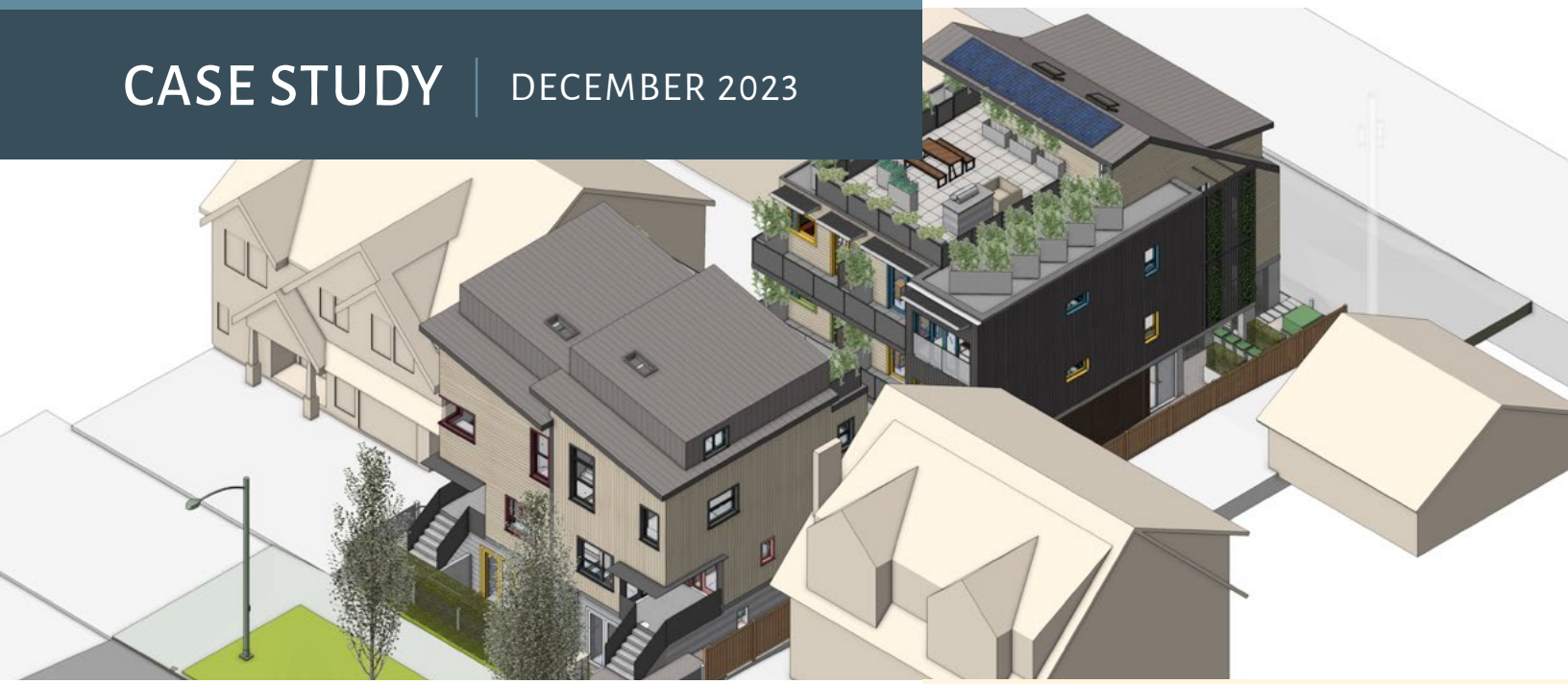
Single-Egress Stairs

in multi-unit residential buildings

CASE STUDY | DECEMBER 2023



1. Background

The National Building Code (NBC) requires that any multi-unit residential building in Canada over two storeys must be equipped with two separate exit (egress) stairs. The two-egress requirement made sense when the NBC was first developed in the 1940s when wood frame buildings were highly combustible and fire safety features were primitive. Today, modern firefighting practices, advanced fire alarms, automated sprinklers, fire resistant separations (walls, doors, ceilings) and other innovations have rendered the two-egress model obsolete in low-rise settings. It is now technically possible to create multi-unit wood frame buildings with a single egress that are as - or even more - fire safe than a two-egress building of yesteryear.

Policy/program

Single egress in multi-unit residential buildings

Municipality

City of Vancouver, BC (2021 population: 662,248)

Gentle Density Types Involved

- Multi-unit residential buildings above two storeys with single egress stairs

Single-egress buildings have a multitude of advantages over their two-egress counterparts:

- Having one staircase saves room, which can be used to add floor space to residential units, e.g., in the form of extra bedrooms or even extra units. For a mid-rise apartment building of between four and six storeys, the floor area efficiency of the building can be improved by about 5% to 10%.
- Single-egress buildings have much more flexibility in the layout of the floors compared to the standard "shoebox" units arranged on either side of a hallway (called a "double loaded corridor") with an egress at each end.
- The increased design flexibility makes it easier to design larger, family-oriented dwelling units with three to four bedrooms, to build mid-rise buildings out of wood, to provide dwelling units with front and back exposure to daylight, and to allow for cross-ventilation, all of which makes the building more livable and sustainable.
- The more compact nature and design flexibility of single-egress designs make it financially feasible to build multi-unit buildings on smaller lots, encouraging densification of the urban fabric.
- Encouraging more sociability by channeling residents into one stairwell where social connections can be made and by making site layouts (like buildings around a courtyard) that lend themselves to sociability more feasible.

By prohibiting single egress designs at this scale, the National Building Code limits the feasibility of "missing middle" buildings (i.e., that are between low-rise single-family homes and high-rise apartment buildings). Many other countries, including the US, Australia, and the UK, have more relaxed standards that permit single-egress solutions in residential buildings of three storeys or more. The City of Seattle and New York City have approved single stairs in buildings up to six storeys.

A movement is emerging across Canada to change the NBC to allow for single-egress residential buildings. At the forefront of the movement is LGA Architectural Partners and David Hine Engineering, who have submitted an application to the Canadian Commission on Building and Fire Codes (CCBFC) to amend the NBC so as to allow single-egress buildings of up to six storeys above grade, with a maximum of four dwelling units per floor and a maximum unit size of 150 m2. The amendment would require positive pressurization of the exit stair (for smoke control), an increase in the fire resistance of apartment entrance doors, and a fire alarm system that automatically signals the fire department in case of a fire. The request was not included in the 2025 revision cycle, but CCBFC says it is committed to considering it for the 2030 cycle.

Until the NBC is amended, the main vehicle for permitting single egress multi-unit buildings is called the Alternative Solutions (AS) process. The NBC stipulates that a divergence from the code may be allowed if the municipality agrees the proposed change will not compromise safety or other performance standards. The AS approach is cumbersome and expensive as it requires additional studies to build a case for each site, but some property owners are willing to try given the substantial benefits on offer. In the City of Vancouver, a property owner is proceeding with the redevelopment of a lot at 351-359 West 16th Avenue that will replace four units with a 13-unit project using a single-egress design.

2. Key Players

Municipality

- The City of Vancouver's Planning Department has approved a conditional rezoning of the project at 351-359 West 16th Avenue.
- Whether the single egress is finally permitted or not will depend on whether the City's Building Department issues a building permit.
- The fire department will comment on the fire safety issues associated with the building permit application.

Stakeholders

- Haeccity Studio Architecture (HSA) is the architectural firm that is designing the project and leading the application for a single-egress alternative solution.
- Haeccity is working with engineering and code consultants to build the case for the single-egress alternative solution.
- Conrad Speckert of LGA Architectural Partners is providing support in the form of shared resources, contacts, and feedback from other ongoing projects across Canada that include similar alternate solutions.
- The family that owns the property intends to live in one of the completed units.

Image source: City of Vancouver 351-359 W 16 Ave rezoning application

3. Description of policy/program/project

Under the City of Vancouver Charter, the city is permitted to develop its own building code – the Vancouver Building By-law (VBBL) - which is substantially similar to the BC Building Code and the NBC in many respects, including limitations on single-egress buildings. This means that any property owner who wishes to implement a single-egress design must go through the alternative solutions route. To obtain the City's approval, the property owner submits documentation with the building permit application showing that the proposed approach will meet the performance standards of the NBC.

The property on West 16th Avenue is 50 feet wide and 128 feet deep, located within the Broadway Avenue planning corridor, a comprehensive 30-year area plan, which is centred on a planned subway extension. The architectural firm on the project is Haeccity, which has already successfully used the AS approach on a smaller single-egress project in Vancouver, a six-unit building with two units sharing a single staircase.

The plan for the property on West 16th Avenue is to demolish an existing four-unit building and replace it with two buildings enclosing a courtyard, for a total of 13 units (9000 sf). The zoning on the site only allows buildings of up to six units so a rezoning was needed to accommodate the project. The City approved a conditional rezoning in 2023, with conditions including a 60-year commitment to remaining a rental building on the deed and a transportation study justifying relaxed parking requirements (only four on-site parking spaces are provided).

The rezoning does not address the egress issue – that will come up when the building permit application is submitted. As the six units in the street-facing building all have separate entrances, the single-egress issue only affects the lane-facing building, which has seven units, of which the ground floor unit has a separate entrance. Thus the single stair will serve six units on the upper two floors. The alternative solution allows the architects to add the third floor while having only one set of stairs, making the project financially viable.

The fire safety features currently being considered by the architects include:

- Mechanical smoke handling system for the stairwell.
- Slightly wider than code stairwell.
- "Enunciator panel" at the entrance to the property helps the fire department find the source of the alarm.
- Higher fire separation assemblies (walls, ceilings, floors, and doors) around the stairs.
- Areas of refuge where someone injured or handicapped can wait for rescue.

To build the case for single-egress the architect will likely need to work with a code consultant and a fire engineer, which together could add about 10% to the consulting costs of the project or 0.5% to the total construction costs.

In terms of project costs and unit affordability:

- Enhanced design flexibility makes this single-egress project financially viable on a lot that would otherwise not be so.
- Eliminating the second set of stairs saves on construction costs but these saving are roughly counterbalanced by the additional costs associated with the greater consulting requirements and fire safety features of the project.
- Additional rentable floor space presents a permanent future income to the property owner that would otherwise not be available.

4. Outcomes

It is too early to report outcomes for this particular project as it is still in the design phase. However, the project is raising interest in the single-egress design solution, especially on smaller lots where design flexibility can be decisive in terms of financial viability.

5. Lessons learned

Facilitators

- Incremental, step-wise change is more likely to succeed, e.g., ask for permission to build three-storey single-egress buildings to allow building code officials and fire departments to become accustomed to this building type before pushing the envelope to additional storeys.
- Share knowledge with city officials about how other countries and cities have handled egress issues and measures of fire safety related to single-egress buildings in other jurisdictions.
- Address misconceptions about and increase public and professional awareness of the potential for single-egress buildings to address housing supply and sustainability issues, e.g., through a design competition.
- Nurture personal connections with people working on this issue, including people with needed expertise, municipal officials, academics, etc.
- Although not pursued in the Vancouver case, another tactical approach would be to follow Edmonton's example and for council to instruct the city's chief building official to allow the single-egress solution and to prepare design guidelines to facilitate the alternative solutions route.

Challenges

- Single-egress units are not necessarily any cheaper to build as the gains made by eliminating the cost of a stairwell are often neutralized by the extra soft costs involved in planning the building (e.g., fire engineering consultant, code consultant) and the costs of specialized fire safety measures.
- Fire departments reflexively oppose single-egress buildings as inherently unsafe. If a fire official rejects a project, they are not required to explain why and there is usually no appeal.
- Having additional density in a neighbourhood could come up against infrastructure limitations, e.g., electrical supply and stormwater drainage.
- NIMBY reactions to denser projects.

6. Next Steps

- The 351-359 West 16th Avenue project has received conditional rezoning and is currently working on a design that will fulfill those conditions. The next step in the Alternative Solution (AS) process will be to submit a building permit application with supporting documentation for the single-egress solution. Construction is scheduled to begin in 2025 and the building should be occupied in 2026.
- As mentioned above, the CCBFC has committed to considering building code changes to allow single-egress solutions for the 2030 revision cycle. This would encourage the provinces to amend their own codes, making single-egress building design allowed as a routine matter across Canada.
- Meanwhile, the BC government has announced that in 2024 it will be considering changes to its code to allow single-egress construction.

7. Resources

- Eliason, M. (2021). "Unlocking livable, resilient, decarbonized housing with Point Access Blocks," City of Vancouver. Online: https://www.larchlab.com/city-of-vancouver-report-on-point-access-blocks/
- Grabar, H. (2021). "The Single-Staircase Radicals Have a Good Point," Slate Magazine. Online: https://slate.com/business/2021/12/staircases-floor-plan-twitter-housing-apartments.html
- City of Vancouver 351-359 W 16 Ave rezoning application. Online: https://www.shapeyourcity.ca/351-w-16-ave
- Uytae Lee, 2023. Why North America Can't Build Nice Apartments. https://www.youtube.com/watch?v=iRdwXQb7CfM