagram of multipoint, movable foundation

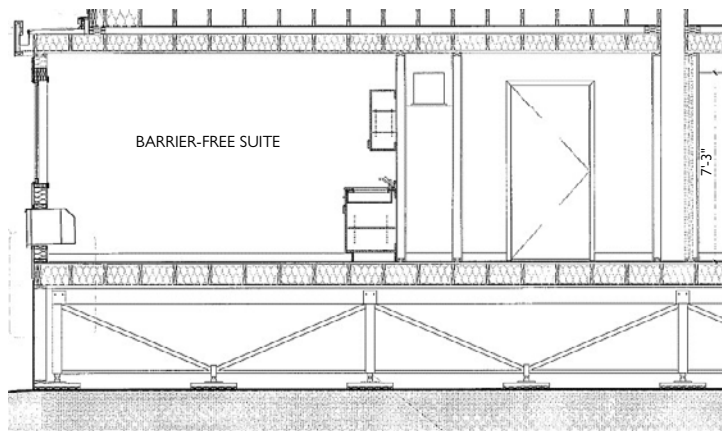


Image source: Horizon North

FURTHER READING

Full report – *Evaluation of a Movable, Modular Affordable Housing Project* (https://eppdscrmssa01.blob.core.windows.net/cmhcprodcontainer/sf/project/archive/research_2/evaluation-of-a-movable-modular_ahp_.pdf)

Related Reading

Post-Occupancy Evaluation: A Guide for Multi-Unit Residential Buildings: <https://www.cmhc-schl.gc.ca/en/data-and-research/publications-and-reports/post-occupancy-evaluation>

An Affordable, Low-Rise, Energy-Efficient Multi-Unit Residential Building: *The “Ateliers Rosemont,” Montréal*: <https://www.cmhc-schl.gc.ca/en/data-and-research/publications-and-reports/an-affordable-low-rise-energy-efficient-multi-unit-residential-building-the-ateliers-rosemont-montreal>

Design Development of Low-Energy and Affordable Multi-Unit Residential Buildings: *Case Study: Bois Ellen Co-operative Residence, Laval, Quebec*: <https://www.cmhc-schl.gc.ca/en/data-and-research/publications-and-reports/design-development-of-low-energy-and-affordable-multi-unit-residential-buildings-case-study-bois-ellen>

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