public

SINGLE STAIR RESIDENTIAL BUILDINGS

BC HOUSING BUILDING EXCELLENCE RESEARCH & EDUCATION GRANT

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> “Point access blocks are the fundamental building block of cities the world over—whether in new construction or existing. That fine-grained nature of cities that urbanists, planners, and politicians claim to love, but it is effectively illegal under our building codes.” —MICHAEL ELIASON, LARCH LAB

PHOTOGRAPHS ON COVER AND PAGES 5 AND 41 BY ANDREW LATREILLE.

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RTA QS

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INTRODUCTION

Current building code requires two staircases in residential buildings above two storeys. Single-staircase solutions exist that will address safety issues, enhance livability, and create more homes. This comparative study presents alternatives for typical Metro Vancouver scenarios.

When thinking about the challenge of providing enough housing to meet the growing needs of Canadian cities and towns, an examination of the number of staircases in an apartment building may seem like a peripheral or even irrelevant issue. However, regulations often shape our built environment in subtle but powerful ways and the building code is no different. As we will see, Canada is an outlier with one of the strictest limitations on small apartment buildings in the world which has led to some missing tools in the housing toolbox.

The primary purpose of this study is to explore current and possible building typologies, discussing the pressing challenges of housing affordability, limited housing options, and the notable scarcity of developable land in urban environments, with a specific focus on the Metro Vancouver area. The phenomenon of the 'Missing Middle' in Vancouver, which signifies a gap in affordable and diverse housing options for middle-income households, especially in densely populated urban neighborhoods, underscores the urgency of this exploration.

In urban areas like Vancouver, where available land for development is increasingly scarce, there is a critical need to optimize the use of existing spaces. The proposed amendments to the National Building Code, which consider allowing multi-unit residential buildings with single egress up to six storeys, represent a strategic endeavor to address these challenges. This initiative aims to expand the housing market by introducing a broader spectrum of housing typologies while enhancing affordability and accessibility.

Significantly, these proposed changes hold particular importance for housing associations and developers working with constrained budgets. By offering the possibility to build efficiently within a limited footprint, these changes to building code can lead to more economical construction projects. This is especially vital in creating affordable housing solutions for a diverse range of residents, contributing to the formation of more inclusive and vibrant neighborhoods.

Moreover, this study intends to facilitate the creation of more diverse neighborhoods. By introducing varied residential building types, it can foster communities that blend different income groups, cultural backgrounds, and lifestyles, thereby enriching the social fabric of the city. The potential for increased density without compromising safety and livability offers a promising avenue to meet the growing demand for housing in urban centers.

Through investigating and proposing these building code changes, the study aims to deliver impactful solutions that address the intertwined issues of housing scarcity, affordability, and diversity in urban areas like Vancouver. The goal is to pave the way for more sustainable, inclusive, and vibrant urban communities, effectively responding to the evolving needs and challenges of urban living.

The main types of apartment buildings—largely determined by fire safety concerns expressed in building code—are the double-loaded corridor, single-loaded corridor, point tower, and point-access block.

APARTMENT BUILDING TYPOLOGIES

Different typologies for apartment buildings are largely a function of circulation—how one moves through the building from the street to the apartment door. Fire safety concerns, expressed in the building codes, play a strong role in shaping the types of residential buildings we see in Canadian cities today.

DOUBLE-LOADED CORRIDOR

In the mid-rise scale (4–6 storeys), apartment buildings designed around an interior corridor represent the most common contemporary type in North America. They are characterized by long internal corridors with exit stairs located at each end to comply with existing building code requirements for two exit paths from every floor area. Apartments are located on both sides of the corridor—hence the term 'double-loaded'.

This configuration is an efficient means of complying with current building codes and often leads to floor plan efficiencies in the 85% to 88% range, particularly for larger floor plans. However, providing two exit stairs becomes increasingly inefficient when looking at smaller lots, so double-loaded corridor type apartment buildings are often best suited to larger sites rather than infill sites in more dense urban areas.

A double-loaded corridor type building with a simple layout can achieve a compact overall form which reduces heat loss through the envelope and promotes energy efficiency in a historically heating-dominated climate like British Columbia. However, this building type has a number of limitations from social and environmental perspectives.

Building depth is typically in the range of 18 to 24 metres which can limit the space available on the site for other valuable functions such as green space or common outdoor space for residents. When developed in proximity to high-traffic streets many units will not have openable windows or balconies that are protected from traffic noise, since most apartments are single-aspect (one exterior face).

Opportunities for natural ventilation are often very limited since the majority of apartments will have windows on only one side, although corner units may benefit from some degree of cross ventilation. Similarly, access to natural light is often compromised, both within the apartments themselves as well as the internal corridor which commonly has no windows and relies solely on artificial light. Summer overheating is also a risk for some units, particularly those that face only south or west and are exposed to significant solar gain without the ability to flush out hot air at night time through cross ventilation.

A further challenge exists in the double-loaded corridor typology concerning social interactions and the quality of shared spaces. Without very careful design, the internal corridors in such buildings typically lack both the space and a welcoming quality that could support casual interaction between residents. Often these corridors become purely transient spaces rather than an opportunity for valuable social mixing between neighbours.

SINGLE-LOADED CORRIDOR

An alternative to the double-loaded corridor typology is the single-loaded corridor, where apartments are located on just one side of a linear corridor - usually in the form of an exterior walkway. This typology is compatible with current building codes in Canada as long as two exit stairs are provided from the walkway. Some buildings in this typology are arranged around a central courtyard where the walkways may form a continuous loop.

Single-loaded or courtyard type projects are typically less efficient than double-loaded corridors—often less than 85% and may have a less compact form factor with a greater area of exterior wall surface. The benefits of this typology include the ability for cross ventilation and daylight from two sides since apartments can have windows facing the walkway and on the opposite side. The external walkway can serve as a more activated social space where neighbours can greet each other in a naturally lit space with views to common outdoor space. The ability to provide two sides of each apartment with windows promotes greater design flexibility than the double-loaded corridor, particularly when incorporating larger units (two-bedroom and larger).

Practical design challenges with single-loaded or courtyard type projects may include maintaining privacy for rooms facing the walkways from passing neighbours, or dealing with snow accumulations in regions with frequent or heavy snowfall.

POINT TOWER

The point tower is a common high-rise residential building type which, in Canada, typically meets the exit requirements of the building code by providing a 'scissor stair' where two separate exit stairs are interlocked as they descend but still maintain smoke and fire separation. A relatively compact core, which includes the stairs, elevators, and corridor, is created at the centre of the floor plan with apartments occupying most or all of the available perimeter.

Point towers are often designed with a broader podium base containing commercial uses or ground-oriented residential units like townhomes, as a way to reconcile the tower form above with the street-level urban grain.

Scissor stairs are prohibited in mid-rise, wood-frame construction by the Vancouver Building Bylaw so they are typically found in concrete apartment buildings of seven storeys or more.

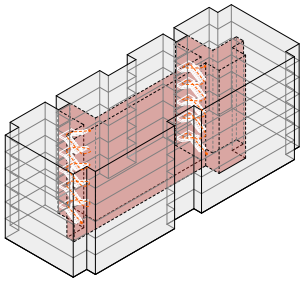
POINT ACCESS BLOCK

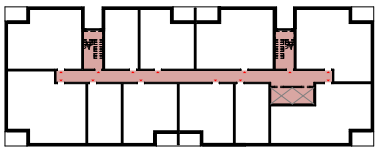
The point access block is a single-stair typology that can be found in one form or another in most cities around the world. The floor plan of a point access block is typically a small number of apartments (e.g. two to four units) arranged around a single stair, with or without an elevator. Rows of point access blocks can be joined together to form a continuous street wall or a single building can be developed as a standalone block, so they represent a scaleable form of development that is suited to incremental development.

The common space can be limited to just the stairway and elevator so point access blocks are capable of delivering floor area efficiency above 90% and can maximize the amount of apartment space in the floor plan. Longstanding building code restrictions on single-exit stair buildings mean that very few postwar examples can be found in Canada or much of the United States (with some notable exceptions).

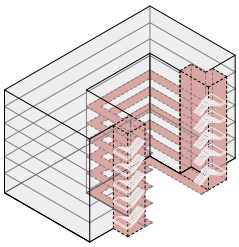
The daylight, natural ventilation and design flexibility benefits noted for single-loaded corridor type buildings can also be realized in point access blocks, without some of the potential privacy and weather exposure challenges. Further, point access block benefits are discussed later in this document.

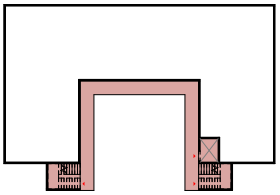
DOUBLE-LOADED CORRIDOR



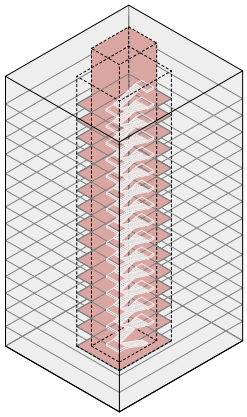


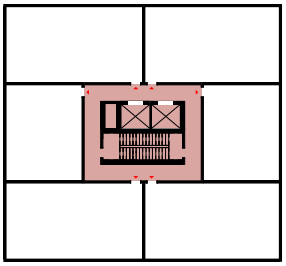
SINGLE-LOADED CORRIDOR



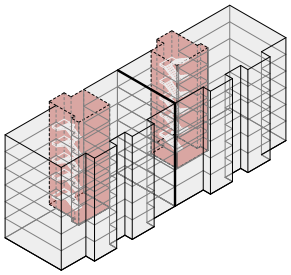


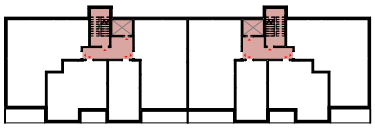
POINT TOWER





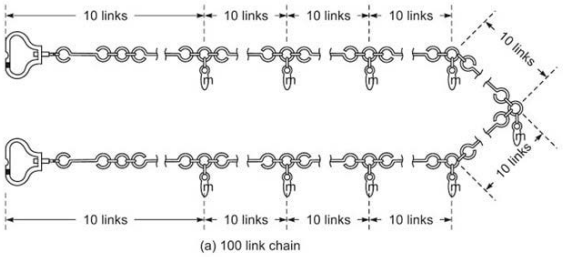
POINT ACCESS BLOCK





SITE DIMENSIONS OF METRO VANCOUVER

The surveying methods used to claim and map the 19th– and early 20th–century property divisions of British Columbia have left a lasting legacy on the urban fabric of Lower Mainland cities. Metal chainsets composed of 100 links were the standard instrument for laying out property divisions at the time. A Gunter's Chain (Edmund Gunter, 1581–1626) was the most common type of chain in use at the time and measured 66ft (22 yards) in length.



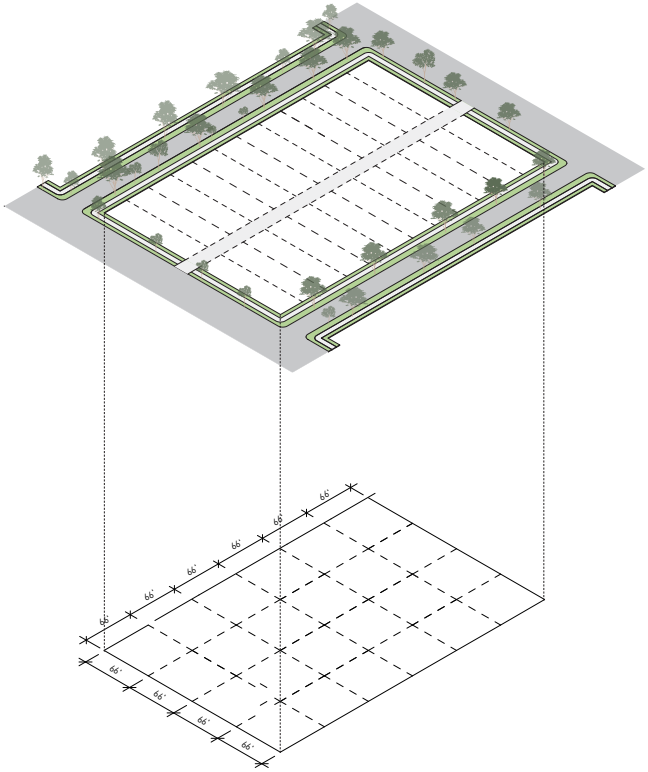
GUNTER'S CHAIN

In Vancouver, streets were laid out as either one or one-and-a-half chains wide (66ft or 99ft), depending on their proposed use or importance. Blocks were laid out as four chains wide and 6 to 8 chains long. A 20ft wide laneways was then added within the block. Individual properties would have one chain of frontage (66ft) but were commonly divided in two to create 33ft wide properties. This process created the most common 33ft x 122ft residential lots found in the City of Vancouver.

An exception to this pattern is lands owned and developed by the Canadian Pacific Railway (CPR). CPR lands were surveyed using a 100ft long Ramsden's Chain, creating a different framework for development. Usually, these properties were then subdivided into 50ft frontages.

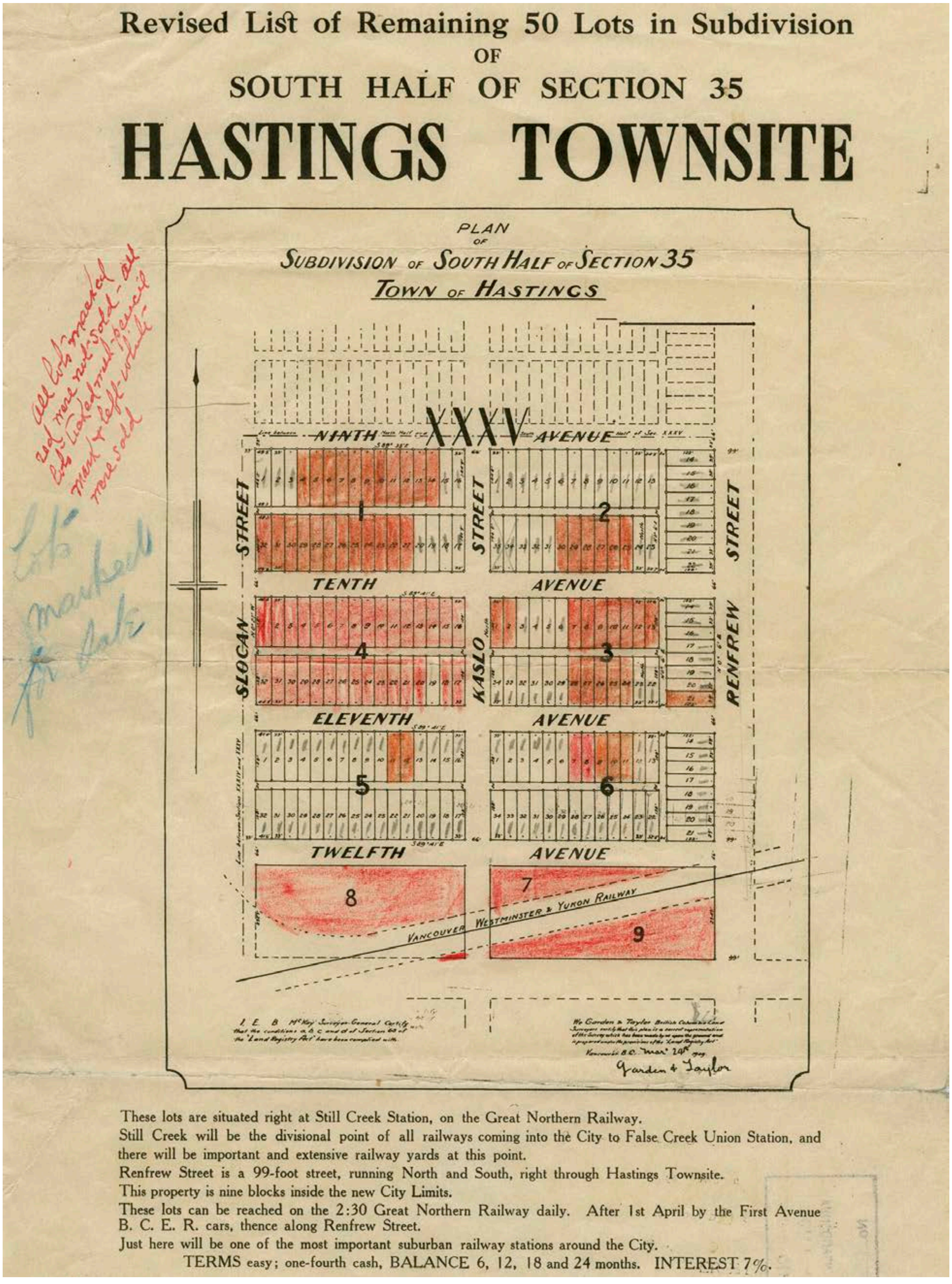
The use of standardized methods of surveying creates a repeating and consistent grid but different subdivisions of properties lead to a range of lot widths from 25 to 50 feet. Lot depths are typically over 100 feet which creates individual lots which are often narrow but deep. Today, re-assembling a significant number of small existing lots is often required in order to develop an apartment building under the existing building code and planning regulations.

1. How Metro Vancouver was Laid Out around Gunter's Chain – Global Civic. https://www.youtube.com/watch?v=AgHVnpv9oJY



METRO VANCOUVER PLAN 66'

IMAGE OPPOSITE: MILLER, JJ. (1909).CARTOGRAPHIC MATERIAL. RETRIEVED FROM HTTPS://SEARCHARCHIVES.VANCOUVER.CA/REVISED-LIST-OF-REMAINING-50-LOTS-IN-SUBDIVISION-OF-SOUTH-HALF-OF-SECTION-35-HASTINGS-TOWNSITE-2


Revised List of Remaining 50 Lots in Subdivision
OF
SOUTH HALF OF SECTION 35
HASTINGS TOWNSITE
PLAN OF SUBDIVISION OF SOUTH HALF OF SECTION 35
TOWN OF HASTINGS
XXXV
NINTH AVENUE
TENTH AVENUE
ELEVENTH AVENUE
TWELFTH AVENUE
SLOCAN STREET
KASLO STREET
RENFREW STREET
VANCOUVER WESTMINSTER & YUKON RAILWAY
Lots marked for sale
Garden & Taylor
These lots are situated right at Still Creek Station, on the Great Northern Railway.
Still Creek will be the divisional point of all railways coming into the City to False Creek Union Station, and there will be important and extensive railway yards at this point.
Renfrew Street is a 99-foot street, running North and South, right through Hastings Townsite.
This property is nine blocks inside the new City Limits.
These lots can be reached on the 2:30 Great Northern Railway daily. After 1st April by the First Avenue B. C. E. R. cars, thence along Renfrew Street.
Just here will be one of the most important suburban railway stations around the City.
TERMS easy; one-fourth cash, BALANCE 6, 12, 18 and 24 months. INTEREST 7%.

Point access blocks—not currently permitted by Canadian building code—are one of the most prevalent residential building types in cities around the world.

INTERNATIONAL CONTEXT

Point access blocks with a single staircase are a prevalent way of designing multi-unit residential buildings around the world. The mid-rise urbanism of cities like Berlin, Paris and Barcelona is characterized by entire city blocks of several single stair buildings arranged in courtyard configurations.

Building code requirements and firefighting practices vary significantly around the world, and so does each jurisdiction's attitude to the use of a single-exit stair. With regard to the permitted building height of a single-exit-stair building, Canada is something of an outlier amongst developed nations, with a maximum limit of two storeys in all cases. In terms of apartment-building design this height limitation is, in practical terms, a total prohibition on point access blocks which steers developers and design professionals towards other building typologies discussed earlier.

A jurisdictional scan of more than 30 building codes of other countries shows that Canada is, with the exception of Uganda, the most restrictive country as a measure of the maximum building height with a single staircase[1].

Switzerland and South Korea do not specify any maximum building height, instead placing limits on the floor area, travel distance, number of dwellings and number of occupants served by the single stair. Many jurisdictions also require additional fire suppression and smoke control measures to protect the integrity of the single exit in high-rise buildings. Germany allows for both office and multi-unit residential buildings of up to 22 metres (7 storeys) in height to be served by a single stair, with additional fire safety measures increasing the maximum height to 60 metres (20 storeys). Australia and New Zealand allow one exit for apartment buildings up to 25 metres in height (8 storeys) where fire sprinklers are provided and up to 10 metres in height without sprinklers.

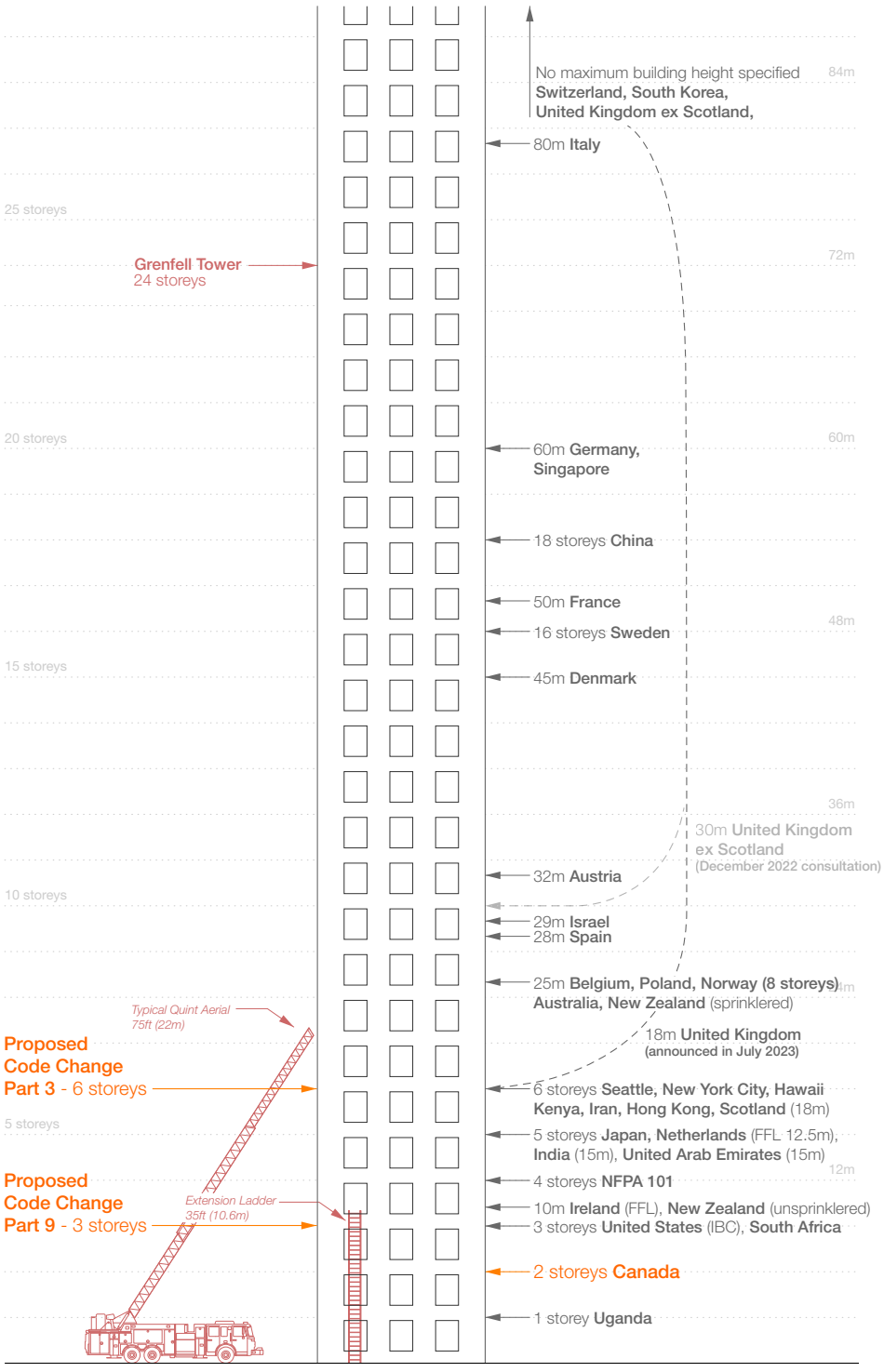
Until 2023, the UK did not establish a maximum height for residential buildings with a single staircase and relied on a "stay-put" evacuation strategy. Following the Grenfell Tower high-rise fire, the UK government consulted on a maximum height of 30 metres for single stair buildings, superseded by the recent announcement of 18 metres. This will make the United Kingdom significantly more restrictive than most of mainland Europe.

Across the United States, single-stair apartment buildings are permitted up to three storeys in height with a maximum of four dwellings per storey. The National Fire Protection Association's model code also allows up to four storeys and the State of Hawaii, New York City and City of Seattle allow up to six storeys.

Despite the widely differing code requirements for single-exit-stair buildings between all these countries we can observe that it is generally not a case of a differing attitude to fire risk or a case of countries with lower height limits for single-stair apartment buildings being associated with the best fire safety outcomes. Many of the countries which permit single-stair apartment buildings over ten storeys have equivalent, or better, mortality rates from fire than that of Canada and the United States[2].

The architectural journals of the world are brimming with compact and elegant mid-rise apartment buildings in vibrant urban areas which, unfortunately, have floorplans that are illegal to build anywhere in Canada regardless of any mitigating safety features that could be applied.

1. Speckert, C. (2023). Jurisdictions. https://secondegress.ca/Jurisdictions
2. Our World In Data (2019). Death rate from fires and burns, 2019. https://ourworldindata.org/grapher/fire-death-rates



Maximum Height for Single Staircase Buildings
multi-unit residential occupancy only

Note: the drawing assumes a floor to floor height of 3m

FFL = uppermost finish floor level

IMAGE: SPECKERT, C. (2022). JURISDICTIONS: MAXIMUM PERMITTED HEIGHT FOR SINGLE STAIR BUILDINGS [INFOGRAPHIC]. MCGILL SCHOOL OF ARCHITECTURE. RETRIEVED FROM HTTPS://SECONDEGRESS.CA/JURISDICTIONS

NORTH AMERICAN POLICY IS CHANGING

In the United States, the International Building Code (IBC) is the model building code on which local codes are based. The IBC is marginally more relaxed about single-exit stair apartment buildings in that it allows three storeys to be served by a single stair[1]. However, several jurisdictions in the US have already adopted, or are planning to adopt, local changes to their building codes to facilitate the greater use of point access blocks as a housing type in their towns and cities.

At the city level, New York and Seattle both have existing provisions for six-storey, single-stair apartment buildings. In the case of Seattle, this policy has been in place since 1977. Specifically, it allows six-storeys with a maximum of four apartments per floor to be served by a single stair and requires that the stair be pressurized and separated from a corridor in which the suite entry doors are located[2].

In 2018, the State of Hawaii added permissions for single-stair residential buildings up to six storeys in height[3]

2023 has seen significant movements towards the adoption of code reform on the West Coast with state-level policies emerging in Washington, Oregon, and California.

In Washington state, the legislature passed a bill to recommend modifications to the International Building Code (IBC) which would allow single-exit stair residential buildings up to six storeys in height[4].

In Oregon's state senate, an amendment to their affordable housing bill was brought forward in 2023 which proposes updated, local, building codes that allow single-stair residential buildings up to six storeys in height with requirements that closely align with Seattle's existing single stair code[5].

In California, the state assembly passed a bill in 2023 to direct the State Fire Marshall to research standards for single-stairway apartment buildings greater than three storeys and to report on fire and life safety considerations[6].

1. International Code Council. (2021) Chapter 10 - Means of Egress. Retrieved from https://codes.iccsafe.org/content/IBC2021P2/chapter-10-means-of-egress#IBC2021P2_Ch10_Sec1006.3.4.
2. Speckert, C. (2023). Seattle Building codes - Second Egress. Retrieved from https://secondegress.ca/
3. Hawaii State Building Code (2018). Retrieved from https://codelibrary.amlegal.com/codes/honolulu/latest/honolulu/0-0-0-14009?fbclid=IwAR24kHU1ZsmJN_mXmTt1eNYWd1y3Y7fGDLJ2Jm5G5sR2ALXygJIGMMB5pXc
4. Washington State Legislature - Bill Summary for Bill Number 5491 (2023). Retrieved from https://app.leg.wa.gov/billsummary?BillNumber=5491&Year=2023
5. Oregon Legislative Information System - Proposed Amendments for SB847 (2023). Retrieved from https://olis.oregonlegislature.gov/liz/2023R1/Measures/ProposedAmendments/SB847.
6. California Legislative Information - Bill Information for AB 835 (2023-2024 Regular Session). Retrieved from https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB835

IMAGE OPPOSITE:13TH AVENUE APARTMENTS, 1821 13 AVENUE, CAPITOL HILL, SEATTLE, WASHINGTON | COMPLETED IN 2023 | B9 ARCHITECTS


1821

POINT ACCESS BLOCK BENEFITS

DEVELOPMENT

The point access block is one of the most-spatially efficient forms for developing high quality urban housing. The common areas (stair, elevator) can occupy as little as 6% of the floor area, leaving the remainder as saleable/rentable floor area. This efficiency is not achieved at the expense of design quality but simply a result of the single-stair and compact circulation.

Point access blocks can provide an opportunity to develop high quality apartments while also efficiently utilizing the site area. Significant design flexibility is afforded by not needing to bisect the floor plan with a corridor to a second stair, and larger apartments can be accommodated in the floor plan without enlarging the common circulation space. The reduced building depth of a point access block (perhaps 12m compared to 18m+ for a double-loaded corridor type) and the ability to bring in light and air from both sides an apartment make it easier to plan space-efficient yet high-quality, family units with two, three, or more bedrooms[1]. Most Canadian cities are struggling to build enough housing and are particularly lacking in appropriate family housing.

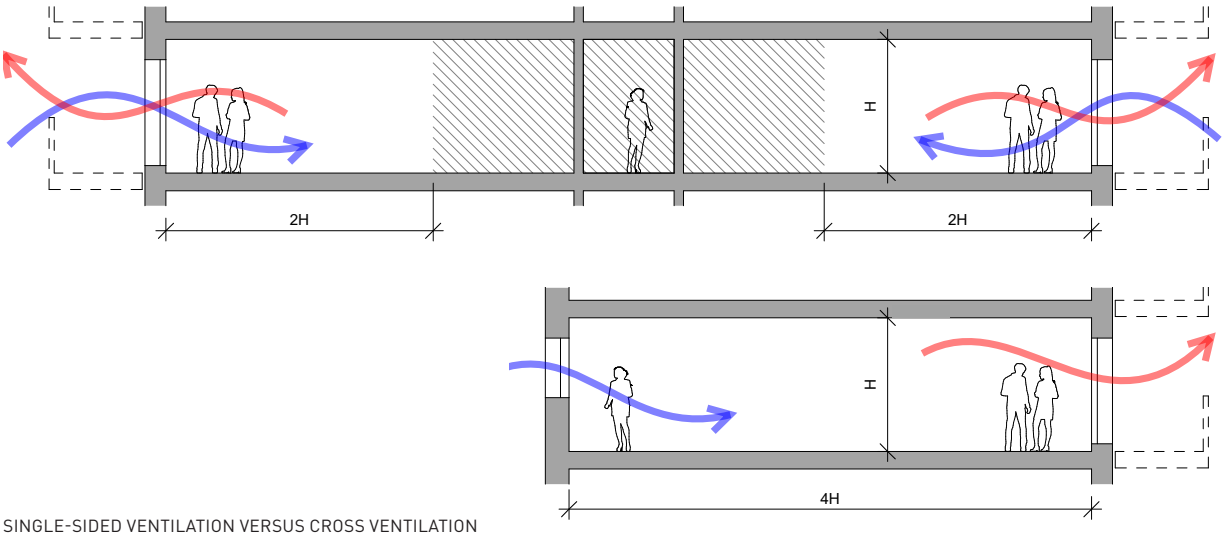
Mid-rise apartment buildings with two exit stairs are at their most efficient on relatively large sites. In the context of Metro Vancouver this usually requires the developer to combine four or more adjacent lots before design can proceed. The consolidation process can take significant time and impose upfront cost and risk on the project. Point access blocks, with their compact circulation cores, can be applied equally efficiently on a single lot or connected in a row so they offer an incremental or scaleable form of development rather than the all-or-nothing strategy needed by other typologies.

Single point access blocks can be created as infill projects on individual residential or commercial lots and can 'unlock' significant numbers of properties that are currently deemed too small or constrained for new development under the code requirements for two exit stairs.

LIVABILITY

Delivering high quality urban housing requires that more units of housing be provided in existing communities close to jobs and services and with sufficient density to support these activities and to prevent sprawl. The challenge of designing and constructing housing in urban areas involves recognizing and addressing the needs of residents in terms of space, comfort, light, air, privacy, and accessibility. The point access block can be a useful tool for providing apartments that meet these needs.

Providing respite from urban noise is very challenging for many new apartment buildings as they tend to be located on or near high traffic streets. A single-stair building typology creates a broad range of options for apartment layouts,



SINGLE-SIDED VENTILATION VERSUS CROSS VENTILATION

including dual-aspect units which may have their living space facing a street but bedrooms facing a quieter interior portion of the city block.

In terms of accessibility, point access blocks can offer reduced travel distances from apartments to the elevator and the greater design flexibility could be leveraged to incorporate accessible unit layouts.

Social isolation is a significant problem in many cities and many of our apartment buildings lack strong connections between neighbors. Point access blocks generally have between two and four apartments on each floor. This smaller scale of development could help to foster personal relationships between immediate neighbors. Whereas, the double-loaded corridor building type sometimes occupies a whole block with a single entry door serving a large number of apartments, point access blocks offer an alternative scale of development that forms a greater number of smaller neighbor groups. Think of the large electronic resident directory at the front door of a modern point tower with dozens of names compared to the small printed nameplates of apartment buildings in older cities.

CLIMATE

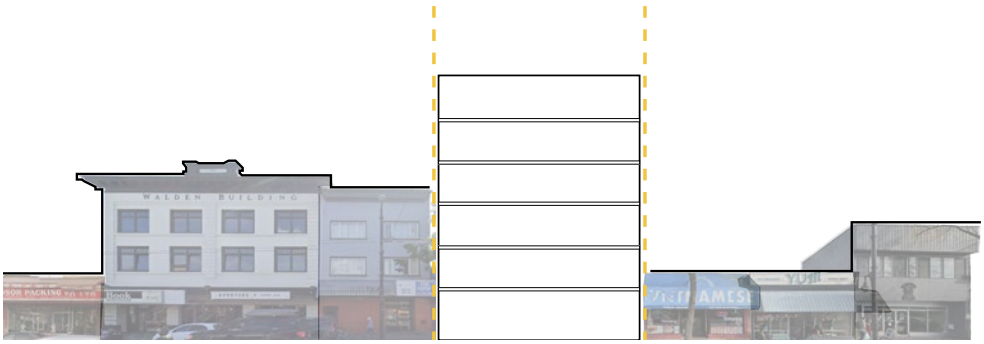
The reduced building depth and possibility for dual-aspect apartments can also offer improved access to daylight, thereby reducing reliance on artificial light, and improved summer comfort by providing natural cross ventilation to apartments. Housing of this type can be better adapted to our warming climate by reducing reliance on mechanical systems and the electrical grid in favour of a more resilient, passive-first approach. European cities with a prevalence of point access blocks often have significant green space and urban tree canopy within the city block which is made easier with slimmer apartment buildings occupying less of the site area.

URBANISM, STREETS, AND NEIGHBOURHOODS

The prevailing types of apartment buildings in Metro Vancouver (six-storey double-loaded corridor, single-loaded corridor, point tower) are often created with significant consolidation of existing small lots. This can mean the replacement of most of the block and sometimes the displacement of existing businesses, often after a prolonged period of vacancy while City approvals are processed.

The Vancouver Plan identifies numerous 'Neighborhood Centres' across the City which are often characterized by much-loved low rise commercial storefronts establishing a fine urban grain. Developing new housing in these areas using existing typologies has the potential for significant disruption of vibrant urban centres. The smaller footprint of a point access block can be inserted as an infill project within an existing city block without the need for consolidation of numerous sites. New housing can then be introduced incrementally over time when sites are developed one or two at a time, as an alternative to wholesale redevelopment of the block.

1. Smith, Stephen (3 May 2023). Why we can't build family-sized apartments in North America (https://www.centerforbuilding.org/blog/we-we-cant-build-family-sized-apartments-in-north-america). Center for Building in North America.
2. Vancouver Plan (23 Sep 2022). https://vancouverplan.ca/. City of Vancouver.



INFILL AND INCREMENTAL DEVELOPMENT

BUILDING CODE ANALYSIS

EXISTING CODE CONTEXT

The National Building Code of Canada is a model code on which local codes such as the BC Building Code and Vancouver Building Bylaw are based. The first edition of the NBC in 1941 permitted up to three storeys of non-combustible construction to be served by a single exit, which was later decreased to two storeys with a reduced floor area permitted.

For residential buildings in Canada, Part 3 of the Building Code sets the life-safety requirements for buildings over three storeys or more than 600 m² in building area (essentially the footprint area of a building). Specifically, Article 3.4.2.1 contains the text that sets the two-storey limit for a residential building having a single-exit stair.

The requirement for two exits has remained in subsequent versions of the NBC right up to the current 2020 edition. During the intervening years significant improvements to building fire safety have been introduced to the code, such as widespread use of sprinklers in residential buildings, improved fire alarm systems and improvements to fire-resistive materials. Nevertheless, the requirement for two exits for buildings over two storeys high has remained largely unchanged.

FIRE IN A SINGLE-STAIR BUILDING

When a fire is detected in an apartment building (either automatically or by a resident activating a pull-station) and the central, fire alarm sounds, residents make their way from their apartment, through the corridor, down the exit stairs and to a predetermined assembly area, often in the street. This sequence is generally the same regardless of apartment building type. Virtually all apartment buildings in Canada will have automatic sprinkler protection, where sprinklers in a suite are activated by the heat of a fire. The sprinklers then act to suppress the fire and prevent its spread.

Residents with impaired mobility may be unable to use the exit stairs and typically require the assistance of the fire department in order to exit the building—elevators being typically not intended for evacuation of residents. If the fire is located elsewhere in the building, then their own suite is deemed to be a safe area of refuge where they can await assistance. If the fire originates in their own suite, it is accepted that they can wait on the landing of the exit stairs and that can provide an area of refuge. In high-rise buildings, one or more elevators will be designed so that the fire department can use them to travel up the building and to evacuate remaining residents.

In apartment buildings with two exit stairs, the second exit stair is intended to mitigate the risk that an exit stair, or section of corridor leading to it, is rendered unusable due to smoke or fire. The second exit stair is assumed to increase the probability of evacuating the residents while also allowing access for emergency responders.

In apartment buildings with a single-exit stair, the intent is to provide an equal degree of safety by limiting the number of occupants and apartments served by the single stair and by adding a number of other enhancements to fire resistive materials, smoke control etc.

3.4.2. Number and Location of Exits from Floor Areas

3.4.2.1. Minimum Number of Exits

1) Except as permitted by Sentences (2) to (4), every *floor area* intended for *occupancy* shall be served by at least 2 *exits*.

2) 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.

NBC CODE CHANGE REQUEST 2022

In 2022 a code change request concerning Part 3 of the NBC was submitted to the Canadian Commission on Building and Fire Codes by Conrad Speckert of LGA Architectural Partners, and David Hine of David Hine Engineering Inc. The code change request proposed "additional sentences under NBC Division B Section 3.4.2.1 to introduce single-exit, multi-unit residential buildings of up to six storeys, requiring additional life safety measures and placing limits on the occupant load and number of dwelling units per storey served by the single exit"[1].

1.Speckert, C. (2023). Second Egress. Retrieved from https://secondegress.ca/

The request proposed the following limitations and additional life safety measures for single-stair residential buildings:

- no more than four dwelling units per storey, using Seattle's building code as a precedent
- a maximum floor area of 150m^2 per dwelling unit
- requiring positive pressurization of the exit stair, based on the requirement for smoke control measures in high-rise buildings above 18m in building height
- increased minimum fire-protection rating of dwelling unit entrance doors from a 20 min rating to 45 mins
- requiring a fire alarm system without exception, and requiring automatic monitoring of the fire alarm system

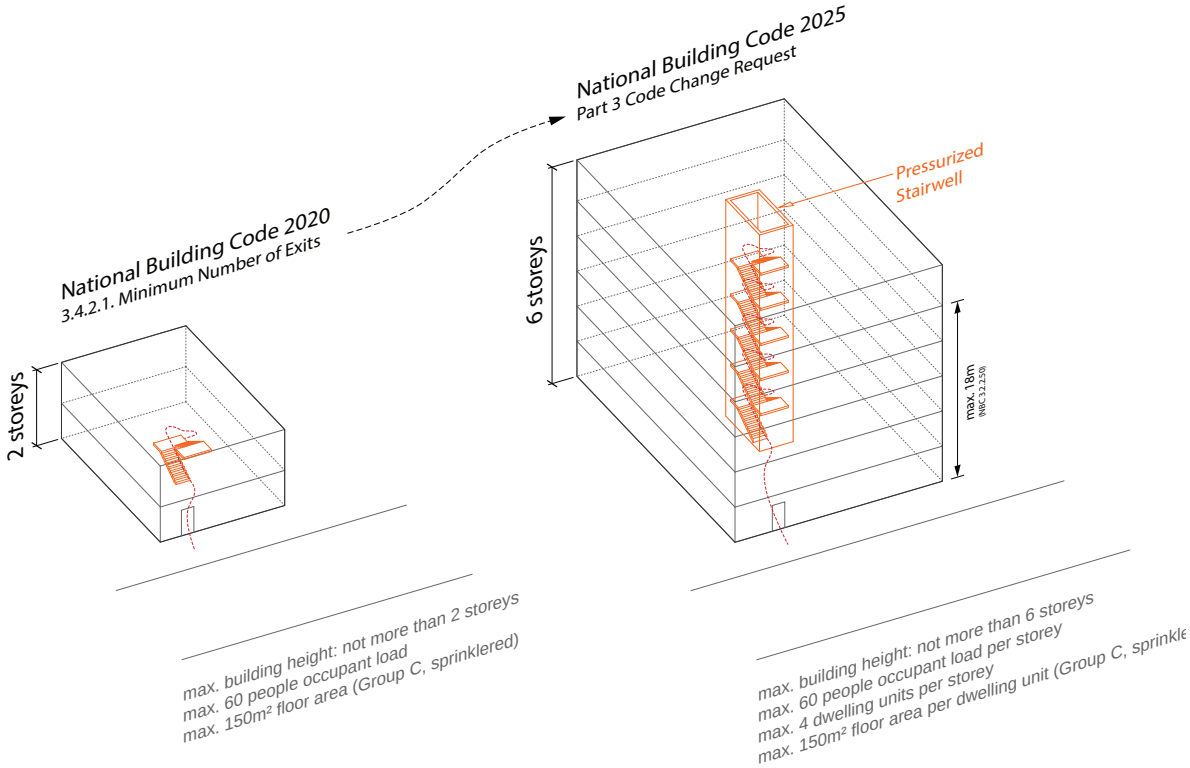


IMAGE: SPECKERT, C. (2022). CODE CHANGE INFOGRAPHIC. MCGILL SCHOOL OF ARCHITECTURE. RETRIEVED FROM HTTPS://SECONDEGRESS.CA/

GHL CODE REVIEW

GHL Consultants has reviewed the 2022 NBC Code Change Request and the single-stair, design scenarios contained in this study and has identified issues which could strengthen the code change submission as well as valuable subject areas for further detailed analysis. Their detailed comments are contained in a letter attached as an appendix to this document.

The maximum number of storeys proposed in the NBC Code Change Request is six, which corresponds with the maximum height for combustible construction in the code. GHL notes that a greater height limit could be considered, with commensurate construction requirements (assembly fire resistance ratings, construction material type, high-rise elevator and smoke control measures etc.). It may be advantageous to consider extending the proposed code change to a 7-9 storey residential building in the future, perhaps of unprotected mass-timber construction. In this case, one could consider the use of the elevator(s) as a second means of egress from the building because fire department access and emergency backup power is already required for elevators in buildings of this height. GHL acknowledges that, politically speaking, six storeys may be a sensible first step for code change in this area.

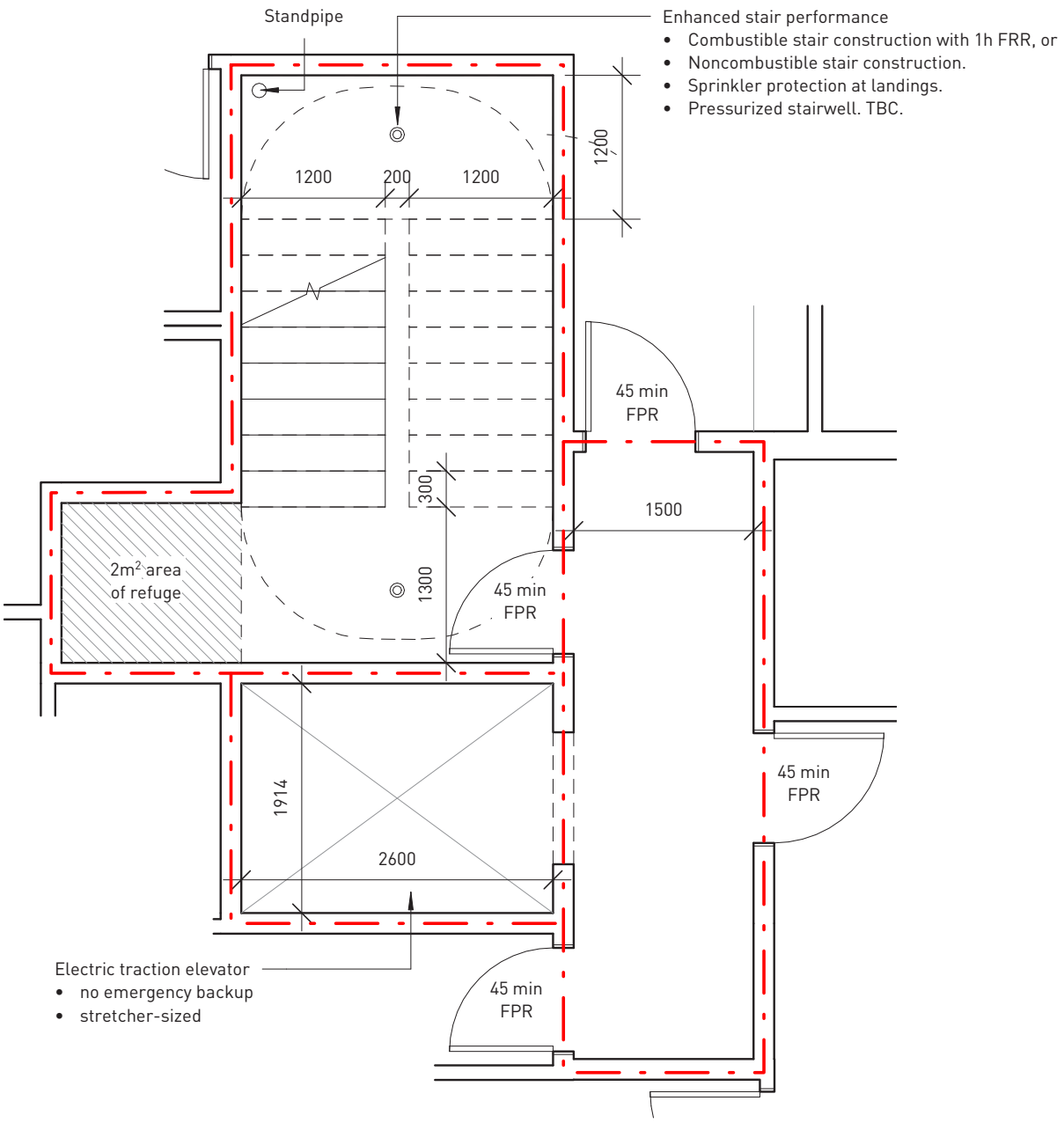
The 2022, code-change request stipulates pressurization of the single-exit stair be provided. GHL is in agreement with this provision for buildings more than six storeys in height but questions it as a requirement for the six-storey limit currently being proposed. For a future seven- to nine-storey, single-stair building, a pressurized stair with a UPS emergency backup could be considered.

As it stands, the Code assumes a single point of egress from residential suites (i.e. the suite entry door). When the single point of egress is compromised, the residential suites are functionally an area of refuge similar to protected accessible floor areas in unsprinklered buildings. To quantify risk to occupants sheltering in place within the residential suites, GHL proposes a probability of failure assessment be undertaken in support of the proposed code change. This would include a study of Canadian sprinkler performance to establish the reliability of a modern, monitored, and supervised sprinkler system. This analysis would be developed and quantified to note that in a sprinklered building the probability of a major fire in combination with failure of a fire department response to clear and make safe an exit stair within a reasonable time is sufficiently low.

In some overseas jurisdictions, evacuation from balconies via truck-mounted ladders is considered as a second means of egress from a residential suite. This requires that suites each have a balcony accessible to a firetruck below. GHL considers this option to be impractical or not reliable in the Canadian context and consequently not beneficial in this discussion. A balcony as an area of refuge to wait for first responders, rather than a point of external evacuation, does remain valid though and is supported by previous National Building Code provisions for unsprinklered high buildings.

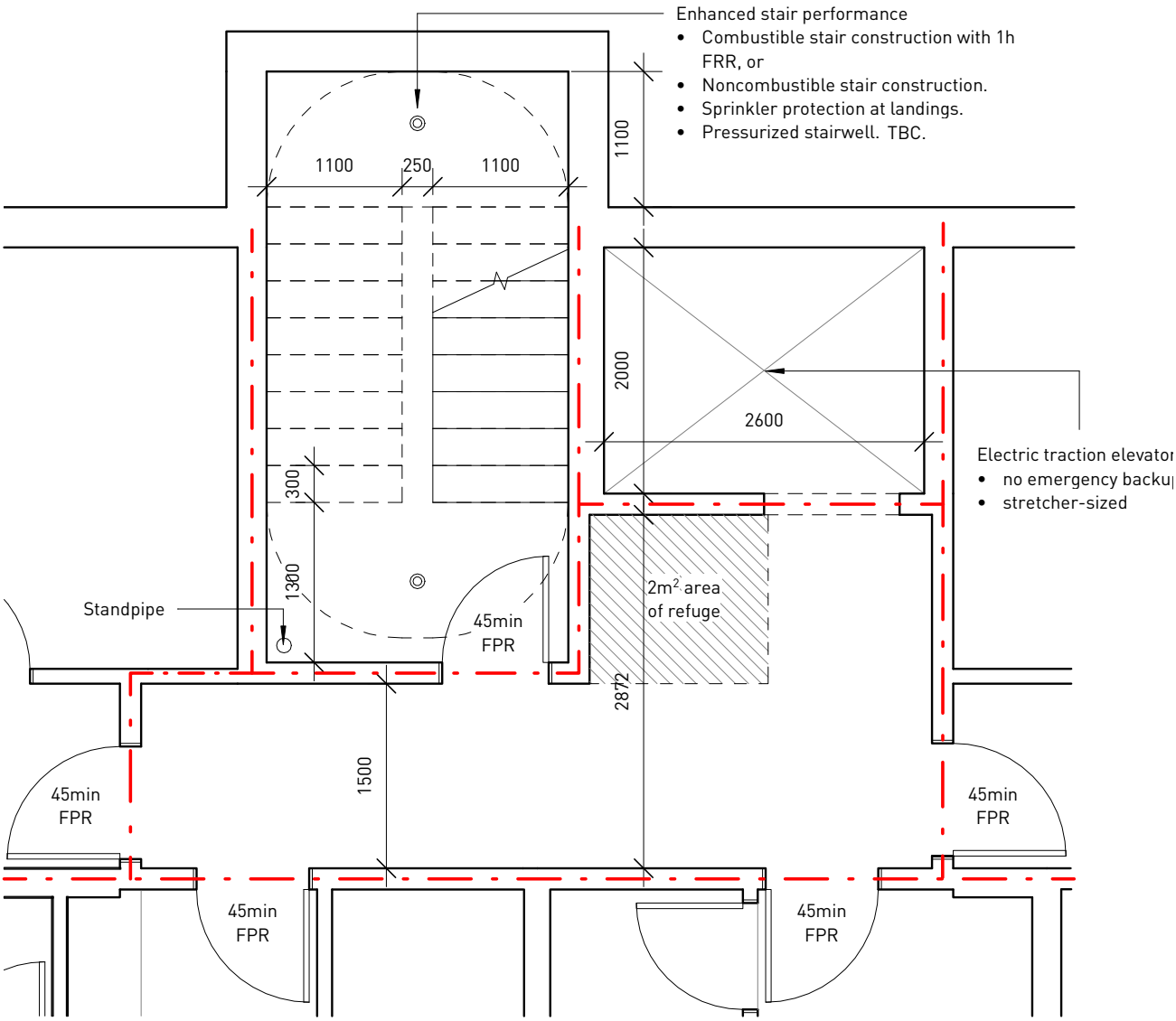
For a person who requires a wheelchair, GHL considers that the proposed code change provides essentially the same level of performance as current Code in event of an emergency, although the second stair does provide options for first responders. As noted above, it is already accepted that the residential suite can provide an area of refuge in event of a fire, or if the fire originates within the suite, then such persons can remain in the stair to await assistance. As part of the proposal for code change, GHL recommends that a defined area of refuge be provided on the stair landing or within the corridor. If the area of refuge is located within the exit stair, then it may not be necessary to increase the fire rating of suite doors which is proposed in the NBC Code Change Request.

Regarding the design of the single-exit stair itself, GHL notes that it may be prudent to require stairs of noncombustible construction (steel treads and risers) or be of one-hour, fire-rated construction. Similarly, and at minimal cost, it is likely advisable to require the stairs be sprinklered at each landing. This would eliminate the risk of fire in the exit stair burning the stairs such that they would not be available after suppression.



INDICATIVE CORE PLAN

1 hr. fire separation



INDICATIVE CORE PLAN

1 hr. fire separation

FUTURE STUDIES

Based on GHL's preliminary review, the following areas of performance-based design are recommended for further study to support code change relating to single-exit stair residential buildings in Canada:

Building Characteristics

Further evaluation of proposed building characteristic limitations, such as building height, area, and number of suites for single egress in residential buildings. This study will explore different building forms utilizing single egress and seek to recommend appropriate limits on building characteristics.

Comparative Egress Analysis

A time-egress comparison of a building with two exits where occupants evacuate into a common corridor compared to occupants' evacuation directly into a single exit. This study will assess the level of performance of egress from a dwelling unit with a common point of failure, present in both the single-exit building and a building with two exits.

Canadian Fire Dept Performance

Evaluate various aspects of fire department operations, including response times, and overall effectiveness in mitigating fire-related emergencies. The study will also explore the methodologies for determining adequate water supply to buildings prescribed by the Building Code, which do not credit the provision of sprinklers. By examining these factors, the research will seek to identify the proposed Building Code change's reliance on fire-department operation.

Analysis of Canadian Sprinkler Reliability

Evaluate the effectiveness and performance of sprinkler systems in Canadian residential buildings to determine the probabilistic risk of failure of monitored sprinklered buildings.

Use of Elevators for Evacuation

In sprinklered buildings, the Building Code only contemplates egress by way of exterior doors or exit facilities such as stairs. Considering seven- to nine-storey, residential buildings, this study will evaluate the effectiveness, safety protocols, and potential benefits of utilizing elevators in fire-related emergencies from buildings provided with single egress.

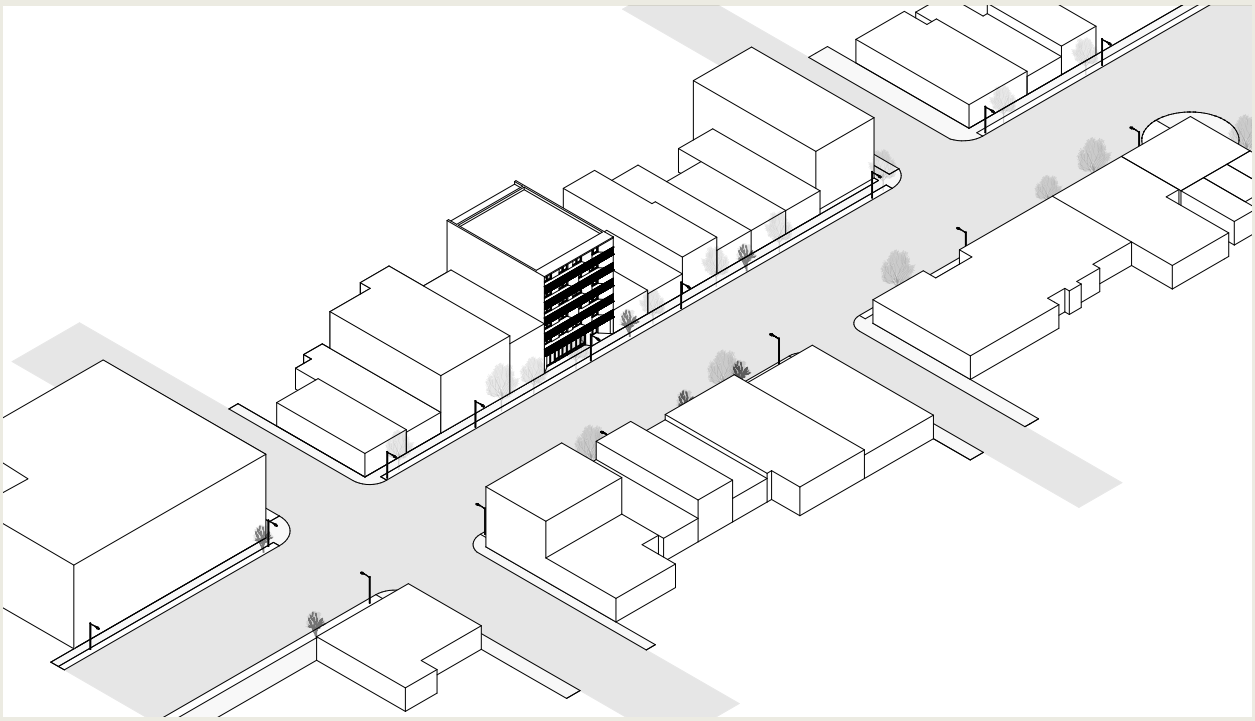
Appropriate Smoke Control Measures

Evaluate the effectiveness and performance of smoke control measures in mitigating risks associated with smoke spread. While this issue is most relevant to buildings greater than six storeys in height, the study will explore the level of risk associated with single-egress buildings up to six storeys in height and whether smoke control measures are warranted at this scale.

DESIGN INVESTIGATIONS

The following three case studies compare a two-stair (code-compliant) building to a single-stair altenative, each on a different standard Metro Vancouver lot scenario.

1 50-foot Lot on Commercial Street



3D DIAGRAM OF A RESIDENTIAL NEIGHBOURHOOD

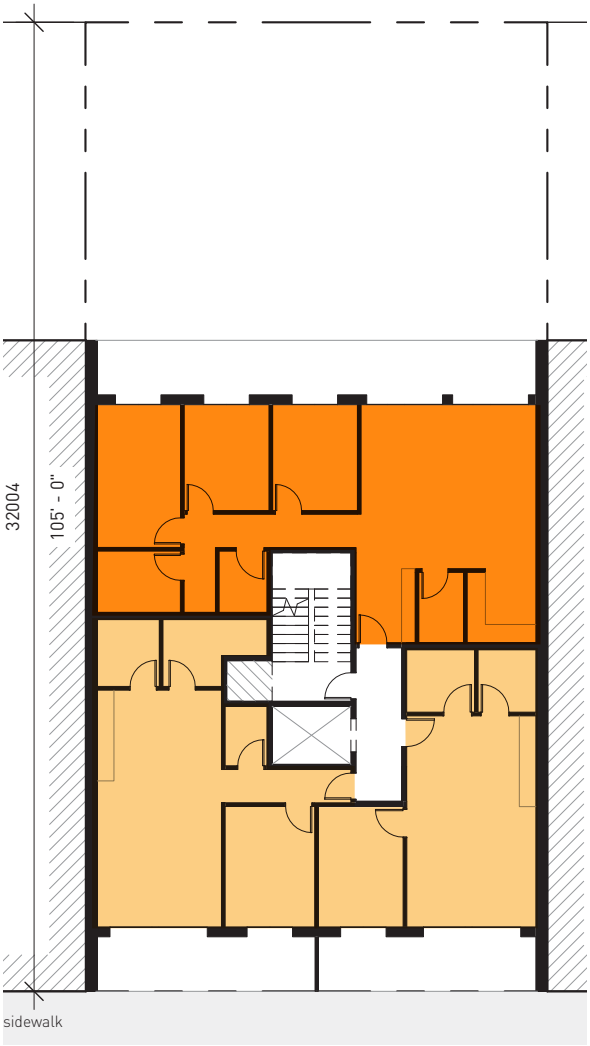
This scenario proposes a small mixed-use building on a commercial street, with 5 storeys of apartments above a ground floor commercial unit. Applicable sites include existing low-rise commercial streets such as those identified as Neighborhood Centres in the Vancouver Plan. This is conceived as an infill project mid-block but could equally be applied on an end-of-block condition or as a series of connected point access blocks with separate or continuous commercial space at street level.

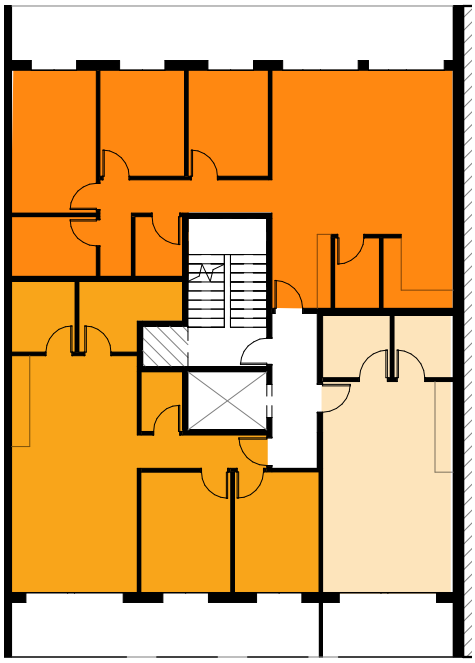
FORM OF DEVELOPMENT

Three units per floor are proposed with a single-exit stair and elevator at the centre of the plan. The unit-mix ranges from studios to three-bed units, with an emphasis on family units (two-bed and larger). Equally, maximizing the number of units is preferable, in which case four units per floor could be provided shifting the unit mix towards studio and one-bed units.

The single-exit stair means that the full extent of the front and rear facades is available for balconies and windows to maximize daylight and private outdoor space. A floor plan efficiency of 84% is provided which maximizes the area of residential floor space.

The building is occupying approx. 70% of the site area although it is anticipated that ground floor functions such as waste storage for both the CRU and residential uses and bike storage would necessitate an extended floor area at level one. A common amenity room could take the place of





1m 10m

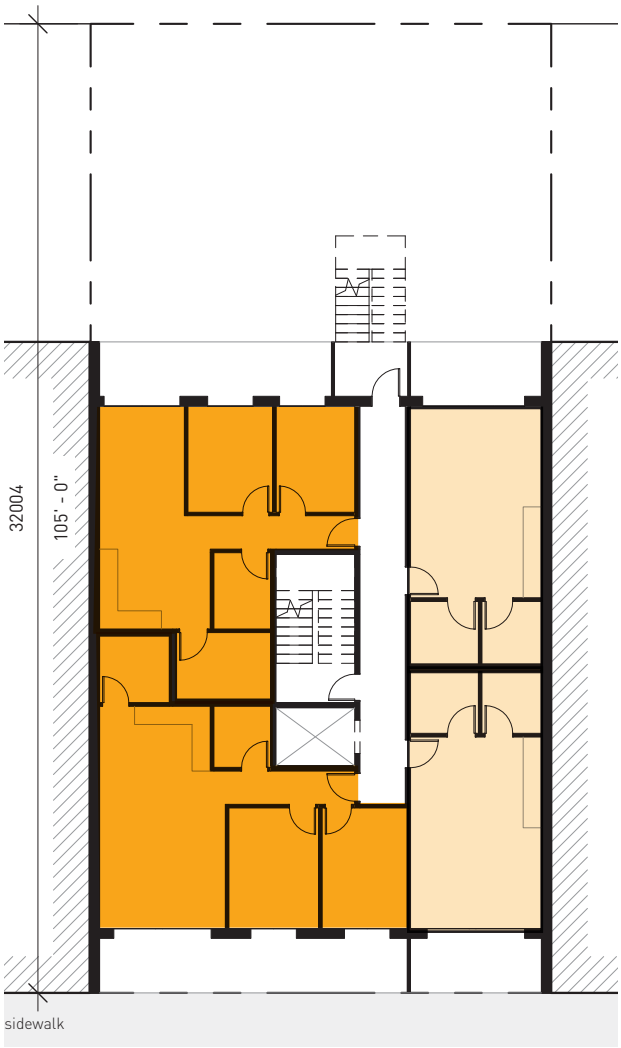
TYPICAL FLOOR PLANS

the three-bedroom unit on level 2, with common outdoor space available at the rear of the site above the extended ground floor spaces. Basement space is likely needed for electrical and mechanical rooms and potentially additional bike storage.

The constraints of the site footprint make below-grade parking impractical, so the potential for resident vehicle parking is minimal. There is potential for residential loading spaces and/or car share space at the rear of the site, accessed from the lane. There is emerging policy in the cities of Metro Vancouver supporting deep parking reductions or even zero parking allowances for sites close to local services and rapid transit and this scenario is an example of that.

Storeys:	6 (1 commercial, 5 residential)
FSR:	3.36
Unit mix:	20% studio
	27% 1-bed
	20% 2-bed
	33% 3-bed
Floor area efficiency:	84%

Studio
1-bed
2-bed
3-bed



TWO-STAIR TYPICAL PLAN

1m 10m

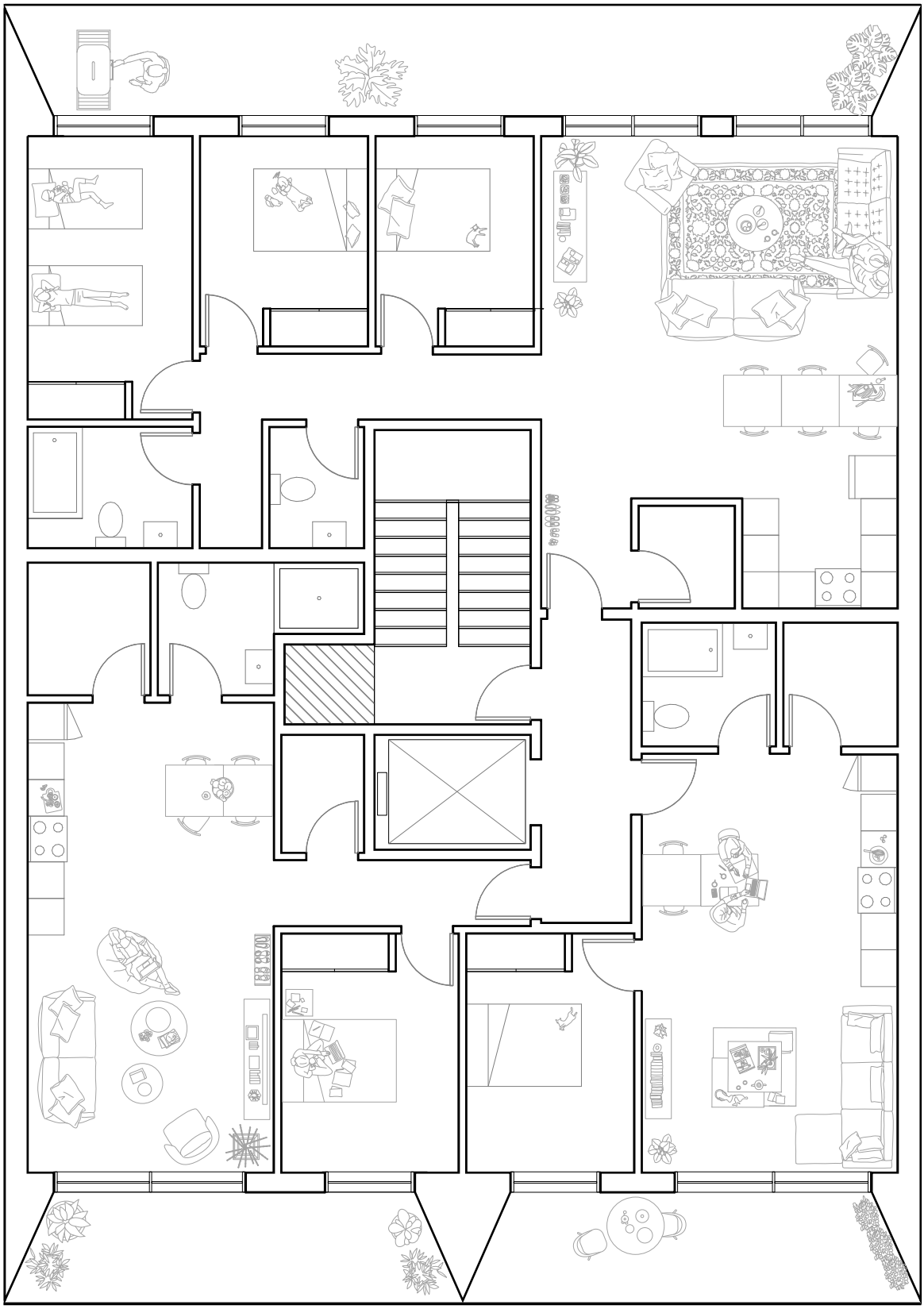
CODE-COMPLIANT TWO STAIR VERSION

A code-compliant version of this plan involves locating a second, exit stair to the rear of the building and extending the corridor to connect both stairs. The previous three-bedroom unit is split by the corridor into a two-bedroom and a studio unit. Floor area efficiency drops to 77% due to the reduction in residential area at the expense of circulation. The added external staircase will disrupt the ground floor plan and occupy space otherwise available for service functions. A comparative review of the this single-exit-stair and two-exit-stair layout by the cost consultant identifies an approximate 6% construction cost increase to build the second stair. The two-exit-stair layout also has less rentable/saleable floor area with which to cover the construction costs.

Storeys:	6 (1 commercial, 5 residential)
FSR:	3.51
Unit mix:	50% studio
	0% 1-bed
	50% 2-bed
	0% 3-bed
Floor area efficiency:	77%
Cost premium:	+ 6%

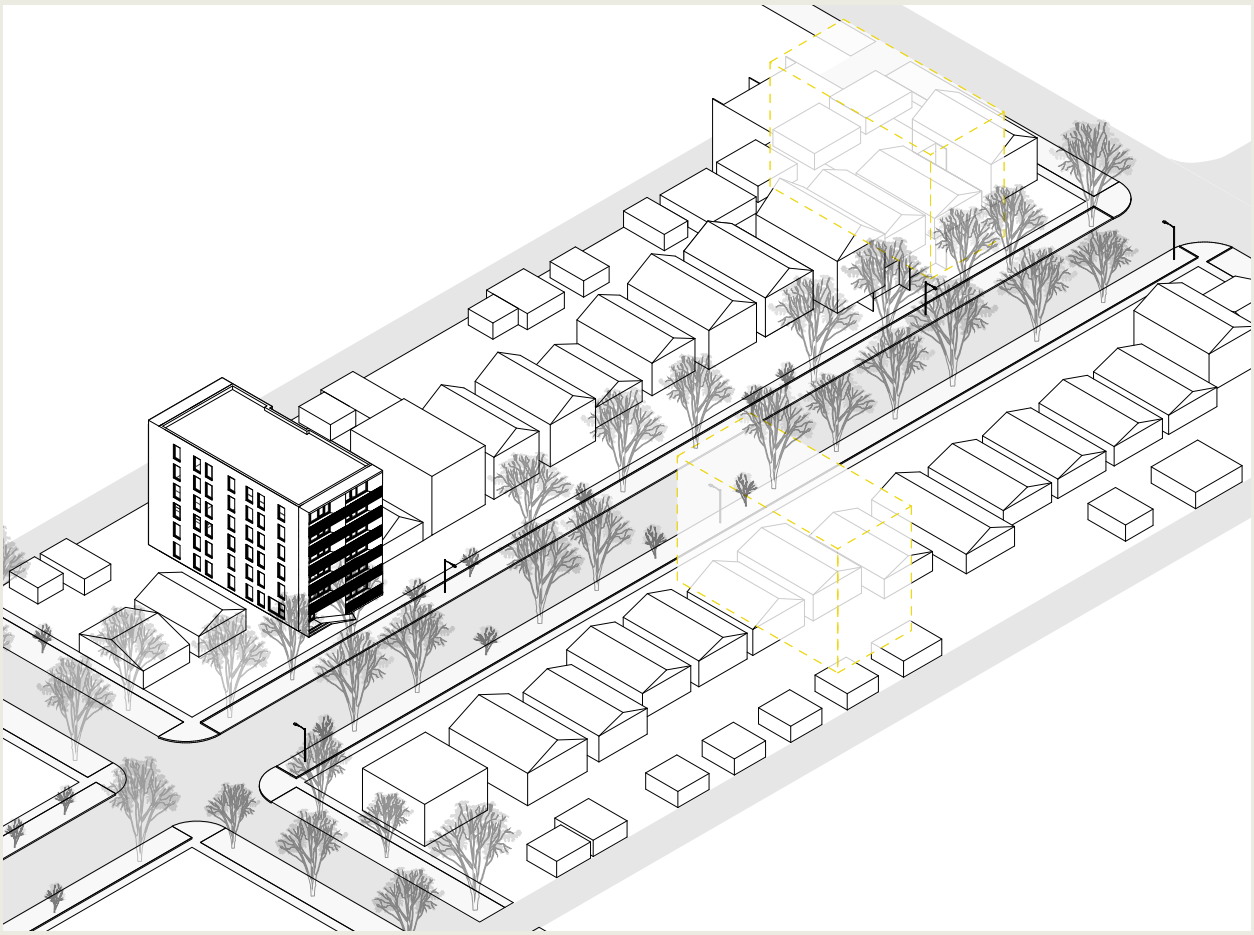
Studio
1-bed
2-bed
3-bed

FRONT ELEVATION RENDER



ENLARGED FLOOR PLAN 1:100

2 Two Combined 33-foot Lots within Mixed Residential Area



3D DIAGRAM OF A RESIDENTIAL NEIGHBOURHOOD

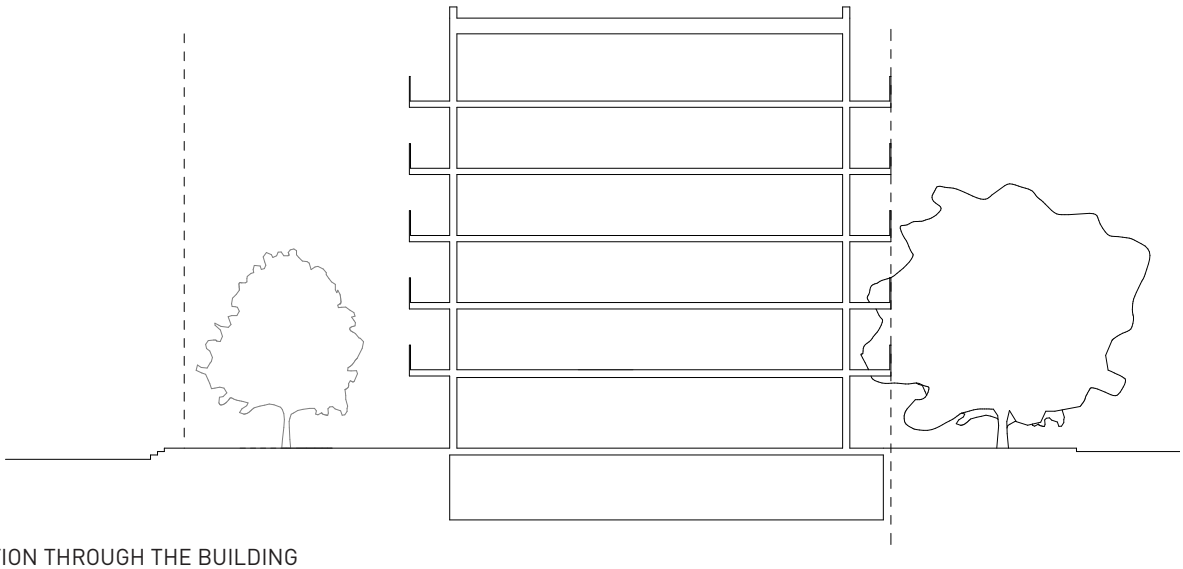
This scenario proposes a compact, apartment building on a mixed, residential street with six storeys of apartments. Applicable sites may include a broad range or RS, RT, and RM zones across significant parts of Metro Vancouver. This is conceived as an infill project mid-block but could equally be applied on an end-of-block/corner condition. Setbacks to the front, rear, and sides are maintained.

FORM OF DEVELOPMENT

Four units per floor are proposed with a single-exit stair and elevator to one side of the plan. The unit mix ranges from one-bedroom to three-bedroom units, with a strong emphasis on family units (two-bedroom and larger), representing 75% of the units. With allowance for ground floor indoor amenity space, a potential of up to 22 units may be achieved. The side setbacks have the benefit of allowing significant daylight access to bedrooms located along the sides of the plan, whether the site is located mid-block or at a corner condition.

The single-exit stair means that the full extent of the front and rear facades, and most of the side facades, is available for balconies and windows to maximize daylight and private outdoor space. A floor plan efficiency of 84% is provided which maximizes the area of residential floor space.

FRONT ELEVATION RENDER



SECTION THROUGH THE BUILDING

TYPICAL FLOOR PLAN

1m 10m

This layout allows for shared outdoor space to be located at the rear of the property, adjacent to an indoor amenity space. The 66ft frontage and side setback could accommodate a single car ramp (3.6m) to access a below-grade parkade without significant disruption to the ground floor plan or common outdoor space. Preliminary study suggests eight to nine parking spaces may be available, in addition to electrical, mechanical and bike storage rooms. For sites located close to local services and transit there may be existing or emerging policy to support this off-street parking ratio.

Storeys:	6 residential
FSR:	2.59
Unit mix:	0% studio
	25% 1-bed
	50% 2-bed
	25% 3-bed
Floor area efficiency:	84%

Studio
1-bed
2-bed
3-bed

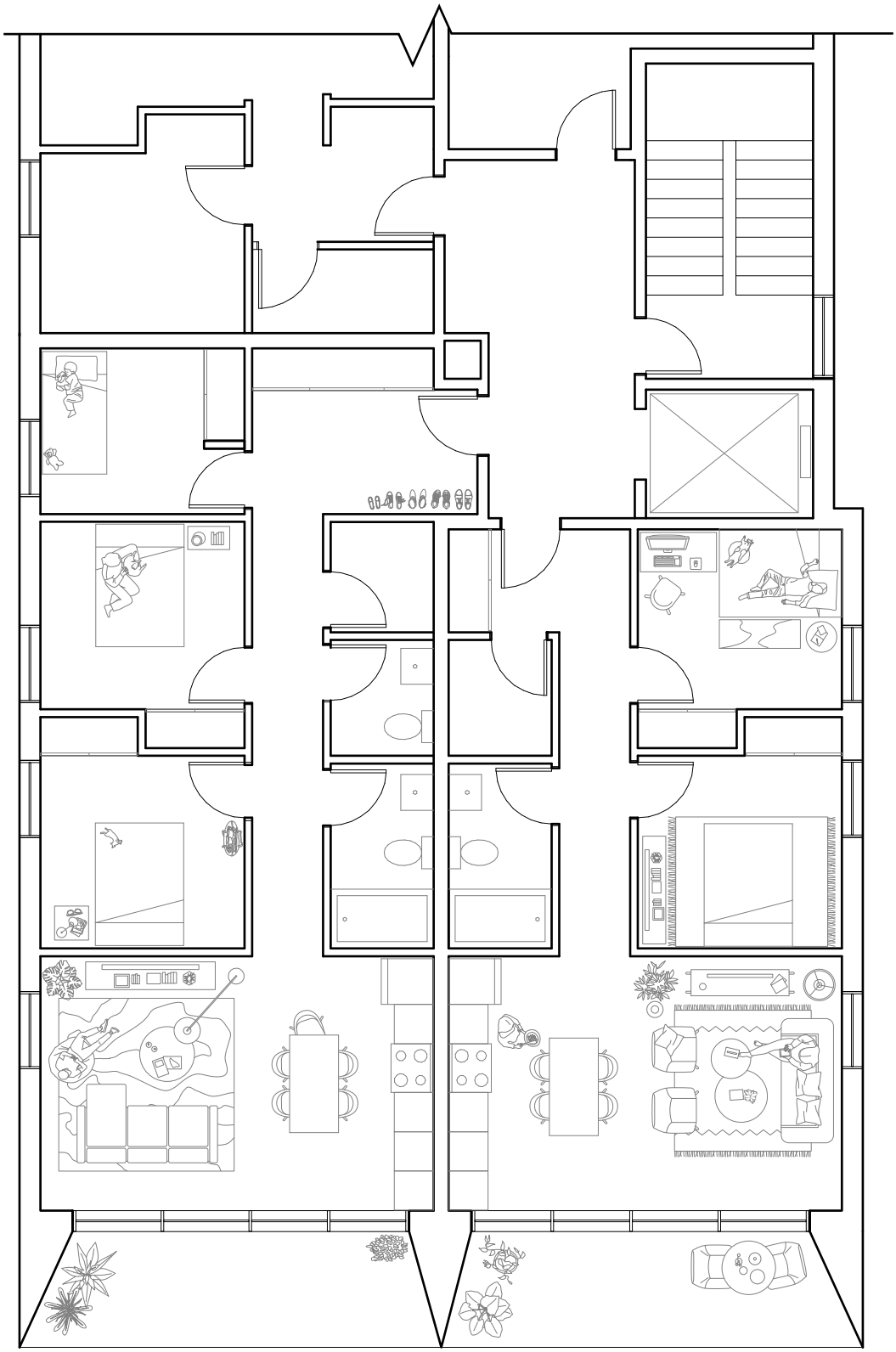
TWO-STAIR VERSION

CODE-COMPLIANT TWO STAIR VERSION

A code-compliant version of this plan involves locating a second, exit stair to the other side of the building and extending the corridor to connect both stairs. The previous three-bedroom unit is reduced in size to a two-bedroom by the extended corridor. Floor area efficiency drops to 80% due to the reduction in residential area at the expense of circulation. The added external staircase restricts the available area for bedroom windows and may create exposure protection issues requiring additional sprinkler protection of adjacent windows. A comparative cost review of the single-stair versus two-stair layout identifies ~2% construction cost increase to build the second stair. The two-stair layout also has less rentable/saleable floor area with which to recover these costs.

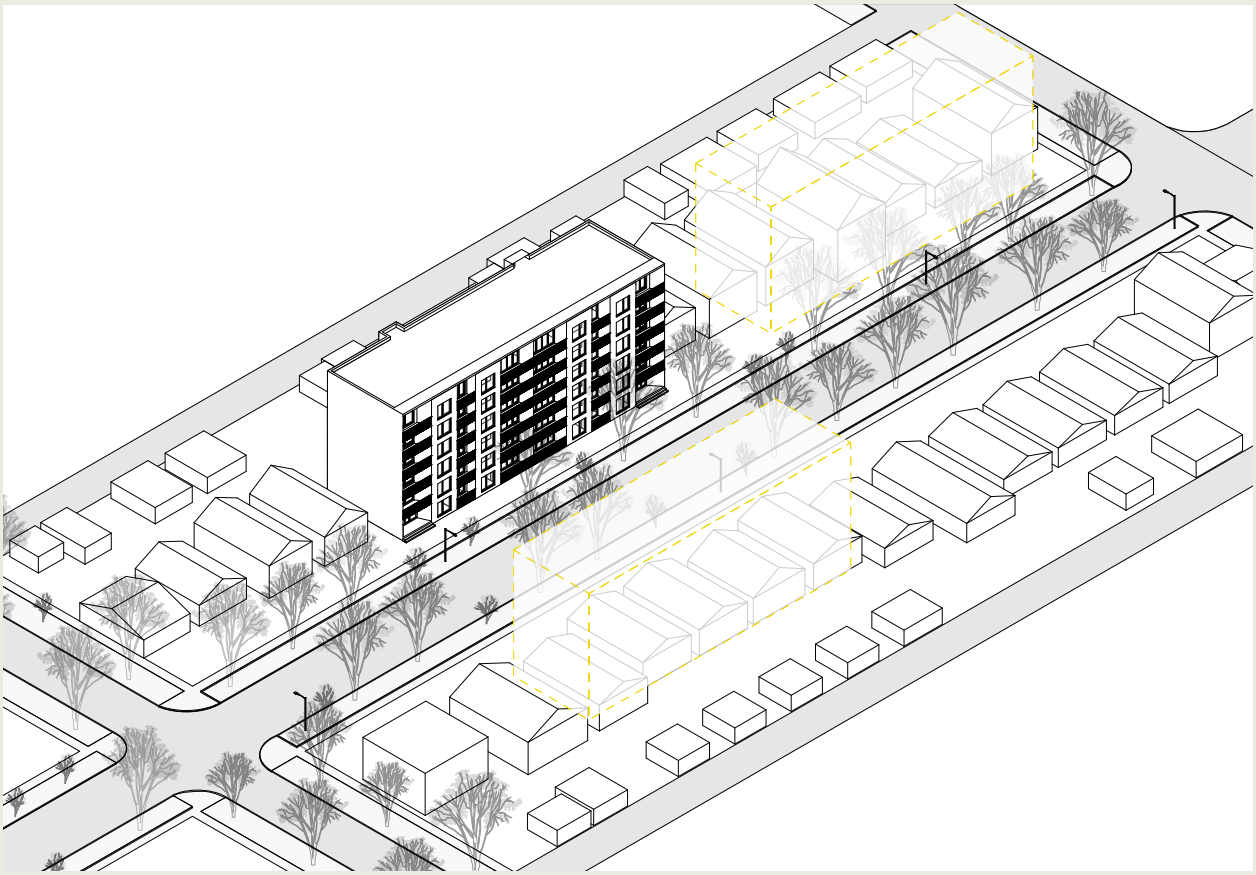
Storeys:	6 residential
FSR:	2.68
Unit mix:	0% studio
	25% 1-bed
	75% 2-bed
	0% 3-bed
Floor area efficiency:	80%
Cost premium:	+ 2%

Studio
1-bed
2-bed
3-bed



ENLARGED FLOOR PLAN 1:100

3 Five Combined 33 foot Lots within Mixed Residential Area



3D DIAGRAM OF A RESIDENTIAL NEIGHBOURHOOD

This scenario proposes an apartment building on a mixed residential street, with six storeys of apartments. Applicable sites may include a broad range of RT and RM zones across significant parts of Metro Vancouver. This is conceived as an alternative approach to the common, six-storey double-loaded corridor in light, wood-frame construction. Setbacks to the front, rear, and sides are maintained.

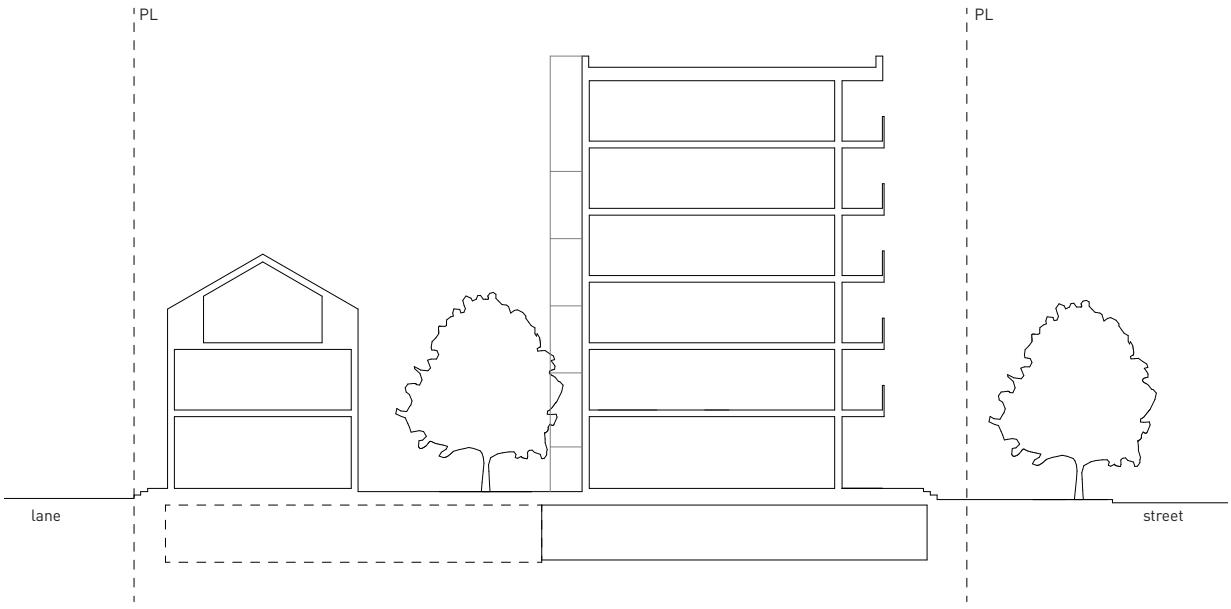
FORM OF DEVELOPMENT

The proposed development is two connected point access blocks with each block having four units per floor, and a single-exit stair and elevator to the rear. We refer to this as a single-exit-stair layout even though there are two stairs in the plan as each point access block is functionally separate.

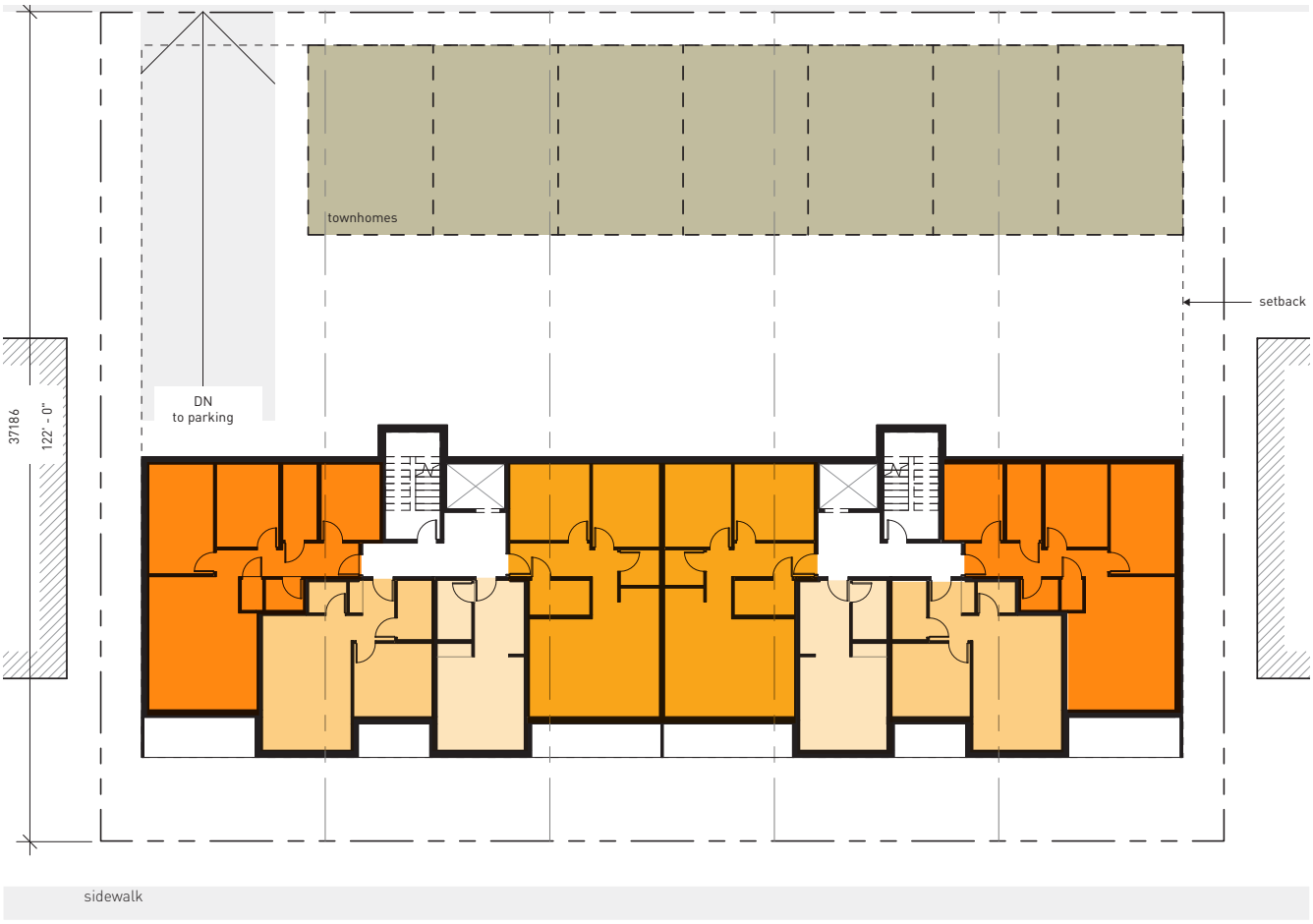
The unit mix ranges from studio to three-bedroom, with a 50% provision of family units (two-bedroom and larger). With an allowance for ground-floor, indoor, amenity space, a potential of up to 45 units may be achieved.

The single-exit-stair layout creates opportunities for the larger units (two- and three-bedroom) to be dual-aspect, with living space facing the street and bedrooms facing the quieter interior of the site. This also provides natural cross ventilation for these units with the benefits of comfort and resilience outlined earlier. The dual-aspect layout of the family units also means that the scheme is not dependent on daylight from the narrow side elevations and so could be provided with small (or even no) side-yard setbacks and still

FRONT ELEVATION RENDER



SECTION THROUGH THE BUILDING



TYPICAL FLOOR PLAN - SINGLE-EXIT-STAIR

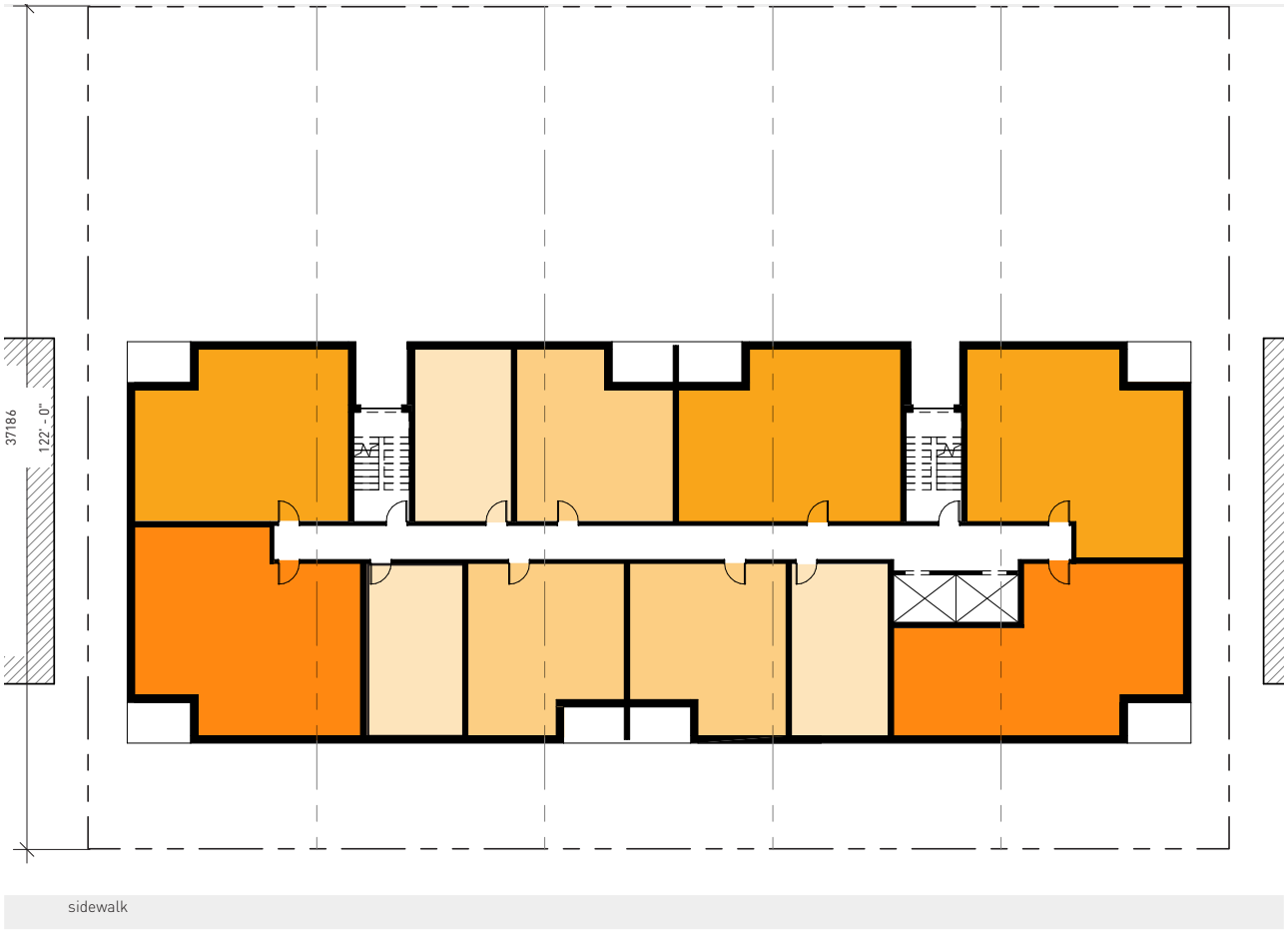
1m 10m

provide acceptable daylighting. The compact stair, elevator, and corridor layout creates a floor plan efficiency of 88%, which maximizes the area of residential floor space.

The usual depth of a lot of this type (approx. 122ft) does not provide sufficient space for two facing point access blocks (i.e. a second block in the back, facing the lane), so other options for increasing density, such as the low-rise row housing/townhomes indicated here, can be considered to make use of the remaining site area. This scheme is expected to include below-grade parking accessed by a ramp from the lane, in addition to electrical, mechanical, and bike-storage rooms.

Storeys:	6 residential
FSR:	1.90
Unit mix:	25% studio
	25% 1-bed
	25% 2-bed
	25% 3-bed
Floor area efficiency:	88%

Studio
1-bed
2-bed
3-bed



TYPICAL FLOOR PLAN - DOUBLE-LOADED CORRIDOR

1m 10m

CODE-COMPLIANT TWO-EXIT-STAIR VERSION

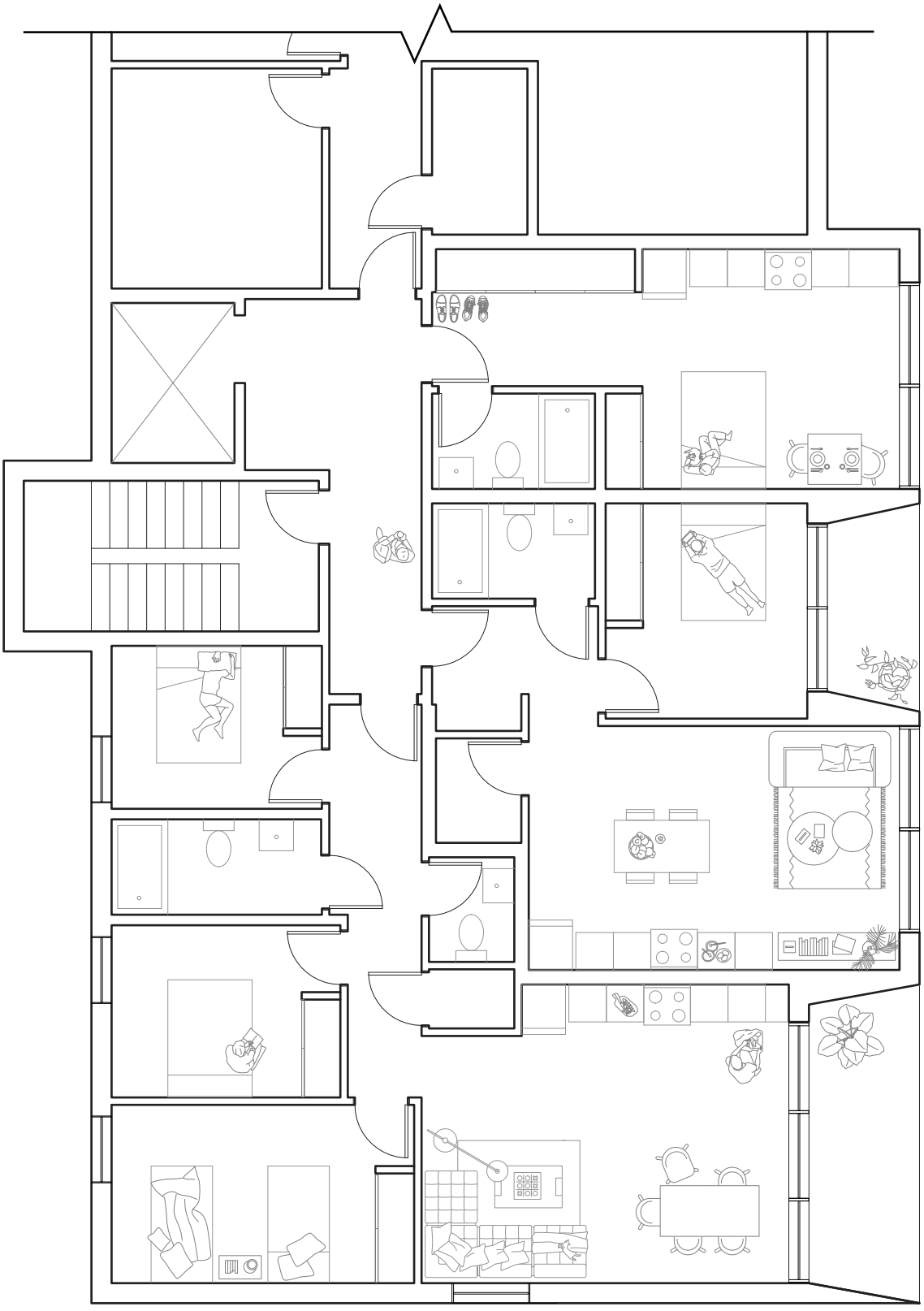
A code-compliant development of this site would be the common, six-storey, double-loaded corridor as illustrated here. We can see greater density in the typical floor plan than the previous point access block layout, both in terms of unit count (an additional three apartments per floor) and in overall floor area (approx. 31% greater). This example maintains a relatively high floorplan efficiency of 86% because the two stairs are inset from the ends of the building, so the corridor does not continue to the end walls.

Storeys:	6 residential
FSR:	2.50
Unit mix:	27% studio
	27% 1-bed
	27% 2-bed
	19% 3-bed
Floor area efficiency:	86%
Cost premium:	+24%

Studio
1-bed
2-bed
3-bed

A comparative review of the single-exit-stair point access blocks and two-exit-stair double-loaded corridor layouts by the cost consultant identifies an approximate 24% construction cost increase to build the two-exit-stair layout.

However, in this case the increased density created by the double-loaded corridor would compensate for additional costs. For sites with these proportions, the common double-loaded corridor can offer an efficient solution.



ENLARGED FLOOR PLAN 1:100

CONCLUSIONS

This study represents an initial exploration into the transformative potential of code reform in the design and supply of high-quality, urban housing. The following points summarize our key findings and recommendations:

INITIAL EXAMINATION OF CODE REFORM POSSIBILITIES
The design studies conducted are an initial step in understanding how changes to the building code can significantly impact the urban housing landscape. These studies highlight the potential for code reform to facilitate the development of high-quality urban housing, addressing both design challenges and market needs.

DESIGN FLEXIBILITY AND EFFICIENCY WITH SINGLE-EXIT STAIR
The option of a single-exit stair in multi-storey residential buildings introduces greater design flexibility and efficiency. This approach allows for more creative and effective use of space, especially in complex urban environments where traditional design solutions may be limiting.

BENEFITS FOR SMALLER SITES
Smaller sites, often overlooked due to their complexity and inefficiency under current building codes, stand to benefit significantly from this reform. The flexibility offered by a single stair could unlock the potential of these sites, making them viable options for urban housing development.

ADDRESSING THE 'MISSING MIDDLE' IN METRO VANCOUVER
The proposed code changes could be a crucial solution for meeting the needs of the 'Missing Middle' in Metro Vancouver. By allowing for more diverse housing types, this reform can cater to a broader spectrum of the urban population, bridging the gap in the housing market.

LIVABILITY AND COMMUNITY BENEFITS
Beyond development potential, the single-stair point access blocks offer valuable livability and community benefits. These designs can lead to more cohesive and engaged communities, enhancing the overall quality of urban living.

RECOMMENDATION FOR DEMONSTRATION PROJECTS
It is recommended that the reform of the requirement for two exit stairs be advanced through 'alternative solutions' to the existing codes. Implementing demonstration projects under this framework can showcase the practicality and benefits of the proposed changes.

SUPPORT FOR BUILDING CODE REFORM
Stakeholders in the provision of affordable and sustainable housing in Canada are encouraged to support a pathway to reform of the National Building Code. This support should include backing the necessary life-safety analysis to ensure that these reforms enhance housing availability while also maintaining or improving safety standards.

In conclusion, the proposed code reforms open up new avenues for addressing some of the most pressing challenges in urban housing development. By embracing these changes, there is a potential to significantly improve the availability, diversity, and quality of housing in urban areas, particularly in regions like Metro Vancouver. These reforms should be pursued with a commitment to ensuring safety, enhancing community engagement, and fostering sustainable urban growth.

public

PUBLIC ARCHITECTURE

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PUBLIC would like to acknowledge that the land on which we gather is the unceded, traditional, and ancestral territories of the Musqueam, Squamish, and Tsleil-Waututh Nations.

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Revised December 18, 2023

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M5T 2E8

PRELIMINARY REVIEW COMMENTS
BC HOUSING GRANT – SINGLE STAIR STUDY **GHL File 8761.00 C**

Dear Conrad:

As requested, this letter is to summarize our preliminary comments regarding the Building Code change request specific to the maximum allowable building height with single egress for multi-unit residential occupancies. We note that these are preliminary thoughts, and we have not endeavoured to check references or perform any analysis described below.

We start by acknowledging the significant amount of work that has gone into the submission to date. The comments below should, by no means, be taken as criticism, but rather as suggestions for strengthening the submission.

Background

The current National Building Code 2020 (NBC) prescribes each floor area to have access to at least two exits unless the building is not more than 2 storeys in height. The proposed Code change request indicates that this limits the type of typologies available for residential midrise buildings in urban development. The Code change proposes residential buildings, up to 6 storeys, to be permitted a single exit provided certain design features are provided. Key design features related to single exit from a storey include:

- Occupant load limit on single exit storey.
- Dwelling unit limit on each single exit storey.
- Area limit within dwelling units.
- 45min fire protection rated dwelling unit doors.
- Pressurization of exit stair.
- Monitored fire alarm.

Preliminary Comments

In our opinion, the relevant documents provide substantial support to substantiate a Code change though a qualitative analysis and comparison to other jurisdictions; however, the proposal should quantify the risk to persons within a suite served by a single exit and compare that to the level of safety provided by existing solutions in the Code. The Code assumes a single point of egress from residential suites. When the single point of egress is compromised, the residential suites are functionally an area of refuge similar to protected accessible floor areas in unsprinklered buildings. To quantify risk to occupants sheltering in place, a probability of failure assessment to the following could be added to the proposal:

1) breach of suite fire separation,
2) delays Fire Department response in urban/rural areas, and
3) failure of sprinkler system.

The only area where we have concern is the discussion and diagrams of the use of truck mounted ladders. This has the potential to lead to limitations in any accepted Code change that each suite must have a balcony accessible to a firetruck. We do not believe this is practical, nor do we believe it is beneficial. Although we are not firefighters, it is our understanding that, even if ground conditions allow setup of truck mounted ladders, there is significant setup time in the order of 10 to 15 minutes in addition to the response time (we believe this was recently assessed by NRC) and that this renders the balcony solution to be limited.

With respect to smoke control, we concur the stair should be smoke protected for buildings greater than 6 storeys in height. The Code currently provides provisions for smoke control in high buildings, noting a maximum of 1% smoke, normally interpreted as 'tenable' per ISO standards. We believe that bottom venting may not be sufficient; however, use of exterior stairs or pressurization, would addresses this issue. We have successfully implemented smoke control systems with battery based 'UPS' based power to avoid generators in 5- to 7-storey buildings, so provisions of pressurization could be readily implemented at reasonable costs. We believe that further discussion of smoke control provisions would complicate the proposal.

We also recommend the following components of the proposed Code change be further reviewed to strengthen the proposal:

a) Single exit is limited to 6-storey buildings and appears to be determined based on the maximum height for combustible construction. Recommend the maximum number of storeys be reviewed through risk base analysis. We believe it could be higher with the commensurate construction requirements, but perhaps politically 6 storey is a first step. For buildings up to 6 storeys, continuous operation of the corridor makeup air may be sufficient. In buildings beyond 6 storeys, further analysis is required and may require provisions for a smoke protected exit stair.

b) Although the Code concentrates on fire scenarios, an anecdotal analysis of other emergency scenarios, including arson, bombings, home invasion would be appropriate. However, it is appropriate to compare the level of safety achieved with conventional housing.

c) Presence of the balcony as a place of refuge to wait for first responders remains a valid concept. This is supported by the options that existed in the Code for use of balconies as areas of refuge in unsprinklered high buildings constructed prior to the provisions of the 1995 National Building Code. There was no expectation that these balconies could be reached by ladders, either hand or

truck mounted: the intent was for firefighters to access via the corridor after they had cleared the corridor of fire and smoke, and the occupants could wait in a place of safety until this occurred.

d) We believe further development of the approach can be made to emphasise that, if there is a fire in the suite, the stair is available for egress and, if there is a fire in the stair, or it is otherwise obstructed, then the suite can serve as an area of refuge. We believe this can be developed and quantified to note that in a sprinklered building the probability of a major fire in combination with failure of a Fire Department response to clear and make safe an exit stair within a reasonable time is sufficiently low. It is noted that the refuge area is not intended to be designed an area of refuge described in Article 3.3.3.6 for care, treatment, or detention occupancies. More discussions may be necessary, though in our opinion, a circular area with a 1.7m diameter my be sufficient based on the assumption of a fire within as single suite.

e) We believe there is a need for a study of Canadian sprinkler reliability analysis to establish the reliability of a modern, monitored, and supervised sprinkler system. We believe that the NFPA statistics based on NFIRS data that include older systems, have no details of the type of sprinkler system, age of system or level of maintenance, provide reliability figures that are significantly below that which anecdotal evidence in Canada, along with the studies by Len Garris. Based on that, and studies of First Responder response, an assessment of the level of safety can be developed. This methodology would permit a comparative analysis of the level of safety. For example, a 3-storey unsprinklered conventional apartment building could be compared with the Code change proposal. We would expect that this study would provide quantitative evidence of the acceptability of the approach.

f) Notwithstanding that, NFPA 13 already requires balconies and attics to be sprinkler protected in buildings over 4 storeys, it would help to re-iterate that these improvements to the Code have been implemented in all new buildings. We note a significant number of buildings in BC and Alberta have had fires enter the attic, and result in loss of the building, although, to our understanding, not loss of life outside the compartment of origin. It would be beneficial to study sprinkler failure in buildings designed per NFPA 13R and the impacts on loss of life or loss of the building.

g) In addition to increasing the fire rating of the suite doors, it may be prudent to require that the exit stairs be of noncombustible construction (steel treads and risers) or be of 1h fire rated construction. There is a risk that, although the Code currently requires the stair enclosure to be 1h fire rated, light wood frame stair construction with no fire rating is permitted. Similarly, and at minimal cost, it is likely advisable to require the stairs be sprinklered at each landing. This would eliminate the risk of fire in the exit stair burning the stairs such that they would not be available after suppression. An increase fire rating at suite doors may not be necessary if the aforementioned area of refuge is located within the exit stair.

h) We note that, for a person who requires a wheelchair, the proposal provides essentially the same level of performance; as such, a person cannot use the stair, although two stairs do provide options for first responders. It is already accepted for the suite to be an area of refuge, or, if the fire originates in the suite, such persons can remain in the stair. On this basis, we recommend the proposal also include minimum dimensions for stair landings to permit a person in a wheelchair to use the stair as an area of refuge. We note that the strongest concerns we have heard to date is the issue of persons with disabilities.

In unsprinklered buildings, the Code provides several options for protection of accessible floor areas. These options include direct access to the exterior, elevator access, compartmentalization of floor areas, or access to balconies. In a sprinklered building, the combination of one of the above noted provisions may be sufficient in forming the basis for a single exit stair alternative solution.

i) There are opportunities to use elevators as the second means of egress for single exit buildings greater than 6 storeys in height. The Code recognizes the use of elevators in Article 3.3.1.7.(1) "Protection on Accessible Floor Areas" when it prescribes an unsprinklered floor area to be served by an elevator. Where an elevator is used, it may be appropriate to smoke protect the elevator as well as the stair. It is noted that the current Code relies on elevators being supplied with emergency power from a generator however, we anticipate battery power options to be available in the future.

j) It would also be appropriate to consider permitting the elevator to be entirely located within the exit stair. Currently the Code prohibits this configuration, although the intent appears to be to prevent having the elevator shaft interconnect the exit enclosure and the floor area. Allowing the elevator to be either entirely within the stair or entirely within the floor area addresses concerns raised with egress for persons with disabilities (we note current elevator restrictions may be based on concerns of leakage of significant quantities of hydraulic fluid, common in past decades; however, hydraulic elevators are rarely used these days).

We believe an assessment of each of the above concerns would result in a positive outcome and be additional support for the proposal.

Other Options

We concur that initial development of a sprinklered 6-storey approach is appropriate. We note that it may be advantageous to consider extending this proposal to larger buildings, particularly in the 7 to 9 storey height range, which it is anticipated will be permitted to be unprotected mass timber construction. For these buildings it may be practical to consider the elevators as an alternative means of egress and first responder access as emergency power will be required for these buildings.

Support

The above comments are ideas and concepts to substantially strengthen the proposed Code change. Based on our experience in developing alternative solutions for a wide range of housing and in performance based design, we believe this proposal can be expanded and strengthened to demonstrate that the level of fire safety is at least equal or better than the lowest level of safety currently accepted by the National Building Code; namely, that of 3-storey house and unsprinklered 3-storey apartment buildings.

Andrew Harmsworth, the undersigned, as a member of Urban Development Institute Pacific Building Codes Committee can confirm that UDI Pacific believes development of Code changes such as this is important to improve the options for multi-family development in dense city environments. UDI Pacific Region represents a significant portion of the Developers in the Metro Vancouver region.

We have also discussed this with the BC Building Safety Standards Branch who confirm they support development of the concept, noting that '*we do not want to take a step back in fire and life safety'* and that it needs consideration of evacuation of persons with disabilities.

Committee Involvement

In the interest of disclosure, we note Andrew Harmsworth is a member of the Standing Committee on Fire Protection, and also the BC Mass Timber Advisory Council, advising the BC Government on Mass Timber Implementation.

Future Studies

Further studies are anticipated to provide a technical assessment to support the Building Code change related to single exits from residential buildings. Based on our preliminary review, the following areas of performance-based design are recommended to be studied:

1. ***Building Characteristics:*** The study will evaluate the building characteristic limitations, such as building height, area, and number of suites for single egress in residential buildings. This study will explore different building forms utilizing single egress and seek to recommend appropriate limits on building characteristics.

2. ***Comparative Egress Analysis:*** This study will evaluate a time-egress comparison of a building with two exits where occupants evacuate into a common corridor compared to occupants' evacuation directly into a single exit. This study will assess the level of performance of egress from a dwelling unit with a common point of failure, present in both the single exit building and a building with two exits.

3. ***Canadian Fire Department Performance:*** This study will evaluate various aspects of fire department operations, including response times, and overall effectiveness in mitigating fire-related emergencies. The study will also explore the methodologies for determining adequate water supply to buildings prescribed by the Building Code. Fire Underwriters Survey (FUS) calculations are often requested by Authorities Having Jurisdiction which create onerous infrastructure expenses without crediting provision of sprinklers. By examining these factors, the research will seek to identify the proposed Building Code change's reliance on fire department operation.

4. ***Canadian Sprinkler Design and Reliability Analysis:*** This study will evaluate the effectiveness and performance of sprinkler systems in Canadian residential buildings. By examining this, the research will seek to determine the probabilistic risk of failure of monitored sprinklered buildings.

   The Use of Elevators for Evacuation: The study will evaluate the use of elevators for evacuation during fire-related emergencies. In sprinklered buildings, the Building Code only contemplates egress by way of exterior doors or exit facilities such as stairs. It does not contemplate alternate means of egress such as elevators. With advancements in elevator technology and safety measures use of elevators may provide an alternative means of egress. This study will analyse the effectiveness, safety protocols, and potential benefits of utilizing elevators in fire-related emergencies from buildings provided with single egress. This study is more appropriate for buildings greater than 6 storeys in building height.

Appropriate Smoke Control Measures: The study will evaluate the effectiveness and performance of smoke control measures in their ability to mitigate risks associated with smoke currently implemented to satisfy the requirement of Subsection 3.2.6. The study will explore the level of risk associated with single egress buildings up to 6 storeys in height and whether smoke control measures are warranted. This study is more appropriate for buildings greater than 6 storeys in building height.

Summary

This letter has described our preliminary review comments for the BC Housing Grant – Single Stair Study.

We trust the foregoing is the information you require at the present time. Should you have any questions or comments, please do not hesitate to contact us.

Prepared by,
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Attention: **Jamie Harte**, Architect AIBC, CPHD
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BC HOUSING GRANT - SINGLE STAIR STUDY
VANCOUVER, BC
CLASS D CONCEPT DESIGN CONSTRUCTION COST ESTIMATE (REV.1)

We have reviewed the design documents provided, prepared a Class D Concept Design Construction Cost estimate priced in current Q4 2023 local Vancouver, BC dollars and enclose our estimate report.

The cost analysis reflects a single above grade floorplan vs single above grade floorplan per option as instructed by PUBLIC for purposes of study.

Pricing has been included at Q4 2023 local unit rates noting the current uncertainty and volatility of the market. Supply chain issues currently being experienced may have unknown (short and long term) impacts on pricing levels and anticipated projected construction escalation.

Future construction escalation costs have been excluded. Future escalation costs should be compound calculated to anticipated mid-point of construction. Escalation contingency is excluded with all dollar values representing current market opinion of Q4 2023 local unit rates. A separate escalation contingency will be required for future price increases.

Current market instability is a significant short- and long-term cost and schedule risk item (supply chain fulfilment of orders in a timely manner may create potential for critical path related construction delays).

Please note the conditions on which the costs are based, and the items excluded.

For Ross Templeton + Associates

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PROJECT DESCRIPTION

The project scope involves the study to compare code-compliant 2-exit-stair designs with alternate single-stair options, City of Vancouver, BC. The scope of the work has been comprehensively defined by PUBLIC within the Concept Feasibility Design scoping package:

- All options are with the same construction assemblies – TJI floors with 2x4/ 2x4 walls.
- BC Housing Guidelines specifications assumed for general construction and finishes.
- All options have standard stretcher-sized electric traction elevators.

Alternate single-stair options additional code requirements include:

1. Apartment entry doors increased to 45min rating (code-compliant 2 stair options have 20min doors).
2. The stair would be pressurized and vented similar to High Building code requirements.
3. Stair pressurization would be on a UPS backup.
4. Stair construction to have 1H fire resistance (5/8" type X).

Option 1
5x 33ft lots consolidated
Conventional double-loaded corridor -v- two connected single-stair blocks
6-storey plus underground parking

Option 2
2x 33ft lots consolidated
Two-stair option with exterior steel stair -v- single-stair block.
6-storey plus underground parking.

Option 3
1x 50ft lot
Two-stair option with exterior steel stair -v- single-stair block.
6-storey including ground floor commercial
Zero lot line condition with CMU party walls.

The cost analysis reflects a single above grade floorplan vs single above grade floorplan per option as instructed by PUBLIC for purposes of study.

ESTIMATED CONSTRUCTION COST (Q4 2023 $)

The cost analysis reflects a single above grade floorplan vs single above grade floorplan per option as instructed by PUBLIC for purposes of study.

Please refer to the appended Class D estimate:

Estimated Construction Cost Q4 2023 $

Option 1: 5x 33ft lots	
Option 1A: Conventional double-loaded corridor	$ 2,506,400 (single floorplate)
Option 1B: Two connected single-stair blocks	$ 2,028,100 (single floorplate)
Construction Cost Variance (+/-) (Q4 2023 $ noting exclusions/pricing basis)	$ 478,300 (+23.6%)
Option 2: 2x 33ft lots	
Option 2A: Two-stair option with exterior steel stair	$ 1,185,500 (single floorplate)
Option 2B: Single-stair block	$ 1,162,500 (single floorplate)
Construction Cost Variance (+/-) (Q4 2023 $ noting exclusions/pricing basis)	$ 23,000 (+2.0%)
Option 3: 1x 50ft lot	
Option 3A: Two-stair option with exterior steel stair	$ 1,039,600 (single floorplate)
Option 3B: Single-stair block	$ 981,000 (single floorplate)
Construction Cost Variance (+/-) (Q4 2023 $ noting exclusions/pricing basis)	$ 58,600 (+6.0%)

Class D Concept Design Cost estimates are typically +/- 30-50% in accuracy 18 times out of 20 with many variables influencing the final construction price including most importantly the final design scope parameters, final specifications (output specification, performance specifications, proprietary specifications), final drawings, contractors' contractual obligations, extent of supplementary conditions, number of compliant bidders, volatility of the market, supply chain issues and market activity at time of tender.

Please refer to the exclusions section and appended Class D estimate for the estimate detail.

Pricing has been included at Q4 2023 local unit rates noting the current uncertainty and volatility of the market. Supply chain issues currently being experienced may have unknown (short and long term) impacts on pricing levels and anticipated projected construction escalation.

Note:
Please note material supply prices have recently spiked with current market supply chain price increases affecting supply price of aluminium, copper, steel, silicone, tile, insulation, ipex, PVC/UPVC products etc. Container freight shipping costs have recently increased by +300-400%. Current market instability is a significant short- and long-term cost and schedule risk item (supply chain fulfilment of orders in a timely manner may create potential for critical path related construction delays).

PROJECT CALENDAR

A project start date has not been indicated. Pricing has been included at Q4 2023 local unit rates noting the current uncertainty and volatility of the market. Supply chain issues currently being experienced may have unknown (short and long term) impacts on pricing levels and anticipated projected construction escalation. **Future cost escalation is excluded from the estimate**. Please refer to the 'Escalation Contingency' section of this report.

AREA ANALYSIS

The cost analysis reflects a single above grade floorplan vs single above grade floorplan per option as instructed by PUBLIC for purposes of study:

Option 1: 5x 33ft lots	
Option 1A: Conventional double-loaded corridor	782 m² (single floorplate)
Option 1B: Two connected single-stair blocks	594 m² (single floorplate)
Gross Floor Area (single floorplate) Variance (+/-)	188 m² (+31.6%)
Option 2: 2x 33ft lots	
Option 2A: Two-stair option with exterior steel stair	336 m² (single floorplate)
Option 2B: Single-stair block	325 m² (single floorplate)
Gross Floor Area (single floorplate) Variance (+/-)	11 m² (+3.4%)
Option 3: 1x 50ft lot	
Option 3A: Two-stair option with exterior steel stair	288 m² (single floorplate)
Option 3B: Single-stair block	274 m² (single floorplate)
Gross Floor Area (single floorplate) Variance (+/-)	14 m² (+5.1%)

CONTRACT CONDITIONS

The costs are based on the work being executed through a Construction Management or traditional 'lump sum fixed price' General Contractor arrangement with competitive tenders received from suitably qualified bidders, on standard form documents with no onerous supplementary conditions. Tenders will be received from at least five qualified bidders for major sub-trades, or subcontractor packages (concrete trade, structure/framing, envelope, roofing, steel stud, insulation & drywall, doors & hardware, finishes, millwork, mechanical and electrical). Consideration of unknown market volatility and supply chain issues at the time of tender have been specifically excluded from this estimate.

EXCLUSIONS

- **Construction project capital costs beyond 'floorplan vs floorplan' pricing approach for purposes of study**
- Land & Finance Costs (Land acquisition fees, associated legal and financing costs)
- Soft costs (Professional fees, client management fees, specialist engineering fees)
- Municipal Fees & Levies (CAC's, Municipal Contributions, Permits etc.)
- DCC's
- On-site development works, On-site M&E services
- Off-site Works
- Off-site Utility upgrades
- Hazmat Abatement costs (if any)
- Demolition of existing costs
- Sub-Phasing of the works or Accelerated Schedule
- Cost impacts resulting from a shortage of suitable trade labour, supply of materials etc.
- Out of hours working premium / restricted working hours / restricted noise conditions
- Loose Fittings Furnishings and Equipment (FF&E)
- Public Art
- Exhibits and artwork
- Operating, Maintenance, Life Cycle Replacement and Facility Management Costs
- Construction works outside the defined scope
- Owners staff training
- LEED Gold, PassiveHouse or NetZero design
- Extraordinary market conditions, market volatility and supply chain issues
- Cost escalation past Q4 2023
- Owners Construction Change Order Contingency
- Pricing based on BCBC 2018 and does not include future unknown code change cost implications
- Goods & Services Tax (GST)
- Items listed as 'excluded' in the estimate detail

DESIGN PRICING CONTINGENCY

The project is at Concept Design (Functional Program) stage and a design pricing contingency of fifteen percent (15.0%) has been included to cover pricing variances that may occur with specification changes and design detailing clarifications. This contingency will ultimately reduce to zero at tender stage.

OWNERS CONSTRUCTION CHANGE ORDER CONTINGENCY

Construction projects are rarely completed without some level of change and often additional scopes of work are required (Change Orders). We recommend the owner carry an additional sum of five percent (5.0%) of the construction cost in their budget to help offset any unforeseen costs that may arise during construction.

We have excluded this contingency from the construction cost estimate.

This contingency is owner owned and will not be included in the tender returns but should be set aside in a separate budget for the owner to manage during the construction period.

ESCALATION CONTINGENCY

Pricing has been included at Q4 2023 local unit rates noting the current uncertainty and volatility of the market. Supply chain issues currently being experienced may have unknown (short and long term) impacts on pricing levels and anticipated projected construction escalation.

Future construction escalation costs have been excluded.

At this stage of design future escalation costs should be compound calculated to anticipated mid-point of construction. Escalation contingency is excluded with all dollar values representing current market opinion of Q4 2023 local unit rates with consideration to the site location and project scope known at this time. A separate escalation contingency will be required.

At construction start all key sub-trades should be fully procured and price locked in. An additional escalation contingency should be added in the event of schedule slippage.

Projecting future escalation carries risk given unknown future market conditions, local and world economy status, general cost of living, CPI, prime rates, supply chains, micro/macro economics local, national and world political situation etc.

DOCUMENTS AND DATA

This cost plan estimate has been prepared using the following documents (file names noted for ease of reference):

- 231027 Costing Consultant Set
- 23-11-09 BC Housing Grant - Single Stair Study Class D Estimate Report_ PUBLIC notes
- No M&E or structural design

CONSTRUCTION COST SUMMARY (TYPICAL FLOOR)

ELEMENT	OPTION 1A - 5 X 33' LOTS (2 STAIRS) 782 m²	OPTION 1B - 5 X 33' LOTS (2 STAIRS) 594 m²	OPTION 2A - 2 X 33' LOTS (2 STAIRS) 336 m²	OPTION 2B - 2 X 33' LOTS (1 STAIR) 325 m²	OPTION 3A - 1 X 50' LOTS (2 STAIRS) 288 m²	OPTION 3B - 1 X 50' LOTS (1 STAIR) 274 m²
	$	$	$			$
Structural	269,700	209,900	126,400	114,300	111,900	97,300
Architectural	1,178,000	967,700	579,100	571,200	510,800	481,100
Mechanical	276,800	225,000	118,900	122,600	101,900	103,600
Electrical	199,100	153,900	85,500	84,200	73,300	70,900
General Conditions (Division 1) & GC/CM Fee	255,900	207,100	121,000	118,600	106,100	100,100
NET BUILDING COST (EXCL. CONTINGENCIES)	**$2,179,500**	**$1,763,600**	**$1,030,900**	**$1,010,900**	**$904,000**	**$853,000**
Design Pricing Contingency	326,900	264,500	154,600	151,600	135,600	128,000
Escalation Contingency (Excluded)	0	0	0	0	0	-
Construction Contingency (Owners CO's) - Excluded	0	0	0	0	0	-
CONSTRUCTION TOTAL (Excluding GST & Soft Costs)	**$2,506,400**	**$2,028,100**	**$1,185,500**	**$1,162,500**	**$1,039,600**	**$981,000**
	$3,205 /m²	**$3,414 /m²**	**$3,528 /m²**	**$3,577 /m²**	**$3,610 /m²**	**$3,580 /m²**

Option 1A: Conventional double-loaded corridor

ELEMENTAL COST ANALYSIS - OPTION 1A TYPICAL FLOOR - 5 X 33' LOTS (2 STAIRS)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 782 m²		
				$	$/m²	%
SUBSTRUCTURE				**0**	**0**	**0%**
Standard Foundations	0	m²	0.00	0	0	
Basement Excavation	0	m^3	0.00	0	0	
STRUCTURE				**269,700**	**345**	**12%**
Lowest Floor Construction	0	m²	0.00	0	0	
Upper Floor Construction	782	m²	332.23	259,800	332	
Stair Construction	36	riser	275.00	9,900	13	
Roof Construction	0	m²	0.00	0	0	
EXTERIOR ENCLOSURE				**370,400**	**474**	**17%**
Walls Below Grade	0	m²	0.00	0	0	
Walls Above Grade	342	m²	550.00	188,100	241	
Structural Walls Above Grade	0	m²	0.00	0	0	
Windows & Entrances	146	m²	750.00	109,500	140	
Exterior Doors	8	lvs.	2,500.00	20,000	26	
Roof Covering	0	m²	0.00	0	0	
Skylights	0	m²	0.00	0	0	
Projections	39	m²	1,353.85	52,800	68	
PARTITIONS & DOORS				**356,300**	**456**	**16%**
Fixed Partitions	1,124	m²	271.33	305,000	390	
Structural Partitions	0	m²	0.00	0	0	
Movable Partitions	0	m²	0.00	0	0	
Interior Doors	54	lvs.	950.00	51,300	66	
FINISHES				**195,300**	**250**	**9%**
Floor Finishes	782	m²	95.01	74,300	95	
Ceiling Finishes	782	m²	104.99	82,100	105	
Wall Finishes	2,590	m²	15.02	38,900	50	
FITTINGS & EQUIPMENT				**256,000**	**327**	**12%**
Metals	782	m²	26.09	20,400	26	
Millwork	782	m²	100.00	78,200	100	
Specialties	782	m²	35.04	27,400	35	
Equipment	782	m²	70.33	55,000	70	
Elevators	2	stop	37,500.00	75,000	96	
MECHANICAL				**276,800**	**354**	**13%**
Plumbing & Drainage	782	m²	159.97	125,100	160	
Fire Protection	782	m²	40.03	31,300	40	
HVAC	782	m²	140.03	109,500	140	
Controls	782	m²	13.94	10,900	14	
ELECTRICAL				**199,100**	**255**	**9%**
Service & Distribution	782	m²	52.56	41,100	53	
Lighting, Devices & Heating	782	m²	150.00	117,300	150	
Systems & Ancillaries	782	m²	52.05	40,700	52	
GENERAL REQUIREMENTS & FEE (BUILDING)				**255,900**	**327**	**12%**
General Requirements (Div.1)			10.0%	192,400	246	
GC/CM Fee			3.0%	63,500	81	
NET BUILDING COST (EXCL. CONTINGENCIES)				**$2,179,500**	**$2,787 /m²**	**100%**

ELEMENTAL COST ANALYSIS - OPTION 1A TYPICAL FLOOR - 5 X 33' LOTS (2 STAIRS)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 782 m²		
				$	$/m²	%
SITEWORK				**0**	**0**	
Site Preparation	0	m²	0.00	0	0	
Hard Surfaces	0	m²	0.00	0	0	
Improvements	0	m²	0.00	0	0	
Landscaping	0	m²	0.00	0	0	
Mechanical Site Services	0	m²	0.00	0	0	
Electrical Site Services	0	m²	0.00	0	0	
ANCILLARY WORK				**0**	**0**	
Demolition	1	Allow	0.00	0	0	
Hazardous Materials Abatement (Allowance)		Excl.	0.00	0	0	
GENERAL REQUIREMENTS & FEE (SITE)				**0**	**0**	
General Requirements (Div.1)			10.0%	0	0	
GC/CM Fee			3.0%	0	0	
CONTINGENCIES				**326,900**	**418**	
Design Pricing Contingency			15.0%	326,900	418	
Escalation Contingency (Excluded)			0.0%	0	0	
Construction Contingency (Owners CO's) - Excluded			0.0%	0	0	
TOTAL ESTIMATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$2,506,400**	**$3,205 /m²**	

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 782 m²

OPTION 1A TYPICAL FLOOR - 5 x 33' LOTS (2 STAIRS)

			$	$/m²	
SUBSTRUCTURE				**0**	**-**	**0%**
Standard Foundations				**0**	**-**	
Not applicable		N/A	-	-		
Basement Excavation				**0**	**-**	
Not applicable		N/A	-	-		
STRUCTURE				**269,700**	**345**	**12%**
Lowest Floor Construction				**0**	**-**	
Not applicable		N/A	-	-		
Upper Floor Construction				**259,800**	**332**	
Wood floor including plywood sheathing and TJI	782	m²	332.20	259,800		
38mm concrete topping						
13mm acoustic mat						
13mm plywood sheathing						
9.5" TJI joists						
Acoustic insulation						
Stair Construction				**9,900**	**13**	
Wood stairs 1.1m wide	36	riser	275.00	9,900		
Roof Construction				**0**	**-**	
Not applicable		N/A	-	-		
EXTERIOR ENCLOSURE				**370,400**	**474**	**17%**
Walls Below Grade				**0**	**-**	
Not applicable		N/A	-	-		
Walls Above Grade				**188,100**	**241**	
Exterior walls (Assume 3.25m high and 70% of total exterior wall area)	342	m²	550.00	188,100		
Structural Walls Above Grade				**0**	**-**	
Included in Walls Above Grade		Note	-	-		
Windows & Entrances				**109,500**	**140**	
Double glazed vinyl windows (Assume 30% of total exterior wall area)	146	m²	750.00	109,500		
Exterior Doors				**20,000**	**26**	
Extra over windows for double glazed sliding doors to balconies	8	no.	2,500.00	20,000		
Roof Covering				**0**	**-**	
Not applicable		N/A	-	-		
Skylights				**0**	**-**	
Not applicable		N/A	-	-		
Projections				**52,800**	**68**	
Balconies	39	m²	700.00	27,300		

ELEMENTAL COST ANALYSIS — **Gross Floor Area: 782 m²**

OPTION 1A TYPICAL FLOOR - 5 x 33' LOTS (2 STAIRS) — $ $/m²

Guardrails	30	m	850.00	25,500			
PARTITIONS & DOORS					**356,300**	**456**	**16%**
Fixed Partitions					**305,000**	**390**	
Interior walls (P7.1)	591	m²	228.90	135,300			
16mm drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.2)	244	m²	261.50	63,800			
16mm Type X drywall		Incl.	-	-			
2x6 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.3)	289	m²	366.40	105,900			
16mm Type X drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Structural Partitions					**0**	**-**	
Included in Fixed Partitions		Note	-	-			
Movable Partitions					**0**	**-**	
Not applicable		N/A	-	-			
Interior Doors					**51,300**	**66**	
Hollow metal doors - single (Stairs)	2	no.	1,700.00	3,400			
Unit entry doors - single (20min FRR)	11	no.	1,550.00	17,100			
Hollow core wood doors - single (Bedrooms, etc.)	41	no.	750.00	30,800			
FINISHES					**195,300**	**250**	**9%**
Floor Finishes					**74,300**	**95**	
Resilient tile flooring	782	m²	95.00	74,300			
Ceiling Finishes					**82,100**	**105**	
GWB ceilings	782	m²	105.00	82,100			
Wall Finishes					**38,900**	**50**	
Paint to walls	2,590	m²	15.00	38,900			
FITTINGS & EQUIPMENT					**256,000**	**327**	**12%**
Metals					**20,400**	**26**	
Stair guardrails	13	m	650.00	8,500			
Stair handrails	13	m	250.00	3,300			

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 782 m²

OPTION 1A TYPICAL FLOOR - 5 x 33' LOTS (2 STAIRS)

					$	$/m²	
Allow for miscellaneous metals (By GFA)	782	m²	11.00	8,600			
Millwork					**78,200**	**100**	
Allow for millwork (By GFA)	782	m²	100.00	78,200			
Specialties					**27,400**	**35**	
Allow for specialties (By GFA)	782	m²	35.00	27,400			
Equipment					**55,000**	**70**	
Allowance for appliances	11	set	5,000.00	55,000			
Elevators					**75,000**	**96**	
Stretcher-sized electric traction elevators	2	stop	37,500.00	75,000			
MECHANICAL					**276,800**	**354**	**13%**
Plumbing & Drainage					**125,100**	**160**	
Allow for plumbing & drainage (By GFA)	782	m²	160.00	125,100			
Fire Protection					**31,300**	**40**	
Allow for fire protection (By GFA)	782	m²	40.00	31,300			
HVAC					**109,500**	**140**	
Allow for HVAC (By GFA)	782	m²	140.00	109,500			
Controls					**10,900**	**14**	
Allow for Controls (By GFA)	782	m²	14.00	10,900			
ELECTRICAL					**199,100**	**255**	**9%**
Service & Distribution					**41,100**	**53**	
Allow for service & distribution (By GFA)	782	m²	52.50	41,100			
Lighting, Devices & Heating					**117,300**	**150**	
Allow for lighting (By GFA)	782	m²	150.00	117,300			
Systems & Ancillaries					**40,700**	**52**	
Allow for systems (By GFA)	782	m²	52.00	40,700			
GENERAL REQUIREMENTS & FEE (BUILDING)					**255,900**	**327**	**12%**
General Requirements (Div.1)	10.0%			192,400			
GC/CM Fee	3.0%			63,500			
NET BUILDING COST (EXCL. CONTINGENCIES)					**$2,179,500**	**$2,787 /m²**	**100%**
SITEWORK					**0**	**-**	
Site Preparation & Civils					**0**	**-**	
Not applicable		N/A	-	-			
Hard Surfaces					**0**	**-**	
Not applicable		N/A	-	-			
Improvements					**0**	**-**	

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** **782** **m²**
OPTION 1A TYPICAL FLOOR - 5 x 33' LOTS (2 STAIRS) — $ — $/m²

Not applicable		N/A	-	-		
Landscaping					**0**	**-**
Not applicable		N/A	-	-		
Mechanical Site Services					**0**	**-**
Not applicable		N/A	-	-		
Electrical Site Services					**0**	**-**
Not applicable		N/A	-	-		
ANCILLARY WORK					**0**	**-**
Demolition					**0**	**-**
Not applicable		N/A	-	-		
Hazardous Materials Abatement					**0**	**-**
Removal of hazardous materials (specialist HazMat costing and survey required) - excluded		Excl.	-	-		
GENERAL REQUIREMENTS AND FEE (SITE)					**0**	**-**
General Requirements (Div.1)	10.0%			-		
GC/CM Fee	3.0%			-		
CONTINGENCIES					**326,900**	**418**
Design Pricing Contingency	15.0%			326,900		
Escalation Contingency (Excluded)	0.0%			-		
Construction Contingency (Owners CO's) - Excluded	0.0%			-		
TOTAL ESTIMATED ESCALATED CONSTRUCTION COST (Excluding GST & Soft Costs)					**$2,506,400**	**$3,205 /m²**

Option 1B: Two connected single-stair blocks

ELEMENTAL COST ANALYSIS - OPTION 1B TYPICAL FLOOR - 5 X 33' LOTS (SINGLE STAIR)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 594 m²		
				$	$/m²	%
SUBSTRUCTURE				**0**	**0**	**0%**
Standard Foundations	0	m²	0.00	0	0	
Basement Excavation	0	m^3	0.00	0	0	
STRUCTURE				**209,900**	**353**	**12%**
Lowest Floor Construction	0	m²	0.00	0	0	
Upper Floor Construction	594	m²	332.15	197,300	332	
Stair Construction	36	riser	350.00	12,600	21	
Roof Construction	0	m²	0.00	0	0	
EXTERIOR ENCLOSURE				**341,600**	**575**	**19%**
Walls Below Grade	0	m²	0.00	0	0	
Walls Above Grade	307	m²	550.16	168,900	284	
Structural Walls Above Grade	0	m²	0.00	0	0	
Windows & Entrances	132	m²	750.00	99,000	167	
Exterior Doors	6	lvs.	2,500.00	15,000	25	
Roof Covering	0	m²	0.00	0	0	
Skylights	0	m²	0.00	0	0	
Projections	45	m²	1,304.44	58,700	99	
PARTITIONS & DOORS				**264,500**	**445**	**15%**
Fixed Partitions	823	m²	275.21	226,500	381	
Structural Partitions	0	m²	0.00	0	0	
Movable Partitions	0	m²	0.00	0	0	
Interior Doors	38	lvs.	1,000.00	38,000	64	
FINISHES				**148,100**	**249**	**8%**
Floor Finishes	594	m²	94.95	56,400	95	
Ceiling Finishes	594	m²	105.05	62,400	105	
Wall Finishes	1,953	m²	15.00	29,300	49	
FITTINGS & EQUIPMENT				**213,500**	**359**	**12%**
Metals	594	m²	30.81	18,300	31	
Millwork	594	m²	100.00	59,400	100	
Specialties	594	m²	35.02	20,800	35	
Equipment	594	m²	67.34	40,000	67	
Elevators	2	stop	37,500.00	75,000	126	
MECHANICAL				**225,000**	**379**	**13%**
Plumbing & Drainage	594	m²	159.93	95,000	160	
Fire Protection	594	m²	45.12	26,800	45	
HVAC	594	m²	159.76	94,900	160	
Controls	594	m²	13.97	8,300	14	
ELECTRICAL				**153,900**	**259**	**9%**
Service & Distribution	594	m²	57.07	33,900	57	
Lighting, Devices & Heating	594	m²	150.00	89,100	150	
Systems & Ancillaries	594	m²	52.02	30,900	52	
GENERAL REQUIREMENTS & FEE (BUILDING)				**207,100**	**349**	**12%**
General Requirements (Div.1)			10.0%	155,700	262	
GC/CM Fee			3.0%	51,400	87	
NET BUILDING COST (EXCL. CONTINGENCIES)				**$1,763,600**	**$2,969 /m²**	**100%**

ELEMENTAL COST ANALYSIS - OPTION 1B TYPICAL FLOOR - 5 X 33' LOTS (SINGLE STAIR)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 594 m²		
				$	$/m²	%
SITEWORK				**0**	**0**	
Site Preparation	0	m²	0.00	0	0	
Hard Surfaces	0	m²	0.00	0	0	
Improvements	0	m²	0.00	0	0	
Landscaping	0	m²	0.00	0	0	
Mechanical Site Services	0	m²	0.00	0	0	
Electrical Site Services	0	m²	0.00	0	0	
ANCILLARY WORK				**0**	**0**	
Demolition	1	Allow	0.00	0	0	
Hazardous Materials Abatement (Allowance)		Excl.	0.00	0	0	
GENERAL REQUIREMENTS & FEE (SITE)				**0**	**0**	
General Requirements (Div.1)			10.0%	0	0	
GC/CM Fee			3.0%	0	0	
CONTINGENCIES				**264,500**	**445**	
Design Pricing Contingency			15.0%	264,500	445	
Escalation Contingency (Excluded)			0.0%	0	0	
Construction Contingency (Owners CO's) - Excluded			0.0%	0	0	
TOTAL ESTIMATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$2,028,100**	**$3,414 /m²**	

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** **594** **m²**

OPTION 1B TYPICAL FLOOR - 5 x 33' LOTS (SINGLE STAIR) — $ / $/m²

SUBSTRUCTURE					**0**	**-**	**0%**
Standard Foundations					**0**	**-**	
Not applicable		N/A	-	-			
Basement Excavation					**0**	**-**	
Not applicable		N/A	-	-			
STRUCTURE					**209,900**	**353**	**12%**
Lowest Floor Construction					**0**	**-**	
Not applicable		N/A	-	-			
Upper Floor Construction					**197,300**	**332**	
Wood floor including plywood sheathing and TJI	594	m²	332.20	197,300			
38mm concrete topping							
13mm acoustic mat							
13mm plywood sheathing							
9.5" TJI joists							
Acoustic insulation							
Stair Construction					**12,600**	**21**	
Non-combustible stairs 1.1m wide	36	riser	350.00	12,600			
Roof Construction					**0**	**-**	
Not applicable		N/A	-	-			
EXTERIOR ENCLOSURE					**341,600**	**575**	**19%**
Walls Below Grade					**0**	**-**	
Not applicable		N/A	-	-			
Walls Above Grade					**168,900**	**284**	
Exterior walls (Assume 3.25m high and 70% of total exterior wall area)	307	m²	550.00	168,900			
Structural Walls Above Grade					**0**	**-**	
Included in Walls Above Grade		Note	-	-			
Windows & Entrances					**99,000**	**167**	
Double glazed vinyl windows (Assume 30% of total exterior wall area)	132	m²	750.00	99,000			
Exterior Doors					**15,000**	**25**	
Extra over windows for double glazed sliding doors to balconies	6	no.	2,500.00	15,000			
Roof Covering					**0**	**-**	
Not applicable		N/A	-	-			
Skylights					**0**	**-**	
Not applicable		N/A	-	-			
Projections					**58,700**	**99**	
Balconies	45	m²	700.00	31,500			

ELEMENTAL COST ANALYSIS **Gross Floor Area:** **594** **m²**

OPTION 1B TYPICAL FLOOR - 5 x 33' LOTS (SINGLE STAIR) $ $/m²

Guardrails	32	m	850.00	27,200			
PARTITIONS & DOORS					**264,500**	**445**	**15%**
Fixed Partitions					**226,500**	**381**	
Interior walls (P7.1)	449	m²	228.90	102,800			
16mm drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.2)	127	m²	261.50	33,200			
16mm Type X drywall		Incl.	-	-			
2x6 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.3)	247	m²	366.40	90,500			
16mm Type X drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Structural Partitions					**0**	**-**	
Included in Fixed Partitions		Note	-	-			
Movable Partitions					**0**	**-**	
Not applicable		N/A	-	-			
Interior Doors					**38,000**	**64**	
Hollow metal doors - single (Stairs)	2	no.	1,700.00	3,400			
Unit entry doors - single (45min FRR)	8	no.	1,700.00	13,600			
Hollow core wood doors - single (Bedrooms, etc.)	28	no.	750.00	21,000			
FINISHES					**148,100**	**249**	**8%**
Floor Finishes					**56,400**	**95**	
Resilient tile flooring	594	m²	95.00	56,400			
Ceiling Finishes					**62,400**	**105**	
GWB ceilings	594	m²	105.00	62,400			
Wall Finishes					**29,300**	**49**	
Paint to walls	1,953	m²	15.00	29,300			
FITTINGS & EQUIPMENT					**213,500**	**359**	**12%**
Metals					**18,300**	**31**	
Stair guardrails	13	m	650.00	8,500			
Stair handrails	13	m	250.00	3,300			

ELEMENTAL COST ANALYSIS — **Gross Floor Area: 594 m²**

OPTION 1B TYPICAL FLOOR - 5 x 33' LOTS (SINGLE STAIR) — $ | $/m²

Allow for miscellaneous metals (By GFA)	594	m²	11.00	6,500			
Millwork					**59,400**	**100**	
Allow for millwork (By GFA)	594	m²	100.00	59,400			
Specialties					**20,800**	**35**	
Allow for specialties (By GFA)	594	m²	35.00	20,800			
Equipment					**40,000**	**67**	
Allowance for appliances	8	set	5,000.00	40,000			
Elevators					**75,000**	**126**	
Stretcher-sized electric traction elevators	2	stop	37,500.00	75,000			
MECHANICAL					**225,000**	**379**	**13%**
Plumbing & Drainage					**95,000**	**160**	
Allow for plumbing & drainage (By GFA)	594	m²	160.00	95,000			
Fire Protection					**26,800**	**45**	
Allow for fire protection (By GFA)	594	m²	40.00	23,800			
Sprinkler protection to landing	2	no.	1,500.00	3,000			
HVAC					**94,900**	**160**	
Allow for HVAC (By GFA)	594	m²	159.70	94,900			
Controls					**8,300**	**14**	
Allow for Controls (By GFA)	594	m²	14.00	8,300			
ELECTRICAL					**153,900**	**259**	**9%**
Service & Distribution					**33,900**	**57**	
Allow for service & distribution (By GFA)	594	m²	57.10	33,900			
Lighting, Devices & Heating					**89,100**	**150**	
Allow for lighting (By GFA)	594	m²	150.00	89,100			
Systems & Ancillaries					**30,900**	**52**	
Allow for systems (By GFA)	594	m²	52.00	30,900			
GENERAL REQUIREMENTS & FEE (BUILDING)					**207,100**	**349**	**12%**
General Requirements (Div.1)	10.0%			155,700			
GC/CM Fee	3.0%			51,400			
NET BUILDING COST (EXCL. CONTINGENCIES)					**$1,763,600**	**$2,969 /m²**	**100%**
SITEWORK					**0**	**-**	
Site Preparation & Civils					**0**	**-**	
Not applicable		N/A	-	-			
Hard Surfaces					**0**	**-**	
Not applicable		N/A	-	-			

ELEMENTAL COST ANALYSIS — **Gross Floor Area: 594 m²**

OPTION 1B TYPICAL FLOOR - 5 x 33' LOTS (SINGLE STAIR) — $ / $/m²

Improvements				**0**	**-**
Not applicable		N/A	- -		
Landscaping				**0**	**-**
Not applicable		N/A	- -		
Mechanical Site Services				**0**	**-**
Not applicable		N/A	- -		
Electrical Site Services				**0**	**-**
Not applicable		N/A	- -		
ANCILLARY WORK				**0**	**-**
Demolition				**0**	**-**
Not applicable		N/A	- -		
Hazardous Materials Abatement				**0**	**-**
Removal of hazardous materials (specialist HazMat costing and survey required) - excluded		Excl.	- -		
GENERAL REQUIREMENTS AND FEE (SITE)				**0**	**-**
General Requirements (Div.1)	10.0%		-		
GC/CM Fee	3.0%		-		
CONTINGENCIES				**264,500**	**445**
Design Pricing Contingency	15.0%		264,500		
Escalation Contingency (Excluded)	0.0%		-		
Construction Contingency (Owners CO's) - Excluded	0.0%		-		
TOTAL ESTIMATED ESCALATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$2,028,100**	**$3,414 /m²**

Option 2A: Two-stair option with exterior steel stair

ELEMENTAL COST ANALYSIS - OPTION 2A TYPICAL FLOOR - 2 X 33' LOTS (2 STAIRS)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 336 m²		
				$	$/m²	%
SUBSTRUCTURE				**0**	**0**	**0%**
Standard Foundations	0	m²	0.00	0	0	
Basement Excavation	0	m^3	0.00	0	0	
STRUCTURE				**126,400**	**376**	**12%**
Lowest Floor Construction	0	m²	0.00	0	0	
Upper Floor Construction	336	m²	332.14	111,600	332	
Stair Construction	18	riser	822.22	14,800	44	
Roof Construction	0	m²	0.00	0	0	
EXTERIOR ENCLOSURE				**233,500**	**695**	**23%**
Walls Below Grade	0	m²	0.00	0	0	
Walls Above Grade	183	m²	550.27	100,700	300	
Structural Walls Above Grade	0	m²	0.00	0	0	
Windows & Entrances	79	m²	750.63	59,300	176	
Exterior Doors	5	lvs.	2,340.00	11,700	35	
Roof Covering	0	m²	0.00	0	0	
Skylights	0	m²	0.00	0	0	
Projections	47	m²	1,314.89	61,800	184	
PARTITIONS & DOORS				**138,300**	**412**	**13%**
Fixed Partitions	471	m²	256.05	120,600	359	
Structural Partitions	0	m²	0.00	0	0	
Movable Partitions	0	m²	0.00	0	0	
Interior Doors	18	lvs.	983.33	17,700	53	
FINISHES				**84,100**	**250**	**8%**
Floor Finishes	336	m²	94.94	31,900	95	
Ceiling Finishes	336	m²	105.06	35,300	105	
Wall Finishes	1,125	m²	15.02	16,900	50	
FITTINGS & EQUIPMENT				**123,200**	**367**	**12%**
Metals	336	m²	60.42	20,300	60	
Millwork	336	m²	100.00	33,600	100	
Specialties	336	m²	35.12	11,800	35	
Equipment	336	m²	59.52	20,000	60	
Elevators	1	stop	37,500.00	37,500	112	
MECHANICAL				**118,900**	**354**	**12%**
Plumbing & Drainage	336	m²	160.12	53,800	160	
Fire Protection	336	m²	39.88	13,400	40	
HVAC	336	m²	139.88	47,000	140	
Controls	336	m²	13.99	4,700	14	
ELECTRICAL				**85,500**	**254**	**8%**
Service & Distribution	336	m²	52.38	17,600	52	
Lighting, Devices & Heating	336	m²	150.00	50,400	150	
Systems & Ancillaries	336	m²	52.08	17,500	52	
GENERAL REQUIREMENTS & FEE (BUILDING)				**121,000**	**360**	**12%**
General Requirements (Div.1)			10.0%	91,000	271	
GC/CM Fee			3.0%	30,000	89	
NET BUILDING COST (EXCL. CONTINGENCIES)				**$1,030,900**	**$3,068 /m²**	**100%**

ELEMENTAL COST ANALYSIS - OPTION 2A TYPICAL FLOOR - 2 X 33' LOTS (2 STAIRS)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA =	336 m²
				$	$/m² %
SITEWORK				**0**	**0**
Site Preparation	0	m²	0.00	0	0
Hard Surfaces	0	m²	0.00	0	0
Improvements	0	m²	0.00	0	0
Landscaping	0	m²	0.00	0	0
Mechanical Site Services	0	m²	0.00	0	0
Electrical Site Services	0	m²	0.00	0	0
ANCILLARY WORK				**0**	**0**
Demolition	1	Allow	0.00	0	0
Hazardous Materials Abatement (Allowance)		Excl.	0.00	0	0
GENERAL REQUIREMENTS & FEE (SITE)				**0**	**0**
General Requirements (Div.1)			10.0%	0	0
GC/CM Fee			3.0%	0	0
CONTINGENCIES				**154,600**	**460**
Design Pricing Contingency			15.0%	154,600	460
Escalation Contingency (Excluded)			0.0%	0	0
Construction Contingency (Owners CO's) - Excluded			0.0%	0	0
TOTAL ESTIMATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$1,185,500**	**$3,528 /m²**

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 336 m²

OPTION 2A TYPICAL FLOOR - 2 x 33' LOTS (2 STAIRS)

				$	$/m²	%
SUBSTRUCTURE				**0**	**-**	**0%**
Standard Foundations				**0**	**-**	
Not applicable		N/A	-	-		
Basement Excavation				**0**	**-**	
Not applicable		N/A	-	-		
STRUCTURE				**126,400**	**376**	**12%**
Lowest Floor Construction				**0**	**-**	
Not applicable		N/A	-	-		
Upper Floor Construction				**111,600**	**332**	
Wood floor including plywood sheathing and TJI	336	m²	332.20	111,600		
38mm concrete topping						
13mm acoustic mat						
13mm plywood sheathing						
9.5" TJI joists						
Acoustic insulation						
Stair Construction				**14,800**	**44**	
Wood stairs 1.1m wide	18	riser	275.00	5,000		
Exterior steel stairs 1.1m wide	18	riser	350.00	6,300		
Steel stair landings	5	m²	700.00	3,500		
Roof Construction				**0**	**-**	
Not applicable		N/A	-	-		
EXTERIOR ENCLOSURE				**233,500**	**695**	**23%**
Walls Below Grade				**0**	**-**	
Not applicable		N/A	-	-		
Walls Above Grade				**100,700**	**300**	
Exterior walls (Assume 3.25m high and 70% of total exterior wall area)	183	m²	550.00	100,700		
Structural Walls Above Grade				**0**	**-**	
Included in Walls Above Grade		Note	-	-		
Windows & Entrances				**59,300**	**176**	
Double glazed vinyl windows (Assume 30% of total exterior wall area)	79	m²	750.00	59,300		
Exterior Doors				**11,700**	**35**	
Extra over windows for double glazed sliding doors to balconies	4	no.	2,500.00	10,000		
Hollow metal doors - single (Exterior stairs)	1	no.	1,700.00	1,700		
Roof Covering				**0**	**-**	
Not applicable		N/A	-	-		
Skylights				**0**	**-**	
Not applicable		N/A	-	-		

ELEMENTAL COST ANALYSIS **Gross Floor Area:** **336** **m²**
OPTION 2A TYPICAL FLOOR - 2 x 33' LOTS (2 STAIRS) $ $/m²

Projections					**61,800**	**184**	
Balconies	47	m²	700.00	32,900			
Guardrails	34	m	850.00	28,900			
PARTITIONS & DOORS					**138,300**	**412**	**13%**
Fixed Partitions					**120,600**	**359**	
Interior walls (P7.1)	289	m²	228.90	66,200			
16mm drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.2)	117	m²	261.50	30,600			
16mm Type X drywall		Incl.	-	-			
2x6 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.3)	65	m²	366.40	23,800			
16mm Type X drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Structural Partitions					**0**	**-**	
Included in Fixed Partitions		Note	-	-			
Movable Partitions					**0**	**-**	
Not applicable		N/A	-	-			
Interior Doors					**17,700**	**53**	
Hollow metal doors - single (Stairs)	1	no.	1,700.00	1,700			
Unit entry doors - single (20min FRR)	4	no.	1,550.00	6,200			
Hollow core wood doors - single (Bedrooms, etc.)	13	no.	750.00	9,800			
FINISHES					**84,100**	**250**	**8%**
Floor Finishes					**31,900**	**95**	
Resilient tile flooring	336	m²	95.00	31,900			
Ceiling Finishes					**35,300**	**105**	
GWB ceilings	336	m²	105.00	35,300			
Wall Finishes					**16,900**	**50**	
Paint to walls	1,125	m²	15.00	16,900			
FITTINGS & EQUIPMENT					**123,200**	**367**	**12%**

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 336 m²

OPTION 2A TYPICAL FLOOR - 2 x 33' LOTS (2 STAIRS)

					$	$/m²	
Metals					**20,300**	**60**	
Stair guardrails	22	m	650.00	14,300			
Stair handrails	9	m	250.00	2,300			
Allow for miscellaneous metals (By GFA)	336	m²	11.00	3,700			
Millwork					**33,600**	**100**	
Allow for millwork (By GFA)	336	m²	100.00	33,600			
Specialties					**11,800**	**35**	
Allow for specialties (By GFA)	336	m²	35.00	11,800			
Equipment					**20,000**	**60**	
Allowance for appliances	4	set	5,000.00	20,000			
Elevators					**37,500**	**112**	
Stretcher-sized electric traction elevators	1	stop	37,500.00	37,500			
MECHANICAL					**118,900**	**354**	**12%**
Plumbing & Drainage					**53,800**	**160**	
Allow for plumbing & drainage (By GFA)	336	m²	160.00	53,800			
Fire Protection					**13,400**	**40**	
Allow for fire protection (By GFA)	336	m²	40.00	13,400			
HVAC					**47,000**	**140**	
Allow for HVAC (By GFA)	336	m²	140.00	47,000			
Controls					**4,700**	**14**	
Allow for Controls (By GFA)	336	m²	14.00	4,700			
ELECTRICAL					**85,500**	**254**	**8%**
Service & Distribution					**17,600**	**52**	
Allow for service & distribution (By GFA)	336	m²	52.50	17,600			
Lighting, Devices & Heating					**50,400**	**150**	
Allow for lighting (By GFA)	336	m²	150.00	50,400			
Systems & Ancillaries					**17,500**	**52**	
Allow for systems (By GFA)	336	m²	52.00	17,500			
GENERAL REQUIREMENTS & FEE (BUILDING)					**121,000**	**360**	**12%**
General Requirements (Div.1)	10.0%			91,000			
GC/CM Fee	3.0%			30,000			
NET BUILDING COST (EXCL. CONTINGENCIES)					**$1,030,900**	**$3,068 /m²**	**100%**
SITEWORK					**0**	**-**	
Site Preparation & Civils					**0**	**-**	
Not applicable		N/A	-	-			
Hard Surfaces					**0**	**-**	

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** **336** **m²**
OPTION 2A TYPICAL FLOOR - 2 x 33' LOTS (2 STAIRS) — $ — $/m²

Not applicable		N/A	-	-		
Improvements					**0**	**-**
Not applicable		N/A	-	-		
Landscaping					**0**	**-**
Not applicable		N/A	-	-		
Mechanical Site Services					**0**	**-**
Not applicable		N/A	-	-		
Electrical Site Services					**0**	**-**
Not applicable		N/A	-	-		
ANCILLARY WORK					**0**	**-**
Demolition					**0**	**-**
Not applicable		N/A	-	-		
Hazardous Materials Abatement					**0**	**-**
Removal of hazardous materials (specialist HazMat costing and survey required) - excluded		Excl.	-	-		
GENERAL REQUIREMENTS AND FEE (SITE)					**0**	**-**
General Requirements (Div.1)	10.0%			-		
GC/CM Fee	3.0%			-		
CONTINGENCIES					**154,600**	**460**
Design Pricing Contingency	15.0%			154,600		
Escalation Contingency (Excluded)	0.0%			-		
Construction Contingency (Owners CO's) - Excluded	0.0%			-		
TOTAL ESTIMATED ESCALATED CONSTRUCTION COST (Excluding GST & Soft Costs)					**$1,185,500**	**$3,528 /m²**

Option 2B: Single-stair block

ELEMENTAL COST ANALYSIS - OPTION 2B TYPICAL FLOOR - 2 X 33' LOTS (SINGLE STAIR)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 325 m²		
				$	$/m²	%
SUBSTRUCTURE				**0**	**0**	**0%**
Standard Foundations	0	m²	0.00	0	0	
Basement Excavation	0	m^3	0.00	0	0	
STRUCTURE				**114,300**	**352**	**11%**
Lowest Floor Construction	0	m²	0.00	0	0	
Upper Floor Construction	325	m²	332.31	108,000	332	
Stair Construction	18	riser	350.00	6,300	19	
Roof Construction	0	m²	0.00	0	0	
EXTERIOR ENCLOSURE				**231,800**	**713**	**23%**
Walls Below Grade	0	m²	0.00	0	0	
Walls Above Grade	183	m²	550.27	100,700	310	
Structural Walls Above Grade	0	m²	0.00	0	0	
Windows & Entrances	79	m²	750.63	59,300	182	
Exterior Doors	4	lvs.	2,500.00	10,000	31	
Roof Covering	0	m²	0.00	0	0	
Skylights	0	m²	0.00	0	0	
Projections	47	m²	1,314.89	61,800	190	
PARTITIONS & DOORS				**146,200**	**450**	**14%**
Fixed Partitions	487	m²	258.11	125,700	387	
Structural Partitions	0	m²	0.00	0	0	
Movable Partitions	0	m²	0.00	0	0	
Interior Doors	21	lvs.	976.19	20,500	63	
FINISHES				**82,400**	**254**	**8%**
Floor Finishes	325	m²	95.08	30,900	95	
Ceiling Finishes	325	m²	104.92	34,100	105	
Wall Finishes	1,157	m²	15.04	17,400	54	
FITTINGS & EQUIPMENT				**110,800**	**341**	**11%**
Metals	325	m²	28.92	9,400	29	
Millwork	325	m²	100.00	32,500	100	
Specialties	325	m²	35.08	11,400	35	
Equipment	325	m²	61.54	20,000	62	
Elevators	1	stop	37,500.00	37,500	115	
MECHANICAL				**122,600**	**377**	**12%**
Plumbing & Drainage	325	m²	160.00	52,000	160	
Fire Protection	325	m²	44.62	14,500	45	
HVAC	325	m²	158.46	51,500	158	
Controls	325	m²	14.15	4,600	14	
ELECTRICAL				**84,200**	**259**	**8%**
Service & Distribution	325	m²	56.92	18,500	57	
Lighting, Devices & Heating	325	m²	150.15	48,800	150	
Systems & Ancillaries	325	m²	52.00	16,900	52	
GENERAL REQUIREMENTS & FEE (BUILDING)				**118,600**	**365**	**12%**
General Requirements (Div.1)			10.0%	89,200	274	
GC/CM Fee			3.0%	29,400	90	
NET BUILDING COST (EXCL. CONTINGENCIES)				**$1,010,900**	**$3,110 /m²**	**100%**

ELEMENTAL COST ANALYSIS - OPTION 2B TYPICAL FLOOR - 2 X 33' LOTS (SINGLE STAIR)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA =	325 m²
				$	$/m² %
SITEWORK				**0**	**0**
Site Preparation	0	m²	0.00	0	0
Hard Surfaces	0	m²	0.00	0	0
Improvements	0	m²	0.00	0	0
Landscaping	0	m²	0.00	0	0
Mechanical Site Services	0	m²	0.00	0	0
Electrical Site Services	0	m²	0.00	0	0
ANCILLARY WORK				**0**	**0**
Demolition	1	Allow	0.00	0	0
Hazardous Materials Abatement (Allowance)		Excl.	0.00	0	0
GENERAL REQUIREMENTS & FEE (SITE)				**0**	**0**
General Requirements (Div.1)			10.0%	0	0
GC/CM Fee			3.0%	0	0
CONTINGENCIES				**151,600**	**466**
Design Pricing Contingency			15.0%	151,600	466
Escalation Contingency (Excluded)			0.0%	0	0
Construction Contingency (Owners CO's) - Excluded			0.0%	0	0
TOTAL ESTIMATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$1,162,500**	**$3,577 /m²**

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 325 m²

OPTION 2B TYPICAL FLOOR - 2 x 33' LOTS (SINGLE STAIR)

				$	$/m²	%
SUBSTRUCTURE				**0**	**-**	**0%**
Standard Foundations				**0**	**-**	
Not applicable		N/A	-	-		
Basement Excavation				**0**	**-**	
Not applicable		N/A	-	-		
STRUCTURE				**114,300**	**352**	**11%**
Lowest Floor Construction				**0**	**-**	
Not applicable		N/A	-	-		
Upper Floor Construction				**108,000**	**332**	
Wood floor including plywood sheathing and TJI	325	m²	332.20	108,000		
38mm concrete topping						
13mm acoustic mat						
13mm plywood sheathing						
9.5" TJI joists						
Acoustic insulation						
Stair Construction				**6,300**	**19**	
Non-combustible stairs 1.1m wide	18	riser	350.00	6,300		
Roof Construction				**0**	**-**	
Not applicable		N/A	-	-		
EXTERIOR ENCLOSURE				**231,800**	**713**	**23%**
Walls Below Grade				**0**	**-**	
Not applicable		N/A	-	-		
Walls Above Grade				**100,700**	**310**	
Exterior walls (Assume 3.25m high and 70% of total exterior wall area)	183	m²	550.00	100,700		
Structural Walls Above Grade				**0**	**-**	
Included in Walls Above Grade		Note	-	-		
Windows & Entrances				**59,300**	**182**	
Double glazed vinyl windows (Assume 30% of total exterior wall area)	79	m²	750.00	59,300		
Exterior Doors				**10,000**	**31**	
Extra over windows for double glazed sliding doors to balconies	4	no.	2,500.00	10,000		
Roof Covering				**0**	**-**	
Not applicable		N/A	-	-		
Skylights				**0**	**-**	
Not applicable		N/A	-	-		
Projections				**61,800**	**190**	
Balconies	47	m²	700.00	32,900		

ELEMENTAL COST ANALYSIS **Gross Floor Area:** **325** **m²**

OPTION 2B TYPICAL FLOOR - 2 x 33' LOTS (SINGLE STAIR) $ $/m²

Guardrails	34	m	850.00	28,900			
PARTITIONS & DOORS					**146,200**	**450**	**14%**
Fixed Partitions					**125,700**	**387**	
Interior walls (P7.1)	312	m²	228.90	71,400			
16mm drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.2)	94	m²	261.50	24,600			
16mm Type X drywall		Incl.	-	-			
2x6 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.3)	81	m²	366.40	29,700			
16mm Type X drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Structural Partitions					**0**	**-**	
Included in Fixed Partitions		Note	-	-			
Movable Partitions					**0**	**-**	
Not applicable		N/A	-	-			
Interior Doors					**20,500**	**63**	
Hollow metal doors - single (Stairs)	1	no.	1,700.00	1,700			
Unit entry doors - single (45min FRR)	4	no.	1,700.00	6,800			
Hollow core wood doors - single (Bedrooms, etc.)	16	no.	750.00	12,000			
FINISHES					**82,400**	**254**	**8%**
Floor Finishes					**30,900**	**95**	
Resilient tile flooring	325	m²	95.00	30,900			
Ceiling Finishes					**34,100**	**105**	
GWB ceilings	325	m²	105.00	34,100			
Wall Finishes					**17,400**	**54**	
Paint to walls	1,157	m²	15.00	17,400			
FITTINGS & EQUIPMENT					**110,800**	**341**	**11%**
Metals					**9,400**	**29**	
Stair guardrails	7	m	650.00	4,200			
Stair handrails	7	m	250.00	1,600			

ELEMENTAL COST ANALYSIS — **Gross Floor Area: 325 m²**

OPTION 2B TYPICAL FLOOR - 2 x 33' LOTS (SINGLE STAIR) — $ | $/m²

Allow for miscellaneous metals (By GFA)	325	m²	11.00	3,600			
Millwork					**32,500**	**100**	
Allow for millwork (By GFA)	325	m²	100.00	32,500			
Specialties					**11,400**	**35**	
Allow for specialties (By GFA)	325	m²	35.00	11,400			
Equipment					**20,000**	**62**	
Allowance for appliances	4	set	5,000.00	20,000			
Elevators					**37,500**	**115**	
Stretcher-sized electric traction elevators	1	stop	37,500.00	37,500			
MECHANICAL					**122,600**	**377**	**12%**
Plumbing & Drainage					**52,000**	**160**	
Allow for plumbing & drainage (By GFA)	325	m²	160.00	52,000			
Fire Protection					**14,500**	**45**	
Allow for fire protection (By GFA)	325	m²	40.00	13,000			
Sprinkler protection to landing	1	no.	1,500.00	1,500			
HVAC					**51,500**	**158**	
Allow for HVAC (By GFA)	325	m²	158.50	51,500			
Controls					**4,600**	**14**	
Allow for Controls (By GFA)	325	m²	14.00	4,600			
ELECTRICAL					**84,200**	**259**	**8%**
Service & Distribution					**18,500**	**57**	
Allow for service & distribution (By GFA)	325	m²	56.80	18,500			
Lighting, Devices & Heating					**48,800**	**150**	
Allow for lighting (By GFA)	325	m²	150.00	48,800			
Systems & Ancillaries					**16,900**	**52**	
Allow for systems (By GFA)	325	m²	52.00	16,900			
GENERAL REQUIREMENTS & FEE (BUILDING)					**118,600**	**365**	**12%**
General Requirements (Div.1)	10.0%			89,200			
GC/CM Fee	3.0%			29,400			
NET BUILDING COST (EXCL. CONTINGENCIES)					**$1,010,900**	**$3,110 /m²**	**100%**
SITEWORK					**0**	**-**	
Site Preparation & Civils					**0**	**-**	
Not applicable		N/A	-	-			
Hard Surfaces					**0**	**-**	
Not applicable		N/A	-	-			

ELEMENTAL COST ANALYSIS — **Gross Floor Area: 325 m²**

OPTION 2B TYPICAL FLOOR - 2 x 33' LOTS (SINGLE STAIR)

				$	$/m²
Improvements				**0**	**-**
Not applicable	N/A	-	-		
Landscaping				**0**	**-**
Not applicable	N/A	-	-		
Mechanical Site Services				**0**	**-**
Not applicable	N/A	-	-		
Electrical Site Services				**0**	**-**
Not applicable	N/A	-	-		
ANCILLARY WORK				**0**	**-**
Demolition				**0**	**-**
Not applicable	N/A	-	-		
Hazardous Materials Abatement				**0**	**-**
Removal of hazardous materials (specialist HazMat costing and survey required) - excluded	Excl.	-	-		
GENERAL REQUIREMENTS AND FEE (SITE)				**0**	**-**
General Requirements (Div.1)	10.0%		-		
GC/CM Fee	3.0%		-		
CONTINGENCIES				**151,600**	**466**
Design Pricing Contingency	15.0%		151,600		
Escalation Contingency (Excluded)	0.0%		-		
Construction Contingency (Owners CO's) - Excluded	0.0%		-		
TOTAL ESTIMATED ESCALATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$1,162,500**	**$3,577 /m²**

Option 3A: Two-stair option with exterior steel stair

ELEMENTAL COST ANALYSIS - OPTION 3A TYPICAL FLOOR - 1 X 50' LOTS (2 STAIRS)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 288 m²		
				$	$/m²	%
SUBSTRUCTURE				**0**	**0**	**0%**
Standard Foundations	0	m²	0.00	0	0	
Basement Excavation	0	m^3	0.00	0	0	
STRUCTURE				**111,900**	**389**	**12%**
Lowest Floor Construction	0	m²	0.00	0	0	
Upper Floor Construction	288	m²	332.29	95,700	332	
Stair Construction	18	riser	900.00	16,200	56	
Roof Construction	0	m²	0.00	0	0	
EXTERIOR ENCLOSURE				**190,300**	**661**	**21%**
Walls Below Grade	0	m²	0.00	0	0	
Walls Above Grade	90	m²	1,172.22	105,500	366	
Structural Walls Above Grade	0	m²	0.00	0	0	
Windows & Entrances	22	m²	750.00	16,500	57	
Exterior Doors	5	lvs.	2,340.00	11,700	41	
Roof Covering	0	m²	0.00	0	0	
Skylights	0	m²	0.00	0	0	
Projections	48	m²	1,179.17	56,600	197	
PARTITIONS & DOORS				**133,100**	**462**	**15%**
Fixed Partitions	364	m²	319.23	116,200	403	
Structural Partitions	0	m²	0.00	0	0	
Movable Partitions	0	m²	0.00	0	0	
Interior Doors	17	lvs.	994.12	16,900	59	
FINISHES				**72,000**	**250**	**8%**
Floor Finishes	288	m²	95.14	27,400	95	
Ceiling Finishes	288	m²	104.86	30,200	105	
Wall Finishes	958	m²	15.03	14,400	50	
FITTINGS & EQUIPMENT				**115,400**	**401**	**13%**
Metals	288	m²	65.97	19,000	66	
Millwork	288	m²	100.00	28,800	100	
Specialties	288	m²	35.07	10,100	35	
Equipment	288	m²	69.44	20,000	69	
Elevators	1	stop	37,500.00	37,500	130	
MECHANICAL				**101,900**	**354**	**11%**
Plumbing & Drainage	288	m²	160.07	46,100	160	
Fire Protection	288	m²	39.93	11,500	40	
HVAC	288	m²	139.93	40,300	140	
Controls	288	m²	13.89	4,000	14	
ELECTRICAL				**73,300**	**255**	**8%**
Service & Distribution	288	m²	52.43	15,100	52	
Lighting, Devices & Heating	288	m²	150.00	43,200	150	
Systems & Ancillaries	288	m²	52.08	15,000	52	
GENERAL REQUIREMENTS & FEE (BUILDING)				**106,100**	**368**	**12%**
General Requirements (Div.1)			10.0%	79,800	277	
GC/CM Fee			3.0%	26,300	91	
NET BUILDING COST (EXCL. CONTINGENCIES)				**$904,000**	**$3,139 /m²**	**100%**

ELEMENTAL COST ANALYSIS - OPTION 3A TYPICAL FLOOR - 1 X 50' LOTS (2 STAIRS)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 288 m²	
				$	$/m² %
SITEWORK				**0**	**0**
Site Preparation	0	m²	0.00	0	0
Hard Surfaces	0	m²	0.00	0	0
Improvements	0	m²	0.00	0	0
Landscaping	0	m²	0.00	0	0
Mechanical Site Services	0	m²	0.00	0	0
Electrical Site Services	0	m²	0.00	0	0
ANCILLARY WORK				**0**	**0**
Demolition	1	Allow	0.00	0	0
Hazardous Materials Abatement (Allowance)		Excl.	0.00	0	0
GENERAL REQUIREMENTS & FEE (SITE)				**0**	**0**
General Requirements (Div.1)			10.0%	0	0
GC/CM Fee			3.0%	0	0
CONTINGENCIES				**135,600**	**471**
Design Pricing Contingency			15.0%	135,600	471
Escalation Contingency (Excluded)			0.0%	0	0
Construction Contingency (Owners CO's) - Excluded			0.0%	0	0
TOTAL ESTIMATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$1,039,600**	**$3,610 /m²**

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 288 m²
OPTION 3A TYPICAL FLOOR - 1 x 50' LOTS (2 STAIRS)

			$	$/m²	
SUBSTRUCTURE				**0**	**-**	**0%**
Standard Foundations				**0**	**-**	
Not applicable		N/A	-	-		
Basement Excavation				**0**	**-**	
Not applicable		N/A	-	-		
STRUCTURE				**111,900**	**389**	**12%**
Lowest Floor Construction				**0**	**-**	
Not applicable		N/A	-	-		
Upper Floor Construction				**95,700**	**332**	
Wood floor including plywood sheathing and TJI	288	m²	332.20	95,700		
38mm concrete topping						
13mm acoustic mat						
13mm plywood sheathing						
9.5" TJI joists						
Acoustic insulation						
Stair Construction				**16,200**	**56**	
Wood stairs 1.1m wide	18	riser	275.00	5,000		
Exterior steel stairs 1.1m wide	18	riser	350.00	6,300		
Steel stair landings	7	m²	700.00	4,900		
Roof Construction				**0**	**-**	
Not applicable		N/A	-	-		
EXTERIOR ENCLOSURE				**190,300**	**661**	**21%**
Walls Below Grade				**0**	**-**	
Not applicable		N/A	-	-		
Walls Above Grade				**105,500**	**366**	
Exterior walls	90	m²	550.00	49,500		
CMU party walls	140	m²	400.00	56,000		
Structural Walls Above Grade				**0**	**-**	
Included in Walls Above Grade		Note	-	-		
Windows & Entrances				**16,500**	**57**	
Double glazed vinyl windows	22	m²	750.00	16,500		
Exterior Doors				**11,700**	**41**	
Extra over windows for double glazed sliding doors to balconies	4	no.	2,500.00	10,000		
Hollow metal doors - single (Exterior stairs)	1	no.	1,700.00	1,700		
Roof Covering				**0**	**-**	
Not applicable		N/A	-	-		
Skylights				**0**	**-**	
Not applicable		N/A	-	-		

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** **288** **m²**

OPTION 3A TYPICAL FLOOR - 1 x 50' LOTS (2 STAIRS)

					$	$/m²	
Projections					**56,600**	**197**	
Balconies	48	m²	700.00	33,600			
Guardrails	27	m	850.00	23,000			
PARTITIONS & DOORS					**133,100**	**462**	**15%**
Fixed Partitions					**116,200**	**403**	
Interior walls (P7.1)	169	m²	228.90	38,700			
16mm drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.2)	140	m²	261.50	36,600			
16mm Type X drywall		Incl.	-	-			
2x6 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.3)	55	m²	366.40	20,200			
16mm Type X drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Furring to CMU party walls	140	m²	148.20	20,700			
Structural Partitions					**0**	**-**	
Included in Fixed Partitions		Note	-	-			
Movable Partitions					**0**	**-**	
Not applicable		N/A	-	-			
Interior Doors					**16,900**	**59**	
Hollow metal doors - single (Stairs)	1	no.	1,700.00	1,700			
Unit entry doors - single (20min FRR)	4	no.	1,550.00	6,200			
Hollow core wood doors - single (Bedrooms, etc.)	12	no.	750.00	9,000			
FINISHES					**72,000**	**250**	**8%**
Floor Finishes					**27,400**	**95**	
Resilient tile flooring	288	m²	95.00	27,400			
Ceiling Finishes					**30,200**	**105**	
GWB ceilings	288	m²	105.00	30,200			
Wall Finishes					**14,400**	**50**	
Paint to walls	958	m²	15.00	14,400			
FITTINGS & EQUIPMENT					**115,400**	**401**	**13%**

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** **288** **m²**

OPTION 3A TYPICAL FLOOR - 1 x 50' LOTS (2 STAIRS) — $ $/m²

Metals					**19,000**	**66**	
Stair guardrails	22	m	650.00	14,300			
Stair handrails	6	m	250.00	1,500			
Allow for miscellaneous metals (By GFA)	288	m²	11.00	3,200			
Millwork					**28,800**	**100**	
Allow for millwork (By GFA)	288	m²	100.00	28,800			
Specialties					**10,100**	**35**	
Allow for specialties (By GFA)	288	m²	35.00	10,100			
Equipment					**20,000**	**69**	
Allowance for appliances	4	set	5,000.00	20,000			
Elevators					**37,500**	**130**	
Stretcher-sized electric traction elevators	1	stop	37,500.00	37,500			
MECHANICAL					**101,900**	**354**	**11%**
Plumbing & Drainage					**46,100**	**160**	
Allow for plumbing & drainage (By GFA)	288	m²	160.00	46,100			
Fire Protection					**11,500**	**40**	
Allow for fire protection (By GFA)	288	m²	40.00	11,500			
HVAC					**40,300**	**140**	
Allow for HVAC (By GFA)	288	m²	140.00	40,300			
Controls					**4,000**	**14**	
Allow for Controls (By GFA)	288	m²	14.00	4,000			
ELECTRICAL					**73,300**	**255**	**8%**
Service & Distribution					**15,100**	**52**	
Allow for service & distribution (By GFA)	288	m²	52.50	15,100			
Lighting, Devices & Heating					**43,200**	**150**	
Allow for lighting (By GFA)	288	m²	150.00	43,200			
Systems & Ancillaries					**15,000**	**52**	
Allow for systems (By GFA)	288	m²	52.00	15,000			
GENERAL REQUIREMENTS & FEE (BUILDING)					**106,100**	**368**	**12%**
General Requirements (Div.1)	10.0%			79,800			
GC/CM Fee	3.0%			26,300			
NET BUILDING COST (EXCL. CONTINGENCIES)					**$904,000**	**$3,139 /m²**	**100%**
SITEWORK					**0**	**-**	
Site Preparation & Civils					**0**	**-**	
Not applicable		N/A	-	-			

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** **288** **m²**

OPTION 3A TYPICAL FLOOR - 1 x 50' LOTS (2 STAIRS) — $ / $/m²

Hard Surfaces					**0**	**-**
Not applicable		N/A	-	-		
Improvements					**0**	**-**
Not applicable		N/A	-	-		
Landscaping					**0**	**-**
Not applicable		N/A	-	-		
Mechanical Site Services					**0**	**-**
Not applicable		N/A	-	-		
Electrical Site Services					**0**	**-**
Not applicable		N/A	-	-		
ANCILLARY WORK					**0**	**-**
Demolition					**0**	**-**
Not applicable		N/A	-	-		
Hazardous Materials Abatement					**0**	**-**
Removal of hazardous materials (specialist HazMat costing and survey required) - excluded		Excl.	-	-		
GENERAL REQUIREMENTS AND FEE (SITE)					**0**	**-**
General Requirements (Div.1)	10.0%			-		
GC/CM Fee	3.0%			-		
CONTINGENCIES					**135,600**	**471**
Design Pricing Contingency	15.0%			135,600		
Escalation Contingency (Excluded)	0.0%			-		
Construction Contingency (Owners CO's) - Excluded	0.0%			-		
TOTAL ESTIMATED ESCALATED CONSTRUCTION COST (Excluding GST & Soft Costs)					**$1,039,600**	**$3,610 /m²**

Option 3B: Single-stair block

ELEMENTAL COST ANALYSIS - OPTION 3B TYPICAL FLOOR - 1 X 50' LOTS (SINGLE STAIR)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 274 m²		
				$	$/m²	%
SUBSTRUCTURE				**0**	**0**	**0%**
Standard Foundations	0	m²	0.00	0	0	
Basement Excavation	0	m^3	0.00	0	0	
STRUCTURE				**97,300**	**355**	**11%**
Lowest Floor Construction	0	m²	0.00	0	0	
Upper Floor Construction	274	m²	332.12	91,000	332	
Stair Construction	18	riser	350.00	6,300	23	
Roof Construction	0	m²	0.00	0	0	
EXTERIOR ENCLOSURE				**183,600**	**670**	**22%**
Walls Below Grade	0	m²	0.00	0	0	
Walls Above Grade	70	m²	1,350.00	94,500	345	
Structural Walls Above Grade	0	m²	0.00	0	0	
Windows & Entrances	23	m²	752.17	17,300	63	
Exterior Doors	4	lvs.	2,500.00	10,000	36	
Roof Covering	0	m²	0.00	0	0	
Skylights	0	m²	0.00	0	0	
Projections	53	m²	1,166.04	61,800	226	
PARTITIONS & DOORS				**130,400**	**476**	**15%**
Fixed Partitions	361	m²	315.24	113,800	415	
Structural Partitions	0	m²	0.00	0	0	
Movable Partitions	0	m²	0.00	0	0	
Interior Doors	17	lvs.	976.47	16,600	61	
FINISHES				**68,800**	**251**	**8%**
Floor Finishes	274	m²	94.89	26,000	95	
Ceiling Finishes	274	m²	105.11	28,800	105	
Wall Finishes	932	m²	15.02	14,000	51	
FITTINGS & EQUIPMENT				**98,300**	**359**	**12%**
Metals	274	m²	32.12	8,800	32	
Millwork	274	m²	100.00	27,400	100	
Specialties	274	m²	35.04	9,600	35	
Equipment	274	m²	54.74	15,000	55	
Elevators	1	stop	37,500.00	37,500	137	
MECHANICAL				**103,600**	**378**	**12%**
Plumbing & Drainage	274	m²	159.85	43,800	160	
Fire Protection	274	m²	45.62	12,500	46	
HVAC	274	m²	158.76	43,500	159	
Controls	274	m²	13.87	3,800	14	
ELECTRICAL				**70,900**	**259**	**8%**
Service & Distribution	274	m²	56.93	15,600	57	
Lighting, Devices & Heating	274	m²	150.00	41,100	150	
Systems & Ancillaries	274	m²	51.82	14,200	52	
GENERAL REQUIREMENTS & FEE (BUILDING)				**100,100**	**365**	**12%**
General Requirements (Div.1)			10.0%	75,300	275	
GC/CM Fee			3.0%	24,800	91	
NET BUILDING COST (EXCL. CONTINGENCIES)				**$853,000**	**$3,113 /m²**	**100%**

ELEMENTAL COST ANALYSIS - OPTION 3B TYPICAL FLOOR - 1 X 50' LOTS (SINGLE STAIR)

ELEMENT	Total Quantity	Unit	Average Unit Rate	ESTIMATED COST ($) GFA = 274 m²		
				$	$/m²	%
SITEWORK				**0**	**0**	
Site Preparation	0	m²	0.00	0	0	
Hard Surfaces	0	m²	0.00	0	0	
Improvements	0	m²	0.00	0	0	
Landscaping	0	m²	0.00	0	0	
Mechanical Site Services	0	m²	0.00	0	0	
Electrical Site Services	0	m²	0.00	0	0	
ANCILLARY WORK				**0**	**0**	
Demolition	1	Allow	0.00	0	0	
Hazardous Materials Abatement (Allowance)		Excl.	0.00	0	0	
GENERAL REQUIREMENTS & FEE (SITE)				**0**	**0**	
General Requirements (Div.1)			10.0%	0	0	
GC/CM Fee			3.0%	0	0	
CONTINGENCIES				**128,000**	**467**	
Design Pricing Contingency			15.0%	128,000	467	
Escalation Contingency (Excluded)			0.0%	0	0	
Construction Contingency (Owners CO's) - Excluded			0.0%	0	0	
TOTAL ESTIMATED CONSTRUCTION COST (Excluding GST & Soft Costs)				**$981,000**	**$3,580 /m²**	

ELEMENTAL COST ANALYSIS					Gross Floor Area:	274	m²
OPTION 3B TYPICAL FLOOR - 1 x 50' LOTS (SINGLE STAIR)					$	$/m²	
SUBSTRUCTURE					**0**	**-**	**0%**
Standard Foundations					**0**	**-**	
Not applicable		N/A	-	-			
Basement Excavation					**0**	**-**	
Not applicable		N/A	-	-			
STRUCTURE					**97,300**	**355**	**11%**
Lowest Floor Construction					**0**	**-**	
Not applicable		N/A	-	-			
Upper Floor Construction					**91,000**	**332**	
Wood floor including plywood sheathing and TJI	274	m²	332.20	91,000			
38mm concrete topping							
13mm acoustic mat							
13mm plywood sheathing							
9.5" TJI joists							
Acoustic insulation							
Stair Construction					**6,300**	**23**	
Non-combustible stairs 1.1m wide	18	riser	350.00	6,300			
Roof Construction					**0**	**-**	
Not applicable		N/A	-	-			
EXTERIOR ENCLOSURE					**183,600**	**670**	**22%**
Walls Below Grade					**0**	**-**	
Not applicable		N/A	-	-			
Walls Above Grade					**94,500**	**345**	
Exterior walls	70	m²	550.00	38,500			
CMU party walls	140	m²	400.00	56,000			
Structural Walls Above Grade					**0**	**-**	
Included in Walls Above Grade		Note	-	-			
Windows & Entrances					**17,300**	**63**	
Double glazed vinyl windows	23	m²	750.00	17,300			
Exterior Doors					**10,000**	**36**	
Extra over windows for double glazed sliding doors to balconies	4	no.	2,500.00	10,000			
Roof Covering					**0**	**-**	
Not applicable		N/A	-	-			
Skylights					**0**	**-**	
Not applicable		N/A	-	-			
Projections					**61,800**	**226**	
Balconies	53	m²	700.00	37,100			
Guardrails	29	m	850.00	24,700			

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 274 m²

OPTION 3B TYPICAL FLOOR - 1 x 50' LOTS (SINGLE STAIR)

					$	$/m²	
PARTITIONS & DOORS					**130,400**	**476**	**15%**
Fixed Partitions					**113,800**	**415**	
Interior walls (P7.1)	198	m²	228.90	45,300			
16mm drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.2)	114	m²	261.50	29,800			
16mm Type X drywall		Incl.	-	-			
2x6 wood stud		Incl.	-	-			
Batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Interior walls (P7.3)	49	m²	366.40	18,000			
16mm Type X drywall		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
2x4 wood stud		Incl.	-	-			
Acoustic batt insulation		Incl.	-	-			
16mm Type X drywall		Incl.	-	-			
Finishing drywall		Incl.	-	-			
Furring to CMU party walls	140	m²	148.20	20,700			
Structural Partitions					**0**	**-**	
Included in Fixed Partitions		Note	-	-			
Movable Partitions					**0**	**-**	
Not applicable		N/A	-	-			
Interior Doors					**16,600**	**61**	
Hollow metal doors - single (Stairs)	1	no.	1,700.00	1,700			
Unit entry doors - single (45min FRR)	3	no.	1,700.00	5,100			
Hollow core wood doors - single (Bedrooms, etc.)	13	no.	750.00	9,800			
FINISHES					**68,800**	**251**	**8%**
Floor Finishes					**26,000**	**95**	
Resilient tile flooring	274	m²	95.00	26,000			
Ceiling Finishes					**28,800**	**105**	
GWB ceilings	274	m²	105.00	28,800			
Wall Finishes					**14,000**	**51**	
Paint to walls	932	m²	15.00	14,000			
FITTINGS & EQUIPMENT					**98,300**	**359**	**12%**
Metals					**8,800**	**32**	
Stair guardrails	7	m	650.00	4,200			

ELEMENTAL COST ANALYSIS — **Gross Floor Area:** 274 m²

OPTION 3B TYPICAL FLOOR - 1 x 50' LOTS (SINGLE STAIR)

					$	$/m²	
Stair handrails	7	m	250.00	1,600			
Allow for miscellaneous metals (By GFA)	274	m²	11.00	3,000			
Millwork					**27,400**	**100**	
Allow for millwork (By GFA)	274	m²	100.00	27,400			
Specialties					**9,600**	**35**	
Allow for specialties (By GFA)	274	m²	35.00	9,600			
Equipment					**15,000**	**55**	
Allowance for appliances	3	set	5,000.00	15,000			
Elevators					**37,500**	**137**	
Stretcher-sized electric traction elevators	1	stop	37,500.00	37,500			
MECHANICAL					**103,600**	**378**	**12%**
Plumbing & Drainage					**43,800**	**160**	
Allow for plumbing & drainage (By GFA)	274	m²	160.00	43,800			
Fire Protection					**12,500**	**46**	
Allow for fire protection (By GFA)	274	m²	40.00	11,000			
Sprinkler protection to landing	1	no.	1,500.00	1,500			
HVAC					**43,500**	**159**	
Allow for HVAC (By GFA)	274	m²	158.60	43,500			
Controls					**3,800**	**14**	
Allow for Controls (By GFA)	274	m²	14.00	3,800			
ELECTRICAL					**70,900**	**259**	**8%**
Service & Distribution					**15,600**	**57**	
Allow for service & distribution (By GFA)	274	m²	56.80	15,600			
Lighting, Devices & Heating					**41,100**	**150**	
Allow for lighting (By GFA)	274	m²	150.00	41,100			
Systems & Ancillaries					**14,200**	**52**	
Allow for systems (By GFA)	274	m²	52.00	14,200			
GENERAL REQUIREMENTS & FEE (BUILDING)					**100,100**	**365**	**12%**
General Requirements (Div.1)	10.0%			75,300			
GC/CM Fee	3.0%			24,800			
NET BUILDING COST (EXCL. CONTINGENCIES)					**$853,000**	**$3,113 /m²**	**100%**
SITEWORK					**0**	**-**	
Site Preparation & Civils					**0**	**-**	
Not applicable		N/A	-	-			
Hard Surfaces					**0**	**-**	
Not applicable		N/A	-	-			

ELEMENTAL COST ANALYSIS — **Gross Floor Area: 274 m²**

OPTION 3B TYPICAL FLOOR - 1 x 50' LOTS (SINGLE STAIR) — $ $/m²

Improvements					**0**	**-**
Not applicable		N/A	-	-		
Landscaping					**0**	**-**
Not applicable		N/A	-	-		
Mechanical Site Services					**0**	**-**
Not applicable		N/A	-	-		
Electrical Site Services					**0**	**-**
Not applicable		N/A	-	-		
ANCILLARY WORK					**0**	**-**
Demolition					**0**	**-**
Not applicable		N/A	-	-		
Hazardous Materials Abatement					**0**	**-**
Removal of hazardous materials (specialist HazMat costing and survey required) - excluded		Excl.	-	-		
GENERAL REQUIREMENTS AND FEE (SITE)					**0**	**-**
General Requirements (Div.1)	10.0%			-		
GC/CM Fee	3.0%			-		
CONTINGENCIES					**128,000**	**467**
Design Pricing Contingency	15.0%			128,000		
Escalation Contingency (Excluded)	0.0%			-		
Construction Contingency (Owners CO's) - Excluded	0.0%			-		
TOTAL ESTIMATED ESCALATED CONSTRUCTION COST (Excluding GST & Soft Costs)					**$981,000**	**$3,580 /m²**