Unlocking livable, resilient, decarbonized housing with Point Access Blocks

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Author's Bio

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His writings and past collaborations have been featured in numerous publications. He has been a guest critic and lecturer at several institutions, including the University of Washington, and Cornish College of the Arts. Michael has also presented internationally and been featured on international media, covering topics such as *Baugruppen* (self-developed urban cohousing), passivhaus, ecodistricts, and social housing. Michael is an activist for dense, livable, affordable, and sustainable cities.

About Larch Lab

Larch Lab is an architecture and urbanism *think and do* tank focusing on prefabricated, decarbonized, climate-adaptive, low-energy urban buildings; sustainable mobility; and livable ecodistricts. We utilize our work experience locally and abroad, a global network, local knowledge, and local wood – to design and construct circular, high quality Mass Timber buildings that meet the passivhaus standard. Larch Lab specializes in community-oriented models of housing. Our focus is delivering on livability, resiliency, comfort, and cost-effective construction

Disclaimer

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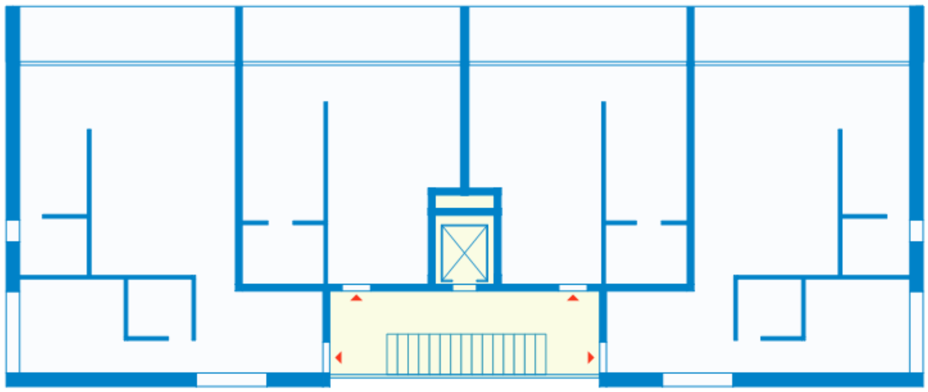
01 Introduction

Building and zoning regulations play an oversized role in the development of livable multifamily buildings, and in reducing embodied and operational carbon. Conversely, regulations can add requirements that increase embodied and operational carbon – for no economic, livability, or life safety benefits.



Diagrammatic Point Access Block floor plan, 93% efficient floor plate

Point Access Blocks, compact single stair buildings with units centered around the stairway, are one of the most basic building forms found in post-industrial cities. ***They provide compact, low-carbon, and livable multifamily housing.*** This report presents our research on the benefits of Point Access Blocks over other means of vertical access. These benefits include:

- **Increased livability**
- **Lower embodied carbon**
- **Lower operational carbon**
- **Lower cost**
- **Increased compactness**
- **Ability to cross ventilate**
- **Accessibility options for low-rise**
- **Elimination of long corridors**
- **No decrease in fire safety risk**
- **Unlocks small lot development**

Part 3 of Vancouver's Building By-Law regulates most medium to large scale housing. This section only allows single stair buildings of 2-storey flats, or 3-storeys with flats and maisonettes. This is considerably lower than jurisdictions around the world allow - up to 10 storeys, or even higher. As Vancouver updates its Building By-Law, low- to mid-rise Point Access Blocks could be an adopted change that unlocks livable, decarbonized, climate resilient multifamily housing.

Part 9 of Vancouver's Building By-Law regulates low-rise, small scale multifamily buildings. This section allows 3-storey single stair buildings like townhouses. However, if just one additional dwelling unit shares a stairway, a second stairway is required.

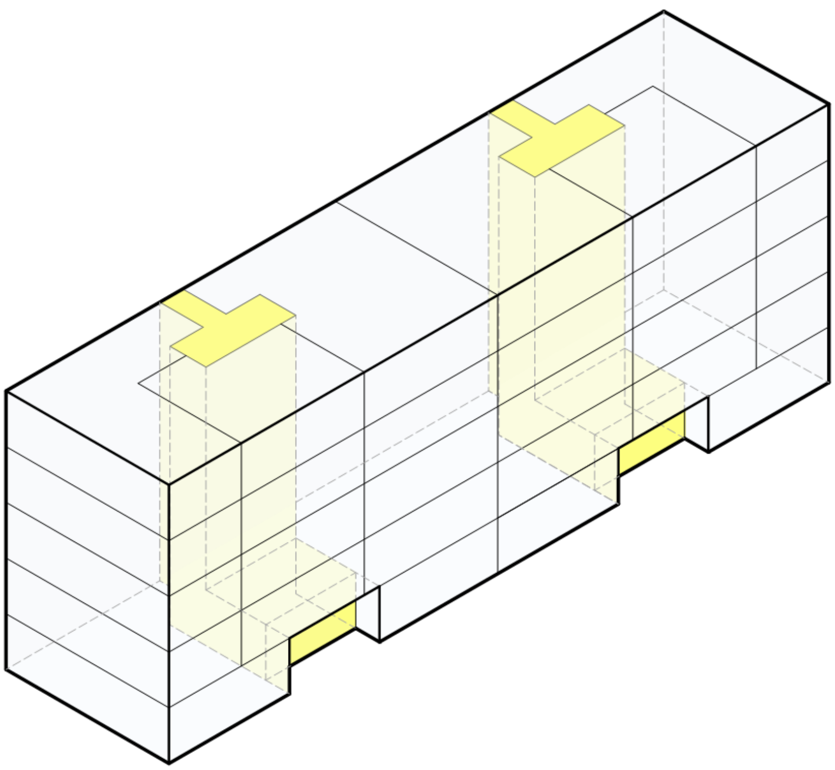
Point Access Blocks offer a path to unlocking climate resilient, flexible, and adaptable low-rise and mid-rise buildings that are more affordable, community-oriented, and family-friendly than current regulations allow. It is our hope that a deeper understanding of regulations and design options in other countries can inform conversations to advance similar solutions locally. It is important to note that Point Access Blocks are not a new concept, rather one that should be revived and re-evaluated for use in modern, growing cities utilizing modern construction methods and fire engineering.

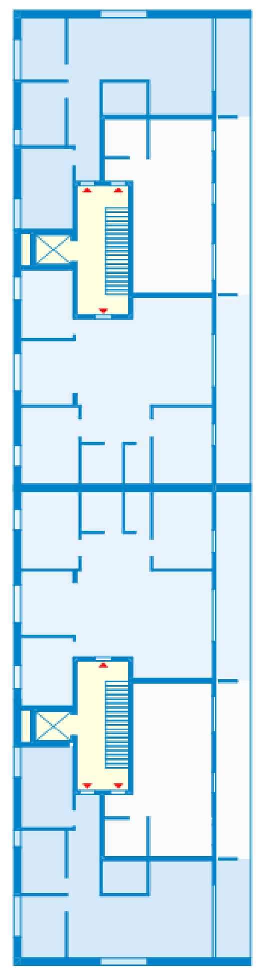
Vertical Access

For most low- and mid-rise multifamily buildings there are three vertical access conditions primarily used. They the Point Access Block, the single loaded corridor, and the double loaded corridor.

The **Point Access Block** is generally three to ten storeys, with only one means of vertical access. In German, it is called a *Punkthaus* (Point house) or a *Spänner*, a multi-storey building with two or more units centered around a central building core or stairway. In many countries, the second means of egress is aerial rescue by the fire brigade. Many jurisdictions allow Point Access Blocks to be built continuously, separated by fire walls. The 1,100 m long Karl-Marx-Hof in Vienna consists of nearly 100 connected Point Access Blocks.

Typically, most units are double aspect, spanning the full depth of the building, with cross ventilation and daylight on two or more sides. There is little circulation space (yellow in diagrams below). Unit sizes vary considerably due to flexibility allowed by the central core. Bedrooms can be situated on the quieter side of buildings. These patterns are common for European low- and mid-rise multifamily buildings.





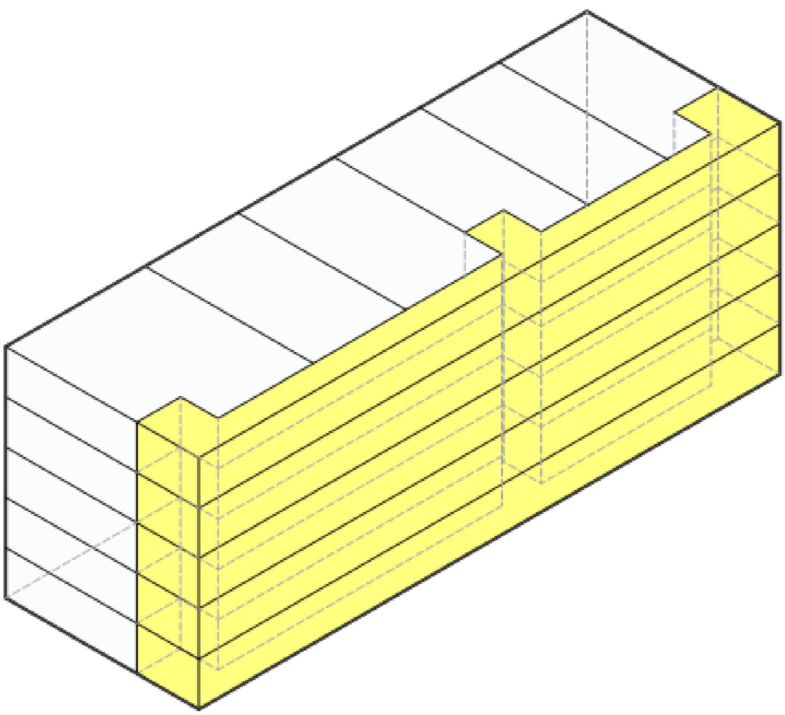
Point Access Block

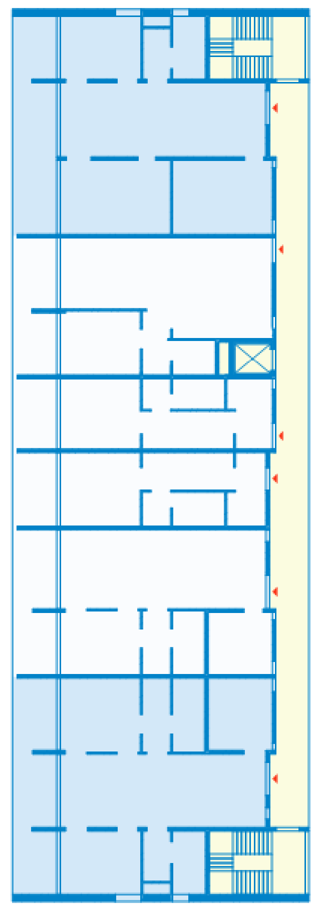
Axonometric drawing (left) and floor plan (right) diagrams, Larch Lab

- compact layout (6,5% of floor plate is circulation)
- diversity of unit sizes (6 units, from 1- to 3-Bedrooms in this example)
- cross ventilation for most units
- daylight on multiple sides
- bedrooms on quiet side of building

The **Single Loaded Corridor** is an arrangement where stairways access an exterior-side internal corridor or exterior passageway on each storey, with all units situated on one side. Typically, this condition results in narrow buildings, with double aspect units. This configuration also allows for cross ventilation and daylight on multiple sides. Single Loaded Corridor buildings are common in social and luxury housing throughout Europe, though they tend to be associated with affordable rentals or hotels in North America.

Vienna House, covered later in this report, utilizes this configuration with a central courtyard that an exterior passageway encircles. In some jurisdictions, the corridor or exterior passageway can be utilized as semi-public space, incorporating outdoor seating, small gardens, or space to store prams and bikes. There are drawbacks to this configuration - it is not spatially efficient, resulting in a large floor area dedicated to long corridors or exterior passageways. It also entails many residents using the elevators and corridors.





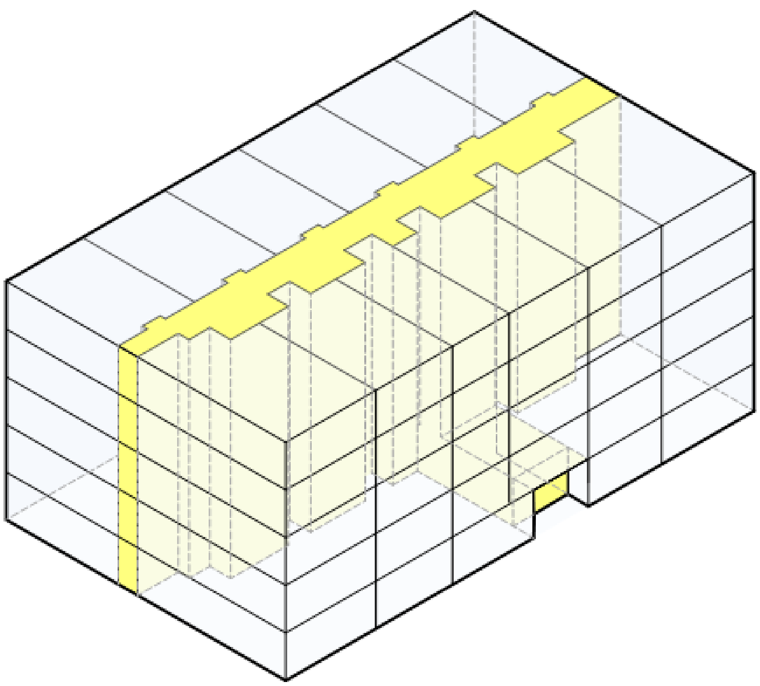
Single Loaded Corridor

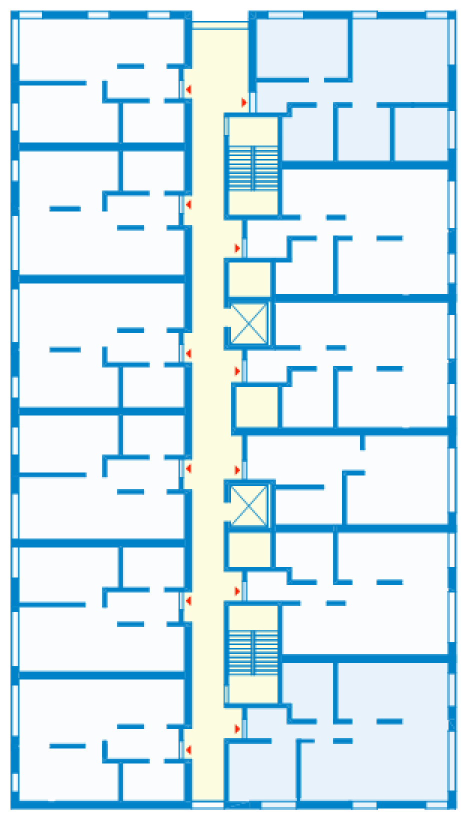
Axonometric drawing (left) and floor plan (right), Larch Lab

- less efficient floor plate (16% of floor plate is circulation)
- diversity of unit sizes
- cross ventilation possible
- daylight on multiple sides

The **Double Loaded Corridor** is an arrangement where stairways access a corridor in the middle of the building, with units accessed on *both* sides. This generally results in very deep buildings and is ubiquitous in North American apartment buildings, in large part due to the infeasibility of small lot development. Most units are single aspect, with daylight only coming from the single exterior wall. Typically, only corner units have daylight on multiple sides. Units on the north side receive very little daylight, while units to the south have little respite from summer sun.

Cross ventilation is extremely rare in double loaded corridor buildings. With a warming climate, this could be problematic for residents in buildings that have neither air conditioning nor active solar protection. On arterials, half of the units have little respite from pollution or loud street noise. Larger and family-sized units require considerable length along an exterior, inducing a large number of smaller units. These buildings tend to be much more impersonal, with long corridors and heavily used lobby and elevators.





Double Loaded Corridor

Axonometric drawing (left) and floor plan (right), Larch Lab

- moderately efficient floor plate (13% of floor plate is circulation)
- primarily small units
- no cross ventilation
- no daylight on multiple sides
- little respite from urban noise

History of Point Access Blocks

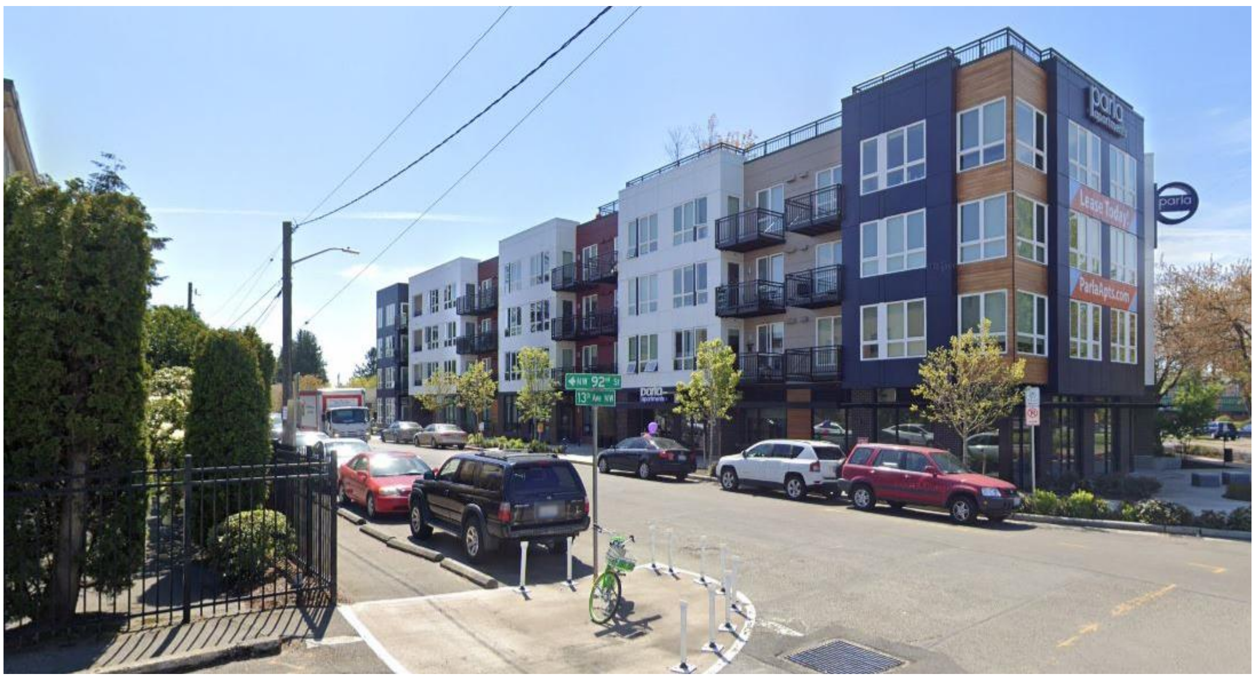
The urban morphology of cities shifted drastically with the confluence of low-rise zoning and the introduction of the automobile in the first half of the 20th Century. Prior to this, cities were much more compact in their development as mobility was largely by foot, and then transit and bike. Development in urban areas was dense in both use and population, and of a fine-grained nature. Small lot development was the norm. Paris, Vienna, Amsterdam, and most other cities saw their development reach three- to six-storeys, with one- or two-storeys of inhabited attics. Unlike most post-sprawl cities of North America, this pattern was not limited to commercial streets, and would stretch on for blocks. Many of these buildings would also incorporate street level businesses, with owners or renters living above.

Fine-grained urbanism of Freiburg. Photo by Mikel Parera, via Unsplash

Berlin's Mitte is filled with *mietskasernen* (rental barracks, or tenements) built to house an influx of workers from the industrial revolution through 1914. These were walk-up purpose-built rentals, with two or three homes per floor accessing one stairway. Building regulations stemmed not from a planning department, but rather the *Baupolizei* (building police) tasked with keeping order and public safety for streets and buildings. In 1869, engineer James Hobrecht developed Berlin's first zoning plan, which introduced regulations on height as a function of street width. Revisions in 1887 set the minimum street width as 22 m, and the maximum *traufhöhe* (eave height) to 22 m. Limiting wall height to the width of the street was a means of preventing collapsed buildings from knocking down buildings across the street. Today, *mietskasernen* are some of the most sought-after apartments in Berlin, and many have been retrofitted with elevators. The Haussmann era of Paris, and Barcelona's Eixample developed in a similar manner.

Historically, most European construction was of solid materials — brick or stone, and eventually concrete. Floors and inhabited attics were built with solid wood beams and flooring. Thus, many buildings were of the sort where vertical elements were already relatively fire resistant. Construction detailing and the onset of concrete floors eventually allowed for compartmentalization to slow or contain fires. Mass Timber construction today can be planned to operate in a similar manner.

With the introduction of the automobile, sprawl ensued, and commercial streets or arterials were rarely built out. Over the last few decades, there has been a tremendous shift as people have moved back into cities. This influx of new residents has often come with growing pains, as cities attempt to balance where new housing should be located. The confluence of present-day financing requirements, building codes, and land use regulations drives new development to arterials and main corridors, requiring assembly of multiple small parcels.



Apartment building with facade modulation in Seattle

This has resulted in large ‘bread loaf’ buildings, thick in footprint and often banal in design, standing in stark contrast to the way we used to build. In my time living in Europe, I have never seen an apartment building that looks like the one above, a double loaded corridor building ubiquitous throughout the U.S. and Canada. Many jurisdictions have attempted to minimize the negative effects of these large projects by requiring setbacks or modulating the façade to break up the massing. Ironically, this mimics the fine-grained development of older cities and historic cores like Vancouver’s Gastown, usually lacking the authenticity of the narrow-lot development it attempts to recreate. Point Access Blocks offer a return to the way we used to build cities, reigniting the love affair with small lot development.

02 Benefits

Point Access Blocks offer a multitude of benefits over Single and Double Loaded Corridors. Those benefits include increased livability, reductions in embodied carbon, reductions in operational carbon, increased accessibility and adaptability, potential cost savings, increased climate resilience, and increased urban resilience - with no discernable reduction in safety.

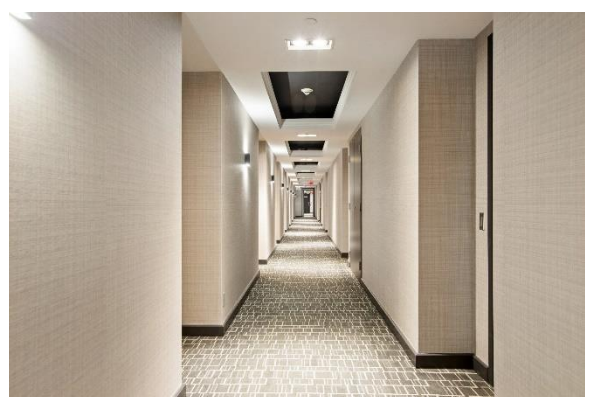
Livability

Point Access Blocks have several advantages in the development of livable urban multifamily housing. The incorporation of double aspect units allows for cross ventilation, the placement of bedrooms on quieter or less polluted sides of the building, and having multiple sources of daylight or views.

The ability to incorporate a variety of unit types and sizes, even on small urban lots, may be one of the most underrated aspects. Floor plates tend to be very flexible, and units ranging from studios to three- and even four-bedrooms can be accommodated. They can also have varied unit types such as cluster apartments, flats, and two storey maisonettes with an internal staircase. The depth and arrangement of Double Loaded Corridor buildings results in a preponderance of studio and one-bedroom units, limiting a positive social and economic mix within the building.

The re-captured floor space from eliminating a second stairway and circulation area allows for several benefits. Units could be larger, perhaps increasing the feasibility of 3- or 4-bedrooms. This re-captured space could be incorporated into additional amenity space for residents, making compact urban living more practical or enjoyable. In Viennese and Berliner cohousing projects, these re-captured areas have become an incredible diversity of uses including a library, workshops, craft room, a sauna, musical practice rooms – and ‘joker rooms.’ Joker rooms are flexible, unprogrammed spaces utilized as a teenager’s suite, student accommodation, a guest suite, or caretaker’s unit.

Building regulations that limit the number of homes per stairway can foster better community-building as neighbors look out for one another, reducing some of the vastness and anonymity of large multifamily buildings. Many countries also allow for a series of connected Point Access Blocks, allowing large buildings to be broken down into smaller ones. This allows residents to identify with either their own segment, the entire building, or both simultaneously.



A typical double loaded corridor

Embodied Carbon Savings

The City of Vancouver's *Climate Emergency Action Plan* states one of its goals is the significant reduction of embodied carbon in new construction. Point Access Blocks provide several paths to reducing embodied carbon, in a manner that creates livable homes for a variety of household sizes.

First, the floor plates of Point Access Blocks are much more efficient than other vertical access types, a considerable amount of embodied carbon can be saved simply through this reduction in floor area. This also ensures there is less construction waste.

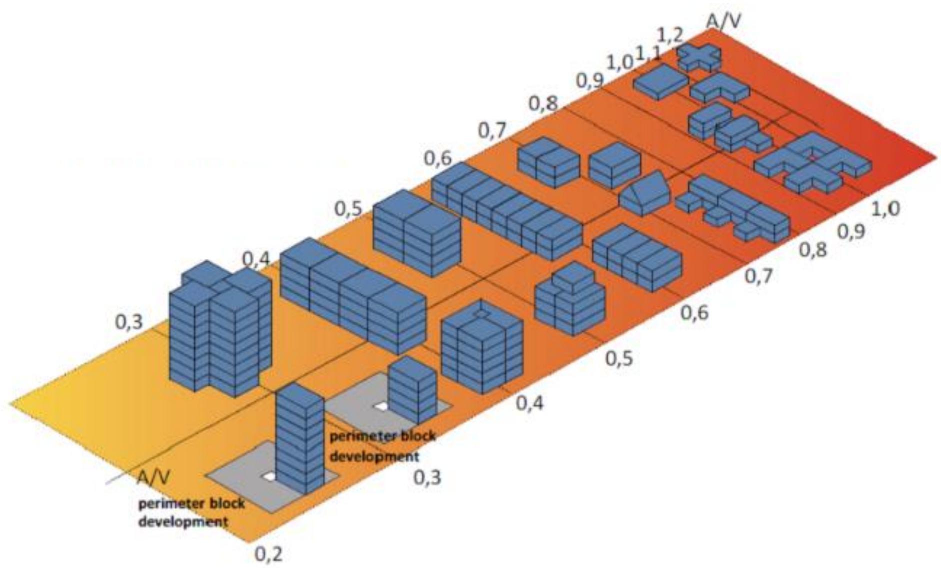


Diagram of building form compactness, via Solarfibel Baden-Württemberg

Second, the compactness of missing middle and mid-rise Point Access Blocks, especially those situated in perimeter block development with shared walls, makes it possible to meet or exceed low-energy standards like Passivhaus without Herculean efforts. The surface area to volume (A/V) ratio for these buildings falls in the range of 0,25 - 0,5 of the building form compactness diagram above. This is also considerably more compact than rowhouses or small apartment buildings, which fall in the 0,6 – 0,9 range on that same diagram. Further embodied carbon savings are possible with the incorporation of decarbonized building materials including mass timber, prefabricated straw exterior panels, or wood-framed panels.

Third, there is the potential for additional embodied carbon savings if Point Access Blocks are paired with policies that reduce car parking and increase sustainable mobility. These lots tend to be small and urban, making it difficult to accommodate underground parking. A 2016 South Korean research paper on underground parking life cycle assessments calculated their embodied carbon to be about 17 tons per stall.

Lastly, there are the avoided embodied carbon emissions of sprawl with small lot mid-rise buildings, especially those that can accommodate families and multigenerational households. The case study section references a 9-unit home on a 211 m² site - half the size of a typical lot in Vancouver (460 m²).

Operational Carbon Savings

Another advantage Point Access Blocks have over Double Loaded Corridors are reductions in operational carbon, the carbon emitted in the process of heating, cooling, and powering a building. Stairways incorporating daylighting and skylights, or the incorporation of double aspect units, allow for daylight on multiple sides, reducing the need for powered lighting. The ability to cross ventilate in Point Access Blocks lowers the need for cooling and could allow for reducing or eliminating active cooling systems.

The compactness that is advantageous in Point Access Blocks for reducing embodied carbon is similarly advantageous in reducing operational carbon emissions. The compact form reduces heat loss considerably, significantly reducing the amount of heating required by residents. An alternative to eliminating the superfluous stair and circulation area from the building footprint is to recapture it into units or amenity space. Both of these options make achieving low-energy standards like Passivhaus easier. Policies that encourage small lot Point Access Blocks are some of the most spatially and energy efficient possible.

Third Place Staircase

Most stairways in Canadian multifamily buildings are not social in nature. They are enclosed and merely a means of egress. Building codes prevent apartment entry doors opening into the stairway unless an exterior stairway is planned. Windows and daylight are uncommon features, leaving these spaces feeling cold or dark. Stairways are not utilized as spaces for chance encounters, social spaces, or even as a means of bypassing the elevator. Many European building codes permit vertical access to incorporate features that make stairways more enticing to walk up and down, allowing residents to stay a little healthier while consuming less energy. Letting residents run into each other, or check in on each other, when leaving or entering. In Freiburg, I lived in a four-storey Point Access Block where the stairway and landings were spaced apart, and with a skylight at the roof. This allowed daylight to reach the lower levels, reducing the need for powered lighting.

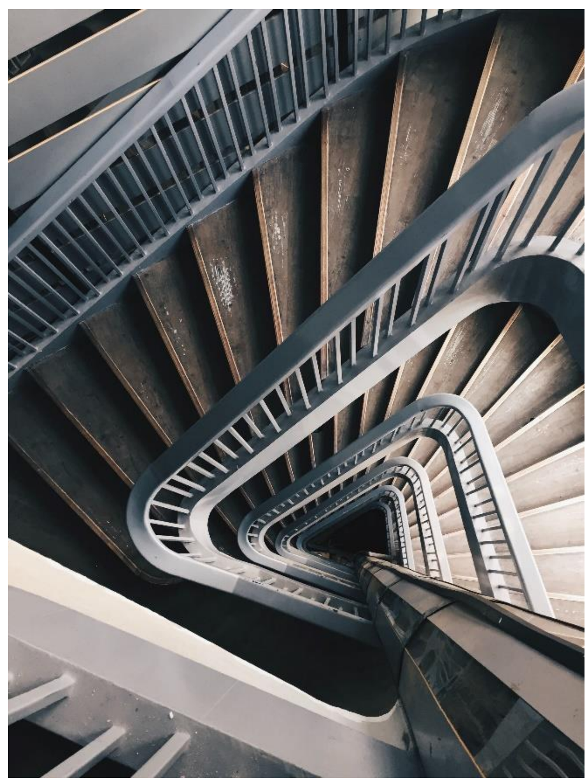


Photo by Nazli Mozaffari, via Unsplash

Potential Cost Savings

The economics of Point Access Blocks could be favorable to unlocking small lot development, even with a nominal reduction of 15-25 m² per floor for circulation. Assuming an average construction cost of CAN \$2,500/m², the reduction of 15 m² results in a cost savings of \$37,500 per floor. On a five-storey building, this results in a reduction in construction costs of \$187,500. These are nominal savings on a medium-sized project, but on small projects, or in an environment where high costs prevent the construction of lower cost housing, it starts to add up.

These savings could become even more advantageous at the scale of European Point Access Blocks with five to eight storeys, and several connected in series. Policies or incentives to re-invest these cost savings into better thermal envelopes or fossil-free mechanical systems offer environmental and operational cost savings as well. Realizing high performance buildings for the same cost or less as status quo construction could be a game changer.

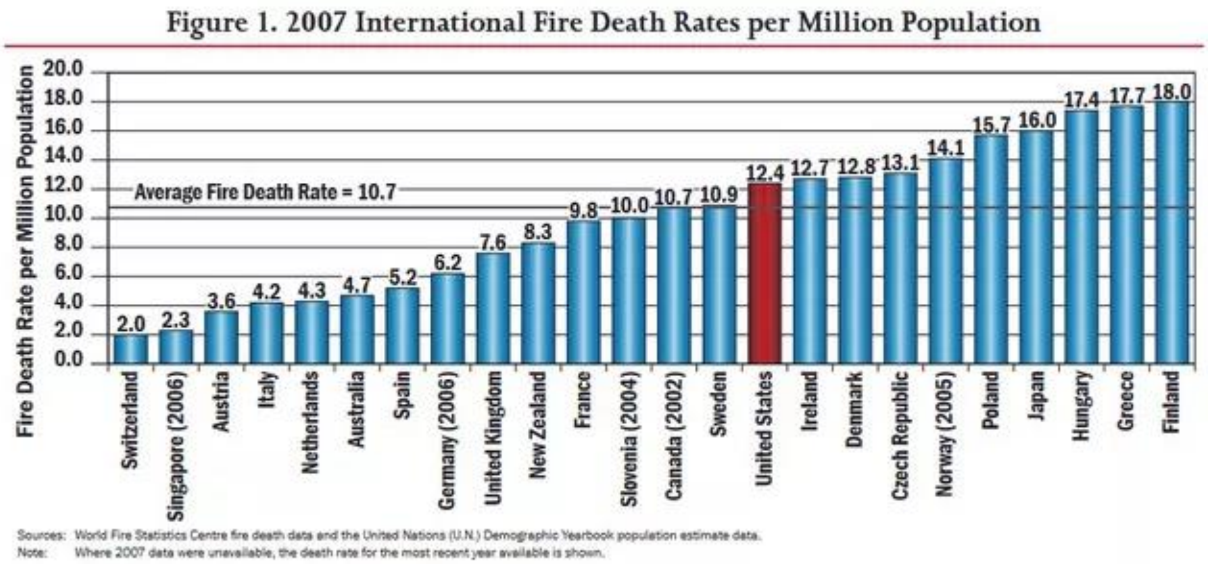
It is also possible to keep the superfluous circulation area and re-allocate it into larger units or amenity space. What could a cohousing group or cooperative do with another 15-25 m² per floor? Could family-sized units be added? What kinds of amenity spaces could the group envision? On the development side, could an additional 60-150 m² make small lot development more feasible? Cohousing groups in Europe get to answer those questions, as their regulations allow them to be asked.

Safety

Since Point Access Blocks are rare in Canada's built history, there may be some questions over whether these types of buildings are safe. Discussions on the issue with fire engineers in Seattle, in addition to my own experience working on and living in them in Germany, leads me to believe they can be incredibly safe. The German approach to containment and egress – with limited floor areas, travel distance, and height contingent upon aerial rescue vehicles, is very pragmatic. The requirement for fire sprinklers also adds another significant layer of safety over most other countries.

Other professionals feel similarly. In January of 2009, research fire protection engineer Richard Bukowski authored a National Institute of Standards and Technology Technical Note that stated:

> "For most of history buildings were short enough that stairs provided for access were sufficient for rapid egress in the event of fire. ***Even in single stair (mostly residential) buildings, experience showed that this stair was sufficient for fire egress as long as the fire did not expose or block access to the stair*.**"



2007 International Fire Death Rates per Million Population

Data is another path for measuring the safety of these buildings. A 2009 United States Fire Administration report features a graph (above) that showed the average death rate in several countries where Point Access Blocks are legal, including Austria, Germany, Switzerland, Italy, and the UK, is significantly lower than Canada or the United States.

Accessibility

The accessibility of Point Access Blocks can be a point of concern, as historically many were built as walk-up apartments, and lacked barrier-free units or elevators. In most countries today, Point Access Blocks have a minimum level of accessibility with the incorporation of elevators and accessible units. In Austria, limited profit housing associations have initiated several projects with units that are either barrier-free or designed to be fully adaptable in the future if needed.

Allowing low-rise Point Access Blocks would also allow for more accessible housing options at the scale of townhouses, which are not typically designed to be adaptable or accessible. As the city renews the vision on how low-rise areas can evolve, having the ability to plan for adaptable units and the incorporation of elevators will pay dividends as demographics change. The incorporation of Limited Use/Limited Application elevators could also be a cost-effective compromise to provide more accessible units at this scale. The flexibility of Point Access Block floor plans could be another tool for incentivizing the planning for barrier-free and adaptable units accessible to a broader section of residents.

Urban Resilience

As cities grow re-compaction and intensification of built-up neighborhoods can cause gentrification and displacement as existing buildings are demolished and replaced, sometimes only incrementally increasing density. The loss of small business spaces and existing housing, generally more affordable than newly constructed ones, can result in drastic changes in the physical and social composition of a neighborhood. This can make it difficult to grow the city without changing it substantially. Point Access Blocks could play a pivotal role that allows for future intensification of built-up neighborhoods, while reducing gentrification and displacement pressures.

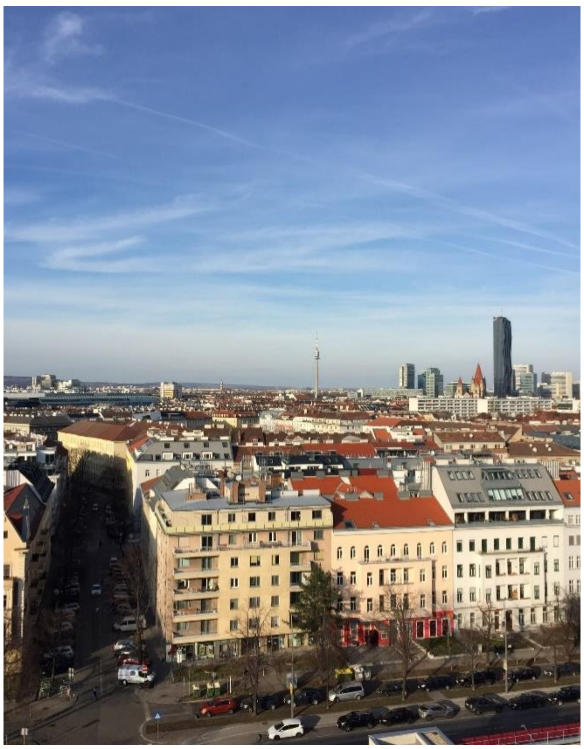


Photo by Dmytro Savitskyi, via Unsplash

One strategy for re-compacting built-up areas in European cities incorporates vertical additions to existing buildings. This is where one or more storeys are added to an existing multistorey building. This approach has the potential to add millions of new homes in Europe especially with prefabricated lightweight wood solutions. A 2021 study by the Technical University of Graz showed there was space for 36,000 new homes within existing roofscapes that require rehabilitation in coming years.

A similar 2019 study by the Technical University of Darmstadt found that up to 1.5 million new homes could be added in Germany through vertical additions. This strategy is an innovative way to add housing in growing cities, that also pairs well with energetic retrofits, and the incorporation of elevators in buildings that were built without them.

One of the keys that unlocks this solution, is the existing protected single stair. As it is possible to build 8 or 10 storey single stair buildings in places like Germany, Austria and France - the existing fire protected stairway is merely extended the number of storeys added to accommodate the new housing. Imagine if there was a Building By-Law that incentivized innovative solutions like this.

Climate Resilience

The events of the last year amplify the imperative for buildings that are adaptable and resilient to climate change. This report has detailed several ways in which Point Access Blocks are more adaptable than Double Loaded Corridors. Reduced requirements for heating and cooling through increased compactness and cross ventilation are adaptive strategies. As mentioned in the previous section, the ability to add new homes on top of existing buildings would offer significant reductions in carbon emissions, over adding units through

demolition or sprawl. The increased community often found within smaller buildings affords another type of resilience – *social* resilience, and the ability look out for one another. During the pandemic, we realized Point Access Blocks may also prove advantageous during public health events by reducing the frequency and number of residents interacting in the same lobby, elevators, and stairways over large buildings where several hundred residents can share those spaces.

03 Building Codes

Building acts and codes have existed in some form for centuries, often being expanded or formalized after significant fire or collapse events. Massive fires were quite common in history, often destroying large parts of the city. In 1662, nearly three quarters of the Bavarian city of Passau burned, for a second time no less. In 1657, the Great fire of Meireki destroyed two thirds of Edo (Tokyo), Japan. The Great Fire of London in 1666 destroyed most of the city located within the Roman city wall, eventually leading to more stringent regulations on construction. The following section details some of the aspects of building codes around Point Access Blocks. Generally, the regulations involve travel distance, floor area, and the number of floors.

Concurrent to this research on Point Access Blocks, Conrad Speckert's Master's thesis was published online at secondegress.ca. Speckert's research dives deep into the requirements for a second stair, highlighting that of the building codes from 25 countries he studied, Canada's was the most restrictive.

Canada

For buildings higher than 3 storeys, the number of exits in Canadian buildings is based on the *National Building of Canada 2015 ed*. Chapter F, Division B, *Section 3.4.2.1 Minimum Number of Exits*. Subsection 2 states that,

*"A floor area in a building **not more than 2 storeys in building height**, is permitted to be served by one exit provided the total occupant load served by the exit is not more than 60, and a) in a floor area that is not sprinklered throughout, the floor area and the travel distance are not more than the values in Table 3.4.2.1.-A, or b) in a floor area that is sprinklered throughout i) the travel distance is not more than 25 m, and ii) the floor area is not more than the value in Table 3.4.2.1.-B."*

For Group C (residential occupancy) – the maximum floor area is limited to 100 m² with a maximum travel distance of 15 m if unsprinklered. The addition of a building sprinkler allows the maximum floor area to be increased to 150 m².

The *British Columbia Building Code, 2018 ed.* language for this section matches the *National Building Code of Canada, 2015 ed*. language. The 2019 Vancouver Building By-Law language for *Section 3.4.2.1 Minimum Number of Exits* also matches the text of the *National Building Code of Canada, 2015 ed*.

United Kingdom

In the U.K., the *National Building Regulation Requirement B1 Means of Warning and Escape* controls exiting from a building. *Section 3: Means of Escape – Flats*, regulates egress from apartments. The number of exits is regulated in *Section 3.27*:

"From the flat entrance door, a single escape route is acceptable in either of the following cases. A) The flat is on a storey served by a single common stair and both of the following apply. I) Every flat is separated from the common stair by a protected lobby or common protected corridor. II) The maximum travel distance in Table 3.1, for escape in one direction only, is not exceeded."

Buildings with a storey more than 18 m above grade are required to have a firefighting shaft, regulated under *Section 15: Access to buildings for firefighting personnel – flats*. Firefighting shafts are stairways with fire resistant construction rated to REI 120 (2-hour rating) from outside the shaft, and REI 60 (1 hour rating) from inside. Also required are a firefighting lift in a lift shaft, a firefighting lobby with fire main outlet, and smoke control. Two firefighting shafts are only required for buildings with a storey height of 18 m or more, *and* a floor area of 900 m². Maximum travel distances are regulated in *Section 3.18*, measured from the Flat entrance to 9 m max to every point in the unit. If the unit has a Protected Entrance Hall (rated corridor), the corridor's max length is limited to 9 m.

It should also be noted that the U.K. regulations assume containment though fire rated separation between units with residents sheltering in place, as stated in *Section 3.3*,

"Provisions are recommended to support a stay put evacuation strategy for blocks of flats."

The number of storeys is not regulated by the building ordinance, meaning the number of storeys served by a single stair could be quite large – and in fact there are numerous single stair high rises in the United Kingdom. It should be noted this is a significant departure from building regulations in Germany, and most other countries allowing Point Access Blocks.

Germany

In Germany, the *Musterbauordnung* (*MBO* - Model Building Regulations), is a model code drafted at the federal level, with the various federal states (*Laender*) developing their own codes based on it. Buildings are generally regulated into *Gebaeudeklassen* (abbreviated *GK* - Building Classes), based on height, floor area, and exit travel distance. Most Point Access Blocks fall within GK-4 or GK-5.

Regulations allow a maximum of 4 units per vertical exit, but there is no limit to the number of instances of vertical exits per parcel. Area is also regulated, with the maximum use area of a single unit in GK-4 and GK-5 buildings limited to 400 m². Bavaria's Building Code (*Bayerische Bauordnung* – BayBO) *Section V Escape Routes*, lays out the requirements for egress. *Article 31* of this section covers escape routes, and states that the second escape route is not required ***if*** the fire brigade has the necessary rescue equipment such as aerial rescue vehicles. Thus, the upper bound of the single stair condition is limited to the maximum extraction height from *Hubrettungsfahrzeuge* (aerial rescue vehicles). This advantages larger cities that have apparatuses capable of higher rescue.

The maximum travel distance (*Maximale Entfernung*) varies by State, but for multifamily housing is 35 m. Stairways are required to be *feuerbestaendig* (fire resistant) for 90 minutes (F-90), with various smoke exhausting requirements. Unlike most countries, Germany's building code allows rated apartment doors to open directly into the stairway. Sprinklers are also very rare in multifamily buildings under 10 storeys.

Seattle

The *2018 Seattle Building Code* (*2018 SBC*) is the current building code, and is based on the *2018 International Building Code*, with both Washington State and City of Seattle amendments. The International Building Code is written by International Code Council, Inc., a non-profit entity that prepares model building codes for the United States, and a handful of other countries. Chapter 10 of the *2018 SBC* covers *Means of Egress*, and the single exit language can be found in *Section 1006.3.3 Single exits,* Subsection 7. It allows for single stair, multifamily buildings with the following requirements:

- Max. 5 storeys of R-2 [long term residential] occupancy (6-storey mixed use possible)
- The building does not contain a boarding house
- Maximum of four dwelling units per storey.
- Construction is minimum 60-minute fire rating
- Equipped with an automatic sprinkler system.
- The stairway and elevator must be pressurized or naturally ventilated.
- Units must open on to a corridor if there is an internal stairway.
- Maximum travel distance is limited to 38 m.

Interestingly, the *2018 SBC* allows for *two* single stair conditions on one parcel and seems to be the most permissive in the U.S. or Canada. Seattle's building code amendment allowing Point Access Blocks results in the fine-grained urbanism found in historic cores of cities. The language and regulations are similar to Germany's, yet also much more restrictive with lower height limits and sprinkler requirements.

04 Case Studies

We have included four built examples of Point Access Blocks across a variety of scales. These are in many ways emblematic of how they can provide a multitude of housing options, even on small urban lots. They are intended to provide an overview of how flexible this building type is, and the diversity in sizes, situations, and uses they can accommodate. The projects include small lot urban infill, stacked flats, small scale urban mixed use, and self-developed mixed-use cohousing. We have attempted to keep the reference projects close to what is possible in Seattle, and around the height limits that we find most intriguing as urbanists.

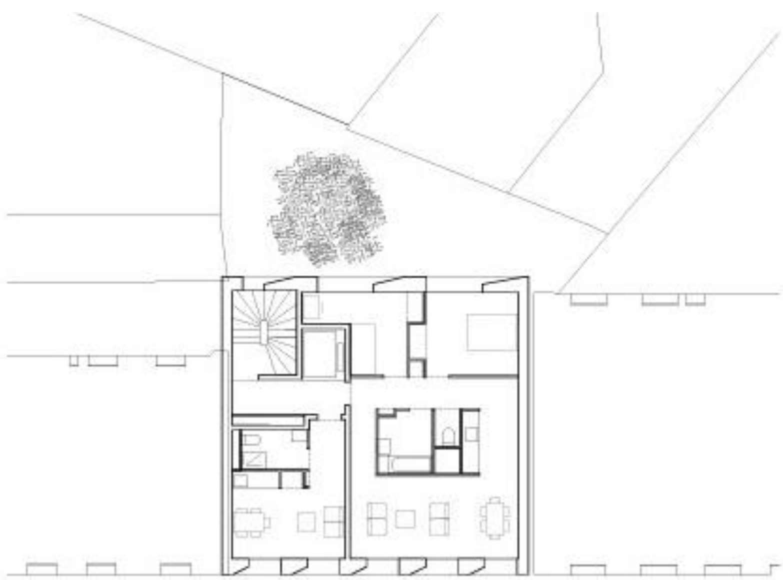
It should be noted that none of these buildings would be legal in Vancouver.

Avenue Netter, Paris

building parcel: 211 m²
total floor area: 570 m²
nr. of units: 9
nr. of storeys: 7
year built: 2017
mixed uses: yes
accessible: yes
building form: closed
situation: urban
architect: Fres Architectes

Photo: Philippe Ruault, courtesy Fres Architectes

Avenue Netter is a 7-storey mid-block infill designed by Fres Architectes, in the 12te Arrondissement of Paris. It is social housing with 9 units ranging in size from studios to 3-bedroom flats. The site is incredibly small, with zero lot line conditions on the sides and street, and a shared courtyard to the rear. The upper storey is set back from the street to match the scale of neighboring Haussmann-era buildings. The ground level features a small business space, residential lobby, and bike storage. This project has a single stairway and elevator core, set to the rear corner, allowing for 1 or 2 units per storey. Interestingly, France's building code allows winder stairs, however units are accessed from a protected corridor connecting to the stairway. Bedrooms are located on the courtyard side of the building. Most units are double aspect, with daylight on multiple sides and the potential for cross ventilation. The requirement of a second stair on this project would consume much of the buildable area on such a small site. Avenue Netter represents a smart, elegant, and modern interpretation of how we once built.



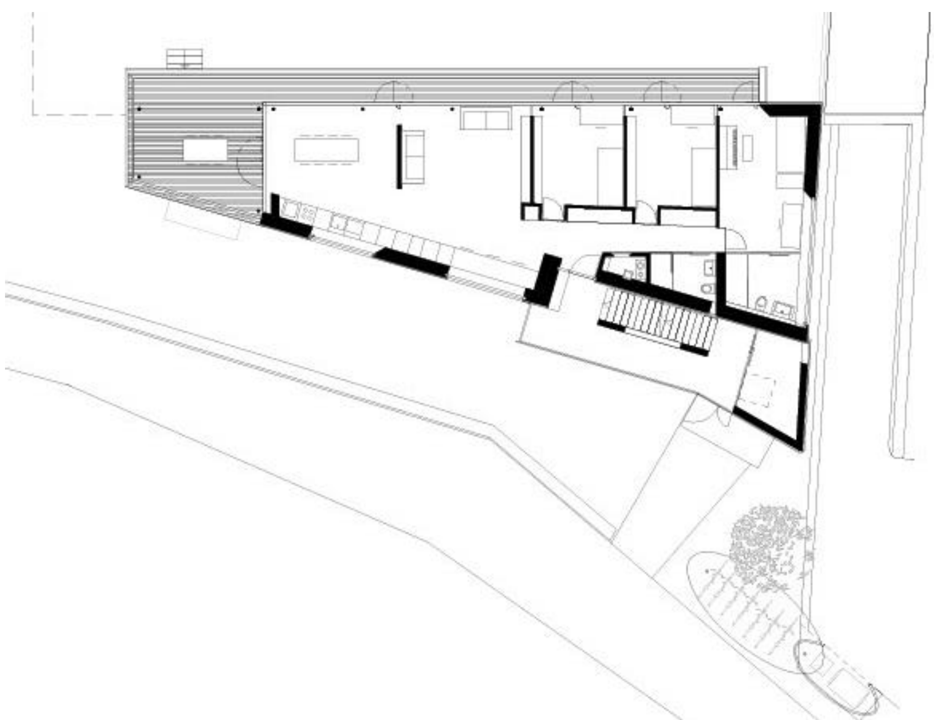
3rd floor plan, courtesy Fres Architectes

Gebhartstrasse, Köniz

Photo: Christine Blaser, courtesy Halle 58

building parcel: 802 m²
total floor area: 551 m²
nr. of units: 3
nr. of storeys: 3
year built: 2006
mixed uses: no
accessible: yes
building form: open
situation: suburban
architect: Halle 58, Bern

Gebhartstrasse is a 3-storey cohousing self-developed and co-designed by its residents, situated just outside of Bern, Switzerland. The building features 3 stacked flats, with nearly identical 3-bedroom units. An external stair and elevator core are situated to the side and set outside of the thermal envelope. This ensured incredible compactness, and was critical to the project's success, Switzerland's first Minergie-P (*Passivhaus*) building. There is ample daylighting, due to the narrow depth, well positioned windows, and open space around it. Cross ventilation is also possible. The building also features generous balconies, a small roof deck, and dynamic external shades to reduce solar heating in summer. It is another form of housing that is incredibly common in outer urban areas of European cities.



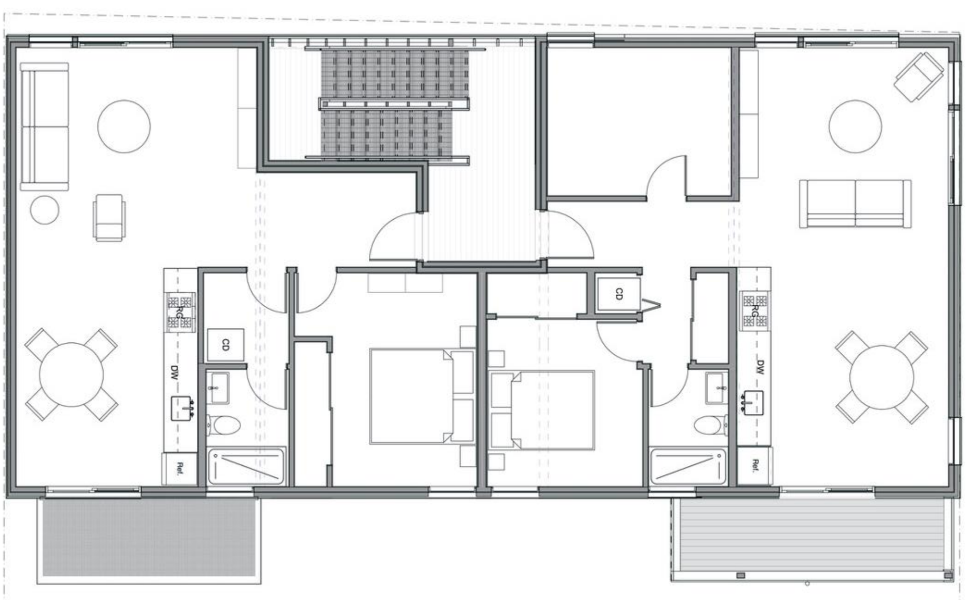
1st floor plan, courtesy Halle 58

Fir Street Flats, Bothell

building parcel: 245 m²
total floor area: 353 m²
nr. of units: 4 (3 homes)
nr. of stories: 3
year built: 2019
mixed uses: yes
accessible: no
building form: open
situation: urban
architect: Cary Westerbeck

Photo: Will Austin, courtesy westerbeck architecture

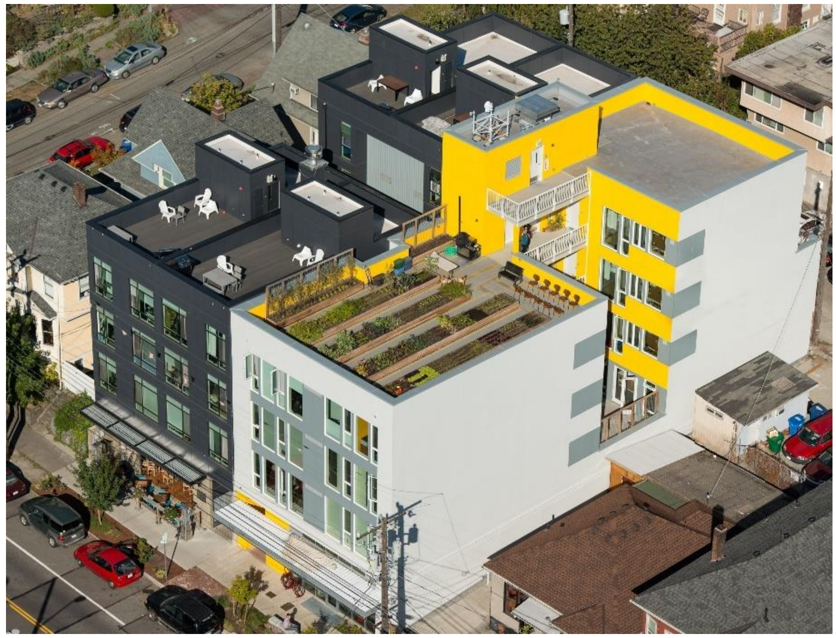
Fir Street Flats is a 3-storey, mixed use Point Access Block situated in downtown Bothell, just outside of Seattle. Construction is a hybrid of wood framing and steel. The vertical access for the building is a central exterior stairway, with 3 units of differing sizes above grade. In the U.S., buildings three storeys or lower do not require an elevator. The ground level features a small commercial space, presently a popular barber shop, and building amenity space. Units range from one to three bedrooms. The exterior stairway is a design feature in this project, acting as a transparent foil to the solid massing. The project was designed and developed by Cary Westerbeck of westerbeck architecture. It is a great example of how this scale of project can add housing and neighborhood amenities on small urban lots.



2nd Floor Plan, courtesy westerbeck architecture

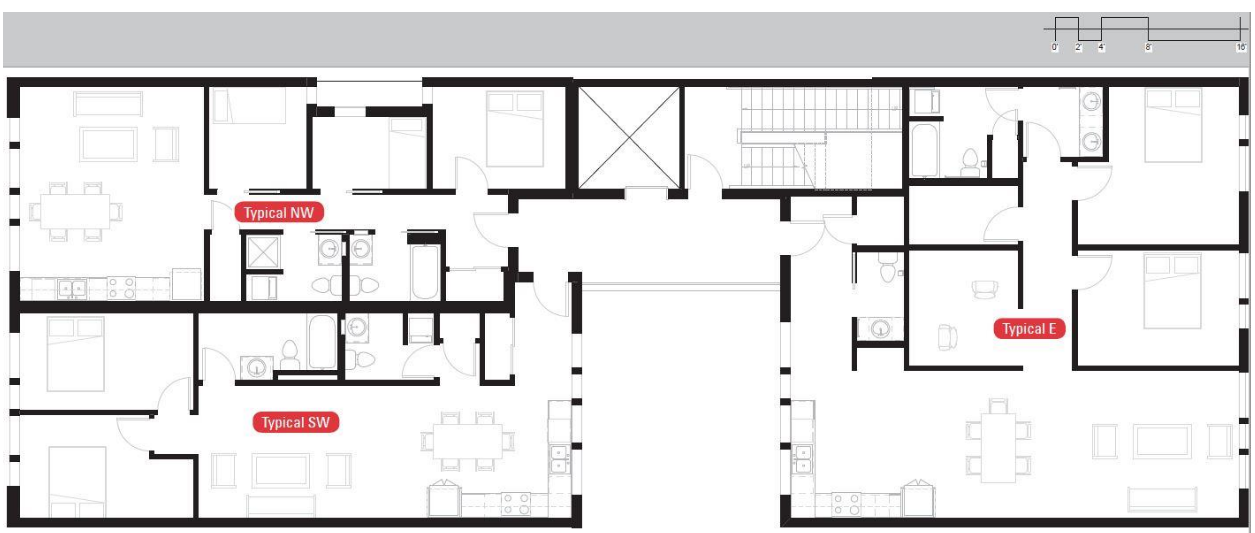
Capitol Hill Urban Cohousing

building parcel: 450 m²
total floor area: 1,800 m²
nr. of units: 9
nr. of stories: 4-5
year built: 2016
mixed uses: yes
building form: closed
accessible: yes
architect: schemata workshop



Building aerial, photo: William Wright, courtesy schemata workshop

Capitol Hill Urban Cohousing is a mixed-use urban infill in Seattle, with 9-units, a "community room", and ground level commercial space accessed from the street. The units are all double aspect flats, with sizes ranging from 2- to 3-bedroom. The single stair and elevator core are situated in the middle of the building, opening to a courtyard with balcony access to units. This arrangement is similar to urban housing found in the historic cores of many cities, allowing for narrow buildings with adequate daylight and cross ventilation. This multigenerational project was designed and developed by the residents, and incorporates solar panels, a roof garden and patio for community gatherings. Community has played a central role for this building though the pandemic, allowing residents to get groceries, cook, commune, and look out for each other.

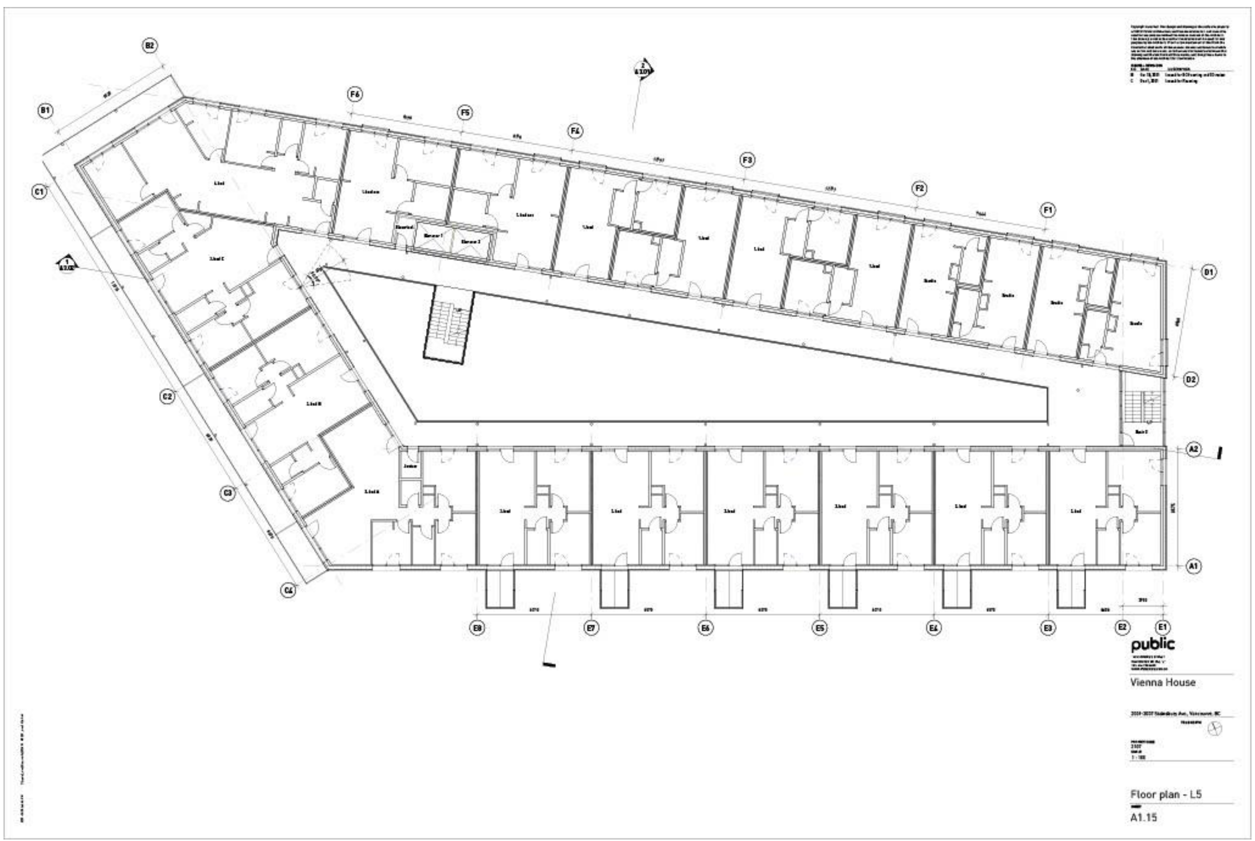


3rd Floor Plan, courtesy schemata workshop

Vienna House

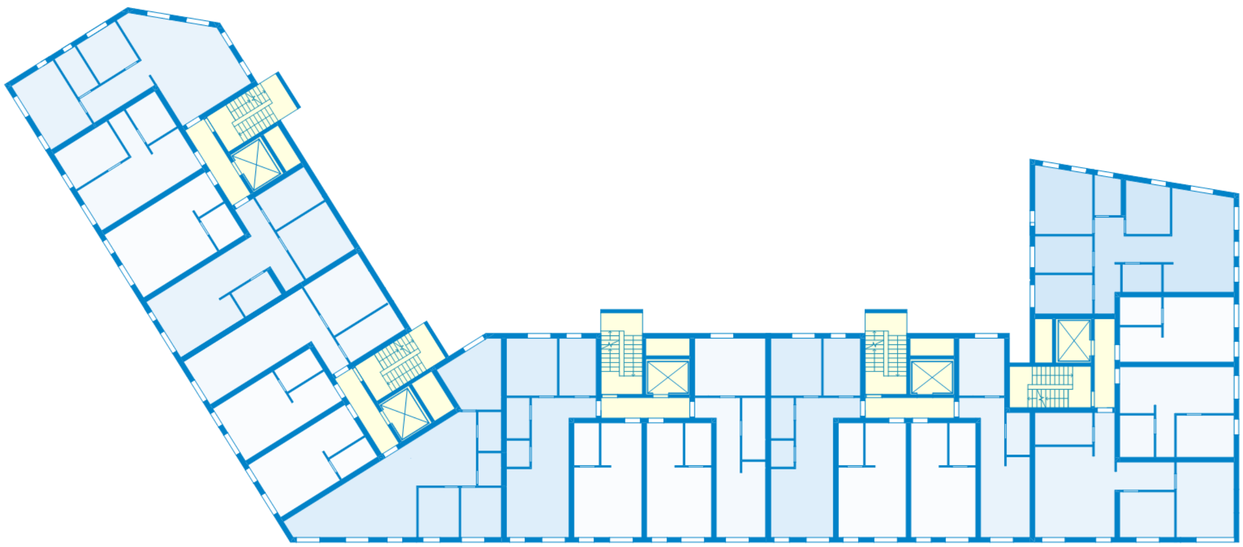
Christopher Higgins connected us with PUBLIC: Architecture + Communication, the architects of Vienna House, to compare what the plan and massing for Vienna House might look like in Europe. Vienna House is an innovative 7-storey affordable housing project located in East Vancouver, currently in planning, that will include 101 homes plus amenity spaces. It will utilize prefabricated wood components and is targeting Passivhaus, an ultra-low energy building standard. The project is a Single Loaded Corridor with an internal courtyard and circumnavigating exterior passageway. There are two central elevators, and two stairways distributed at opposite ends of the courtyard. This configuration results in double aspect units, with daylight on multiple sides and allowing for cross ventilation. Some jurisdictions charge the exterior passageway against Floor Space Ratio, as is the case with this project.

This comparison is not meant as a critique of Vienna House, a project whose goals and design are incredibly laudable, but rather to show what this project might look like in a European context, where codes allow multiple Point Access Blocks per parcel. it is difficult to get a 1:1 comparison given the constraints and dimensions of the site and our limited familiarity of the project. We evaluated it as though the 6th level was typical of all levels. This storey consists of twenty units of varying size, from studios to four bedrooms. It should be noted that our calculations are schematic in nature. The German Inspired approach is not legal in Canada at this time, and so the differences are only theoretical.



Vienna House schematic design floor plan, courtesy PUBLIC: Architecture + Communication

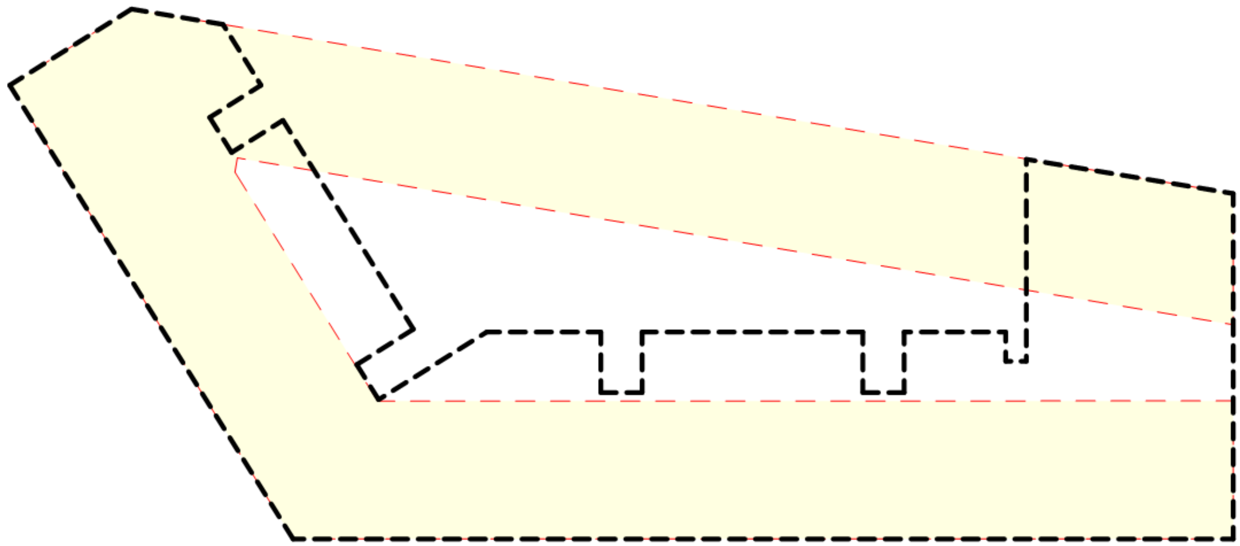
The 'German Inspired' redesign consists of five connected Point Access Blocks, with four units per stairway. We have positioned the stairways outside the thermal envelope, similar to the original design. Each stairway accesses a protected corridor that adjoining units are accessed from, as well as the elevator. The number, size and type of units is intended to correlate with the original design. Due to the existing site geometry, there is weirdness that would be designed out in a typical schematic design process. The number of elevators is increased by three over the original design, ensuring every unit can be reached by wheelchair. Only half of these units have cross ventilation and daylight on multiple sides, a departure from the original design. With additional work, we believe it would be possible for all units to have those features.



'German Inspired' Vienna House with Point Access Blocks, Larch Lab

The 'German Inspired' re-design has some very interesting results. We calculate a **21.9% decrease** in charged Floor Space Ratio for the re-design (1,348 m² v. 1,726 m²). The footprint of the thermal envelope, a closer comparison to the as-designed Vienna House's built area, is a **14,6% decrease** in area for the re-design (1,218 m² v. 1,427 m²). We also calculated surface area of both designs. In calculating the vertical surface area of the re-design (perimeter of thermal footprint * 18 m height), there is considerable reduction over the original. The Point Access Block re-design represents a **22,6% decrease** in façade area (4,680 m² v. 6,048 m²), The courtyard scheme does have significantly more façade area than the German Inspired scheme, due to the single loaded corridor access. Were Point Access Blocks legal, we believe significant cost savings could be realized with this reduction in façade area.

The re-design has a **7,8% decrease** in compactness (surface area/volume, 0,32 v. 0,347), which has the benefit of making it slightly easier to achieve Passivhaus. This could also result in the reduction of insulation thickness or a less stringent window specification, further reducing envelope costs. While the redesign does have the added cost of three additional elevators and three additional external steel stairways – the redesign eliminated the 270 m² external passageway that circumnavigates the above grade levels of the courtyard. In looking solely at circulation area, the redesign represents a **35% decrease** (175 m² v. 270 m²).



Thermal Footprint Overlay (yellow original, heavy dashed line is redesign), Larch Lab

We believe that if connected Point Access Blocks were legal in Canada, buildings like Vienna House could be planned and constructed for less cost and in a manner that significantly reduces carbon emissions due to the compactness and high floor plate efficiency. This would result in buildings that are also more energy efficient, requiring smaller mechanical systems and less energy to heat and cool, offering the potential for further operational carbon savings.

The reduction in building footprint comes with a corresponding increase in outdoor amenity space for gardens, terraces, playgrounds, and courtyards. Multiple Point Access Blocks would also give residents significantly less distance from the elevator or stairway to their front door, in addition to allowing units to be accessed without exposure to weather.

05 Summary

Point Access Blocks are the basic building block of urbanism around the world, spanning back centuries, through today, and into the foreseeable future. They are found in cities that have suffered significant fire and seismic events, from the smallest villages in Switzerland, to the bustling center of Tokyo.

They offer a level of flexibility and innovation in multifamily housing design that is largely missing in the North American context, especially on small parcels. Point Access Blocks are more adaptable and resilient to climate change, more energy efficient, and more spatially efficient than most other buildings. While construction practices for low-rise and mid-rise multifamily buildings in Europe and Japan has historically been very different than Canada, the rise of innovative products like Cross Laminated Timber, which can easily meet a 2-hour fire rating, offers an opportunity to revisit outdated fire and building codes.

Recommendations

As Vancouver looks for ways to build more affordable housing, it should evaluate how to make small lot multifamily housing economically feasible. We believe, after discussions with local professionals working at this scale, there could be several opportunities in Vancouver with adopted regulations like Germany or Seattle. ***We recommend the following actions to facilitate the adoption of Point Access Blocks:***

The City of Vancouver is unique in British Columbia, in that it has the authority to adopt its own Building By-Laws. A code modification would be needed for this form of development as it is a departure from what is presently allowed. This change should be made in conjunction with fire officials, and we believe there could be interest in discussions at the Federal or Provincial level for facilitating these changes.

After discussion with Conrad Speckert and others, ***we recommend an incremental approach to legalizing Point Access Blocks***, allowing up to three or four storeys to match or slightly exceed the limits for Part 9 buildings like townhouses. Over time, as code officials and fire departments become accustomed to this building type, allowing additional floors could be codified. This is the sweet spot for Missing Middle and small lot mid-rise housing and could unlock new opportunities the current code stifles.

Knowledge share is critical to facilitate these changes. This could include discussions and roundtables with Fire and Building Code professionals from Vancouver and other countries, to understand what is possible. Given its long history in firefighting and innovation in architecture, Germany's regulations on egress and compartmentalization could be an excellent model for adopted changes. Seattle's regulations could also prove relevant given proximity and similar seismic issues.

Educating professionals and the public should be a priority. There are many misconceptions around the egress of Point Access Blocks, despite a long safety record across many countries. One approach could be a study looking at the data around fires and life safety of small-scale multifamily buildings. Another could entail dialogues and events with architects from cities like Tokyo or Paris who have been designing and working on Point Access Blocks most of their career. Vienna may be an ideal partner, given its long history of Point Access Blocks and affordable housing, in addition to the City of Vancouver's relationship with Vienna House/Vancouver House. It would also be an opportunity for community land trusts, cooperatives, and other groups to discuss the types of housing formations this could foster.

A design competition can be another tool for expanding awareness of the concept, with a brief to get teams of small-scale developers, architects, and planners thinking about how this housing type could be applied in certain neighborhoods or on typical parcels. This approach could be much like the Urbanarium's 2018 Missing Middle Competition, which resulted in several recommendations for the City of Vancouver that are also relevant to this concept.

Lastly, ***Point Access Blocks are one of those policies that pairs well with other climate actions.*** One aspect that makes Point Access Blocks so livable in other cities, is that a sizeable portion of the building parcel is reserved for common outdoor space – yards, gardens, and even playgrounds. This necessitates either underground parking, which has a very high carbon footprint, or nudging residents towards a car-optional or car-free life. Many newer multifamily buildings of this type have large bike garages, or bike rooms for secure storage. A model of family-friendly, low-carbon living could be achieved through policies such as the relaxation of parking requirements and exempting bike storage from Floor Space Ratio calculations. This is a larger discussion about sustainable mobility, with significant impacts on the success of these buildings.

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