Housing Relief Through Adaptable Living

by

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Dalhousie University is located in Mi'kmaq'i,
the ancestral and unceded territory of the Mi'kmaq.
We are all Treaty people.

Contents

Abstract

Housing serves the fundamental human need for shelter. As family structures fluctuate, the living space changes. Instead of the need for multiple dwellings, having a living space that accommodates each life stage in the form of multi-generational housing is an effective alternative. In the urban context, due to housing shortage and unaffordable market prices, an adaptable housing strategy is needed.

This thesis takes place in Toronto, Ontario, Canada. Scarborough has a diverse history in urban development. As the city center continues to grow and public transit spreads outwards, the suburban context has the potential to transform into a new urban core. This study investigates an alternative dwelling form that can fit into the present living model between generations. By developing housing typology, it seeks to address how multi-generational high-density living could form a sustainable neighbourhood and provide a healthy living community.

Acknowledgements

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Thanks to my parents for the unconditional love over the years. To my partner Rui, thank you for always being there for me, this could not have happened without your support.

Chapter 1: Introduction

1.1 Overview

In recent decades, the affordability of housing has been a social concern in Canada, especially in populated and growing cities like Toronto. With high market prices and limited financial resources, families are struggling with providing proper childcare and senior care. In the city centre, the functionality of high density urban living is questionable as well. In order to improve the quality of family dwelling, there is a rise in multi-generational living. However, the conventional high-density residential dwelling units do not provide enough flexibility for modern family structures. By developing housing typology and rethinking the structure of multi-generational living, this thesis seeks to address how multi-generational high-density living could form a sustainable community.

This thesis is structured in six sections: Housing in Toronto, Multi-generational Living, Case Study, Site Selection, Design Method, and Proposed Project.

The section of Housing in Toronto (Chapter 2) will briefly address current housing concerns, including housing affordability and housing shortage. Following will be a discussion of the present high-density urban living pattern, the functionality of current suite designs for each age group, and communal living in shared spaces.

In the section of Multi-generational Living (Chapter 3), there will be a study of different forms of traditional multi-generational living in both North America and China, as well as an analysis of their social behavior. This section will also

examine the reasons behind the decline of traditional multi-generational living, and review the current main stream housing pattern of nuclear families. Furthermore, the latest housing trend of multi-generational living will be explored, along with its numbers of reasons: economics, childcare, ageing care, share responsibility and urban design policy.

The section of Case Study (Chapter 4) will study multi-generational living in different forms: courtyard house in Beijing and co-living project in Norway.

In the section of Site Selection (Chapter 5), the area of Scarborough Town Center will be recognized for its potential to become a new urban core. Next, the site will be analyzed at different scales, including urban fabric, community structure and urban planning strategy.

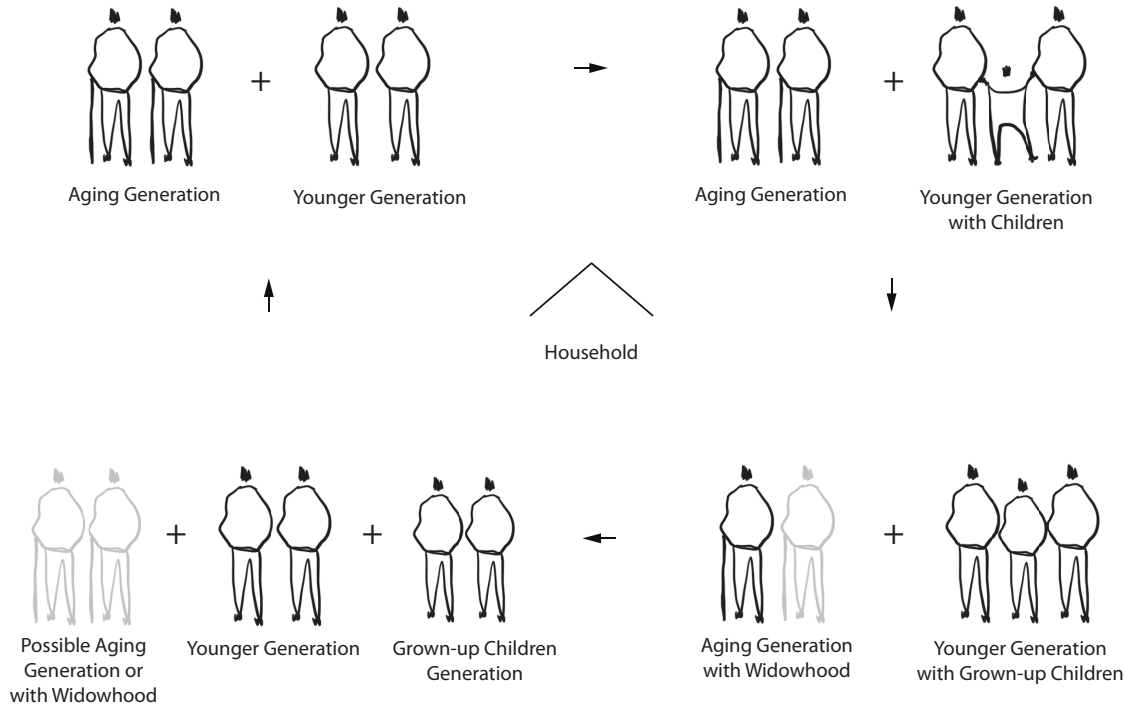
The section of Design Method (Chapter 6) will identify and study the people the proposed project will serve, including working couples, children, and ageing elders, as well as the programs needed. Design principles will be explored, including unit typology and strategy for living in different scales (unit, community and collection of communities). Then, stating performance criteria consists of courtyard typology, unit strategy, courtyard organization and connection to public realm.

In the section of Proposed Project (Chapter 7), multi-generational living will be tested in a proposed project located in Scarborough, which is a region in the Greater Toronto Area (GTA). The proposed project will start with project overview, followed by an exploration of multi-generational living within a community typology. There will also be an study of unit typology, and demonstrate how the unit is adaptable and transformable to accommodate each

life stage in multi-generational living. Expanding to another layer, the potential for how a new form of multi-generational living could influence people's behavior in the larger context of collections of communities will be studied.

1.2 Thesis Question

How could multi-generational high-density living form a sustainable neighbourhood and provide a healthy community?



Proposed household structure.

Chapter 2: Housing in Toronto

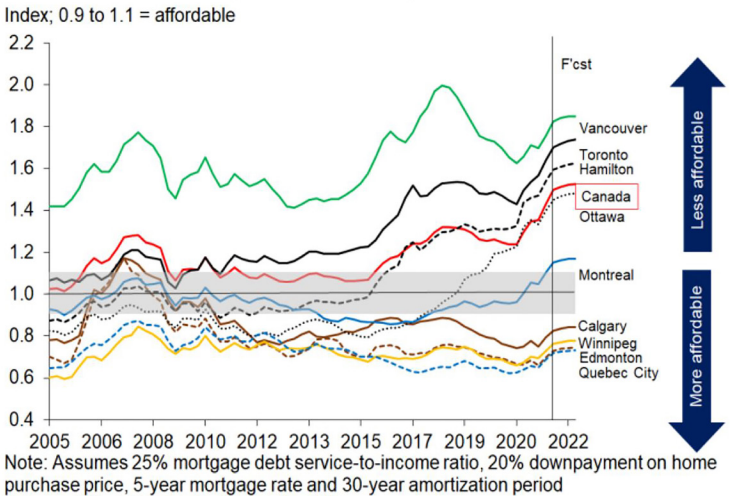
2.1 Current Housing Concerns

Housing serves one of the fundamental human needs for living, and is considered as a basic human right (Hulchanski 2005, 2). Without proper dwelling, it is impossible to achieve healthy living physically and mentally. At a larger scale, in the absence of suitable dwelling, a healthy society cannot be formed, and therefore housing issues have been recognized as social issues (Hulchanski 2005, 3). The matter of housing involves complicated issues, for which there are no set answers. It is the combination of housing affordability, housing shortage and housing functionality. In this chapter, the report will briefly discuss each element.

2.1.1 Housing Affordability

First, what is housing affordability? The definition of housing affordability is the percentage of housing cost in household income (CMHC 2022, 10). Housing cost is the cost of shelter including mortgage payments, insurance and maintenance fees (CMHC 2022, 10). Household income is the total after-tax income in a household (CMHC 2022, 10). When the majority of household income is spent on housing cost, housing becomes unaffordable.

In order to better identify housing affordability issues in Canada, it is important to analyze the housing climates in major cities. These major cities are indicators of how the housing market and quality of life are changing across the country. According to Oxford Economics, housing affordability has been rapidly decreasing from 2005 to 2022 (Stillo 2022, 3).

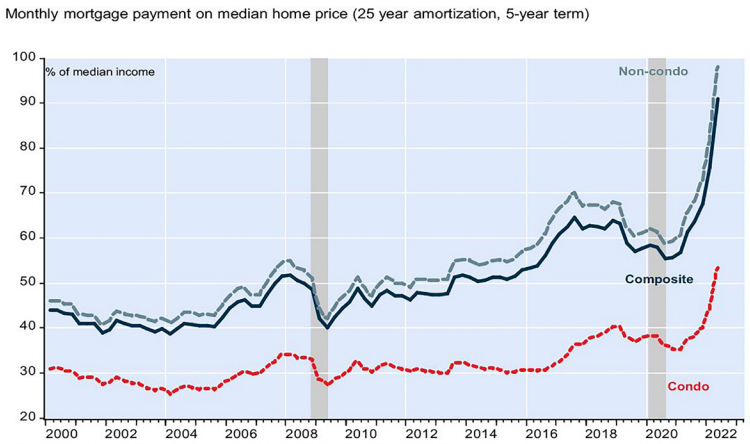


Canada housing affordability indices (Stillo 2022).

Compared to other cities, the Toronto housing market is one of the least affordable ones (Stillo 2022, 3). As Canada housing affordability indices shows, between 0.9 pt to 1.1 pt is considered as affordable. Since 2011, Toronto index has been rapidly increasing from 1.1 pt to 1.57 pt in 2021 Q3, which means that the average home price was 57% higher than the borrowing capacity of median income households (Stillo 2022, 3).

To cross reference and study the numbers from another aspect, housing cost can be compared to median household income. In Toronto non-condo market, the representative home price is $1,408,797 (National Bank of Canada 2022, 5). At a saving rate of 10% of the median household income per monthly, it would take approximately 31.8 years to save for the down payment (National Bank of Canada 2022, 5). In Toronto condo market, the representative home price is $764,876. At a saving rate of 10% of the median household income per monthly, it would take approximately 5.8 years to save for the down payment (National Bank of Canada 2022, 5). These high costs of housing also mean that the monthly mortgage payments for the median income family

has become unaffordable in recent years, especially for non-condo homes. At the end of 2021, the average housing price is $923,000. Compared with the average housing price in 2011 ($329,000), the increase of housing price is 180% while average household income growth is approximately 38% (Ontario 2022). As the market continues to increase, in 2022 the affordability of Toronto housing market has reached the lowest point since 1981 (National Bank of Canada 2022, 5).

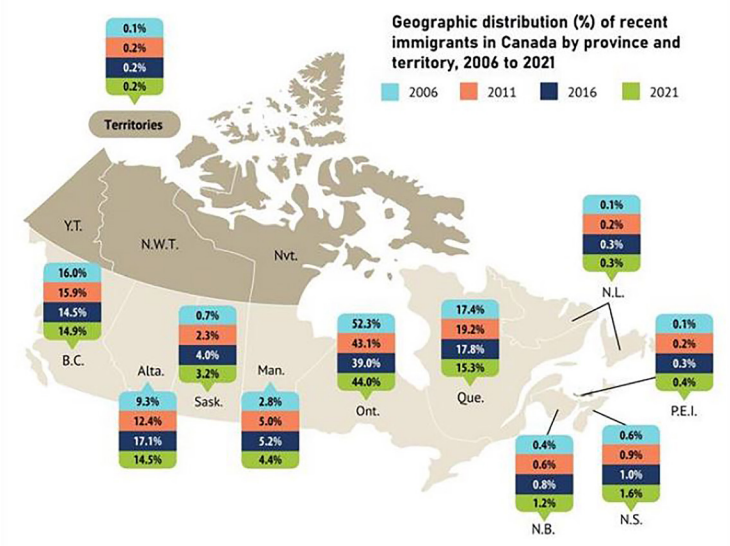


Toronto: Perspective on Housing Affordability (National Bank of Canada 2022).

2.1.2 Housing Shortage

Another major reason that contributes to housing issues is insufficient housing supply. For both condo and non-condo markets, the number of new residential developments does not respond to the change in housing demands. In recent years, the increase in housing supply has been challenging due to the following factors. The first factor is construction time frame and government approval processes (CMHC 2022, 8). The city approval process for a residential development includes initial planning, rezoning, and site plan approval. These steps could take

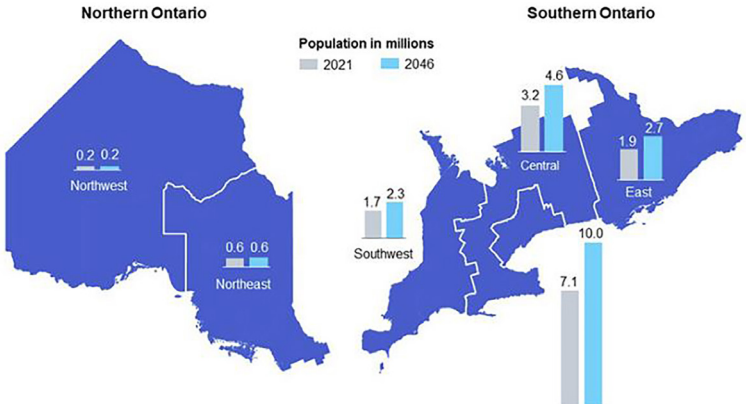
anywhere from a few years to several years or longer. The second factor is construction cost, as building material, labour, and equipment costs have increased significantly since the Covid-19 pandemic. Thirdly, increase in interest rate drives up development financing costs, which may lead to project cancellation or delay (CMHC 2022, 23). For instance, the increase in interest rate, construction cost and land costs have caused purpose-built rental apartments to fall by 24% in 2022 (CMHC 2022, 24). Lastly, with housing concerns in mind, the city of Toronto has been working on development requirements and policies aiming to create affordable housing and public shared spaces within new developments. However, since these requirements add to project cost, there has been push back from developers, creating further tensions.



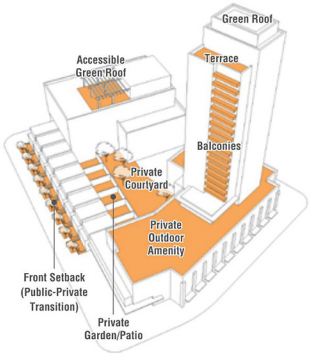
Geographic distribution(%) of recent immigrants in Canada by province and territory, 2006 to 2021 (Statistics Canada 2022).

While housing supply is decreasing, there is an increase in housing demand caused by population growth. Immigration is the major source of Canadian population growth. Between 2016 to 2021, the number of new permanent immigrants is

over 1.3 million (Statistics Canada 2022). The majority of the immigrants settled in Ontario (Statistics Canada 2022). Population projections for Ontario show that by year 2046, there will be a 37.7% increase in population The senior population is projected to increase from 2.7 million in 2021 to 4.4 million by 2046. The children population of those under the age of 14 is projected to increase from 2.3 million in 2021 to 3.0 million by 2046. The Greater Toronto Area (GTA) will be the fastest growing region (Ministry of Finance 2022).



Population of Ontario regions, 2021 and 2046 (Ministry of Finance 2022).



Private gathering spaces are well defined under City of Toronto Tall Building Design Guidelines, but lack connections in larger context. (City of Toronto 2013, 36)

2.2 Current High-Density Living

Currently, urban high-density living is not desirable. The built form does not connect to the public realm effectively for gathering to happen. To make things worse, it is very difficult to find the right balance between quality living space and affordable market price. In the recent decade, the average unit size is constantly being reduced due to the increase of housing price per square foot with limited living space, the quality of family life is compressed. The consequences of these issues raise concern to many professionals. For example, the City of Toronto has adopted a policy that requires 10% of new residential development units to meet

the Growing Up Guidelines requirements, which provides larger unit sizes suitable for children's growth (City of Toronto 2020). However, due to larger unit size and market price per square footage, these units are not affordable.

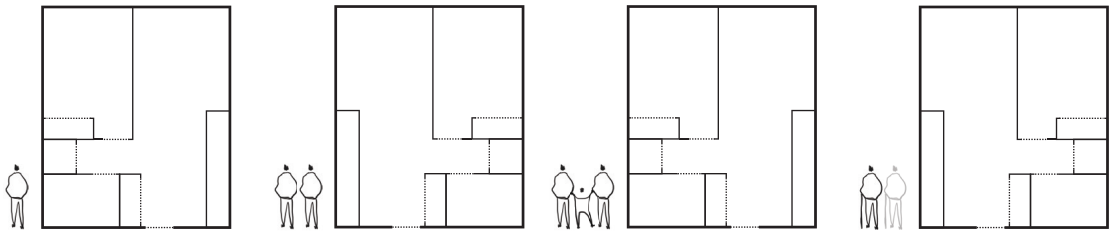
2.2.1 The Community

Most of the existing high-density projects today do not offer a sense of community living. According to Jane Jacobs, if the neighbourhood is lacking sidewalk life, people would need to enlarge their private life to accommodate contact with other people in the area (Jacobs 1993, 81). The same theory applies in the community, if the development does not provide a public space for people to communicate, people would need to find a space elsewhere, or there will be a lack of neighbourhood togetherness. The typical urban high density strategy, including the tower-podium built form, contains necessary program for the residents, as well as indoor and outdoor amenity areas. However, this kind of high density urban living emphasizes on self rather than community. Most of the time, the public space is too refined for people to use casually. If gathering can not be done naturally, and people do not feel a sense of belonging, then the space does not serve as communal space effectively (Jacobs 1993, 83).

2.2.2 The Unit

In each different life stage, the requirement for living space varies. Children require space that could evolve as they grow. Toys and gears need large storage space that is easy to access. On the other hand, the ageing group needs space that could provide different functions to accommodate aging. Traditionally, high density units are categorized by

unit types based on the number of bedrooms. The unit types may be targeting different groups of people, but the needs of these groups of people are not carefully considered. Rather, the determining factor in a typical development is the market, which plays a large part in informing the design, from the level of finishes to unit size. In order to make the process more efficient and more profitable, suite layout and fixtures are highly standardized. This means that as family members are increasing or decreasing, the family structure is changing, resulting in a need to seek for a new place for living.



In traditional high-density dwelling unit, families need to adapt to units.

2.3 Vision

With knowledge of the previously addressed issues, this thesis will focus on developing a dwelling typology that is adaptable to different needs, and create a community that is designed for people. In a larger context, new development should connect to the public realm and create shared space that is equally open to people. In the streetscape, interaction and togetherness can be encouraged when people can situate themselves within the space naturally. In a smaller scale, dwelling is designed for end users. Instead of the standardized one model fits all method, living space needs to evolve with family growth. A new typology is needed to create functional and affordable high-density living.

Chapter 3: Multi-Generational Living

3.1 Traditional Multi-Generational Living

Multi-generational living typically means families with three or more generations living under one roof (Beresford and Rivlin 1969, 1). It consists of at least two adult generations and one children generation. Sometimes, families with only grandparents and grandchildren can also be considered as multi-generational households. Historically, multi-generational living used to be the most common family structure, not only in North America but also in other countries. During that time, living resources and financial resources are shared within the family.

3.1.1 In Different Regions

In North America, multi-generational living was the main household form in the last two centuries. Since agriculture was the main source of living in rural areas, the most common scenario is parents own the farm and children work on the farm (Burr 1969, 60). Everyone contributed to the family and lived on the farm together.

In East Asia, especially in Chinese history, multi-generation al living had always been the dominant family structure until recent decades. Under the influence of Confucianism, the adult generation has the responsibility to support the parent generation as they age. Depending on the region, there are several multi-generational housing variations. The courtyard house in Beijing, known as the Siheyuan, is one of the most well-known types.

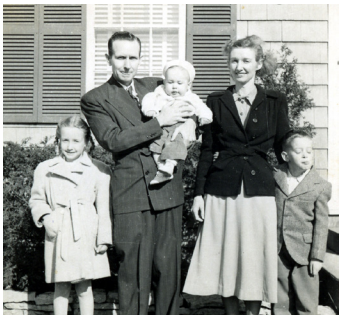
3.1.2 About Multi-Generational Living

Any form of family living has its advantages and disadvantages, and this applies to Multi-generational living as well. First, we can analyze the benefits of this form of living. Beginning with the benefits of multi-generational living, having all generations live under one roof helps to combine resources and distribute them among the family members based on need. In such case, no one needs to struggle alone, as there is always support from others. Studies show that there are various reasons for the older generation to join the younger generation to form one household. It could be reasons that relate to aging, such as widowhood, poor health, low income and loneliness (Donahue 1969, 39). In the case where the younger generation joins the older generation, usually the reasons are related to economic factors and childcare (Donahue 1969, 40). In addition, multi-generational living could help to stabilize the emotional well-being in the older generation and contribute to improved mental health (Weinberg 1969, 54).

Conversely, the form of multi-generational living can sometimes create conflicts. With any cultural background, there is a sense of household headship within a family. Normally, the adult generation would be the household head, with the highest family status. As the adult generation starts aging, the younger generation takes over the financial power, and the household headship might switch. However, under one roof, in most of the cases, each generations would like to maintain their own household headship and family status (Donahue 1969, 42, 45). Another one of the most common conflicts is that each generation hold their own different beliefs, and if they cannot communicate meaningfully, living together becomes challenging (Donahue 1969, 44). When

the younger generation forms their own family while living with retired parents, the responsibility of child care is often shifted from parents to grandparents (Donahue 1969, 45). If the grandparents are not comfortable with taking the responsibility, or if each individuals hold different opinions regarding children care, multi-generational living is difficult to maintain. Lastly, from the economic aspect, it is stressful for one generation to support two or three generations (Donahue 1969, 46).

3.2 The Fall of Multi-Generational Living



Family with couple and children in 1950s (Parker 2012)

By definition, nuclear family means a family with a married couple, or a family with a married couple and their children (Beresford and Rivlin 1969, 2). Since the industrial revolution in North America, nuclear family started to replace the traditional multi-generational household, and became the dominant family structure. In 1960, 86% of American families are with one or two generations (Beresford and Rivlin 1969, 3), 8% of American families are with multi-generations (Beresford and Rivlin 1969, 6).

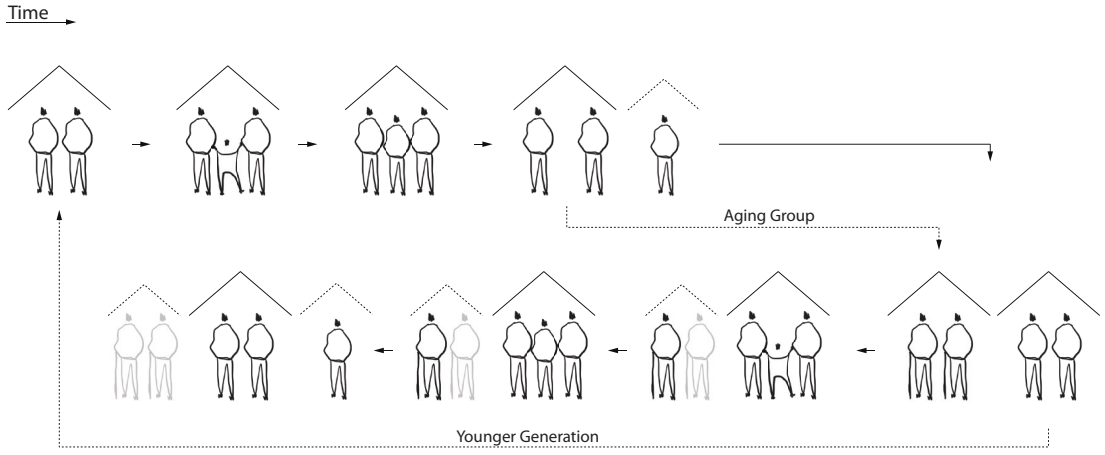
3.2.1 Causes for the Decline

In North America, the main reason that caused multi-generational living decline is urbanization. Since late nineteenth century, the American population changed from mostly agriculturally based to urban based with wage earning jobs. The change in economic structure led to young adult children moving from rural to city living (Pilkauskas, Amorim and Dunifon 2020, 2273). As adult children moved from their parents to the urban community, the older generation left on the farm were no longer able to support their living with low income, due to issues such as aging and lost of

labour (Burr 1969, 60). This became a social issue during that time. Another reason that caused the decline of multi-generational living was the change of social value. The older generations tried to maintain their households as long as their health and finance allowed. However, during that time, it was a strong value of younger generations to form their own households at their earliest age (Beresford and Rivlin 1969, 20).

3.2.2 Current Housing Pattern

In order to understand the current housing issues, it is important to understand the present concept of dwelling. Since the industrial revolution and urbanization in North America, nuclear family has become the major trend in rural areas as well as in the urban context. In this type of family structure, a young couple starts off with a smaller dwelling space due to limited accumulation of financial resources. As the family continues to grow with the birth of children and financial build-up, the living space needs to be expanded. Once children turn into adult children, the majority of them would choose to leave the parent's house to form their

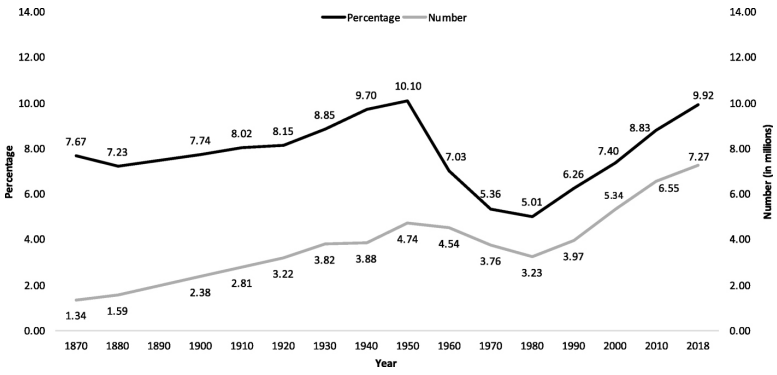


The life cycle of current housing.

own family. Although it is important to build the individual's household, several social issues are caused by the life cycle of this type of dwelling. First, this is an inefficient use of housing resources, as housing supply cannot catch up with population growth. The second major issue is child care and elder care, which will be further discussed in the following sections.

3.3 The Come Back of Multi-Generational Living

From statistics, an increase in multi-generational living can be observed. In 2011, only 7% of Americans were living in multi-generation families. In 2021, the percentage increased from 7% to 26 % (Generations United 2021, 1). Furthermore, in 2021 approximately 47% of Americans with children under the age of 18 were living in multi-generational families (Generations United 2021, 6). Several studies show that multi-generational living has multiple benefits, including providing care for elders and children, improving mental health and familial bonds, and better sharing of economic resources based on need (Generations United 2021, 7).



Children living in multi-generational family between 1870 to 2018 (Pilkauskas, Amorim and Dunifon 2020, 2273).

3.3.1 Economics

The economic climate is the main factor in the recent increase in the number of families forming multi-generational households (Generations United 2021, 7). Due to the impacts of Covid-19, inflation has reached a historic high point. Living expenses increased dramatically in recent years, and has become increasingly difficult to afford. To make things worse, many people lost their jobs during the pandemic. In a multi-generational household, resources are shared among all family members. If a family member becomes unemployed or accumulates unexpected expenses, other family members in the household could help to cover living expenses. At the same time, retired grandparents could provide childcare to free up one parent to work.

3.3.2 Childcare

During the Covid-19 pandemic, many childcare centres and schools remained closed, and children needed to stay home with parents or grandparents (Generations United 2021, 11). In the nuclear family scenario, if both parents have full-time jobs, one would need to take time off to stay home with their children. On the other hand, in a multi-generational household, grandparents could provide additional support for childcare. In addition to childcare support, multi-generational households provide diverse sources of learning, resulting in a learning environment that is more dynamic, and contributing to enriched growth.

3.3.3 Ageing Care

Ageing care is another major social concern. When elders lose the ability to take care of themselves physically and financially, who should take the responsibility? This is a

complex issue, and is challenging for any single party, such as the government, to take upon alone. During the Covid-19 pandemic, many elders were isolated in nursing facilities, resulting in a lack of proper care, as well as a loss of familial bond (Generations United 2021, 11). Both physical health and mental health have been affected heavily. In multi-generational families, by staying with children and grandchildren, elders can receive better health care, mental support and financial support.

3.3.4 Sharing

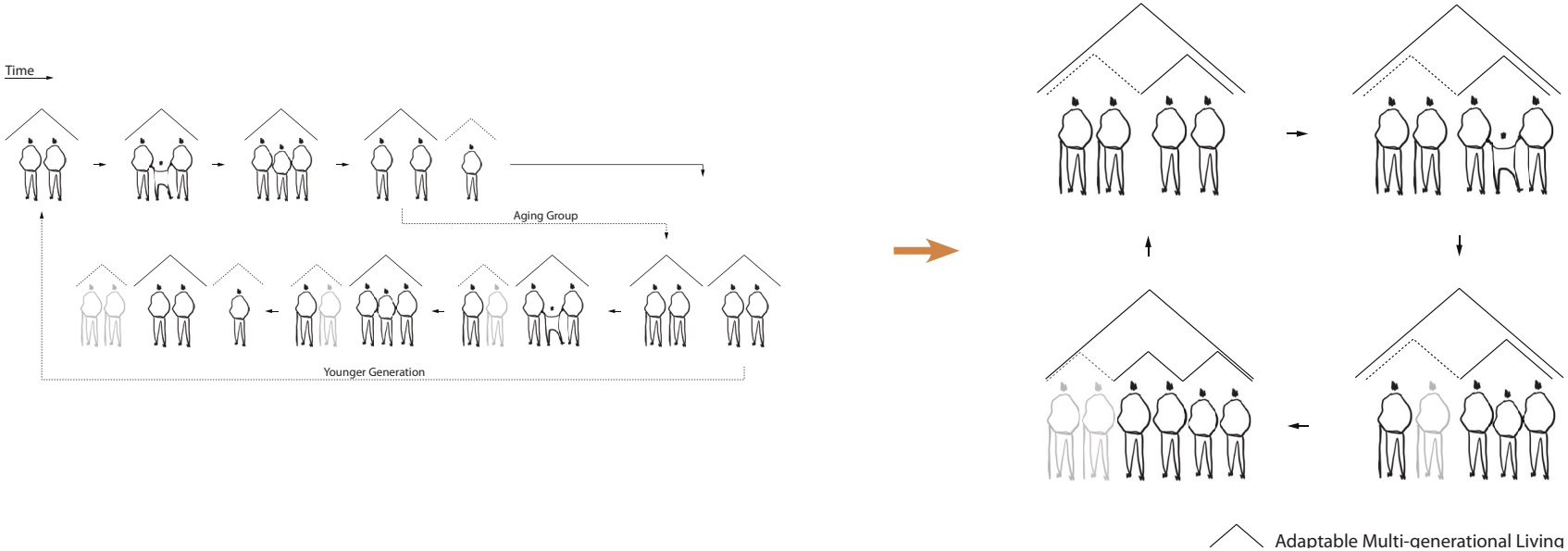
The model of multi-generational household encourages the sharing of responsibilities between generations, as well as the forming of stronger bonds through the action of sharing. A study shows that 42% of people living in multi-generational families agree that multi-generational living engaged actions of sharing, including cooking, storytelling, and cultural exchange (Generations United 2021, 18). This can potentially increase the quality of living and improve mental health.

3.3.5 Urban Policy

While the general public is starting to rethink the value of multi-generational living, the city of Toronto has been implementing housing initiatives in response to the housing crisis by rethinking the idea of the singular household, and moving toward the direction of increased density, where multiple exists where singular used to. In 2019, secondary suites (in-law suites) are officially permitted in city of Toronto (City of Toronto 2019). In 2022, the city of Toronto adopted the idea of garden suites to encourage multi-generational households (City of Toronto 2022).

3.4 Vision

Currently, most people are living in smaller families with one or two generations. As younger generations move out of parents' house to form their own families, each generation is faced with unique difficulties. The elders are faced with aging issues, while the adult children may have financial concerns. This thesis proposes an adaptable multi-generational living concept, where all generations live under one roof and share resources. The dwelling is transformable to provide different levels of privacy and respond to individual needs. Over time, the same dwelling can accommodate the user in each life stage.

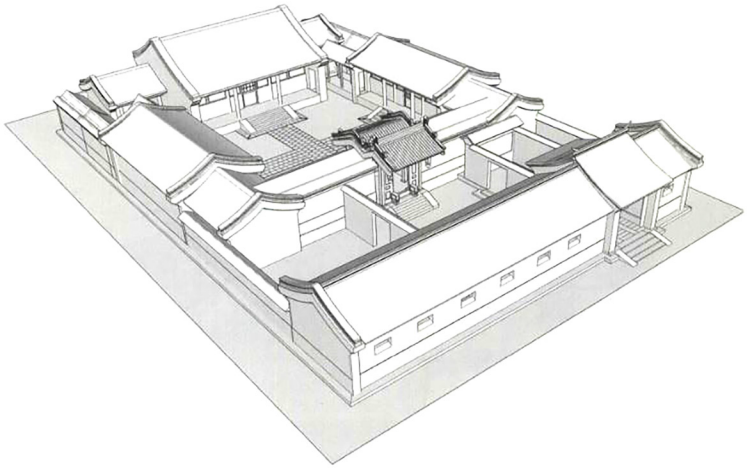


From current family structure to adaptable multi-generational living.

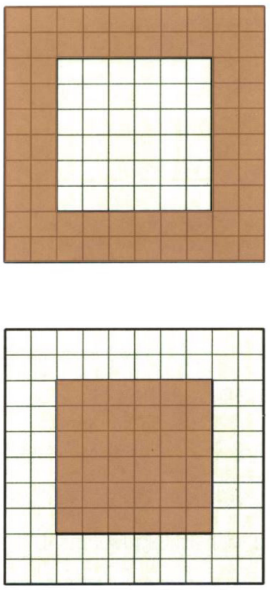
Chapter 4: Case Study

4.1 Courtyard House

The courtyard house (Siheyuan) in Beijing used to be the most well-known form of dwelling in China. It had been a common architectural form since the Yuan Dynasty (1271-1368) (Jia 2009, 29). Most of the Siheyuan seen today were built during Ming (1368-1644) and Qing dynasty (1636-1912) (Jia 2009, 30). Traditionally, it is inhabited by one family with multiple generations.



Courtyard House in Beijing, Siheyuan (Jia 2009).



64% of building footprint in enclosed courtyard built form align with social system at the time (Jia 2009).

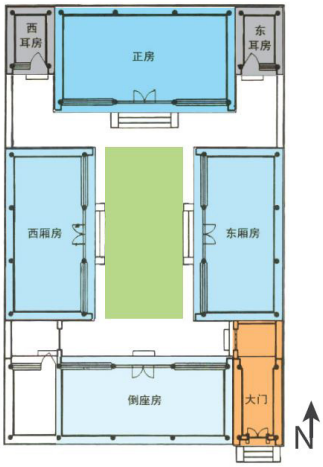
4.1.1 Why Courtyard House

Compared with other forms of settlements, the courtyard built form creates a micro-climate within the courtyard. It protects people from the sun and the wind, helps with ventilation, and provides opportunity for private landscape (Jia 2009, 23). Traditionally, men and women have different social status, and require different levels of privacy, and these factors can be satisfied with the enclosed courtyard built form (Jia 2009, 25). The overall set-up also corresponds well with fengshui elements (Jia 2009, 244).

4.1.2 Space Organization and Social Structure

The courtyard is located at the center of Siheyuan, where family's social and cultural activities happen. The main entrances is located at the southeast corner, which follows fengshui rules.

The main house is located on the north side with the best sunlight and view. The roof is the highest among all structures which represents the highest social status within the family. Traditionally inhabited by the household head, the main house contains 3 or more rooms depending on the size of the Siheyuan, with the living room in the centre.



Basic Siheyuan (Courtyard House) (Jia 2009).

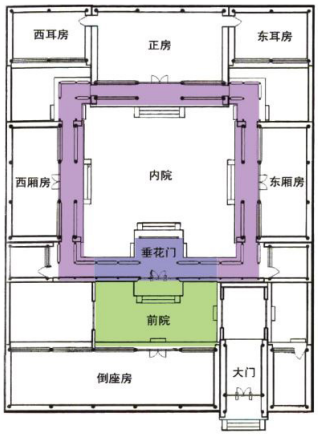
Traditionally the east has higher social status than the west, therefore the east wing is inhabited by the oldest son's family. The west wing is inhabited by the other family members. Each wing has the same organization as the main house, 3 or more rooms with living room in the center.

The south wing is the least desirable location with less sunlight and view. It is by the street with no or very limited window opening on the street side. The depth is less than the main house and wings. There are two small rooms

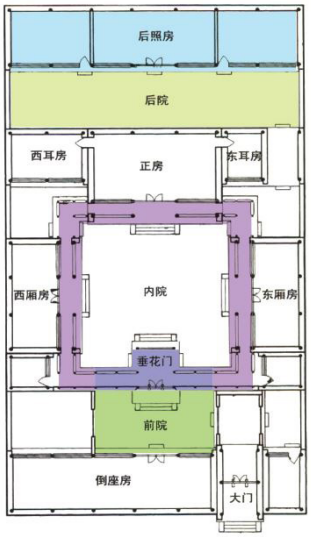
located at the north corners. These rooms are called the ears, and are mostly used as service rooms and storage.

4.1.3 Siheyuan Variations

The size of Siheyuan could vary but the basic principles stay the same. Layers of house and courtyard can be added at the front or both the front and the back of Siheyuan. With front extension, the front courtyard is added and serves as the public layer. The front courtyard and the main courtyard is separated by a wall. Covered exterior corridor is added to link the major component. In the scenario where it is both a front and back extension, in addition to the front courtyard, there is a back entrance to access the back courtyard and rear-house. The rear-house is inhabited by female family members and unmarried female children. Traditionally, women have lower social status than men and live in more private areas. The rear courtyard serves as private activity area for women. When the social status of a family increases, or the size of the family expands, the Siheyuan could expand to its sides (Kuayuan) as well. If the family members decrease in number, the side courtyard (Kuayuan) could be sold as an individual courtyard house.



Siheyuan (Courtyard House) with front extension (Jia 2009).



Siheyuan (Courtyard House) with front extension (Jia 2009).

Vindmøllebakken in Stavanger, Norway (Helen & Hard 2019).

Communal living in multi-generations (Helen & Hard 2019).

4.2 Co-housing Project

Vindmøllebakken in Stavanger, Norway is a co-housing project completed in 2019. It consists of 40 co-living units, 4 townhouses and 8 apartments. According to the architecture firm Helen & Hard, this project was designed with “Gaining by Sharing” in mind (Helen & Hard 2019).

The project contains a courtyard space, which serves as an entrance and as a place where people could chat and sit. It extends to a communal kitchen, dining area, and more socializing areas. Privately owned dwellings are arranged around the centre courtyard. The targeted residents are smaller families, healthy elders, or people living alone (Helen & Hard 2019).

The form of co-living can encourage social interaction, create connections between people, and realize the idea of different generations living together and helping each other. The intention of the project is to increase mental health and reduce environmental impact (Helen & Hard 2019).

Chapter 5: Site Selection

5.1 Recognizing Scarborough Town Centre Potential

5.1.1 Development History

Originally, Indigenous communities inhabited the Scarborough Town Centre area. In the 1800s, the land turned into agricultural use during the Euro-Canadian settlement, and the township of Scarborough was established in 1850 (Heritage Planning, Urban Design and City Planning Division 2021).

In 1950, Highway 401 was built, and the area of Highway 401 and Progress Ave were designated as industrial districts. In 1957, the Scarborough Township Official Plan was formally created (Heritage Planning, Urban Design and City Planning Division 2021).

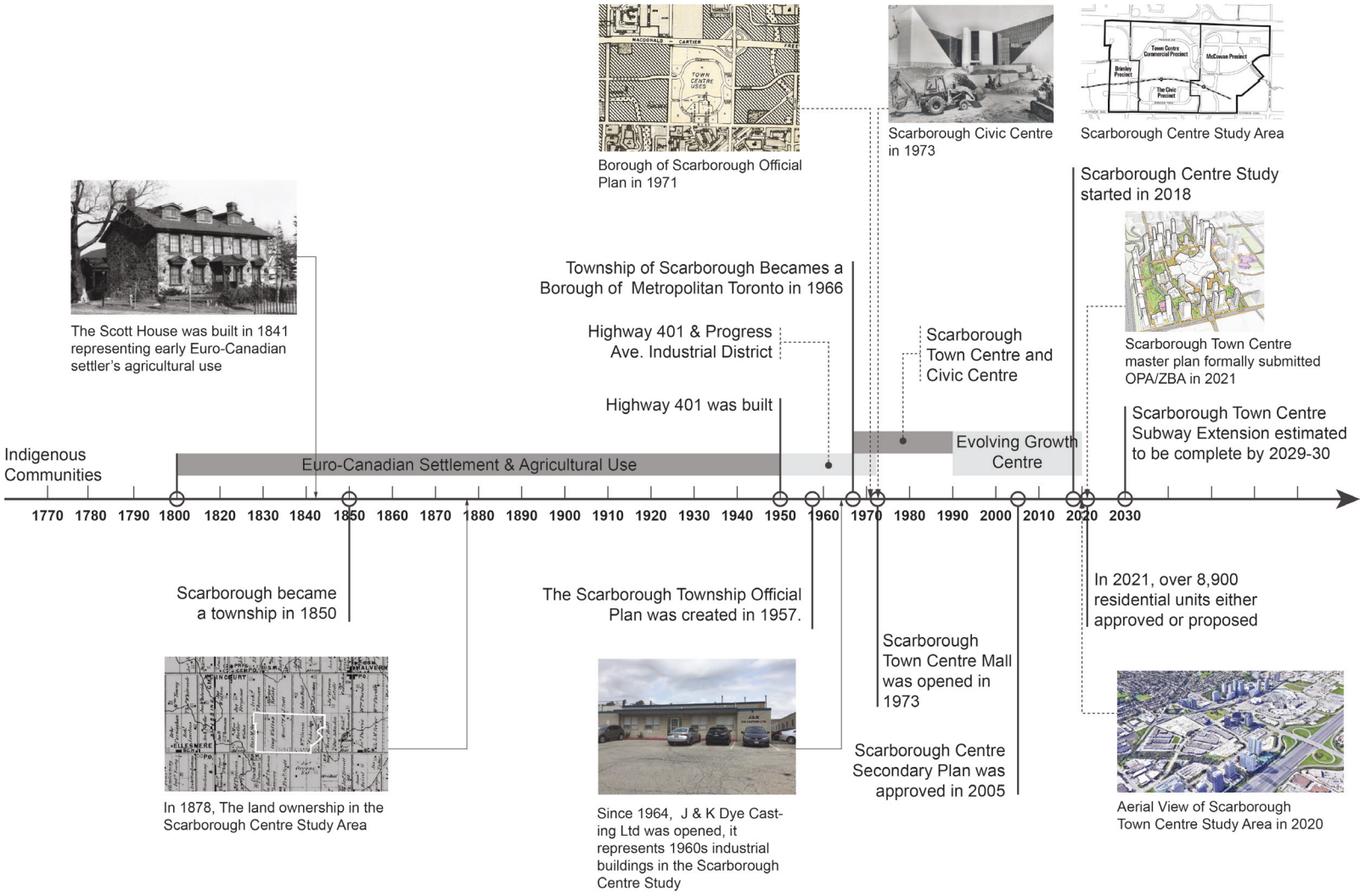
In 1966, the township of Scarborough Became a borough of Metropolitan Toronto. Scarborough Town Centre Mall was opened in 1973 as a business hub in the area. The district became the Town Centre and Civic Centre between 1967 to 1990.

Since 1990, the Scarborough Town Centre area developed into an evolving growth centre, containing high-density residential towers, a commercial centre and a community centre. The area became known for its diverse communities (Heritage Planning, Urban Design and City Planning Division 2021). In 2021, there were over 8,900 residential units either approved or proposed in the area (Mirabelli 2022). At the same time, a study is being undertaken to replace

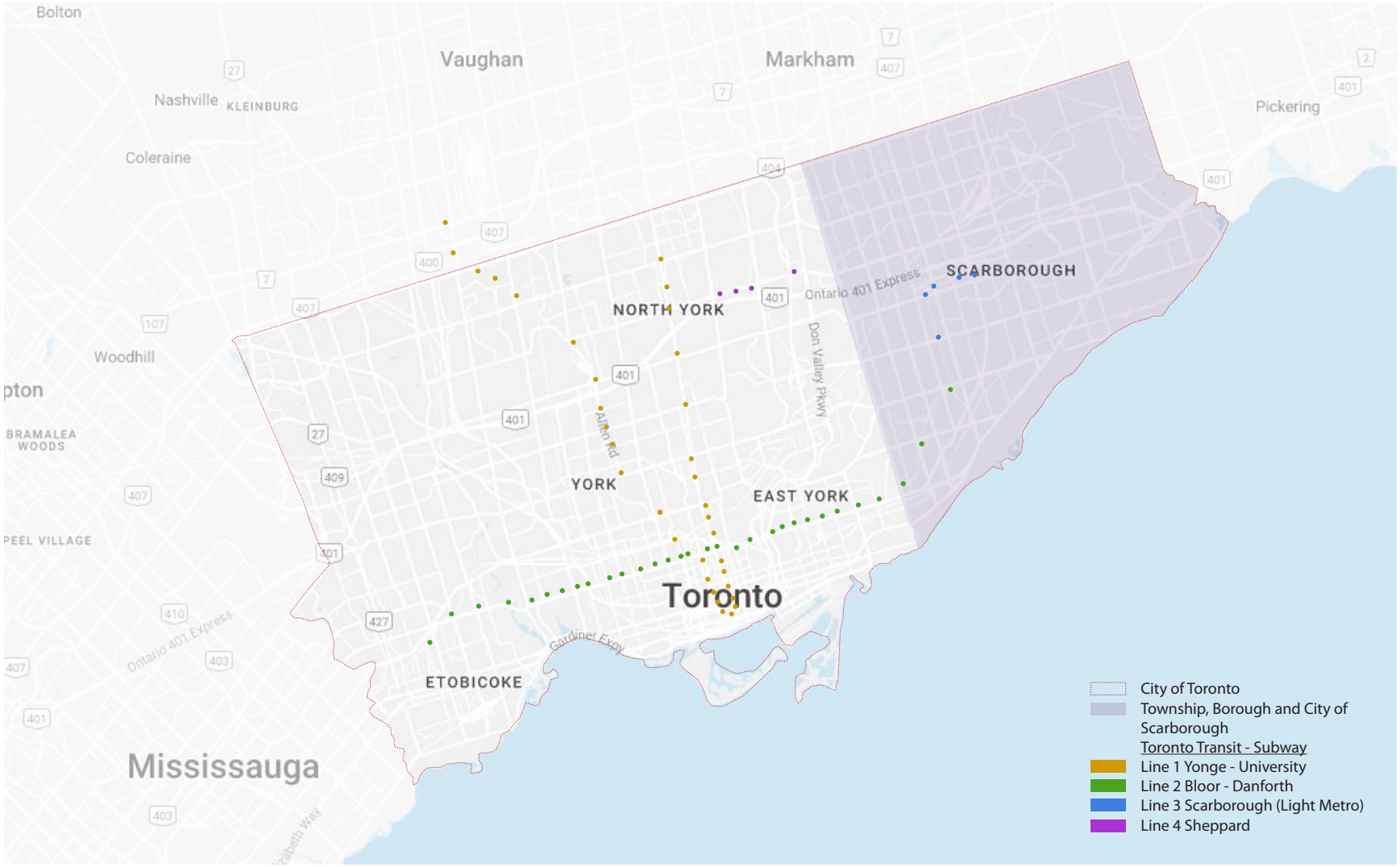
the current Scarborough Centre Secondary Plan that was approved in 2005 (City of Toronto n.d).

5.1.2 Subway Extension

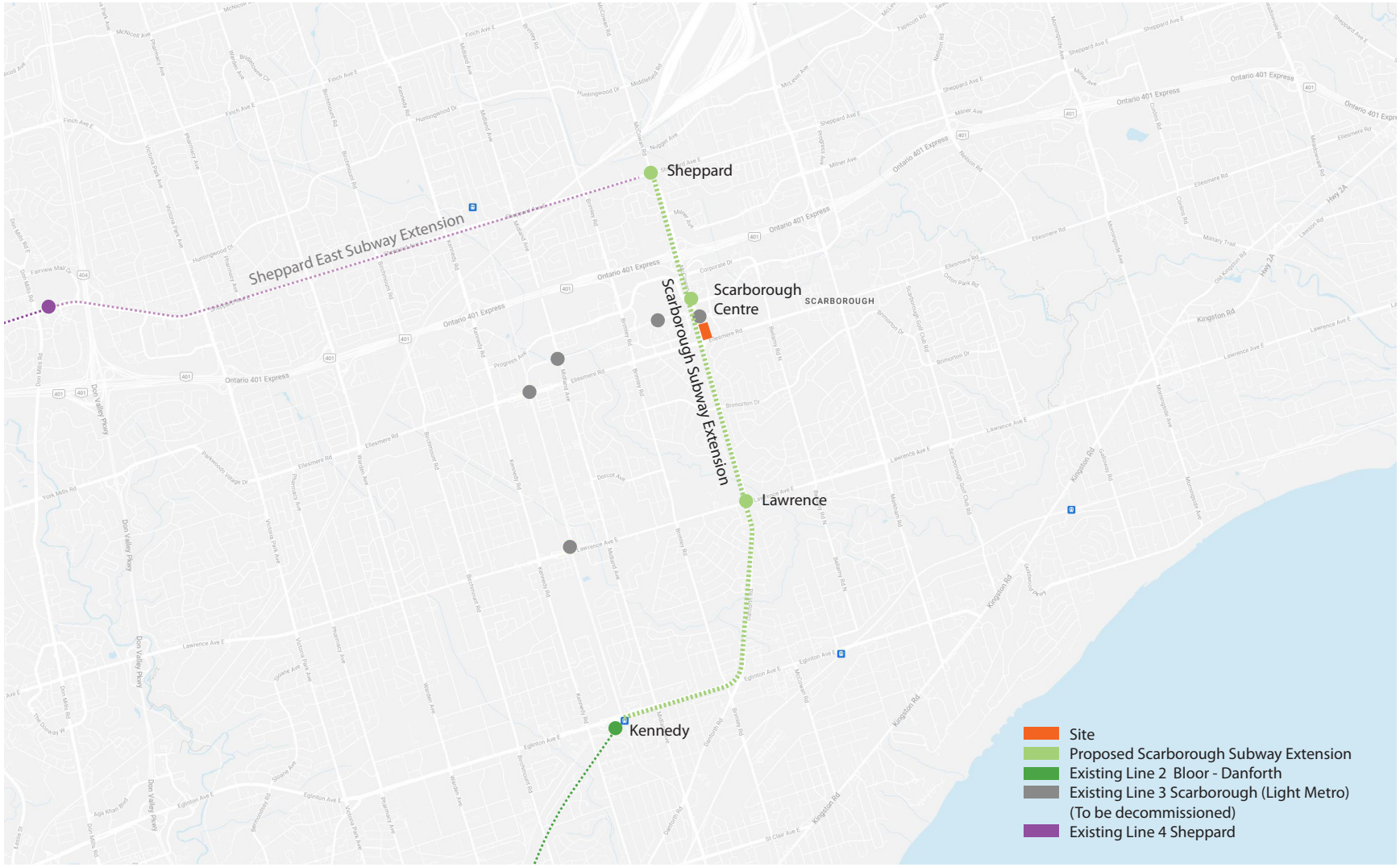
The Scarborough Subway Extension project started in 2020, broke ground at the launch shaft site in 2021, and is estimated to complete by 2029 to 2030. (Metrolinx). The current public transportation RT line will be replaced by the extension of Toronto subway Line 2. Three new subway stations are proposed, including Lawrence station, Scarborough Centre station and Sheppard station (Metrolinx). Compared to the current RT line, the Scarborough Subway Extension will bring the Line 2 service about 7.8 kilometres farther into the heart of Scarborough (Metrolinx). Once complete, it would create opportunities to connect to the Sheppard East Subway Extension in the future (Metrolinx). The goal of this extension is to create seamless connections between Scarborough and downtown core, and to provide opportunities for people to travel from Scarborough Town Centre area to the rest of Toronto freely. Thus, with the existing civic, commercial and residential infrastructures, Scarborough Town Centre is transitioning to a vibrant urban node.



Scarborough Town Centre Study Area Development.



Township, Borough and City of Scarborough and its connection to Downtown Toronto.



Proposed Scarborough Subway Extension - Currently under construction.

5.1.3 Planning Vision

Scarborough is a region adjacent to downtown Toronto. It is currently dominated by low density residential areas, industrial factories, and several high-density residential towers. As the City of Toronto spreads outwards, its surrounding areas correspondingly experiences growth. The new subway extension could potentially contribute to the population growth in the area. Since 2018, the City of Toronto has initiated a study to review the current Scarborough Centre Secondary Plan that was developed in 2005. The purpose of this study is to support and guide the development more sustainably, in order to accommodate growth in the coming decades (City of Toronto. n.d.).

5.2 Site Analysis

5.2.1 Urban Fabric

The Scarborough Centre Study area contains four precincts: Brimley Precinct, Town Centre Commercial Precinct, The Civic Precinct, and McCowan Precinct. The selected site is located at 1225 - 1255 McCowan Road, and is within the McCowan Precinct. It is currently occupied by a Freshco supermarket, a drug store, a restaurant, a bank and a large at grade parking lot. This site is located on the south of the new proposed Scarborough Centre station, with a low-density housing neighborhood on the south side, three condominium buildings on the east side, and a park plus one condominium building on the west side. It is situated in a critical lot that connects high-density living, traditional housing and nature.

5.2.1.1 Current Zoning By-law

The proposed project site, 1225-1255 mcCowan Road, is regulated under the Scarborough Employment Districts Zoning By-law 24982 (City of Toronto 1998-2022), as well as the Scarborough Centre Secondary Plan, which was approved in 2005 (City of Toronto 2005). Since it is within the Scarborough Centre Study area, the site is also guided by the Scarborough Centre Study (City of Toronto. n.d.).

5.2.1.2 Current Land Use

The Scarborough Centre Study Area is located within the Scarborough Employment District. It is surrounded by a residential neighborhood, an employment industrial district, commercial elements, and open spaces. Since this area is situated in the heart of Scarborough, it has the largest concentration of commercial and civic activities. The proposed project site is adjacent to the Scarborough Town Centre shopping centre, town hall, a library, office buildings, high-rise residential buildings, and low-rise housing.

5.2.1.3 Transit Pattern

1225 - 1255 McCowan Road is located at the northeast corner of McCowan Road and Ellesmere Road, and is covered by multiple transportation services. Access to the Ontario 401 Express highway via McCowan Road exit is within a 20 minute walking distance. Ontario 401 Express highway is a major highway that runs east-west bound, from Windsor, Ontario to the Ontario-Quebec border. Within a 10 minute walking distance, there are eight bus stops servicing routes in all directions. The newly proposed Scarborough Centre station can be accessed within a 5 minute walking

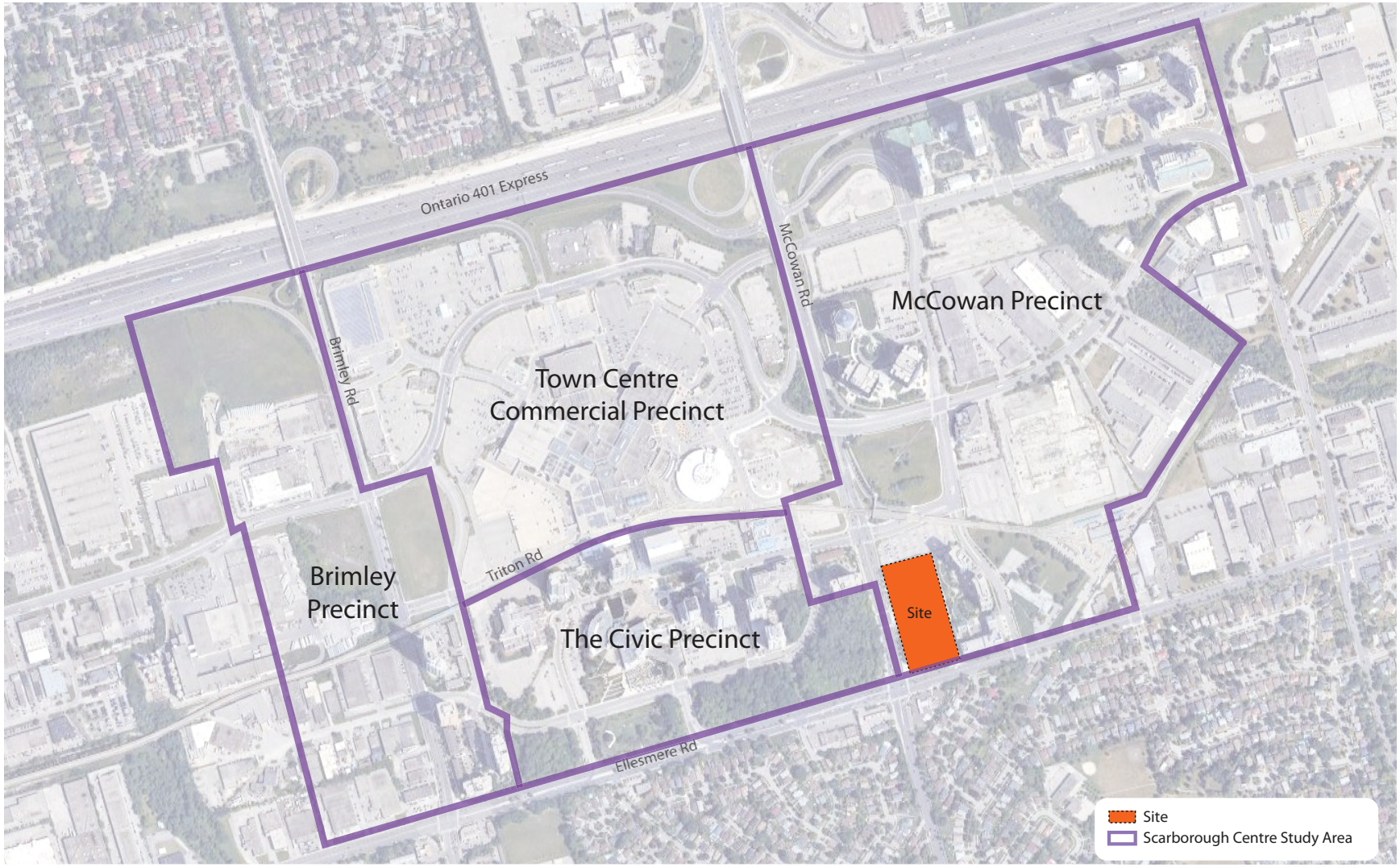
distance, which takes people to downtown Toronto, as well as the Sheppard East Subway Extension in the future.

5.2.2 Community Structure

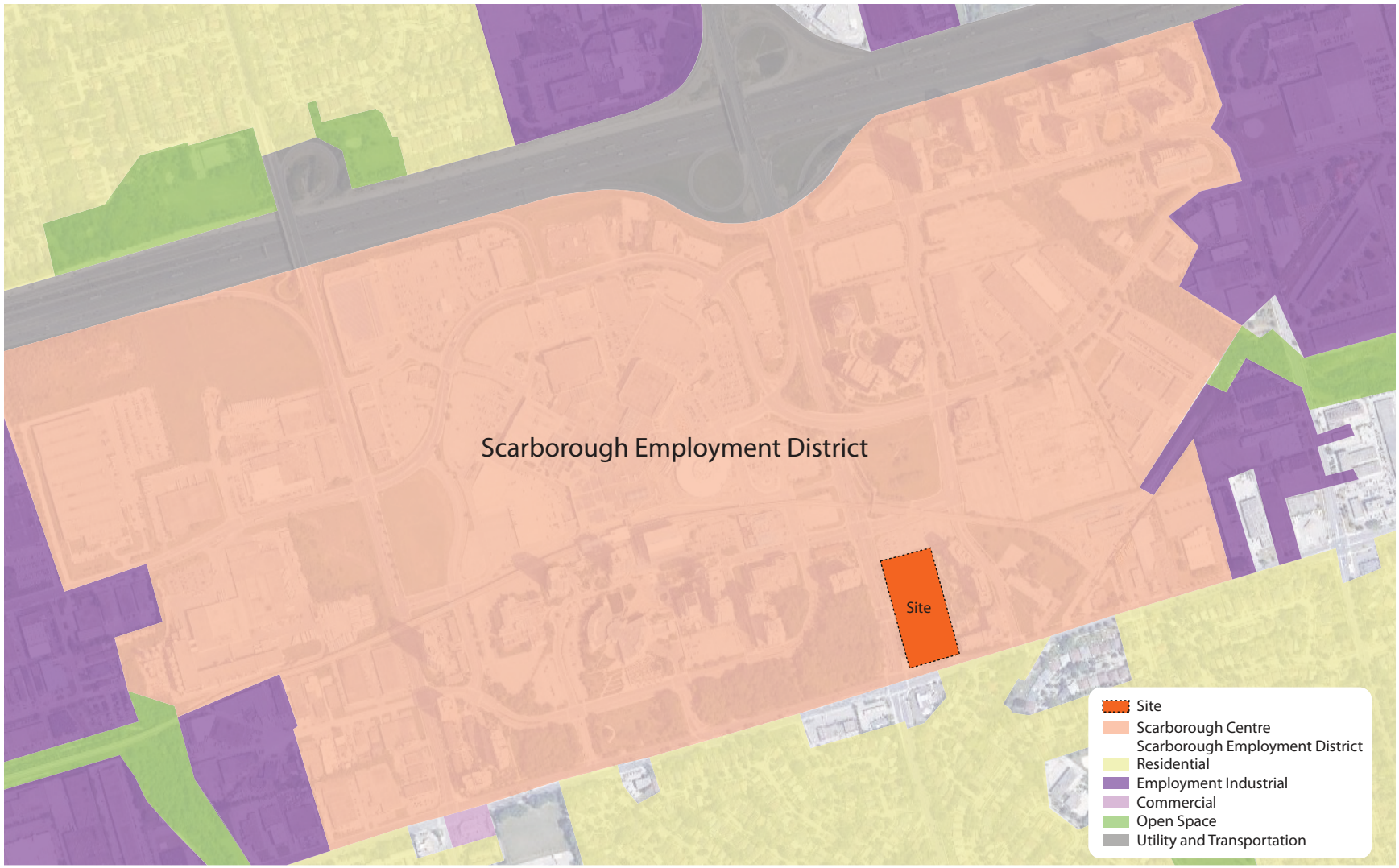
Most of the high-density households are located in the McCowan Precinct and the Civic Precinct. The median age group varies from 29.7 to 47.2 years old, the average household size is small, and close to half of the households are with children (Statistics-Demographics. n.d). With the combination of working-age group, children and ageing group, the site is suitable for testing how multi-generational high-density living could potentially become a sustainable urban living model.

5.2.3 Development Opportunities

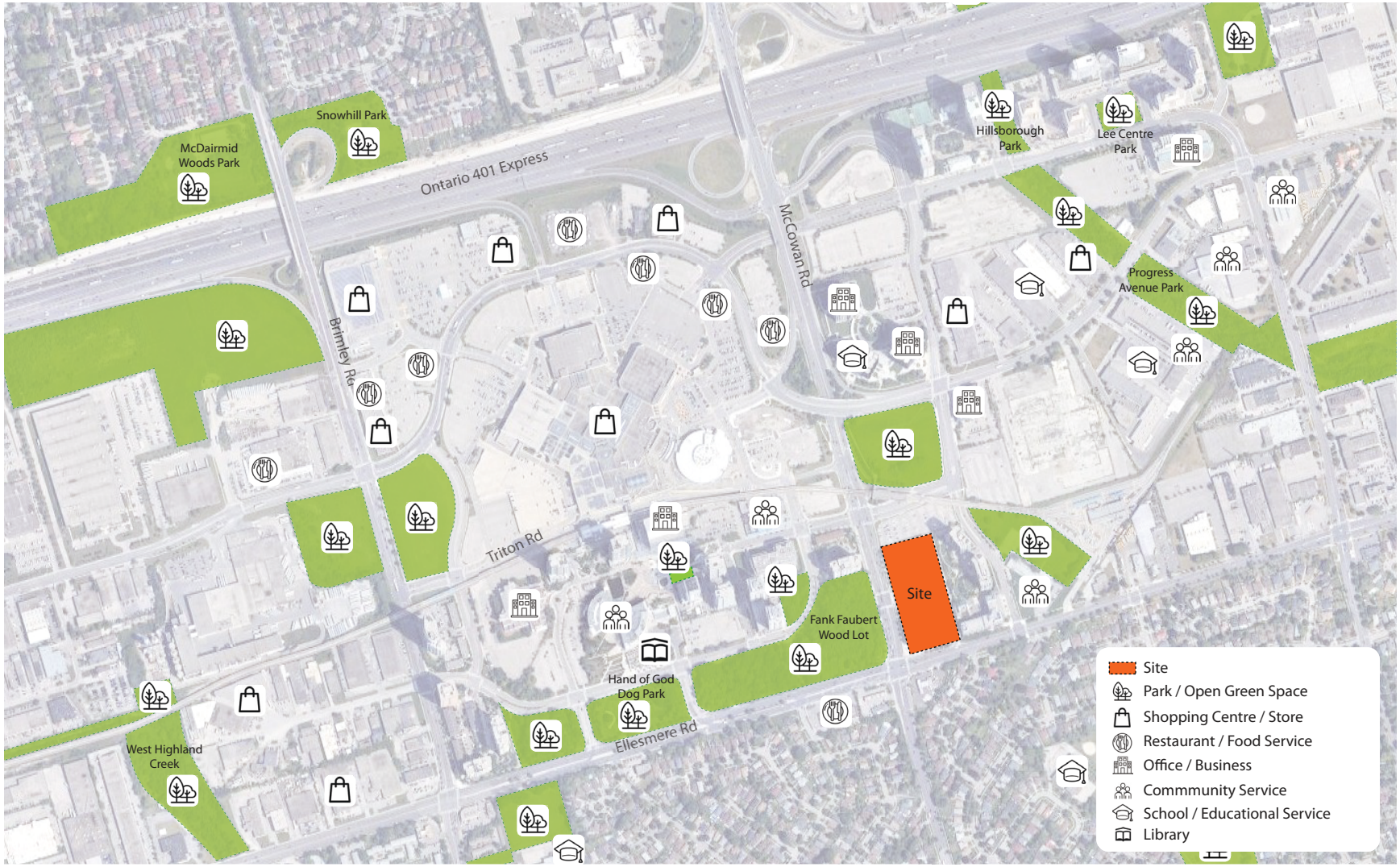
Many proposals have been submitted to the city for the Scarborough Centre Study Area, however all the proposals are currently on hold due to the Scarborough Centre Review that the area is under (City of Toronto, 1998-2022). The proposals include public parks and high-rise mixed-use developments, typically 35 storey to 65 storey. Although these proposals have been on hold, they demonstrate that the area is on its way to becoming a new vibrant urban core.



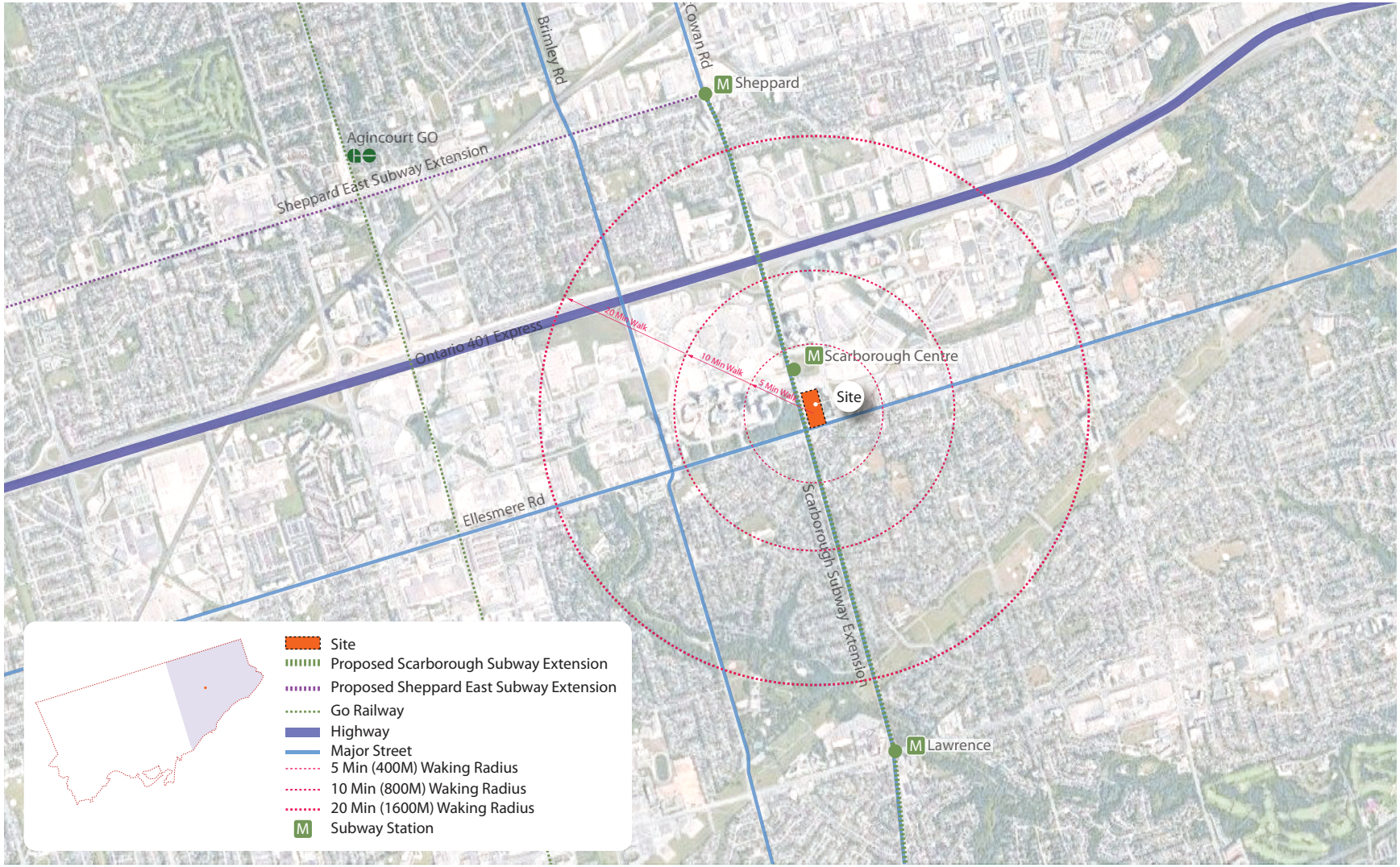
Scarborough Centre Study Area, base map (Google Maps 2022).



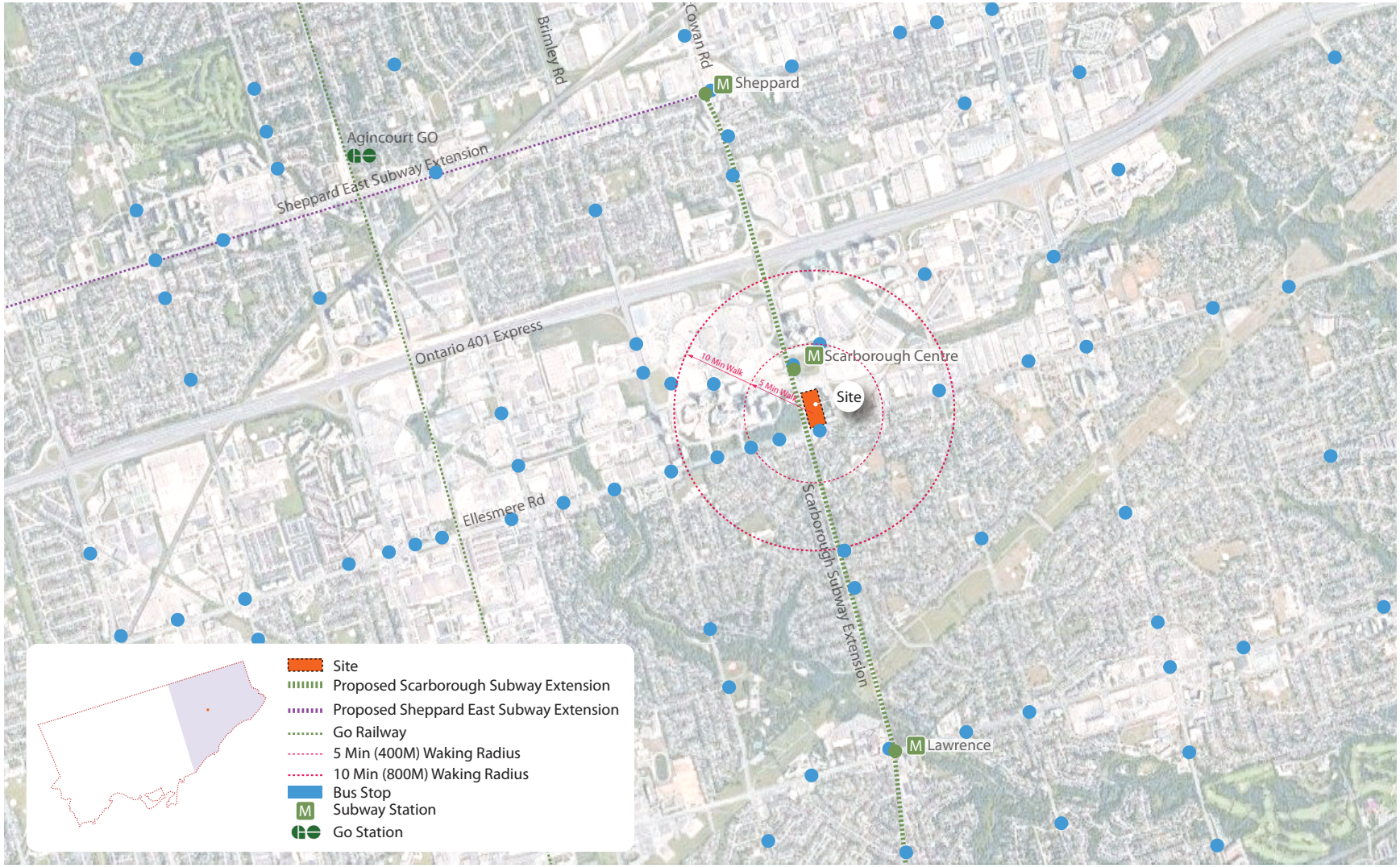
Current Landuse, base map (Google Maps 2022).



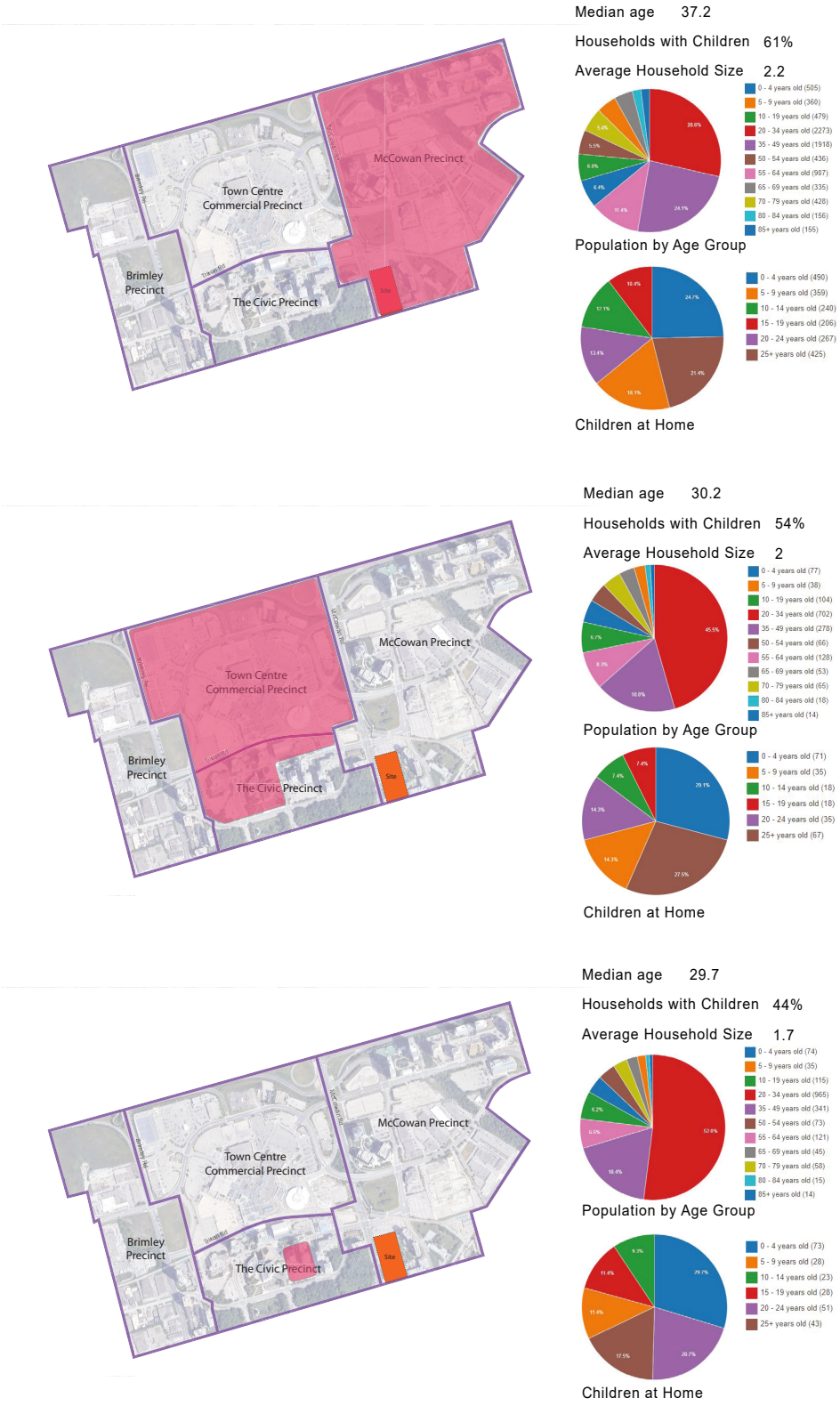
Current landuse and local services, base map (Google Maps 2022).



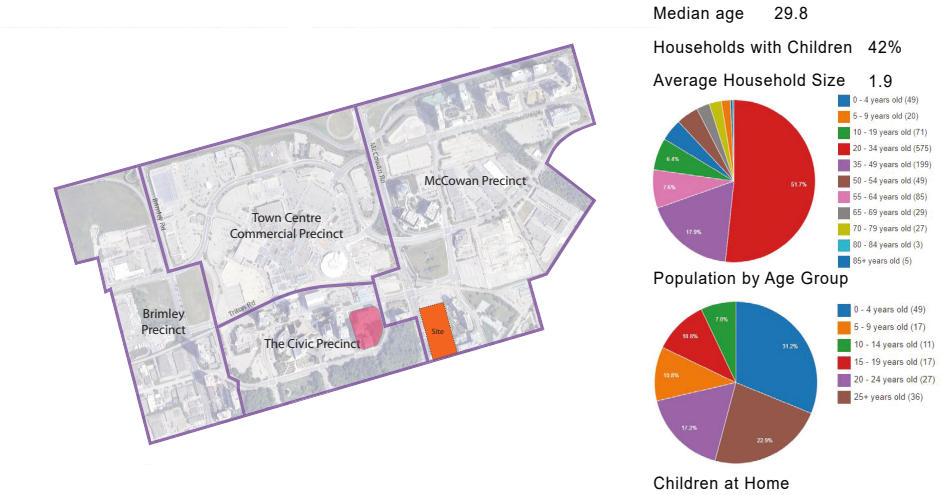
Walkability, road hierarchy and proposed subway extension in the Scarborough Centre Study Area context, base map (Google Maps 2022).



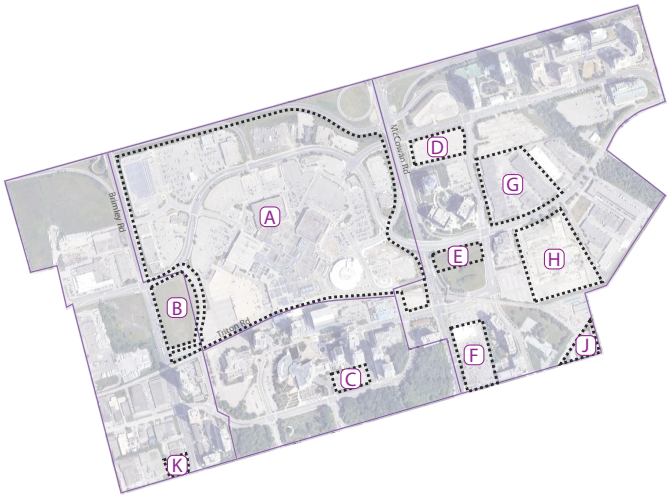
Local transportation and proposed subway extension in the Scarborough Centre Study Area context, base map (Google Maps 2022).

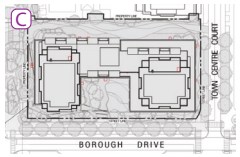


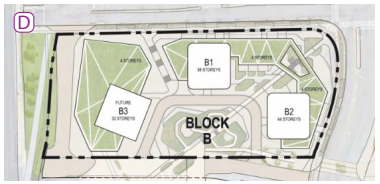
Population and household size in the Scarborough Centre Study Area (Statistics-Demographics. n.d.).

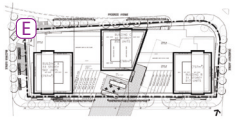


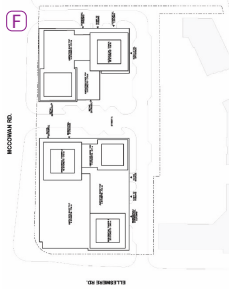
Population and household size in the Scarborough Centre Study Area (Statistics-Demographics. n.d.).

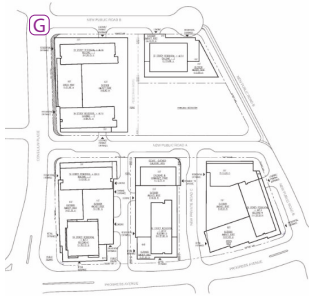


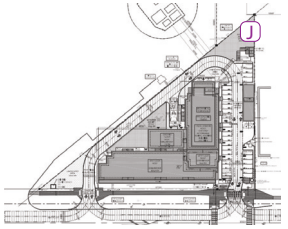


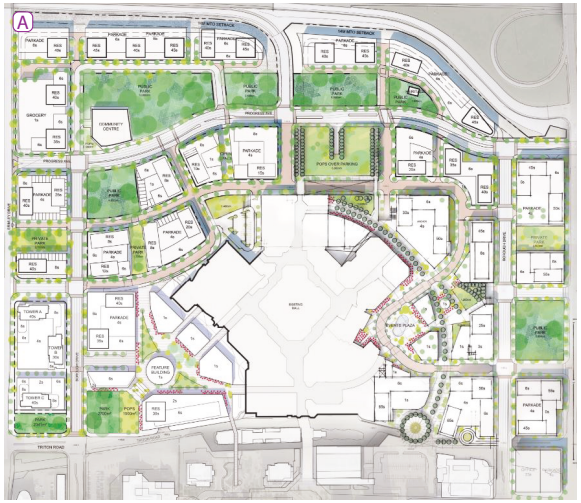


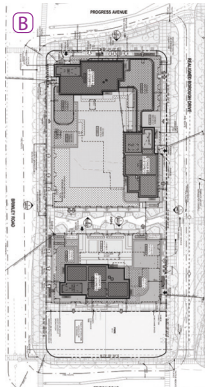


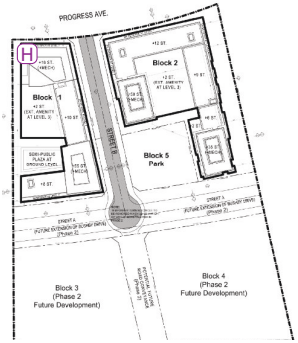


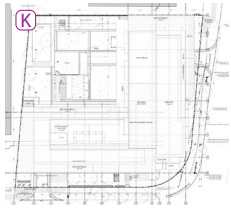












Current development proposals in the Scarborough Centre Study Area (City of Toronto 1998-2022).

5.3 Site Principles

Based on the site analysis, the following strategy guides the design process:

- Higher density located on the north of the site, close to the new Scarborough Centre subway station.

- Lower density on the south of the site to respect and connect to the existing housing neighbourhood.

- Building height to be around 36 storeys, to align with new developments in the coming decades.

- Minimize shadow impact on the south housing neighbourhood, and the park on the west.

- Provide effective public shared space at grade and within the building in order to connect to the park and housing neighbourhood.

- Connect to public realm to promote at grade activities.

- Maintain one vehicular access on McCowan Road.

Chapter 6: Design Method

6.1 Programing

6.1.1 The People

The project will serve three population groups: working couples with children, elders (grandparents generation), and adult children living with parents.

Growing children need extensive amounts of attention and care, but sometimes this could be a challenge for parents with full time jobs. With multi-generational living, extra care from grandparents could be a great help for the small family, and the learning experience for children could be more dynamic.

When adult children form their own families and move out of their parents' house, the parents would be left alone and eventually would have to face ageing issues. With multi-generational living, resources could be distributed more efficiently, and it could become easier to provide proper care to each other.

Adult children with limited financial resources may find it difficult to afford living alone, and therefore most of them choose to live under their parents' roof. With multi-generational living, while public space is shared among family members, each generation has their own private space to maintain the self moments.

6.1.2 The Program

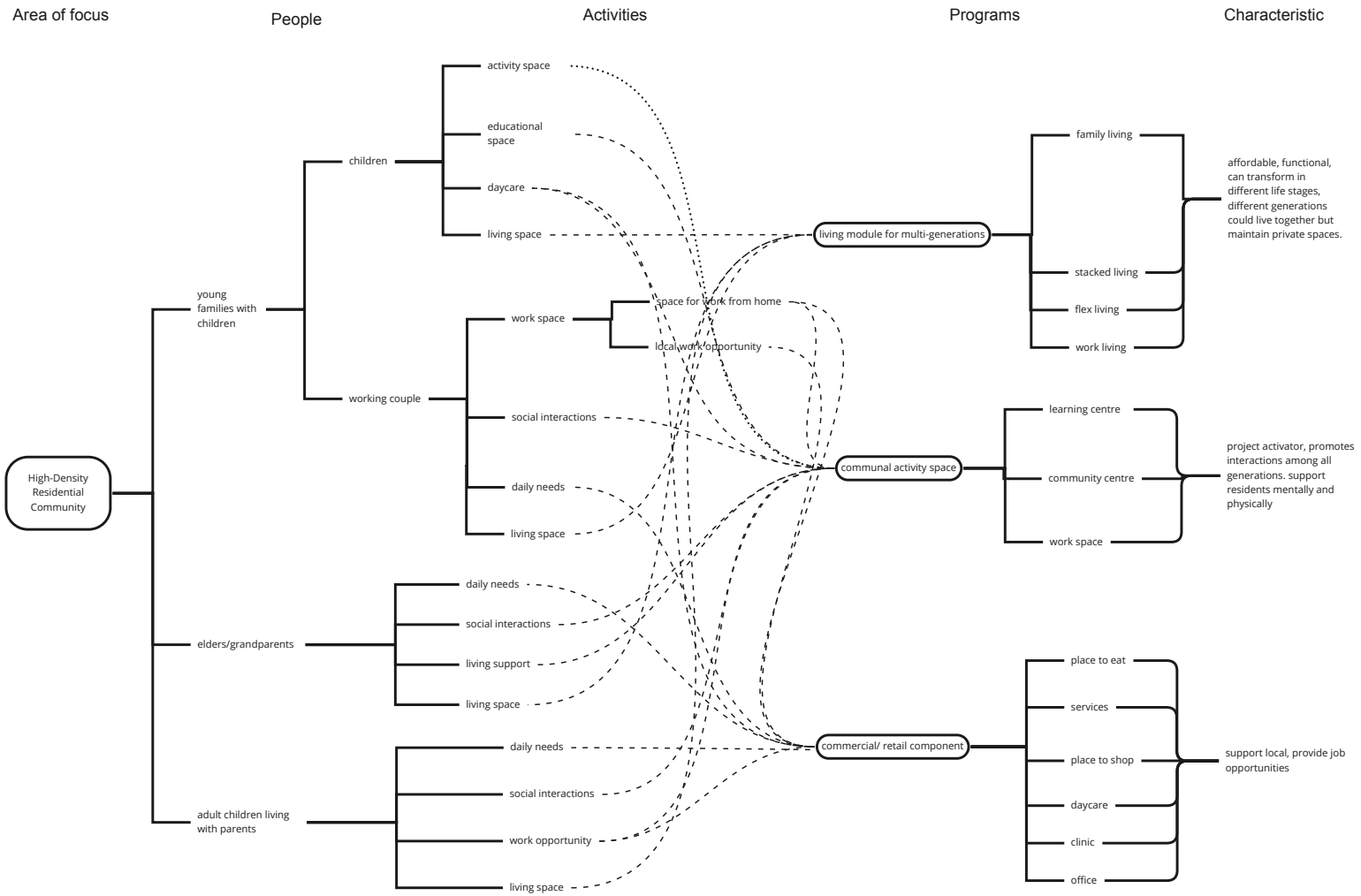
In order to support three different age groups, the proposed project includes three major components to address people's

needs: living component, communal activity component and commercial activity component.

The project aims to design modular residential units that are adaptable and transformable to accommodate each life stage. Working with the idea of multi-generational living, it seeks to create spaces that are functional for each generation.

Different levels of communal activity space serve as the activator for the project. Unlike traditional multi-generational living, the main idea for the proposed project is to create spaces that could encourage interactions between generations. Thus, individuals from different generations could benefit from each other both mentally and physically.

The commercial and retail activity component is proposed to support the community, as well as to provide job opportunities locally. The idea behind it is to promote sustainable projects for people to live locally, work locally, and spend time locally.



Relationship between people and programs.

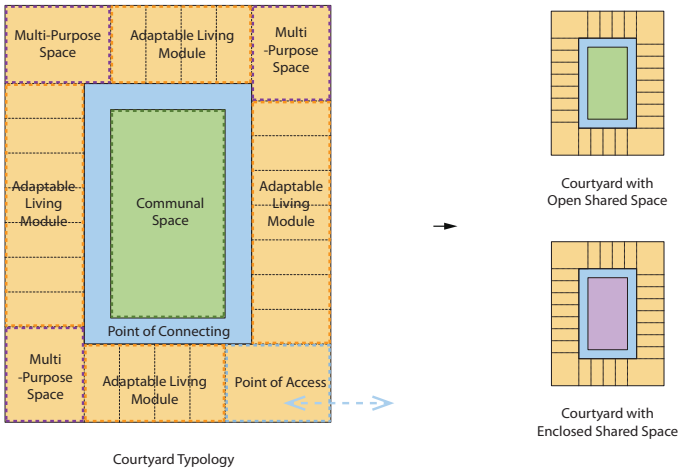
6.2 Design Principle

6.2.1 Design Strategy

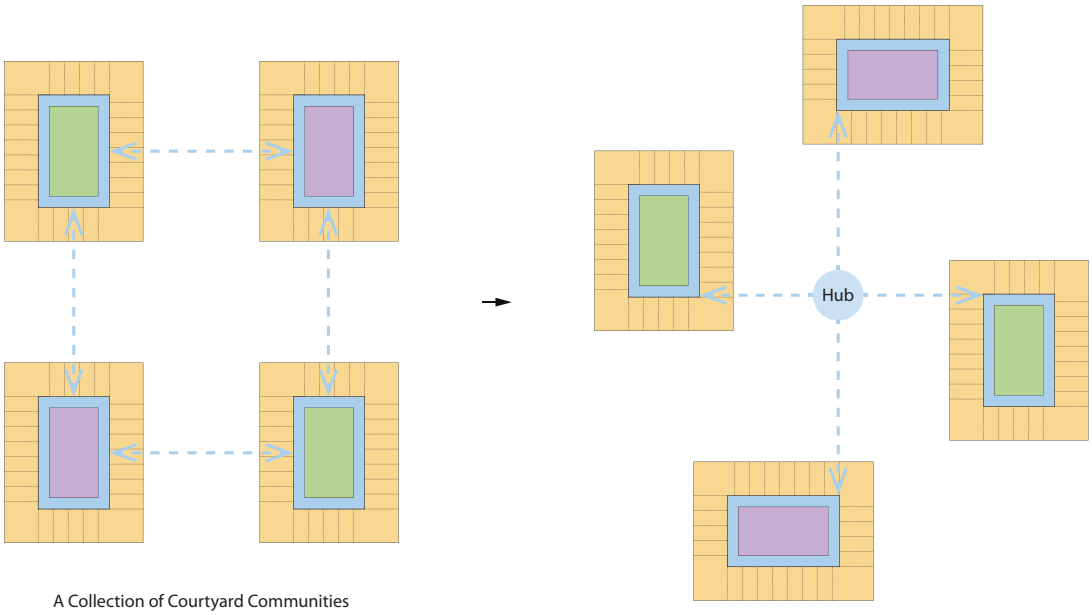
The proposed project will study the nature of courtyard living, and incorporate its essence into high-density living. It will also be using courtyard typology as a tool to accommodate different living styles, and to achieve useable landscape spaces.

The project will also analyze the key functions of dwelling unit, and develop modules that are adaptable and transformable to serve multi-generational living in each life stage. The study will focus on creating family living space as well as individual living space. At the same time, the project will explore more opportunities to provide better options economically.

In addition, the project will challenge the traditional podium-tower high-density residential building typology, and explore a new method of place-making. The primary idea is to create spaces that are meaningful to the neighbourhood, and that emphasizes multi-generational communal living (the activator) to establish a sustainable community.

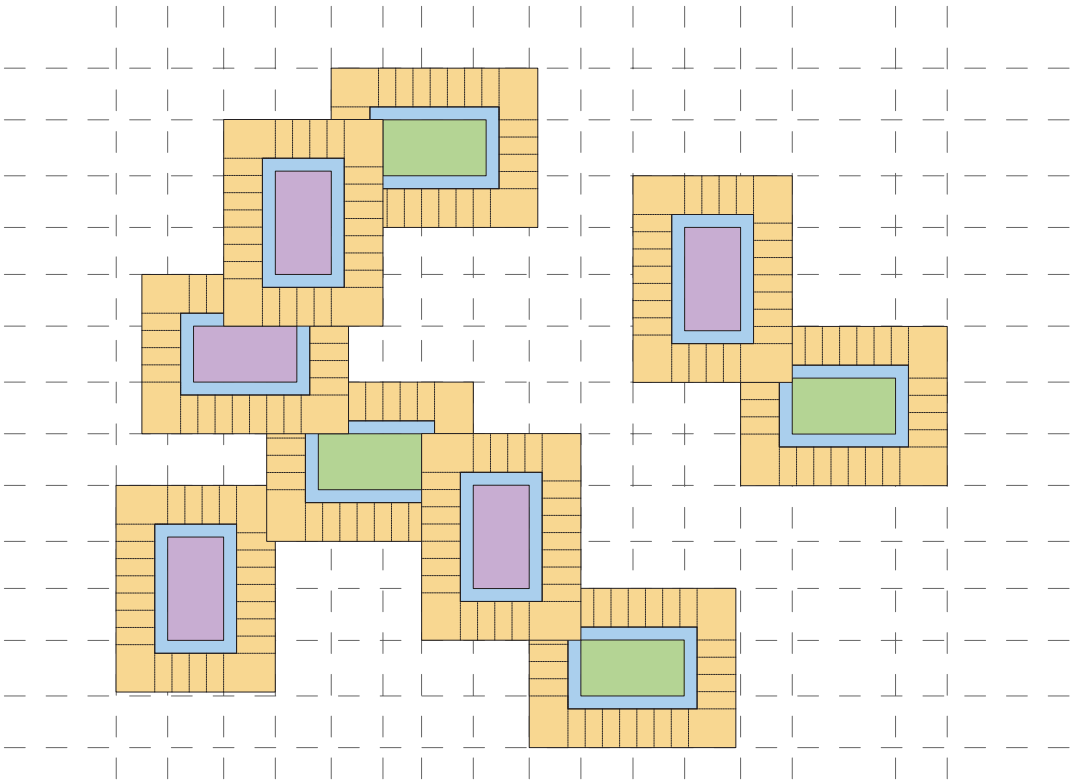


The basic principles of Courtyard community typology, and samples of variations.



A Collection of Courtyard Communities

Place Courtyard Communities Strategically



Piled-up the Collection of Courtyard Communities
to Form Sustainable Neighbourhood

The process of forming a collection of courtyard communities, to form a sustainable neighbourhood.

6.2.2 Living in Different Scales

6.2.2.1 The Community - Courtyard

Similar to the traditional courtyard typology, units are arranged around the centre open space to form a community. The individual unit serves as the private portion to support people's daily living. The communal space in the courtyard serves as the activator to promote people's social activities. The number of families living in a courtyard community is limited, making it easier for people to build a sense of belonging. As a result, communal space in a smaller community scale would be more meaningful compared to traditional amenities space.

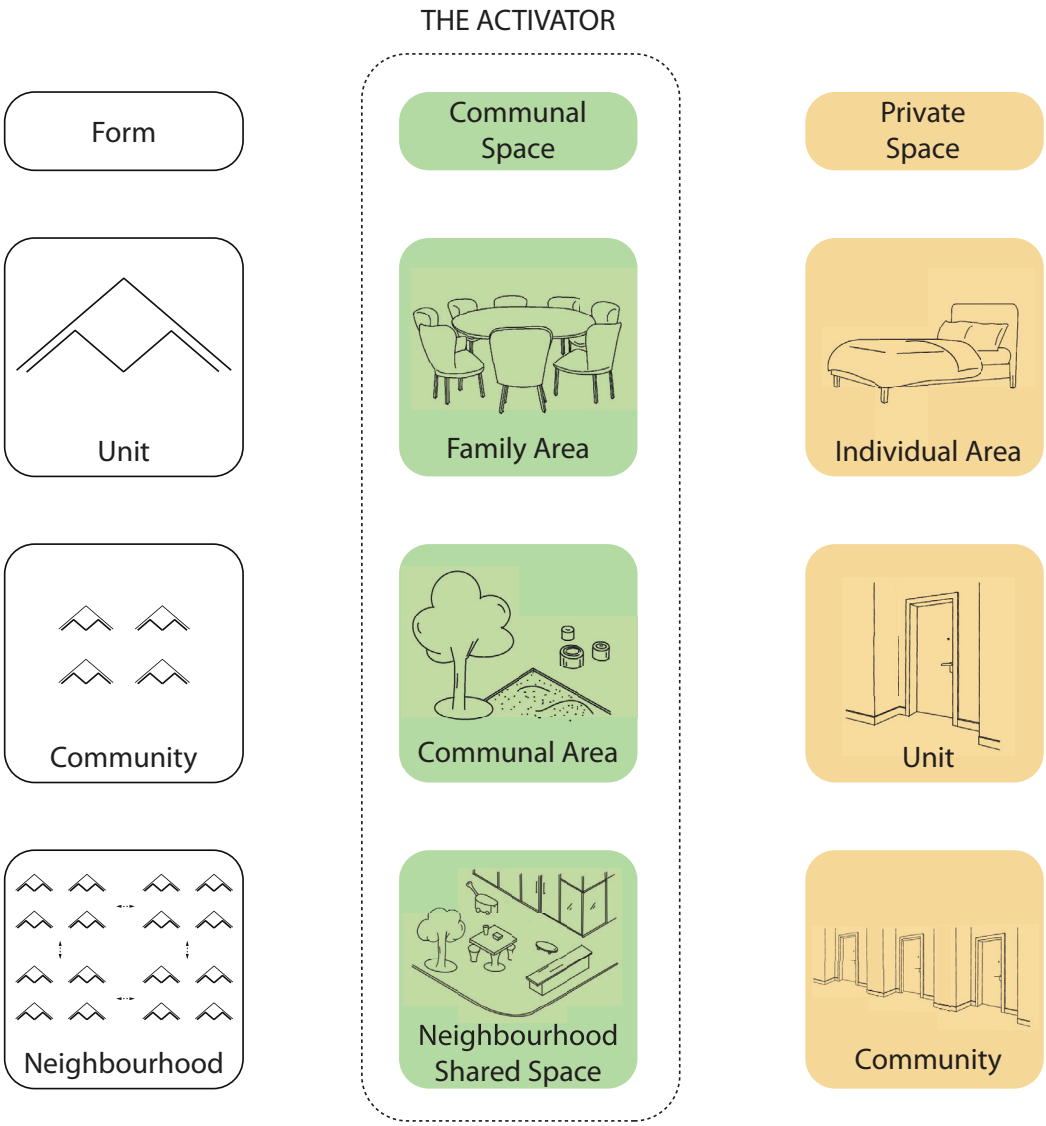
6.2.2.2 The Unit

A group of nested units are transformed into a larger dwelling that could be adaptable for multi-generation families. The nested unit is the base module that could be combined into a larger unit, or separated from the larger unit to function as an individual component. Over time, as a multi-generation family evolves, the combination of nested units could also evolve to provide different living arrangements to satisfy different needs. The individual nested unit provides the opportunity to allow each generation to live independently. At the same time, the larger dwelling provides communal family / group area to encourage bonding and communication between the generations.

6.2.2.3 The Collection of Communities

While some of the courtyards could serve as residential communities, the rest of the courtyard modules could function as communal activity spaces or commercial and

retail spaces. By connecting each courtyard community, a collection of communities can be formed, creating the neighbourhood. Unlike traditional developments, the idea of the proposal is to use the arrangement of courtyards to connect to the public realm and to respond to the site. Furthermore, it aims to provide usable spaces for each generation, and to situate the inhabitants in a larger neighbourhood scale.

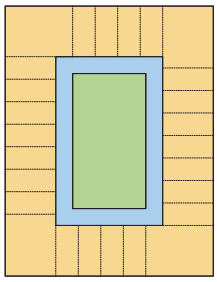


Multi-generational living in different scales.

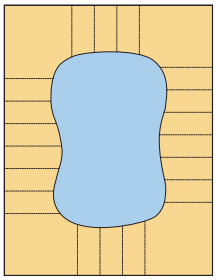
6.3 Performance Criteria

6.3.1 The Courtyard

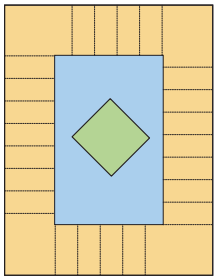
The essence of courtyard living is to have dwelling units situate around the shared courtyard space, and this set up and this arrangement serves as the foundation of the courtyard typology. The idea is to create usable and meaningful shared spaces within a smaller community. Depending on the scale and characteristic of the proposed project, the form of courtyard should be adaptable to meet the need. Not only the internal courtyard space could have variations, the overall courtyard module could be shaped differently as well.



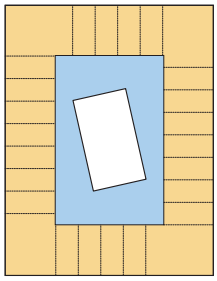
Courtyard with Open Shared Space



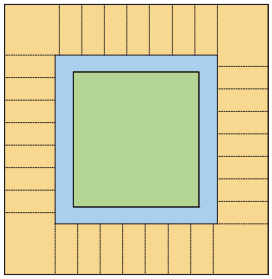
Courtyard with Enclosed Shared Space



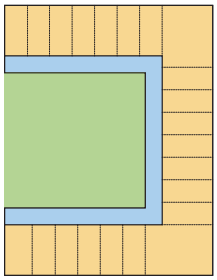
Courtyard Variation with Open Shared Space



Open to Below



Courtyard in Different Size



Courtyard Variation with Opening on Side

Examples of courtyard variations to meet different project's requirements.

Compared to the traditional tower and podium residential development, the courtyard strategy is meant to create additional communal or individual habitable spaces outside of the dwelling units. Spaces such as corridor and elevator lobby are enlarged to contain casual gathering activities.

Available Communal Gathering Spaces		
	Traditional Tower and Podium Residential Development	Courtyard Typology
At Grade / Rooftop Outdoor Spaces	Yes	Yes
Courtyard Space	N/A	Yes
Indoor Communal Spaces	Yes	Yes
Corridor Space	N/A	Yes
Elevator Lobby Space	N/A	Yes

Available communal gathering spaces comparison between traditional tower and podium residential development and courtyard community development.

6.3.2 The Unit

In order to form a healthy and sustainable community, dwelling units in courtyard community developments should be adaptable to accommodate different living styles. Unlike traditional tower units where typical suites are stacked to achieve high density. The living habits of the family and individual should draw more attention in the design process. In addition, units should be transformable to serve people in different generations, and allow them to live together while maintaining individual identity.

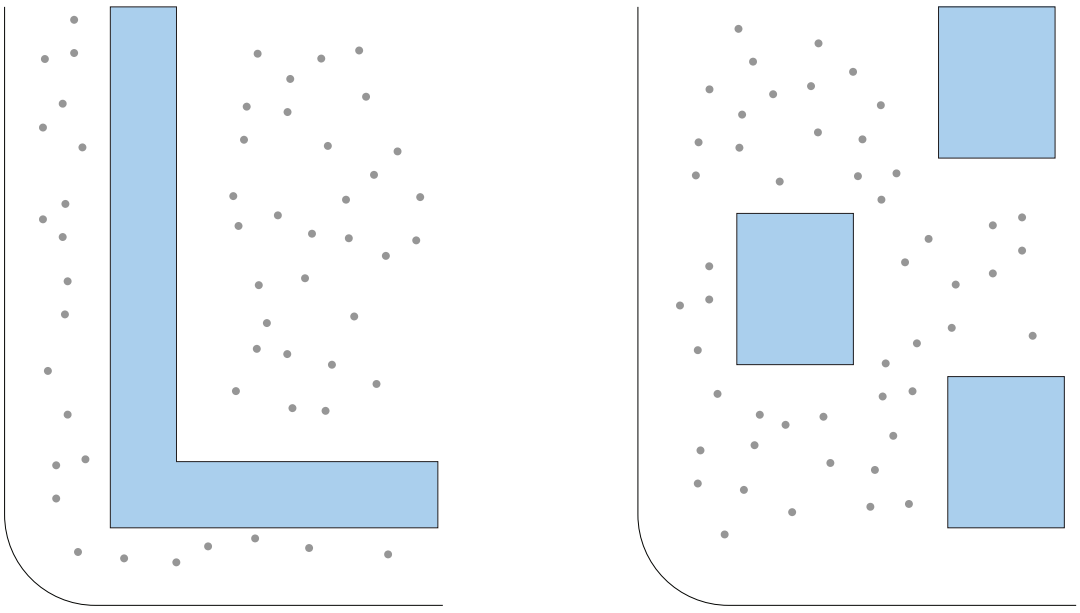
6.3.3 Courtyard Organization

Depending on the scale of the project, courtyard modules could be organized in clusters or piled-up to form a collection of communities, which could potentially become a neighbourhood. Rather than dropping towers on site, it is important to create different levels of habitable spaces within communities. The circulation system becomes the main spine that threads through each courtyard community and connects them together. Multiple pathways could be

created to travel from A to B to enrich social interaction. In order to form a self-sustaining neighbourhood, non-residential courtyards should be included for office, retail, community and commercial uses.

6.3.4 Connection to Public Realm

Currently, the most common pedestrian friendly at grade strategy is to form a low-rise to mid-rise streetwall with either residential or commercial uses. However, it is challenging to build a sense of belonging for people on the outside. The proposed strategy is to respond to site by creating welcoming and functional spaces to allow different types of activities to happen. To draw people from surrounding neighbourhoods, and potentially bring people from at grade level to elevated communities.



Rethinking existing at grade strategy and responding to site with place making.

Chapter 7: Proposed Project

This chapter will outline the proposed project located in Scarborough, Ontario, and demonstrate how the idea of multi-generational living could be tested architecturally. It will apply design methods stated in the previous chapter to generate a new high-density housing typology that could accommodate multi-generational living. In addition, this chapter will use the proposed project to discuss how the new form of multi-generational living could fit into current society, and how this form of family living could help to relieve housing economic tension and create a sustainable community as the area transforms into a new urban core.

7.1 Project Overview

7.1.1 Site Organization

The selected site is located at 1225 - 1255 McCowan Road, on the northeast corner of McCowan Road and Ellesmere Road. Based on the site analysis in Chapter 5, a 36-storey mixed-use residential development is proposed, with higher density shifted towards the north of the site close to the newly proposed Scarborough Centre Subway Station. A 45-degree angular plane is projected from the south of Ellesmere Road (the housing neighbourhood) to guide the proposed building height on the south side. The idea is to minimize shadow impact on the housing neighbourhood located south of the site, as well as the adjacent park west of the site. On the ground floor, the project aims to create effective public shared open space to invite people from the surrounding neighbourhood. Services such as access to loading area and access to underground parking is located

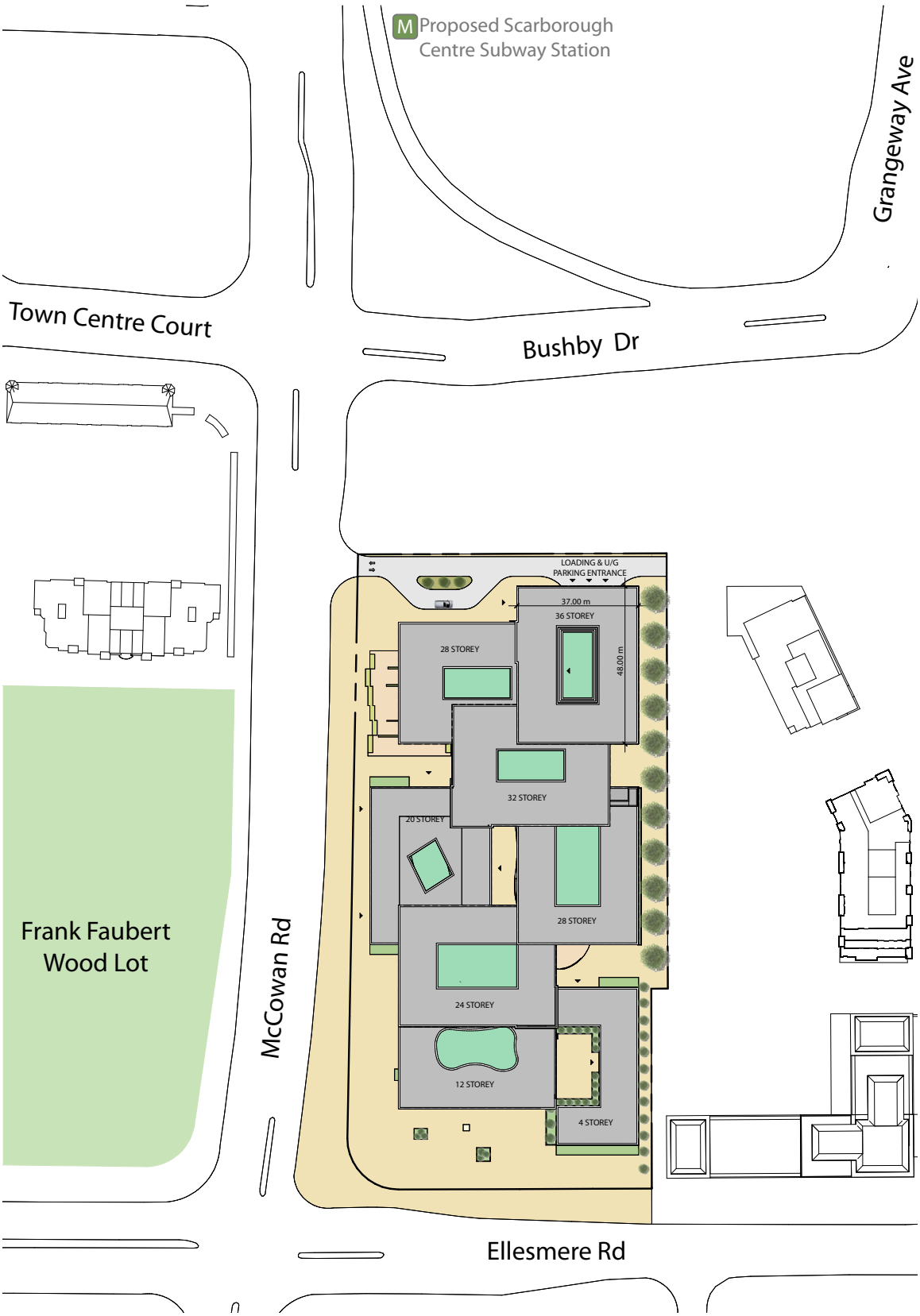
on the north of the site, with existing access on McCowan Road shifted to the north.

7.1.2 Programing

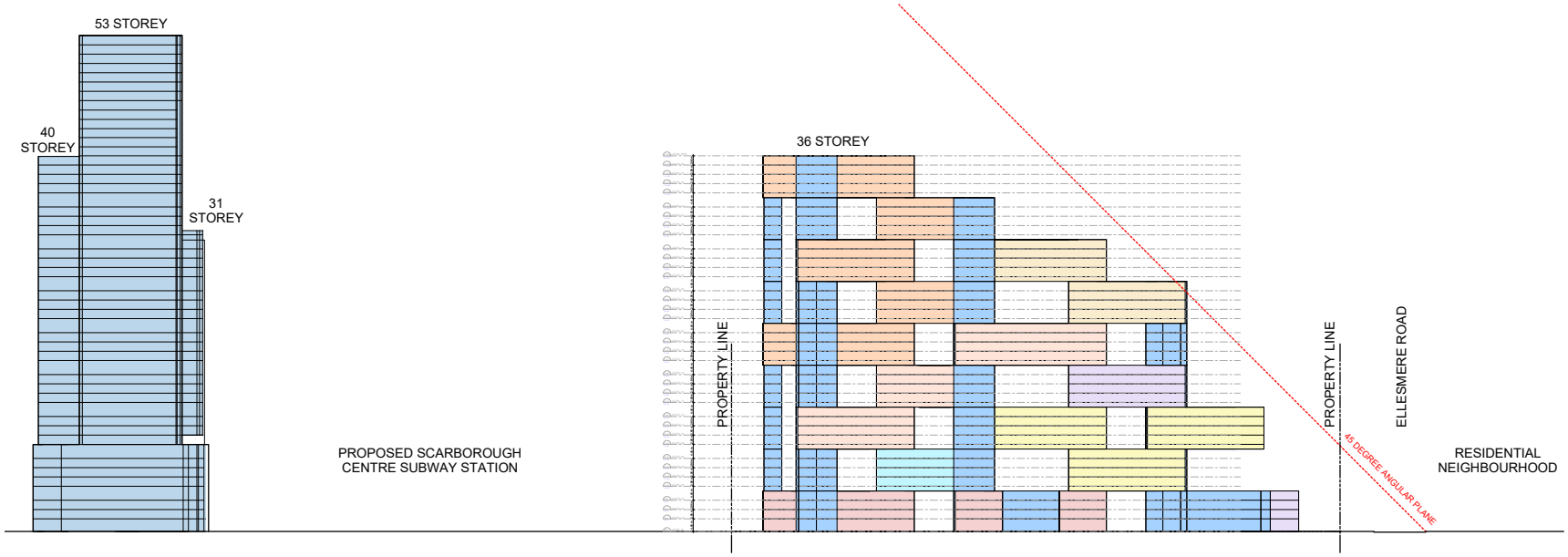
The proposed project consists of three main categories, the residential living component, the commercial activity component, and the communal activity component. For the residential living component, there are four living models to address the different living needs of each generation. It includes the family living model, the stacked living model, the flex living model, and the live-work living model. The commercial activity component includes offices, retail spaces, clinics, and daycare to support the neighbourhood. Lastly, communal activity areas such as learning centre, community centre, and work spaces are provided to promote interactions among all generations. The positive physical and mental support provided to the residents allow the neighbourhood to become sustainable.

7.1.3 Structural Strategy

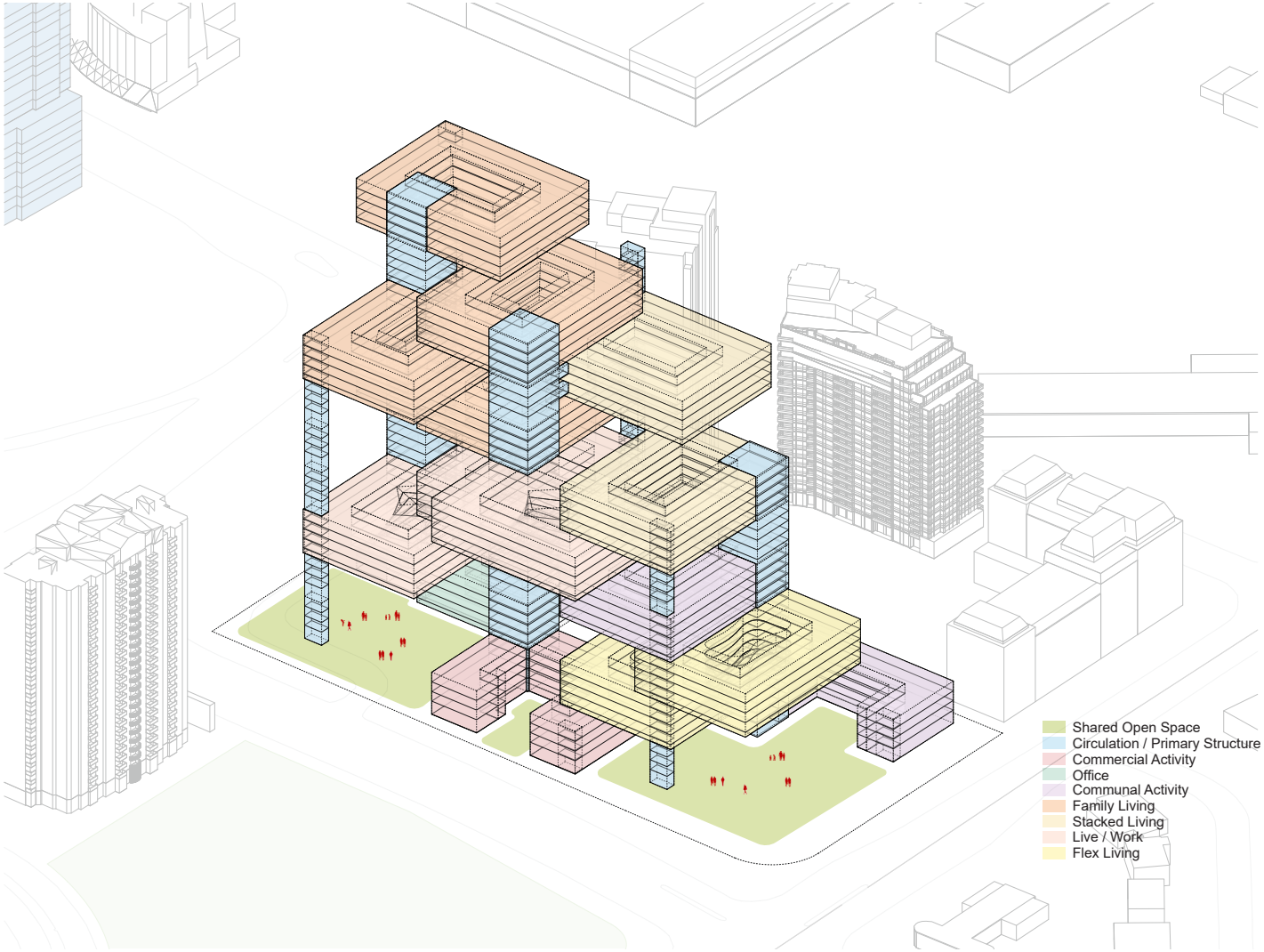
The proposed project is a series of courtyard modules stacked in a grid system. The structure of such kind of built form is challenging in nature. The proposed structural strategy is to have a structural transfer slab at the underside of each courtyard module to accommodate load distribution, and three layers of structural system to support the built form vertically. Vertical circulation system functions as the primary vertical structural component. An external structural screen acts as the secondary structural support. Column system is the tertiary structural element.



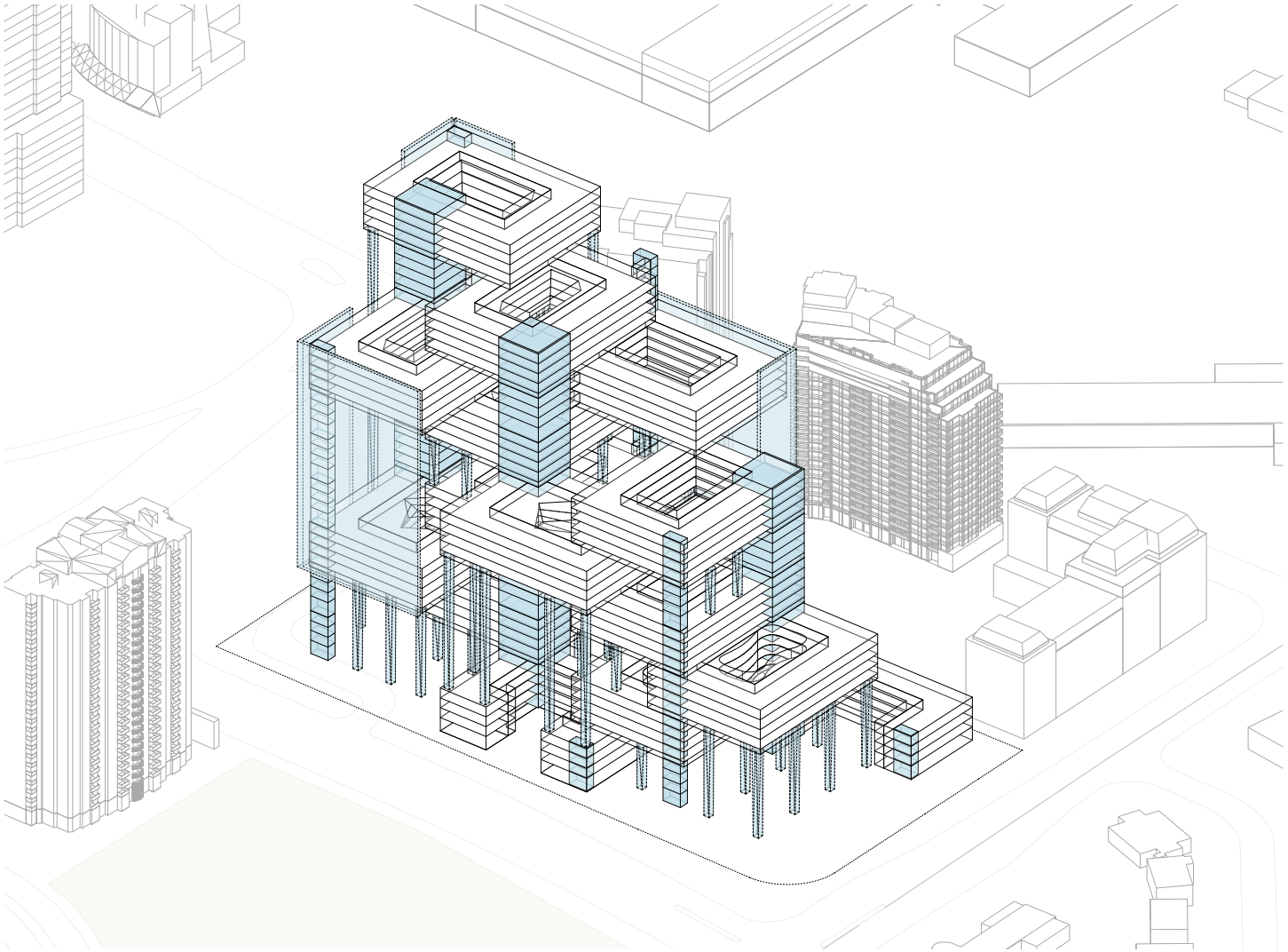
Proposed site plan.



The building height is determined by a 45 degree angular plane from the housing residential neighborhood.



Program organization.



Structural strategy.

The conceptual renderings show the overall appearance of the proposed project.

1.0 LOT AREA

m²	acres
18,149.51	4.48

2.0 PROPOSED GFA

As per City of Toronto Zoning By-law 569-2013,

Gross Floor Area *means the sum of the total area of each floor level of a building, above and below the ground, measured from the exterior of the main wall of each floor level.*

15.5.40.40 Floor Area means

Gross Floor Area Calculations for an Apartment Building

In the Residential Apartment Zone category, the gross floor area of an apartment building is reduced by the area in the building used for:

(A) parking, loading and bicycle parking below established grade;

(B) required loading spaces and required bicycle parking spaces at or above established grade;

(C) storage rooms, washrooms, electrical, utility, mechanical and ventilation rooms in the basement;

(D) shower and change facilities and bicycle maintenance facilities required by this By-law for required bicycle parking spaces; [By-law: 839-2022]

(E) indoor amenity space required by this By-law;

(F) elevator shafts;

(G) garbage shafts;

(H) mechanical penthouse; and

(I) exit stairwells in the building.

15.20.40.50 Decks, Platforms and Amenities

(1) Amenity Space for an Apartment Building

In the RAC zone, an apartment building with 20 or more dwelling units must provide amenity space at a minimum rate of 4.0 square metres for each dwelling unit, of which:

	m²	No. of Courtyard	Total
Family Courtyard	6526.9	5	32634.5
Total GFA			32634.5

	m²	No. of Courtyard	Total
Stacked Courtyard	6045	2	12090
Total GFA			12090

	m²	No. of Courtyard	Total
Flex Courtyard	6162.333	3	18487
Total GFA			18487

	m²	No. of Courtyard	Total
Live-work Court yard	6704.517	3	20113.55
Total GFA			20113.55

	m²	No. of Courtyard	Total
Communal Space A	4005	1	4005
Communal Space B	5733	1	5733
Deduction	1216		1216
Total GFA			8522

	m²	No. of Courtyard	Total
Commercial Space A	4869	1	4869
Commercial Space B	3573.75	1	3573.75
Office	6409	1	6409
Total GFA			14851.75

	m²	No. of Levels	Total
U/G	50	2	100
Total GFA			100

2.1 Total Proposed GFA

m²
106798.8

Project statistic part one.

3.0	DENSITY - FSI		
	Proposed Density	(Proposed GFA/Gross Site Area)	5.88

4.0	Unit Count	No. of Unit
	Family Living	280
	Stacked Living	64
	Flex Living	192
	Live-work Living	72
		608

5.0	Plate Efficiency		
	Plate efficiency is total unit salable area / GFA.		
	Total habitable area is total unit salable + total communal space		
		Living Area Efficiency	Total Habitable Efficiency
	Family Living	56%	100%
	Stacked Living	57%	100%
	Flex Living	49%	100%
	Live-work Living	52%	100%
	Traditional Living Tower (750 m² plate)	± 92%	
	Traditional Living Podium	± 85%	

Project statistic part two.

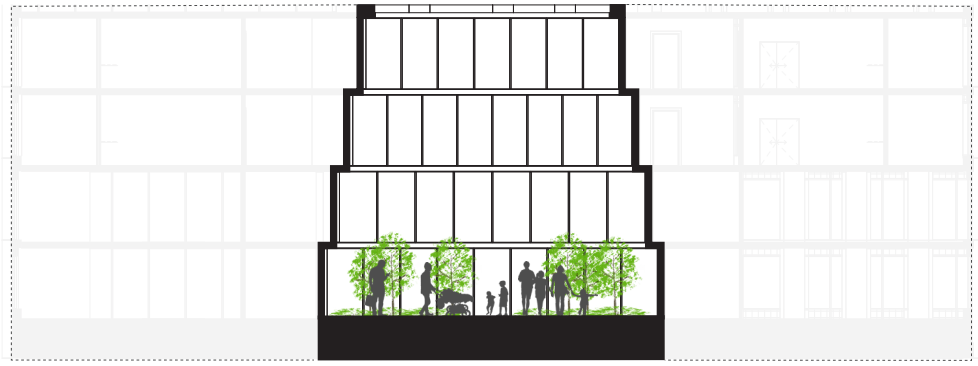
7.2 The Community - Courtyard

7.2.1 Courtyard Typology

The courtyard module is an open or enclosed shared courtyard space surrounded by 4 storey living units. The quality of the courtyard spaces can adapt to different styles of living. Unlike the traditional double loaded residential development, the courtyard typology forms a micro-climate within the built form. This allows the shared space to be protected from wind, and the multi-use corridor area to receive increased natural sunlight. Social interaction and visual connection among residents could be encouraged within the courtyard community.

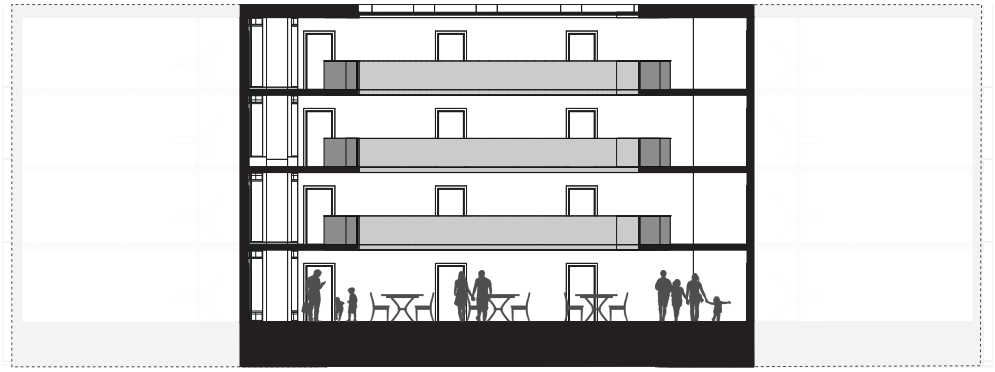
The idea is to use the courtyard module as a tool to create useable landscapes that are meaningful for individuals. Instead of designing the courtyards with identical landscapes, the goal of the courtyard space is to provide a place for people to gather, and to allow each courtyard to transform to respond to people's needs. In Jane Jacobs' opinion, parks

are meaningless without people using it (Jacobs 1993, 124). Therefore, the courtyard space becomes a meaningful communal space when residents find a sense of belonging.

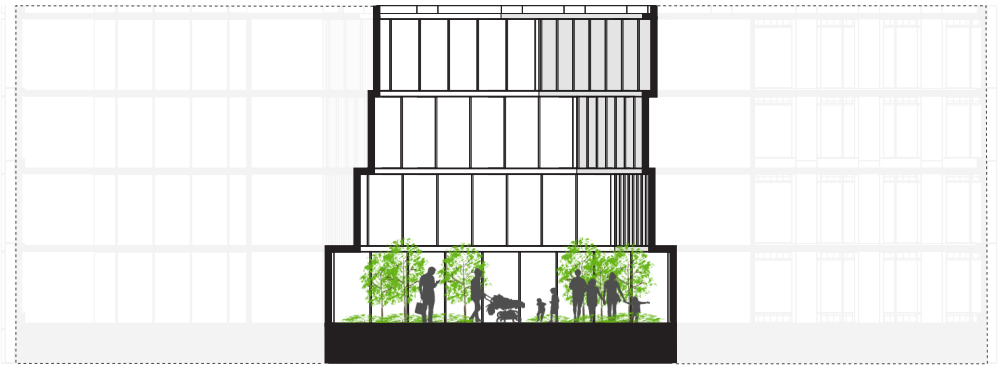


The family living courtyard creates a space that is suitable for multi-generational family living.

The stacked living courtyard creates a space that is suitable for traditional townhouse-like family living, with views of the courtyard from private balconies.



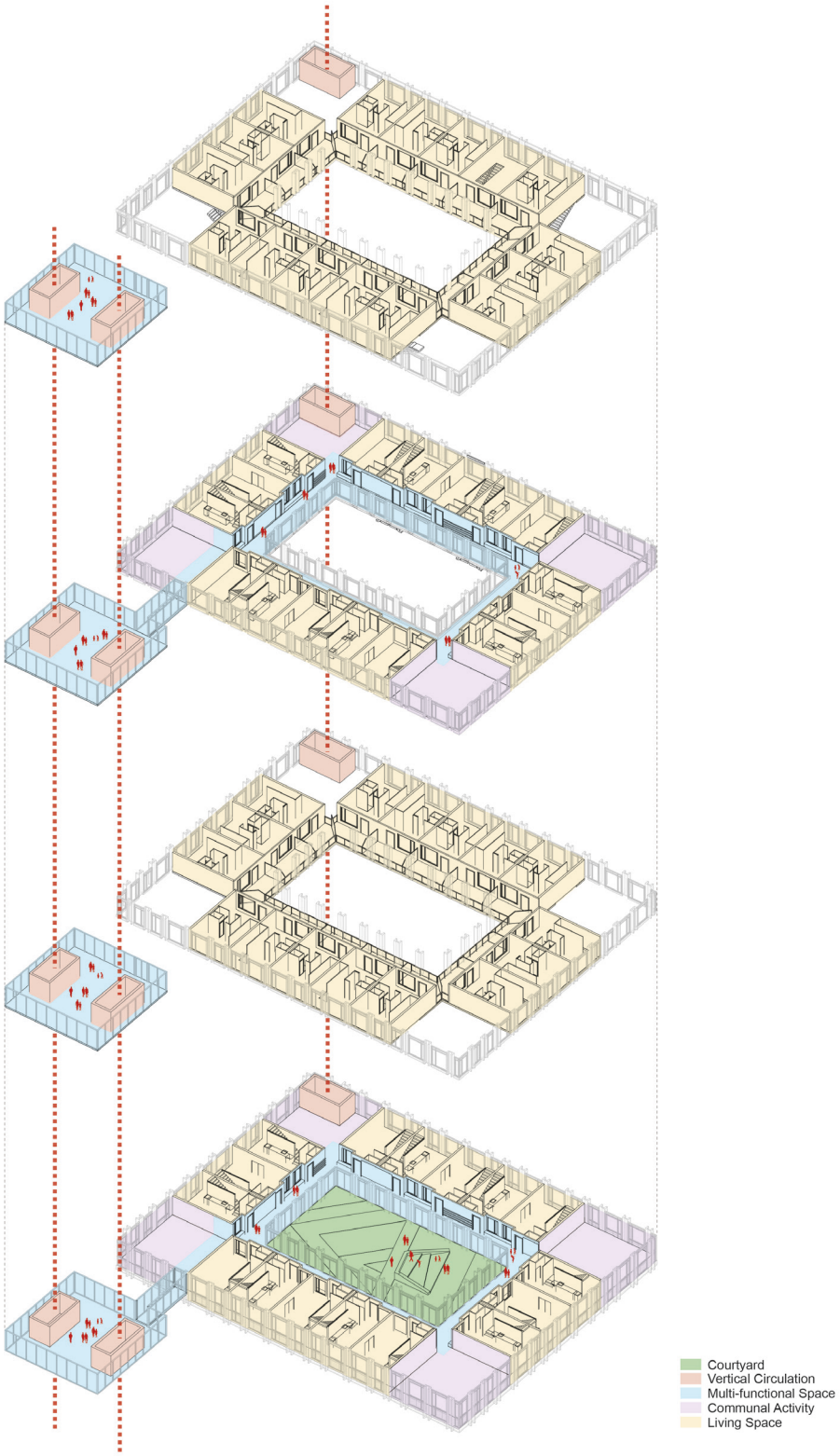
The flex living courtyard creates an enclosed dining and activity space that is suitable for elder generation and adult children generation.



The live-work living courtyard creates a space that is dynamic in form and is suitable for both living and working needs.

7.2.2 Courtyard Spatial Organization

Each courtyard space is surrounded by 4 storey living modules that are either single storey dwelling units or 2 storey stacked units. Depending on the unit type, each courtyard community contains about 32 to 64 dwelling units. Multi-purpose spaces are located at the four corners. These areas could be transformed into different spaces such as children's play room, elders activity room, family theater, and office pods for people who work from home. Instead of fixed programing for every space, the communal spaces are provided with flexibility, which allows the program to evolve with residents' inhabitation. An inhabitable corridor space is designed to connect dwelling units and courtyard spaces. The traditional elevator lobby space is enlarged to contain casual communications while people get in and out of the courtyard. All levels are connected by 2 staircases and 1 set of elevators. These vertical circulation elements also connect to adjacent courtyard communities.



Courtyard spatial organization.

7.2.3 Courtyard Inhabitation

In the courtyard community, dwelling units are private, the courtyard is the shared communal activity space, and the inhabitable corridor serves as the in-between space that connects the public space and private space. The courtyard is the hearth in the courtyard typology, it is the activator that triggers the main community life. The idea of hearth symbolized human settlement, and is the sacred focus within a community. In addition, it is the moral element of architecture (Semper 1851, 102). Rather than focusing mainly on the aesthetics of landscaping, the proposal emphasizes on creating people-oriented spaces of varying scales and forms to allow different kinds of activities.

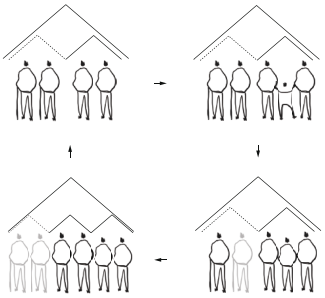
Unlike the traditional corridor and elevator lobby, where they only serve as traffic zones, these spaces can be reimagined as multi-functional areas. Sitting areas are provided in front of each unit for short-term gathering, mini shelving units are installed between units as community library for book exchange, and drawing boards are used to substitute regular wall paint to encourage families and kids to express themselves. The front of the dwelling units could act like the front yard in a traditional housing neighbourhood, when the weather does not allow for outdoor activities, people could spend time in front of their dwelling units just like the front yard in a traditional housing neighbourhood. Thus, social life can be extended from the courtyard to unit frontage.

View of courtyard from stacked living private balcony.

The inhabitation of multi-functional corridor space.

Courtyard section, the inhabitation of units, corridor space and courtyard.

7.3 The Unit



Adaptable multi-generational living.

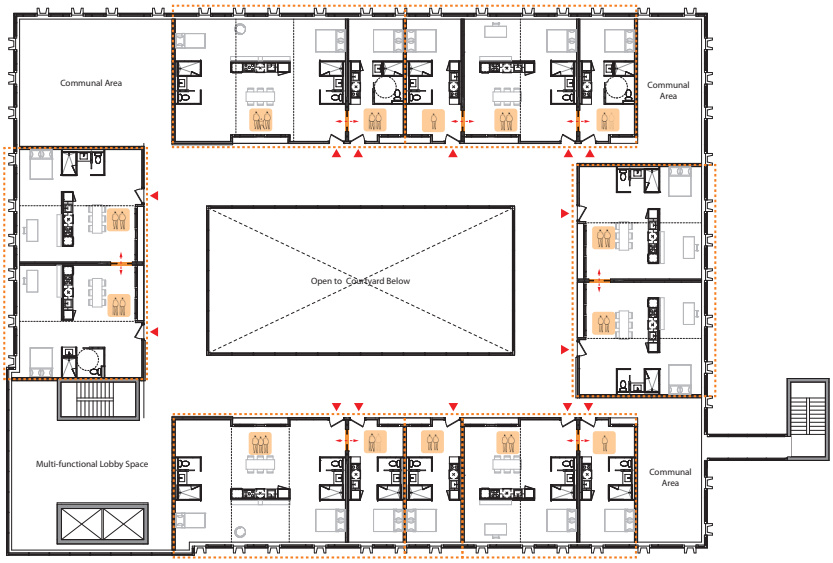
Four different dwelling types are used to explore how the high density courtyard typology could adapt and transform to accommodate each age group in multi-generational living. The general courtyard concept is applied to all four dwelling types, but each type targets different groups of people with different lifestyles.

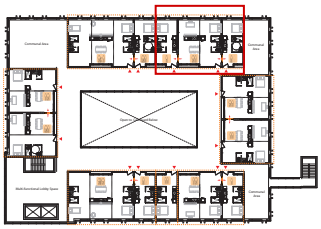
7.3.1 The Family Living Model

The family dwelling type is located in the top levels of the building, and has less public access compared to flex dwelling and live-work dwelling types. The design of the nested unit modules aims to accommodate living activities and daily needs. As the family structure fluctuates, the nested units could be combined or separated to form a dwelling unit that suits the unique needs of the household.

In this type of dwelling, each generation could share the family area, which includes kitchen and dining space. The family area serves as the hearth of the unit, where family members could share stories, exchange ideas, and carry out any family activities.

The main unit and the nested unit are connected by an internal door, and each has an individual unit entry door from the corridor space. As a result, each generation has the opportunity to join the main household or to live independently. It is important for each generation to have their own space, as spending time alone could help individuals restore physical and mental wellbeing (Alexander, Ishikawa, and Silverstein 1977, 671). In order to be financially flexible, the nested unit could be rented out as well.



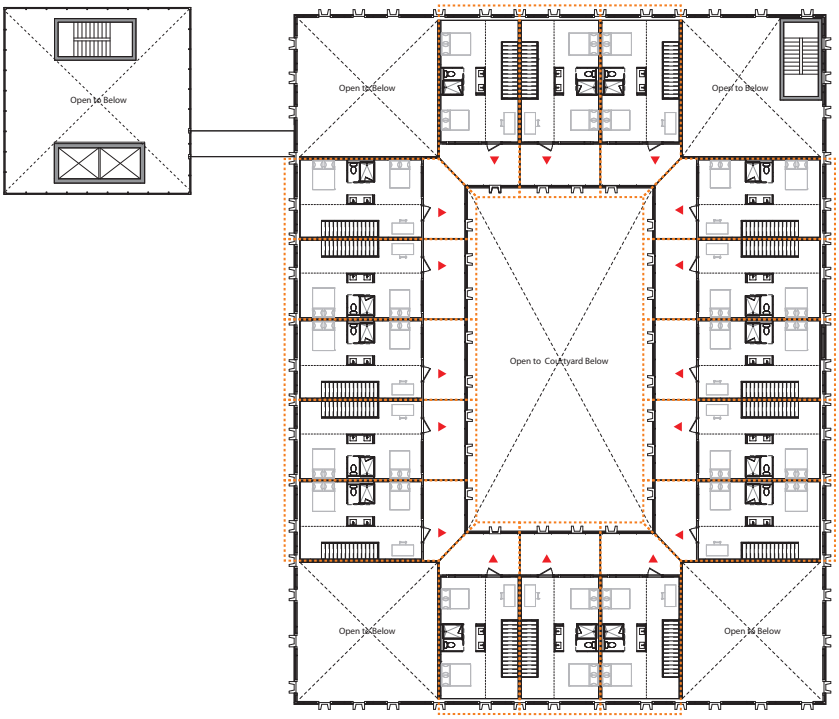


The family living courtyard dwelling with different household structures.

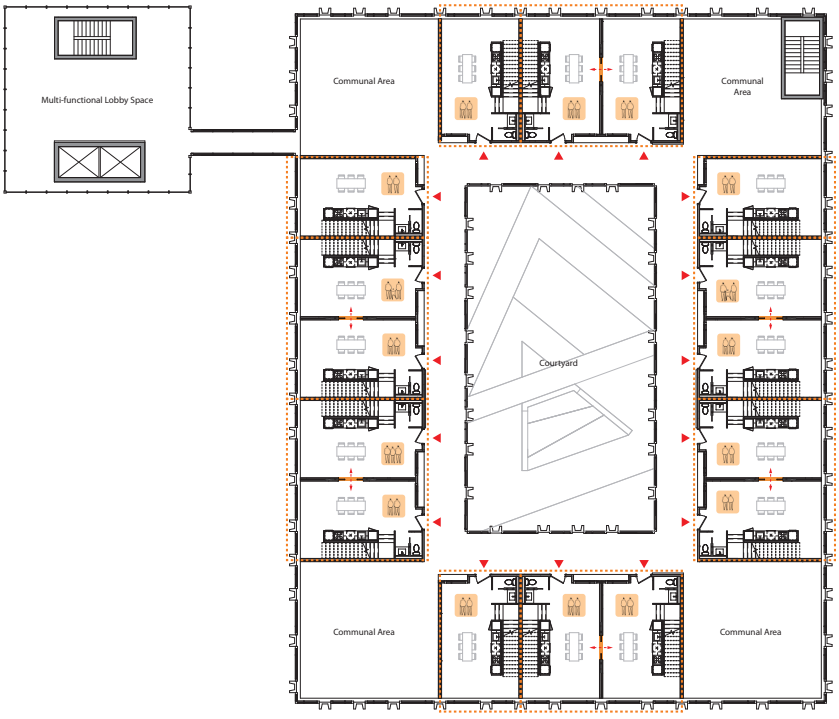
7.3.2 The Stacked Living Model

The stacked dwelling type is situated in the middle portion of the building. Similar to the family dwelling type, it has less public access compared to flex dwelling and live-work dwelling types. The stacked dwelling type demonstrates that traditional townhouse living could be achieved with the high density courtyard typology.

On the lower level, the unit opens to a multi-functional corridor space, which could be thought of as the front yard. The kitchen and family areas are also located on the lower level, and could become a point of connection with adjacent units internally. This allows the older generation and younger generation to share the family activity space if desired. Bedrooms and office spaces are located on the second floor with a private balcony, which could be thought of as the back yard, opening to the courtyard space.

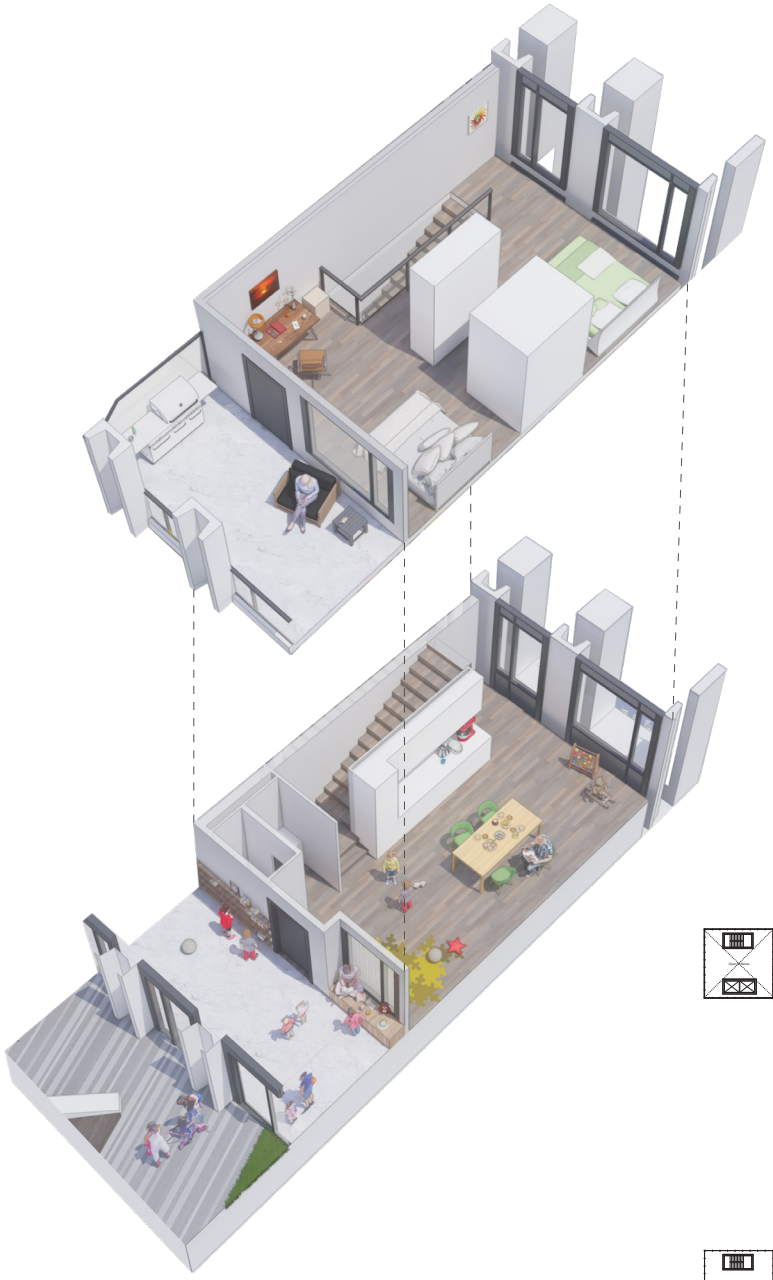


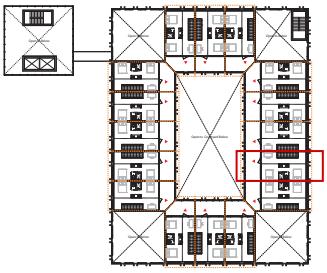
Upper Level



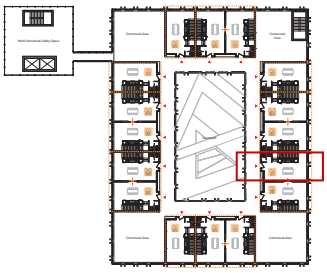
Lower Level

The stacked living model.





Upper Level



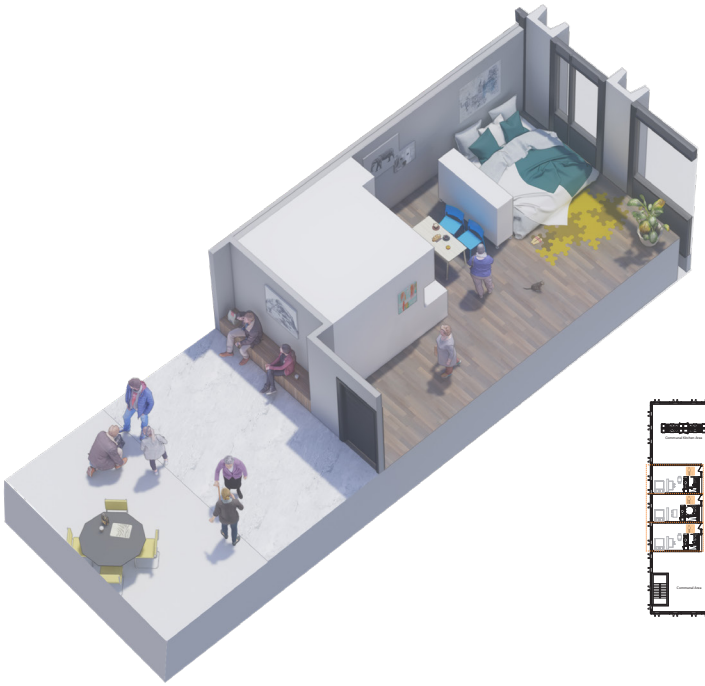
Lower Level

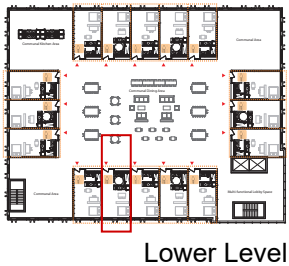
The stacked living model unit.

7.3.3 The Flex Living Model

The flex dwelling type consists of smaller individual units designed for younger generations and elder generations. Residents have the option to cook for themselves at home, or participate in communal living. There is a communal kitchen and shared dining area located on the lower level of the enclosed courtyard.

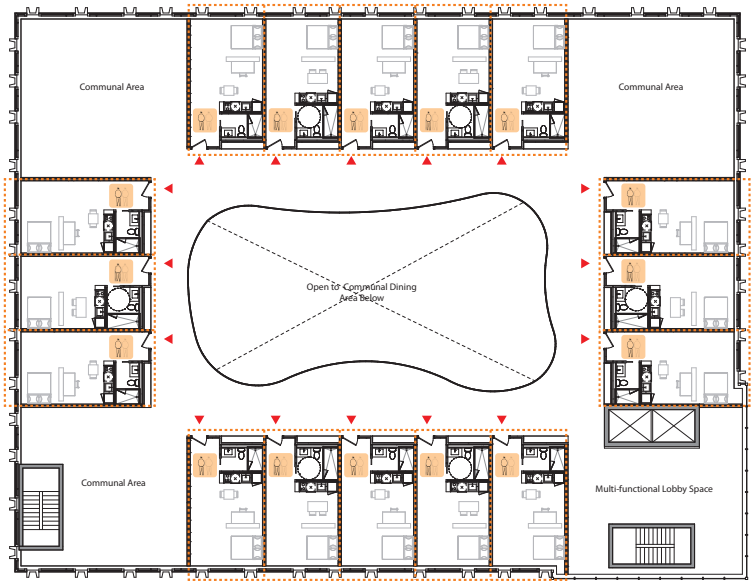
This type of dwelling emphasizes on encouraging communication among the older and younger generations. Financially, individuals could provide community services to offset living expenses. Unlike traditional nursery homes, the living environment is more dynamic and there is more positive mental support for the elders. Concurrently, younger generations could gain experiences from the elder generations. The flex living courtyards are located close to the communal activity courtyards to expand communal living.





Lower Level

The flex living model unit.



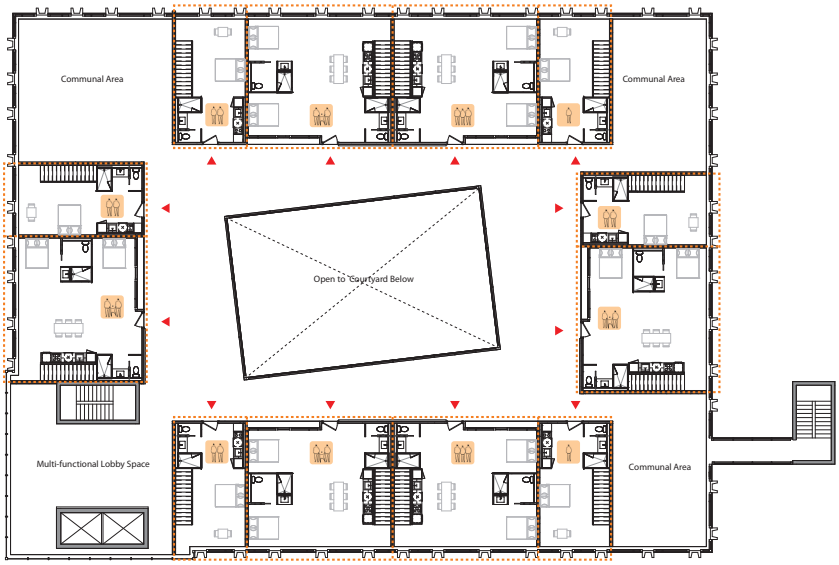
Upper Level

Lower Level

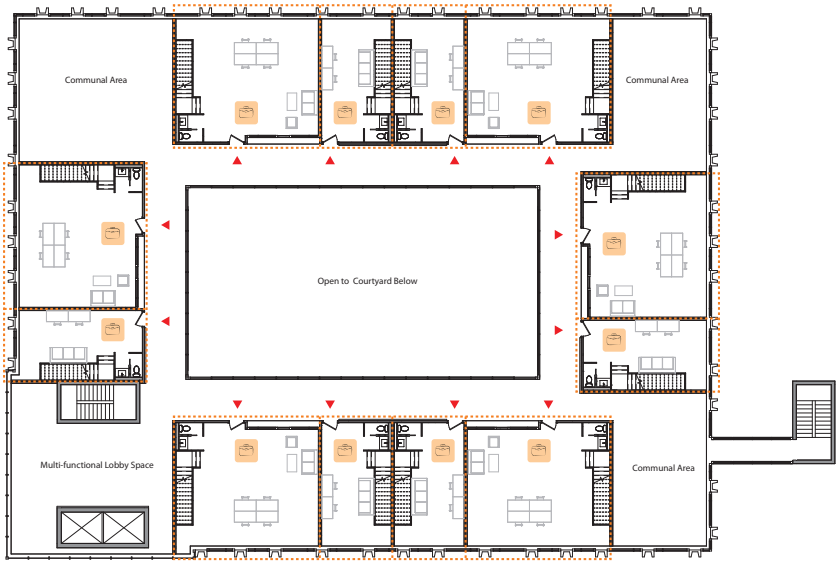
The flex living model.

7.3.4 The Live-Work Living Model

Due to the effects of the Covid pandemic and the economic climate, many people have shifted from working in the office to working from home. Home offices have largely become an essential part of the home, and having the ability to separate the working environment from the living environment has become demanding. The live-work living model is located at the lower levels of the building, with easy access to offices and commercial components. The unit contains two levels, with living and working each occupying one storey. The layout provides the effective separation needed between the two activities. A larger multi-functional corridor space could be used as an extension of either live or work environments.

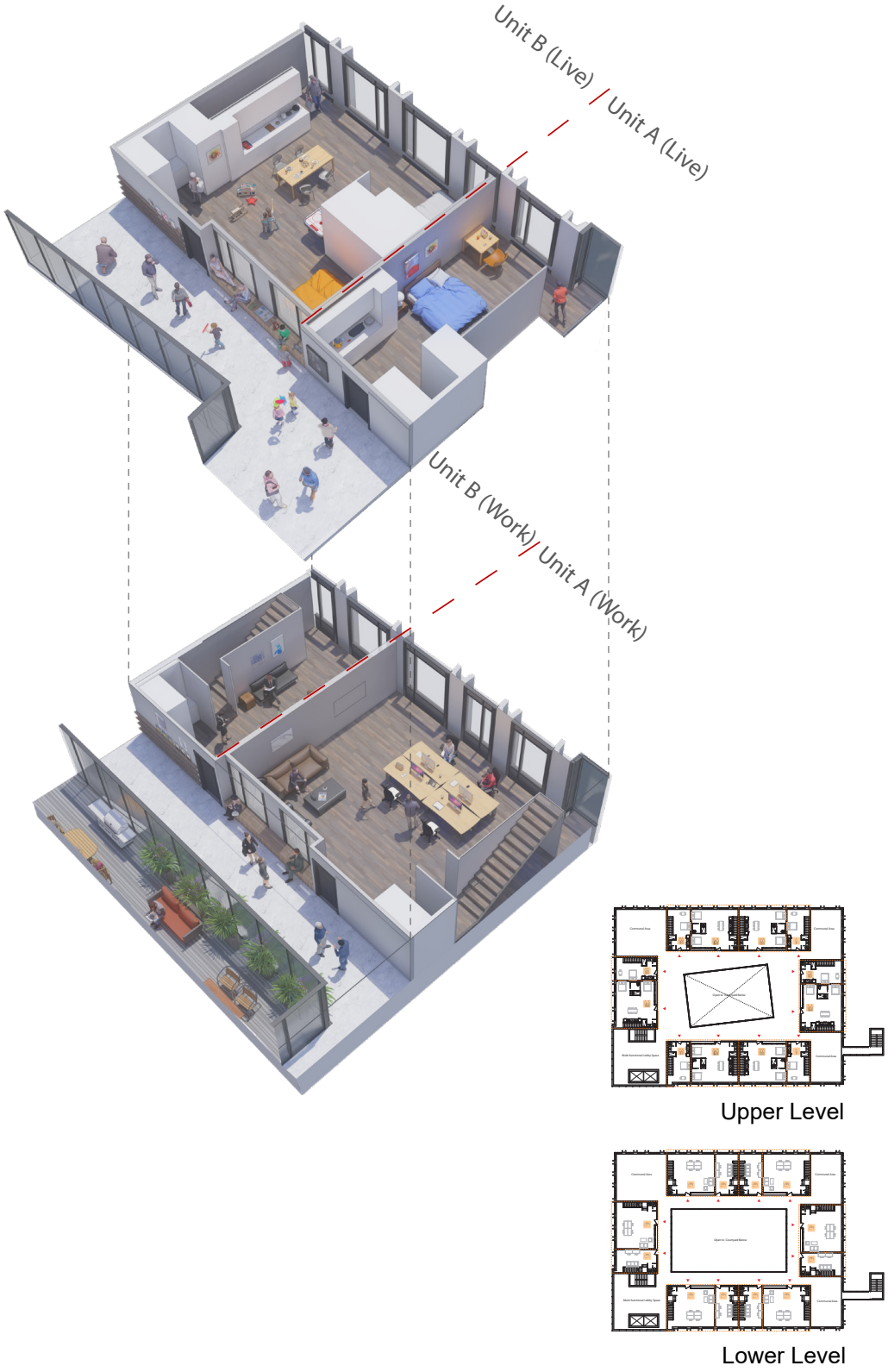


Upper Level



Lower Level

The live-work living model.



The live-work living model unit.

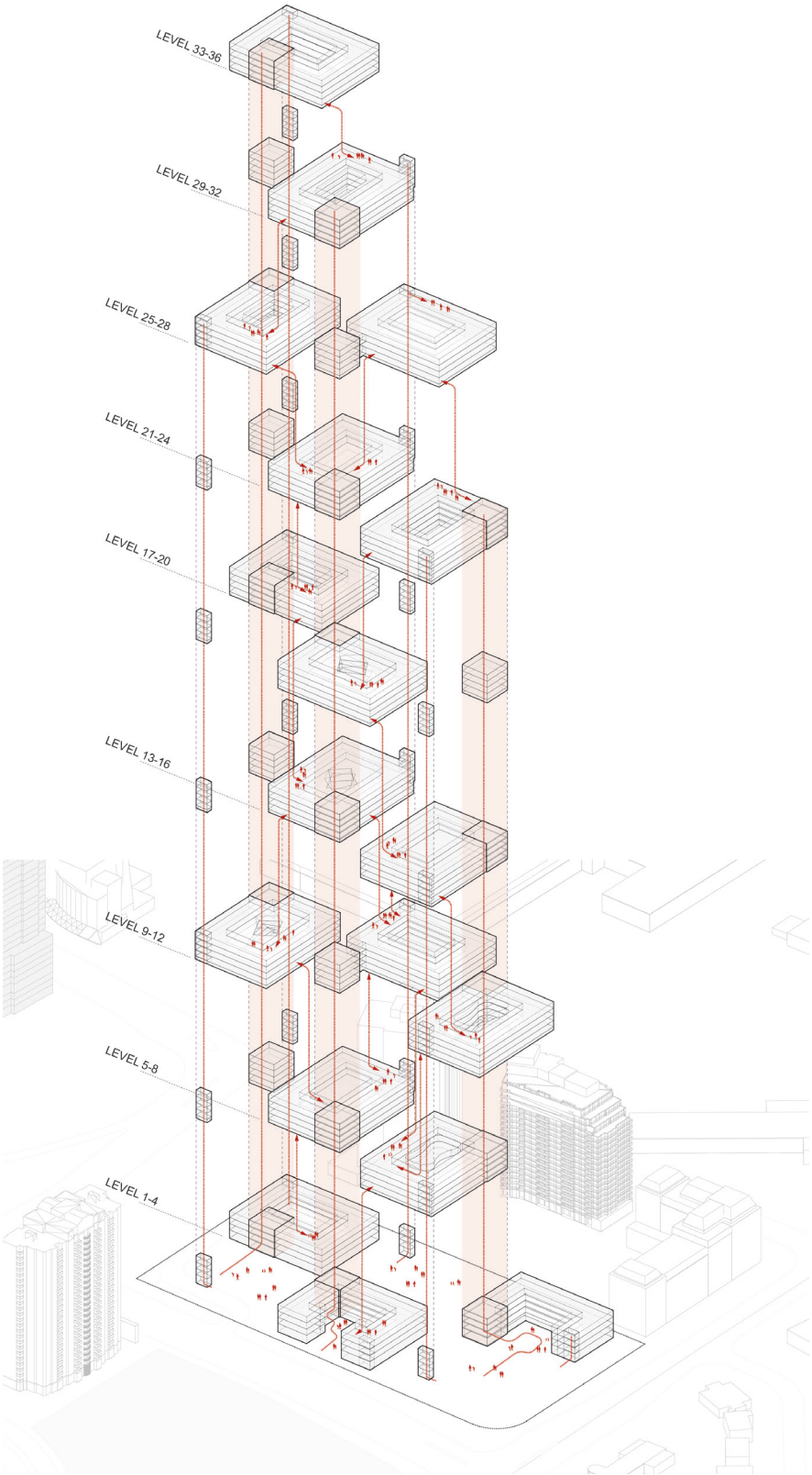
7.4 The Collection of Communities

7.4.1 Community Connections

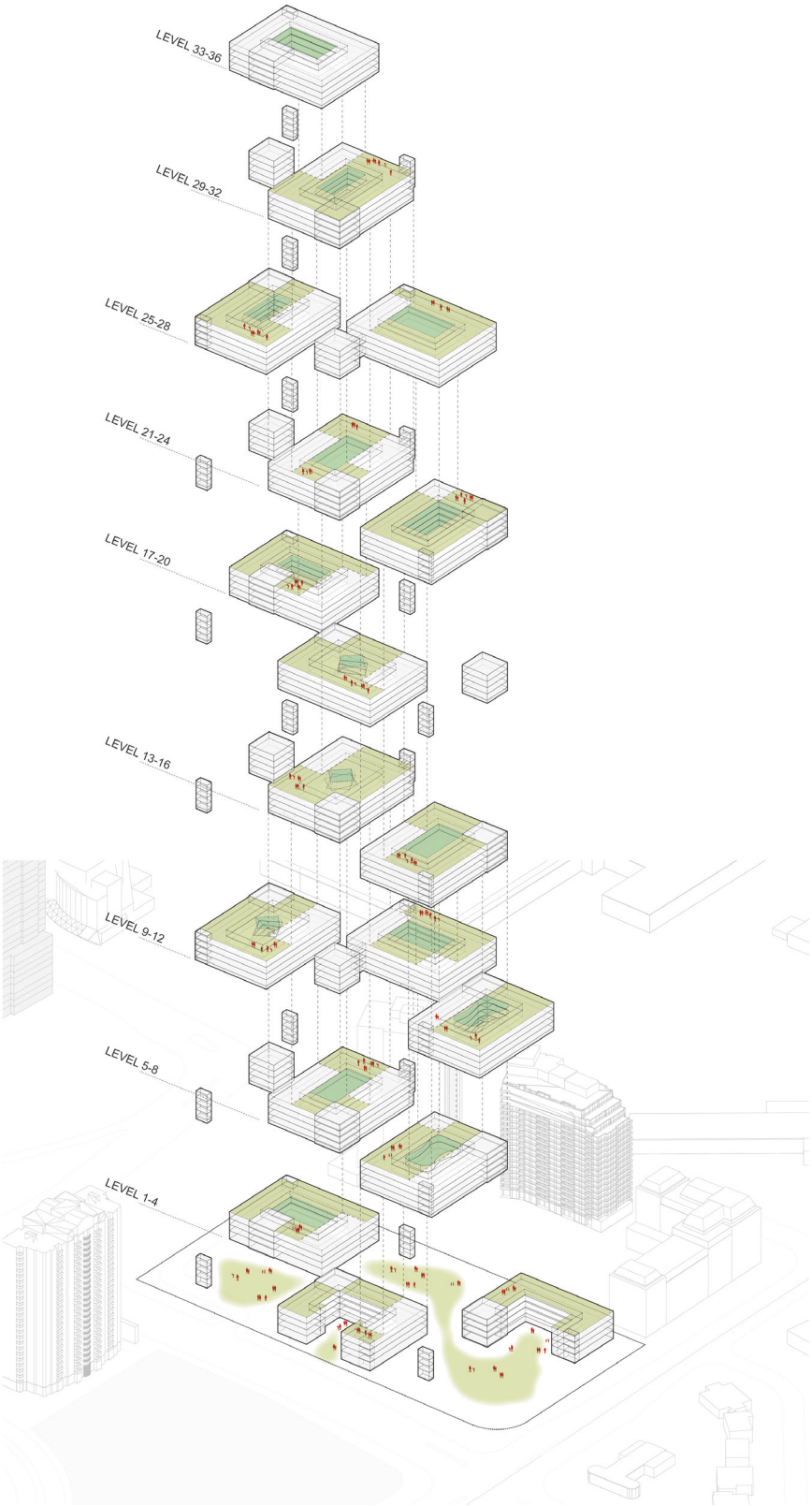
As preciously discussed, each courtyard functions as an individual community with its own identity. Connecting these communities creates a collection of communities, forming the neighbourhood. The vertical circulation is the main spine between the ground and the courtyards. Each courtyard is connected to its adjacent courtyard horizontally or vertically.

There are three layers of landscaped shared spaces: at grade, in the courtyard, and between courtyards. The landscaped shared spaces referred to here do not only mean plantings and greenery. While these types of landscaped areas are visually pleasing, they are often lacking in meaning. Public spaces are powerful in their ability to contribute to an individual's identity, as well as to the personal and collective memory (Hayden 1997, 9). The three layers of shared spaces are representative of the personal, social, and public levels of communication and interaction.

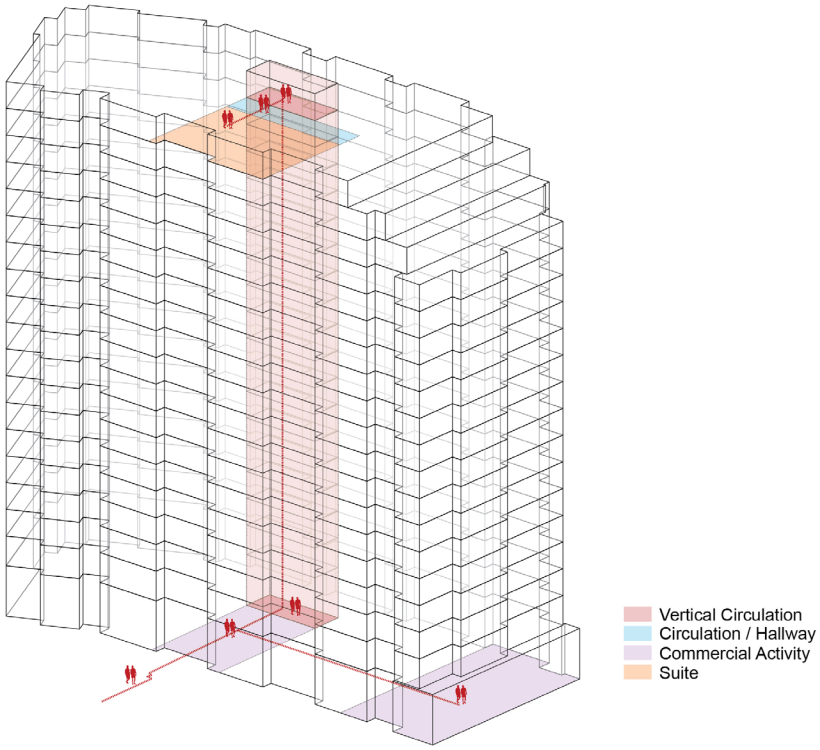
In traditional tower-podium high-density residential development, there is one primary route connecting the ground, the unit and available amenity area. It represents the social interaction with others is linear and simple. However, the path of travel from the ground level to the unit in the proposed courtyard typology is much richer compared to the traditional building. Since courtyards are connected to each other, there are multiple pathways to take people from the street to destination. Along the way and depending on the route taken, many gathering nodes are provided to encourage different levels of communal communication.



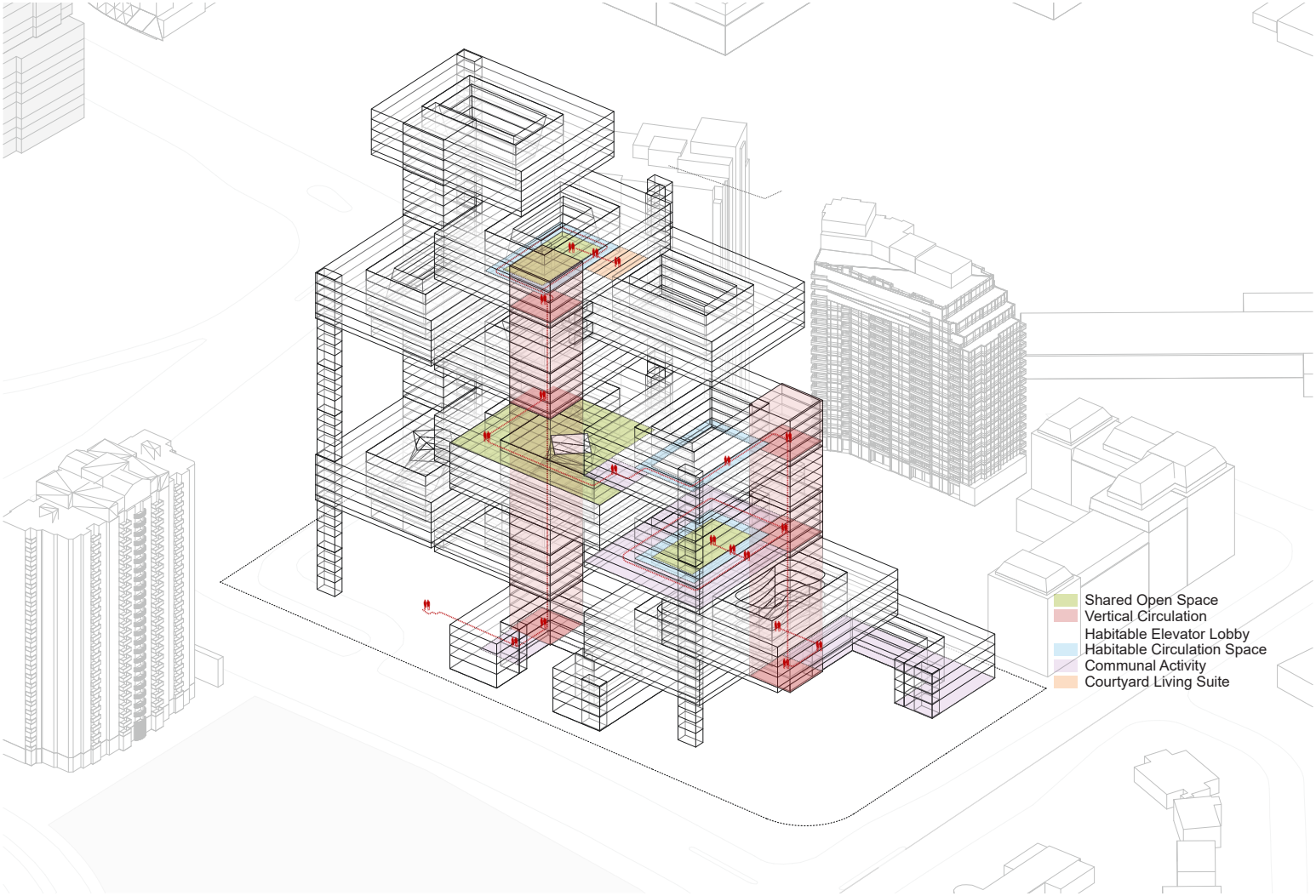
Circulation diagrams shows the connections between the ground and courtyards.



Landscape diagrams shows the connections between the ground and possible landscape spaces within and between courtyards.



Social connection in traditional high-density residential development.

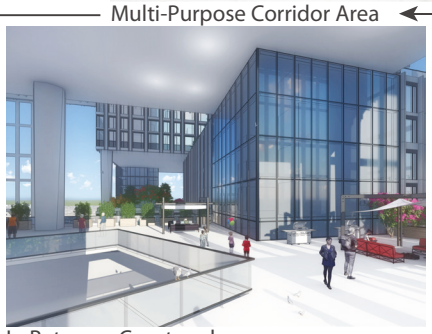


In traditional residential development, the path of travel represents simple social connections. However, in the proposed project, there are multiple path to travel from the ground level to the unit, which means the social connection in the proposed community is much richer than the traditional high-density residential development.

Unit Kitchen Area

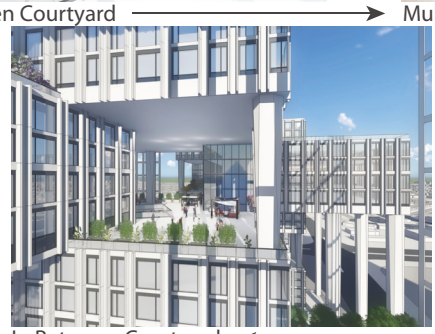
Multi-Purpose Corridor Area

Courtyard



In Between Courtyard

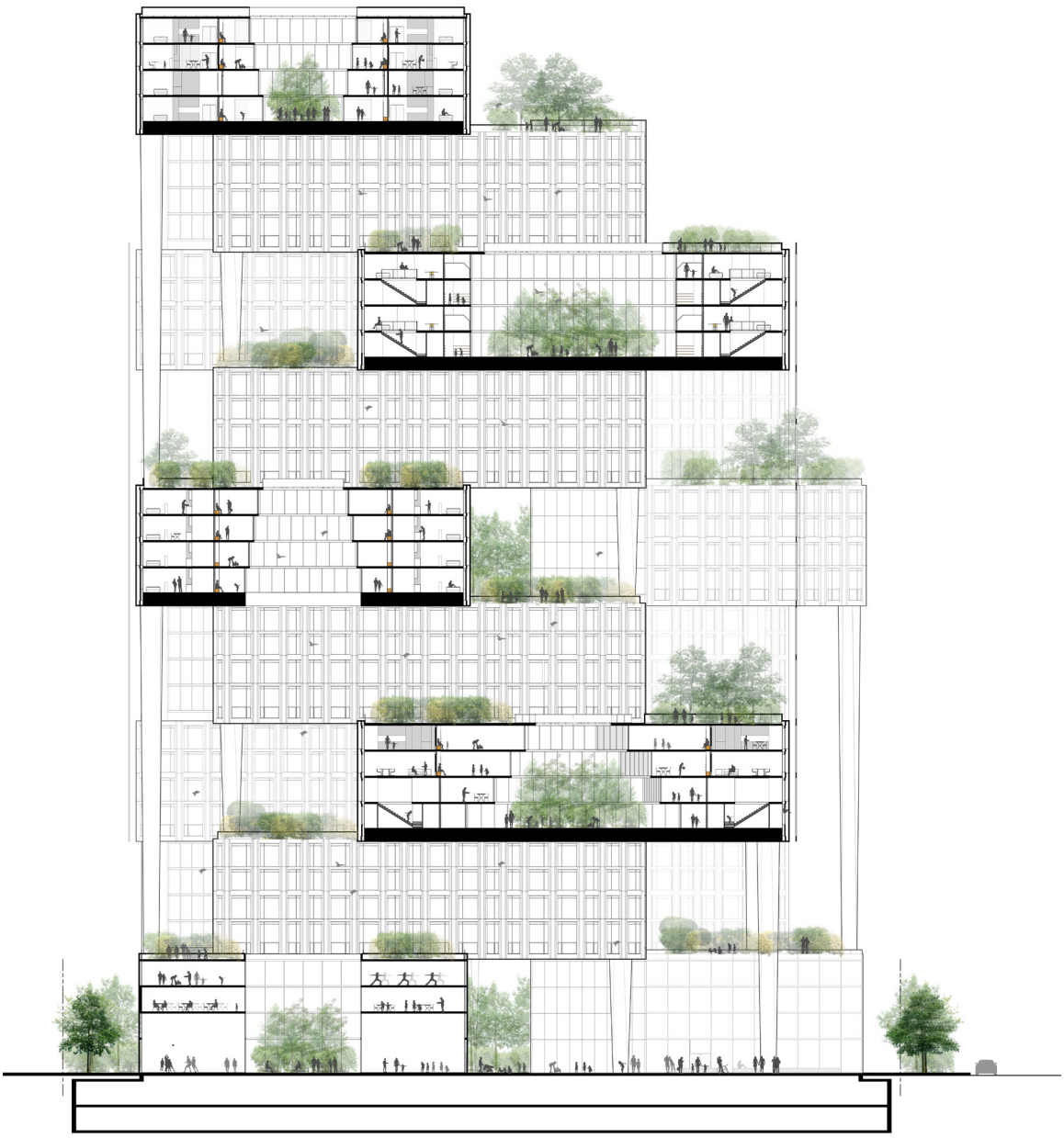
Multi-Purpose Elevator Lobby Area



In Between Courtyard

At Ground

Gathering nodes is created throughout the building to provide different levels of communication moments.



Conceptual building section shows the connections between courtyard spaces and landscaped shared spaces.

7.4.2 Public Realm Connection

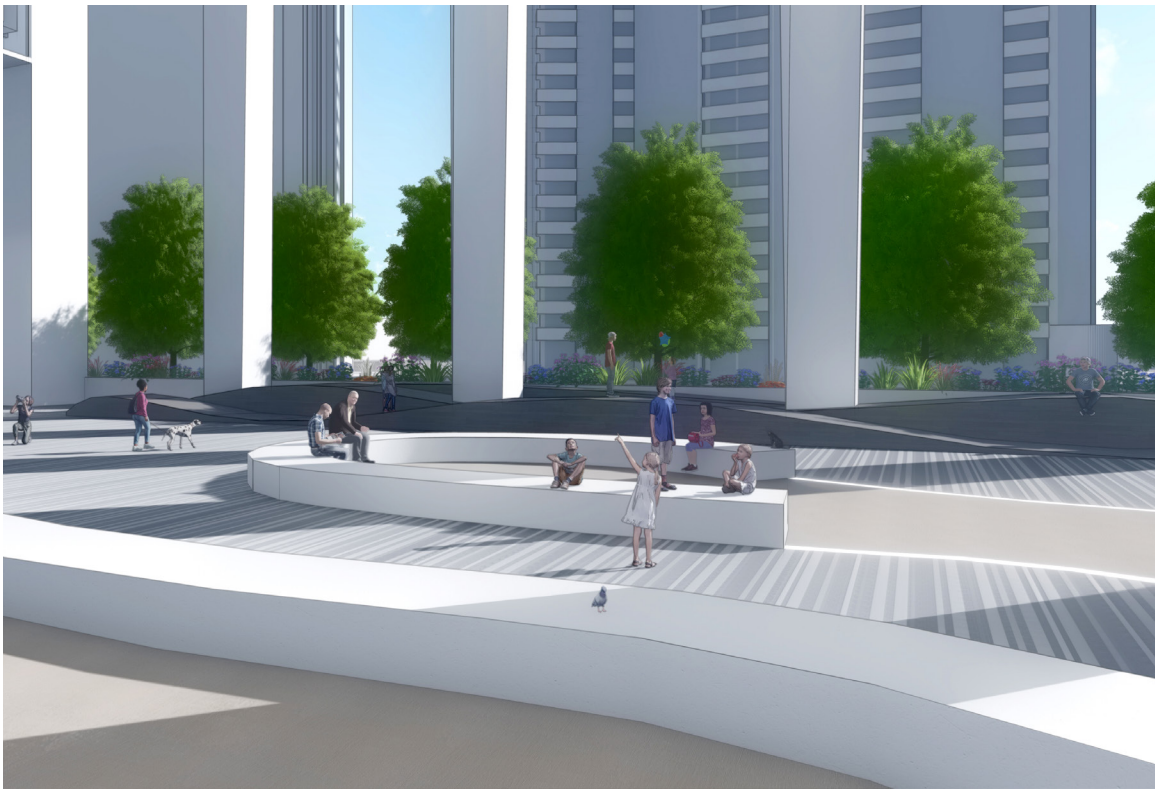
A good urban space can often invite people to spend time, and provide opportunities for physical activities. It is important to maintain social sustainability and provide equal opportunities for individuals to access public spaces in an urban context comfortably (Gehl 2010, 109).

Traditionally, the urban design strategy is to maintain a streetwall at podium level to create a pedestrian friendly environment. The project introduces a new form of at-grade strategy to connect to the public realm. Instead of building a podium streetwall, the proposed project attempts to create connected spaces at grade level to invite people from the adjacent neighbourhood. The public shared spaces further connecting with the park located to the west.

The 4-storey courtyard height could address the human dimension effectively. The community centre and commercial activity spaces provide opportunities for gathering and social life. With breathable void spaces, it aims to reduce the impact of the overall building volume, and create dynamic spaces for people to use. The space is meaningless without people using it, so it is important to keep the at grade space open, safe, and functional.

Ground floor shows the connections between the building and public realm. Three different outdoor zones are created to encourage various types of activities to happen.

Conceptual views of ground floor activity zone.



Conceptual views of ground floor gathering zone.

Chapter 8: Conclusion

This thesis illustrates how high-density urban housing could be designed to be adaptable and transformable to accommodate each life stage, allowing an effective model of multi-generational living, and at the same time forming a collection of communities. While multi-generational living is not the only possible solution for the housing crisis in the city of Toronto, it could be a sustainable method of living. By pooling resources together and using it efficiently, some of the current housing economic tensions could be relieved.

The proposed project is located in Scarborough, but this form of high-density urban housing is not limited to this region. Compared to the new developments currently underway in the area, the courtyard typology proposed in this thesis is demonstrated to be an effective tool in creating usable spaces and sustainable communities. In the traditional podium and tower form of high-density living, units are piled up very efficiently. However, this form of architecture is not about place making, there is no place for people to inhabitate. This thesis would like to argue the proposed courtyard typology is a new method of place making.

After experimenting with a collection of courtyard development strategies, a set of design principles could be extracted and applied to other projects. Since the neighbourhood is made up of a number of courtyard modules, this strategy can also be applied at different scales. In the low-rise to mid-rise context, courtyards could be arranged in clusters to form a neighbourhood. In the high density context, courtyard modules could be piled-up to reach the desired density and create a vertical dynamic neighbourhood.

Design Principles:

- Courtyard - Follow the nature of courtyard living by having dwelling units arranged around shared courtyard space. Provide multi-functional communal gathering spaces to encourage social interaction.
- Unit - Design dwelling units to be adaptable and transformable to accommodate different living styles and provide proper living spaces for multi-generational living.
- Neighbourhood - Rather than design for density, the neighbourhood can be formed from a collection of courtyard communities. Use circulation system to connect individual courtyards and create dynamic gathering moments.
- Public realm - Respond to site through place making. Create usable spaces and let shared spaces evolve with people’s inhabitation.

After all, place making is at the centre of architecture. The proposed housing strategy is an architectural response to the current housing crisis. Once housing becomes sustainable, the neighbourhood and the city can maintain healthy development.

References

Alexander, Christopher, Sara Ishikawa, and Murray Silverstein. 1977. *A Pattern Language: Towns, Buildings, Construction.* New York: Oxford University Press.

Beresford, John C. and Alive M. Rivlin. 1969. “The Multigeneration Family.” In *Living in The Multigeneration Family*, 1-36. Detroit: Institute of Gerontology, The University of Michigan - Wayne State University.

Burr, James J. 1969. “Financial Support of The Aged by Their Relatives.” In *Living in The Multigeneration Family*, 60-67. Detroit: Institute of Gerontology, The University of Michigan - Wayne State University.

City of Toronto. 1998-2022. “Development Applications.” https://secure.toronto.ca/AIC/index.do.

City of Toronto. 1998-2022. “Scarborough Zoning Information.” https://www.toronto.ca/city-government/planning-development/zoning-by-law-preliminary-zoning-reviews/zoning-bylaws/scarborough-zoning-information/.

City of Toronto. 1998-2023. “Overview: Our Scarborough Centre.” https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/scarborough-centre-review/overview-scarborough-centre-review/.

City of Toronto. 2005. “Scarborough Centre Secondary Plan.” https://www.toronto.ca/wp-content/uploads/2017/08/8f5b-scarborough-centre-secondary-plan-Division-Planning-and-Development.pdf.

City of Toronto. 2013. “Tall Building Design Guidelines.” *City of Toronto Design Guidelines.* https://www.toronto.ca/wp-content/uploads/2018/01/96ea-cityplanning-tall-buildings-may2013-final-AODA.pdf

City of Toronto. 2019. “Secondary Suites.” https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/secondary-suites/.

City of Toronto. 2020. “Growing Up: Planning for Children in New Vertical Communities.” *Toronto Planning Studies.* https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/growing-up-planning-for-children-in-new-vertical-communities/.

City of Toronto. 2022. “Garden Suites.” https://www.toronto.ca/city-government/planning-development/planning-studies-initiatives/garden-suites/.

CMHC. 2022. “Canada’s Housing Supply Shortages: Estimating what is needed to solve Canada’s housing affordability crisis by 2030.” https://www.cmhc-schl.gc.ca/en/professionals/housing-markets-data-and-research/housing-research/research-reports/accelerate-supply/housing-shortages-canada-solving-affordability-crisis#:~:text=To%20restore%20affordability%2C%20we%20project,a%20province%20once%20considered%20affordable.

CMHC. 2022. “Housing Supply Report.” https://www.cmhc-schl.gc.ca/en/professionals/housing-markets-data-and-research/market-reports/housing-market/housing-supply-report#:~:text=Highlights%20from%20the%20October%202022,main%20cause%20of%20this%20decline.

Donahue, Wilma. 1969. “Living in The Four-generation Family.” In *Living in The Multi-generation Family*, 37-51. Detroit: Institute of Gerontology, The University of Michigan - Wayne State University.

Gehl, Jan. 2010. *Cities for People.* Washington, Covelo & London: Island Press.

Gehl, Jan. 2013. *How to Study Public Life.* Washington, Covelo & London: Island Press.

Generations United. 2021. “Family Matters: Multigenerational Living Is On The Rise And Here To Stay.” *Multigenerational Families.* https://www.gu.org/app/uploads/2021/04/21-MG-Family-Report-WEB.pdf

Google Maps. 2022. “Scarborough Town Centre.” https://www.google.com/maps/place/Scarborough+Town+Centre/@43.7784775,-79.2562791,14.69z/data=!4m6!3m5!1s0x89d4d1a641e645df:0xf5b63df4538043ea!8m2!3d43.775369!4d-79.2578136!16zL20vMDVxX3ly.

Government of Ontario. 2022. “Report of The Ontario Housing Affordability Task Force.” https://files.ontario.ca/mmah-housing-affordability-task-force-report-en-2022-02-07-v2.pdf.

Hayden, Dolores. 1997. *Power of Place: Urban Landscapes as Public History.* Cambridge: The MIT Press.

Helen & Hard. 2019. “Vindmøllebakken Gaining by Sharing.” https://helenhard.no/work/vindmollebakken/.

Heritage Planning, Urban Design and City Planning Division. 2021. “Scarborough Centre Historic Context Statement.” *City of Toronto*. https://www.toronto.ca/wp-content/uploads/2022/05/8fe5-city-planning-our-scarborough-centre-historic-context-statement.pdf.

Holl, Steven. 1989. *Anchoring.* New York: Princeton Architectural Press.

Hulchanski, J.D. 2005. “Rethinking Canada’s Housing Affordability Challenge.” *Toronto.* https://tspace.library.utoronto.ca/bitstream/1807/71780/1/Hulchanski%202005%20Rethinking%20Housing%20Affordability%20Challenge%20-Discussion-paper.pdf.

Jacobs, Jane. 1993. *The Death and Life of Great American Cities*. New York: Random House.

Jia, Jun. 2009. *Beijing Quadrangle*. Beijing: Tsinghua University Press.

Metrolinx. 2023. “A Subway for Scarborough.” https://www.metrolinx.com/en/greaterregion/projects/scarborough-subway-extension.aspx.

Ministry of Finance. 2022. *“*Ontario population projections.” *Ontario Business and Economy.* https://www.ontario.ca/page/ontario-population-projections#chart8.

Mirabelli, Julian. 2022. “Planning the Future of Scarborough Centre is One Tall Task.” *Urban Toronto.* https://urbantoronto.ca/news/2022/02/planning-future-scarborough-centre-one-tall-task.47235.

National Bank of Canada. 2022. “Housing Affordability Monitor.” *National Bank of Canada Economic Analysis.* https://www.nbc.ca/content/dam/bnc/taux-analyses/analyse-eco/logement/housing-affordability.pdf.

Pallasmaa, Juhani. 1996. *Eyes of the Skin: Architecture and the Senses.* Chichester: John Wiley & Sons.

Pilkauskas, Natasha V., Mariana Amorim, and Rachel E. Dunifon. 2020. “Historical Trends in Children Living in Multigenerational Households in the United States: 1870–2018.” *Duke University Press Demography*. https://read.dukeupress.edu/demography/article/57/6/2269/168352/Historical-Trends-in-Children-Living-in.

Pocius, Gerald. 1991. *A Place to Belong: Community Order and Everyday Space in Calvert, NF.* Montreal & Kingston: McGill-Queen’s University Press.

Semper, Gottfried. 1851. *The Four Elements of Architecture and other writings.* Cambridge: Cambridge University Press.

Statistics-Demographics. n.d. “Realtor Canada”. Accessed November 22, 2022. https://www.realtor.ca/real-estate/25166932/303-88-grangeway-ave-toronto-woburn#view=stats.

Statistics Canada. 2022. “Immigrants make up the largest share of the population in over 150 years and continue to shape who we are as Canadians.” *The Daily.* https://www150.statcan.gc.ca/n1/daily-quotidien/221026/dq221026a-eng.htm.

Stillo, Tony, Oren Klachkin, and Jacob Dolinar. 2022. “Research Briefing | North America US and Canada housing affordability edged down in Q3 ” *Oxford Economics.* https://blog.oxfordeconomics.com/content/us-and-canada-housing-affordability-edged-down-in-q3.

Weinberg, Jack. 1969. “Interpersonal Relationships in Multigeneration Families.” In *Living in The Multigeneration Family,* 52-59. Detroit: Institute of Gerontology, The University of Michigan - Wayne State University.