VANCOUVER’S MISSING MIDDLE

Comparing Urban Forms to Inform Residential Building Typologies for Vancouver

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Abstract

Vancouver, British Columbia is experiencing rapid growth. The city currently faces difficult questions about how it will grow, and how to ensure this growth is sustainable. Some kind of intensification of residential land uses will undoubtedly need to be part of the strategy for increasing the supply of housing in the city, but questions remain about how this intensification should be carried out. This report compares the built form of Vancouver's low-density, single-family communities to older and more established neighbourhoods in cities in both North America and Europe. The purpose of this exercise is to understand how the built form of the city, such as the street patterns and types of buildings, affect the level of density. This report finds that there is a significant amount of land in Vancouver that could be redeveloped to meet future housing needs.
ACKNOWLEDGEMENTS

I would first like to thank all of the faculty at the University of British Columbia’s (UBC’s) School of Community and Regional Planning (SCARP) who have provided me with an incredible opportunity for professional and academic growth over the past two years. The field of planning is very broad and filled with tensions and conflicts that make for a challenging intellectual environment, much more so than I anticipated when I began the program. I appreciate the dedication with which the SCARP faculty seek to prepare students to tackle some of the very difficult problems facing our world.

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I would also like to thank my family for supporting me in every way through all my educational, professional, and personal endeavours. My parents, Donald and Mary, in particular, worked very hard to make sure that my brothers and I had access to opportunities that allowed us to pursue our dreams. They also taught us important life lessons, including the importance of curiosity, skepticism, and integrity.

My partner, Greg, will forever be appreciated for his patient and loving support and encouragement throughout my time at SCARP. He is also owed a debt of gratitude for proofreading this report. Our two cats, Annabelle and Mackenzie, who we adopted in the first year of my program at SCARP, offered a wonderful distraction when I needed a break from my studies; unfortunately, they were also responsible for providing an unlimited source of procrastination from coursework, creating some long nights when deadlines approached.

Greg and our cats in our downtown Vancouver apartment
PREFACE

This report, the capstone requirement for my Master of Arts in Planning degree at UBC SCARP, was in many ways a very long time in the making. It was a project that built upon a lifetime of personal experiences, combined with many values and professional interests that led me to enrol in SCARP.

I grew up in a suburban community in central Massachusetts. My parents, of modest means, worked hard to buy a home in the suburbs. They felt it was important to raise their three sons in a house on a quiet street, with a big yard, and in a community with well-regarded schools. In many ways, it was a perfect environment for a child to grow up in. Once we were a bit older and independent, our bicycles provided access beyond the suburban subdivisions onto country roads where we could explore the surrounding woods. We explored stone walls from long-abandoned farms that went on for miles, and played in babbling brooks building dams and looking for crayfish.

As I grew older, however, this suburban landscape seemed to abruptly restrict both autonomy and mobility. Although the idea of adolescents afflicted by suburban ennui has become a bit of a cultural cliche, I can vividly remember the boredom and dissatisfaction of being stuck in the house with nothing to do except read or watch television. At the same time, the idea that there was a larger world out there out of my grasp was enormously frustrating. The lack of a car, in a community with no public transportation and with distances between destinations too far to walk, was a key obstacle.

As a child, my family had visited cities around the northeastern United States such as Boston, New York, Montreal, and Washington. I fell in love with the complexity of cities, with all the interesting people who seemed to live in them, and with the beauty of the layers of old and new buildings. As I began to make college plans, I knew that I needed to be in a city.

My first college dormitory at Northeastern University in Boston overlooked the Back Bay Fens, part of the Emerald Necklace park system designed by Frederick Law Olmsted in the late 19th century. Walking around the neighbourhoods and exploring quiet residential streets of Beacon Hill and The Back Bay provided a great deal of stimulation and joy.

While in college, and as a young gay man in the process of coming out, the discovery of a coffee shop at the corner of Tremont Street and Union Park in Boston's South End provided me with an opportunity to connect with an entire new community of people. I took a job at the counter of the coffee shop, where regulars from the neighbourhood would gather each afternoon. It was a diverse group—gay and straight, young and old, working professionals and retirees, bartenders and professors—and it provided a much-valued source of connection to the community around me.

In subsequent years I've had opportunities to live in other vibrant urban neighbourhoods in Washington, DC; San Francisco; and now Vancouver. I've never owned a car, and in almost each city I was able to walk to work. These cities offered so many different environments to spend time in, such as quiet parks with expansive city views, lively parks crowded with people on picnic blankets, secluded coffee shops where you could lose yourself in a book, and crowded pubs to meet friends after work. I've had many serendipitous experiences of meeting new people in such places, making connections that often resulted in long-lasting friendships. I love the experience of living in cities, and would never consider returning to a suburban community.

One of the reasons why I was interested in attending SCARP was a profound concern about environmental sustainability. I hoped to be able to learn how to design cities that
were environmentally sustainable and could reduce our ecological footprint to prevent further degradation of our environment. At SCARP I learned that achieving such a goal is a herculean task, one that may be impossible to achieve in our lifetimes. However, we know—in large measure—what is required to make our cities more environmentally sustainable. Better land-use planning is a central element, with the aim of creating compact, complete, walkable communities.

In Vancouver today, as in many cities throughout North America, there is great conflict surrounding change, especially as it concerns intensification of residential land uses. As single-family homes give way to larger buildings, neighbours often lament the loss of their communities characterized by trees, green lawns, and secluded back yards. In Vancouver, such change is often perceived as loss. However, while some attributes of these communities, such as the large expanses of private space, may be lost, there is a lot to be gained by having denser communities. Such communities may also be healthier, more economically productive, and offer a higher quality of life.

With these thoughts I offer this work. I hope it may offer some insight into the complicated issues that the City of Vancouver and other cities struggling with growth and housing shortage are currently facing.
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Figure 1: Map of neighbourhoods in the City of Vancouver
INTRODUCTION

Vancouver, British Columbia is experiencing rapid growth. Between 2011 and 2041, the population of the metropolitan area is expected to grow by nearly 1 million people (City of Vancouver, 2013). According to policy adopted by the City of Vancouver as part of planning efforts with the regional body Metro Vancouver, the City of Vancouver is expected to absorb 80,000 people during this time period, growing from 685,000 to 765,000 people (City of Vancouver, 2013). To accommodate this growth, it is projected that the city will need 53,000 new housing units, increasing the number of dwellings by 17 percent over current levels (City of Vancouver, 2013).

Vancouver is already experiencing growing pains. Today, the city is nearly built out with little land left to develop. The city's decades-long project to replace large areas of former industrial land near the city's downtown core with dense, mixed-use, and residential developments is nearly completed, and has produced the new neighbourhoods of Yaletown, Gastown, and Railtown.

These new neighbourhoods were built in the form of point towers and podiums—a form which now can be characterized as the Vancouverism style—and have added considerable density to the downtown core.

Figure 2: The changing skyline of Vancouver showing the redevelopment of the downtown peninsula between the 1970s and the present day
These new developments allowed the downtown peninsula to absorb 40 percent of the city's population growth between 2006 and 2011 (City of Vancouver, 2012a). Today, however, there are few obvious areas available for redevelopment to accommodate future population growth. Increasing scarcity of housing is one of many factors that contribute to the growing unaffordability of housing in the city.

There have been suggestions to convert other industrial lands adjacent to the downtown core to residential uses, such as in False Creek Flats, Mount Pleasant, and the Burrard Slopes. However, such changes might threaten an important source of employment in the city, especially for working-class and middle-income earners. These industrial areas also provide important ancillary services to businesses that are operating throughout the city, including those in the downtown core. Eliminating these industrial lands would reduce employment in the city and force many service providers to less efficient locations outside the city.

Vancouver has also adopted long-standing commitments to promote environmental sustainability in the city. In the face of a growing crisis of climate change caused by greenhouse gas emissions, the city has adopted various policies to reduce energy use and emissions in areas of building, transportation, and other areas (City of Vancouver, 2012b). Although the city has made great strides toward improving its performance in a number of environmental measures, it appears that these improvements are not sufficient for the city to become truly environmentally sustainable.

It has been calculated that for the city of Vancouver to achieve one-planet living—that is, living within the ecological carrying capacity of the Earth—residents of the city would need to reduce their ecological footprints by 66 percent (Rees & Moore, 2013). Energy consumed by

Figure 3: Population density in Vancouver, showing low density suburbs (City of Vancouver, 2011)
buildings and transportation sectors accounts for large portion of the city's ecological footprint. Further efforts are needed to promote walking and public transportation while reducing automobile use, and to develop more energy-efficient buildings.

The City of Vancouver is currently facing difficult questions about how it will grow, and how to ensure this growth is sustainable. One potential area where the city could grow is in its existing low-density communities. Most of the developed residential land in Vancouver is occupied by single-family detached housing at a relatively low density. From a planning perspective, many of these low-density neighbourhoods are good places to accommodate new development.

The city is currently pursuing various strategies for increasing the supply of housing in the city. The city has promoted mid-rise, mixed-use residential developments on major transit-accessible arterials, although many of these sites have been slow to redevelop due to unattractive economic conditions. The city has pursued a number of high-density developments along major transit routes, such as with the Oakridge Mall redevelopment and the Rise Tower at Kingsway and Broadway. The city has also allowed the development of secondary suites and laneway homes in virtually all single family neighbourhoods of the city, which can marginally increase the density of the city's single family neighbourhoods. This housing type, however, has also been slow to materialize due to the high cost of building and servicing new laneway homes.

The city is also developing some new medium-density forms for selected multi-family-zoned areas of the city, such as those identified in the recently-adopted Marpole Community Plan. In these areas, low-rise apartments, ground-oriented stacked row houses, and row houses will be allowed (City of Vancouver, 2014). This will also include the ability to develop freehold row houses with party walls, a building form that has long been absent in Vancouver. However, these multi-family-zoned areas are limited and the most of the land in the Marpole neighbourhood will maintain its single-family form.
However, it appears that nearly all efforts for increasing the housing stock in the city are met with significant opposition from local residents resistant to change in their communities. Proposals to allow row houses or low-rise apartments are met with opposition from neighbours concerned about losing the character of their neighbourhood. Larger developments, such as those featuring high-rise residential towers, are opposed by residents living nearby who are object to the scale of high-rise towers adjacent to their communities.

Some kind of intensification of residential land uses will undoubtedly need to be part of the strategy for increasing the supply of housing in the city, but questions remain about how this intensification should be carried out.

In this report I will compare the built form of Vancouver's suburban communities to communities in other parts of the world. Specifically, I will compare Vancouver's low-density, single-family communities to older and more established neighbourhoods in cities in both North America and Europe. The purpose of this exercise is to understand how the built form of the city, such as the street patterns and types of buildings affect the level of density as measured by dwellings units per acre.

A major theme of this report will focus on the relative absence of traditional forms of medium density building typologies in Vancouver, such as row houses, flats, and apartment blocks. In older cities, these building typologies have proven to be extremely long-lasting and adaptable. Because these buildings are largely missing from Vancouver's neighbourhoods, I describe these building typologies as Vancouver's "missing middle."

The report is organised in four sections:

1. Defining the Missing Middle
I will define what is meant by the "missing middle." I will identify building forms that characterize traditional, medium density building, and compare construction costs and density levels that these various forms of construction can provide.

2. Origins of Vancouver's Urban Form
I will describe the origins of Vancouver's urban form, looking at history in Europe and North America that will describe the factors behind Vancouver's unique development. This history will also describe the origins of current land-use conflicts in Vancouver.

3. Comparing Urban Forms
I will compare four areas of selected neighbourhoods in Vancouver to neighbourhoods in North American and European cities. An analysis of land use and building patterns will be used to discern density levels within these areas. Observations of urban design in these communities will also inform a discussion about how urban form and building typologies might influence quality of life and the experience of place in these various communities.

4. Reimagining Vancouver's Urban Form
I will present one strategy for how medium density building forms could be introduced into Vancouver's existing urban form, applying some design principles that were observed in previous sections of the report. I will also measure the expected increases in density over a conventional development patterns.
1. DEFINING THE MISSING MIDDLE

The "missing middle" refers to a lack of diverse housing types in many contemporary neighbourhoods comprised of detached, single-family households. Often, current zoning by-laws and building codes may hinder the realisation of many traditional housing forms like row houses and low-rise apartments. This will be further discussed in this section.

Single-family-zoned areas often have homes occupying relatively large lots. The dispersed nature of this development often necessitates the use of automobiles, since walking distances can be far and low population densities make public transportation financially unfeasible.

In contrast to single-family communities, areas with diverse housing types can accommodate the needs of a larger spectrum of the community. In addition to providing housing designed for the needs of people beyond the tradition nuclear family of two parents and children, neighbourhoods with more diverse housing types can accommodate the needs of single-parent families, childless families, extended families, and people living alone. The increased density of these building types can also make communities more walkable, affording many social and health benefits. Denser communities are also more environmentally and economically sustainable.

Responding to forecasts predicting continued population growth in urban areas, rising costs of transportation and energy, growing environmental concerns, and growing demand for housing in walkable urban communities, architect Dan Parolek in 2012 called for "a complete paradigm shift in the way that we design, locate, regulate, and develop homes." He described a "missing middle" of housing options that includes duplexes, fourplexes, bungalow courts, townhouses, live-work

Figure 5: Illustration of the range of types of missing middle housing types and their location between single-family homes and mid-rise buildings (Parolek, 2012)
units, and courtyard apartments. The introduction of such housing can achieve medium-density yields between the scales of single-family homes and mid-rise apartment flats, but at a scale that doesn't feel like a dense urban city. He describes such housing as currently "missing" because very few of these housing types have been built since the end of the Second World War due to regulatory constraints and a shift to automobile-dependent patterns of development. Parolek's observations are not new, though he does appear to be the first to describe the absence of this spectrum of housing as a "missing middle."

In the 1961 book, *The City in History: Its Origins, Its Transformations, and Its Prospects*, urban theorist and historian Lewis Mumford criticized the proliferation of single-family homes in new suburban communities, along with the expansion of highways and the hollowing out of city centres that accompanied this shift. Also in 1961, Jane Jacobs published her seminal book, *The Death and Life of Great American Cities*, in which she criticized the rise of single-use housing projects, car-dependent thoroughfares, and segregated commercial centres. Instead she argued for the continued relevance and utility of mixed-use neighbourhoods. Later writers continued advocating for change. In 1993, James Howard Kunstler criticized the overabundance of sprawl and advocated for a need for better urban design in *North America in The Geography of Nowhere: The Rise and Decline of America's Man-Made Landscape*.

The New Urbanist movement, led by architects and planners that include Peter Calthorpe, Peter Catz, Andres Duany, and Elizabeth Plater-Zyberk, also called for change and a return to traditional urban design forms in our communities (Katz, 1994). In their book *Suburban Nation: The Rise of Sprawl and the Decline of the American Dream* (2000), Duany, Plater-Zyberk, and Speck described many of the economic, health, social, and environmental problems associated with automobile-dependent suburban housing patterns.

Today it is widely accepted by architects, planners, environmentalists, and others that there is a need to redesign the built form of our communities, and for more medium density building forms to be introduced into existing neighbourhoods. This section will describe in more detail what is meant by the missing middle, and describe the benefits that can be afforded by increased residential density. It will also describe some of the challenges that arise when attempting to address the missing middle.

### Missing Building Typologies

In public discourse, when people consider the introduction of increased residential density in their communities, people often describe images of closely-spaced high rise apartment buildings that block access to daylight, reduce open space, and block views. However, the reality is that there is an entire spectrum of housing types that provide different levels of density.

This section will introduce some of these medium density building typologies and compare them to both low- and high-density typologies. In an attempt to categorize these building typologies along the spectrum of density, this section will also identify how many dwellings per acre each of these housing typologies would typically accommodate. Based on work by Jan Ellis (2004), an index comparing modern construction costs for the various types of building typologies will be provided.

It should be noted that this section presents medium-density building typologies as they are constructed today. Current parking requirements and building codes have significant influences in determining building form and often increase the construction costs and other expenses for higher density residences.
While there are still many historic medium-density buildings in use today, current building codes often prevent faithful reproductions. For example, the historical row houses in cities such as Montreal, Boston, New York, Philadelphia, Baltimore, Chicago, and Toronto which often comprise four, five, and even six stories would be nearly impossible today. This is because today’s building codes often require two egresses with two separate sets of enclosed stairs for any residential unit above two stories. This would mean that a single narrow row house containing separate flats would need two separate concrete-enclosed stairways, providing access both from the street and the rear (Ellis, 2004). In the past, external staircases, such as fire escapes, were sufficient for providing emergency egress. However, modern building code requirements make narrow row house development, which often have just one unit per floor, uneconomical due to the amount of space taken up by the stairs.

**Single Family Detached Home**
The single family home is the most common building type in the United States and Canada and can range in density from 2 to 3 dwellings per acre at the low end to up to 16 dwellings per acre at the high end. On average, single family neighbourhoods usually have approximately 10 dwellings per acre (Campoli and MacLean, 2007).

Utilizing wood frame construction techniques, single family homes are less expensive to build per unit than construction of high density buildings that require concrete construction (Ellis, 2004). Much of the reason for this lower cost is due to the fact that the cost of parking is far lower than in higher density settings, where cars need to be housed under concrete decks or underground.

However, the growing size of the average single family house, relative to how many people it houses, has caused the relative cost of housing to increase over the past fifty years. During this time, the size of the average single-family home has nearly doubled in size, while at the same time the number of people in the average family has fallen from 3.5 to 2.5 persons (Campoli and MacLean, 2007). In the 1950s, the average single family home provided 290 square feet of living space per person. By 2002, the average single family home provided 893 square feet of living space per person (Campoli and MacLean, 2007).

Single family homes can be either "front loaded," with parking from the street with a side drive, or "rear loaded" with parking from an alley (Ellis, 2004). An alley also provides opportunities to hide service activities, such as garbage containers, cars, and other unattractive elements. The presence of alleys offers the opportunity to create street frontages that do not have frequent curb cuts, providing more on-street parking for visitors.

**Secondary Suites**
The presence of an alley in a single-family neighbourhood also provides opportunities for secondary units above garage spaces in the rear. These are often referred to as laneway homes in Vancouver, but are also known as "inlaw units" and "granny flats." In Vancouver, many homes may also feature basement secondary suites. The addition of secondary suites in existing single family neighbourhoods is a way to provide additional housing units, often creating a mixed-income community by providing an important source of rental housing for retirees, young workers, and students.

It also serves as a way of increasing density without dramatically affecting the single family character of the surrounding streets. The presence of these secondary suites can increase density by 4 to 5 dwellings per acre, bringing total density to approximately 15 dwellings per acre in a single family neighbourhood (Ellis, 2004).

**Row Houses**
Moving from low density to medium density housing along the building typology spectrum, row houses come in many shapes and sizes and have a long historical tradition. It is also known as terrace house, townhouse, and brownstone.
<table>
<thead>
<tr>
<th></th>
<th>Single Family Detached</th>
<th>Single Family with Secondary Suites</th>
<th>Row Houses (3 Storey)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwellings per Acre:</td>
<td>10 DU/AC</td>
<td>15 DU/AC</td>
<td>20-25 DU/AC</td>
</tr>
<tr>
<td>Parking Type:</td>
<td>2 Car Garage</td>
<td>1 Car per Dwelling</td>
<td>1 Car per Dwelling</td>
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<tr>
<td>Construction Type:</td>
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<td>Wood Frame</td>
<td>Wood Frame</td>
</tr>
<tr>
<td>Construction Cost Index:</td>
<td>1.00</td>
<td>0.95</td>
<td>0.90</td>
</tr>
</tbody>
</table>

**Figure 6**: Spectrum of modern residential building typologies comparing density in dwelling units per acre (DU/AC) and construction costs (Ellis, 2004)

Typically this building form comprises a row of identical or mirror-image houses that share common side or "party" walls. Row house widths can range from 16 to 25 feet. Row houses commonly provide residential density levels of about 20 to 25 dwellings per acre (Ellis, 2004).

Row houses can be either front or rear loaded. However, in the modern world and with the need to provide parking, rear loaded row houses are far preferable to allow parking at the rear to avoid a street frontage dominated by garage doors. Constructed of wood, utilizing shared walls, avoiding interior corridors, and utilizing either off-street parking in the rear or simple garages, row houses are about 10 percent less expensive to build per unit than standard single family homes (Ellis, 2004).

**Stacked Row Houses**
A stacked row house is designed for the vertical layering of living units over each other, dividing the row house into multiple...
### Stacked Row Houses (4 Storey)

<table>
<thead>
<tr>
<th>Units</th>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-35 DU/AC</td>
<td>2 Cars per Dwelling</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>Wood Frame</td>
<td></td>
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</tbody>
</table>

### Stacked Flats (5 Storey)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>35-45 DU/AC</td>
<td>1 Car per Unit</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>Wood Over Concrete Garage</td>
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</tr>
</tbody>
</table>

### Midrise Stacked Flats (Below 8 Stories)

<table>
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<th>Description</th>
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<tbody>
<tr>
<td>45-75 DU/AC</td>
<td>1 Car per Unit</td>
<td>2.00</td>
</tr>
<tr>
<td></td>
<td>Concrete Frame</td>
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</tr>
</tbody>
</table>

### Highrise Stacked Flats (Above 8 Stories)

<table>
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<th>Units</th>
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</thead>
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<td>75-125 DU/AC</td>
<td>1 Car per Unit</td>
<td>2.50</td>
</tr>
<tr>
<td></td>
<td>Concrete Frame</td>
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</tbody>
</table>

Units. Stacked row houses often provide a separate street related entrance for each unit, avoiding the need for a common interior corridor. The stacked row house usually has three to four stories. Four storey configurations often utilize a half-storey first floor that is partially below ground. Stacked row houses can be configured in many different ways, but today a common construction technique is to layer two 2-storey family units one on top of the other or for a smaller, one-bedroom unit to be placed below a three storey family row house.

Although still constructed of wood, stacked row houses using modern building methods are slightly more expensive to build per unit than a standard single family home. Much of this increase in cost is because of the need to provide parking in the first storey of the building or in underground parking below (Ellis, 2004).
In some developments, elevators are seen as necessary for providing access to a basement garage (Geller, 2012).

**Stacked Flats**
Moving higher up the density scale, stacked flats can be used to achieve building heights of five and six stories and achieve densities around the range of 35-40 dwellings per acre (Ellis, 2004). To provide the necessary parking, however, parking must be provided either underground or under a concrete deck. Although residential dwellings above the concrete frame can still be constructed of wood, the cost of providing parking in a concrete frame, along with the expenses of shared stairways and elevators, increases the cost of construction. Street level retail can also be provided on the first floor in mixed use buildings, with parking underneath.

**Mid-Rise and High-Rise Stacked Flats**
When density levels rise above 45 dwellings per acre, building forms require elevators and double-loaded corridor access with communal parking garages usually located below grade. At densities above 75 dwellings per acre, multilevel parking arrangements are required (Ellis, 2004). Such parking structures require mechanical ventilation and fire separation.

As buildings grow taller, special life-safety building code requirements require additional features. These include the need for two pressurized stair shafts and places of safe refuge in buildings with floors above the reach of a fire-truck ladder at eight stories or about 24 meters (Ellis, 2004). Building up to this eight storey cutoff mark typically costs about twice as much per unit to construct as a conventional single family home, while building above eight stories costs even more (Ellis, 2004).
For buildings above eight stories, building-code requirements vary greatly from city to city in terms of life-safety requirements. For instance, California building codes require a minimum 30-foot separation between the two stair shafts. In Vancouver, “scissor stairs,” where two straight-flight stairs interlock in a single concrete-framed shaft, are permitted, and allow the stair shaft to be located behind the elevators in a compact core. This allows the construction of slender towers with smaller floor plates, making possible Vancouver’s distinctive point towers. Meanwhile, in San Francisco floor plates as large as 10,000 square feet exist in new downtown residential districts (Ellis, 2004). These additional life-safety features typically cause a high-rise residential unit to cost about 2.5 times more than a conventional single family home.

A Note on the Cost Index
In the case of Vancouver, the cost index developed by Ellis and presented here is likely to underestimate building costs, perhaps significantly. This is because Vancouver zoning bylaws act to discourage parking structures above grade, forcing parking underground in more expensive configurations.

Benefits of Increased Density
While higher density building forms are more complicated to build, there are numerous reasons why they are a preferable option than conventional developments with detached single-family homes. Research over the years have demonstrated a number of wide-ranging benefits that arise from increased density.

Environmental Sustainability
Adam Rome's *The Bulldozer in the Countryside* (2001) details how low-density development, which proliferated following the Second World War, changed...
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the nature of millions of acres of land throughout North America. He notes that in addition to destroying valuable wildlife habitats, including wetlands and floodplains that were especially valuable for wildlife diversity, the rush to build suburbs created many other problems. Poorly-designed septic tanks polluted waterways. The destruction of woodlands, which had served an important function in terms of absorbing and storing rain water, contributed to soil erosion and flash flooding.

Buildings in low-density developments also consume more energy than buildings in more dense communities (Owen, 2009). This effect is partly due to the fact that buildings in denser communities often share walls, better insulating the buildings. Part of the lower energy use also has to do with the fact that residents of urban areas have smaller homes than their suburban counterparts, requiring less energy for heating and cooling.

Energy use and greenhouse gas emissions for people living in denser areas tend to be lower on the whole (Owen, 2009). The close proximity to many destinations in denser communities allow people to walk to corner stores, local restaurants, or their places of work. In some cases, people can forgo ownership of a car completely.

Increased density also makes public transportation more feasible. Many low density areas simply do not have sufficient critical mass of people to warrant an investment in public transportation. At higher density levels, and with more potential riders, it becomes possible to offer bus or rail public transit. A number of transportation studies have accurately predicted ridership levels based on the densities of neighbouring communities, and confirmed that more people in dense communities use public transportation (Bernick & Cervero, 1996).

These factors contribute to very different levels of green house gas emissions when comparing low-density suburban and urban areas. While low-density areas produce annual carbon emissions per household at a rate of 5.5 to 8.4 tons per year, in urban areas the average is 4.2 tons per year and the average for an urban household without a car is 1.3 tons (Chakrabarti, 2013).

Public Health

Frumkin, Frank, and Jackson (2004) have well documented the many health related consequences of living in low-density, automobile dependent areas. Automobles and other vehicles release particulate matter and volatile organic compounds that contribute to respiratory illnesses. Sedentary lifestyle in communities where the automobile is the only viable means of transportation is contributing to higher levels of obesity and diabetes.

Automobile dependence may also contribute to mental health disorders (Frumkin, Frank, and Jackson 2004). One area of concern is the loneliness caused by social isolation and a lack of interaction with other people, an issue that can be more acute for populations with limited mobility such as the elderly. Another area of concern is anxiety and stress caused by long daily commutes.

Injuries caused by motor vehicle accidents are another serious consequence of automobile dependence. Although injuries and fatalities have been declining, they are still alarming. In 2011 there were 121,159 reported incidents of an automobile accident that caused personal injury in Canada. There were 1,834 automobile accidents that caused fatalities, resulting in

Figure 11: Air pollution concentrations along major vehicle corridors (Marshall, Brauer, and Frank, 2009)
2,006 deaths. Nearly 60 percent of these fatalities were either the driver or a passenger of the vehicle, while about 15 percent were pedestrians (Transport Canada, 2013).

**Economic Development**
In 2012, three percent of the land mass of the United States generated 85 percent of its gross domestic product (Chakrabarti, 2013). Historically, cities have always been centres of trade and commerce. Research indicates that increased levels of density foster increased levels of economic development. When urban density doubles, productivity increases in the range of 6 and 28 percent (Chakrabarti, 2013).

Using cluster theory, Michael Porter suggests denser urban areas are able to amass concentrations of individuals with skills and talents that make it possible for a collective contribution to economic growth that is greater than the sum of otherwise individual efforts. Clustering and concentration of these skills leads to increased productivity, drives innovation, and stimulates new business (Porter, 2000).

Similar to Porter, Richard Florida describes how denser urban settings can attract highly skilled professionals who can drive creative industries. The creative class themselves can attract investments from elsewhere—corporate or otherwise—in their businesses, and this can positively grow the local economy of the urban community. (Florida, 2002).

**Quality of Life**
Denser communities can also provide a mix of attributes that contribute to higher quality of life. Living close to a workplace, a child's school, or a corner store means that less time is spent commuting on congested roads. This extra time can instead be devoted to other activities, such as spending more time with friends and families.

Increased density also allows for an increased diversity in urban amenities, such as unique restaurants, art museums, musical events, coffee shops, and neighbourhood pubs. The higher number of residents in denser communities provides the critical mass to support such diverse business.
2. ORIGINS OF VANCOUVER’S URBAN FORM

This section will provide information on the historical factors that contributed to creating the urban form that we see in Vancouver today. It will also describe how historical forces conspired to cause Vancouver to skip several steps in development that older cities typically went through, development that tended to produce medium-density building forms in walkable communities. This is largely due the period of time in which the City of Vancouver developed, with much of the development that defined the city taking place in the early 20th century.

European Roots

Until the 19th century, before the advent of technology such as automobiles and highway construction permitted greater mobility, cities tended to grow by intensifying the use of their land. That is, buildings tended to be built taller to accommodate the needs of more people, workshops, and shops. The boundaries of cities were typically constrained by how far people were willing to walk and building heights were limited by how many flights of stairs people were willing to climb (Condon, 2010). Cities in the pre-modern era were often physically constrained by the presence of defensive walls. While these walls often served a defensive function of protecting inhabitants from marauding armies, they also served an important function of enforcing customs boundaries (Kostof, 1992). Cities then, as today, served as the principal places for trade and commerce, and rulers would collect customs on transactions at the city gates.

Prior to the age of modern medicine, disease conspired to keep most cities relatively small in terms of population by today's standards, reducing their need to grow up or out. Historical demographers refer to an "urban graveyard effect": until the beginning of the 20th century, cities required a constant flow of migrants from the countryside in order to grow, to "replenish" the population lost to diseases. (Reader, 2004).

Despite the ravages of disease, some ancient cities were able to grow to significant sizes as centres of government, commerce, culture, and spirituality. Archaeologists digging in Ur, a city that flourished in the Middle East around 2000 BC, calculated population densities at that time to range from 120-200 people per acre, close to population densities of modern cities (Mumford, 1961). In ancient Rome, which introduced aqueducts and sewage systems that reduced deaths from waterborne illnesses, the city swelled to

![Figure 12: Model of ancient Roman Insula](Dodge & Roger, 2005, p. 94)

![Figure 13: The medieval town of Vezelay, France, grew around a processional path to a Benedictine Abbey said to house the remains of Mary Magdalene](Kostof, 1991, p. 42)
over 1 million. To house the masses, large multi-storey tenements, known as insulae or “islands,” were constructed. Often rising seven or eight stories in height, some 40,000 of them were constructed in the city (Kostof, 1992). Some insula could house over 200 people and would often covering an entire city block (Mumford, 1961). Conditions in these poorly built tenements were crowded, unhealthy, and dangerous due to frequent fires (Mumford, 1961).

Medieval cities often grew around seats of government, strategic strongholds (such as castles), sites of religious significance, or as centres of commerce (such as around important crossroads). Unlike Roman cities, which utilised a regular square street-grid, many later medieval cities followed a more organic pattern (Kostof, 1991).

Instead of straight streets, these new cities often featured curved or crooked streets. Public spaces such as marketplaces often appeared to be organized haphazardly, though they were often organized to align with topography or at an important crossroads. Rather than a formal square, marketplaces might emerge simply in the middle of a wide central street. Important public buildings such as cathedrals often would emerge where space was available.

Property owned by a king or a lord was divided into "burgage" plots and leased to

Figure 14: Stages of urban infill on burgage plots. In the first stage (top left), buildings sit at the head of plots with gardens in the rear. Over time, new buildings are added to the rear (top middle and right), followed by the gardens being built over (middle row), and then gradual heightening of backlot buildings (bottom row) with narrow courts and airshafts. (Kostof, 1992, p. 295)
individuals, and the required payment could be money or other services. The burgage plots were typically long and narrow (Mumford, 1961). Buildings were built at the front of the plot next to the major street, often with gardens at the rear.

Medieval cities were fairly dense by modern standards. Buildings would serve a variety of different functions. A single building would often serve as a combination of a workshop, store, and home, with no municipal zoning in place to separate these functions (Mumford, 1961). However, conditions in these dwellings were crowded and uncomfortable, with no modern sense of privacy. Sanitation was a major problem, with waste often being deposited either in the street or in the rear of the lot (Mumford, 1961).

As these cities grew, a pattern of development emerged that resembled modern redevelopment patterns (Kostof, 1992). Initially, existing buildings at the front of the burgage plot, along the major street, were built higher with the addition of new stories. This was due to the importance of proximity to the flow of pedestrian traffic and, with it, opportunities for commerce. As pressure continued to increase for more homes, workshops, and stores, new buildings emerged at the tail ends of the burgage plots. Accessory buildings would then emerge within the plot itself.

Between the 15th and 18th centuries, multiple forces in Europe would bring about significant changes to the design of cities. These forces included the rise of modern nation states in Europe, ruled by centralized governments with a single oligarch at its centre; an economy that was dramatically rising due to the advent of mercantile capitalism; and a renewed interest in culture and science during the Renaissance and the Enlightenment (Mumford, 1961).

New ideas about urban form, and a desire by rulers to develop their capital cities into showcases, led to radical new building forms. In place of the chaotic and organic forms of the medieval cities, new methods of city building featured straight streets, uniform roof lines, consistent setbacks, and identical facades (Kostof, 1991). In many ways, this represented a return to older city forms, such as those that existed in ancient Greek and Roman cities with formal grids, regulated heights, and separated land uses.

At the same time as new methods of urban design emerged, increased pressure from population and economic growth led to increasingly intolerable levels of disorder and discomfort in the existing organization of space on the traditional burgage plots (Mumford, 1961). This is especially true with regard to the lack of access to light and fresh air caused by the increased size of buildings within a property lot.
When increased densities could only be achieved by creating rooms without access to light and air, and as foundations became overloaded with additional stories, a reconfiguration of building lots was required (Kostof, 1992).

Eventually it became necessary for the burgage plots to be amalgamated to create larger plots with larger, wider frontages on the streets (Kostof, 1992). The back ends of the burgage plots were then separated to form independent lots. Mid-block alleys would be added between these new plots allowing access to buildings in the rear. The new blocks would be characterized by much shallower depths with longer frontages, rather than consisting of multiple short, deep plots with very little access to the street (Kostof, 1992).

As European cities continued to expand, and as medieval burgage plots were assembled into more efficient forms, differences began to emerge in terms of building typologies. In 17th century Paris, blocks of multi-family flats, with separate apartments consisting of multiple rooms on a single floor, began to replace narrow-fronted medieval buildings (Olsen, 1986, p. 94). Such flats became popular with the growing middle class in Paris. In 18th century Vienna, similar large blocks of flats with wide frontages appeared (Olsen, 1986, p. 98). In Vienna, such flats might occupy an entire city block and consist of over 100 apartments.

In many of these flats, building owners would occupy the entire first floor above the street, with middle-class people occupying upper floors in smaller units. The top floor, often more of an attic in height and form, would be occupied by members of the lower classes, often servants. These higher units were seen as undesirable due to the physical exertion of having to climb multiple flights of stairs. In both Paris and Vienna, flats were typically six stories tall and would feature large internal courtyards, grand staircases, and elegant facades. Many of these flats also included shops on the first floor (Olsen, 1986).

In London, however, the apartment block was largely rejected. Instead, the English adopted a single-family townhouse as the predominant housing form (Olsen, 1986). These houses were typically uniform in structure, with six floors, two rooms per floor, and with a staircase and hall to one side. The outward appearances of the homes were standardized in form, and often sparse in outward decoration. It was often difficult to discern from the outside which buildings were home to wealthy aristocrats and which were home to tradesmen (Olsen, 1986). It would not be until the early 20th century that the apartment building would gain favour in London (Olsen, 1986).

The English row house with its standardized form proved to be very flexible as needs changed in the city (Olsen, 1986). In some homes, each floor was converted into individual self-contained apartments, called “maisonettes.” In other homes, adjacent buildings were joined by knocking down party walls to...
form larger buildings, often to house lodging houses or hotels. In others, first floors were converted into offices, banks, shops, and pubs, with large windows available for displaying goods. Still other homes were completely converted into specialized office blocks.

The North American Context

European colonization and settlement of North America, especially in British colonies, brought similar rowhouse and apartment forms and city planning ideas to emerging cities. Early Boston and New York, in fact, had organic patterns like those of medieval Europe. However, as time passed a pattern of development emerged distinct from that of Europe emerged. In both the newly-established United States and in the British possessions of Canada to the north, young cities would come to be defined by low density, detached homes, and strict adherence to an orderly grid pattern of streets (Kostof, 1992).

Private land ownership would contribute to one of the most significant differences in development patterns (Kostof, 1992). In contrast with Europe where land was often owned by the crown or other nobles and leased to individuals, private landowners in North America frequently subdivided their parcels and sought to sell their land for considerable profit. During the 19th century, private landownership, combined with a relatively passive role of government in urban planning, led to often chaotic development patterns (Kostof, 1992). Simple grids were used draw up new subdivisions on greenfield sites to maximize the amount of land that could be sold. Indistinct urban fringes appeared in the transition zone between rural and urban land development, and large areas of land in this transition zone often went undeveloped as speculators waited for market conditions to change. Building styles could be highly eclectic with frequent variations between blocks.

Another notable feature of North American development patterns would be a cyclical pattern urban growth (Kostof, 1992). Every fifteen or twenty years, cities would build roads, develop new neighbourhoods, and invest in other types of infrastructure investment. This cyclical readjustment would also correspond to maintaining structures of inequality since growth in one area would usually correspond with decline in another.

Nineteenth century Boston provides a good case study in these development trends. The city rapidly grew during this period as the principal port for New England, beginning to grow beyond the peninsula on which it was founded. This process was assisted by the filling in of marshes surrounding the city. One of the first areas to be developed was along the "neck" of the peninsula that connected the city to the mainland (Whitehill, 1959). Beginning in the 1850s developers built many well-designed townhouses in a style that was fashionable in London at the time and
would later become known as the South End. These well-appointed homes, larger and less crowded than homes in the older sections of the city, were intended to house members of the expanding upper-middle class (Whitehill, 1959).

To stimulate sales of homes, a series of squares with formal gardens and shade trees were constructed. Homes were constructed around these squares in a uniform architectural style and sold at auction (Whitehill, 1959). Many religious and educational institutions followed the movement to the South End, lured by the availability of land and the opportunity to expand (Whitehill, 1959).

However, after a mere 30 years, the South End lost its appeal. Just to the north of the South End, a new development was emerging which was made possible by the filling in of the Back Bay, formerly a tidal estuary (Whitehill, 1959). The Back Bay eventually became the premier destination for respectable families. Many of the religious and educational institutions that had just built new buildings in the South End also relocated to the Back Bay and other areas of Boston. Homes in the South End neighbourhood transitioned into rooming houses for the lower classes (Whitehill, 1959).

The introduction of the railroad had a dramatic effect on North American development patterns. The railroads allowed commuters to live far beyond the traditional boundaries of the city, creating the first true suburbs in North America, such as those along Philadelphia's Main Line. The transcontinental railroads also opened up vast new areas of the continent to development. Land grants provided to the railroads allowed immense profits to be made in land speculation (Brechin, 1999).

**The Vancouver Context**

The City of Vancouver was chartered in 1886 in anticipation of the arrival of the Canadian Pacific Railroad (Wynn, 1992). The arrival of the railroad on the shores of the Burrard Inlet would create the western port of entry for all of Canada. In a very brief period of time, the city would experience tremendous growth. A year after its founding, the city had nearly 3,000 residents; in five years, the city had over 15,000 residents; and by 1911, the city and neighbouring municipalities of Point Grey and South Vancouver (which would eventually be amalgamated into a single city) had 120,000 residents (Wynn, 1992).

In exchange for extending the transcontinental railroad to the future deep-water port of the Burrard Inlet, the Canadian Pacific Railroad (CPR) was given large land grants throughout the area that would become the future city of Vancouver. Eager to maximize profit, the CPR was quickly set out to survey the land and divide it in the most efficient manner possible (Berelowitz, 2005).

The CPR based its surveying and platting on the medieval “chain” measure of 66 feet (20 meters) in length (Berelowitz, 2005). A typical block would measure 4 chains or 264 feet (80.5 meters) in depth on its short side and 6 chains or 396 feet (120.5 meters) of length wide. A mid block service land of 20 feet (6 meters) would also be included.

As the area was surveyed and the city spread, speculators quickly began to acquire peripheral properties to hold until their value grew at which point the land could be sold for a lucrative profit (Wynn, 1992). One of the key technological innovations that led to the development of more distant properties was the introduction of the streetcar. In 1891, 20 kilometers of streetcar tracks existed in the city; in the next 18 years, 64 kilometers of streetcar tracks would be added; and between 1909 and 1914, 80 more kilometers would be added (Wynn, 1992). However, development was quite haphazard, with few modern planning systems in place separating land uses or building forms. On the downtown peninsula and in the newly-emerging inner suburbs, mansions often stood beside modest cottages, and labourers and
professionals shared the same streets (Wynn, 1992). As these diverse inner suburbs such as Fairview, Kitsilano, and Mount Pleasant were built out, the suburbs beyond would be developed in a more socio-economically compartmentalized manner (Wynn, 1992). Generally speaking, the working class settled in the east, while the middle and upper classes settled in the west.

These new suburbs would grow in a wide arc around the inner suburbs, replacing the virgin forests. The CPR laid out the Shaughnessy development with grand Tudor-style mansions as a prestigious community for the wealthy, and protected the community with restrictive covenants. Middle classes settled in Point Grey and Kerrisdale. Working classes settled in Strathcona and Grandview, close to wharves, mills, and refineries on the Burrard Inlet.

The streetcar system continued to determine the growth patterns in these new suburbs. By 1929, fourteen out of every fifteen residents lived within 400 meters of a streetcar line (Wynn, 1992). The expansion of the city and the urban form that was produced was shaped by factors of demand, such as demand for housing, commerce, and workshops, as well as speculation. The relative abundance of land was also a major factor in shaping a relatively low-density building pattern throughout the city. In 1912, population densities of Montreal and Toronto were nearly three times those of Vancouver (Wynn, 1992).

Although the city featured an orderly grid, development continued to occur in a very irregular manner (Wynn, 1992). Parcels would come onto the market sporadically and in small numbers. While this would allow investors a steady and long-term stream of income, the resulting development meant that dwellings often stood alone or in small groups of three, four, or six.

After 20 years of subdivision and sale in Vancouver's future Riley Park neighbourhood, more than a thousand households were established. But the landscape was still largely undeveloped.
Vancouver's Missing Middle

(Wynn, 1992). Only two roads in the area were paved. In some places, rough empty tracts of stumps, bushes, and small trees defined the landscape. A few small farms that had been established in the 19th century persisted into the early 20th century. More accurately described as farmlets, these small landholdings produced food that supplemented the needs of families or was sold in markets serving the growing urban classes. The area would retain this appearance for several years past the First World War.

Buildings in the earliest areas of the city, those built before 1910, were developed based on four basic variants: basic cabins, usually comprising a single room; slightly more elaborate but simple prefabricated cottages; more ornate two-and-a-half storey homes for the city's middle class, which featured highly stylized facades but...
By 1910, styles had changed and the Arts and Crafts movement began to displace Victorian styles. Inspired by this movement, Vancouver builders adopted the Craftsmen-styled California bungalow and Swiss chalet (Wynn, 1992). The California bungalow provided a one-storey home to mostly middle-class buyers, while the Swiss chalet (very similar in style to the bungalow) was a larger two-storey home for slightly wealthier buyers. For the wealthy, large Tudor Revival homes would...
be built in scattered locations throughout the city, such as along the northern edge of Point Grey and more concentrated in Shaughnessy Heights.

By the 1920s, the characteristics of styles that were used in the grand Tudor Revival homes of Shaughnessy Heights were being adopted by housing for the middle classes. Housing styles such as the "ideal house for Vancouver" and the Voyseyesque cottages introduced the use of stucco walls, steep roofs, and half timbering (Wynn, 1992). For working classes, a simpler home inspired by the arts and crafts movement, known as a "builders' special" offered a small home with two bedrooms on the main floor and an unfinished or partly-finished upper storey (Wynn, 1992).

Neighbourhoods around Vancouver would come to be characterized by the presence of these buildings based on the period in which the neighbourhood was built. For instance, homes for the wealthy built between 1890 and 1910 were concentrated extensively in the West End. Many of these larger homes were converted to rooming houses when wealthy families fled the West End to take up residence in the new Tudor Revival mansions in Shaughnessy Heights. Bungalows and Swiss Chalets can be found in Kitsilano and other early suburbs. The ideal house, Voyseyesque Cottage, and builders' special can be found in the outer suburbs. Builders' specials can be found in the city's East Side.

Inspired by the City Beautiful movement, and the 1892 Chicago World's Fair, leading citizens in Vancouver advocated for better planning principles. This coincided with the rise of zoning ordinances throughout North America. In 1922, the adjacent municipality of Point Grey created the first ever zoning bylaw in Canada (Berelowitz, 2005). In 1925 the provincial government passed regulations allowing local municipalities to establish planning bodies (Berelowitz, 2005). There was a desire in the city to develop a comprehensive plan to deal with the haphazard growth, traffic congestion, and the need for amenities like schools and parks. There was also pressure on City Council to act to maintain property values (Berelowitz, 2005). With these pressures, the city hired Harland Bartholomew and Associates, a well-known planning firm with a prestigious reputation.

Bartholomew's *A Plan for the City of Vancouver* was presented in 1928 as a far-reaching document that sought to plan all the needs for the next 50 years. The document recommended land-use zoning,
public street network, public transportation, schools, parks, and a prominent new civic centre (Berelowitz, 2005). Although the plan was never formerly adopted, the city did carry out many of its recommendations. The network or arterial streets, the location of neighbourhood shopping areas, and the distribution of parks were all implemented very closely to Bartholomew's recommendations (Berelowitz, 2005).

Many of the zoning recommendations made by Bartholomew were adopted as well. The Great Depression, which began in 1930 and was followed by the Second World War, ushered in a period of very limited growth in Vancouver. The post-war period, however, would bring about a renewed period of significant growth in the city. A great deal of conflict would accompanied this growth. In fact, the current conflicts over development and the future of single family neighbourhoods can trace their roots to this period of growth beginning in the 1950s and 1960s.

**Growth and Conflict**

In Vancouver's West End, a proliferation of concrete towers began to replace the large Victorian homes that had been home to the city's upper classes in its early days. As the wealthy classes left the crowded and chaotic West End in the 1920s, many of these large houses found new usages as rooming houses and apartment buildings. Zoned for multi-family development, their redevelopment displaced many vulnerable low-income populations (Gutstein, 1975). A similar trend took place in some of Vancouver's inner suburbs, such as Kitsilano. Kitsilano, unlike today, was at that time a more mixed-income neighbourhood, with many older Craftsman homes serving as rooming houses and small apartments (Gutstein, 1975). In areas that were zoned for multi-family apartment buildings, many of these older Craftsman-style homes were demolished.
By the 1970s, residents began organizing to put an end to the rapid rate of redevelopment in these neighbourhoods (Gutstein, 1975). The city responded by downzoning several of these areas and began a process of more local area plans to better address the needs of local residents and to prevent rapid gentrification (Punter, 2003).

In the 1970s and 1980s, a growing population began to put pressure on Vancouver's outer suburbs. Maturing baby boomer families with new needs began to change the housing stock of what had been fairly stable communities in the 1950s and 1960s. The appearance of the "Vancouver Special," a basic but functional home with a boxy design and flat roof, caused a great deal of concern from existing residents. The design maximized the amount of floor space that could be developed on a single lot, allowing a secondary unit on the first floor below the main level of the house (Punter, 2003). While technically illegal, these secondary units provided an important source of housing in the growing city.

In the 1980s, residents also became concerned about the growing trend in "monster houses." After a severe recession beginning in 1982, an economic recovery began in 1986. The recovery was accompanied by a rise in stature for the city following the successful Expo '86, and a wave of Hong Kong immigration to Vancouver commenced (Punter, 2003). The rate of immigration from Hong Kong tripled in 1987 and doubled in 1990 following the Tiananmen massacre and impending turnover of Hong Kong from British to Chinese control (Punter, 2003). Many of these new immigrants demolished existing homes to make way for much larger homes, often conflicting with what other neighbours viewed as the character of their communities.

Throughout this period of time, the Vancouver planning department put in place policies to alleviate concerns of residents about changes in their community.
communities. In 1988, new zoning regulations made Vancouver Specials essentially impossible to build (Punter, 2003). In the 1990s, the city implemented new discretionary zoning procedures to discourage monster homes, requiring those wanting to increase the size of their home to adhere to a set of design guidelines and submit their designs in advance for review (Punter, 2003).

During the 1990s, the City of Vancouver launched its ambitious CityPlan. Seeking to define a consensus based approach to how the city should deal with future growth, this city-wide public engagement process sought to educate residents about issues facing the city and provide a set of discernible choices that residents could choose regarding future development policy. Such choices concerned where future growth should occur, such as whether growth should be focused towards creating an ever expanding downtown core or whether growth should be distributed throughout the city (Punter, 2003).

Following significant outreach activities, residents endorsed an idea for the city to pursue a neighbourhood centres approach. This would entail concentrating growth in neighbourhood centres that could provide a wide range of housing options for the young, old, and less affluent. Community services such as recreation centres could be located in these enhanced neighbourhood centres (Punter, 2003).

However, CityPlan left unresolved some difficult questions regarding the restrictiveness of single-family zoning and the acceptable level of density that would be allowed on arterial roads. Efforts to implement policy objectives indentified in CityPlan through a series of individual community planning visioning for each of the 23 neighbourhoods in the city has also been problematic. Efforts to reach consensus within these communities have proved elusive, and the processes have been highly contentious (Punter, 2003).

Today these longstanding underlying conflicts within the city continue to hamper efforts to develop effective strategies to deal with population growth and housing affordability. Vancouver's rising international stature has also increased levels of immigration and real estate investment (or speculation), further exacerbating issues of housing affordability in the city.
3. COMPARING URBAN FORMS

This section will compare how urban form and building typologies affect density levels by comparing twelve different neighbourhoods. The objective of this section is to demonstrate how the presence of medium density building typologies can significantly increase the number of dwelling units per acre (DU/AC) a community can accommodate, while at the same time creating very liveable residential communities.

Using observations of the built environment, this section will also explore the impacts of higher density on everyday life and how one experiences a neighbourhood. Using principles that have been established by urban design theorists, it will explore some of the more subjective aspects of urban design.

Site Selection

Selected areas of four Vancouver neighbourhoods featuring low-density development patterns will be compared with eight identically-sized areas of neighbourhoods in other cities with higher forms of density. Areas of selection for the Vancouver neighbourhoods are all on frequent transit networks, where transit service runs at least every 15 minutes in both directions throughout the day and into the evening, daily. These neighbourhoods were selected because they contained a low-density, single-family building form that is typical to large areas of the city. But due to their proximity to frequent transit networks, these neighbourhoods that could stand to benefit the most from residential intensification.

Comparison neighbourhoods in other cities were selected to provide diverse urban forms and building typologies, while also exhibiting medium-density building forms. Four of the neighbourhoods were selected from the North American cities of Boston, Montreal, San Francisco, and Washington, DC. Another four neighbourhoods were selected from the European cities of Amsterdam, Copenhagen, Marseille, and Vienna. All of these neighbourhoods are older than those in Vancouver, with all of the North American neighbourhoods having been developed beginning in the 19th century and the European neighbourhoods often being significantly older.

Vancouver Neighbourhoods

Dunbar–Southlands is a neighbourhood in Vancouver’s southwest. The neighbourhood is predominantly made up of single family homes, though there are limited commercial areas and mixed-use developments along the major arteries of Dunbar Street and West 49th Avenue running through the area. A number of recent mixed-use developments have been built on major arterials. The area selected in this study is just to the northwest of the intersection of Dunbar Street and West 49th Avenue.

Hastings-Sunrise is a neighbourhood located in the northeastern corner of Vancouver. Historically the area has been primarily working class, with a large immigrant population. In the past, the area also contained a large number of industrial uses related to the nearby Port of Vancouver. However, in recent years there has been less industrial activity in the area and the neighbourhood has experienced gentrification. The area is predominantly made up of single-family residences, though some apartment buildings as well as commercial and industrial uses can be found in the area.

Riley Park is a neighbourhood in the centre of the city. It is east of Queen Elizabeth Park, a popular recreational amenity in the city set on a prominent hill. It is also close to the Hillcrest Community Centre, which features an aquatic centre, fitness centre, ice rink, and gymnasium. The area had been the home to Vancouver's oldest public housing development, which was recently demolished after a contentious conflict to make way for 15-acre mixed-use and higher-density redevelopment. The area is predominantly made up of single-family residences, though some mixed-use developments can be found on Main Street.
Victoria-Fraserview is a neighbourhood in the south of Vancouver encompassing a large area of single-family residences and some limited commercial development. Some larger developments of residential apartment buildings exist in scattered areas in the neighbourhood, and a number of mixed-use developments are located on Victoria Drive. The area is home to an ethnically diverse population, with many ethnic minority-owned businesses on Victoria Drive. The area of selection for this study is set to the Northwest of Victoria Drive and East 49th Avenue.

North American Neighbourhoods

Boston’s South End was originally developed in the mid-19th century and is characterized by streets of uniform three- and four-storey brick row houses. Row houses and mid-rise apartment buildings on major streets feature shops, restaurants, and other commercial uses on their first floor. Although originally built as a neighbourhood for the wealthy, it eventually became a neighbourhood of predominately lodging houses. Beginning in the 1950s, urban renewal schemes had resulted in some of the blocks of row houses being raised to make way for modern tenements. In recent years, the area has experienced significant gentrification, with the remaining historic row houses being highly desirable.

Montreal’s Le Plateau was also developed in the mid-19th century, originally as a working class neighbourhood. Its proximity to downtown and to McGill University attracted gentrification. The neighbourhood is characterized by an eclectic collection of brightly-coloured houses that are diverse in form, with two- and three-storey row houses, four-storey flats, and other larger apartment buildings side by side. The neighbourhood has gained a bohemian reputation and is home to many cafes and bookshops. The neighbourhood is also now home to many upscale restaurants and nightclubs as it continues to gentrify.

Washington, D.C.’s Logan Circle was developed beginning in the 1870s when a streetcar line was laid out through the area. Victorian row houses were built as homes for the city’s upper-middle class. Most of the buildings were eventually transformed into apartments and rooming houses in the 20th century. Since the 2000s, the area has experienced rapid gentrification and housing costs have sharply increased. Many new restaurants, bars, and high-end retailers have established themselves on 14th Street, the main commercial corridor in the neighbourhood.

San Francisco’s Duboce Triangle is located near the centre of the city bordered to the south by Market Street. The neighbourhood was developed beginning in the 1880s when a streetcar line was built down Market Street. It is characterized by a large number of brightly-painted Victorian and Edwardian homes and flats of various sizes. The neighbourhood has historically been home to Scandinavian and Irish immigrant populations, as well as large numbers of gay and lesbian people beginning in the 1970s. The neighbourhood is now experiencing significant gentrification with high property and rental prices displacing long-time residents.

European Neighbourhoods

Marseille’s Le Panier neighbourhood is built on the site of the ancient Greek city of Massalia. The neighbourhood features a typical Mediterranean character with narrow streets and colour-washed facades. The neighbourhood became a largely working-class district in the 17th century when wealthier residents relocated to newly completed and more fashionable districts to the east of the city. Today the neighbourhood is also home to many immigrant communities. The diverse population is reflected in the neighbourhood’s many ethnic restaurants and cafes (Rouzeau, 2013).

Vienna’s Neubau is located near the centre of Vienna and is a heavily-populated residential district. The area was originally the location of the city’s silk factories in the 18th century. Today its streets are lined
with specialty shops, as well as a large number of pubs and coffee shops. It is also home to a large student population. The neighbourhood is home to many cultural institutions, such as the Volkstheater Wien, one of Vienna’s large mainstream theatres, and a centre dedicated to modern art ("Neubau," 2014).

Amsterdam’s Jordaan neighbourhood was constructed beginning in 1612. Although originally a working-class neighbourhood, it is now one of the most expensive and upscale areas in Amsterdam. The neighbourhood is home to many art galleries, speciality shops, and restaurants. The neighbourhood features a large number of inner courtyards called hofjes, which often enclose gardens and smaller houses inhabited by artists, students and the elderly ("Jordaan," 2014).

Copenhagen’s Potato Rows, or Kartoffelraekkerne, is a neighbourhood featuring rows of similarly-designed row houses. Built in the 19th century as housing for workers, it is now one of the most popular and expensive addresses in Copenhagen. The row houses feature small gardens and patios visible to the street in the front of the house, which residents configure in a variety of ways. Quiet, narrow streets are utilized as a shared space between people and cars, slowing traffic and allowing children access for play ("Copenhagen’s Potato Rows," 2011).

Methods

An analysis was conducted using aerial imagery from Google Earth of selected neighbourhoods combined with an analysis of ground level imagery. For each neighbourhood, detailed areas of 225 meters by 225 meters, or 15.44 acres, were selected. Figure ground and block diagrams were created to assist in analyzing the built form.

Approximate densities were calculated using the figure ground diagrams. Using ImageJ image processing software, the total area covered by buildings—or the total size of the combined floorplates of all buildings—in each selection was established. Visual observations were used to determine the average number of stories for buildings, and calculations were conducted to estimate total habitable building space. The total habitable building

Figure 27: Example of 225 meters by 225 meter sample size of a neighbourhood area, in this case from the Le Panier neighbourhood of Marseille.
space was then divided by 1,600 square feet to produce an estimate of dwelling units per acre (DU/AC). This use of this 1,600 square foot number was used by assuming (1) that in denser areas that up to 25 to 30 percent of floor area would be devoted to corridors, staircases, lobbies, and other common areas outside of dwelling areas; (2) that in low-density areas, house sizes will be slightly larger than in denser areas; and (3) that in both areas a certain amount of habitable building space would be devoted to non-residential function, such as ground level retail.

In an attempt to verify the validity of these measures, or at least to see if these calculations appeared accurate, the calculated DU/AC were compared with another recent work that visualized density in the built environment. Specifically, images and DU/AC for each for the selected images were compared with those produced in Julie Campoli and Alex MacLean's *Visualizing Density* (2007), which created a density catalogue of 250 neighbourhoods in the United States. Comparing areas in this study with similar densities to areas in the Campoli and MacLean study, visual observations confirmed similar building forms and massing.

![Comparison of figure ground diagrams](https://example.com/figure28)

*Figure 28: Comparison of figure ground diagrams*
Although this method may fail to produce a completely accurate count of the number of dwelling units in the selected area, it provides a useful tool to compare relative density levels.

To further inform the analysis of neighbourhood characteristics, observations using Google Earth and Google Maps (and especially the Street View function of Google Maps) were conducted. Relevant writings from several urban theorists are included to inform the discussion.

**Analysis**

Calculations of total ground level building coverage using the figure ground diagrams indicated that the Neubau neighbourhood of Vienna had the highest ground coverage at 60 percent and the Vancouver neighbourhood of Hastings Sunset had the lowest ground coverage at 23 percent. The average ground-level building coverage for European neighbourhoods sampled was 50 percent, the average from North American neighbourhoods sampled was 41 percent, and the average for Vancouver neighbourhoods sampled was 29 percent.

Using the methods described, DU/AC was calculated for each neighbourhood sample. With both the highest ground level building coverage and the highest average number of stories, Vienna's Neubau

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**Figure 29:** Comparison of block patterns
neighbourhood had the highest density with 82 DU/AC. The lowest calculated density was for Vancouver's Hastings-Sunrise neighbourhood with 9 DU/AC.

The average density for European neighbourhoods sampled was 56 DU/AC, followed by the samples from North American neighbourhoods at 39 DU/AC. The sampled areas of neighbourhood in Vancouver had an average density of 12 DU/AC.

These results indicate that density levels of the North American neighbourhoods sampled are over 3 times as dense as the Vancouver neighbourhoods sampled, and the neighbourhoods sampled in Europe are nearly 5 times as dense. This would suggest that low density neighbourhoods in Vancouver actually have the capacity to accommodate much higher population densities.

Figure-ground diagrams can serve as a useful analytical tool in helping to quickly observe built and unbuilt space. This can help visually assess the amount of density in an urban area. The use of figure ground in urban design analysis has a long history. It was used by Le Corbusier in the 1920s to promote a modernist vision for...
architecture. In the 1970s, Colin Rowe would use figure-ground diagrams to criticize modernist urban renewal schemes inspired by Le Corbusier.

Figure grounds can help identify the underlying "fabric" of an urban area. A common way of determining the urban fabric is by assessing whether an area is fine-grained or coarse-grained. A fine-grained urban area consists of small blocks in close proximity and is likely to have numerous smaller buildings, frequent storefronts, more intersections, and narrow streets. Coarse-grained urban areas tend to have larger blocks, more open space, and less frequent intersections. Generally, finer-grained urban areas would be expected to have higher levels of density, though this would depend on the heights of the buildings.

Figure grounds can also help determine the patterns and texture in an urban area. Patterns are the underlying geometry of an urban form, such as those created by streets and block patterns. Texture is the amount of mixing between fine- and course-grained elements of an urban area. A uniform texture with buildings and blocks of similar fine-grained features would be described as "even" while an urban area with a diversity of fine- and coarse-grained features which would be described as "uneven."

Observing the figure ground and block patterns for the twelve urban areas, the large size of Vancouver's blocks stand out. The sample from the Dunbar neighbourhood of Vancouver is especially stark, where a single block takes up nearly the entire space that eight or nine blocks might take up in Marseille's Le Panier. In fact, all of the neighbourhoods sampled in Vancouver have longer block sizes than any other neighbourhoods sampled.

The importance of shorter blocks was noted by Jane Jacobs (1961) who recognized their importance in promoting pedestrian activities. She noted that shorter blocks provide more pedestrian permeability, allowing someone who is walking to avoid circuitous routes around long blocks to get to a mid-block destination. Thus, such permeability enables more direct travel between two points using existing streets and pathways.

The concentration of intersections in a given area is another way of measuring permeability, with more intersections indicating more potential routes available to a pedestrian and allowing more direct travel. Such features improve the walkability of a neighbourhood, and researchers have observed that neighbourhoods with higher concentrations of intersections also have higher levels of pedestrian activities (Frank, 2003).

In the selection of Vancouver neighbourhoods, while there are long and deep blocks, this doesn't necessarily translate to long and deep buildings. In fact, most of the buildings in the Vancouver neighbourhoods are relatively
small. This creates a great deal of empty space. While in reality such space is not empty, and may be occupied with parking lots or landscaping, the form of such landscapes could provide an additional deterrent to walking.

Using visual observations at the ground level, more stark difference emerge between the Vancouver neighbourhoods and those in other cities. The auto-dependent nature of these neighbourhoods becomes very clear with their wide streets and large parking lots. For a pedestrian, the environment in some places appears hostile—with wide, multi-lane roads and few pedestrian crossings—compared to the images of neighbourhoods in other cities.

Jans Gehl notes that streets must contain stimuli and be varied to make for an attractive walking environment (2010). A lack of stimulating surroundings can make walking a boring experience, deterring people from wanting to take part in a healthy activity. He suggests that successful streetscapes offer eye-catching stimuli so that a person walking at a moderate pace encounters one every 4 to 5 seconds. This works out to encountering something noteworthy, such as a new building facade, every 5 to 6 meters. Such visual stimuli are very apparent in images from the neighbourhoods outside of Vancouver, where commercial streets offer large storefront window displays. Residential streets can offer such visual stimuli as well, such as with a small garden, a collection of potted plants, a brightly painted facade, or a person sitting on a stoop.

Many Vancouver neighbourhoods, even outside the areas that were sampled, are conspicuously lacking in public areas where people would want to spend time. The other neighbourhoods sampled, especially the European examples, boast...
many diverse types of public spaces, such as plazas, parks, and even well-placed benches on city streets.

Such public places serve as important places for people to congregate and socialize. William Whyte, who conducted observational studies of public places in New York City, noted how even relatively small spaces could be well utilized by people wanting to socialize (1980). He also noted how people were often attracted to other people in public places. He noticed that not only did friends clump together when sitting in a plaza, but even strangers tended to take seats in reasonable proximity to each other rather than evenly disperse themselves throughout the space. Such behaviors might relate to a natural human need for companionship.

Many Vancouver neighbourhoods offer large, centrally-located parks, often featuring well-equipped recreation centres. The vicinity around Vancouver's Riley Park, which is close to both Queen Elizabeth Park and the Hillcrest Community Centre, come to mind. While these large open spaces serve an important purpose for certain recreational activities, they are poor substitutes for smaller public areas that people seek to be in the company of others.

There is also a noticeable lack of private places outside of the home where people might want to congregate, such as in coffee shops, restaurants and pubs. Ray Oldenburg describes such places as "third places" (1989). He recognized that such places serve as anchors for community life, facilitating and fostering broader, more creative interaction.

The Vancouver neighbourhoods also lack significant landmarks compared to those in other cities. In the other cities sampled,
prominent buildings might rise a bit taller than other building around them, such as in the case of a church steeple. Kevin Lynch (1960) notes the importance of such easily-identifiable objects in urban setting to serve as visual reference points that help people more easily make sense of a city. Lynch describes how such landmarks aid in the process of wayfinding and help people create mental maps of urban areas.

One element that is present in several of the cities is repetition, such as in the row houses of Boston's South End and in Copenhagen's Potato Rows. Edmund Bacon (1976) noted the importance of this kind of repetition. Using as an example the colonnades of Greek or Roman towns, he noted that repetition is a time-honoured tradition that unifies urban areas but has largely been lost in the modern world.

Another important element is harmony between buildings, even when forms and sizes are very different. San Francisco's Duboce Triangle offers many examples of this harmonizing of buildings, in which building of very different colours and forms contain similar architectural elements.

Although the neighbourhoods in Vancouver offer repetition and harmony in some places, such as in a row of older Craftsmen bungalows, redevelopment of parcels over the years has often broken up this repetition. Additionally, the long distances involved between buildings make it difficult to discern repetition and harmony.

Neighbourhoods in other cities seem to use space very efficiently considering the small public gathering places and narrow roads which, in some cases, like with Copenhagen's Potato Rows, are shared between both people and cars. Homes in
the Potato Rows also make good use of semi-public space at the front of the building, where people use the space in a wide variety of ways such as dining areas, seating areas, or for small gardens.

In contrast, the Vancouver neighbourhoods appear to waste a lot of space. Large front yards with manicured lawns seem to serve no purpose other than being a visual amenity. A look down the alleyways in these neighbourhoods reveals that a considerable amount of space is devoted to storing cars.

Perhaps the most significant difference is the height of the buildings. In Vancouver's neighbourhoods, most residential buildings are either one or two stories tall, although there is the occasional four-storey mixed-use buildings on commercial arterials. Most commercial are just a single storey.

Building heights in the neighbourhoods outside of Vancouver range in height from two-and-a-half stories in the case of Copenhagen’s Potato Rows to four, five, and six stories in Vienna's Neubau neighbourhood. While historically this height range was defined by the number of stories people were willing to climb, they also represent a height at which a person at the top level of the building can maintain connection with the ground level.

In *A Pattern Language: Towns, Buildings, Construction* (1977), Christopher Alexander, Sara Ishikawa, and Murray Silverstein go to considerable length to advocate for a 4 storey limit. They argue that at four stories you can still see the face of a person on the street. You can also yell to them or gesture to them to get their attention.
These observations reveal that Vancouver's neighbourhoods are missing many important elements that make neighbourhoods pleasing and functional in other cities. In comparing the Vancouver neighbourhoods to those of other cities, one of the key differences is the treatment of the automobile. While other neighbourhoods accommodate automobiles, the Vancouver neighbourhoods seem to be built around them. Walking does not appear to be the primary mode of mobility in the Vancouver neighbourhood, as it appears in the comparator neighbourhoods.

While the analysis comparing density levels in various cities seems to indicate that much higher levels of density could be accommodated in Vancouver's neighbourhoods, a key question that emerges is whether Vancouver residents are willing to make way for that density by reducing their dependence on their automobile.
4. REIMAGINING VANCOUVER’S URBAN FORM

In this section, a strategy for increasing the density of a hypothetical block in Vancouver will be pursued. This exercise is meant to demonstrate how the introduction of medium-density building typologies could increase density levels while also incorporating many of the positive attributes of the medium-density neighbourhoods described in previous sections. This section will look at one type of building typology, the row house, and see how it could be adapted to Vancouver's urban pattern. Although other building typologies could be pursued, such low-rise apartments or courtyard apartments, the focus on the row house in the section is due to a number of attributes that makes it an excellent choice for residential intensification.

Land-Use Efficiency
The row house is organized in a vertical format, often with three or four floors, allowing living space to take up less space horizontally. Also, with no double-loaded corridors, shared staircases, or elevators, the row house maximizes the amount of building space that is devoted to living space. The row house also eliminates space that is often wasted in neighbourhoods with single-family detached homes, such as front and side yards, by bringing the building to the front of the lot and sharing common walls between buildings. The row house does not eliminate private outdoor space, and many row houses allow private or shared outdoor space in the rear. The organization of the row house with a clear delineation of outdoor space, with the public outdoor space in the front and the private in the back, can often act to shield private outdoor space from the sound of traffic or other noise on the street.

Environmental Sustainability
With shared party walls, buildings are better insulated against extreme temperatures, both hot and cold. When compared to larger buildings that have double-loaded corridors and elevators requiring pressurized cores and complex heating, ventilating, and air conditioning systems, the row house can use much simpler climate control systems. No energy is required to run elevators or to light common areas of the building. In terms of construction, row houses can be built mostly with wood frame construction, aside from a fire-resistant party wall. Compared to energy costs associated with steel or reinforced concrete construction, the construction of a row house releases much less greenhouse gas emissions.

Flexibility
Row houses, historically, have been able to adapt significantly over the course of their lifetimes. Row houses that were originally designed to house a single family, would often be converted for use as a rooming house, split into single floor flats, or have their ground floor converted to retail or office space. Such flexibility is one of the reasons many row houses in neighbourhoods presented in the previous section have persevered for so long, such as nearly 160 years in Boston's South End and nearly 400 years in the case of Amsterdam's Jordaan neighbourhood. This flexibility also adds to the environmental sustainability of this building typology because of the very long building life. When considering the design of modern row houses, the possibility of future conversions to other uses should be a key design criteria.

Compatibility
The row house is not much taller than the average single-family home. Like a single-family home, the row house is divided into individual units which, though attached, each have individual doors that open onto the street. The facade and side walls of a row house can be configured to relate to a wide range of building styles. The row house can serve as a good transitional structure between higher density buildings and lower density single-family homes.
The Lot

The size of most residential land parcels in Vancouver is relatively large compared to parcel sizes in Europe and North America. The smallest standard Vancouver lot size is 33 feet by 122 feet. In many other urban areas, the standard width for parcels is 20 feet. When combined with the presence of a rear lane, which allows for additional flexibility in accessing the parcel from the rear, the large size of the Vancouver lot presents wide-ranging redevelopment options.

One of the most efficient ways to use the lot would be to develop two row houses side-by-side on the lot facing the street. Although dividing the 33 foot lot in two would create a very narrow space for a building, at just over 16 feet, there are a number of historical precedents for row houses of this size. The city of Baltimore, for instance, has many row houses that are 16 feet in width, and sometimes smaller row houses in the range of 12 feet.

Historically, the 16-foot width was often used because lumber was seldom cut much longer than that size, and a 16-foot beam (joists) could be carried between two party walls (Philipsen, 2012). To make up for the narrow width, row houses would occupy multiple floors, with three to four stories serving as a standard height.

Many of the historic Baltimore row houses were added onto over the years, and incremental additions often added considerable depth. Some row houses would grow to extend 50 feet to the rear. To ensure that the middle section of the home would have access to daylight and ventilation, additions were built with a rear area that was 2 to 3 feet skinnier than the front, allowing for space between the row house and its neighbour (Philipsen, 2012). The 2 to 3 foot gap is wide enough to provide rear windows. If the neighbouring building was built in mirror image fashion, a gap of 4 to 6 feet would be produced. To further address the issue of light and ventilation, the upper stories would step back, occupying less floor space than the floors above. These measures allowed row houses in Baltimore to be livable long before the innovation of modern ventilation, heating, and cooling systems, a significant feat given the humidity and heat of the Mid-Atlantic region of the United States.

Row houses are typically oriented very close to the street, with only a few feet as a setback. The "stoop," a small staircase ending in a platform at the front door to the main house, served an important social function in cities. Homemakers, children, and other household members would sit on the stoop to relax and greet neighbours. Jane Jacobs recognized the importance of the stoop as an important safety feature of...
urban areas by providing a set of eyes on the street that deters crime.

In many row houses, it is common for a separate unit to be located on the first floor, often partially below ground. Known as an “English basement,” “garden basement” or “garden flats,” such units were often rented out by the owner of the larger home above. The garden basement units would have a separate entrance off the front street. The extra 5-foot rise for the first level of the main house that comes about from the partially above-ground English basement provides an additional layer of privacy from the street for the upstairs unit, while the downstairs unit can gain privacy by strategically placing shrubs or fencing.

When set on the standard-sized 33 foot Vancouver Parcel, two row houses with two English basement apartments could increase the number of dwelling units on a single parcel from one to four. This would offer two larger dwelling units (potentially larger if they were extended to the rear) which would be appropriate for larger families, and two smaller ground units appropriate for individuals or couples.

Even with the large size of the main building, there would still be 70 feet of room to the rear of the parcel (or 50 feet if the row house was in a larger format). This area could be used in a variety of different

Figure 44: 16 foot Baltimore row house (Philipsen, 2012)
ways such as a communal back yard or for surface parking if necessary. The rear area could even be developed as a laneway house if there was sufficient demand for additional housing. The rear area could alternatively be devoted to parking for the building, preventing the need for expensive underground parking.

The Block

As a neighbourhood is redeveloped, it is important that additional amenities are added to the community. There is no denying that there is a sacrifice of private outdoor space in this redevelopment option. But in exchange for such loss of private outdoor space, some public space can provided within the block. Ideally, this open space should allow for the development of mid-block pedestrian pathways, which will increase the permeability of the community. In this model, a mid-block break of comprised of four parcels of land is left clear. While the passage could be much narrower, this option allows for a small pocket park to emerge in the centre of the block.

Such mid-block pedestrian pathways could also form natural transition areas between single-family homes and a new development of row houses, since row homes facing the pedestrian pathway would have an outward facing appearance.

Figure 45: Comparison of housing configurations on a typical 33 feet by 122 feet lot as site plans and elevations
Figure 46: Comparison of housing configurations in isometric projection on a typical 33 feet by 122 feet lot
on their side rather than a bare, unadorned party wall. Windows on such a wall could be sensitively designed to provide privacy to neighbouring buildings, and design techniques could even be used to attempt to minimize their scale, perhaps using mansard roofs.

Another consideration with the redevelopment of entire blocks is heritage preservation. In this exercise, two heritage buildings are moved and placed at the shorter end of the block along the main street to the rear of new row houses. Easements could be developed to allow homes that are now cut off from the laneway to maintain access along a narrow path so that the laneway can remain functional for services such as garbage pickup.

In an illustration of what an entire standard Vancouver block would look like if it was redeveloped entirely using a row house form, an image emerges that looks strikingly like some of the examples from the neighborhoods in other cities. In these figures, a comparison is offered between a typical low-density block in Vancouver and a redeveloped block.

This reconfiguration would likely increase the density four-fold for this hypothetical community. This provides a level of density which approaches levels observed in other cities that were investigated earlier. If laneway homes were considered as well, the level of density could be brought up to levels seen in some of the higher-ranging examples.

**The Neighbourhood**

Despite the preferences expressed by residents of Vancouver during the CityPlan process, specifically to concentrate future
Figure 48: Site plan and simulated views of a Vancouver block in which half of the single-family homes have been replaced by row houses. A mid-block pedestrian pathway has also been added, along with a small park featuring a playground.
Figure 49: Site plan and simulated views of a Vancouver block in which all of the single-family homes have been replaced by row houses. Laneway homes are in the rear. Four older California bungalow have been reoriented to the rear of the lots and oriented towards the street.
growth in neighbourhood centres that could provide diverse housing options, many neighbourhood centers are still poorly-defined and lack density. Many centres are simply strips of low-rise commercial buildings on busy arterial roads. Although there has been some redevelopment on these arterials, the process has been slow due to four-storey height restrictions that limit the economic feasibility of redeveloping a site.

To develop more defined neighbourhoods, row houses could be allowed in the areas immediately surrounding these neighbourhood centers. One way of further defining where such growth should take place would be to focus on areas adjacent to the crossroads of frequent transit networks. Such crossroads would offer multiple options for accessing destinations on public transit, which would increase the possibility that residents might be able to live without cars. One proposal would be to allow row houses within a five-minute walk of frequent transit network bus routes, where transit service runs at least every 15 minutes in both directions throughout the day and into the evening, and SkyTrain stations. A five minute walk works out to be within 400 metres of an intersection, using the standard measure for

**Figure 50:** Frequent transit network shown in green and SkyTrain Lines shown in blue. Yellow areas indicate an area within a five-minute walk (within 400 metres) to the intersection of two major transit routes.
walking that 80 metres is equal to one minute of walking time.

Rather than commercial activity taking place exclusively on the major arterials, the corner sites of row house developments would benefit from selectively incorporating corner stores, cafes, and perhaps even pubs.

Corner stores at such locations would provide residents with a nearby, convenient location to pick up items such as milk or bread, and prevent people from using their cars for quick trips to the grocery stores. Such short trips collectively add a considerable amount of traffic on our roadways, and allowing corner stores would be an easy way to alleviate congestion, as well as reduce air pollution and greenhouse gas emissions. Cafes and pubs in these locations could also offer a quiet place to sit outside on a sunny day, or seek shelter on a rainy day. Such businesses could be licensed in such a way as to prevent making a nuisance to neighbours. Such small-format businesses might cater to a more local clientele and offer opportunities to connect with neighbours and build relationships, the essence of a "third place."

**Implications**

Interventions such as the one presented here could significantly increase density in the city of Vancouver. Examining the hypothetical block presented above, a redevelopment of the block from a typical single-family block to a block in which half the parcels have been converted to row houses would produce an increase in dwellings from 24 dwelling to 80 dwellings and an increase in density from 10 to 33 DU/AC. A block that was completely redeveloped using row houses would increase the number of dwellings to 100 and produce a density of 42 DU/AC, and a block that is redeveloped using both row houses and laneways would increase the number of dwellings to 120 and produce a density of 50 DU/AC.

As stated earlier, the City of Vancouver currently projects a need for 53,000 new dwelling units to accommodate expected population levels in 2041. Using this
figure, if all population growth were to be accommodated using the row house form presented in this section, nearly 700 single family blocks in the city would need to be redeveloped. This represents a land area of about 6.8 square kilometers, comprising 17 percent of the city's total land mass of 115 square kilometers.

If this process were to begin in 2015, and if we assumed that an equal number of blocks would be redeveloped in a linear fashion to reach the target of 53,000 new dwelling units by 2041, this would require more than 25 blocks to be redeveloped each year, a pace that would effectively redevelop an entire neighbourhood each year. These numbers make clear that even pursuing a housing strategy that focuses on the “missing middle” will still present significant challenges.
CONCLUSION

When zoning bylaws were first implemented in the City of Vancouver in the late 1920s, the people who took part in their development could not have foreseen the challenges the city face with in the 21st century. At that time the automobile was still a relatively new invention, commercial radio was in its infancy, travel to other cities in North America was by train, and travel to cities on other continents was by ocean liner. But it was at that time that the city largely formalized what had been a fairly irregular development pattern and codified into law a land-use regime that would persist for nearly ninety years to the present day.

Today the city faces significant challenges with population growth, housing affordability, and a growing environmental crisis. Perhaps it was for this reason, with uncertainty in mind, that the original Harland Bartholomew Plan specifically stated that it was only designed to anticipate for the needs of the city up until the year 1960 (Bartholomew and Associates, 1929).

A key question today is whether the City of Vancouver will be able to adapt to the needs of a changing world. Put simply, will the city be able to accommodate population growth by building a sufficient number of new dwellings? And will the city be able to transform its current development patterns and transportation systems in an environmentally-sustainable manner? Some kind of intensification of residential land uses will undoubtedly need to be part of the strategy for increasing the supply of housing in the city. Currently, however, every option appears to be deeply unpopular.

Before moving to Vancouver, I lived in most recently in San Francisco. It is a gorgeous and vibrant city, but it is a city that undergoing abrupt and traumatic change. For decades San Francisco has been unable to build sufficient new dwellings for the city's growing population. With the recent technology boom, a critical housing crisis has emerged. Two weeks ago, a studio apartment close to where I used to live was listed for rent at $3,135 a month (Suzdaltsev, 2014). At the market rate for housing, artists, families, service workers, middle-class workers, and others can no longer afford to live in the city. The loss of so many people who make San Francisco vibrant and colourful is depriving the city of its soul. The experience of San Francisco should serve as a cautionary tale for residents of Vancouver thinking about the future.

This project demonstrates that there is a significant amount of land that exists in Vancouver that could be tapped to meet future housing needs. The strategy investigated in this project, that of focusing on Vancouver's missing middle as a source of new housing, is meant to show that population growth could be accommodated without relying exclusively on towers and other forms of high-density development. Such a trade off, however, would require significant changes to Vancouver's long established low-density, single-family neighbourhoods. That said, this type of growth could also make very positive contributions to Vancouver's neighbourhoods, with benefits in environmental sustainability, public health, economic development, and overall quality of life.

While this project is limited in scope, and focused on how different urban forms can impact residential density levels, much more work could be done to further explore the idea of missing middle housing strategies. An economic analysis could look at the impact on land prices of allowing higher densities in currently single-family-zoned areas. Other studies could look at the impact of introducing such housing types on overall housing affordability. A survey of zoning tools that could be used to help achieve high-quality missing middle neighbourhood design, such as form-based zoning, as well as other regulatory devices and financial incentives, could help clarify how a missing middle housing policy could potentially be
implemented. Novel community engagement techniques could be explored, such as community visioning and participatory budgeting, both to help educate the public about the complex problems facing the city and to inform them of choices available to deal with them.

Ultimately, there is a political decision before the residents of Vancouver, one concerning choices about how our city will develop. I do not believe this needs to be an entirely discrete choice, and some combination of strategies for increasing housing in a number of different ways may be the most effectively strategy for moving forward. But unfortunately, one possible outcome is that the political system governing the city will become unable to accomplish change and the status quo will prevail. However, with a combination of leadership, vision, and creativity, a path to developing novel solutions to Vancouver's housing shortage may emerge.
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Vienna’s Neubau

Built Area: 60%    DU/AC: 82    DU/HA: 201
Marseille's Le Panier

Built Area: 60%    DU/AC: 65    DU/HA: 160

Aerial View

Detail    Figure Ground    Block Pattern    Neighbourhood Context
Amsterdam’s Jordaan

Built Area: 40%    DU/AC: 48    DU/HA: 120

Aerial View

Detail    Figure Ground    Block Pattern    Neighbourhood Context
Washington, DC's Logan Circle

Built Area: 38%  DU/AC: 41  DU/HA: 102

Aerial View

Detail  Figure Ground  Block Pattern  Neighbourhood Context
San Francisco's Duboce Triangle

Built Area: 50%    DU/AC: 41    DU/HA: 100
Montreal's Le Plateau

Built Area: 46%  DU/AC: 37  DU/HA: 91
Boston's South End

Built Area: 33%  DU/AC: 36  DU/HA: 89

Aerial View

Detail  Figure Ground  Block Pattern  Neighbourhood Context
Copenhagen’s Potato Rows

Built Area: 42%  DU/AC: 28  DU/HA: 70

Aerial View

Detail  Figure Ground  Block Pattern  Neighbourhood Context
Vancouver’s Victoria-Fraserview

Built Area: 35% _DU/AC: 14 _DU/HA: 35
Vancouver’s Riley Park

Built Area: 33%  DU/AC: 13  DU/HA: 33

Aerial View

Detail  Figure Ground  Block Pattern  Neighbourhood Context
Vancouver’s Dunbar–Southlands

Built Area: 26%  DU/AC: 10  DU/HA: 26
Vancouver’s Hastings-Sunrise

Built Area: 24%  DU/AC: 9  DU/HA: 23

Aerial View

Detail  Figure Ground  Block Pattern  Neighbourhood Context