**RESILIENT HOUSING FOR GROWING FAMILIES:
LIVING IN THE URBAN CORE OF TORONTO**

by

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Bachelor of Architectural Science, Ryerson University, 2010

A thesis

presented to Ryerson University

in partial fulfillment of the
requirements for the degree of

Master of Architecture

in the Program of

Architecture

Toronto, Ontario, Canada, 2015

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Resilient Housing for Growing Families: Living in the Urban Core of Toronto

M Arch 2015

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Abstract:

Toronto is experiencing a trend in which apartment housing lacks the flexibility and adaptability to transform over one's life cycle. A majority of suites in Toronto's apartment housing stocks are unsuitable for potential family growth and change to an Echo Boomer's needs over time due to its static layouts. In light of this phenomenon, how can Toronto's downtown intensification accommodate the changes and demands in all phases of an Echo Boomer's life cycle in the ever growing apartment typology? Through analyzing city's development guidelines, precedent studies and a design proposal to culminate the findings, this thesis envisions a building typology that will enable an architectural response that is flexible to accommodate Echo Boomers over their life cycle.

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Resilient Housing for Growing Families: Living in the Urban Core of Toronto

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1

Thesis Abstract

Toronto is experiencing a trend in which apartment housing lacks the flexibility and adaptability to transform over one's life cycle. A majority of suites in Toronto's apartment housing stocks are unsuitable for potential family growth and change to an Echo Boomer's needs over time due to its static layouts. In light of this phenomenon, how can Toronto's downtown intensification accommodate the changes and demands in all phases of an Echo Boomer's life cycle in the ever growing apartment typology? Through analyzing city's development guidelines, precedent studies and a design proposal to culminate the findings, this thesis envisions a building typology that will enable an architectural response that is flexible to accommodate Echo Boomers over their life cycle.

1.2 Abstract

From 2006 to 2011, Toronto's downtown population has tripled; this growth was triggered mainly by Echo Boomers aged 20-39. The housing market has experienced unprecedented growth; the high-rise apartment housing typology has been at the forefront of the market boom and its popularity continues to rise. The apartment market was strongly influenced by the influx of young and single Echo Boomers who are diverging from the suburban lifestyle of their parents and are returning to the city center for close proximity to work and take advantage of all the amenities in downtown. Acknowledging the demands for affordable downtown living, developers have rushed to create one-bedroom and bachelor housing units with minimal to no supporting amenities. These smaller units are geared towards the one or two-person household and account for over 60% of the supply. Only 3% of the units in the condo market have 3 or more bedrooms and only 26% are two bedroom units.

The short-sighted approach to the current developments has failed to take into consideration the life progressions of the Echo Boom generation and have only built to support the current market of single individuals. As families started to form and their needs expand, prescriptive apartment building layouts that were once adequate will become obsolete. The current homogeneity of residential

towers with small, inflexible units and inadequate public amenities offers little to accommodate family and community growth. The inability to cope with change could mark the demise of the apartment market in Toronto, as potential residents will be forced away by uncompromising dwelling units and insufficient public amenities and open spaces. Toronto needs an architectural response capable of supporting not only the Echo Boomers' current needs for accessibility, proximity and convenience, but also future needs that will come with family expansion and eventual aging.

The Toronto official plan and subsequent studies produced regulations and design guidelines for which future apartment typology should follow within the downtown core. The proposals focused on the overall developmental vision of Toronto, and lacked sensitivity towards the user, community and diversity within the downtown region. An applicable housing model resilient to changing needs was absent from these guidelines. This thesis will focus on developing a building type and generating creative solutions that can adapt to the needs and changing demands in all phases over a family's life cycle. Refocusing on Echo Boomer needs, it will identify what is absent from the booming city center and will derive an architectural solution that is functional, serviceable, and sustainable as the city center continues to grow.

2

Main Research Question

This section outlines the main research objectives and establishes the research methods used during this thesis.

2.1 Main Research Question

This paper aims to project and anticipate trends in lifestyle and family growth and change in the Echo Boomer generation, asking: **How can Toronto's downtown intensification accommodate the needs and demands in all phases of an Echo Boomer's life cycle?** In order to explore this topic, four research objectives are defined:

- 1 - To review and analyze current official plans and guidelines employed for accommodating growing households.
- 2 - To determine strategies for residential buildings appropriate for family growth in downtown Toronto.
- 3 - To analyze trends of new Echo Boomer settlement in Toronto's downtown core.
- 4 - To propose a new architectural typology to support and sustain the changes and growth of the Echo Boomer generation.

2.2 Research Methods

To develop the overall research methodology, qualitative research methods will be used throughout this thesis. Using Ritchie and Spencer's *Objective of Qualitative Research Questions* as a framework, the questions are divided into four categories (Ritchie & Spencer, 2002, p.311):

Table 1: Qualitative Research Objectives

Categories	Objective	How to apply to this thesis
Contextual	identifying the form and nature of what exists	Precedent studies of existing development
Diagnostic	examining the reasons for, or causes of, what exists	Examine current plans and guidelines with proposal of accommodating the growth
Evaluative	appraising the effectiveness of what exists	Evaluate the missing components which make Toronto more suitable for family growth
Strategic	identifying new theories, policies, plans or actions	Develop new architectural typology to support and sustain the changes and growth

Adapted from (Ritchie & Spencer, 2002)

3

Introduction

3.1 Current Situation

Toronto, a world-renowned city and the epicenter of population growth in Canada, is undergoing tremendous changes. Amalgamated from six municipalities in 1998, the Greater Toronto Area offers a unique blend of rural and suburban lifestyles in addition to the urban lifestyle in the downtown core. Since the amalgamation, a majority of the population still resides within the original boundaries of Toronto; where the 2014 population was 2.6 million (City of Toronto, 2012). Growth has been particularly apparent in the downtown core, as downtown Toronto's population growth rate as of 2011 had multiplied four-fold, from 4.6 percent to 16.2 percent in a short period of five years. (Figure 1)

It is estimated that Toronto's population will increase to 3 million by 2031 and may reach up to 3.5 million

by 2041 (Figure 2) (City of Toronto, 2012). The growth of the downtown has been supported by the Echo Boomer generation, born between 1980 and 1995. Known as the generation after the Baby Boomers, they comprise one of the largest demographic groups in Canada and represent 25% of Ontario's population. In downtown Toronto, there is a higher percentage of Echo Boomers than in other regions of Ontario, with nearly half of downtown Toronto's population consisting of Echo Boomers (Figure 3) The young, skilled and well educated Echo Boomers are locating themselves in the core with objectives of shorter commute times, closer proximity to amenities, work, daily service support, and access to mixed-use communities. The disproportionate number of Echo Boomers in downtown Toronto has shifted that area's median age to the mid-30s, as opposed to the rest of Ontario where the median age is over 40.

Figure 1: Population Growth in the GTA (Fong, 2013)

Figure 2: Toronto Population Projection (City of Toronto, 2012)

As the Echo Boomers continue to move into the downtown core, how the city accommodates their needs will largely determine the success of Toronto. The main challenge for Echo Boomers on the horizon will be how a downtown lifestyle can accommodate the future phases in their life; from the creation of a family to the nurturing of their children to their life as seniors. According to Statistics Canada, 66% of the family households in Toronto have children at home. (Statistics Canada, Census 2011, 2013) While the majority of parents are married couples, 32 percent of households are headed by single parents. (Statistics Canada, Census 2011, 2013) Infrastructure and communal services for these families will be crucial in allowing them to prosper within the downtown region.

The inability to cope with the progression of users from childless families to larger family groups could lead to the demise of the condo market in Toronto, as potential residents would be driven away by uncompromising dwelling units, insufficient public amenities and open spaces.

The current housing market has not been accommodating to families wishing to live in the downtown core. A booming real estate market has produced soaring prices even as the amount of detached homes reaching unprecedented heights due to the growing population and foreign investments. In Toronto, detached homes, which comprise 28 percent of total housing options have an average price of \$713,807 in 2014, an increase of 9 percent from 2013. (Toronto Real Estate Board, 2014) The overall market has been trending upwards, as the price of an average home (including semi-detached and row houses) has increased 8.4 percent and currently stands at \$562,504. Costs will likely continue to rise, with the cost of a home in 2036 double that of the 2011 cost. By that time, there could be an income-to-cost ratio of seven to one, higher than the rest of Canada. (Pastrick, 2013) This has led many to proclaim the inevitable “Manhattanization” of Toronto, where housing is simply unattainable for the masses unless they are fortunate enough to benefit from rent control. (Yelaja, 2012).

Figure 3: Toronto Generation Shift (City of Toronto, 2012)

As a result of the desire to live downtown and the high cost of living, many Echo Boomers and their families are looking into the condo market as an alternative to high-priced detached housing. Condominium development has been the key component in the growth of the real estate market, as 92% of high-rise buildings currently under construction in the downtown core are residential. (Ecans, 2014) This rapid developmental growth has been referred to as the “condofication” of downtown Toronto. (Lehrer & Wieditz, 2009) The tremendous growth of the condo market has raised concerns, especially in regards to the form that it has taken. In an attempt to build and sell faster, developers are building smaller units in an effort to keep costs attractive. As a result, 63 percent of the units available in 2012 are one-bedroom or bachelors, with an average size of 76.3 square metres. (Yelaja, 2012). The trend of building smaller has continued to worsen, as the units completed by 2014 averaged 64.5 square metres. Amenities and facilities have fallen victim to Manhattanization, as they are often excluded in an attempt to further cut costs. The overall outcome is that families of three people or more are being neglected in the booming real estate market, as there are no housing types that can meet their needs. As Echo Boomers continue to migrate to the city's core and families continue to form, there will be limited options in downtown Toronto to satisfy their needs.

The city has tried to mitigate the lack of family housing by creating provisions that would require developers to make 10 percent of their units three-bedroom apartments. (Marr, 2009). Some developers, such as Edilcan Development Corp., are willing to build bigger units; their developments feature condo units larger than the Toronto standard. This is only one company's policy, however, and has yet to gain

traction in other developments.

Unit size is not the only issue. Families are concerned about the safety of downtown living and its suitability for younger family members. (Dale, 2012) Experts fear that the city's indecisiveness in providing housing options for Echo Boomers, added to the high costs of multi-room units, will eventually force families back to the suburbs. (Marr, 2009) The small units which were highly desirable for single people, may no longer have a market to sustain them, which will have catastrophic effects on the real estate market. (Yelaja, 2012)

Figure 4: Toronto's Family Household Demographic, 2011 (Statistics Canada, Census 2011, 2013)

As an Echo Boomer's life cycle continues, there will be a mismatch in the market between fixed and prescriptive homes and the people who want to live there. The overall housing market in downtown is currently only targeted to the mainstream of young professionals with small household size, and have neglected other age groups which comprise the community, which are students, growing families, and the elderly. In order to make downtown living affordable for all age groups, a unit must be able to break through the prescriptive dwelling and search for a new architectural solution which can be able to cope with different requirements and transformable to fit many uses.

3.2 Resilient Architecture

Resilience is defined as the ability to recover from, or adjust easily to, change. (Meriam Webster, 2014). In architecture, resilience is commonly referred to as "the ability to absorb disturbances, to be changed and then to re-organize and still have the same identity, which retain the same basic structure and ways of functioning". (The Resilience Alliance., 2002) As part of a trend towards resilient architecture, progress has been made to ensure building envelopes and materials are sustainable; a macro approach has often been taken in which architecture deals with the future as much as the present.

It is crucial to acknowledge that a resilient approach towards changes within internal functions of a building is as vital to adaptation as are external factors. Throughout the lifespan of a building, the usage and events that occur within the building will continue to evolve and change, redefining the purpose of the architecture. Residential architecture is one building

type that must be resilient in its adaptation to the needs of the owners in order to achieve success. Unlike other types of uses, residential users tend to remain in the same location for longer periods of time, and it will be crucial that their homes can match their changing needs as they inhabit the space. As their needs evolve, the units need to have the capacity to accommodate for these changes, serving as vehicles for smooth transitions. Architecture and the space are defined by the users and the method they are inhabited. For most users, exterior envelope and system efficacy are not as impactful and vital to changing their lives as interior resiliency, and how it can change their everyday lives and routine. In most cases, architecture offers little flexibility in its ability to adapt to change. As needs change, it is most often users who make sacrifices to suit surroundings, not vice versa.

In Toronto, where the condos are getting smaller, size is the most problematic issue for future families. Current housing typologies have not taken into account the growth of buyers and their needs, as size restraints has made it impossible for Echo Boomers to attempt to make changes to match their growing needs. The difficulty presented by their existing homes' inability to cope with growth will leave homeowners little option but to move. The generation of a response towards a lack of flexibility and adaptability with a fixed space must be derived outside the confines of a unit. Therefore, it is critical to abandon the prescriptive dwelling units and search for a new architectural solution which can cope with a variety of different requirements in an apartment unit.

4

Toronto Guidelines Review

4.1 Toronto Official Plan

In Post-World War II North America, the dominant strategy for residential development emphasized privacy and independence. Cities began to expand outwards, with a lack of regard for consequences. The increased use of vehicles altered the perception of distance, and where it became desirable for workplaces and shops to be further away from the serenity of one's home. Citizens and urban planners alike embraced the idea of urban sprawl, which was driven by the principle that massive single-purpose residential communities in the suburbs were the better environment for raising children. The city center was perceived as family unfriendly, welcoming only bachelors and couples. This philosophy has been largely retained up to the present; the saturation of the downtown condo market with bachelors and one-bedroom units reflects this perception.

However, families have begun to realize that the founding principles established after World War II of a typical North American city, such as urban sprawl and dependency on the automobile, were flawed and problematic. Families now desire the lifestyles that urban centers can provide, and realize that vibrant downtowns can give children experiences that the suburbs cannot. Modern families are more eco-conscious and are making efforts to be less vehicle dependent. According to Cherise Burda's report for the Pembina Institute, in the Greater Toronto Area, 60% of families with three or more children prefer to trade off a large home to a smaller home in a location with higher walkability and public infrastructure. They actively search for alternatives to automotive transport, as 81% in a recent survey suggest that they would prefer to live with access to public transit and amenities within walking or biking distance. Traits

once associated with suburban living are becoming less vital to families; as only 19% in a survey identified large houses and spacious backyards as vital components for their homes (Burda, 2014, pp. 3-4). Echo Boomers now prefer to stay within the city as they start their families, as opposed to opting for a suburban lifestyle.

In anticipation of this trend continuing, Toronto has altered its philosophy towards city planning. The city has begun to turn its focus within the core, with areas within the city center being re-evaluated with the goal of accommodating added density. The Toronto Official Plan was produced in 2006 as a guideline intended to both foresee and manage the overall developmental direction of the city. The official plan identifies the dangers that are associated with continual sprawl, and justifies focusing attention on redeveloping the urban fabric of the inner city.

Like many North American cities, Toronto has a high-density commercial and financial core with low-density residential neighborhoods featuring detached homes on its peripheries. (Wright, 2010, pp. 2-7). The residential neighborhoods are generally stagnant in nature with limited development potential. Toronto's Official Plan identifies five locations in which intensification can and should occur.

Downtown:

The downtown area is considered the most important area in a city. Its prosperity and success directly symbolize the city. Thus, the direction that future development takes in Toronto's downtown will determine the image the city portrays to the world. The downtown area features a very complex urban

Figure 5: Intensification Area

fabric with office buildings, post-secondary institutions, hospitals and government buildings. The thriving economy has led to tremendous changes in the region, as the area has also been a stronghold of condo development. The waterfront has seen the most growth, and its mostly residential intensification will likely continue in the future.

This intensification has led to some concerns about the ability to develop and maintain public amenities for a growing population. The city fears that this fierce growth will likely impact the historical regions of the city, with public areas succumbing to the development market. Intensification will need to coordinate with all other considerations to create a cohesive core that maintains a sense of the past. Toronto has made a concerted effort to maintain a balance between growth and heritage, in the hopes of maintaining the city's historic character.

Centers:

Centers are transit hubs within the city; here, existing infrastructure has created nodes that attract communities. Many of these centers, such as Scarborough Centre and North York Centre, provide a fair balance of convenience and tranquility. These neighborhoods are attractive to families because they offer benefits arising from both these conditions. The homes in these areas, still considered to be on the periphery of the city, are generally much less expensive than those in the downtown. Although these neighborhoods are generally residentially oriented, the city has ensured the insertion of balanced programming by building a variety of mixed-use structures to create an environment similar to that of the downtown core.

Avenues:

The avenues represent key arteries in the city in which intensification has been actively undertaken. Many major streets in Toronto are classified as underdeveloped, usually lined predominantly with one or two-storey commercial buildings. (Wright, 2010, pp. 2-15) The avenues present perhaps the most difficult challenge for reurbanization. The plan has acknowledged this, noting that the built fabric will take more time to redevelop. One main concern is to ensure that the characteristics of these corridors are maintained as development occurs. More stringent regulations have been put into effect to monitor developments here than in any other regions. Conditions such as height and massing limits were imposed to ensure that the streetscape will remain vibrant. Mixed-use developments were also encouraged in the attempt to maintain vibrancy.

Employment districts:

In addition to planning for housing for a projected population, it is also important to consider future workplaces. Commercial districts are vital to any city as they are essential for the creation of a balanced economy. These are areas in the city in which residential development is not recommended; it is vital to maintain properties there for commercial and employment purposes. A change in usage would make it difficult in the future to return the land to a commercial or industrial use. (Wright, 2010, pp. 2-18) It is important that these areas continue to thrive as the city continues its intensification, as the creation of environments where businesses can succeed is essential for healthy urban growth.

(Wright, 2010)

4.2 Toronto Official Plan Overview

While the official plan acknowledges projected population growth in Toronto and the resulting need for urban dwellings, it fails to take into consideration that different sectors of the community have distinctive needs. A generic approach was taken in the hope of encapsulating all household types; the result is that perspective was lost regarding the households of need. While the needs of children and families are much different than those of couples and bachelors, for example, the intensification propositions were ambiguous and did not address these distinctions. The policies they presented lacked the depth and analysis required to generate positive changes.

The decision to provide for more units and density within the downtown core is a clever one; however, the plan does not propose solutions or policies to address the shortage of family-suitable units. In addition, action was not taken to create more affordable options in Toronto. In the past decade, the downtown core has been flooded with one-bedroom or bachelor units. The continuation of this developmental model has led to shortages of larger units, and may result in an oversaturated market of micro-units. Housing prices have been soaring and will continue to rise in the future, (Pastrick, 2013); consequently, families have been forced away from communities that they wanted to live in and had grown attached to. It is necessary to put policies in place to ensure that lower-income and middle income families would be able to live in the downtown core, in neighborhoods that are becoming unaffordable. Clear directions are needed to monitor developments and to ensure that actualization of this plan would preserve diversity and affect the city favorably. (Wright, 2010, pp. 2-17)

Figure 6: Mid-Rise Building Guidelines

4.3 Avenues & Mid-rise Building Study

In 2010, a study of intensification policies for Toronto's avenues was produced in response to the Toronto Official Plan. The Avenues and Mid-Rise Building Study proposed standards that architectural interventions within the Avenue context were required to follow and abide by. The guidelines would ensure that unity was created along the street, thereby giving Toronto's urban intensification a stronger identity. Figure 6 illustrates the summary of the mid-rise urban guideline.

Building Heights

In an effort to control the streetscape and to maintain continuity along the avenues, maximum and minimum building heights were proposed for future developments. The maximum heights were generated from taking into account street width, with the general right-of-way being the determinant of building height. In most cases, avenues were composed of four major widths of 20, 27, 30 and 36 meters, so that buildings could have a six-to-twelve storey limit, depending on location. Minimum heights were then set at 10.5 meters, which equates to a three-storey building. These regulations are meant to ensure that the avenues will have a consistent street wall, thus creating a rhythm that will, in part, define the space.

Building Form

Measures have been taken to ensure that the height and size of a development does not adversely impact the street or the neighboring community. A study by Peter Bosselmann (et. al.) concluded that a 5-hour per day sunlight window must be available on the sidewalk between the spring and fall equinoxes. (Brook McIlroy Planning , 2010, p. 58) In order to allow sunlight to reach the streetscape, the buildings

are to be constructed with 80 percent of the right of way against the property line, with structures above the designated mark being subject to a setback within a 45-degree angle limit. This strategy has the intention of creating more favorable shadow castings on public space.

The policy encourages buildings to be built against the property line, with zero setbacks. This allows for the definition of the Avenue and for the creation of strong connections between the retail uses lining the street and the sidewalk. Voids and setbacks which disturb the flow and rhythm of the Avenue are largely discouraged, as a building should inhabit its property as much as possible. In some cases where properties are excessively long, with facades of undesirable proportions, the use of voids is then encouraged to break up the monotony of the façades.

Streetscapes

The development of the streetscape is as important as the development of the architecture it serves. According to recommendations in the City of Toronto's "Final Report- Official Plan Amendment to encourage the development of units for households with children," avenues without an attractive street surface to promote community interaction will not thrive and succeed (Toronto City Planning, 2009, p. 11). A 4.8-meter sidewalk was proposed as the minimum dimension that would allow proper spacing for landscaping and safety for pedestrians. Depending on the size and proportion of the avenue, the sidewalks may be required to be increased to 6 meters for additional space and comfort. (Brook McIlroy Planning , 2010, p. 67) Street amenities are also crucial in forming an attractive space. Items such as trees, benches and street lighting can help to create rhythm within the avenue, creating nodes and areas which are enjoyable and welcoming.

By Author

4.4 Children and the Family Friendly City

During the course of their American House Survey, that was a step towards attempting to revitalize urban cores. Thomas Sanchez and Casey Dawkins discovered that the majority of residents in city centers tend to be young, highly educated, high-income professionals without children. While their study surveyed major US cities, the current situation in Toronto's demographics are similar. In Toronto, these residents chose city centers for their convenience, close proximity to work and amenities, or out of a desire to establish their own household. Sanchez and Dawkins suggest that in order for a city center to thrive, it is essential to attract middle-income inhabitants; they refer to "urban diversity", that is, the mixture of people of different incomes, classes, races, ages, lifestyles and life cycles. Generally speaking, city center cultures lack urban diversity because they lack the space and amenities needed to support families with children. (Sanchez & Dawkins, 2001, p. 611)

Former Vancouver Chief Planner Brent Toderian suggests that the two amenities critical to the attraction of families to the downtown are daycare centers and schools. The close proximity of these facilities has major appeal and affects parents' decision of where to live. In Vancouver, daycare centers and schools in downtown prime real estate areas are integrated into new developments through government funding of construction and operations costs. (Toderian, 2012) In Toronto, there is no government funding for the construction and operation cost for non-profit daycare centers. With the continuous demand of prime real estate, non-profit daycare

centers are diminishing in the downtown core, the Scotia Plaza Child Care Center located near King Station, is one of the rare daycare operated by George Brown College in a rent-free space. As owner of the building decided to rent the space to a for-profit center which does not accept subsidies, many parents cannot continue sending their children to this daycare as it become unaffordable. There are 25,000 parents who rely on subsidies in Toronto's childcare system and 16,500 on the subsidy waiting list (McGinn, 2015). Therefore, it is critical for mix-used buildings to incorporate not-for-profit daycare spaces which can support daycares for these parents in the downtown core, this can dynamically benefit the community and attract more family growth downtown.

In addition, unit size is a crucial settlement decision. While Adam Vaughan, a former City Councilor in Toronto, suggests that three-bedroom suites should comprise 10 per cent of Toronto's new housing developments, Vancouver has already mandated that 25% of suites must be 2-bedrooms or more. (Toderian, 2012)

The number of children in Toronto's core is increasing rapidly. The Director of the Toronto District School Board (TDSB) has indicated that 35,000 junior kindergarten students are enrolled every year in downtown Toronto. Some neighborhoods, such as Trinity-Spadina, have a 16.5% child growth rate as compared to a 4% growth rate in the city overall. This shows that the population of children in the downtown is booming. (Statistics Canada, Census 2011, 2013) Elaine Baxter, General Manager of Toronto Children's Services, has worryingly indicated that

only 7% of children living in the downtown attend licensed daycares. Toronto lacks "universal access to child-care which provides affordability, stability and quality" (Keesmaat, et al., 2014).

A roundtable discussion was held in the City Hall of Toronto in 2014, titled "Planning Cities for Families". Conducted by Chief Planner Jennifer Keesmaat and with the participation of City staffs and industry professionals, it examined how Toronto's downtown can be a more family-friendly environment. Lynda Macdonald, Planning Manager of West Downtown, suggests that a cultural change is needed in order to make Toronto's downtown appealing to families and children. She indicates that there should be places to get together with families, such as parks and open spaces at the ground level of buildings, and also suggested that shops be stocked with more child-friendly products (Keesmaat, et al., 2014).

Sybil Wa, associate of Diamond Schmitt Architects, also stressed the lack of public realms for children in the downtown. She compared the outdoor amenities children have in suburbs to those in the downtown (Figure 7) and suggested alternative solutions for creating safe outdoor spaces. Through statistics and images, Wa demonstrated the potential of rooftops as a main source of public realm for children as they could provide safe areas for children to play without the presence of vehicles.

In order for children to have a sense of identity in the downtown, spaces for play and social interaction are critical. Marcus and Sarkissian (1986) suggested an ideal solution for families residing in city centers in high-density, low-rise housing that provides both private and public open green spaces. Living in city centers can provide parents with the proximity they desire for work, public transport, efficient maintenance and cultural facilities, while children can have access to private and common green spaces for socializing and playing, thereby improving their physiological and mental health. Living in low-rise housing can provide residents with a strong sense of place, whereas in high-rise buildings, people can feel distanced and anonymous as there are too many residents living within a small footprint. (Sarkissian & Marcus, 1986) Under the current downtown intensification development, low-rise buildings in city centres are unaffordable for the average family. Jason McLennan, author of *The Philosophy of Sustainable Design* suggests the ideal building height in an urban setting should be midrise, between four to twelve stories ranged between 30 to 100 suites, Any higher would increase the burden on community and public transportation systems and also would prevent daylight from passing into nearby buildings. (Malennan, 2009)

Figure 7: Amenities for Children in Suburbs vs. Downtown

Adapted from (Keesmaat, et al., 2014)

4.5 Sustainable Urban Form

This section examines strategies from various international urban intensification guidelines as it seeks to target sustainable urban forms for Toronto. These strategies formed the basis of site selection criteria.

Urbanist Jan Gehl criticized big-name architects such as Norman Foster, saying that their research-led urban planning approaches focus on aesthetic appeal rather than context. Gehl envisions a habitable city in this way: “Architecture is the interaction between life and form and only if that works well it is good architecture” (Martindale, 2013). Gehl argues that in order to design a habitable city, a “sentimental rather than research-driven decision” is needed. Placing more seating on the sidewalk near cafes and restaurants, providing entrances every 6 metres, use of ground-floor glazing, and reducing private vehicle usage should be stressed in order to establish a more integrated community (Martindale, 2013). These strategies would encourage more walking and cycling, and therefore increase the opportunities for human interaction that are one foundation of a healthy and habitable community.

4.5.1 Smart Growth: New Design

Guidelines

According to Jon Reed, urban sprawl over the last 100 years has been contributed to unsustainability and has resulted in “environmental disaster” (Reed, 2011, p. 17). An alternative approach for city planning is needed in order to provide a sustainable platform for future generations.

Reed suggested North American cities should learn from the UK Smart Growth principles (Table 2), urban planning development guidelines that discourage urban sprawl and promote living in compacted, walkable, public transit-oriented communities, with the effects of a great reduction in the pollution created by sprawl as well as the preservation of valuable greenspace (Reed, 2011, p.19).

The Smart Growth UK model provides American cities with broad guidelines on the macro-level for designing sustainable cities through tactics that encourage people to live in compact and efficient areas. Unfortunately, the guidelines lack refinement, such as dealing with different cities’ by-laws, various city scales, and the solutions they present are complicated in nature with low probability of succeeding.

American architect Peter Calthorpe, one of the founders of New Urbanism, an urban design movement started in the early 1980s, suggests a reduction in automobile usage and the creation of mixed-use walkable communities. He has proposed a movement called “transit-oriented development” for a suitable future (Calthorpe, 2011). He argues that North Americans have become overly dependent on automobiles over the past century and have thereby created an urban sprawl (Figure 8 and Table 3). The “transit-oriented development” can provide sustainable living for future generations as it urges people to develop dense, socially and economically diverse, mixed-use walkable city centres near public transit infrastructure (Reeds, 2011, p.160).

Figure 8: Transit-Oriented Development

Adapted from UK Smart Growth principles (Reeds, 2011)

Table 2: Smart Growth UK principles

Categories	Objective
Plan compact communities	Discourage sprawl by promoting compact and efficient communities
Strengthen and direct development towards existing communities	Stress the use of existing resources and infrastructure in the community and protect urban open spaces
Provide sustainable transport choices	Reduces automobile dependency and increase the opportunities for walking, cycling and public transit system
Protect unbuilt environment	Protect valuable green fields as a mean of economic relief
Foster attractive communities with a strong sense of place	Creating a sense of place by supporting human-scale development such as promote residents to envision the future and preserve cultural and architectural heritage, and resist big-box, monolithic developments
Mix land uses	A mixed use of land that is suitable for the community and meets their daily needs
Encourage communities to flourish and grow	Encourage mixed-income, mixed-age and inclusive communities that can be self-supportive
Create a range of housing opportunities and choice	Create housing type for all income bracket and developments with appropriate density that can be supported by existing infrastructure
Make development decisions fair and economically inclusive	The three sector of the market - public, private and community must be successfully applied in order for Smart Growth to operate effectively and sustainably

Adapted from UK Smart Growth principles (Reeds, 2011)

Table 3: Transit-Oriented Development

Principles	
Walkability	Pedestrian-friendly design is the highest priority
Public transit hubs	Public Transit Hubs as prominent features of city centres
Nodes	Mixed-use nodes with a combination of use in close proximity, including office, residential, retail and civic use
Density	High-density development in proximity to the public transit hub
Transit alternative	Provide an alternative to transit system, such as buses, light rail, etc.
Bicycles	Provide infrastructure for walking bicycle as everyday transportation
Parking	Reduce and manage parking within 10-minute distance of public transit hubs and city centres

Adapted from UK Smart Growth principles (Reeds, 2011)

4.6 Alternative Transportation Options

Urban dwellers have always found neighborhoods that present viable options for their lifestyles appealing; these options include access to transportation options that avoids car usage. Wanting more transportation options, however, has not deterred individuals from their own vehicle at times. Having a vehicle at one's disposal is still an attractive proposition for many; 83% would prefer the option regardless of whether alternative transportation is available. In recent years, however, it has become increasingly difficult to justify owning a vehicle while living downtown, the rising condo market has led to soaring prices for parking spaces. The cost of a parking space has now exceeded the cost of purchasing a new vehicle, being valued at as much as \$100,000 in certain areas of the city. (Wong T., 2011) Compounding the situation is the fact that developers want to build fewer parking spaces in an effort to reduce construction costs. The surging prices of parking downtown and of car ownership have led to the rise of other modes of transportation. The creation of car-sharing and bicycle-sharing programs has provided alternative to owning a car that the public infrastructure cannot provide, as well as reduced overall living expense, such as parking and auto maintenance fees.

Car-Sharing

Toronto is home to a number of car-sharing businesses. Since 1998, when Autoshare was founded, the quality of their services has improved, benefitting from new technologies, and this business sector has seen tremendous growth. In 2012 there were over 1000 vehicles in 550 locations from

three separate companies for users to choose from, (Hamilton, 2012). As business continues to expand. The car-share program has become the ideal service for users who need a vehicle on a sporadic basis, or need to travel long distances. A major increase in the number of locations has provided added convenience, as some companies allow vehicles to be returned to a different location. Many developments now incorporate car-share parking spaces and programs. Autoshare currently has vehicles in over 60 condo and rental apartment buildings. (Autoshare, 2014) This has been a positive for both the consumers and developers. Developers are able to earn LEED (Leadership in Energy & Environmental Design) points, (LEED, 2014) while residents are able to use the system with ease. Families are able take advantage of the convenience and cost effective traveling with a semi-private vehicle as opposed to using public transportation which can be cumbersome for a large family. As urban dwelling becomes more common and the cost of owning a vehicle increases, the car-sharing program will likely continue its success.

Bixi Bicycle Sharing

As opposed to the car-sharing program, the Bixi bicycle sharing program has failed to meet the financial expectations put forth by the city. Developed in 2011 and based on models in Montreal and Portland, the bicycle-sharing program was meant to provide a convenient mode of transport for shorter commutes and for travelers wishing to navigate the city. The program originally had a positive reception, with 4743 subscribers as of October 2012, (City of Toronto, 2012), a number that far exceeded the initial milestone set in 2010 of 1000. (City of Toronto, 2010). The project was thoroughly supported and was praised by the public and by the city as a green alternative for city center inhabitants. Unfortunately,

although the program continued to serve a large number of riders, the company was unable to turn a profit. In 2013 it was incapable of returning start-up loans and was taken over by the City of Toronto. The program, which is looking at a possible public-private partnership, is looking to further expand its network, in anticipation of the Toronto Pan Am games in 2015 (Johnston, 2013).

survey on the benefits bicycle sharing program, has found that the bike sharing program had increased the resident in London an additional 74 million hours of physical activity. Fishman also suggested the key to success for bicycle sharing program worldwide is convenience (Stein, 2015). The bicycle-sharing program in Toronto lacks the convenience of offering a variety of choices, such as in helmets and different types of bikes, for users.

Toronto is looking at the Montreal program, which has been more successful, but still financially non-profitable, as a model to follow. In comparison to Toronto, Montreal has vastly more complex and developed network, as they currently feature 5120 bikes and 411 stations. (CBC, 2013) The future for bicycle sharing remains unclear. Cycling has gained popularity in recent years, as Toronto experienced a 30% increase in cyclists riding to work from 2001 to 2006. (City of Toronto, 2014) The city has been active in its support of cycling, with projects such as the Sherbourne bike plan attempting to develop a network. Costs of bike ownership and maintenance are much lower than those for vehicles and therefore cyclists will likely have their own bikes and thus not need this service. All bicycles are designed for adults, which makes it difficult to lure families with young children to the program. A diversity in the fleet may be necessary to attract more users.

A sustainable and growing bicycle-sharing program is crucial as it could drastically alter the infrastructure of Toronto and affect decisions for urban living. Bicycle sharing programs can have the potential to improve public health by reducing air pollution as people reduce the dependency on vehicles and public transportation. Researcher Elliot Fishman, director of the Institute for Sensible Transport conducted a

4.7 Conclusion

It is evident from these findings that as the youth population continues to grow, Toronto and in particular the downtown area needs to become a children and family-friendly city. Toronto needs a paradigm shift culturally and in the housing market to provide for the Echo Boomers who are ready, or soon will be, to start a family. Research suggests that the ideal child and family-friendly building form would be a mixed-use, mid-rise building located within a highly walkable district and with close proximity to public transportation, car and bike share programs, public

services and amenities such as parks, daycares and schools. The architectural response should provide the residents with private and common outdoor space within the building as well as public open spaces that offer children a secure place to play and space for adults to exercise.

Upon examining urban guidelines from the city of Toronto and other guidelines relating to shaping a child and family-habitable city, a set of guidelines have been formulated as a design platform and prototype for a test site (Figure 9 and Table 4):

Table 4: Children and Family Friendly Design

Principles	Objective
Neighborhood	Close proximity to public transportation such as heavy rail and light rail systems, and should be a bike and pedestrian friendly community. A mixed land use community is essential as it provides diversity, and daily-need amenities must be within walking distance. Personal vehicles should be discouraged as other means of transportation are widely available.
Streetscape	The buildings in the community should be human-scale and have a high walkability score to encourage social interaction.
Building typology	A mixed-use, mid-rise (four to twelve stories) range between 30 to 100 suites to achieve urban intensification plans without impacting the existing community. A mid-rise building with private and public open spaces can also improve its inhabitants' physiological and mental health and create a sense of identity.
Built form	The building form should respect adjacent buildings and should allow sunlight onto the sidewalk; a setback approach should be applied. Human-scaled podium, animated ground-level outdoor seating should be applied to allow social interaction and create a pedestrian-friendly environment. Open green spaces should be provided for children and family for play and social interactions.
Housing model	A resilient housing that supports mixed age, mixed income residents that consist of mixture of amenities suitable for both children and adults.
Flexibility	Housing size and function are adaptable to growth and change in order to create affordable and desirable housing needs over one's life cycle.

Walkable Streetscape

Sustainable Built Form w/
Safe Open Space

Resilient Housing Model

Compact Neighborhood

Mixed-use Building Typology

Urban Diversity

Figure 9: Design Guidelines

By Author

By Author

5

Neighborhood Selection

Figure 10: Toronto Neighborhood Map

In an attempt to arrive at a suitable architectural solution, three distinct neighborhoods were identified as possible locations for intensification. The Danforth, the Annex and Liberty Village are three neighborhoods that are undergoing different phases in their growth, and thus are adjusting their outlook on the future.

5.1 Danforth

Located in Toronto’s east end, the Danforth is a neighborhood which has remained largely unaltered since its inception. The main arterial road, Danforth Avenue, is a stretch of road which travels east west from Scarborough to Downtown. The official plan by Toronto has acknowledged Danforth Avenue as a potential avenue for redevelopment and intensification. (Walker, Nott, Dragicevic Associates Limited,

2013) The neighborhood benefits from having a well-developed infrastructure system: it is situated along the Bloor-Danforth Subway TTC line and streetcars are available along a portion of Danforth Avenue. Currently, the avenue is lined with mixed-use buildings that vary from two to three stories in height; detached and semi-detached housing occupies the surrounding streets. The majority of the development is low density: as of 2011, 66% of the structures in the neighborhood are lower than 5 storeys. (Statistics Canada, Census 2011, 2013)

Although the city had plans to increase density in the Danforth area, it has yet to experience the anticipated growth. From 2001 to 2011, the area’s population had decreased 6.5%, signifying that it has not been attractive to potential buyers. (Statistics Canada, 2014)The majority of the

population are of the working age; however, it is a quickly decreasing demographic, depleting at a rate of 11.8 percent. (Statistics Canada, 2014) New development after the approval of Toronto’s Official Plan has been absent in the area, and old establishments are suffering from decreasing patronage. Reporter Sarah Barmak believes that density should have been incorporated when the subway systems were first opened, and that the current built environment has been settled so long that future growth is not viable. (Barmak, 2007) New developments, however, are slowly reappearing in the area, and as Toronto intensifies and its population continues to increase, more changes could potentially be on the horizon as a ten-storey midrise, mixed-used residential tower named On the Danforth Condos is purposed on the south side of Danforth Avenue (Landau, 2015).

Figure 11: Danforth Demographic

(Statistics Canada, Census 2011, 2013)

5.2 Annex

The Annex is a neighborhood in downtown Toronto with a diverse urban landscape. Located in close proximity to the University of Toronto's downtown campus, Yorkville and Chinatown, the neighborhood is a vibrant part of the city that attracts people from various demographics. The neighborhood is anchored by Bloor Street, a major artery with high vehicular traffic and with a TTC subway line below it. Various public networks also serve the region: the Spadina streetcar network has one of the highest daily riderships of all surface TTC routes. In 2012, it had 55,400 passengers. (Toronto Transit Commision, 2012) The Annex neighborhood has benefitted from balanced development: it features an even distribution of mid-rise and high- rise buildings. (Statistics Canada, Census 2011, 2013)

The region has been experiencing steady growth, with a rise in population of 8.9 percent from 2001 to 2011. (Statistics Canada, Census 2011, 2013). The majority of the demographic is of working age. The area offers various modes of transportation to the city's business districts while Bloor West and Korea Town offer an array of entertainment venues. Its proximity to the University of Toronto has brought stability to the area, as well as a youth population whose numbers have been growing since 2001 (Statistics Canada, Census 2011, 2013) Anticipating that this growth will continue, the City of Toronto has identified Bloor Street as one of the main Avenues for intensification, and in 2009 produced a set of guidelines. (Toronto City Planning, 2009)

Figure 12: Annex Demographic

(Statistics Canada, Census 2011, 2013)

5.3 Liberty Village

Unlike the Annex or the Danforth, Liberty Village is a neighborhood built and executed from a master plan. Whereas old neighborhoods were built up over time, and thus feature diverse building types with distinct histories and timelines, the recently developed Liberty Village was conceived and developed as part of an integrated system. During much of Toronto's existence, Liberty Village was an industrial area that housed several factories. This circumstance was largely unchanged until the 1980s, when most of the industries left the neighborhood. (Camber, 2012) The site was then left mostly vacant until 2004, when Lifetime Development had a vision to convert the industrial site into a mixed-use neighborhood. (Harris, 2012) As of 2011, 89% of the buildings in Liberty Village were apartment buildings, and 75% of them were higher than five stories. (Statistics Canada,

Census 2011, 2013). Michelle Xuereb, Senior Associate at Quadrangle Architects, believes that repurposing the abandon factories into dynamic mixed-use and residential buildings are the most sustainable and successful architectural approach to revitalize liberty village neighborhood. Projects such as The Candy Factory Loft and Toy Factory Lofts are examples of using adaptive reuse to transform one of the old factories into residential buildings. (Xuereb, 2015) Since the conversion, the neighborhood has had great success, as the population grew 83.4% from 2001 to 2011, and the number of residents of working age doubled during those years. (Statistics Canada, Census 2011, 2013)

Located away from the subway system, Liberty Village does not offer many public transportation options for residents. There are currently two

streetcar routes operating near the Village, and a GO station is also available for their use. This lack of infrastructure has led to a dependence on automobiles. Developments within the Village have drawn criticism for their approach to urban density. Commercial developments have placed an emphasis on vehicular traffic, placing large parking pools within their developments, which are a characteristic of suburban sprawl. (Hume, 2008)

Figure 13: Liberty Village Demographic

(Statistics Canada, Census 2011, 2013)

Figure 14: Neighborhood Composition

(Statistics Canada, Census 2011, 2013)

5.4 Conclusion

These neighborhoods represent three unique spectra within the city of Toronto. An architectural response to the need for family housing with long-term sustainability must address unique problems. As the three neighborhoods undergo different phases in their growth, the community's attitude toward urban development and the overall outlook of the region will determine if an architectural response is even required. Careful selection of a building site is crucial to ensure that a solution maximizes its potential, and that at the same time, the selection needs to take into consideration long-term effects that are brought forth onto a neighborhood. Table 5 indicates the scores that were given to each individual site for their walkability and infrastructure.

Liberty Village has recently been a hotspot for development in the Toronto market; its growth is still in its infancy, and will likely continue to be so in the future. Liberty Village had the highest population growth of the three neighborhoods under consideration, a 83% increase since 2001, (Statistics Canada, Census 2011, 2013) while at the same time it has the least diverse age demographic, with the majority of residents between ages 25 and 64. It is currently in the midst of a construction boom that will likely continue as Toronto's housing market continues to prosper. The region's development can be seen as a microcosm of the overall Toronto market, as the housing composition is predominantly apartments five stories and higher.

The lack of public infrastructure serving the Liberty Village community is a concern, and future transit relief lines have not yet been proposed. Current

developments have seen mixed-use buildings built at a tremendous pace, with amenities and family supports not yet established. The outlook on Liberty Village remains bright, as more residents are expected to populate the region. An architectural investigation into the area would likely not yield results with city-wide applicability, as neighborhoods similar to Liberty Village, with its industrial heritage, size and development potential are not typical for downtown Toronto.

The Danforth area is a region that has sorely needed the infusion of new developments. It is a family-oriented neighborhood, with 57 percent of the area families including children (Statistics Canada, Census 2011, 2013). With a declining population, the Danforth can stand to benefit greatly from intensification and re-population plans. Existing public infrastructure could stand to serve more riders, as the four TTC subway stations within the region serve an average of 16,097 per day, well below the average ridership of 19,296 in 2013. (Toronto Transit Commission, 2013) Local business could also benefit from more residents.

Although the area has potential, Danforth may be a difficult location for the integration of mid-rise, mixed-used buildings and increased densities. While the city has realized the need to supply new projects in the area and has declared Danforth Avenue a major Avenue for intensification, resistance to change remains strong within the community. The majority of residents chose the neighborhood for its low density, and many have been vocal regarding their reluctance to change. As a result, developments in the area have been minimal and will likely continue to be so. A forceful integration of the Avenues plan

could adversely affect the neighborhood as it would conflict with the core values of the community.

The Annex has developed into the most diverse community of the three neighborhoods, and is an area which is growing and will likely continue to grow. The Annex is similar to the Danforth as it is a relatively old neighborhood, in contrast to Liberty Village. However, it does not have the stagnancy in development or the decreasing population that have plagued the Danforth area. The neighborhood benefits from having a well-developed infrastructure and a diverse streetscape that attract Echo Boomers. The majority of households in the area (53%) do not have children (Statistics Canada, Census 2011, 2013). As Echo-Boomers mature and begin to form family, there may be limited options for them to stay in the Annex neighborhood as it is now. Planning for this area needs to accommodate such change, exploring a variety of different methods for retaining existing residents, while still accommodating incoming populations.

The City of Toronto has identified Bloor Street (that runs through the Annex) as a major Avenue for intensification, and envisions the area with a mid-rise urban fabric. (Toronto City Planning, 2009) An architectural proposal in this region will be able to serve the needs of the shifting population in the Annex, and also serve as a prototype for future similar developments as urbanization intensifies.

Table 5: Site Scores

	Danforth	Annex	Liberty Village
Walk Score	93	100	92
Transit Score	98	100	100
Bike Score	94	81	51

(Walk Score, 2015)

6

Bloor-Spadina Intersection Study

In 2009, following the guidelines set out by Toronto's official plan, a report called Bloor Corridor Visioning Study was produced that set forth visions for Bloor Street, an important corridor in the downtown Toronto. The street was divided into different precincts, sectors with different characteristics and programs. One precinct of particular interest is the Spadina node, characterized by a mixture of new high-rises and community amenity spaces. This area has been identified as a key portion of the corridor for intensification (Figure 15). Located as it is between the heavily commercial Main Street precinct and an Institutional precinct, the study envisions the Spadina node as a transition between the two, serving to define the two distinct sectors. (Toronto City Planning, 2009) The development of the Bloor-Spadina intersection will be crucial in defining the Avenue and neighboring precincts.

Defined as gateways within the corridor, the intersection will be key to generating neighbourhood identity and improving the public realm. The northern corners of the intersection, currently retail establishments, are ideal as standards for future developments. The southern corners are occupied

by important amenities serving the community, such as Matt Cohen Park and The Miles Nadal Jewish Community Centre. These provide important services to the neighborhood and should be left unaltered. Therefore, further investigation should focus on the development potential of the northern properties.

According to the Toronto City Planning document "Official Plan Amendment to encourage the development of units for households with children," One key aspect with regards to the development of the Avenues is the buildings' relationship to the street. The streetscape is an important factor in creating the urban fabric that Echo Boomers and their families' desire, and the corridor should be designed with pedestrians as the priority (Toronto City Planning, 2009, p. 30). Developments should explore alternatives to improve the community; for instance, injection of amenities would be beneficial to the corridor. Public spaces and art installations would animate the streetscape and inject life onto the streets. The relationship of a building to its surrounding is also critical, and thus the study identifies three scales which govern the built form within an Avenue context.

Figure 15: Bloor Corridor Nodes and Precincts

(Toronto City Planning, 2009)

6.1 Pedestrian Scale

The development of a pedestrian scale is of primary concern for a building and its relationship to the immediate neighbourhood. The sidewalks and their scale in relation to buildings and to pedestrians must be sensitive, as these relationships will impact the success of the architectural intervention. Materiality and landscaping are useful techniques for defining the sidewalk. Details such as canopies help to create a comfortable atmosphere for the pedestrians. (Toronto City Planning, 2009) Consideration of the corner condition is critical and disregarding it would cause confusion and chaos.

6.2 Street Wall Scale

The street wall is defined as the portion of the building that fronts the street. (Toronto City Planning, 2009) Uniformity in the scale of street walls is vital to the intensification of Avenues. This study envisions a base on a building four to five stories in height; modeling other developments on this design will

create a unified appearance. Retail development should be at-grade; glazing should be maximized to allow for animated interaction with the street. Corner properties provide prominence and exposure that few locations can provide, and the scale of street façades must be sensitive to adjacent buildings, and to public amenities located on the south side.

6.3 Urban Scale

Urban scale analyzes the built form from a larger context. Factors such as building heights and their relationship to the urban context must be recognized and diligently addressed. Serving as a buffer between the Main Street and Institutional precinct, the Spadina node will need to take a sensitive approach to building heights. (Toronto City Planning, 2009) Developments must be mindful of relationships to other properties and to their potential impacts on them and on the neighborhood in question. Consequences of developments must be identified, and solutions derived to mitigate potential impacts.

Figure 16: Northwest Corner of Bloor and Spadina

By Author

TDSB Schools

- Secondary School
- Elementary School
- Other Education

Licensed Daycare

- Infant 0-18 months
- Toddler 18months - 2.5 years
- Preschool 2.5 up to 6
- School Age 6+

Figure 17: School and Daycare Locations

By Author

Spring

9am

12pm

3pm

6pm

Summer

9am

12pm

3pm

6pm

Autumn

9am

12pm

3pm

6pm

Winter

9am

12pm

3pm

6pm

Figure 18: Sun Study

6.4 Site Analysis

The final site selection for a test site is on the Bloor Corridor, as it has the most potential for family growth. Specifically the northwest and northeast corner of the Bloor and Spadina intersection (Figure 16), this region features a full walking and public transit scores of 100, and is in a neighborhood which has schools for all ages and features many cultural buildings. This site is ideal for family growth as it has many children friendly facilities such as the Jewish Community Centre, Royal Ontario Museum, and Varsity Centre. The Annex offers rich context of food, entertainment and amenities for both adults and children without excessive traveling or a need of private vehicle. Cycling infrastructure is also under development in this region. The region currently has a popular community centre, with a daycare facility, and other extracurricular activities for the neighborhood. However, the daycare has already reached a full capacity and are unable to accommodate further. A site visit have been conducted and have revealed that this area lacks other daycare facility options, particularly for infants and preschoolers (Figure 17). In addition, there are limited options for children to play, where the parkettes and playing fields are either fenced off, too small or near the road, which can expose children to potential danger. To understand how shadows affect the site, a simulated sun study is generated (Figure 18), although there are some high-rise buildings in the surrounding, the two potential sites do not have shadow casted over them for the majority of the day. Figure 19 illustrates the intersection of Bloor and Spadina, and Figure 20 shows the street elevation of the north side of Bloor street west.

Figure 19: Intersection Perspective

Figure 20: Street Elevation Study

By Author

6.5 Site Selection

It is vital for a node as prominent as Bloor and Spadina to have presence and an identity. The current composition of buildings in the neighborhood west of Spadina Ave is two to three stories. By contrast, institutional buildings dominant the ground level on the east side, and the ground level on the west side is composed primarily of retail. The age of the buildings on site would also make that section of the area highly desirable for redevelopment and intensification. Building on the northwest node would allow an architectural intervention to set precedents regarding standards and design language.

The northeast corner is chosen as the final site selection, as it has the most potential for redevelopment. The site currently has two low-rise commercial buildings which consists of one to three storeys building with some vacancy. This site is currently underutilized and has the lowest density ratio in the Bloor and Spadina node. Replacing the low-rise commercial buildings with a mid-rise, mix-used building can intensify this prime location, which is promoted by the Toronto Official Plan. This site also takes advantage of the proximity of the public infrastructure as there is a TTC subway station north of the site and Spadina streetcar running south of Spadina Avenue.

Figure 21: Final Site Selection

By Author

6.6 Zoning Analysis

This section illustrates site information for the final site.

Table 6: Site Information

Character	Large student population (University of Toronto, Harbord CI) Adjacent to Miles Nadal Jewish Community Centre Good public infrastructure (Spadina Station) Large Annex residential neighborhood with close proximity to retail hub of Bloor West.
Zoning	CR 3.0 (c2.0;r2.5) SS2 (x2615) (Policy Area 1)
Land Use	Mixed-Use Development/ Retail, Residential
Density	FSI max 3.0 (Commercial 2.0, Residential 2.5)
Transition/Angular Plane	Site exempt from angular plane restrictions, as site is adjacent CR zone.
Min. Height	Defines as height of existing building = 10.6m
Base Height	First Storey min. 4.5m
Max. Height	18m from Height Overlay map 50j-12
Setbacks	Front Yard: 75% of building face between 0-3m Ext. Side Yard: No setback is required (adjacent to street) otherwise 5.5m Int. Side Yard: 5.5m if wall has windows and openings, otherwise 0m Rear Yard: 7.5m abutting a laneway
Stepbacks	Not Applicable
Frontage	75% of building face between 0-3m
Ground Floor	Ground floor area is a prime real estate for retail (With its corner location and high foot traffic, retail stores will be successful.)
Entrance	Retail entrances have high visibility on both streetscapes (Spadina, Bloor) Corner entrances may be left to attract anchor stores, or could possibly serve as entrances to more retail on higher levels. Residential entrances require less visibility and prominence, and are likely to be located away from the corner.
Access	Site benefits from being a corner property on two primary streets (Spadina and Bloor) and thus have premium access points for retail.
Parking	Not permitted to be above ground Requirements for Dwelling per policy area 1 0.3-0.4 per bachelor up to 45sm 1-1.2 per bachelor 45sm+ 0.5-0.7 per one bedroom unit 0.8-1.2 per two bedroom unit 1-1.5 per three or more bedroom unit Visitor parking: 0.1 per dwelling unit Retail parking must be provided if retail is more than 200sm 1-3.5 per 100 sm of GFA

Active Transportation	No designated bicycle lane
Transit	Close proximity to Spadina Subway Station (high volume station as it is an interchange station and also the last stop for the Spadina streetcar, a busy route which travels to Union Station.)
Streetscape	Current sidewalk has been revitalized. Planters are aligned on Bloor Street West. Spadina sidewalk needs revitalizing, possible widening to give corner more prominence.
Open/Green Space	Across the street is Matt Cohen Park, a small parcel along a busy intersection which would benefit from revitalization.
Implementation	<ul style="list-style-type: none"> - Mixed-rise development (4-6 stories) - Potential 2 stories retail base (anchor stores pending) - Enhance streetscape with patios, stores - Amenity space to serve tenants and community (possible joint venture with Miles Nadal Jewish Community Centre, as they already have many public infrastructures in place.) - Residential component consisting of units with more than one bedroom, intended to cope with the impending growth in an Echo Boomer's family - Possible integration with TTC for platform entry <p>Variance Required:</p> <ul style="list-style-type: none"> - Floor Space Index: Increase of allowable area of 3.0 Commercial 2.0, Residential 2.5 - Parking requirements: Reduction in required parking - Height Restriction: Building to be more than 18m

Zoning Information Adapted from (City of Toronto Zoning Division, 2013)

7

Precedents

7.1 Flexible Architectural Approaches for Potential Growth

Developers have admitted concerns with regards to the regulations of the proposed 10 percent three-bedroom requirement. Paul Etherington, President of Toronto Real Estate Board suggests that these units would likely be out of the price range for a typical family. Etherington announced that a two-bedroom unit would cost approximately \$600,000 and a three-bedroom over \$1.2 million in the Downtown core (Toronto Real Estate Board, 2014), which would be unattainable for most families, as the median total income for a Toronto family is \$71,210. (Statistics Canada, 2014) These figures vary among developers and are dependent on the methods they would employ to build two and three-bedroom units. In some case, developers believe that building a three bedroom-unit would incur only minimal cost implications, considering that efficient and flexible methods could offset the cost differential. (City of Toronto, 2009)

In 2007, the city had a Council meeting aimed at finding solutions for identifying possible ways to encourage family-sized units. (Tyndorf, 2007) One potential option discussed was the use of knockout panels. A knockout panel is defined as a “Demising wall, structurally designed to facilitate the future removal of predetermined sections of the wall... to allow flexibility in the design of units.” (Tyndorf, 2007) Panels are meant to provide flexibility for owners who desire the capability to expand their homes as required. Young couples can purchase a smaller start-up condo unit and expand into adjacent units as their family grows. The units could

then be separated when the children move out and easily converted back to their original condition. (Wong L. , 2014) New developments are increasingly viewing this method as a positive alternative for providing larger units mandated by the city. Using flexible floor plates with smart arrangements of space, one-bedroom and bachelors could serve existing needs and decrease risks to developers during construction. (Swerhun, 2014) The capability to expand would serve as an added incentive to potential buyers, offering future stability and flexibility.

Although flexibility is a popular concept, there are some concerns about the execution of the project. Some condo developments have not been receptive to the proposal and have denied owners this option. (Gioventu, 2014) Timing and availability are also concerns, as adjacent units may not be available when owners wish to expand. (Lautens, 2009) The size of available units might also hinder their future ability to be joined. The process of combining units could also be a costly endeavor, as purchasing other units and doing necessary renovations may not be financially feasible for many families. Families might also not want to incur the cost of owning multiple units with high property taxes and maintenance fees. (Tyndorf, 2007)

In order to understand different architectural approaches to achieve flexible housing, a series of methods currently in use will be examined to identify their strengths, weaknesses and compatibility for growing families residing in the urban core. The current approaches can be divided into the following categories: 1) a plug-in method; 2) expandable and interchangeable interiors; 3) shared spaces; and 4) dynamic spaces.

7.1.1 Plug-in Method

Figure 22: Highrise of Homes

(Wines)

To address people's desire to live in convenient urban centers and yet not sacrifice the open and private space provided by detached houses, James Wines, the founder of SITE Architects has envisioned a "vertical community" called the Highrise of Homes. The project consists of a central core with amenities, circulation and gardens, and an eight to ten-storey concrete framework that separates into lots that can be sold as separate parcels of land (Figure 22). This structure is intended to provide buyers with maximum flexibility as it creates a home with privacy and yet potential for human interactions, one that places psychological and sociological needs over aesthetics. (Cline, 1981)

This approach may not be appropriate in the constructs of Toronto, as the major concern for Echo Boomers are the cost of homes in downtown. An arrangement as such would likely be the same as detached housing financially.

Highrise of Homes, SITE Architects, 1981

3Gatti Architecture Studio had attempted to bring Site Architect's Highrise of Homes concept alive in a recent proposal for a new hotel in China called the Shelf Hotel (Figure 23). It would have the same concrete framework and core structure as the SITE proposal and would integrate different styles of architecture. Residents would be provided a strong sense of identity as their suites would be instantly recognizable and also free to expand on the same level (Figure 23).

This type of architecture would likely bring forth constant construction with incoming and outgoing families. A project of this nature would likely succeed in a rural environment, where disturbance to the neighborhood and residents can be minimized, as opposed to causing chaos within the busy and tight confines of an urban setting like Downtown Toronto.

Figure 23: Shelf Hotel Suites Integration

(Frearson, 2012)

Highrise of Homes	
Easily achievable in urban core	No
Mixed-used program	No
Suitable for family growth	Yes
Suitable in high-rise form	Yes
Easy expansion and reduction without costly renovations	No
Sense of identity - noticeable exterior changes with modification	Yes

7.1.2 Expandable and Interchangeable Interiors

The Republic Condos, Toronto - Burka Architects, Project Completed August 2008

Developed by Tridel, 70 Roehampton Ave Condo is a 25-storey condo complex where the city required the developer to incorporate knock-out panels. As per city reports, the development was required to equip 85 percent of the units with knock-out demising wall panels that provide the potential to create combined suites (City of Toronto, 2007). The majority of the units designed this way were one-bedroom and two-bedroom units.

With the use of flexible layouts and knockout panels, the units were able to be transformed to create larger units to suit preferences. Figure 24 features an upgraded suite in the development in which the owner combined two one-bedroom units and a portion of an adjacent two-bedroom to create large unit. The residual space from the two-bedroom unit was then converted to a one-bedroom unit.

The Republic Condos, Toronto	
Easily achievable in urban core	Yes
Mixed-used program	No
Suitable for family growth	Yes
Suitable in high-rise form	Yes
Easy expansion and reduction without costly renovations	No
Sense of identity – noticeable exterior changes with modification	No

(Bird House Media, 2014)

Figure 24: Combined Units and Original Unit Configuration

(Shahsavari, n.d)

Terraced Hillside Homes, Austria – Tobias Weiss and Gernot Reisenhofer, 2010 , Not Built

Created by Austrian architects Tobias Weiss and Gernot Reisenhofer, the Terraced Hillside Homes is a series of row-house style homes that is nestled in the hills, designed with family growth and sustainability in mind. Each dwelling is equipped with passive solar design, rainwater recycling and photovoltaic sunshades (Chino, 2010). Basic housing modules are designed with a basement that takes up 60% of the floor area; with 40% of open space, growing families can grow into the space on the basement level, leaving the roof of the basement as a terrace area for the ground floor. In this approach, inhabitants will not lose open spaces, but still have the possibility to grow up to 40m2 within their lot. The disadvantage of

this approach is the loss of daylighting entering into the basement living level, resulting in a dark living environment and poor ventilation due to a majority of the building buried within earth.

Terraced Hillside Homes, Austria	
Easily achievable in urban core	Yes
Mixed-used program	No
Suitable for family growth	Yes
Suitable in high-rise form	No
Easy expansion and reduction without costly renovations	Yes
Sense of identity – noticeable exterior changes with modification	Yes

Figure 25: Terraced Hillside Homes

(Chino, 2010) Figure 26: Terraced Hillside Homes Expansion Plan

(Chino, 2010)

7.1.3 Communal Spaces

Unpacking the Home: 3 for 2, Stan Allen Architect, and Rafi Segal A + U, 2011

Targeted at young professionals and growing families who prefer to live downtown, this proposal examines typical 1960s office buildings, demonstrating how they can be transformed into a mixed-used tower with collective programs. The deep floor plates of the office tower provides shared central space for residents and small offices. Multi-storey vertical gardens provide large open spaces for residents and double as a buffer zone between the residential and commercial spaces. Multiple dwelling layouts are explored to suit the diverse group of residents, from students to families to elderly (Figure 27), the duplex offers a downtown house style that provides a clear separation between living and resting areas. Its interlocking layout is similar to that of skip-stop units with the entry on one level and a living space on either the upper or lower floor. Apartment style units are also offered in various sizes to suit needs for students and elderly who do not want stairs. Shared work space and collective programs are located in the centre core of each floor, which can cause security issues and noise problems as children will be playing while others are trying to work in the same space. Because of the large floor plate, the central communal space has no natural daylight and will require artificial lighting to operate.

Unpacking the Home, New York	
Easily achievable in urban core	Yes
Mixed-used program	Yes
Suitable for family growth	Yes
Suitable in high-rise form	Yes
Easy expansion and reduction without costly renovations	No
Sense of identity – noticeable exterior changes with modification	No

Figure 27: Unpacking the Home: 3 to 2 Unit Layouts

(Allen, 2011)

Suburban Housing, actLAB, RIBA Housing in the Private Rental Market Competition 2013

Throughout a family's life cycle, dwelling requirements and preferences change; a flexible housing unit can provide options that can accommodate residents of all ages. The intention of the design is to create an environment similar to suburban housing with cluster forms that enhance physical and social networks even as they allow for more social interactions and gathering places. Flexible housing offers live-work units suitable for singles and elderly on the ground floor and a stairwell that connects to the multiple bedroom unit upstairs for family dwelling. Expansion can easily be achieved by connecting the stairwell and the live-work unit below (Figure 28). These flexible units grow horizontally into clusters, which provide voids for potential growth and also a network of communal space. Since the clusters grow in a horizontal manner, they will require large area of land that is not available in the urban core. The growth of clusters may result in narrower walkways and smaller communal spaces, which would reduce social interaction as the original intent.

Figure 28: Suburban Housing Expansion Strategy

(Maceda, 2013)

Suburban Housing, Private Rental Market	
Easily achievable in urban core	Yes
Mixed-used program	Yes
Suitable for family growth	Yes
Suitable in high-rise form	Yes
Easy expansion and reduction without costly renovations	No
Sense of identity – noticeable exterior changes with modification	No

7.1.4 Dynamic Spaces

Maison Loucheur, France – Le Corbusier, Not Built

Flexibility was explored in the 1920s by a variety of Western architects as an attempt to provide affordable homes that would maximize utilization in a fixed area. Le Corbusier described housing as “a machine for living” with five trademark points of architecture, one of which is the Free Floor Plan, which allow non-load-bearing walls to be placed only where aesthetically required. (Sharp, 1991) This opens up the floor plate and allows for a flexible dwelling. Shown in Figure 29, a typical unit in Maison Loucheur used the bathroom as a central core, generating different zones around it; all these could access the bathroom without interfering with other rooms. The 48m² unit functioned as a 78m² space, moveable wall panels and folding beds allow for open spaces through daytime activities, and transforms into diversified spaces at night, allowing one space to be multi-functional and affordable (Schneider & Till, 2007). One drawback is that the structure of the building, which features a load-bearing concrete wall in the middle of two units, makes future expandability impossible.

Maison Loucheur, France	
Easily achievable in urban core	Yes
Mixed-used program	No
Suitable for family growth	Yes
Suitable in high-rise form	Yes
Easy expansion and reduction without costly renovations	No
Sense of identity – noticeable exterior changes with modification	No

Figure 29: Plan of Maison Loucheur Showing Night (Left) and Day Configurations

(archweb, Le Corbusier - Maison Loucheur 1929, n.d.)

Rietveld Schröder House, Utrecht, Netherlands– Gerrit Rietveld, 1924

This design provides flexibility in the form of moveable wall panels, but lacks adaptability regarding furniture accommodation, as there is no a multi-usage space for hiding furniture away. Although the façade is not operable, layers of planes and vertical lines have a resemblance to the tracks and movable walls in the interior as the tracks are colored in red, yellow and blue. Similar to Le Corbusier's Maison Loucheur, Rietveld designed a flexible residential house originally for a single mother and

three children with a rental unit on the ground floor. With the staircase as the central core, the floor plate opens up into a big open space in daytime with moveable wall panels that slide into closet space and allow maximum area for children to play. Wall panels can create individual quiet zones for rest and other activities, and will also keep the floor plan versatile and continue to function smoothly as space requirements change (Figure 30).

Figure 30a: Rietveld Schröder House (Groenekan, 1924)

Rietveld Schröder House, Utrecht	
Easily achievable in urban core	No
Mixed-used program	No
Suitable for family growth	Yes
Suitable in high-rise form	No
Easy expansion and reduction without costly renovations	Yes
Sense of identity - noticeable exterior changes with modification	Yes

Upper Floor Open Position

Upper Floor Closed Position

Figure 30b: Rietveld Schröder House Day and Night Configuration

(Groenekan, 1924)

BosaSPACE Alumni Tower, Vancouver, Canada – Rafii Architects, Under Construction

Traditionally, homes are designed and transferred to the users with no furniture. In most cases, homeowners are given an empty palette, with certain elements in place, typically the partitions, the kitchen and bathroom(s), and are allowed to manipulate the remaining space according to their needs and preferences. The adaptability and transformability of a space was a task that was left up to the homeowners.

In Vancouver, a development is attempting to integrate furniture and space planning to create dynamic spaces for the homeowners. Known as BosaSPACE, it proposes units that contain custom furniture that will allow for transformation and flexibility according to the user’s needs. Layouts are developed with the intent to maximize utilization of custom furniture. The project is unique in that the furniture is not optional but is provided as a fixture in all 310 units. The scale of the project kept the cost of the built-in furniture to a minimum (Kwan, 2013, p. F4).

The majority of the furniture, such as a dining table, bed and sofa, was incorporated into the transformable components. This decreased the ability of users to personalize and customize their homes to their own desires. The forced integration of the components into all units may also impact the future desirability of the units, as the furnishings encourages freedom for personalization of the units. Although the development is positive in that it offers very flexible space within the units, the fact that other types of furnishings don't work within this scheme may deter potential owners.

Alumni Tower, Vancouver	
Easily achievable in urban core	Yes
Mixed-used program	Yes
Suitable for family growth	No
Suitable in high-rise form	Yes
Easy expansion and reduction without costly renovations	No
Sense of identity – noticeable exterior changes with modification	No

Figure 31 : BosaSPACE Unit Configurations

(Pang, 2013)

7.2 Mixed-use Child and Family-Friendly Complex

7.2.1 The Rise, Vancouver - Nigel Baldwin Architects Ltd, Projected Completed August 2008

Figure 32: Public Open Space

(Scully, 2014)

The Rise is a mixed-use rental development that took a novel approach towards conventional housing typology. Located on Cambie Street, one of Vancouver's main corridors, the development was located in a favorable part of the city. The Canada Line network (Vancouver's Sky Rail) runs directly parallel to the street, leading to increased foot traffic there. The city of Vancouver has been active in requiring developers to enhance the streetscape with initiatives such as the Cambie Corridor Plan. In The Rise, a row of smaller shops and restaurants lining the street facade minimized the deadening effect of larger retail "big boxes" at the street level. As shown in Figure 32, an open public plaza creates a pedestrian-friendly streetscape for social interactions at the same time as it serves retail needs.

Figure 33: Site Plan

(Scully, 2014)

In many new apartment developments in Toronto, residential building forms are monotonous glass towers with repetitive floor plates. The Rise in Vancouver departs from this convention by opting for a townhome arrangement; separate units have individual open courtyards as amenities (Figure 33). Each unit has a small private outdoor space that resembles a backyard, following the suburban detached-house typology. Suites can be accessed through one of three mews, giving a sense of a micro-neighborhood on top of commercial spaces. This housing strategy provides children with a safe and protected area to play under a caretaker's supervision. A community garden shown in Figure 34 encourages residents to grow their own produce, making a downtown lifestyle agriculturally productive. New developments will often shy away from this concept and opt instead for high-rise condominiums, which provide more density and units.

The Rise takes advantage of Vancouver's mild climate, the residential units are layout in a U-shape configuration, and all communal space and circulation are placed outdoor in the around the courtyard and mews. This allows for maximum outdoor living space. This layout provides the units to have windows in opposite ends which allows natural ventilation, and access to a private open space. Although open green space and a private terrace is provided, only one to two-bedroom suites were built, leaving little potential for family growth and future expansion. There are a few types of units, two-story units, live/work units with double height lift spaces, and some single units. (Scully, 2014, p. 7) Commercial portions focused on giant retail chain stores, and provided minimum public services for residents. The project provides three stories of underground parking to support retail stores (Figure 35), encouraging the use of cars rather than promoting alternative means of transportation.

Figure 34: Rooftop Courtyard

(Takemoto, 2009)

Figure 35: Building Program

(Scully, 2014)

7.2.2 Queen & Portland Loft, Toronto - Turner Fleischer Architects Inc., Completed 2009

In most Toronto neighborhoods with vibrant streetscapes, the architecture consisted of mid-rise buildings. In older neighborhoods, some streets are too narrow to accommodate patios or interactive space. Buildings in areas like Queen West, which features a vibrant night life, often accommodate the need for more space by opening the ground floor of buildings. Locating patios and gathering spots at the ground level allows for the formation of nodes.

Located in Queen Street West and Portland Street, this mid-rise mixed-used complex is similar to The Rise in Vancouver, as it contains space for two large-scale retail stores. It also accommodates some smaller retailers, and a bank on the ground level of the Queen Street West façade. The building's podium consists of three double-height retail-floors. Located within a historic section of the city where two-to-three storey buildings predominate, the base was created to harmonize and respect the existing neighborhood fabric. (Figure 37). This building comprises an apartment-style

seven-storey residential block, set back from Queen Street, and provides a large secured private open green roof terrace as an amenity (Figure 36). Suite sizes range from 51.65 to 118 square meters, and it offers units containing up to three bedrooms.

Although this complex integrates a mixed-use typology, the commercial sector focuses mainly on retail and lacks other public supports such as pre-school and health care, amenities that are lacking in this neighbourhood. Retail shops have frontage only on Queen Street, as the Portland Street façade is largely an inaccessible blank glazing wall on the ground floor; the main façade of the residential tower changes character dynamically compared to the commercial portion, which gives a disconnect to the building, making the appearance of two separate building. The commercial podium is set at a three story height, which respects the overall streetscape of Queen Street West and allow for a large rooftop patio for the residents (Figure 37).

Figure 36: Rooftop Courtyard on Top of Podium
(Urban Toronto, n.d.)

Figure 37: Building Respects the Scale of Existing Neighborhood and Historical Fabric
(GoogleMaps, 2015)

7.2.3 Howard Park Condo, Toronto – RAW Design, in Construction

Located in the neighbourhood of Roncesvalles Village near High Park, Howard Park Condo offers an ideal location for family dwelling. With that in mind, the architect developed a building form that provides large private terraces for some units above the podium, creating a typology similar to Habitat 67 in Montreal. The condo is located in a triangular site, making unit configuration a challenge. The architect considers daylighting as an important factor for the design, for the units above the five story podium face true south, forming diamond shaped terraces with large outdoor living spaces. Nature and greenery is also incorporated, as part of healthy living in an urban area. This building utilizes a green roof and a green wall as an exterior façade. The outer metal mesh of the green wall provides a surface for vines to grow in the summer to minimize solar gain. The green wall lowering the interior temperature in summer and the growing medium provides an extra layer of insulation (Benaroya, 2014). This has been shown to be more cost-effective than façades such as stone cladding that provide the same degree of insulation.

Although there are shops on the ground level, they are currently only boutique shops that do not support a family's daily essentials. The living green wall only applies to terrace units; other units use glazed facades, which can increase solar gain and create discomfort. Like the majority of the available apartment housing stock, the units are fixed with no expansion possibilities; this results in a lack of flexibly for family growth.

Figure 38: Howard Park Condos

(White, 2011)

7.2.4 Sugar Hill Affordable Housing, New York - David Adjaye, Project Completed August 2014

Figure 39: Sugar Hill Floor Plan

(ArchDaily, 2014)

As Toronto mid-rise residential buildings continue to be built in the urban core, the mixed-use model provides only retail space and basic amenities. David Adjaye has provided a new mixed-used family-orientated housing typology which now offers a symbol of civic pride and be a valued new resource for the neighborhood. (ArchDaily, 2014) Located in Harlem, New York, this affordable housing development has 124 apartment units, office spaces, a preschool, and a cultural institution called Sugar Hill Children's Museum of Art & Storytelling. It aims to revitalize its community and to commit to urban and cultural responsibility by fostering a new generation of artists. This family-friendly complex

provides bachelor to 3-bedroom units, organized in a double-loaded corridor. In order to keep the units affordable, they all have only one full bathroom and a small galley kitchen; the 3-bedroom unit has one-and-a-half bathrooms (Figure 39). Only 5 units have private exterior spaces with a small entrance patio. Residents will have to find alternative parks or recreational centers as the building doesn't provide amenities.

7.2.5 Rosemont Affordable Housing, Montreal – L'OEUF, Project Completed 2007

Rosemont Affordable Housing is a social housing project located in Montreal, Canada. It provides an excellent example of sustainable and affordable housing, while at the same time reduces the need for private vehicles in a densified city. This large complex consists of 155 family-sized units ranging from 2-bedrooms to 5-bedrooms. L'OEUF Architects proposed the complex to be built no higher than 3.5 stories, which allows the residents to have a healthy relationship to the outdoor courtyard. The complex is organized in a rectangular ring shape and allows for a large void in the center as courtyard; this provides a semi-private leisure space and play space and is also big enough to hold neighborhood events. The courtyard is the heart of the project and allows for natural ventilation for each unit. It includes 12 parking spots to serve 155 units; this is a dramatic reduction from the 78 spots required by the city. This variance was granted by the city because Rosemont Affordable Housing is located adjacent to a public transit hub and a bike path. The architects also introduced a car-sharing program parking spots to further reduce the need for private vehicles. With its parking variance granted, this complex is “designed for people, not cars.” (Pearl, 2014, p. 94) The Rosemont complex has multiple pedestrian and bike access points, and only one driveway. These features keep the complex safe and provide more park space for the neighborhood.

Figure 40: Rosemont Building Form Strategy

(Pearl, 2014)

7.3 Program Organization

7.3.1 Yokohama Masterplan, Japan – OMA, 1992

As discussed in Section Three, children and families can thrive in city centers with a vibrant mixed-use, pedestrian-friendly community. When OMA envisioned the Masterplan for Yokohama's public plaza, Rem Koolhaas did not design individual buildings that would have given each program limitation and separation; instead he proposed a site that "is for a continuous and formless project which engulfs the site like a kind of programmatic "lava"" (OMA, 1992). Layers of activities merge with other programs, making it possible to users to experience both with minimal constraint.

This planning method can be applied to children and family-friendly designs as open spaces can combine private and public usage. Spaces can serve as courtyards for residents while at other times daycare centers create social interaction for children as well as security in protected open spaces.

Figure 41: Programmatic Diagram

(OMA, 1992)

8

Design Research

Figure 42: Preliminary Conceptual Sketch

This section showcases the progress of the design proposal, documenting the investigation of its different components. Through a series of design explorations, an array of outcomes were generated before the finalization of the design proposal.

8.1 Massing Studies

To understand the relationship of individual units to the outdoor garden, paper cubes were used as a tool to form different configurations. Plan and building form were studied to provide an understanding of how different formations interact with open spaces.

In this experiment, four categories of formations were examined: Double Tower, Courtyard Tower, Experimental and U-Shaped Courtyard (Figure 43). The double towers are two single-loaded towers set face to face with different openings to allow for private open space. The courtyard tower is an approach with units forming an enclosed courtyard with openings as paths. The experimental units create random open spaces and facades to allow for daylight from different angles. The U-Shaped Courtyard formation provides a courtyard that is open on one side, giving an unobstructed view of the city.

In this experiment, four types of building forms were examined (Figure 44). The plan helped to demonstrate how units can be formed to create not only public courtyard spaces, but also private open spaces such as balconies or terraces. The terrace formation uses the recessing stacking method to utilize the rooftop as a terrace space. The solid-void formation creates voids between the units and provides a recessed open space, allowing the inhabitants to enjoy a covered and shaded outdoor area. The tower formation aims to achieve height while maintaining a central core, and to sculpt various types of open spaces within the tower. Courtyard towers address courtyard situations with one or multiple towers, taking into consideration the relationship of daylighting to units.

Figure 44: Building Form Study

Façade exploration was done by combining cubes to form dwelling units and by examining different configurations in order to produce private open spaces. Altered configurations generate different voids on the façade, creating alternative dynamic patterns. Balconies with floor plates above and below have the option of being enclosed in the winter by the closing of one façade.

Flexible and adaptable living space is a key concept for fostering a diverse community that can withstand growth and change. Unit organization is a key factor to enable a unit's expansion or contraction. In the Skip-Stop strategy, a series of unit organizations were modeled. The corridor level is laid out with bachelor-size modules. Bachelor units are set in every other unit; adjacent units become two-storey units, either one- bedroom lofts or two-bedroom units. As families expand, they can be combined with bachelor units below to create larger units and have more open space. Two adjoining bachelor units can also be merged into a bigger unit for those who prefer a single-storey apartment.

Figure 45: Possible Unit Formation Study

Figure 46: Possible Unit Organizations

8.2 Building Form Design Interventions

In this design exploration phase, building forms were generated by a series of physical models and sketches in an attempt to understand the relationship between the residential portion and the supporting amenity space, as well as site context and relationship between streetscape and public interaction. Building forms were tested on both the northwest and northeast corners of Bloor and Spadina to determine which site would be the most suitable location for the building.

Site 1: North West Corner of Bloor and Spadina

Design 1

This design proposes a 10.5 metres rectangular podium form for public amenities, and an angled front façade to create a wider sidewalk space at Bloor and Spadina intersection. The residential portion consists of two towers: the southern tower is 3 stories high, the northern one 4 stories. A shorter southern tower will allow maximum daylight into the open space, and allow it to penetrate the skylight into the podium. The floor plates of the towers are stacked in a zigzag manner, creating balconies which overlook the courtyard and the street.

Figure 47: Design 1

Design 2

The previous design did not provide enough height for the desired number of units, and the two towers did not take into account the solar angle. In the second design, two L-shaped towers were proposed on top of the podium, a taller northwest tower to capture the daylight and a shorter southeast tower to allow daylight to enter the open space. A tilted glass façade was used for the podium to allow daylight penetration; a wider sidewalk at the front façade allows for exterior patios and other street fixtures.

Figure 48: Design 2

Figure 49: Angular Plane for Widened Sidewalk

Design 3

Although medium density was achieved by the double tower in previous designs, the courtyards created are not big enough to support daycare and family and didn't provide an open field for kids to play. The adjacent site north of the proposed site, is a parking lot surrounded by buildings with no street frontage and a single-storey Spadina Station. These provide an opportunity to maximize the potential of this site.

In this experiment, a 3-storey-high platform was built on top of the parking lot to provide an enlarged floor plate for the residential portion. A setback single-loaded rectangular building form provides a central void; this serves as a courtyard for the residents. Private exterior spaces that provide different views of the central area are achieved by forming voids and extrusions into the courtyard. The hill-like form respects daylight; its high point is at the northwest and it slopes into a low point at the southeast; this allows for the optimal flow of daylight into the courtyard and residential units. Both south and east facades of the podium are tilted to widen the sidewalk for exterior patios (Figure 50); the angular plane created at the Bloor and Spadina intersection provides small public nodes that serve as the new main access points to the recessed Spadina Station.

Figure 50: Design 3

Design 4

Another approach involving the enlarged floor plate features an L-shaped tower set in the northwest corner with balcony spaces overlooking the open space. The height of the podium at the Bloor and Spadina intersection creates a focal point and a front entrance, a town-house style cluster is placed behind the podium façade to allow for a view and for family terrace space. However, the overall architectural language is not connected, as the residential tower appears to have been added on after the podium was completed. Sketching and studying floor plans for this design revealed that circulation between residential and public access is the biggest challenge for this design. The main entry only speaks to the

commercial portion of the building, and because the L-shaped tower is located on top of the existing parking lot, the logical location for residential access from the podium is pushed back to the west side of the building. This made the building commercially oriented rather than residentially focused with the podium providing amenities for the residents. Residents must be the main focus and the podium a supporting amenity for them and the neighborhood.

Figure 51: Design 4 East View

Figure 52: Design 4 Southeast View

Figure 53: Design 5

Design 5

Upon studying the building form and adjacent building, it was noticed that the raised platform on top of the parking lot created a daylight problem for the row house directly adjacent to the site (Figure 54). The 3-storey- high platform blocks off all daylight entering its southern façade. One solution is to set back the raised platform 20 metres to allow for sufficient daylight penetration. However, this sacrifices building area and resulting in a smaller open space.

Figure 54: Row House Daylighting Issue

Design 6

This exploration responds to the daylight problem presented by the raised platform by dropping to a height of one storey, sufficient to clear the Spadina Station and to allow trucks to pass through into the parking lot. Design 5 focused on the podium; it created a clear architectural separation of public amenities and the residential tower, making the building very commercial focused. In Design 6, the podium is reduced in height to a one-storey animated ground floor; the tower form is stepped back gradually to form a pedestrian-friendly streetscape; and the daycare and other semi-private offices are incorporated within the tower. These changes together create a more uniform language overall. Three horizontal L-shaped stripes provide rooftop garden opportunities; they also generate a central opening for ventilation and to provide daylight into the lower floors. The daycare's location on the second floor provides direct access to the open space. This solves the problem of insufficient daylight into the row-house behind the site and creates an optimal open space for family recreation and for the daycare itself. It also clarifies the relationship of circulation to building form and highlights the fact that the residential entrance can be located on one of the major streets. The height and form of the tower will have to be adjusted to allow for optimal flow of daylight into units and open spaces.

The main entrance on the ground floor is angled to create access to commercial buildings and to the subway station. The residential entry can be behind the main entry on Spadina Street, a mainly residential street; the resident will have privacy as well as convenient access to the main street. With voids created by the balconies, the building form

becomes dynamic: the south façade steps back toward the west side as the mid-rise tower grows in height. This provides large terraces and also reduces shadows on the site. This schematic design provides a general building form as a vision of resilient housing for growing families in the urban core of Toronto.

Figure 55: Design 6

Figure 56: Design 6

Site 2: North East Corner of Bloor and Spadina

Design 7

Instead of arranging suites linearly, this design investigates clusters of units: separate clusters would surround the central core. The intention of this design is to provide a townhome-style shape organized in a pinwheel form; this would give residents the impression that they were living in a low-rise instead of a mid-rise. The exterior clusters would twist up from the floor below while the pinwheel approach creates private exterior rooftop spaces (Figure 57). A rooftop garden and playground is formed by placing the residential cluster in the west side of the lot; three clusters on each level will have views to the garden. One shortcoming of this proposal is that it limits the maximum size a family can expand into; another is that its irregular shape would necessitate expensive structural systems that would make the project unaffordable.

NE Perspective

SW Perspective

Figure 57: Design 7

Design 8

User needs are not apparent in previous building forms and façade designs. These designs tailor different households with communal kitchens and a terrace between two suites. The façade consists of variously sized hexagonal shapes that represent different households. Outdoor spaces can be sculpted by pushing the hexagons to different depths, creating playfulness and also uniqueness though the façade. Expanding families may be considering expanding their units from a one-bedroom to a two or three-bedroom unit. In these designs, the suites are laid out between communal spaces. Expansion can be achieved by transforming the bachelor space into a three-bedroom with a private kitchen and terrace (Figure 58).

Figure 58: Design 8 Unit Combination

Design 9

The design pushes the residential portion to the north side, allowing both the outdoor garden and all residents to have maximum daylight throughout the day. The residential tower starts with L-shaped units on the podium and gradually transforms into a linear shape on top. This design allows for more interior area for daycare programs, which can be connected to the outdoor garden. The residential suites can take on bigger floor plans in the stepping floors as they have more glazing and a bigger terrace. A large terrace on every other level provides residents a communal garden, but the deep terrace also minimizes daylight entering into dwelling units, resulting in dark, unwelcoming homes. The north and west façades have angled glazing in an attempt to catch daylight from different angles and thereby keep the homes brighter (Figure 59). The resulting building form is one which lacks continuity and appears fragmented.

Through various design iterations, a few challenges have arisen as the design proceeded on the north-west corner of Bloor and Spadina Ave. There is a three-storey and a five-storey concrete office building established on the site's north-west, compared to the north-east corner with three two-storey buildings. Demolishing the building in the north-east corner would be more sustainable and sensible. Another difficulty in placing the building at the north-west corner of Spadina and Bloor is it would cast an unfavorable shadow onto the adjacent buildings to the west and north. Building form studies show that daylighting can be blocked from the apartment building to the west that is only 5 meters away, and the row-house to the north is only two to three stories high. The north-east corner of Spadina and Bloor offers more flexibility in terms of daylight requirements for surrounding buildings, and is thus a more appropriate site for the project.

Figure 59: Design 9

8.3 Units Configuration and Flexibility

In this exploration, units are designed with 10'x10'x10' modules as a grid. A strategic organization of different rooms can meet the various needs of a diverse community. With service modules placed close to the corridor, plumbing and exhaust can be easily managed, and can interchange as needs expand or contract. All modules which do not require plumbing and exhaust can be interchangeable and can easily merge with other connecting units vertically and horizontally. Since units are set with modules as a structural frame; walls and flooring can be easily installed and also removed in or between units.

Bachelor units targeting students and singles are single-storey units made up of 3 modules and a half-module of private open space, flexible furniture is employed to increase functionality and livability. As these units are small, they must be merged with other units as families expand; placing these units adjacent to one-bedroom units allows for their expansion into three-bedrooms. If the family decreases in size, the units can easily be restored for rent or sale by simply reinstalling demising walls.

Figure 60: Basic Module Units

Bachelor 1

Bachelor 2

Figure 61: Bachelor Units

2 Bedroom Duplex

1 Bedroom Loft

1 Bedroom

2 Bedroom

One and two-bedrooms can be arranged in a single-storey or a double-storey configuration, with the possibility of a full-module open space or half-module open space. In a duplex layout, residents could start in a loft configuration with a double-height living room space, and reduce the double-height space by installing flooring to create more living space.

Figure 62: One and Two Bedroom Units

1 Bedroom Loft

3 Bedroom Duplex

The skip-stop approach can be used for two-storey units; this would reduce corridors in the building, maximize unit size, and provide excellent cross-ventilation for the unit. It would also provide views to both the street and courtyard. The effect would be similar to house-style living in an apartment setting.

Figure 63: Skip-Stop Units

Figure 64: Balcony Operation

Private open spaces usually become useless dead spaces during the cold weather. These open spaces can be enclosed by a glass partition that rests in the cavity of the balcony wall, and by a sliding roof that rests inside the unit. The newly-created enclosed space could be used as a sun room or as an additional living space with at least three seasons of functionality.

owners. A stairs module has been designed to serve as a shelving unit when the owner does not require the second-floor space. When the owner is ready for expansion, the shelves can be detached to form the other half of the stairs; minor assembly of railings is required to produce a fully functional staircase. The floor above gives access to the one below, allowing for faster renovation time and less costly expenses.

In order to maximize flexibility within the units, the functionality of the stairs must be addressed. As units are downsized and expanded, the implications of installing new stairs may seem overwhelming to

Although flexibility is achieved by several building components throughout the units, the configuration of the modules and separation walls limits the unit's ability to transform as a whole. Consequently, the units become prescriptive and similar to the existing units that are already on the market. Since rooms are predefined, space-saving strategies are insufficient; units will not be economically viable since their areas will be insufficient for daily living.

Figure 65: Stairs Module

9

Design Proposal

The following proposal for an alternative design to a prescriptive dwelling responds to research on how downtown intensification can accommodate changes in family size, type and structure. This architectural response answers to Echo Boomers' desire for accessibility, proximity and convenience is one that will also provide strategies for coping with a family's life cycle. As the children and family-friendly design guidelines in Table 4 in section 4.7 suggested, the design proposal should accommodate family growth, provide flexibility for change and have the ability to transform. This suggests a mixed-use, mid-rise, mixed-age and income building located within a highly walkable district with close proximity to public transportation, public services and children's amenities such as daycare and schools. The intervention should provide the residents private and common outdoor spaces within the building as well as public open spaces where children can play safely and interact with nature. Publicly accessible daycare and retail stores are some of the amenities that would assist residents with daily tasks. On the ground level, an animated and pushed-back design with outdoor seating will encourage human interaction and increase walkability. An eight-storey-high residential tower will be set back from the main podium to allow daylight to penetrate into adjacent buildings and sidewalk. The podium roof will function as a green open amenity space not only for residents, but also for the daycare at the podium level. The sense of identity of residents can be addressed by the façade design and also by individual contributions to the public open space.

Affordability is one of the main concerns in Toronto's housing market for family-sized units. This thesis proposes an alternative housing

model. Flexibility is one of the main concepts, as Echo Boomers may not have the resources to purchase a family-sized suite at the start of their careers. Suites must be designed with flexibility: the capacity to expand and transform with little effort so that they are resilient to change. The main objective of this development is to create a template for avenue intensification, and a housing typology that will cope with a family's spatial requirements as one's life cycle grows and changes.

Inspired by the Yokohama master planning strategy, this mixed-use building will have layers of activities that merge with other programs, making it possible for users to experience shared programs with minimal constraint (Figure 66). As the program configuration shown in Figure 67 shows, this mixed-used building proposal starts with an animated ground level with exterior seating that encourages interaction and increases walkability. Underground parking with AutoShare-

designated parking spots will encourage residents to use shared vehicles. Spadina Station is located adjacent to the site, providing maximum convenience for daily commuters and reducing the need for a private vehicle. It is critical to provide safe and secure amenity spaces for children so that families can raise their young in the urban core; as such licensed daycares for toddlers and preschool children are essential. This building is designed with a daycare complete with a secure open space on the top of the podium, which adds a valuable resource for the neighborhood. Some spaces in the daycare can be shared with the residents after daycare hours. A flexible and multi-functional space could host different activities from different programs of the building. Residents would also have basic amenities which are accessible throughout the day. The project will aim to provide approximately 40 residential units with the adaptability to cope with changing needs.

Figure 66: Programmatic Diagram

Figure 67: Program Configuration

Figure 68: Building Form

9.1 Building Form

The analysis of site and city guidelines made it clear that was important for this building to act as a node for its intersection since it has two TTC entrances on the north side of the Spadina and Bloor intersection. A two-storey-high podium connects with the existing streetscape and maintains walkability of the site. A café with an exterior patio is proposed for the southwest corner of the building; this would provide a wider street for TTC access and would increase human interaction. The south ground floor façade would provide an entrance to various retail stores and would continue the Bloor streetscape. A safe and secure open space is vital for a mixed-used, family-friendly building, as many precedents have illustrated. A rooftop playground and exterior space have been proposed; they would be located on top of the podium and would have a glass railing that continues from the podium facade, allowing visual connections from street level to the garden.

The main residential tower is set back to the north side of the podium; this allows for the optimal amount of daylight to penetrate the site with minimal shadowing effect on surrounding buildings. The residential tower starts with an L-shape on the podium that gradually transforms into a linear shape on top, allowing more interior area for daycare, multi-functional programs and larger-size suites.

Figure 69: Site Plan

Figure 70 shows the views from the site: an unobstructed view of downtown Toronto can be seen from its south side; the west side frames Bloor Street and Trinity-St Paul's United Church. A few architectural icons such as the Bata Shoe Museum and ROM are on its east side and the Annex neighborhood is found toward the north. With the intensification of the Avenues, the site remains open with three elevations visible to the neighborhood. An angled façade is proposed for two reasons. First, it allows for a panoramic view of the city as the balconies open up to 3 orientations. Second, a maximum amount of daylight must be allowed to penetrate into the interior during the winter months while the balconies act as shading during the summer. The result that the interior is kept at an ideal temperature

and there is sufficient lighting all year around.

The daycare and residential tower is set back to the north façade, the recessed façade creates a well-proportioned podium which respects the three storey building height set out within the Avenues study guidelines. The third to ninth floor's floor plates take a form that is gradually stepping back towards the north side (Figure 71 - Figure 72), creating large terraces for the lower floors. This stepped back approach allows for the creation of safe and secured outdoor public amenities space, suitable for daycare use, while creating larger units for which it will be suitable for families who are expecting growth.

Figure 70: Views from Site

Figure 71: Bird's Eye View of Southwest Corner

Figure 72: Bird's Eye View from Southeast Corner

In response to the angle of the south façade, all other façades are angled as well, with rectangular patterns. These facades contain three different panels: clear glazing, frosted glazing and insulated blind panels. The insulated blind panels are assigned different shades of grey to add variety to the façade, and recall the voids created by the balconies in the south façade (Figure 73a+b). Although the façade panels are standardized, different shades of grey in the façade and the different configuration of balconies generates variety, adding a sense of identity to individual units.

Exploded Glazing Component
Figure 73a: Facade Detail

South West Facade Close Up
Figure 73b: Facade Detail

Figure 74 to Figure 79 showcase the angled building elevations. The south elevation faces Bloor Street west and is the main façade of this building. The podium is clad with an angled storefront wall, which response to the overall aesthetics of the building. An animated ground level continues the characteristics of Bloor Street West; all public spaces are located at the south façade as this façade is the most exposed to the public. The southwest corner is recessed 2 metres from the property line, this provides an opportunity for an exterior patio and a wider intersection for human interaction. The daycare and residential tower is set back to the north side of the property, providing enough daylight penetration to the street suggested by the Avenue and Mid-Rise Building Study and also provides a pedestrian-friendly streetscape.

The west elevation faces Spadina Avenue and provides access to semi-private and private users of the building. The office entry is located just north of the exterior patio, the west façade pops back out to the property line, creating a projection in the façade, and houses the residential lobby. This projection provides a sense of identity for the residents and also separates the entrance from the public sector of the building.

The north elevation faces the Annex neighbourhood with Spadina Station adjacent to the property. This façade continues the angled façade with balconies on alternating floors for the larger units in the “Skip” levels. The podium level does not require glazing at this elevation as this faces a service laneway. Building services and all delivery access are located in the north side ground level. The east elevation has the same angled façade to on the residential floors complete the overall aesthetics of the building.

Figure 74: South Elevation along Bloor Street

Figure 75: South Elevation

Figure 77: West Elevation

Figure 76: West Elevation along Spadina Street

Figure 78: North Elevation

Figure 79: East Elevation

9.2 Program Layout and Configurations

Figure 80: Basement Level Floor Plan

This section explains the program configurations in this design proposal.

Adhering to the precedent of Rosemont Affordable Housing's strategy to dramatically reduce the dependency on private vehicles, the basement level (Figure 80) houses the underground parking for 25 private vehicles, as well as providing 6 parking spots for the AutoShare program, which encourages residents to reduce the dependency on privately owned vehicles. A locked bicycle storage is also provided with a capacity for holding 100 bicycles. With the AutoShare program and bicycle storage in place, the proposed parking ratio will be reduced to 0.6 parking space/unit.

On the ground floor, a portion of the west façade has been pushed back from the street to create an exterior patio, which serves as an extension to the café. This produces a wider street on Spadina to accommodate the pedestrian traffic to and from Spadina station. The residential entrance, shown in Figure 81, is located at the north end of Spadina Avenue, stepped out from the west façade, providing a more prominent identification to the residents off of the main street. The commercial and daycare entrance is also located in the west façade and can also be accessed through the residential lobby, allowing easy access for parents.

Figure 81: Ground Level Floor Plan

1 Office Lobby	4 Residential Lockers
2 Residential Lobby Below	5 Office Space
3 Staff Lounge	6 Mechanical Shaft

Figure 82: 2nd Level Floor Plan

The second level (Figure 82) provides office spaces in the south side of the building. Due to its deep floor plate, the north side of the building is used for residential storage. The daycare on the 3rd level can be accessed through the office lobby.

The third floor houses the daycare, an outdoor garden and an exercise track. These are amenities for residents that also benefits the community. The daycare operates in the daytime with full access to the outdoor garden, which serves as a playground and outdoor learning centre. The outdoor garden is separated from the exercise track by a planter wall, which acts as a barrier to provide privacy and safety for the children. Tall trees are planted in the planter walls; they provide shading for the outdoor garden area, and are also equipped with benches on both sides. The multi-purpose rooms in the east side of the 3rd floor can be used by the daycare as a gymnasium for children in the double-storey space. The single-storey open space can be used as a learning spaces or as a daycare lunch room. Once the daycare operation hours have passed, these multi-purpose spaces can become a small theater or assembly hall, which can be connected to the exterior wooden deck for weekend events such as family barbecues. The outdoor garden will be accessible to the residents after daycare hours through the multi-purpose room or the wooden deck. This will allow children to continue playing in a safe space or providing a venue for weekend events.

Figure 83: 3rd Level Floor Plan

Figure 84: 4th Level Floor Plan

The 4th level provides a recreational centre and a large terrace overlooking the outdoor garden; these amenities are accessible to the residents throughout the day, it can also be used as an extension for the daycare as it grows. Residential units are located on the west side of the building.

The 5th to 12th floors (Figure 85 - Figure 92) are flexible residential units ranging from bachelor to 5-bedroom units, and provide three-unit types: 1) communal units with shared kitchen and dining, 2) lofts, and 3) family-sized units. The residential tower applies a skip-stop strategy, which maximizes the floor area by reducing corridor space and provides cross-ventilation on floors without corridors. The lower levels have bigger floor plates for larger family units and a large terrace that overlooks the outdoor garden.

Figure 85: 5th Level Floor Plan

1 1-3 Bedroom Unit	4 Loft Upper Level
2 Staircase to Skip-Stop Units	5 1-4 Bedroom Unit
3 1-4 Bedroom Unit	6 1-5 Bedroom Unit

Figure 86: 6th Level Floor Plan

1 1-3 Bedroom Unit	4 Loft Unit
2 Shared Kitchen	5 1-2 Bedroom Unit
3 0-3 Bedroom Unit	6 1-4 Bedroom Unit

Figure 87: 7th Floor Plan

1 1-3 Bedroom Unit	4 Loft Upper Level
2 Staircase to Skip-Stop Units	5 1-4 Bedroom Unit
3 1-4 Bedroom Unit	6 1-5 Bedroom Unit

Figure 88: 8th Level Floor Plan

1 1-3 Bedroom Unit	4 Loft Unit
2 Shared Kitchen	5 1-2 Bedroom Unit
3 0-3 Bedroom Unit	6 1-4 Bedroom Unit

9th level

Figure 89: 9th Level Floor Plan

1 1-3 Bedroom Unit	4 Loft Upper Level
2 Staircase to Skip-Stop Units	5 1-4 Bedroom Unit
3 1-4 Bedroom Unit	6 1-5 Bedroom Unit

10th level

Figure 90: 10th Level Floor Plan

1 1-3 Bedroom Unit	4 Loft Unit
2 Shared Kitchen	5 1-2 Bedroom Unit
3 0-3 Bedroom Unit	6 1-4 Bedroom Unit

Figure 91: 11th Level Floor Plan

1 1-3 Bedroom Unit	4 Loft Upper Level
2 Staircase to Skip-Stop Units	5 1-4 Bedroom Unit
3 1-4 Bedroom Unit	6 1-5 Bedroom Unit

Figure 92: 12th Level Floor Plan

Figure 93: Elevator Level

Figure 94: Skip Level

These diagrams (Figure 93 - Figure 94) illustrates how the skip stop strategy works. The upper units are accessible by staircase on the elevator level, the units (with similar shades), can be joined to create one larger unit if necessary through removing wall partitions. For example, the communal units can be joined to form one large unit by removing two partition walls separating the kitchen, the removed panels can be stored in the locker space in the second floor. The removable panels can be reinstalled to form two separate units again in the future.

The third floor space is designed as a multi-purpose level, serving as daycare in the daytime and a resident's amenity spaces after daycare hours. During daytime, the daycare utilizes all interior space and the exterior garden as a kid's playground, the northeastern double story unit serves as an assembly hall or for game playing when the outdoor space is not suitable for activity due to poor weather. The southeastern area serves as a library or media centre for large groups of kids to gather for movies or group learning. Residents only have access to the exercise track and a small exterior patio during the operation hours of the daycare.

Figure 95: Third Floor Daytime Configuration

Post-daycare Hours Configuration

Open for Daycare:

- Daycare Space
- Service/circulation

Open for Residents:

- Residents Multi-purpose Space
- Running Track
- Residents Green Space
- Service/circulation
- Daycare Green Space

As daycare centre closes, care taker will collect and store away all materials from the daycare and the designate daycare space will be off access. The double storey space and media centre in the eastern side will open and become accessible to the residents. The exterior garden will also be accessible through the media centre or the exterior patio. During holidays, special events can be held in the third floor while the daycare centre remain closed and off access. The third floor become a flexible amenity space which saves space and resources by using a time management operating method.

Figure 96: Third Floor Post-Daycare Hour Configuration

9.3 Flexible and Transformable Homes

These units are designed to expand to the adjacent units for the Echo Boomer's' growing household who are ready to upsize their homes. The units are designed to be expanded easily without extensive renovations. The communal units can be turned into a 4-bedroom as the family expands and requires more space (Figure 97). With life cycle changes, the unit can be restored back to the original state by installing two walls, providing an opportunity to sell or rent out one of the units for extra income. Loft units can also expand into a full two storey unit apartment by adding floor panels, where the balcony on the second level of the lofts are accessible after the floor panels are installed.

Communal Units

Loft Units

Figure 97: Combined Units

Figure 98: Multi-usage Bathrooms

Instead of a traditional 3 piece bathroom in the same enclosure, the bathroom area is separated into 3 zones: shower room, toilet, and sink. This allows for multiple usage at the same time and thus saves space and money to build additional bathrooms (Figure 98). An extra-large closet in each unit has a roughed-in plumbing system for future fixture installation, allowing for installations of more bathrooms to a large family if needed.

9.3.1 Interior Transformation

This section illustrates the flexibility within a unit designed to cope with family growth and changes. There are two types of transformations: interior and balcony transformations.

Communal Units

The main interior space does not have a permanent interior partition. Moveable furniture systems with ceiling tracks and wheels are placed in the open interior space. When all furniture is in the closed position, the interior space becomes a large open space, suitable for hosting large dinner parties or for accommodating anything that requires a large open space, such as a personal dance or exercise studio (Figure 99).

Figure 99: Communal Unit - All Closed Position

These dwellings allow home owners to create a variety of spaces suitable for their household size and its requirements. The wall/furniture units are designed to be able to move daily if desired or to stay in a semi-permanent state. These movable walls move in two axes, allowing for creation of rooms with entryways and storage units. Figure 100 shows the communal units in a semi-permanent state, where both are 2-bedroom configurations.

Figure 100: Semi-Permanent Position

Temporary rooms can be divided using fold-away partitions. These can turn a one-bedroom unit into a 3-bedroom unit without feeling crowded. The communal kitchen and dining area saves space for both units, as it allows maximum flexibility in one unobstructed space. These three spaces can be combined into one big unit with a private kitchen and dining area.

Figure 101: Maximal number of Rooms Position

The following diagrams illustrate many possibilities for family units in various stages of their life cycles, with the units in different configurations.

Figure 102: Communal Unit Possible Residents (Maximal Rooms Configuration)

Figure 103: Communal Unit Possible Residents (Two Rooms Configuration)

Figure 104: Communal Unit Entertainment Mode

The following renderings shows the interior view of the communal unit in different configurations.

Figure 105: Bedroom View

Figure 107a: Temporary Room Arrangement

Figure 106: Living Room and Work Station

Figure 107b: Temporary Room Arrangement

Two Storey Loft Units

Loft units can also expand into a full two storey unit apartment by adding floor panels, the balcony on the second level of the lofts are accessible with a moveable ladder and after the additional floor panels have been installed. The loft units are completed with a powder room in level one, which is adjacent to a storage closet with a plumbing wall rough in, the powder rooms have the potential of becoming a full bathroom by installing a shower in the closet area.

Figure 108: Loft Unit Level One

Once expansion is completed by installing the floor panels, the loft can transform into a three-bedroom with two complete bathrooms, one on each floor. Since a skip-stop strategy has been applied to this design, both the south and north end of the suite have glazing and balconies and allow cross ventilation throughout the suite.

Figure 109: Loft Unit Level Two

Growing Families, with Young Children, Extra Bed Located in Master Bedroom

Growing Families, Offering Multi-Level Housing Configurations in a Mid-Rise Setting

Couple with Short Term Guest, Extra Bed in Loft Quarters Offer Additional Accomodation Benefits

Bachelor Lifestyle

Couples Desiring a Large Work Station In Loft Area Offers Capacity To Work At Home

Expanded Loft Unit

Original Loft Unit

Figure 110: Loft Unit Possible Residents

The following renderings show the interior view of the loft unit in an un-expanded configuration.

Figure 111: Loft Unit Renderings

Skip Level Family Sized Units

Skip level units take advantage of the full length of floor plate, resulting in a unit with balconies on both the south and north side, which can promote cross ventilation and increase natural daylight entering the units. Like most traditional apartments in Toronto, these units have private kitchens and dining area.

Dormitory Style Living for
Students

Growing Families, with Young
Children, Desiring Privacy
and Rooms

Stable Families, with Teenagers
and Separate Quarters

Multi-Families, Unit Sharing

Dormitory Style Living for
Students

Figure 112: Family Unit Possible Residents (Maximal Rooms Configuration)

Dormitory Style Living for Students with Lounge and Closed Work Station

Growing Families, with Young Children, and Possible Work - Home Office

Multi-Families and Couples

Families, with Two Adults and One Teenager and Need for Large Work Area

Dormitory Style Living for Students with Lounge and Closed Work Station

Figure 113: Family Units Possible Residents (Two Rooms Configuration)

Figure 114a: Skip Level Interior Rendering

Figure 114b: Skip Level Interior Rendering

All movable furniture has at least three functions: partition, storage and work/rest. The furniture that moves in the north-south axis houses the main components: beds, working stations and a closet. Furniture that moves in the east-west axis is narrower and is used as entryways. Small shelving units and removable tables and chairs are located in these units. The tables can be transformed into a dining table or a coffee table. All furniture features a glass panel to allow soft, natural daylight to penetrate through the apartment.

Figure 115: Furniture Detail

Figure 116: Flexible Furniture Possibilities

9.3.2 Balcony Transformation

Almost all balconies and outdoor spaces are neglected in Canadian winters. These can provide valuable living spaces when the size of a dwelling is limited. In this design proposal, balconies can be transformed depending on the weather and the season. The balcony is one of the unit's many multi-purpose spaces. The balcony can be transformed using two sets of folding and pivoting doors. The double doors to the balcony can be opened and folded. Outer doors can be kept in the fully closed position, creating an extended living room space. In the winter time, the double doors can be closed with the outer door fully closed as well to create a sun room. Another option is to keep the outer door as a divider that divides the balcony into a half-enclosed space year-round. Users can transform the balcony into exterior or interior spaces for various uses. A solar-control window film can be added to the balcony glazing to minimize solar gain as the glazing is on the southern façade. This allows residents to enjoy a fully glazed southern window which frames the downtown Toronto without adding a substantial cooling load to the building.

Structural Axonometric Diagram

Figure 119: Structural Diagram

Exploded South West Facade Close Up

Figure 120: Wall Section

9.4 Exterior Renderings

The followings are the renderings showcasing various views of the building.

Figure 121: Residential Lobby

Figure 122: Cafe

Figure 123: Garden Section

Figure 124: Garden for Daycare Centre

Figure 125: Exercise Track

Figure 126: Exterior Patio on Spadina Street

Figure 127: Northwest View from Across the Street

Figure 128: Southwest View

Figure 129: Northwest View from Spadina Station

Figure 130: Southeast View from Street

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Figure 131: West View

9.5 Conclusion

This thesis utilized the Toronto Official Plan and Bloor Corridor study as its primary platform, applying its core principles and intentions into a design development suitable to meet the population growth in the city of Toronto. Their inherent flaws in their perception and emphasis on the present and disregard for the future was replaced by the ideologies of resilient and sustainable built forms. An ideal mid-rise apartment typology needed to be resilient to all factors, which was lacking in the current Toronto housing market.

Current trends and construction of bachelor and one bedroom units, in their desire to meet only existing demands and desires, are leading the Toronto housing market into a direction that will ultimately lead to oversaturation and a potential housing crisis. It is clear the current prescriptive approach to mid-rise developments are not the best model for intensification. This project envisions a mid-rise apartment typology which would serve as a vehicle to grow with the Echo Boom generation's ever changing needs. An understanding of the needs of the users and local neighborhoods was developed to form the basis of the thesis and final proposal.

The Annex is a diverse neighborhood which benefits from having a well-developed infrastructure and a diverse streetscape. Its environment is attractive for Echo Boomers, however, the available housing may not be conducive to such a scenario. This project hopes to set forth a precedence and principles in which a resilient development is needed within the neighborhood, to ensure it meets the demands of the Echo Boom generation.

The proposed design offers variety in an attempt

to anticipate the potential needs of an Echo Boomer. With a mixture of communal, loft style and family sized units, this design proposal offers diversity and flexibility among and within the units. Through the use of multi-purpose furniture and unit layouts predicated on flexibility, the mid-rise living arrangement has been reinvented from its current rigidity and stagnation.

In many developments, a certain disconnect between the project and its position within the community was apparent. Developers often are driven only by the economics of a project, that other community issues and problems are ignored, expecting others to resolve them.

This project hopes to bring some the issues within the neighborhood to the forefront, and attempt to address the issues rather than avoiding them. Daycare and a privatized common spaces offer inhabitants a peace of mind that their children and youth has a safe place to play, away from the potential threats associated with urban living. Office and commercial spaces on the ground levels reintroduces businesses and lively streetscape which are important aspects of the economics and character within the community.

The culmination is a mid-rise building that is respectful towards its surroundings, accommodating future needs. It sets a precedent for how future developments should be designed, with a preparation and anticipation of the continual neighborhood changes, and the changes experience by the inhabitants within. It is this ability to modify and adapt, to be resilient towards change, that will be crucial for the success of the urban core of future Toronto living.

Appendix

Physical Model Pictures

Figure 132: Design 1 Study Model

Figure 133: Design 1 Study Model

Figure 134: Design 2 Study Model

Figure 135: Design 2 Study Model

Figure 136: Design 3 Study Model

Figure 137: Design 3 Study Model

Figure 138: Design 4 Study Model

Figure 139: Design 4 Study Model

Figure 140: Design 5 Study Model

Figure 141: Design 5 Study Model

Figure 142: Design 6 Study Model

Figure 143: Design 6 Study Model

Figure 144: Site Model South View

Figure 145: Site Model Southeast View

Figure 146: Site Model Southwest View

Figure 147: Site Model Northwest View

Figure 148: Building Model Aerial View

Figure 149: Building Model Northwest View

Figure 150: Building Model South View

Figure 151: Building Model Southeast View

Figure 152: Unit Model Southeast View

Figure 153: Unit Model Northwest View

Figure 154: Unit Model Southwest View

Figure 155: Unit Model Aerial View

Figure 156: Final Thesis Defense Presentation

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