Revitalizing Suburbia:
Build Integrated Communities

by
Connie Lei

A thesis presented to the University of Waterloo in
fulfillment of the thesis requirement for the degree of
Master of Architecture

Waterloo, Ontario, Canada, 2018

AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

Urbanization has dragged workers to the city center day after day, to get to and from work for the last century. The intervention of the hub enacts as an alternative to urbanization of the city, allowing neighbourhoods to intensify locally. By minimizing the need for commute, an individual's time, energy and mental sanity are precluded from the hectic travelling. Through analysis and trend observations, minimizing the need of commute can have macro and micro impact on the city.

The hub addresses the issue of commute by introducing a new typology of workspaces that support the mobility of work, through locations in communities where the concentration of long distance commuting is. To serve the changing dynamics of the workplace, the hub provides a plethora of spatial diversity to suit individual needs. Amenities should not be a marginalized benefit. With the blur of work life balance, the goal is to integrate leisure activities and services that support daily life. Ergo, the hub aims to cultivate collaboration and foster cultural identity for the modern dweller. The proposal aims to support a healthy way of life and sustain growth in the revitalization of existing suburban communities.

ACKNOWLEDGEMENTS

I would like to express my gratitude to my supervisor, John McMinn, and committee member Val Rynnimeri for the constant encouragement to act boldly upon my argument and continual support of my thesis work.

To my family and friends, thank you for the persistent encouragement and endless support in every way possible.

To my colleagues, thank you for taking part in my journey and sharing your perception of the world to me.

Here is mine in return.

Psalm 9:1

TABLE OF CONTENTS

LIST OF FIGURES

1.0 Connecting the City and Suburban Landscape

2.0 Evolution of the Individual Comfort: Home, Office, Community

3.0 Architecture as Infrastructure of Culture: Framework of Hub

4.0 Architecture as Medium of Revitalization: Design Iteration

5.0 Conclusion

INTRODUCTION

INTRODUCTION

The invention of cars reshaped the city, just as digital technologies are revolutionizing the built environment through increased mobility and greater distribution of work. Architecture of suburban communities will increasingly be the medium to revitalize and sustain growth in suburbia and to reinforce the way of life in communities to facilitate richer local cultures. The goal of this thesis is to analyze the change in demand and develop a design as a possible solution for an individual suburban community hub in the city of Vaughan in the Greater Toronto Area.

1.0 CONNECTING THE CITY AND THE SUBURBAN LANDSCAPE

Definition

The contemporary meaning of suburbia encompasses a range of activities and lifestyles that delineated from its original intent of distancing from the unsanitary conditions of the industrial era. However, what maintained in suburbia is the built landscape and form that encompasses the proximity to nature and abundant open space. In the projection of urban planning, the government has set out goals and standards for what constitutes as complete communities. Yet, the modern suburban development continues to isolate land use and function. The segregation within communities and dependency on private automobiles created a diversion to the way of life in suburbia and the positive qualities that it once thrived upon. The lack of centricity pushes a need for a medium to alleviate isolation and support daily living in the suburb.

Commute

On most days of the week, residents are relegated to spending hours on commuting. The journey to and from work is merely a mundane routine; until there is the added dose of time constraints with innumerable variables, causing unexpected delays that piles on the stress of the commuter. This can manifest from the pressure to arrive in the office on time or awkwardly stepping into a meeting late, which, to no surprise, is associated to psychological health problems. Conversely, for those who live downtown and dwell in the luxury of being able to walk or bike to their respective nearby offices, are constantly exposed to heavily polluted air. Meanwhile, those who participate in the long commute of driving or taking public transit are facing physical health problems without proper regular exercise, due to the severe time and energy constraints of commuting, which, in and of itself is an environmental burden. The effects of long distance commuting, which clearly influence individuals and families can permeate through communities and are correlated to global issues at large. Undoubtedly, the consequences of commute lead to a demand for alternatives to reorganize the way of life and work.

City vs. Suburb

The city and suburbia have been two drastically different territories since the post war period. The abundance of outer city land allowed for large lots; hence, developments of new suburbs continue with the ever-increasing demand of single-family homes. The cleanliness, proximity to nature and access to open fields are amongst the positive qualities that people cite for their desire to reside in the suburbs. Arguably, the formation of the suburban city is modeled after the invention of cars that gave access and mobility for people to travel to the city core. Inevitably, creating the modern dependency on cars in the suburbs and the segregation and inaccessibility to facilities, amenities and commercial spaces. The low density of population also puts a burden on the infrastructure and economy of the city (i.e. public transit having to service large areas despite a low passenger rate). In contrast, the downtown core is densely packed which allows for it to sustain the variety of entertainment, commercial, and amenity space. However, despite the convenience downtown offers, the urban city centre raises other problems such as fear of urban sprawl and gentrification. Certainly, modernity under the influence of many factors is reshaping the built fabric yet again. The intervention of the thesis is to create local intensification in consolidating points of interest, giving centricity in suburban communities to bring benefits of the dense urban core into local neighbourhoods.

Toronto

In 2011, *Statistics Canada* revealed that the average commuting time in Toronto is 32.8 minutes.[1] As an average, this means that it is greatly offset by people who has a 5 minute walk versus those who travel well over an hour in order to step foot into the office. Economically, the commute doesn't come free of charge as well. The cost of living in Toronto is skyrocketing, adding to the burdens of commuters who have to deal with car ownership and its many related fees or paying for public transportation. From the perspective of the employers, there is deficit in productivity with long commutes straining employees' energy. Overtime, employee health has been declining, as they face various medical issues that could potentially impact overall performance on the job. Throughout the course of history, many brilliant inventions have automated or made redundant the repetitive, tedious tasks such as washing clothes or dishes. However, vast populations are still forced to endure the repetitive and tedious task of commuting for great lengths of time in Toronto.

Problems

The high population density in Toronto is a great source of economic activity for businesses and even transportation. In order to fund and sustain business operations, many existing coworking spaces are concentrated in servicing locations in urban cores. This makes them a very niche market catered to those who work remotely and are either living downtown or already within the downtown vicinity. The mobility of work can dissipate commuting and extend benefits of coworking spaces to suburbia.

The quality of life in suburbia has been impeded upon by the need for commuting. When such a large portion of the population is spending countless hours travelling to and from work everyday, it makes it difficult to truly embrace suburban living. Lifestyle and well being is depleted from suburbia without intervention to revitalize the way of work.

2.0 EVOLUTION OF INDIVIDUAL COMFORT

Home Culture

At different stages of life, how people choose and determine where they live is outlined by certain restrictions and priorities. Individuals and small startup businesses have difficulty due to the lack of resources. Couples struggle to find a compromise between their office locations. Young parents often sacrifice the proximity to work in exchange for the proximity to school for their children. With the heavy reliance on cars for transportation, having to travel between points of interest limit individual households from the opportunity to interact socially as well. The built form of suburbia is in need for a node of connection to enact as the nexus point of the community.

Physical Comfort

With the advancement in technology, the notion of comfort has steadily evolved with breakthrough inventions and constant innovations. For example, the phenomenal invention of the elevator gave way to accessibility and allowed buildings to reach new sky-high limits. Continuous innovation on the Internet of Things (IoT) and integrated building systems contributed in enabling environments to be adjusted to cater to individual comfort. Various physical discomforts have been eliminated as building technology continues to advance.

Psychological Comfort

To address stress beyond the journey of the commuter, buildings impose and shape occupant psychological comforts as well. Components of the building, such as materiality, are part of the design decisions that make up the environmental qualities of a space. Humans inherently heavily rely on visual senses; hence, design strategies that integrate a relationship to nature are often desirable. Understanding that these elements can be designed and should be implemented can play a large role on the mentality and psychological comfort of the building occupants.

3.0 ARCHITECTURE AS INFRASTRUCTURE OF CULTURE – FRAMEWORK OF HUB

History of work/office

The office landscape has been changing through history and sparked different inventions, such as the infamous cubicles and the concept of open office. While the industrial revolution replaced majority of manual labour with automated machinery, the office landscape and its demands are undergoing a similar revolution with technology. The era of smart phones, sensor driven devices and the Internet of Things, the digital connection of devices, objects and people through a network, highlights the difference between generations and their individual expectations of what an office should be comprised of. Therefore, there is a growing desire for diversity in work environments to provide distinguished areas that cater to the different types of work and individual requirements of a desirable workspace.

Change in Office Structure

Change extends to how businesses are structured; the concept of hierarchical office pyramid is breaking down as companies are nurturing an office culture that supports the success as a group rather than individuals. There is also a growing attention on the balance between work and life. Studies and pilot programs reveal economically sounding results for both the individual and corporation when work hours are shortened. Rapidly realizing that work is a matter beyond efficiency but effectiveness as well. Subsequently, recognizing how the design of the office space has the potential to help facilitate work in the office.

Community Engagement

The intervention is to utilize the building as an architectural device to bring people together to connect work, life, and play. It is a place for the community to host events, workshops, and socialize. Within the community context, it can support daily living, through the integration of services, utilities and workspaces. To create a nearby hub of interconnections with less secluded public space and a node for transit to provide access into the city, the community is involved in activity engaging with one another. The hub itself serves as an incentive for residents to reduce use or need of ownership in automobiles, from its proximity to the existing neighbourhood. Furthermore, simple gestures such as expanding the ground network of paths allow residents to take advantage of active transportation more easily. Thus, this will inherently reduce the need for motored vehicles and reinforce a safer community overall.

Renewed Business Structure

The construction of the hub requires actors from different disciplines. By implementing a bottom up approach, it will allow the community to voice their needs and shape the building. The role of the architect is the mediator and designer, implementing the requirements of the community onto the basic framework of the hub. It allows for the hub to be integrated into the community to offer flexibility, customization and adaptability.

Precedents

Precedents portray the visualization for the spatial quality that fosters the new home of the neighbourhood amenity and workspace. WeWork is a business model for the hub to follow in terms of the operation and services it provides. The ANZ Centre in Australia, Axel Springer campus in Berlin, and the PGA Tours Headquarters in Florida are the drivers of what the hub aims to offer and demonstrates how a diversified workspace can be beneficial to occupants and operation management.

4.0 ARCHITECTURE AS MEDIUM OF REVITALIZATION - DESIGN ITERATION

Existing

The design proposal is to stand as a framework of a typical strategy with a specific design catered to the project site. The site was chosen to be located in an area saturated with existing housing in Vaughan, as it is one of the major sources of commuting in the Greater Toronto Area. In this strategy, it explores how a strip plaza in the suburban landscape has the potential to become a hub through the benefits from its' proximity to surrounding facilities. This is an exploration in how to reconfigure components of an underutilized strip plaza into a community office hub.

Proposal

The basic framework treats architecture as infrastructure for the community. The building is not to be defined by a single purpose but to complement, consolidate, and maintain the existing facilities. The population density is slowly increasing, as there is already an integration of medium and high-rise residential towers with the park as a common resource. The hub would bring centricity to the neighbourhood and projects to intensify the current population by implementing housing strategies as well. The objective is to accommodate different people during different stages of life. These could be individuals, couples that struggle financially, or geriatric individuals who are trying to integrate into the community.

The design strategy extends and carves into the street typology to give more active transportation options to access the hub. The goal is to create and encourage an active transportation environment that can incentivize the residents of the neighbourhood to walk or bike to arrive at the hub.

Environmental Education

Landscape design is implemented to formalize and add trails in the park. Rainwater collection and the communal garden complement the building to include environmental education for the community. Through the incorporation of passive heating, cooling, and lighting strategies; subsequently, the building can inform occupants the benefits and raise awareness in environmental design from its materiality to daily operations.

5.0 CONCLUSION

Future Implications

Projecting into the future, the proposal of the hub integration in existing suburban communities aims to transform the Greater Toronto Area to beyond the projected urban growth centres. The proposal raises possibilities of a dense network of the office hub where the current dependency of cars can be phased out. In addition, the hub stands to facilitate a future where roads can become more focused in accommodating for the pedestrians, bikers and public transit. The intervention aspires to transform the segregated suburban landscape into complete communities that function together as a network between cities, yet individually act as nodes to serve individual communities for a revitalized modern suburban life.

1.0

CONNECTING THE CITY AND SUBURBAN LANDSCAPE

THE EXISTING CONDITION

1.0 Connecting the City and Suburban Landscape

1.1 Definitions & City Planning Goals

Urban Planning

Urban planners and architects play an important role of serving and protecting the public interest. The built environment holds the relationship between health and well-being through the means of community and land use planning. Noting that the condition of having no disease and embodying complete physical, mental, and social well-being is how the World Health Organization defines health. [1]

The origins of modern urban planning derived from the unhealthy conditions of the industrial cities in the late 19th century.[2] Industrial factories neighboured residences, which pushed citizens to relocate to the outskirts as a means of recovering a healthier environment; thus, urban sprawl began to infiltrate new territories. At the time, there was a latent demand for major infrastructure implementation in order to regain sanitation and service the areas of expansion.[3] The outer city was ideal for many reasons beyond offering health; it also provided ample green space for landscaping and recreational uses. Therefore, to regulate the expansion and administer public health, the government established the grounds of urban planning.[4]

The progression of the planning profession continued, as members of the society also began recognizing the potential connections between architecture, community design and socio-cultural factors.[5] Land development was under regulations and control, reshaping the city and suburb to become what it is today. Now, with more understanding in the impact of planning, awareness in the potential harm of the suburban regime is rising as well. The dependency on automobiles are impeding on the health of the community. Hence, the consequences are being recognized by the government and pushed the consideration of integrating community health with land use planning once again.

Active Transportation

The successful escape from the unsanitary industrial era is in the past but evidence is revealing the presence of a new problem impeding on public health of the suburb. When the residences moved to the outer city, the ample land gave way to the establishment of large plots of land subdivision, without the need to subdivide and replicate the density of the urban core. The suburb developed an automotive reliance that is now heavily ingrained into the sedentary routine of the residents leading to various health concerns due to the lack of active transportation.

Active transportation is a mode of transportation that is physically powered such as walking or biking. In conjunction, mobilizing at a similar speed through the help of mobility aids and powered maneuvers is accounted for as well, which could be motorized wheelchairs and other devices as outlined in the *Provincial Policy Statement*.[6] The statement was created to establish the foundations and parameters for guiding planning initiatives such as development and use of land.[7]

"Complete communities...well designed to meet people's needs for daily living throughout an entire lifetime by providing convenient access to an appropriate mix of jobs, local services, public service facilities, and a full range of housing to accommodate a range of incomes and household sizes...support quality of life and human health by encouraging the use of active transportation and provide high quality public open spaces, adequate parkland, opportunities for recreation, and access to local and healthy food...balance of jobs and house...reduce the need for long distance commuting."

Growth Plan for the Greater Golden Horseshoe 2017

Complete Communities

Implementation of active transportation is crucial in reviving the health of the suburban life. Hence, the definition of complete communities was mentioned and reiterated many times in various planning guidelines, such as the *Growth Plan for the Greater Golden Horseshoe*, *Provincial Policy Statement* and *The Walkable City* to name a few, as a part of emphasizing the crucial need.

Complete communities constitutes for providing the necessary qualities and facilities that support daily living for the different stages in life. This can be delivered through the means of offering a range of jobs, housing and services catered for a variety of income and household sizes. By accommodating for a diverse demography, it should be supported through access to transportation infrastructure, schools, community amenities and health services.[8] Moreover, it should implement and encourage active transportation through a close proximity to parkland, public spaces, local healthy food sources and minimizing the presence of long distance commuting.[9]

Many aspects and disciplines can influence the success or fall of a community. By outlining the source of concerns and understanding the planning goals a solution can be derived to effectively revitalize the current built landscape of suburbia.

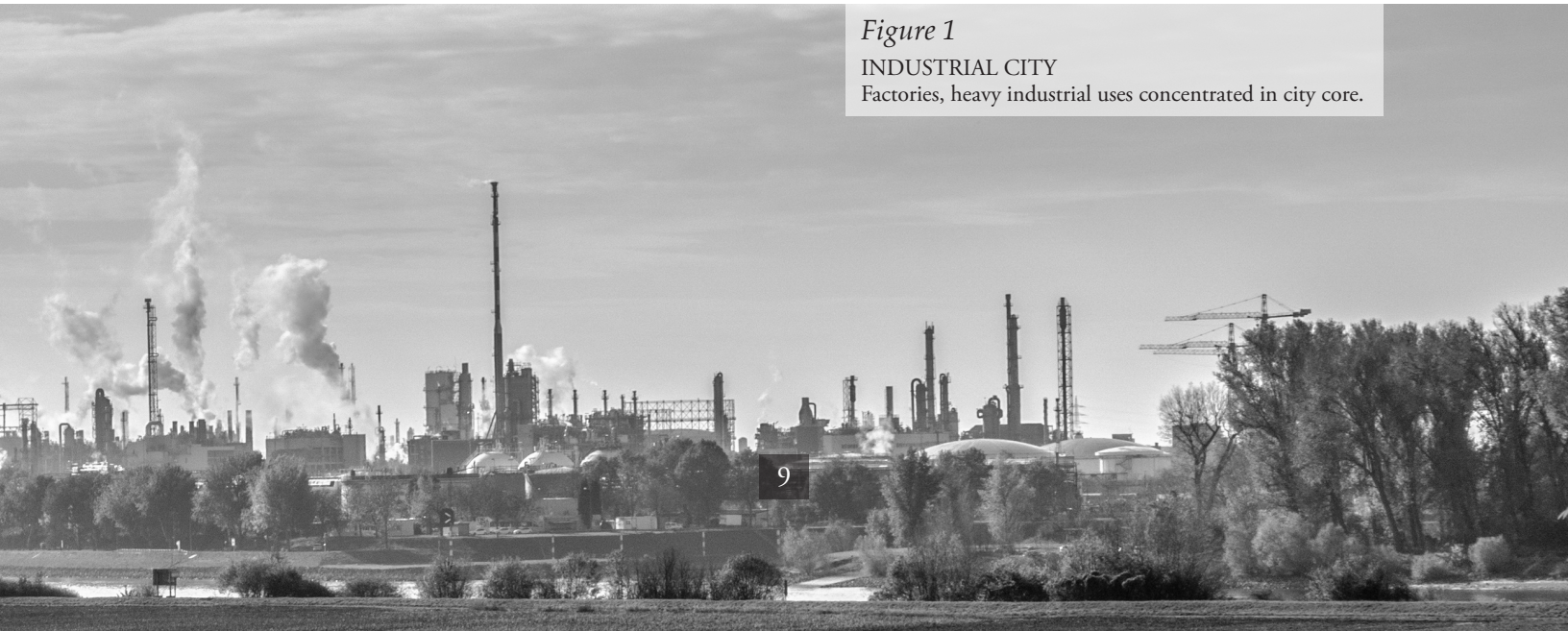


Figure 1
INDUSTRIAL CITY
Factories, heavy industrial uses concentrated in city core.

Planning Goals of Suburbia

Innumerable planning policies, such as *Coordinated Land Use Planning Review*, *Growth Plan for the Greater Golden Horseshoe*, *Provincial Planning Statement*, are strategies and principles stated to contribute to establishing future strong communities. Overall, the longevity, resiliency and maintainability of promoting residents' health and social welfare take precedence. By emphasizing universality in housing, employment, institution, and recreation, planning policies utilize relationships between land use and development to facilitate a healthy environment and prosperous economy.[10] Meanwhile, opposing developments that may be harmful to the natural environment.

To further encourage inclusivity, land use patterns are embracing a mixture of programmatic elements. Catering to different stages of life and needs of diverse demography, facilities that provide additional units for instigating affordable housing for the vulnerable population is encouraged. By integrating industrial and commercial uses, it gives opportunities for a mixture of occupations. Through mixed land use, the benefits from a close proximity of affordable housing, jobs and facilities can be embraced together with the use of active transportation.

The *Growth Plan for the Greater Golden Horseshoe 2017* defines many aspects that support the upbringing of creating complete communities.
The agri-food network urges an agricultural system that is supported through regional infrastructure and transportation. By concentrating processes of agricultural production regionally, it eliminates the need for processing and distribution. Hence, communities can be supportive of local agricultural production, while gaining freshness in quality and awareness to food sources.[11] On a smaller scale, implementing a local communal garden can begin introducing the benefits of the agri-food network.

Compact built form relates to an integration of land uses, to serve the neighbourhood by means of close proximity. Thereby creating a more walkable built landscape and increasing the efficiency in land use and reducing the economic burden of transportation infrastructure.[12] By consolidating facilities, a centrality is created within the neighbourhood reducing the need for residents to travel to multiple locations.

Complete streets attributes to crafting a road system that can facilitate and provide equality for all road users.[13] Instead of an automobile emphasized network, design considerations give the opportunity for active transportation to become safer and easier.

Frequent transit is outlined as public transportation that is able to provide service in both directions throughout the day and night, running in 15 minutes or less intervals.[14] While a consolidated built form can concentrate program, it gives the opportunity to create a network of hubs to feed into a frequent transit system.

Innovation hubs are an uprising concept that describes a place where the public, private and academic sectors can intervene despite various economic backgrounds to stimulate innovation.[15]

The current suburban landscape lacks to provide a range of services for varying audiences; hence, current planning policies are projecting these guidelines in hopes of revitalizing the desire of what a modern suburb may include. The positive qualities of suburban living can then expand the audience to accommodate beyond the typical middle class commuting families and reinforce the needs of the community with a healthy lifestyle.

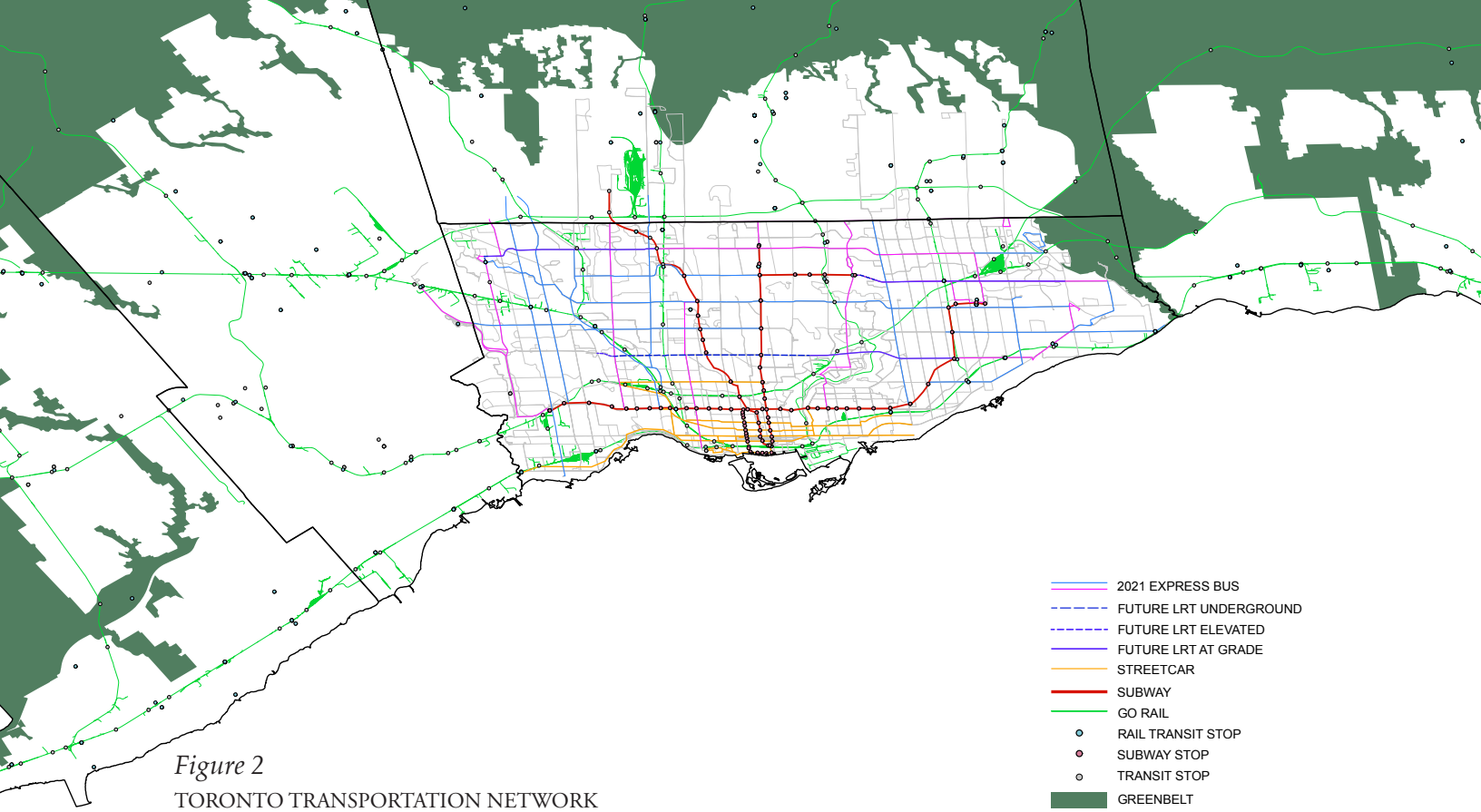


Figure 2

TORONTO TRANSPORTATION NETWORK

Current and projected expansion of Toronto public transit services.

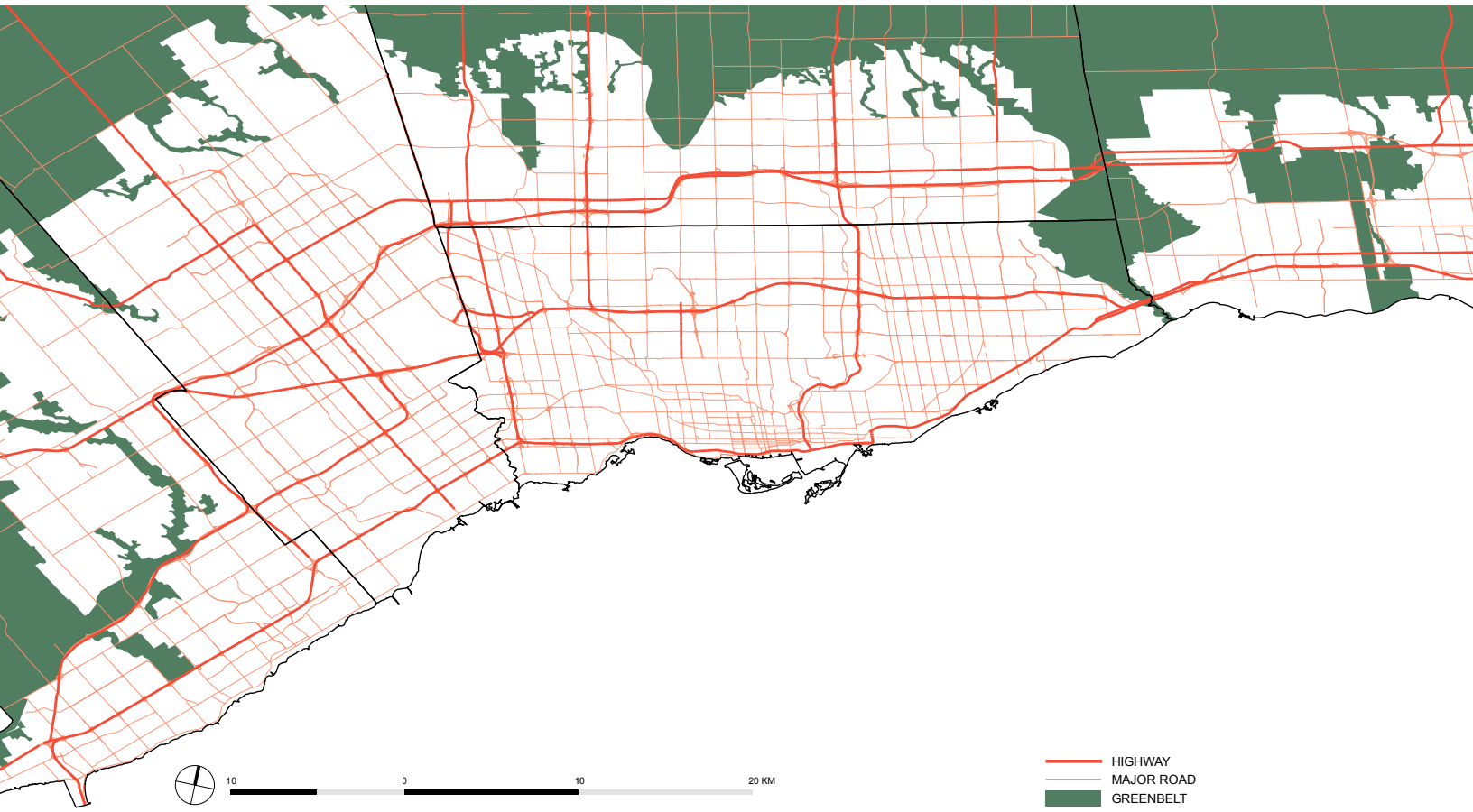


Figure 3

ROAD NETWORK

Major road and highway network across GTA.

Barton's Model

The prospect of revitalizing suburbia by eliminating commute is to bring psychological, physical health and well-being to the community. In Barton's concentric ring model, it demonstrates how health is dependent on the decisions made by the regional land use planning. In each ring, it displays the increasing influential factors impeded on the individual and community with respect to health and well-being.

The first ring demonstrates lifestyle outlined by the varying levels of physical activity and the opportunity to exercise, as it is a fundamental attribute to physical and mental health. It describes the ability for delivering services to a ranging audience of different age and culture through the community land use and providence in amenities. The breadth and availability of facilities that support active transportation, accessible services and recreational activities and whether its presence is within walking distance is crucial as well.

Second tier of rings relates to the community and one's mental health. The abundance and inclusion of land use mix for incorporating components such as public or green space to nurture social networks of mutual support within the community.

The third ring refers to the local economy and income relationships. The individual health is correlated to a level of income and occasions available to partake in the economy. This includes the opportunity of land use planning in supporting initiatives to deliver affordable housing, advocating public services and amenities.

The fourth ring ties in the activities, spaces and networks of the neighbourhood. It recognizes the relations between land use, infrastructure and amenities and the way in which it contributes to how one lives and establishes standards in quality of life. This emphasizes the building and environmental design for nurturing the mental perception and experience of well-being.

The fifth ring zooms out to the local bioregion by looking at the high-level pollution concentration that is affluent to community health. It relates to the impact of urban densification and the presence of urban heat island effects.

The sixth and outermost ring defines the global ecology condition. It links the connection between the global biosphere and cities worldwide. The concerns focus on the impact of climate change on health in communities and identifying the importance of planners being in control of the forces and the impact through resources.

The Barton's model identifies relations between individuals' health in relation to an enlarging scale at each tier. Demonstrating the acute and macro influence each level has in affecting effects of climate change through land use planning.[16] It illustrates a progressive model of the intrinsic value in how changes in planning can alleviate problems locally and globally. Similarly, the proposal of the hub strives to revitalize suburban lifestyle with consolidated land use, bringing a new landscape of work to eliminate commute for the dissipating effects it can have on individuals and communities.

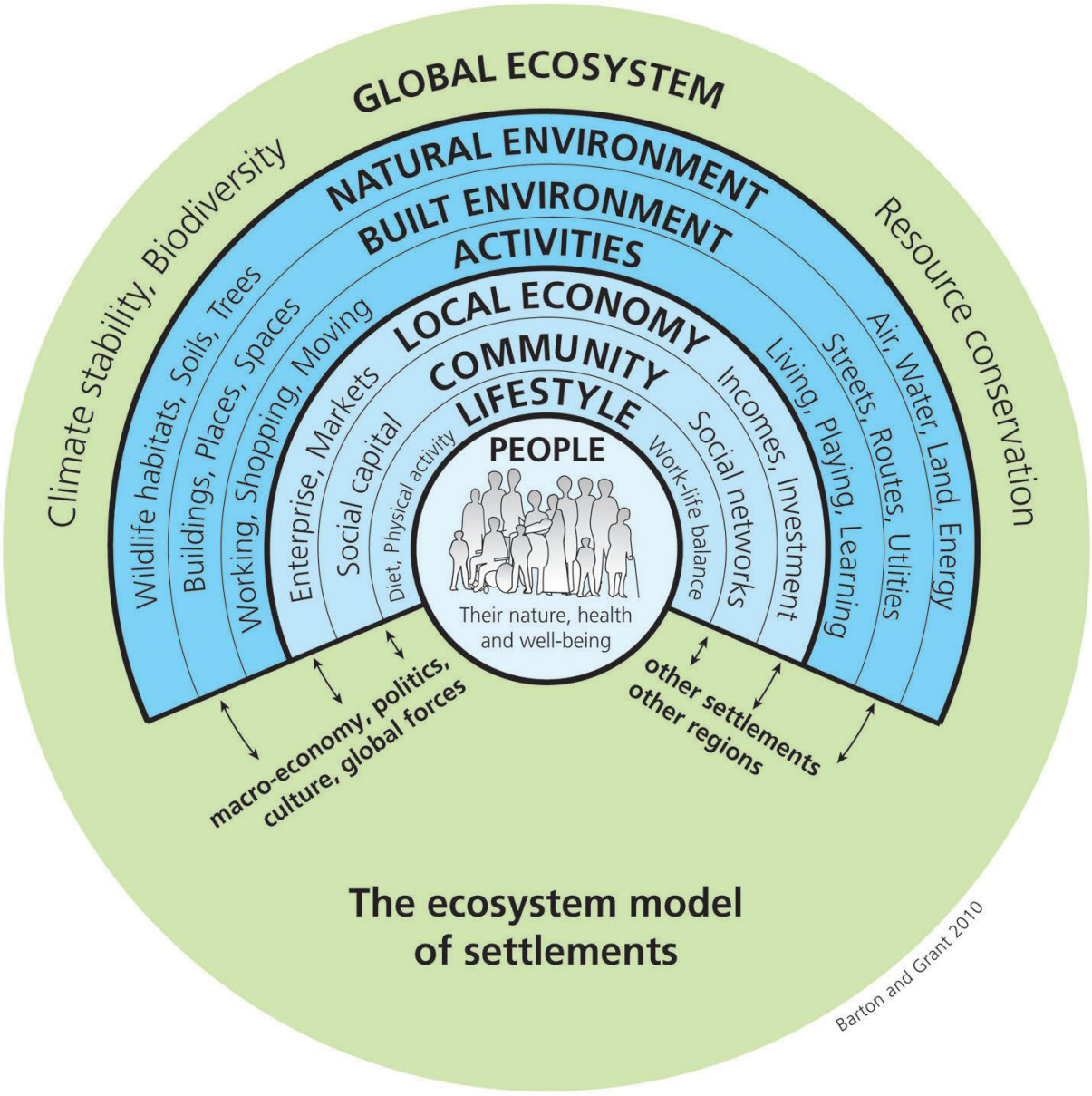


Figure 4

BARTON'S MODEL

Scales of influence on health and well-being through land use planning.

1.2 Commute

Toll on Well-Being

Long distance commuting is undesirable due to its onset of serious psychological stress impeding upon physical and mental health. Studies contribute it to two categories of objective and subjective stressors. Objective or environmental stressors explains the lost of control and comfort one may endure during the journey of commuting. While subjective stressors refer to the satisfaction one has for the mode of transportation.[17]

A journey of travelling from the Toronto city core to the northern outer city of Barrie would typically take a 90-minute drive. It ended up as a 7-hour trip with the unforeseen storm and traffic as the Barrie's city councilor, Michael Prowse once mentioned, first hand experiencing how disruptive congestion can be on the quality of life.[18]

The unexpected qualities of commuting are frustrating. The major factors of stress from commuting are the duration, unpredictability and impedance. However, the enlightening quality is revealed when research finds that the stress can be reduced, but it is ironically from constant exposure and repetition. Over many years of commuting, a selection and adaptation process develops mentally over time.[19]

Nonetheless, it doesn't take away from the impact commuting has on health, as research revealed that long commutes attribute to increased risks of diabetes, cardiovascular diseases and obesity.[20] In addition, it is also linked to a poor quality of sleep, exhaustion, depression and overall feelings of poor health.[21] Beyond physical health, mental health suffers from the stress and lack of physical activity with the loss of time. Tired commuters are in deficient of energy and stimulation after a long day at work and travelling home. Whether it is waiting to grow immunity towards commuting stress, it seems as though reducing the source of the problem can be more reassuring. This is contributed by the make up of suburbia and interventions can be made to revitalize this landscape.

Figure 5

STRESS OF COMMUTING
Typical crowd on public transit during hours of commuting.

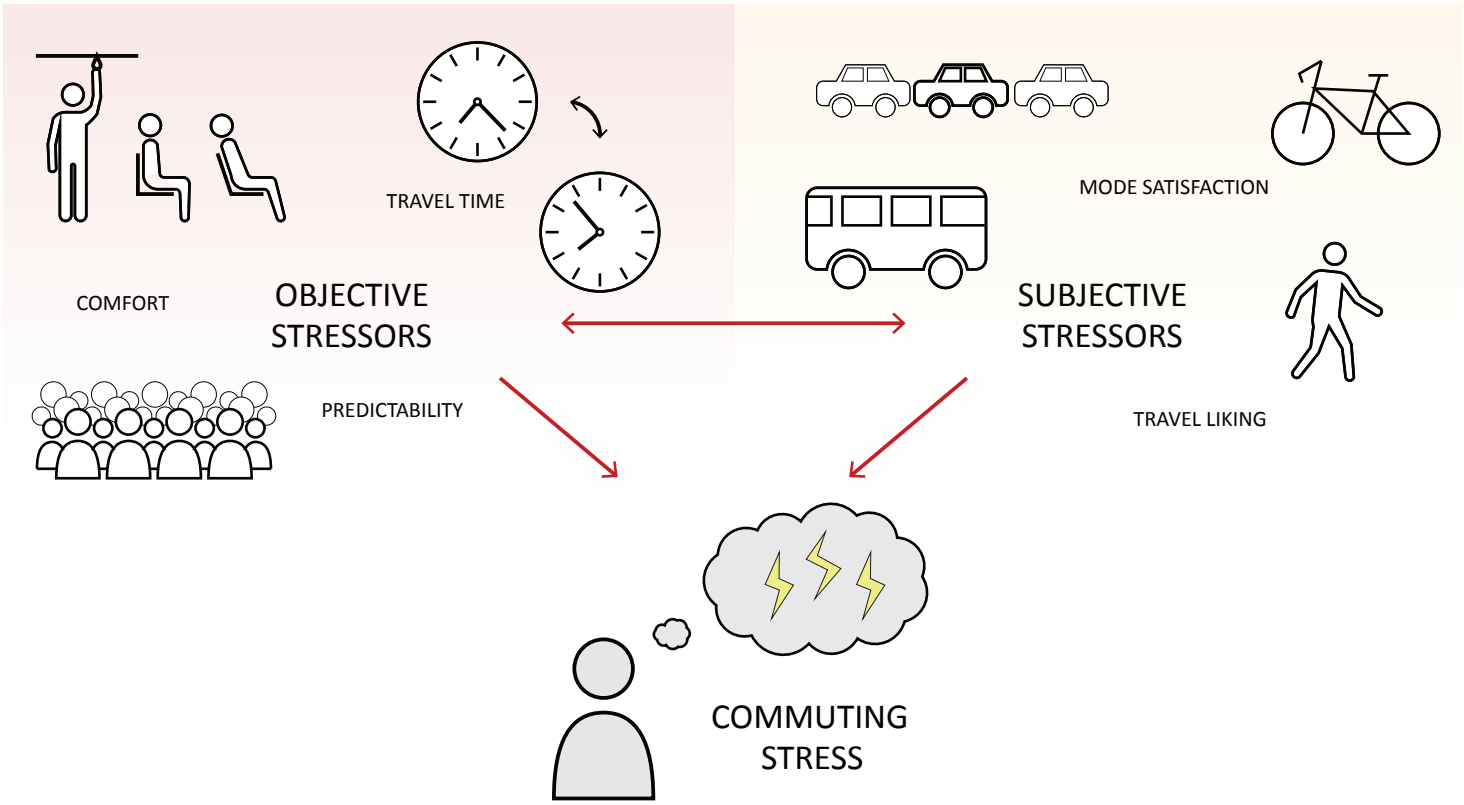


Figure 6
STRESS FRAMEWORK
Toll on well-being from commuting stress.

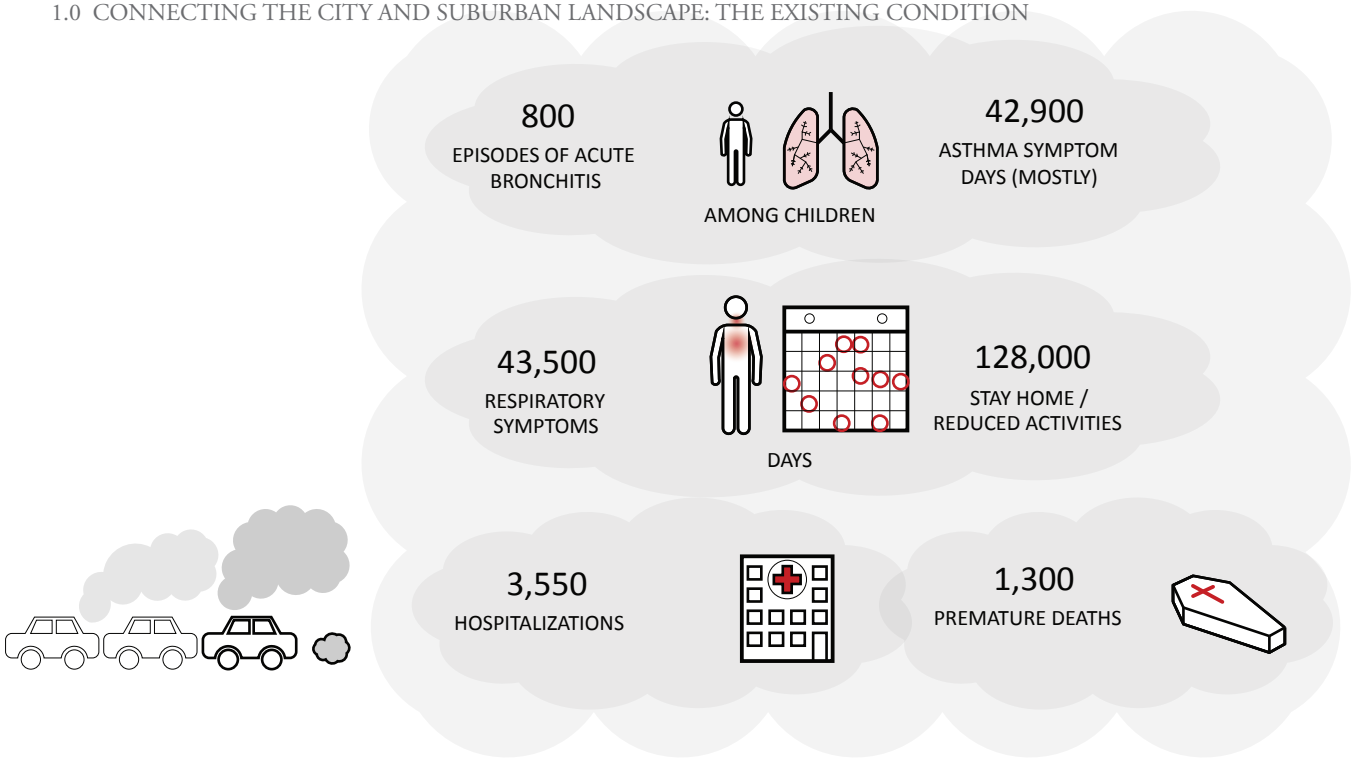


Figure 7
ILLNESS ATTRIBUTABLE TO AIR POLLUTION
Impact on health from exposure to air pollutants.

Environmental Pollution

To no surprise, commuting also contributes heavily to environmental pollution. In Toronto, air pollution is estimated to affecting children's health the most, with 800 cases of acute bronchitis and 42,900 asthma symptom days. In addition, chest discomfort, wheeze or sore throat was also experienced, with the occurrence of 43,500 days of respiratory discomfort symptoms. More severely, 128,000 people chose to take a day of rest or reduced activities as a result of air pollution.[22]

In the recent years, *Traffic-Related Air Pollution* (TRAP) received a growing awareness as it demonstrated its linkage to being a major local contributor to air pollution in Toronto. The seriousness of the matter is concerning when the Toronto Public Health have reported air pollution to give rise to 1,700 non-traumatic deaths and 6,000 hospitalizations each year; over 25% of which are correlated to traffic-related air pollution.[23] The pollutant levels found in Toronto far surpass the health benchmarks and the realization of this is concerning. It suggests an ascending pattern in risks of respiratory, cardiovascular illness and cancer. In addition, research is indicating the relations to diminishing immunology, neurological and developmental problems as well.[24] The symptoms and affects of health are even more prominent in the areas along major transit corridors, which tends to be highways and large arterial roads.[25] The increased risks of health problems are especially influencing the vulnerable demography of young children and seniors who live nearby and people who travel in long commutes are literally in the middle of it all. The constant elongated time of exposure by situating within vehicles during rush hours are hampering health. In general, researchers are suggest being setback 150m away from these transit corridors, or major roads that receive over 100,000 vehicular traffic each day.[26]

In the past decade, Canada's regional, provincial and municipal government have been outlining various policies and programs, to put more focus in lowering pollutant emissions that correlates with ambient air pollution and its related health impacts. But the prominence of illnesses in Toronto is not revealing significant result with the slow progress.[27] The impact of commuting has been illustrated and it is vital to design and implement interventions to reduce air pollution in order to regain public health.[28]

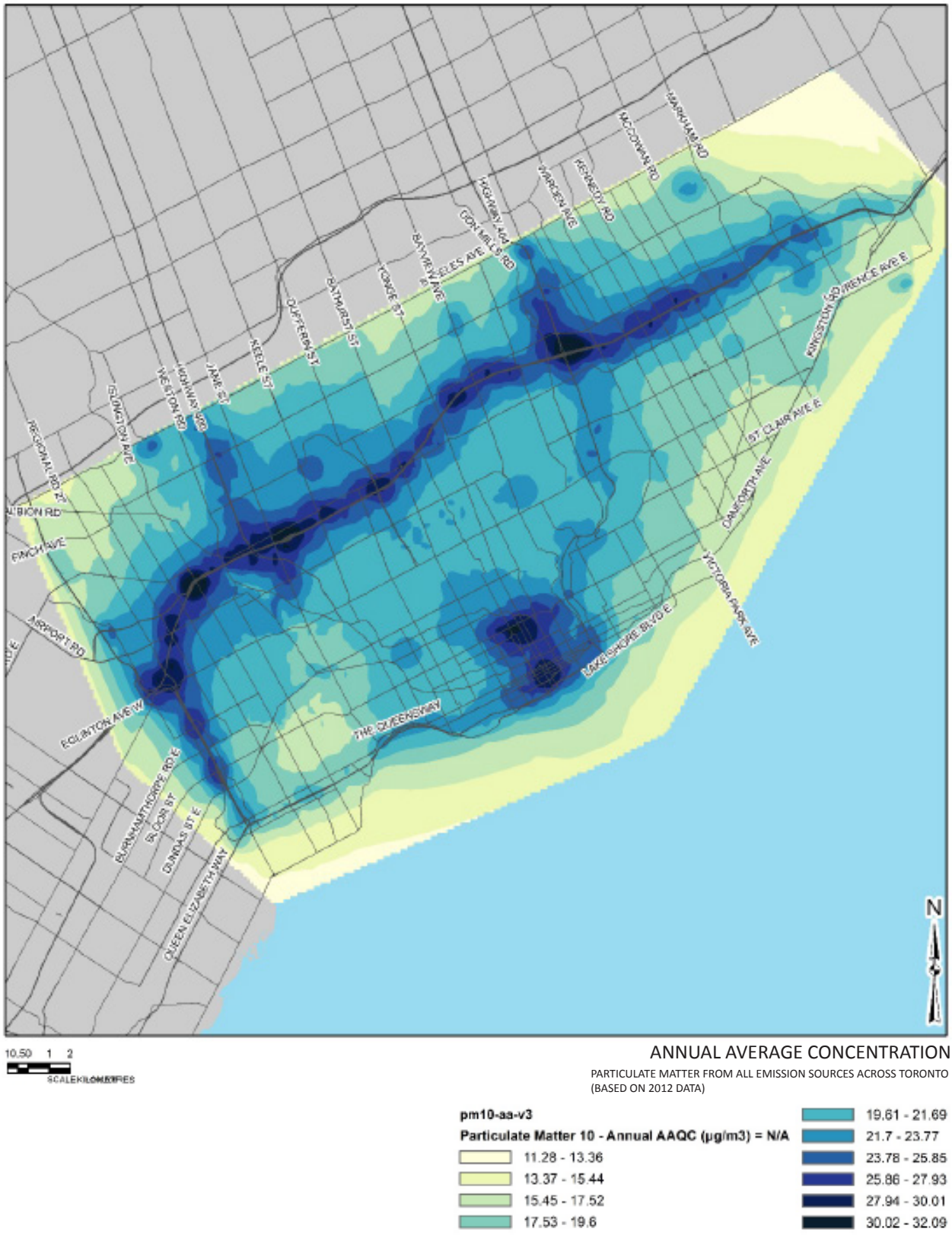


Figure 8
AIR QUALITY
Concentration of air pollutants in Toronto.

Active Transportation

The current demography of Toronto is made up of over 40% of adults and 22% of adolescents whom are overweight or obese.[29] The physical inactivity is a definite issue of the modern Canadian citizens, as research clearly identifies the ties to risks of chronic diseases such as colon cancer, Type 2 diabetes, osteoporosis and heart disease.[30] Luckily, the adverse effect can be achieved to greatly decrease the risk of chronic illnesses through high levels of physical activity, as simple as walking or cycling.[31]

To illustrate the need for active transportation, the average adult over the age of 18 is advised to exert at least over 150 minutes of moderate to vigorous physical activity every week summarized by the Canadian Physical Activity Guidelines. This translates to merely 30 minutes of physical activity, which can be easily achieved with a 2 km walking trip or a 7.5km biking trip 5 days of the week. For children, it is recommended to execute a minimum of 60 minutes of physical activity per day.[32] However, the guideline is not met by most of the population, when 85% of adults and over 90% of children and adolescents are not achieving the standards.[33] It leads to questioning whether the requirements are too rigorous or the lack of opportunity and circumstances are discouraging people to exercise more regularly.

Dangerous Sidewalks

To encourage active transportation, the city may need to reconsider the design of the sidewalks and the overall road network to be less heavily focused on automobiles. Pedestrian accidents and fatalities are to not be ignored when advertising citizens to walk or cycle more. With adequate support and satisfaction of concerns, citizens are no longer abandoned to prioritize immediate safety and overall health.

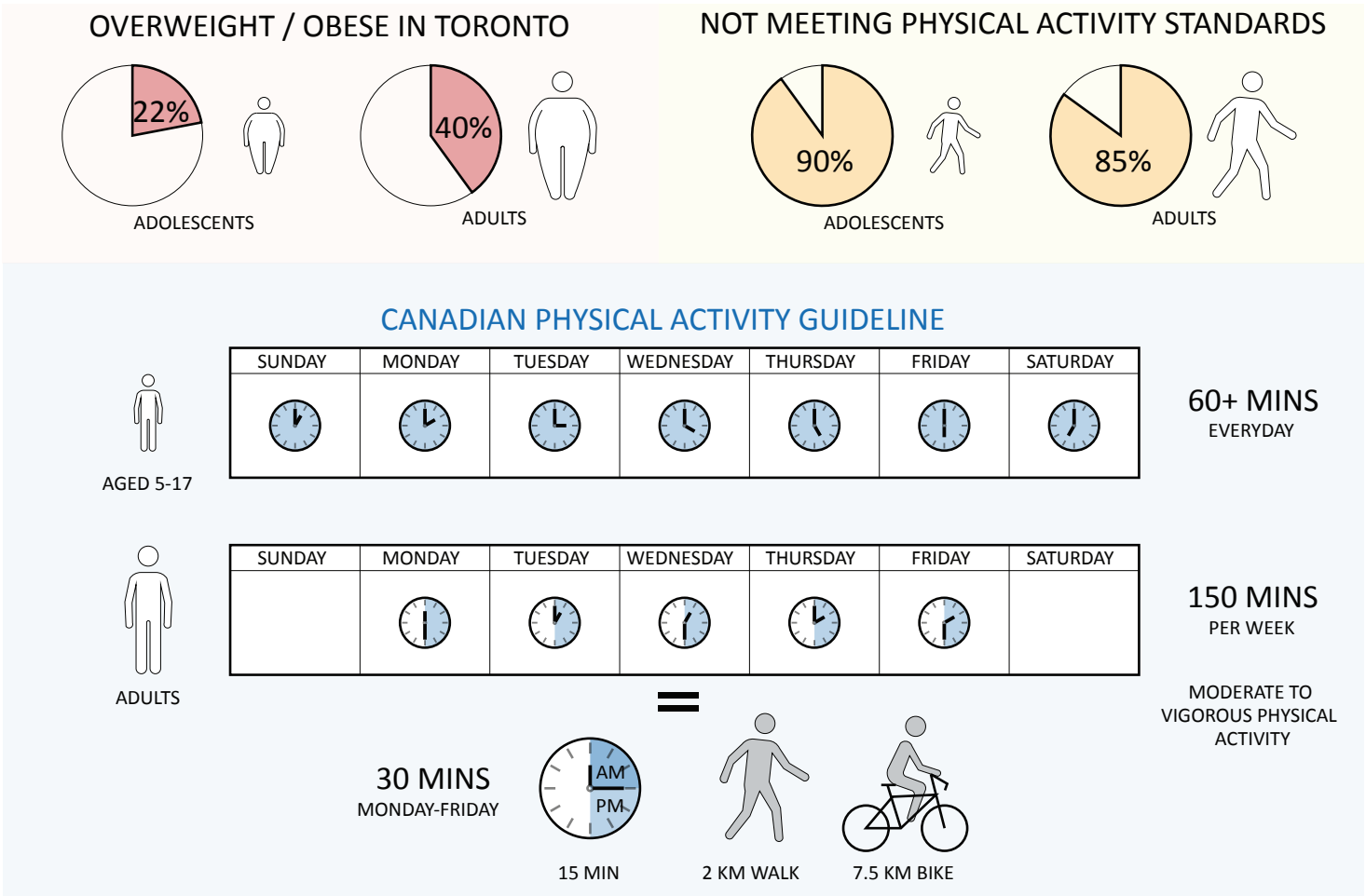


Figure 9

ACTIVE TRANSPORTATION
Physical activity guideline recommended for adults translate to 30minutes of exercise 5 days a week.

Economics

Commuting influences extend from deprivation in air quality to costly consequences in Gross Domestic Product (GDP) due to traffic congestions slowing the movement of people and goods.[34] People are pushed to taking leave of absences and abandoned to feeling stressed with poor health. Conclusively, the workforce is unable to contribute to their full potential, with the lack of production and ability to output, it is causing the economy to suffer. The health-related costs attributed from air pollution alone costs around $8 billion dollars each year as estimated by the Canadian Medical Association.[35] If citizens are staying active, direct medical costs could be prevented, as it is estimated to contribute to $110 to $160 million dollars in savings[36].

Conclusion

The post-war industrial era led to the car-oriented landscape of suburbia that made communities less walkable. Urban city core continues to suffer immensely as temperatures rise and effects of climate change amplify, causing disruption to the ecosystems and citizen health. The large plots of land and concentration of economic activity in downtown Toronto caused the majority of the population to commute to work. Driving as the leading method of commute contributes to the air pollution in the Greater Toronto Area. The consequences are then reflected in citizens' health with increased possibilities to chronic illnesses. Environmentally, the development of neighbourhoods geared towards active transportation and transit reliance is supported, as it suggests significant benefits in air quality, traffic congestion and climate change.[37] Hence, the proposal of the hub relies in alleviating the source of commuters from suburbia to the urban core by reconfiguring the built landscape. Through consolidating mixed land uses, a hub can utilize the mobility of the workforce and encapsulate the benefits of active transportation to strengthen the community health.

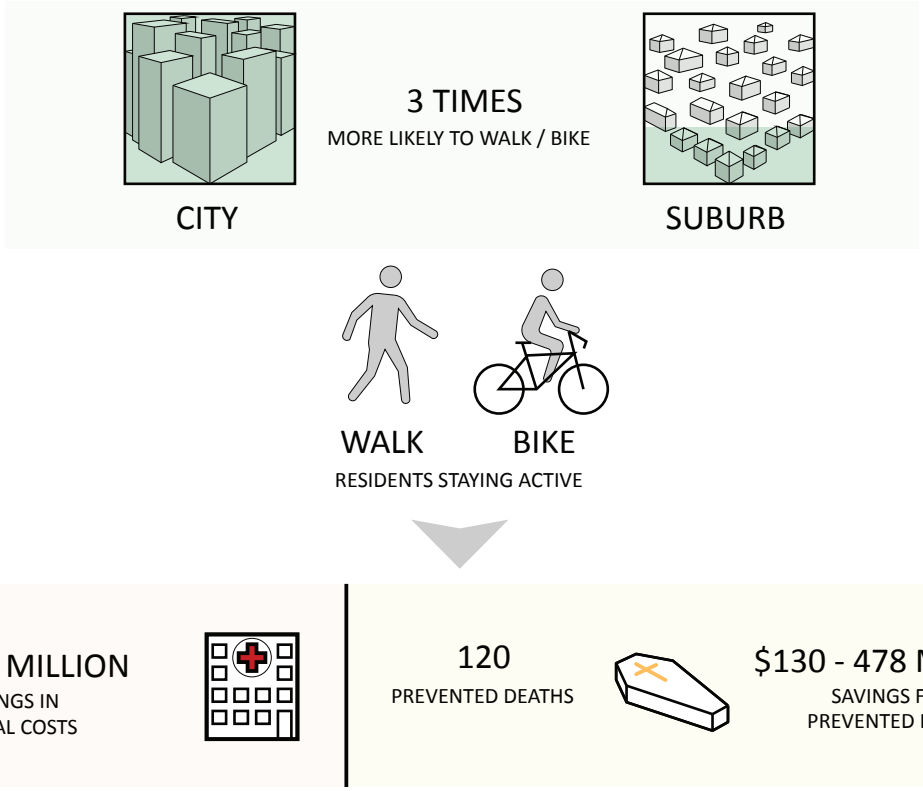


Figure 10

ECONOMICS
Potential savings from physically active citizens.

1.3 City versus Suburb

Interaction

Understanding the difference between the city, suburb and outer city outlines the factors that govern the expectations of citizens' quality of life. The relationship between the built form and the residents suggest how the hub can be designed to provide certain facilities and services for the varying demands.

Kevin Lynch suggests a perspective of looking at the city in terms of its density and interaction between residents. In the outer city, it is not difficult to find that everyone in the community knows one another. There are social merits that exist as everyone is aiding in each other's security and being able to identify any foreign intruders to the close-knit neighbourhood. However, while population surge in a specific area, it begins to resemble the more modern urban town at 70,000 people. Residents dwell in the security of public services with the presence of police protection, medical facilities and institutional centres.[38] Essentially, a very different way of life emerges, as there are too many people in a concentrated area to be closely acquainted with each other. Arguably, the city contends to social division.

When there are even more citizens, at 350,000 people, the reliance on public services increase but so does its efficiency. This brings a distinct character to the region, marking a newfound freedom and richness in economic and cultural diversity. It enables economic activity and even though the city size enlarges, the central core brings familiarity to most residents.[39] Despite the efficient urban services, congestions begin to appear as well. It is often described as the archetype of a modern city planner, referring this as the size of a community that is most sustainable through its self-sufficiency and the ability for personal relationships to develop while providing a decent quality of life.[40] However, it raises the question of whether such environment of an urban city is suitable for forming a family with its impact through the dense built form and moral standards.[41]

Edward Krupat presents another methodology of examining the city in terms of objective data and subjective opinion.[42] While it can be broken down into economic, political, health, education and social components, it reinforces the need to harmonize between objective and subjective notions since it is related to human behaviour.[43] It is difficult to

Figure 11
URBAN CORE
Downtown Toronto, infiltrated with high-rise buildings.


Sheraton Centre
Hilton
RBC

rationalize the functionality of a city or one's lifestyle in a systematic way because citizens' prioritize differently and the effects are constantly affected by changing variables.[44] Hence, despite urban planning schemes, studies and trends, there will always be indeterminate factors affecting the livelihood of a city.

Densities

Urban cities take pride in building an iconic downtown core. Modernity gave way to its formation with elevators extending access vertically while dramatically increasing occupant densities. At 35,000 people per square mile, complaints arise due to the occurrence of congestions and often correlated to the lack of clean air, daylight, and insufficient green space nearby for nurturing children.[45] Being the medium of social interaction, urbanity brings facilities to many adjacent residences. In addition, the close proximity between points of interest limit travel distances to reach the workplace or transportation infrastructure.

At the inner city, it is primarily made up of row houses and multi-family homes. There is a presence of private gardens but the constricted arrangement allows for more budget friendly households. It receives the advantage of abundant public transportation; though at 10,000 people per square mile, it often requires an extensive commute towards the metropolitan centre.[46]

The generic American suburb consist a density of 3,500 people per square mile. This frames a scene of substantially large lots lined with single-family homes. The access to nature is the tradeoff for immense long distance commutes with infrequent public transportation. Social isolation develops without social stimuli; however, over 60% of the American population still indicates favorability towards this living condition.[47] Suburban living is still desirable for the quality of life it provides.

In the establishment of suburbs, *John Sewell* explains how relationships and expectations are sprouted differently in response to the variance in density of the area.[48] For example, citizens are more tolerant of dissimilarity in the urban cities since it is seen as enriching than a threat found in the outer city. These effects are spread out amongst its residents; hence, reflected in aspects such as community values and political views.[49]

The low population density of the suburb entails a certain level of wasted land and issues of mobility and social cohesion in contrast to downtown

Figure 12
INNER CITY
Outskirts of downtown Toronto, dense low-rise & mid-rise buildings.

city cores. At a certain point, only the prosperous households would be able to afford such inefficient built landscape.[50] In other words, as the city population increases, there is merit in saying that the exchange of a thriving economy is given to social solidity. Yet if the social stability is the foundation in mental health, how can communities be designed to allow for adequate opportunity for interaction and encourage a stable social realm for citizens? The ways in which planning policies are formed and carried out will be reflected in the next generation through shaping the well-being of individuals and families today.

Lawrence Solomon predicts an upcoming problem of the middle class continually abandoning the old suburbs for the new suburbs, they would eventually reintegrate into the city for access to services and convenience. This would then drive immigrants away from occupying inexpensive old suburbs but to be housed in the urban core to avoid transportation expenses.[51] The hub could present itself as a method to relinquish this problem by equipping and intensifying current suburban neighbourhoods. Giving the suburban lifestyle an expansion in social realms and convenient access that the urban core provides.

Need for Diversity

Densification suggests the chance of an expansion in the diversity of residents' background, field and general sensibility in the modern city. The urban core concerns of security and safety puts the public realm in deprivation of humanizing and socializing; losing the social benefits that only the enmeshed, close-knit network of small communities can receive.[52] The suburbs need this diversity to grow beyond the typical middle class single-family homes to flourish.

Low Income, Lack of Transportation

Regionally, walkability mapping and walk score assess districts that experience more pedestrian traffic. Correlations reveal that households with low income are living in areas that are least walkable and endangered with higher probabilities of illness and injury.[53] Mobility becomes difficult for the low-income households since the proportion of income spent on basic needs are higher. [54] This can be redefined through implementing complete streets and connecting adjacent streets through introducing a more dynamic ground network.[55] Hence, a safer

Figure 13
SUBURBAN LANDSCAPE
Uptown Toronto, ample green space and spacious lots with low-rise buildings.

pedestrian network of streets can benefit those whom are unable to afford automobiles as well as children and the elderly, who simply cannot drive. By designing a more walkable neighbourhood the vulnerable population is able to relinquish the difficulty of access and social cohesion leading to lower rates of crime with more ground activity.[56] Complete communities would be able to assist low-income households, as the current built landscape is found to limit mobility and transportation options. This can also increase access and availability to healthy foods.[57] Giving the opportunity for low-income households to regain health with more affordability.

Growth vs. Development

In the evolution of the metropolis, planners outline a difference between growth and development. Growth describes the expansion of something, whether it is population or an increase of the current economic state. Development refers to the capacity of the individual or neighbourhood and how the lifestyle within can be improved.[58] It can be seen through the establishment of a new lot, consolidating or change in land use or construction of buildings, upon the approval under the Planning Act.[59] Economically speaking, it is often undesirable when growth is occurring without development to support it. Growth poses more traffic and more commuters on the road, which undermines the quality of life; hence, the need for development allows it to become more promising. However, affordability becomes a concern when there is a greater population and demand, driving property value to thrive. Ironically, without a stable market demand, economies may undergo shrinkage causing businesses to close. The occurrence of local stagnation is a precursor that lead to the flee of residents and job opportunities.[60] Controversially, there is a common uproar in fear of gentrification whenever growth or development is mentioned. The displacement of an established community is worrisome since it evokes social isolation between the current residents and businesses. Nonetheless, many components are codependent and can fluctuate the ability of a city to sustain and prosper; it needs to gain resilience and adaptability to new circumstances.

The regional municipality of York consists of many commuting cities north of the city of Toronto. From 2011 to 2016, *Statistics Canada* revealed a 7.5 percent in population growth in the area,[61] surpassing the provincial growth of 4.6 percent.[62] The proposal of the hub strives to bring people together, living in small neighbourhoods within a larger city to encapsulate the benefits of close-knit communities for social security and cohesion, while accommodating for varying levels of affordability and stability of economy.

Economy

Ontario was once a major manufacturing centre of North America, while it is still generating over $258 billion in 2011.[63] The abundance of assorted industries that range from agriculture, mining, manufacturing to design and technology is contributing to the resilient economy of Ontario.[64] The occupation makeup of high tech, financial services and knowledge-based industries account for almost 50% of all workers and immersed in generating as much as 37% of the national Gross Domestic Product (GDP).[65] The Greater Golden Horseshoe, the extended metropolitan area surrounding the city of Toronto alone makes up to 25% of the nation's GDP.[66] As evident, the economy is shifting with constant innovation in the service and knowledge-based sectors.[67] The increasing value on these sectors are changing the landscape of the workforce, where the basis of work is no longer executed in factories but heavily relies on technology with different demands at the workplace facilities. The hub stands to accommodate this change and provide workspace for the expansion of these sectors.

1.4 Toronto

GTA Commute time

In 2011, the *National Household Survey*, curated by *Statistics Canada* revealed astonishing facts that 17.2 percent of commuters in Canada are taking over 45 minutes to step into the office. Meanwhile, the national average commuting time is 25.4 minutes, which is nearly the same as United States at 25.5 minutes. In the commuter shed of Toronto, it takes 32.8 minutes on average for residences to reach their respective workplace.[68] Noting that these averages are thrown off scale when put into perspective of the citizens whom reside close to work and those who travel well over an hour. Nationally, 74 percent or 11.4 million workers take the automobile as the primary method of travel.[69] In summary, most of the nation suffers from commute and the impact of air pollution and health is only part of the consequences of commuting. The inefficient journey costs citizens' time and transportation costs, the hub hopes to reallocate resources with the support in the mobility of work.

Dependency on Car

The *Growth Plan for the Greater Golden Horseshoe* recognizes how the suburb is heavily reliant on travelling with the automobile. Health problems rise in regions of increasing rates of inactivity within low-density neighbourhoods, as residents experience obesity, diabetes and cardiovascular illnesses.[70] It also urges the use of zero or low emission vehicles and

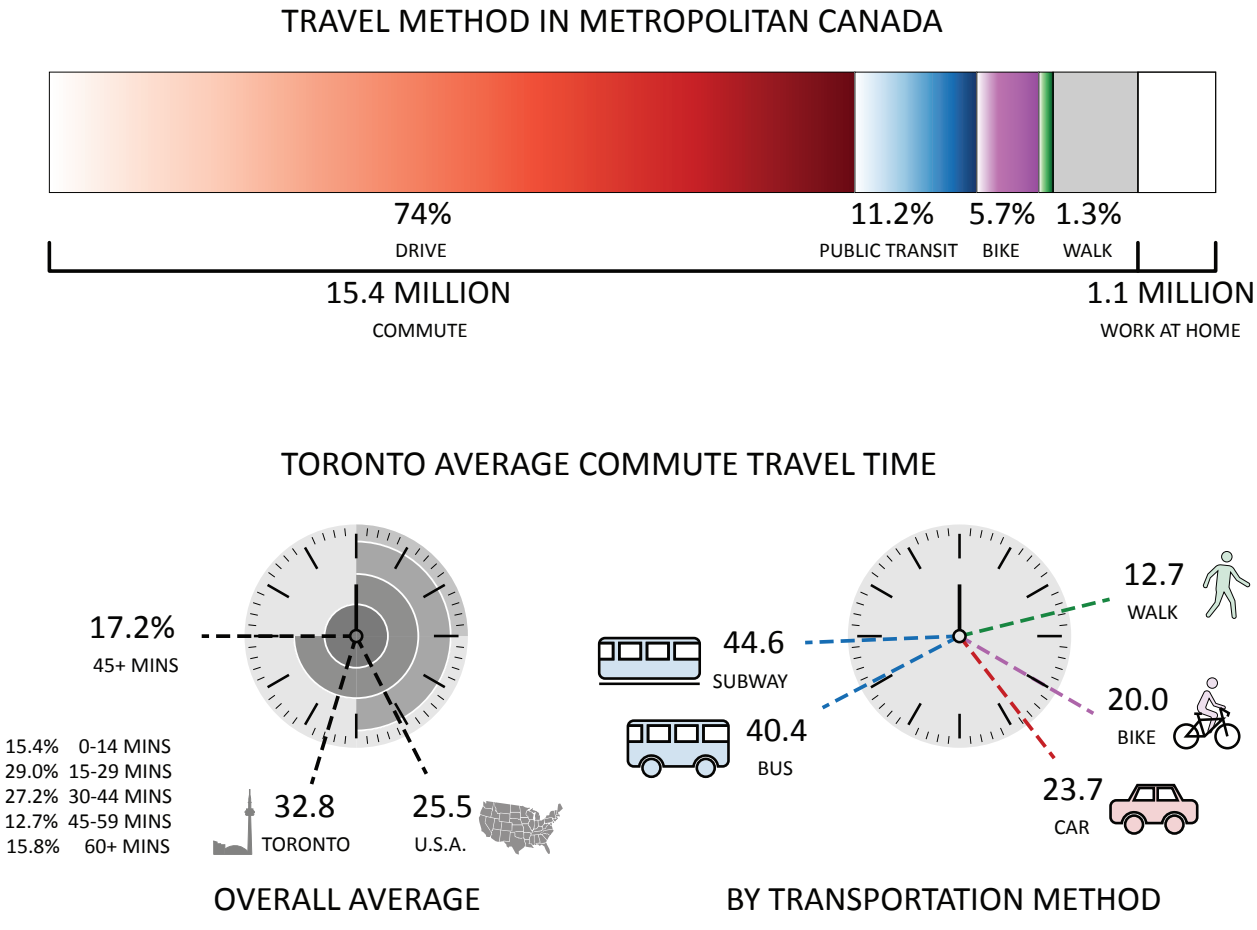
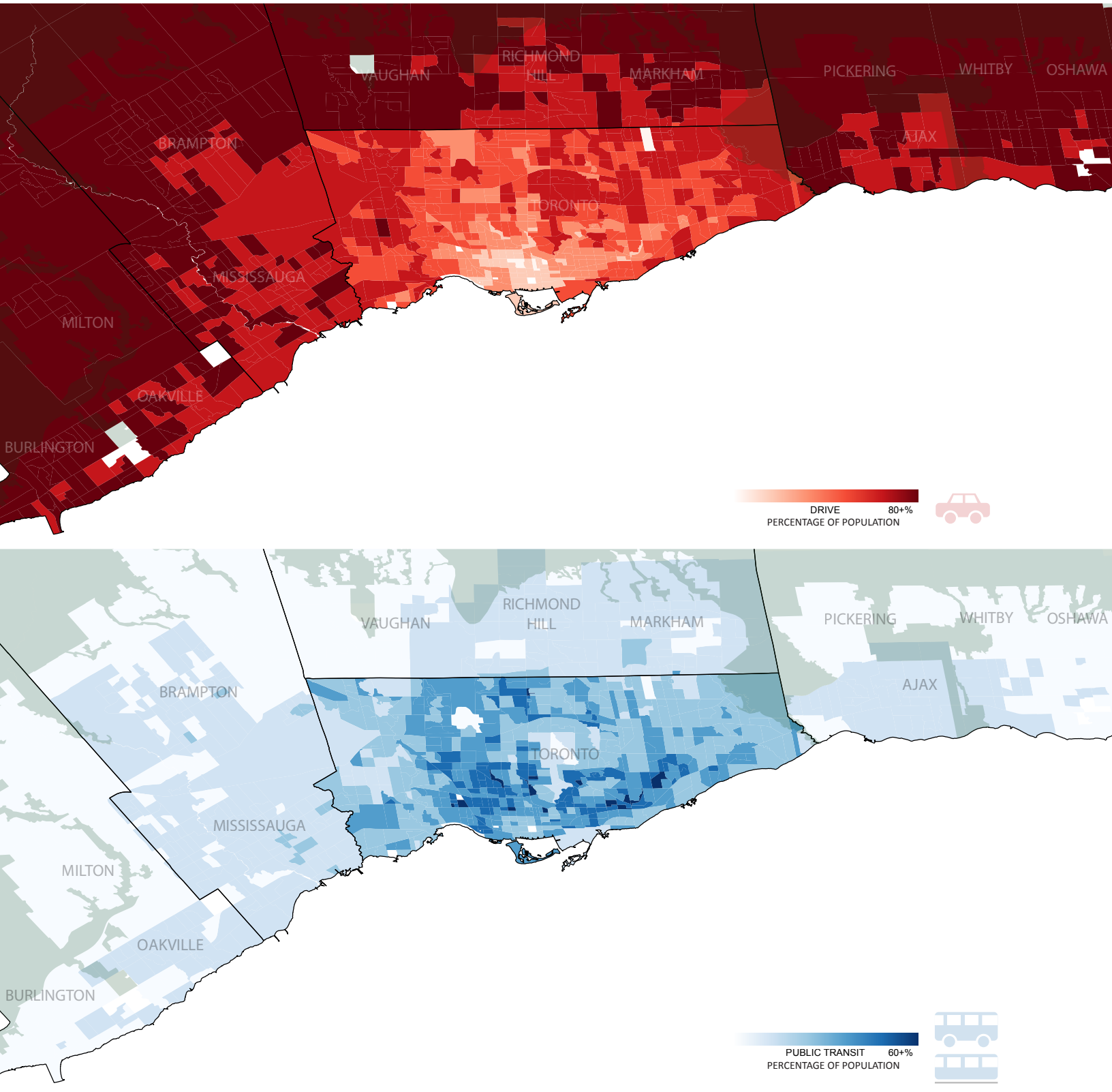
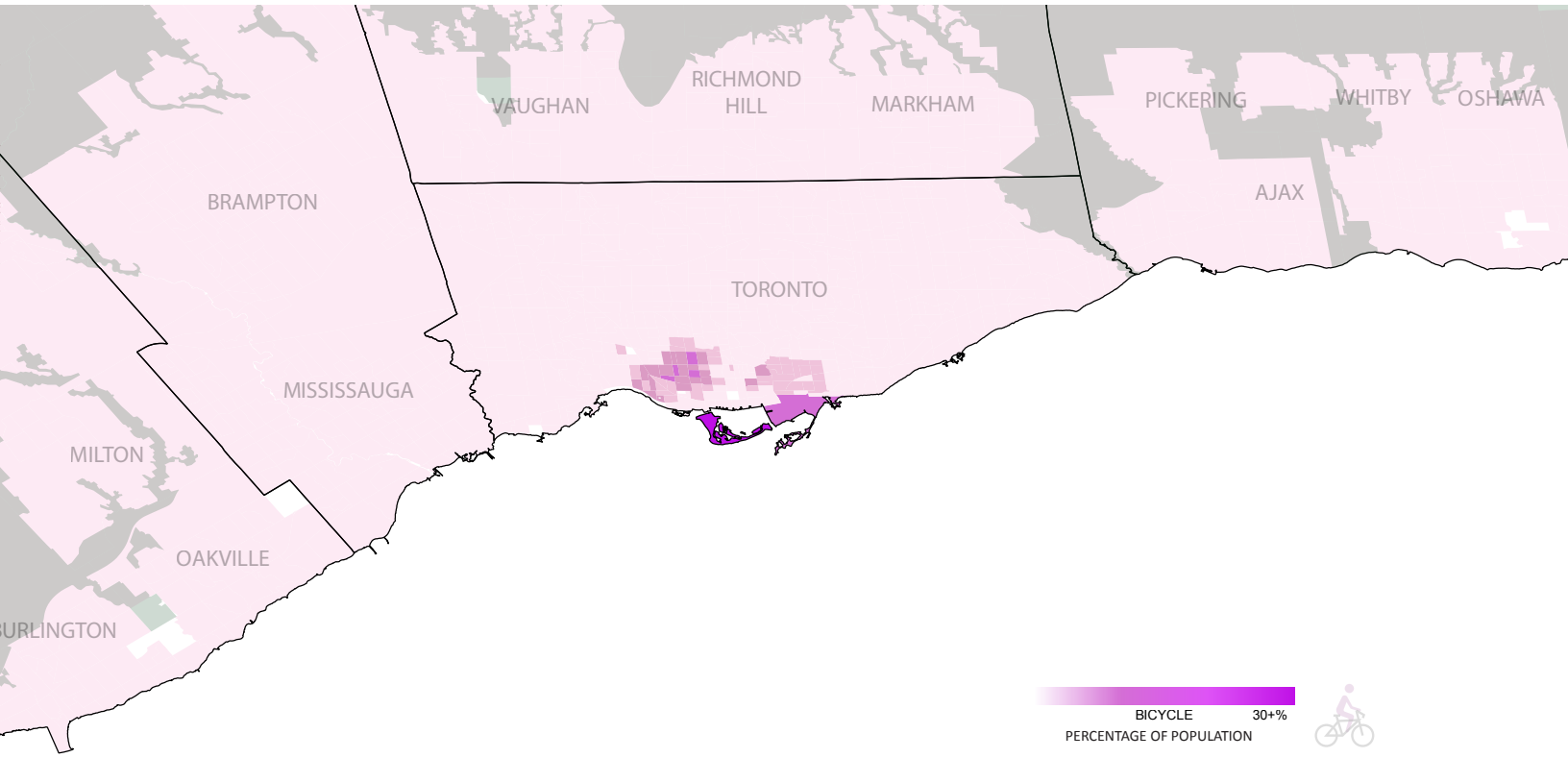


Figure 14

COMMUTING TO WORK

Average commute time in Toronto is 32.8 minutes, with 38.5% of the population travelling over 45minutes.


VAUGHAN
RICHMOND HILL
MARKHAM
PICKERING
WHITBY
OSHAWA
BRAMPTON
AJAX
TORONTO
MISSISSAUGA
MILTON
OAKVILLE
BURLINGTON
DRIVE
80+%
PERCENTAGE OF POPULATION
VAUGHAN
RICHMOND HILL
MARKHAM
PICKERING
WHITBY
OSHAWA
BRAMPTON
AJAX
TORONTO
MISSISSAUGA
MILTON
OAKVILLE
BURLINGTON
PUBLIC TRANSIT
60+%
PERCENTAGE OF POPULATION
10
0
10
20
30
40 KM
GREENBELT



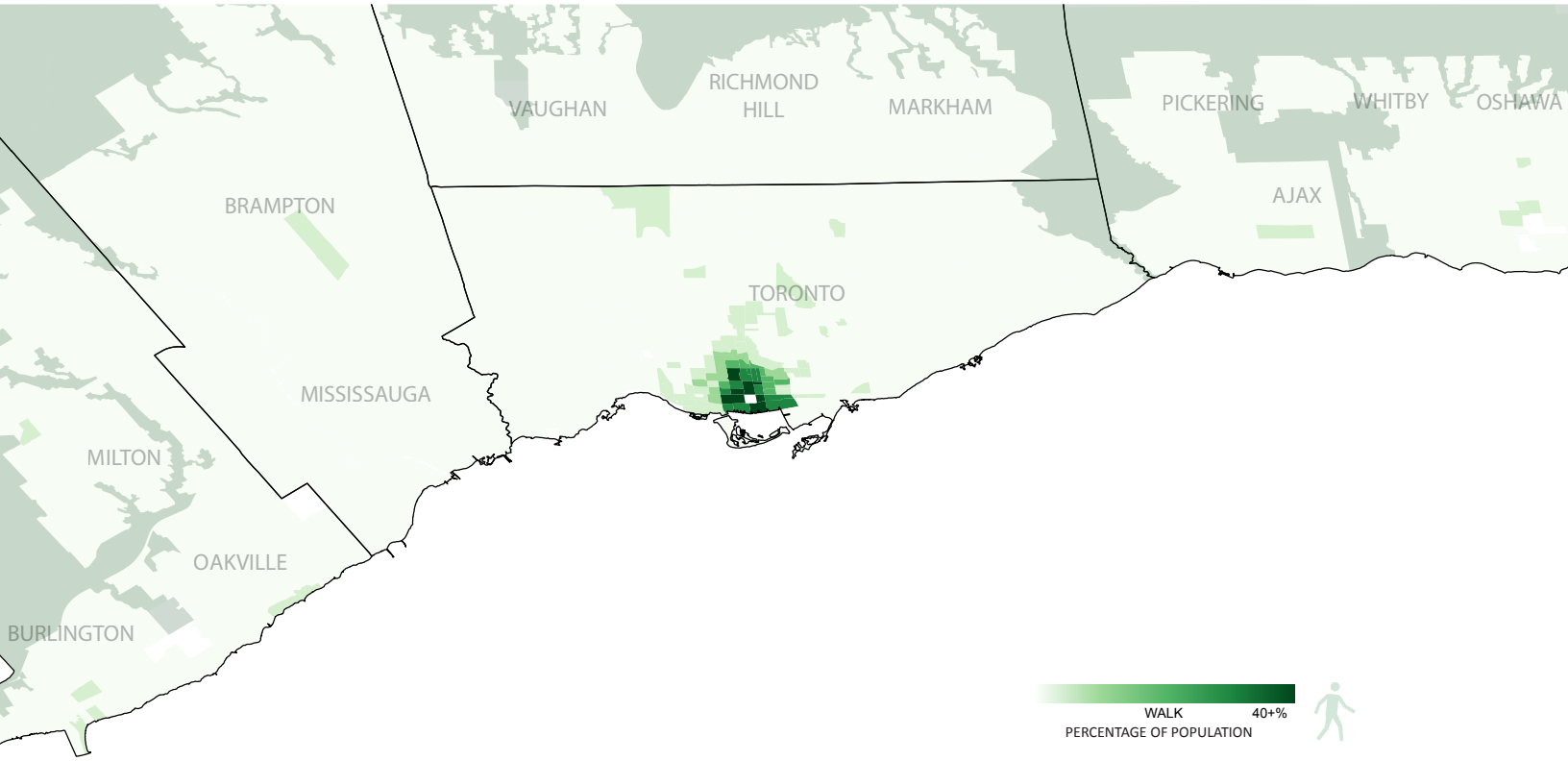


Figure 15

COMMUTE METHOD BY LOCATION

Saturation of commute by driving in cities surrounding Toronto.

other strategies such as reducing trip distance and duration to minimize environmental effects of the automobile. The city also indicated valuing innovative methods that may provide access to jobs, homes, institutions and amenities.[71] Active transportation is a priority in implementing to the suburban built form. Developments that are supported by transit ideally incorporate a mixed use of residential, office, institutional, and commercial space.[72]

The physical activity of walking in Toronto's downtown core is double of the outer GTA. When comparing the travel method of choice, the difference is significant as public transit is used 4 times more often. In the city, when the automobile is chosen as the method of travel, the distance travelled is typically half as far than the outer city.[73] Over 55 percent of the trips are less than 7km for cycling and over 20 percent are less than 2 kilometers for walking.[74] This can easily be attributed to the supportive facilities the core provides for active transportation.[75] Downtown has a smaller subdivision of land with smaller street blocks to reach one's destination and a cycling network that has been implemented and refined for many years.

The residents of more walkable neighbourhoods in the Greater Toronto Area do more utilitarian walking and travel by transit more frequently; consequently, body weights are lower with less driving than those who live in less walkable neighbourhoods.[76] Figures also indicate a staggering 7 percent lower chance to be obese when dwelling in the inner city than the outer city.[77] This alleges the preposition that it is the lack of opportunity and facility for active transportation that cause people to drive more. Logically, the hub interjects into the established neighbourhoods of suburbia, encouraging the immediate adjacent residents to utilize the conglomerated services and facilities through active transportation.

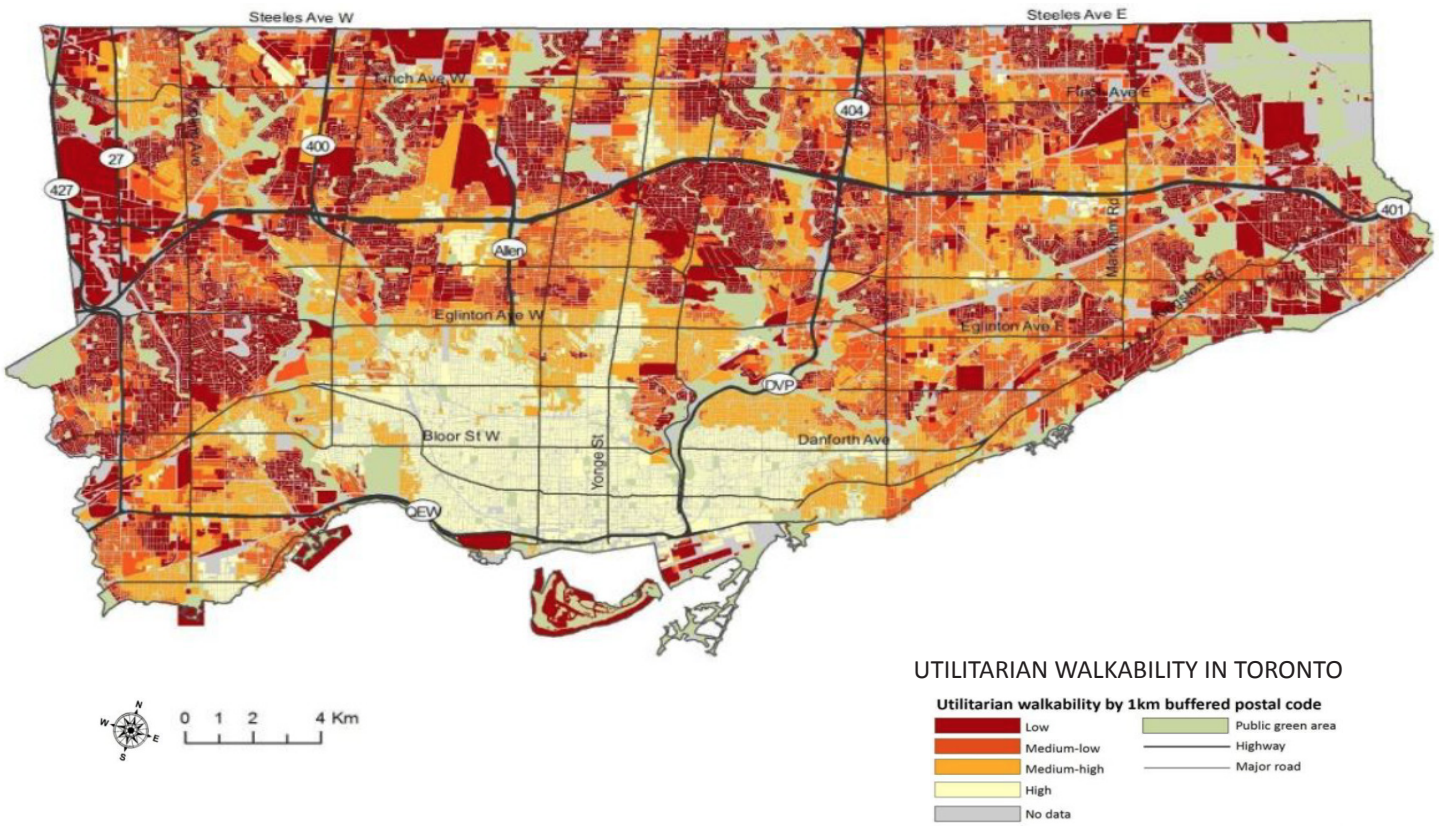


Figure 17

WALKABILITY AND INCOME
Maps indicating areas of low walkability in Toronto.

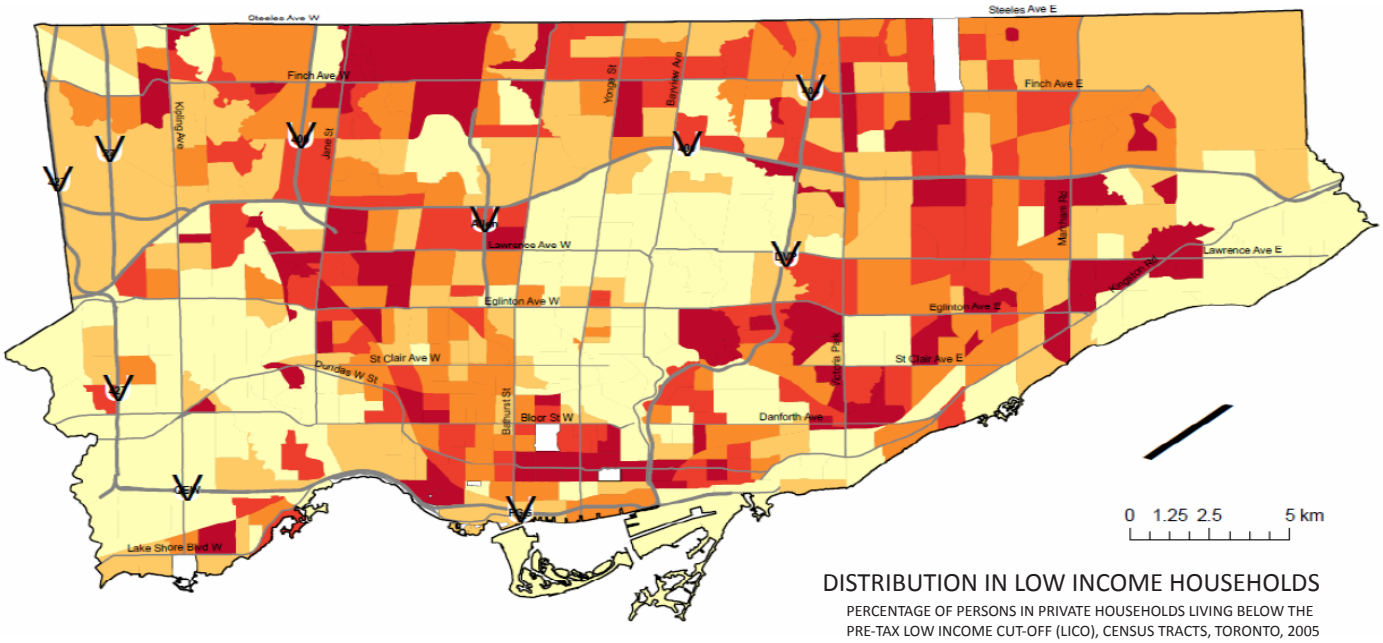


Figure 18

WALKABILITY AND INCOME

Maps indicating areas of low-income households in Toronto.

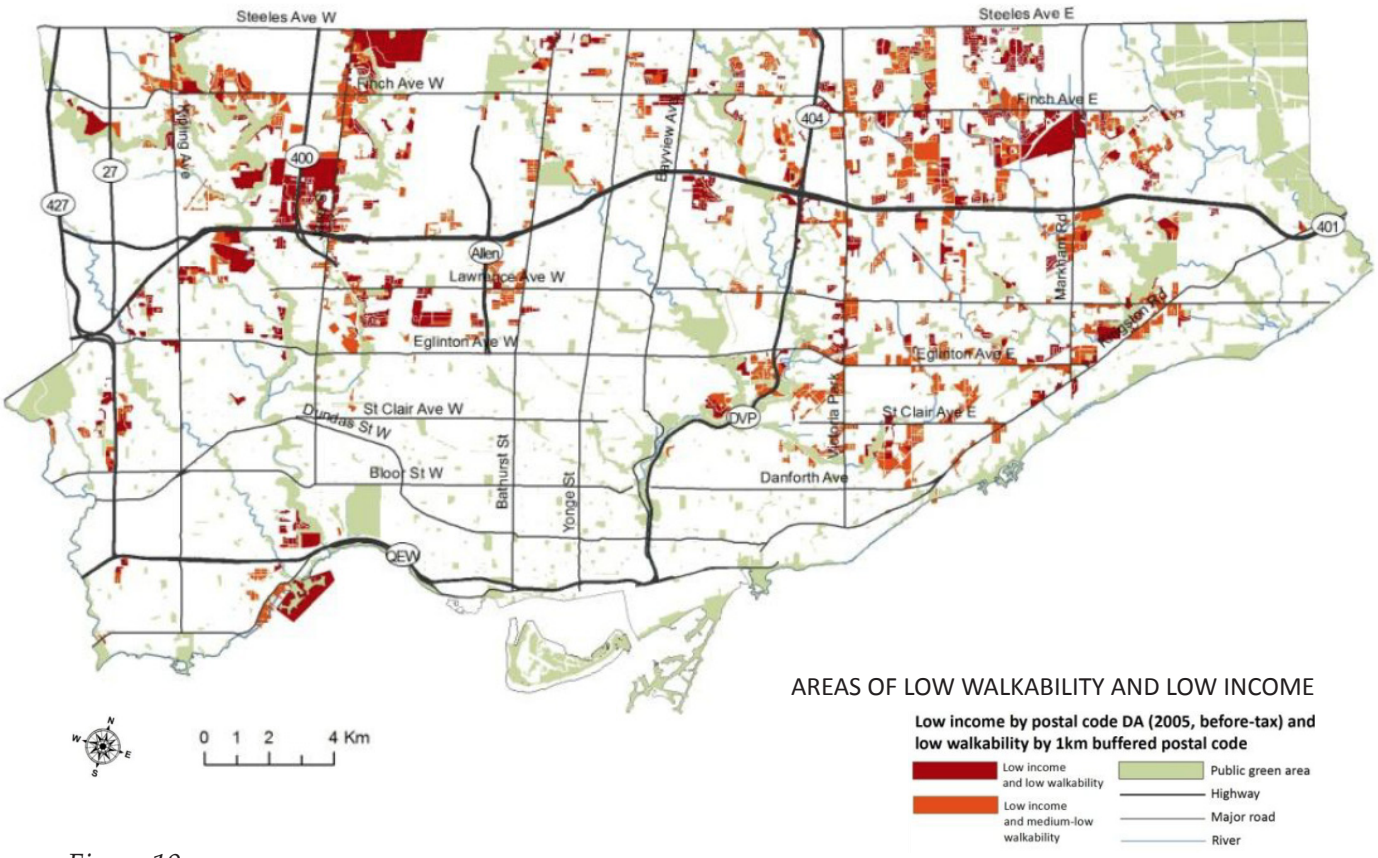


Figure 19

WALKABILITY AND INCOME

Maps indicating correlation between areas of low walkability and low-income households.

Sustainability

The natural landscape being the positive quality of suburbia is intoxicated by the damaging lifestyle. The excessive automotive dependency is causing traffic congestion, which inherently triggers imminent pollution to the natural environment, damaging the air quality and water resources. The government has established goals for municipalities to reduce greenhouse gas emissions in the long run.[78]

Overall, there is an imperative need to reduce greenhouse gas emissions from every industry.[79] The construction industry is in no place to shy away from this problem. Building systems undeniably are a major source in contributing to the impairment. Inevitably, controlling the interior environment is a challenge in the cities around Toronto since temperatures range from over 30°C in the summer and dive below -40°C in harsh winters. Sustainable systems need to be incorporated in future developments to protect the natural landscapes of suburbia.

Ontario is the home to many scenic environments of vast ecologic and hydrologic multiplicity, such as the Oak Ridges Moraine, Niagara Escarpment and the Greenbelt Areas.[80] These regions not only need to be protected but preserved for the richness it brings to give opportunities to recreational activities, enhancing citizens' health and quality of life. It is also the source of potable water supporting life and feeds the countless resource-based industries, while diffusing the impact of greenhouse gases from the city.[81]

By regulating future development and land use, the government aims to prioritize public health, safety, social equity and minimize influence to protect the natural and built environments. Planning officials recognize merit in efficient developments that aim to not interfere with natural resources. Designs that allow for green spaces and encourage public service centres to aid affordability for the public are also valued.[82]

Green infrastructure is defined to be the components that serve ecological and hydrological purposes whether it is natural or man-made; this includes systems such as storm water management, parkland, urban forests, permeable surfaces and green roofs.[83] The desire is to implement resilience in communities and to cultivate long term planning goals of net-zero neighbourhoods.[84]

The hub sprouted from the possibilities that technology have given way to the construction industry. Integrated building systems and passive strategies are achievable to create sustainability. It is crucial to recognize the importance of sustainable development and protect the ample greenery and access to green space, as it is one of the overarching benefits of suburban living.

Figure 20

TOOGOOD POND PARK TRAIL

Living in suburban communities gives easy access to green space.

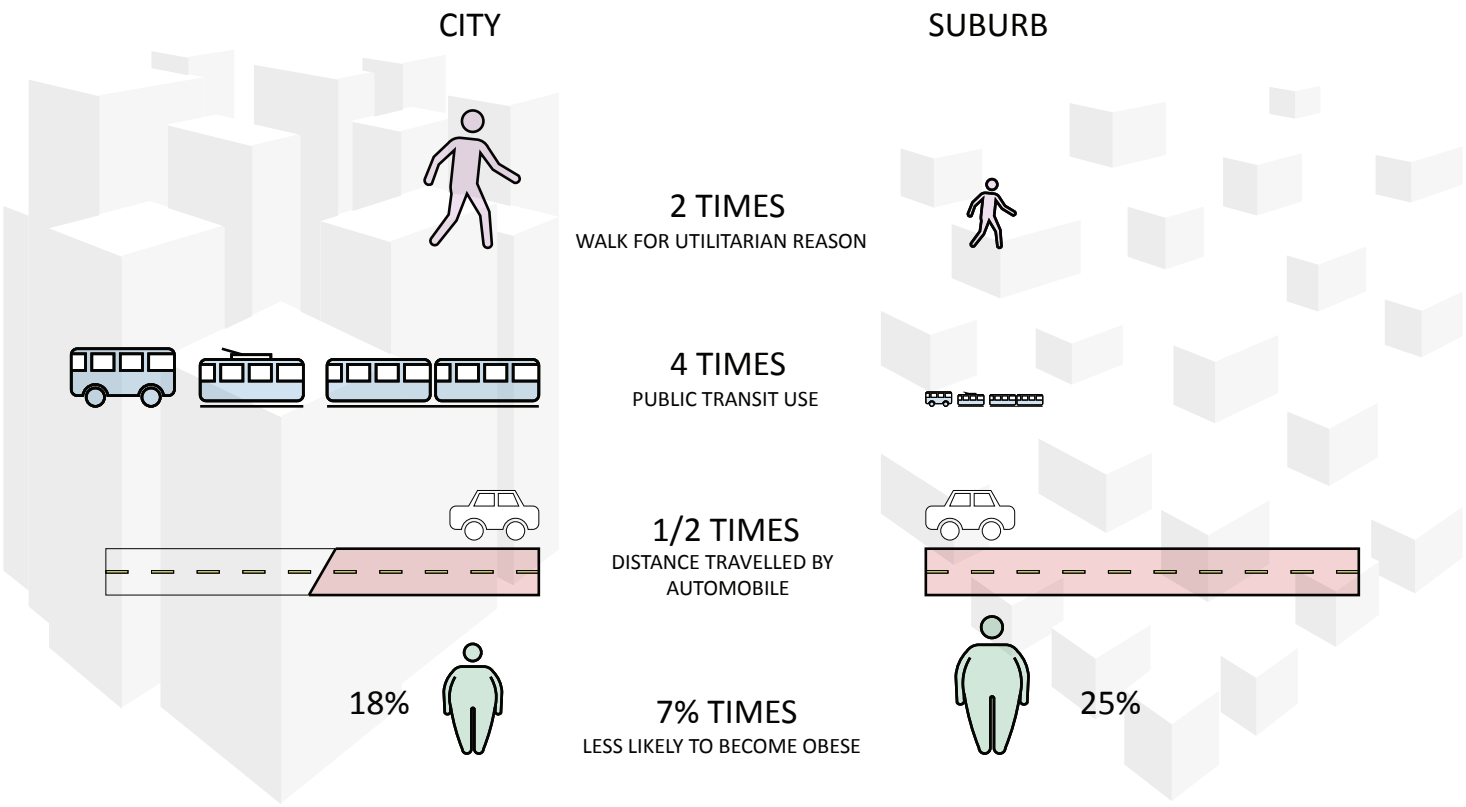


Figure 21
CITY VS. SUBURB
Comparison of travel methods in relation to the chance of obesity.

1.5 Problems, Problems, Problems

Technology Transforms City

Modernity transformed the city, just like the machine age has taken over the industrial era. The revolutionary invention of the computer brought upon information technology. It sprouted the concept of translating electronic connections into physical connections in the real world, and evidently influencing the modern built landscape.[85] In the 1900s, affordable electric power enabled businesses and society at large to operate on a budget. The prevalence of this, rapidly transformed cities enabling elevators to mobilize people within record high skyscrapers. Businesses were enabled with electrical lighting to operate on an extended schedule and stay open after sunset. Analogously, cities are about to transform yet again with cloud computing and mobility at a different realm.[86]

The system of organization in the office resembles the city.[87] Conversely, the built landscape has yet to revolutionize despite the changes in work. Buildings and offices will increasingly require adaptation to accommodate for the future needs.

Globalized economy was enabled with technology advancement. It is empowering as it connects intellects and industries worldwide to innovate without location as a limitation. Although traditional industries are still prominent in the economy, globalization and technology will increasingly be replacing the occupational landscape.[88] There is a demand to transform regional economy to gain resiliency and allow the community to sustain in the long term.[89] Reinforcing the need for the hub to expand the method of which suburbia can adapt to future needs of the workplace.

Figure 22

COWORKING SPACE
Currently, most coworking spaces are targetted towards laptop work.

Laptops in Urban Cores

Cloud based computing are mobilizing workers. The convention of work from home is not bizarre anymore. Coworking spaces are on the rise for the modern worker. However, the locations are still concentrated within the urban core. Nonetheless, it gives these providers stability in business with the high population concentrated in downtown Toronto. However, the services and facilities provided are generally catered for the average laptop worker. Most consist the utilities that serve as an alternative to the noisy café in the buzzing downtown. There is opportunity in assimilating this setup of work in the suburb with the addition of other equipment allowing for other industries to utilize coworking spaces and to transform the traditional need of commuting.

1.6 Isolation in Suburb

Loneliness

A common criticism of suburbia is the difficulty in reaching any points of interest. The desire to even get to a public library is a journey in itself. Suburban communities maintain a coarse grain in the composition of its building fabric. Distinct regions defined by zoning separate the quiet residential streets with intermediate green open space for parks and independent industries occupying the employment lands. This creates the phenomenon where individual areas can grow without interfering with one another.[90] This is ideal in the sense that there is no intermixing the pollution and filthiness of the manufacturing plants to school and areas of rest and recreation; however, the smaller scale commercial and manufacturers become less accessible to the residents. Generating segregation without viable modes of transportation other than the sparse public transportation system and individual automobiles. Isolation and specialization is a fine line for serving the purpose it compels to be, a planning theory that is controversial for finding the ideal effective grain of the city.[91]

"Suburbs can cultivate social isolation and promote the kind of social and ethnic homogeneity that breeds intolerance."[92]

The urban lifestyles of people living in city centres are mounting loneliness, as there is a lack of conventional attachment to family and community.[93] Moreover, added responsibilities taking away precious time means less bonding is occurring between one another and people end up feeling isolated. When the city concentrate on arranging itself based on automotive transportation, the separation increases between citizens. Through building strong meaningful relationships in the community, there can be opportunities to end contemporary lonesomeness.[94] The hub prioritizes bringing people together for the potential to cultivate culture within the community and allow for the public to interact and bond a sense of belonging.

Urban Growth Centres

The government has projected urban growth centres for the Greater Golden Horseshoe area around the city of Toronto. Essentially, it is each targeting to become the new downtowns for each township to focus on housing the incoming population and employment expansion. Planning guidelines suggest these focal points to be a place for meeting, cultural activities, public institutions, and major commercial activity supported by a transit nexus hub.[95] However, this model is still upheld by the means of mobility heavily dependent on automobiles without accounting for the proximities of neighbourhoods to the urban growth centres. The intervention of the hub operates at a smaller scale to serve individual neighbourhoods instead.

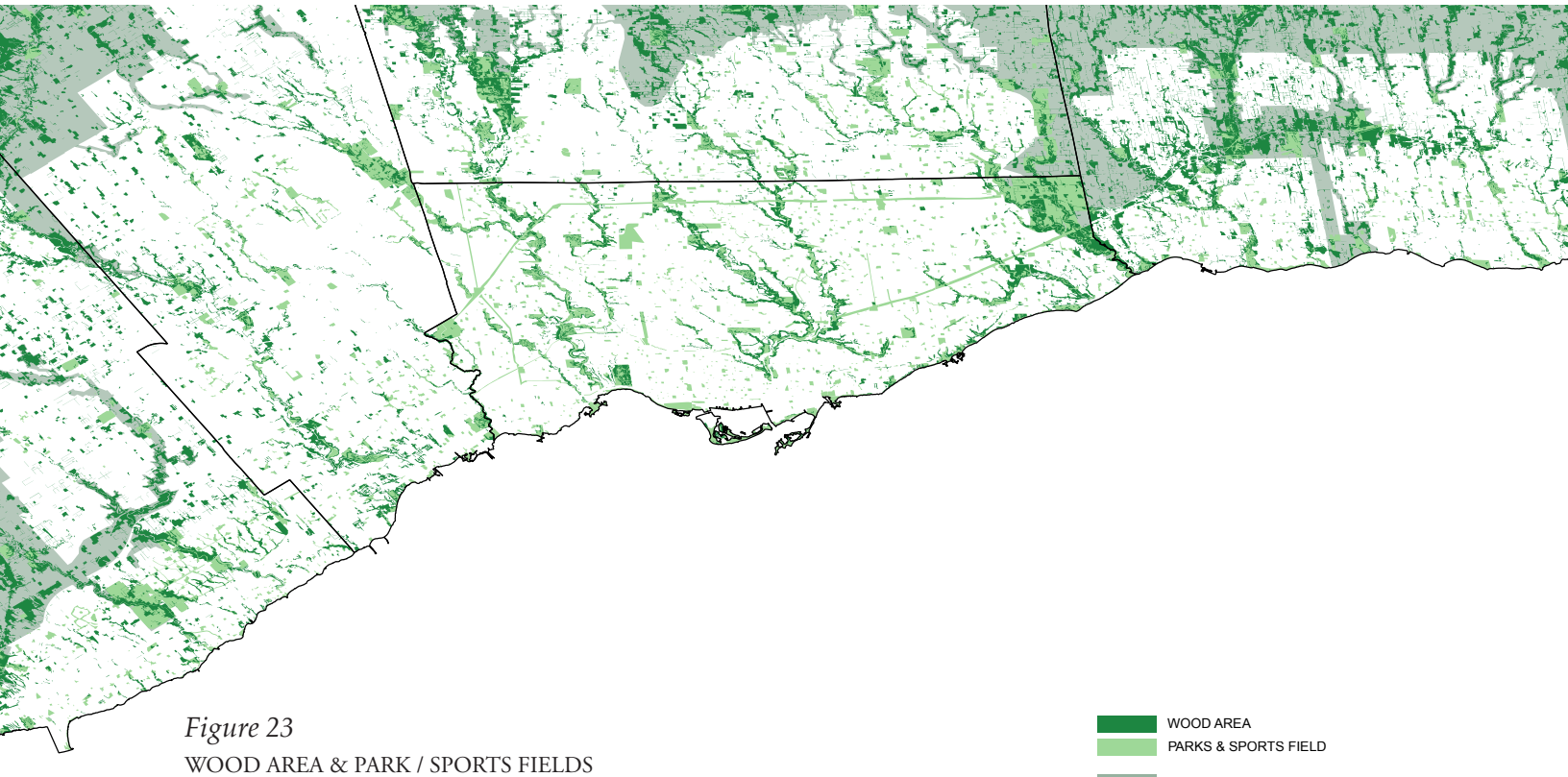


Figure 23

WOOD AREA & PARK / SPORTS FIELDS
Distribution of green space throughout GTA.

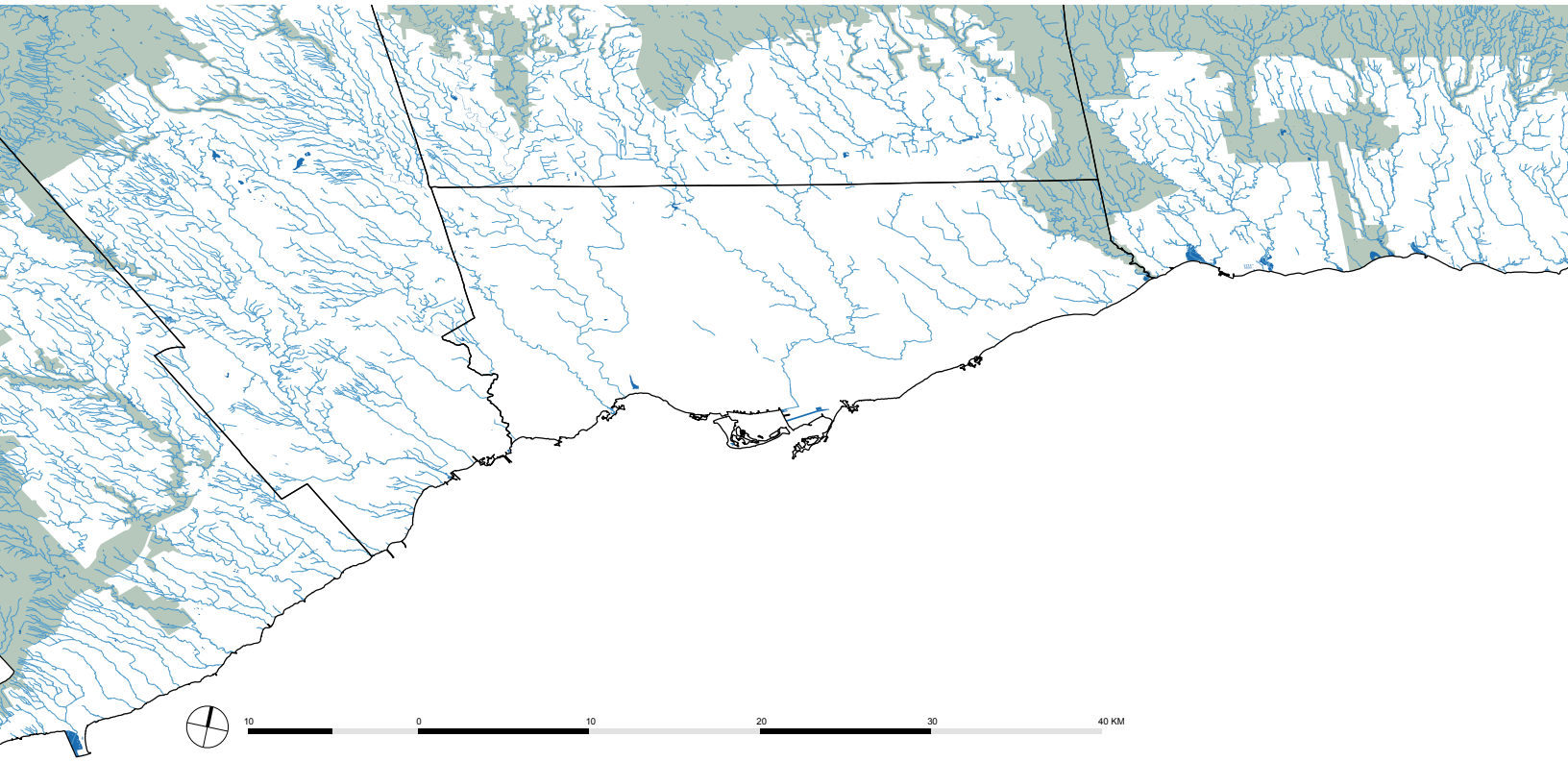


Figure 24

WATERBODIES AND WATER COURSE
Presence of water resources beyond the city core.

Opportunity for Change

"Mobility is at the heart of this revolution."[96]

Extending more than a quarter of the century, mobile phones and laptop computers have been present. The potential of the Internet was not yet discovered until the release of cloud computing, commencing a new way to interact, and further pushing globalization to a new level.

The proposal aims to create an impact to the existing built environment of the suburban communities. Being mindful of creating a safe environment to support active transportation. Embracing the access to nature that suburbia thrives upon. The hub consolidates commercial opportunities for local businesses and a space for connecting with other industries to change the landscape of the economy. The time saved from commuting is alternated to opportunities to develop deeper connections with friends, family and colleagues. At a global ecology level, the overall reduction in greenhouse gases can transform cities and mitigate traffic congestion returning the loss of GDP from delayed transportation.

The addition of a communal garden encourages an agri-food network for the neighbourhood. It raises awareness in the process of cultivating food, an educational opportunity for children and a source of fresh, affordable food for the lower income families. The compact built form aims to consolidate and become a node for the surrounding residents. Reversing the current sparse intersection density, the hub aims to tie facilities together. The proposal is not to excavate new land but to manipulate existing underutilized land. Revitalizing suburbia to become more resilient and accounting for the needs of the community.

Figure 25

AERIAL VIEW OF SUBURBIA

Defined disconnections of building uses and automobile dominated landscape.

2.0

EVOLUTION OF THE INDIVIDUAL COMFORT

HOME, OFFICE, COMMUNITY

2.0 Evolution of the Individual Comfort: Home, Office, Community

2.1 Home Culture

Demographics Trends

The province of Ontario houses a population of over 13.5 million people, over 85% residing in metropolitan cores, mainly focused around the shores of the Great Lakes. The Greater Golden Horseshoe is the extension of the urban core of the region's largest city of Toronto, with a staggering combined population of over 9 million people; it is one of the fastest growing urban regions in North America.[1]

Canada is known for multiculturalism and acceptance of diversity of culture and religion. Hence, 40% of the annual national immigration or approximately 250,000 people who choose to come to Canada, end up settling in Ontario. Speaking over 100 languages and dialects, the city of Toronto is often recognized in its cultural richness.[2]

With 5 million households in Ontario, the median age is around 40 years old and the life expectancy is 79 years for men and 84 years for women. The labour force focus on adults aged 25 and over, which makes up of over 6 million people and around 64% have completed post secondary education.[3] This metropolitan centre population is predicted to grow to 13.5 million people and 6.3 million occupations by 2041.[4] Toronto is a city that is highly educated, constantly training the next generation, and also an immigration centre attracting global talent, no doubt Toronto and its surrounding cities are in dire need to facilitate this growth.

The aging of the Baby Boomers entail a situation of having to mend a gap between the generations. Millennials are, if not already, actively engaged in the workforce. With Generation Z coming up, the technology driven generations have different demands in the job, such as valuing meaningful work, sense of accomplishment, social media freedom, device flexibility and work mobility.[5]

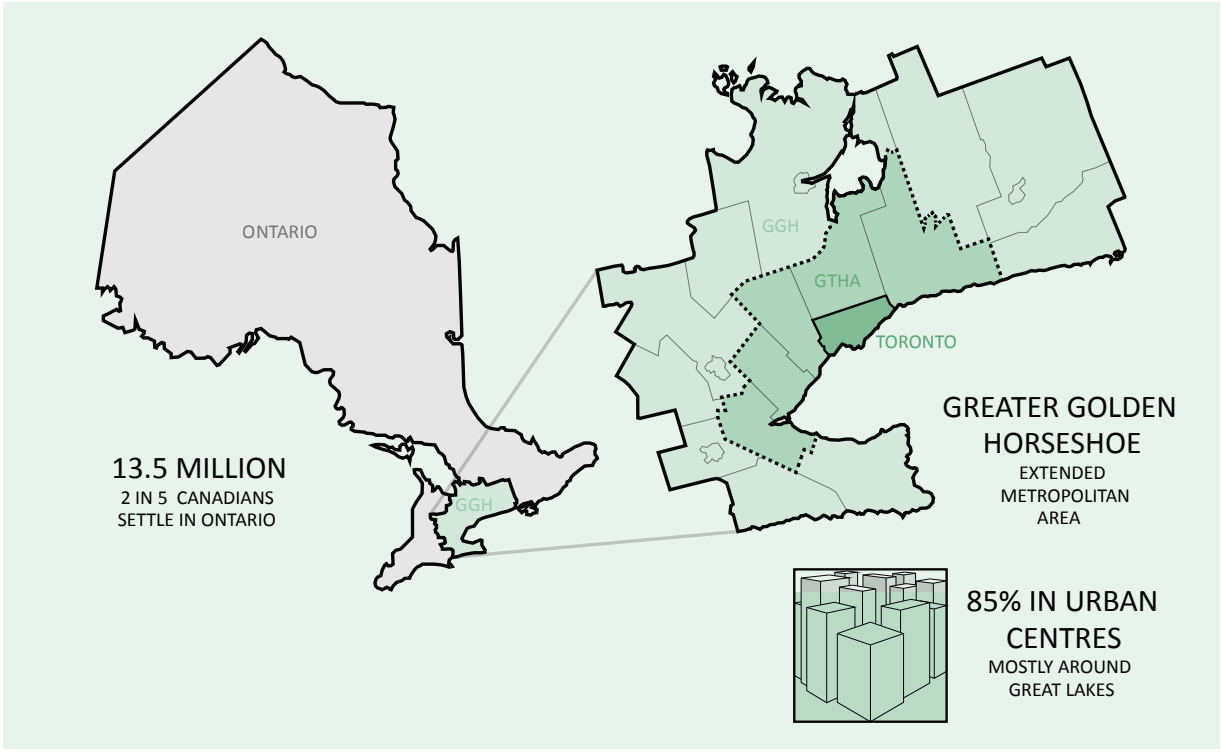
The Baby Boomers are aging. By 2041, over 25 percent of the population will be over the age of 60. Ultimately driving the demand for more walkable neighbourhoods.[6] The *life course* model advises on the need for evolving trends of goods and services throughout one's lifetime.[7]

The presence of change in the urban population is also prominent in the households. In the past 70 years, the average persons per household decreased, while number of households increased dramatically; from 4.3 persons in 2.6 million households in 1941 to 2.5 persons in 13.3 million households in 2011.[8] The quintuple number of households inherently created a demand of more residential units at smaller size. Since the planning goal of complete communities is to include such mix of demography of varying values and lifestyles. It urges one to reconsider how modern society is redefining life stages, lifestyles and family size when cogitating the ways in which the built environment can adapt to be better designed for the dissimilar values and increasing models of family.

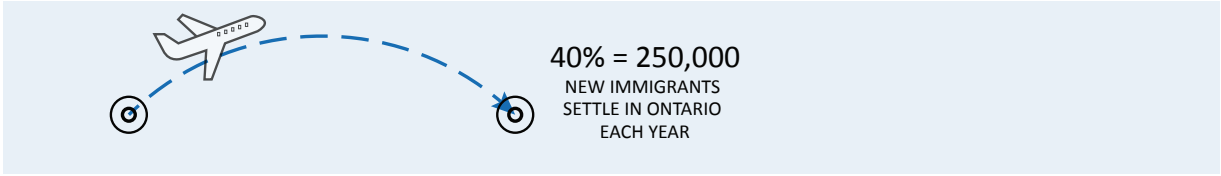
Figure 26

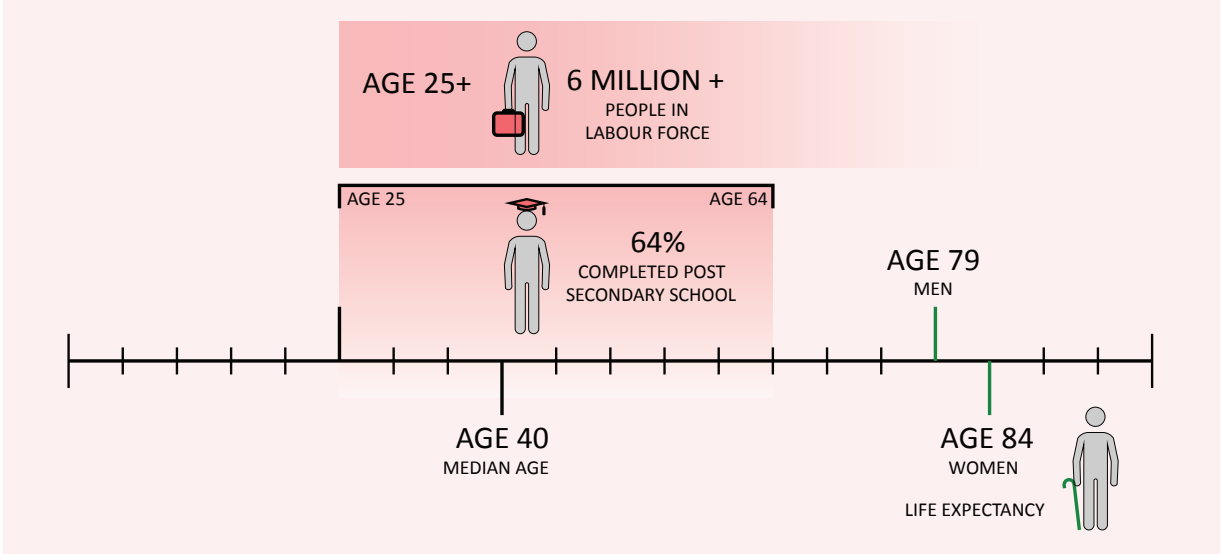
DEMOGRAPHIC TRENDS

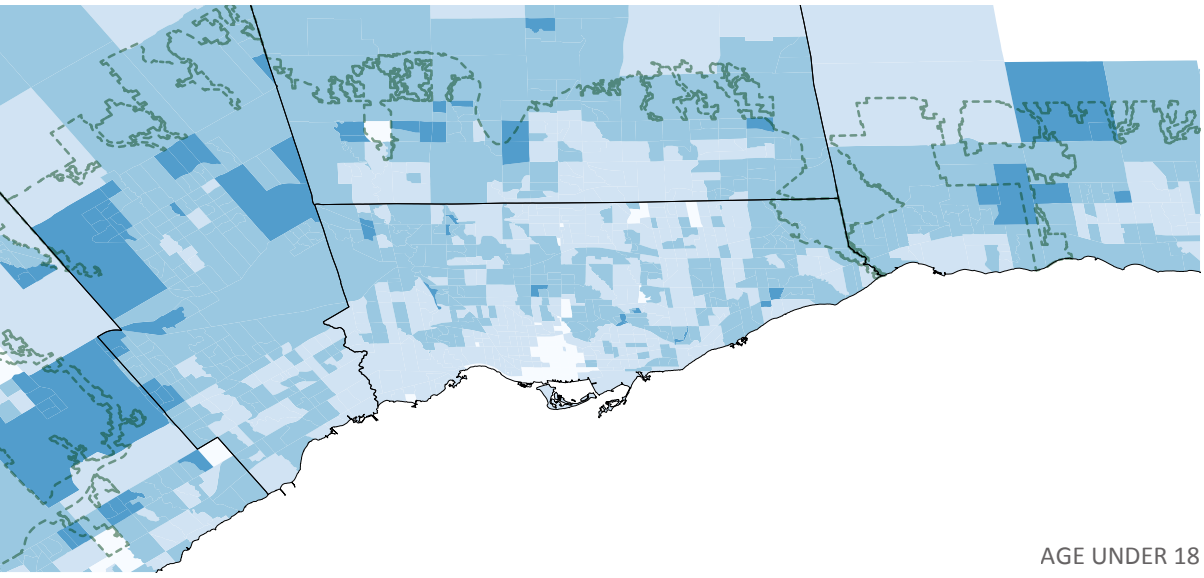
Data visualization of demographic makeup of Ontario and Greater Golden Horseshoe Area.


ONTARIO
GGH
GTHA
TORONTO
13.5 MILLION
2 IN 5 CANADIANS
SETTLE IN ONTARIO
GREATER GOLDEN HORSESHOE
EXTENDED METROPOLITAN AREA
85% IN URBAN CENTRES
MOSTLY AROUND GREAT LAKES

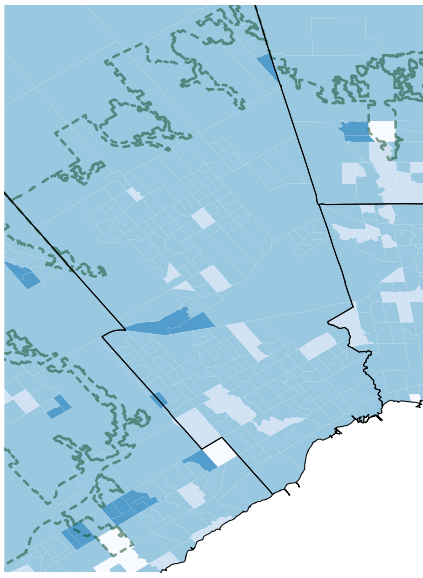

9 MILLION+
ONE OF FASTEST GROWING AREA IN NORTH AMERICA
5 MILLION
HOUSEHOLDS

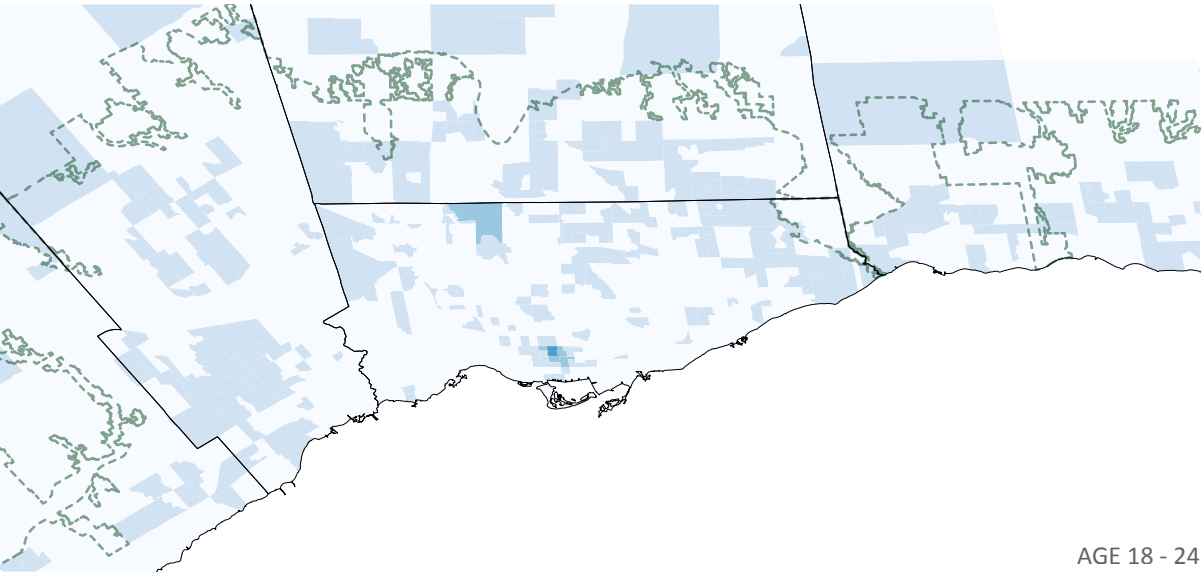

40% = 250,000
NEW IMMIGRANTS SETTLE IN ONTARIO EACH YEAR


AGE 25+
6 MILLION +
PEOPLE IN LABOUR FORCE
AGE 25
AGE 64
64%
COMPLETED POST SECONDARY SCHOOL
AGE 79
MEN
AGE 40
MEDIAN AGE
AGE 84
WOMEN
LIFE EXPECTANCY

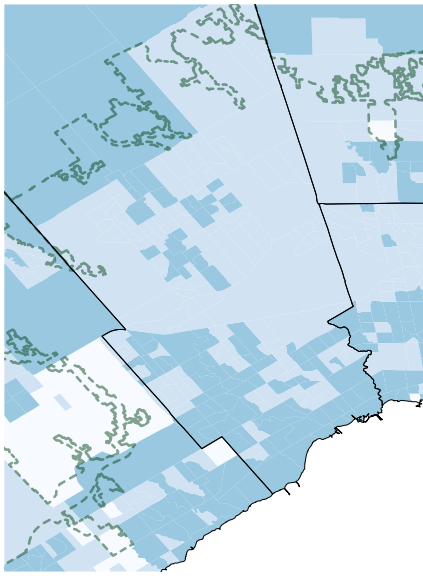


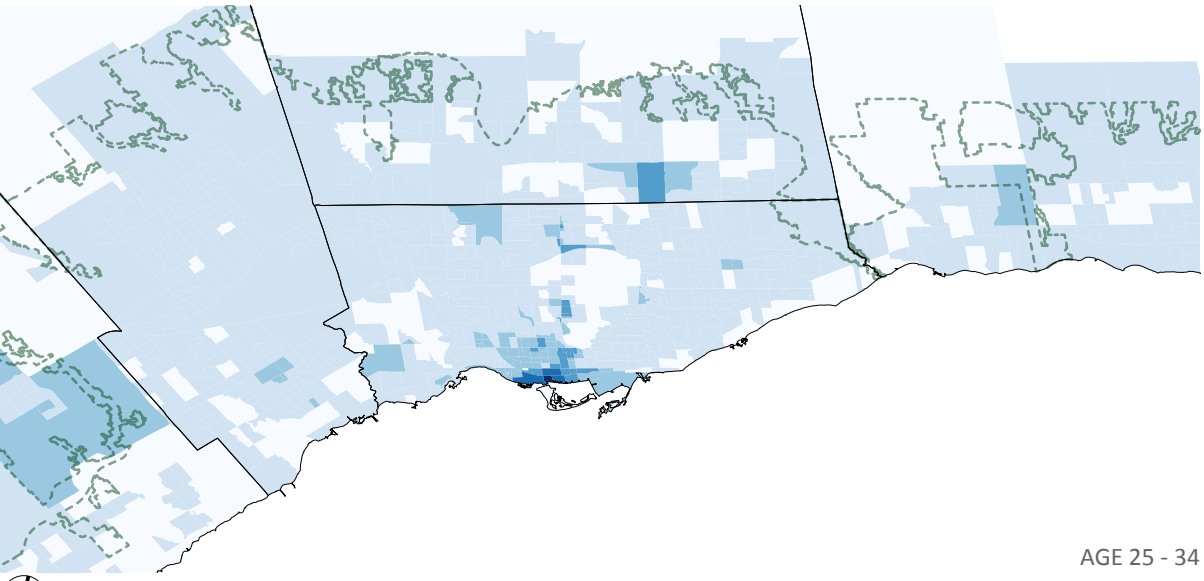
AGE UNDER 18



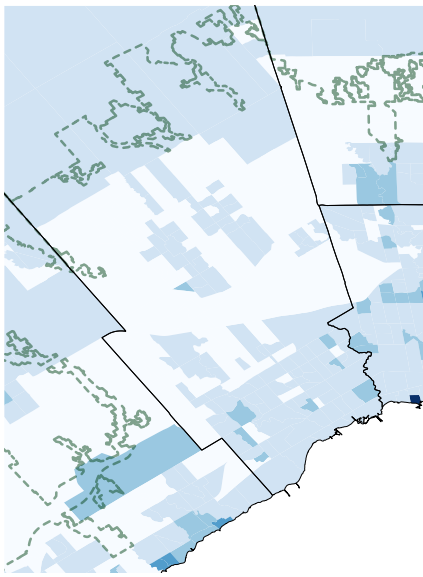


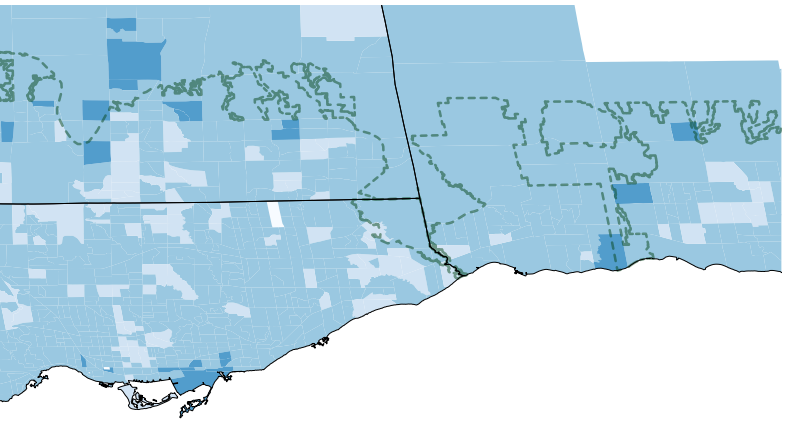
AGE 18 - 24



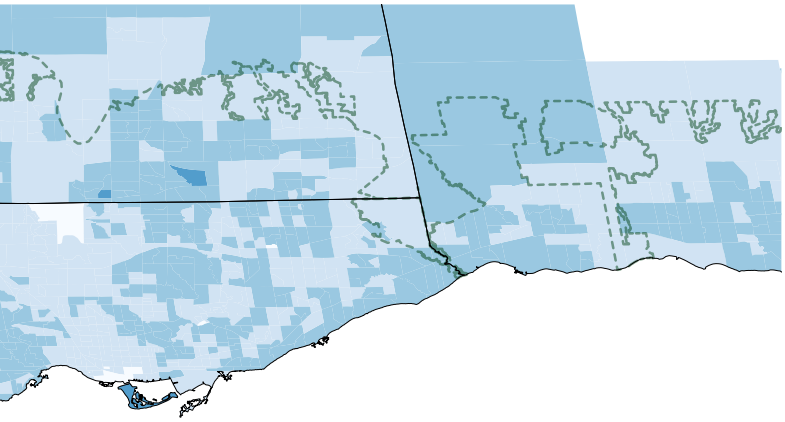


AGE 25 - 34

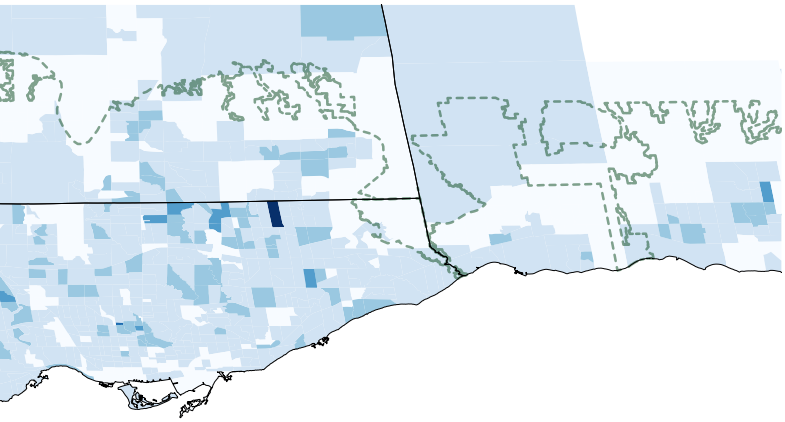




AGE 35 - 49



AGE 50 - 64



AGE 65+

Locating Home

The real estate and job market pushed workers to find the balance between paying for sanity to be closer to the office or surrendering to the life of commuting.[9] However, research studies have then indicated a positive correlation between the family income and the amount of travelling required reaching the office. It also reveals that parents are more willing to commute, in order for the family to be nurtured in a suburban neighbourhood.[10]

However, studies have discovered the significance of stress on one's health, such as a higher chance of heart attack and obesity that stems from enduring long commutes through driving. In less extreme cases, it also contributes to lack of good sleep, tiredness, sadness and feeling of sickness.[11]

Ironically, these parents fail to recognize that the amount of time that is spent on travelling takes away from maintaining personal health, family bonding time and inherits unnecessary stress on themselves as well. The original intentions are lost without the support of a hub for the lost time and energy to be reallocated to bonding with one's family and community.

Figure 27

PLACE OF RESIDENCE

Geographical representation of where different age groups reside. Concentration of children outside of Toronto and reorganized to downtown core when stepping into employment age.

Immigration

Conventional suburbia was modeled for the middle class Europeans that came to Canada with similar socioeconomic status. Until late 1960s when the immigration gates were opened beyond the traditional European citizens did the current social diversity of Canada begin to take shape.[12] The early settlements often reside within the inner city or edge of urban core, relevant in seeing the presence of Chinatowns in Vancouver, Montreal, Calgary, Ottawa, and Toronto. Those locations tend to offer more affordable choices and allow an easier transition into a new environment where there is less of a culture shock. At the time, ethnic groups tend to huddle together for mutual support and security despite difference in economic statuses.

In the recent years, the pattern of settlement has shifted to immigrants submerging directly into suburban neighbourhoods. The economic statuses of immigrants are no longer what it used to be. Often times, there is an already established network of family or friends and socioeconomic position. Considerations of settlement are relative to the proximity to work and cultural centres instead. Regardless of the reason of emigration, incoming settlers are increasingly well educated and affluent than the past generations.[13] However, unemployment and underemployment are still common issues immigrants face in the long run.

By consolidating services and the workplace at the hub, it provides a platform for new immigrants to expand the necessary social network required to engage in economic activity. Incorporating opportunities for small local businesses, it would generate an alternative way of employment for new immigrants as well.

Recreation

Toronto often celebrated its multiculturalism as the city is enveloped in festivals year round, such as Caribbean Carnival, Oktoberfest and Indigenous Arts Festival to name a few. The cultural richness is indisputable as it also brings tourism and fosters a sense of place for innumerable communities.[14]

The inclusion of cultural space creates an attractor to the individualized hub that dwells in the cultures of the community. Helping residents connect and develop a sense of place, it adds to being a viable option for tourists to visit local neighbourhoods. Economically, it boosts tourism and allows the local residents to benefit from the conglomeration of public facilities. For the municipality it is an additional cost effectiveness, as well as a viable long-term investment.[15] The intention is to co-locate public services, cultural events and amenities in the hub. Allowing residents to celebrate and express culture while bonding within the neighbourhood.

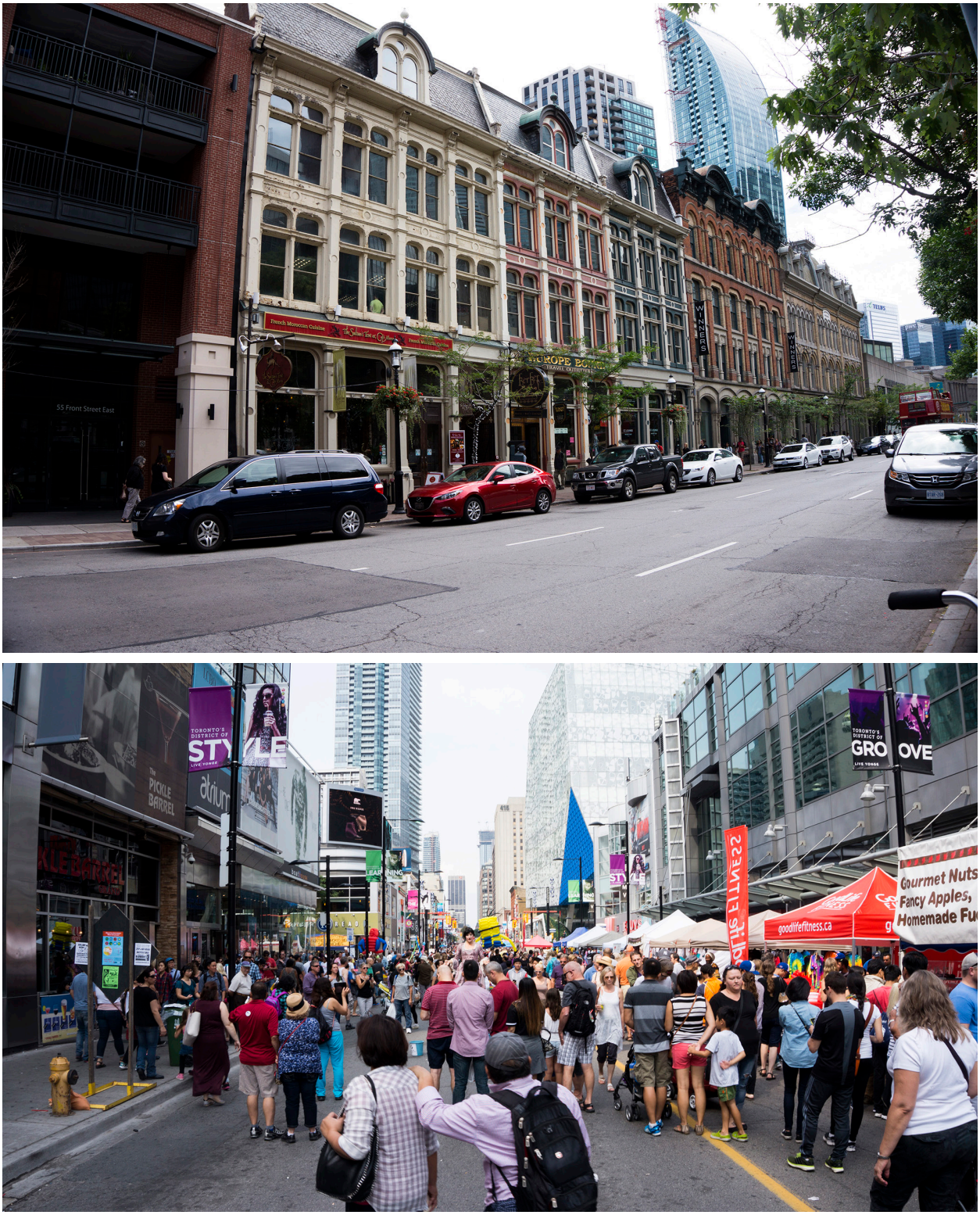


Figure 28

HISTORIC BUILDINGS, FESTIVALS
Attractions bringing in locals and tourists.

2.2 Changes at Large

For the Home, Lost the Home

To mitigate the crisis of city densification, the hub is to eliminate the need for commuting. A typical eight-hour workday often really means a ten or more hour day when someone accounts for the time spent on travelling. Toronto suffers the longest commute in the nation, at an average of 33 minutes, over a third of the population are spending more than 45 minutes for the journey to the office.[16] Despite the trends towards pushing for the mobility of work to resolve these issues, it has yet to be wide spreading enough to alleviate the problem. Temporarily, immediate solutions are changing the location of the home or workplace.

Nonetheless, the pressure of travelling to and from work is taking a toll on one's physical and psychological well-being.[17] The intervention of the hub would rewire the suburban fabric through its locations determined by the concentration of where commuters are residing.

The proposal is a hub for the revitalization of the office typology, in order to provide physical, psychological, and functional comfort for individuals. Meanwhile, influencing the local economy positively with the inclusion of an office space to serve the surrounding community. [18] The hub also stands to accommodate for the different aspects of life beyond work, recognizing the other identities of a person in relation to family, friends and hobbies.

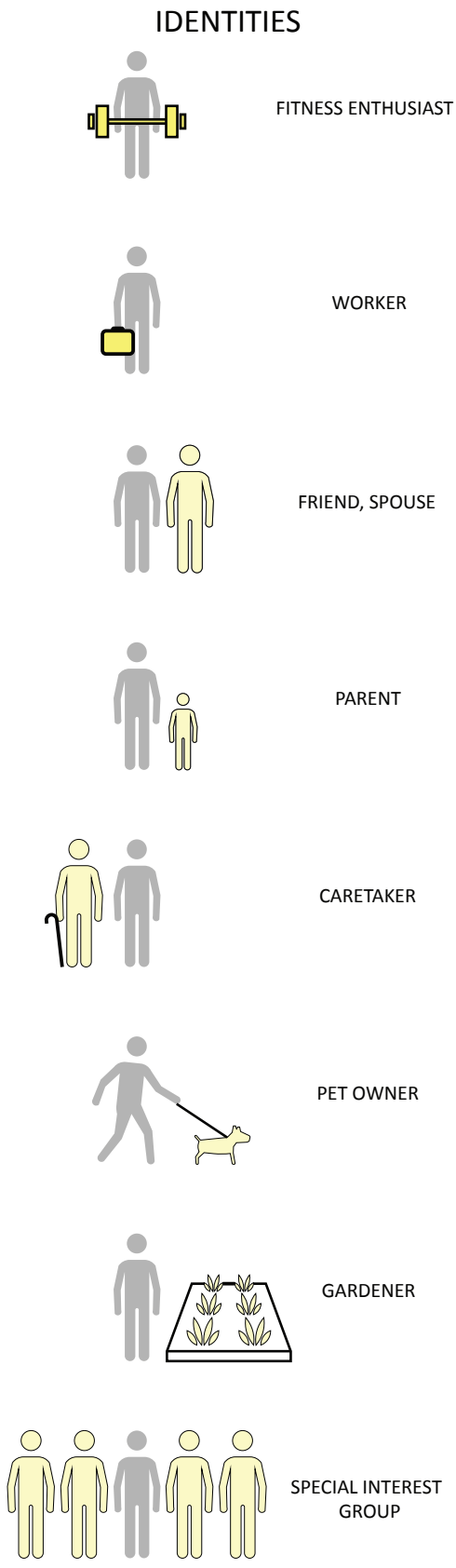


Figure 29
IDENTITIES
Roles a typical person may have and how it affects the facilities needed to tend to different aspects of life.

Neighbourhood Infrastructure

The scheme is to submerge into established communities for various reasons. In the low density built fabric of suburbia, the project is able to renew any aging infrastructure and optimize the existing assets.[19] By revitalizing existing land and upgrading existing systems, it signifies an intensification that also reduces the need of urban sprawl.[20] By consolidating land uses with the hub, under utilized land are intensified with more occupancy.

The hub aims to prioritize active transportation in a residential neighbourhood; the sidewalks, bike lanes and roadway will require interventions to become complete streets.[21] By creating a safer experience for pedestrians, active transportation would then reduce the need for driving and parking spaces. Consequently, the minimized pollution and emission of greenhouse gases serve to regain public health and ecological sustainability.

Implementing passive heating and cooling strategies, reusable water system and alternative energy cultivation methods can contribute a step further into enhancing sustainability concerns. The inclusion of an agri-food network such as a communal garden can allow citizens to cultivate local produce and enact as an educational opportunity for the neighbourhood.

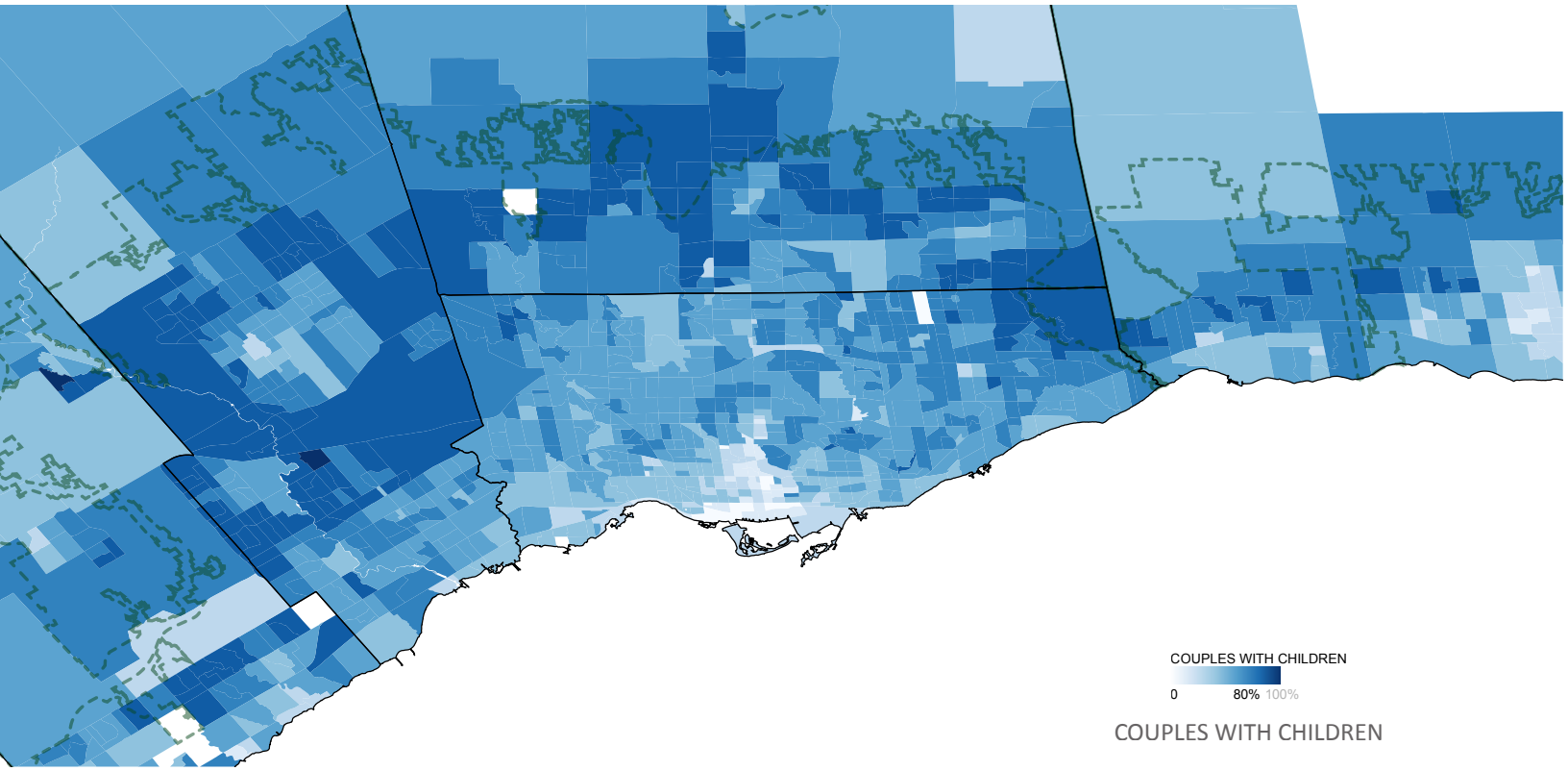
Successful, maintainable cities consist of infrastructure, residential, culture, institution, food and medical care.[22] The hub embraces culture and recognizes the local economic benefits through the new opportunities it brings and as a public gathering space for the neighbourhood. It stands to transform the inaccessibility of suburbia into a conglomeration of convenience, connectivity and culture.

Housing and Commercial

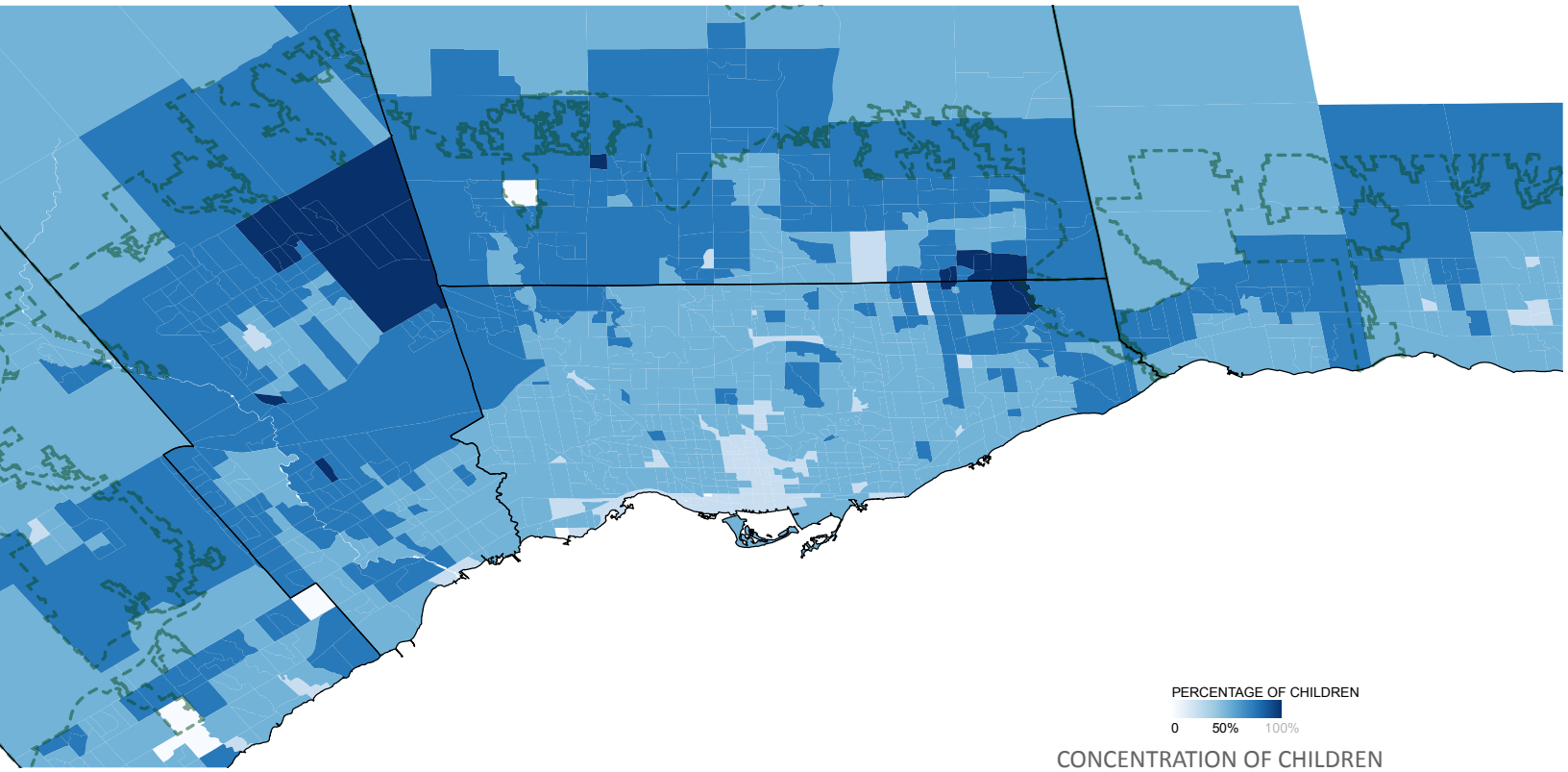
Affordability is an issue for most when living expenses continue to rise with the real estate market. Planning guidelines also explore the viability of workplace adjacent to residential communities for cultivating resiliency through mixed land uses.[23] To expand the diversity in available residential units, developments are encouraged to include multi-units and ranges of sizes to cater to a variety of audience with different household size and budget.[24]

By adding multi-unit residence or short-term housing strategies adjacent to the hub, it allows for a change to the ubiquitous suburban single-family housing typology. Through expanding accommodation options to provide for the changing needs at different stages of life, individuals can find a home without leaving their community when starting a family. Allowing the marginalized and vulnerable population to refrain from constant gentrification or displacement. Single-family homes can be modified to become multigenerational residences or to multi-family inhabitations. The modernity of smaller household sizes signifies a need to integrate alternate residential unit options to cater different housing needs. Co-living or private rooms with shared communal facilities provides an opportunity for travellers or young individuals the chance to utilize the hub as well.

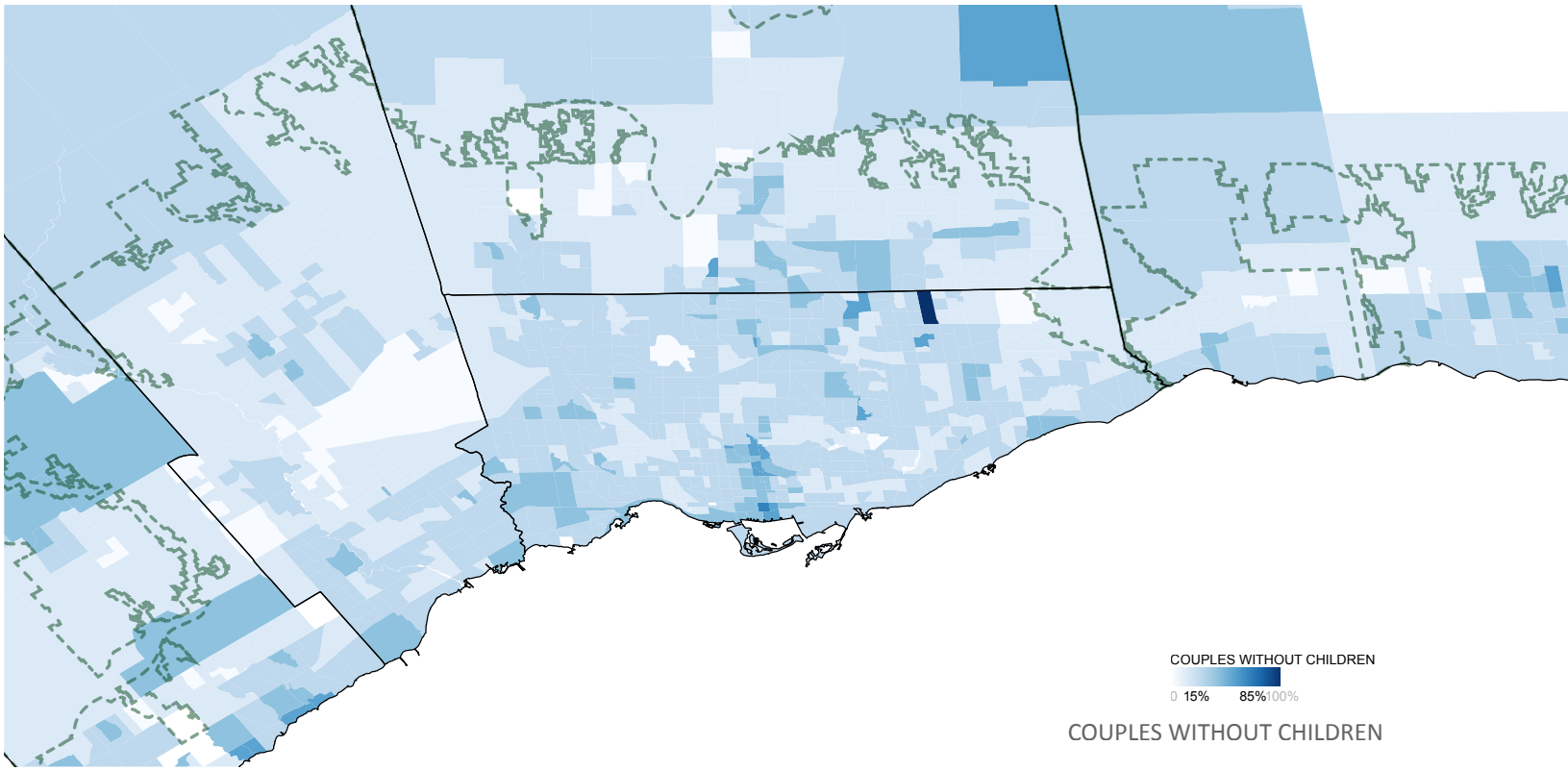
By consolidating the built form of dispersed spaces found in the suburb, it elevates the chance of economic transactions, strengthening various attractors of the site. The users benefit with convenience and businesses' potential of profitability increases with a more stable source of customer base. In the long run, situating within coworking and co-living environments may establish innovative collaborations as well. The mix of employment is created and the range of economic activity on the site fortifies the local economy with the diversifying base.[25] Revitalizing the work-at-home scenario to allow connectivity within the neighbourhood, economic activity can thrive altogether.



COUPLES WITH CHILDREN



CONCENTRATION OF CHILDREN



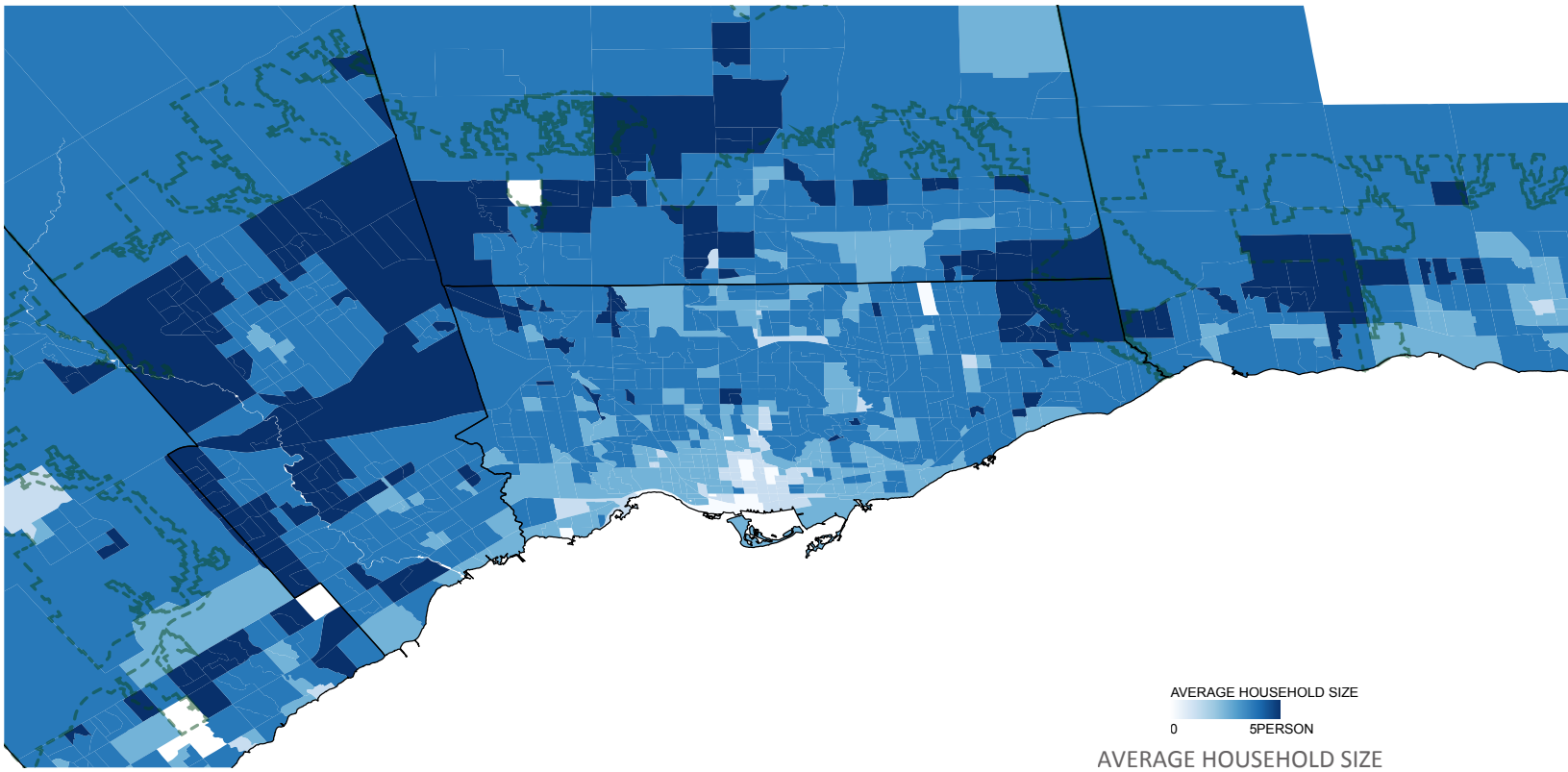


Figure 30

CHILDREN AND FAMILIES

Geographical distribution of couples, families and household sizes. Concentration of couples with children and larger families to reside in outer cities.

Diversity, Social Equity, Economy, Health

Socio-economic stratification is intensifying with the current continuous development of large single-family homes in the suburb. Equality is depleting. In Toronto, the rates of disease and death are more apparent at an early age for those with low income, despite Canada's superior healthcare system.[26] With this mixed-use compact built form, the proposal strives to be able to serve universally, to be inclusive for those of different income levels, age cohorts, cultures and religions. A complete community encapsulates stable economic activity, healthy environment and social equity for residents.[27]

Kevin Lynch concurs the idea of grouping land uses to help refrain from continuing the coarse grain of suburbia. By combining areas that can mutually benefit from its uses, different groups can come together to mutually benefit. [28] While young children are placed in daycare, parents alike can connect with a place of assembly. The aging population can find social connectivity, access to nature and medical care at the hub.

The large plots of land designated for specific land use caused residents to relegate to driving in suburbia with the manifestation of chronic illnesses as the outcome. The excessive use of cars pose higher probability of traffic related injuries for other users on the road, with congestion leading to degrade air quality for respiratory and cardiac illnesses. The choice of travel method relates beyond access and mobility but enable health in relation to connect working, learning, eating, physical activity and public services.[29] A fine grain of the city promotes smaller subdivisions for greater accessibility, social cohesion and variety in built form.[30]

"Public service facilities should be co-located in community hubs, where appropriate, to promote cost-effectiveness and facilitate service integration, access to transit and active transportation."[31]

Where active transportation is more apparent and residents are able to become more physically active. Safety and activity are required to elevate the health of suburbia. Economically speaking, a healthier community relief burdens on healthcare, and the government can then focus funding on other aspects as well.

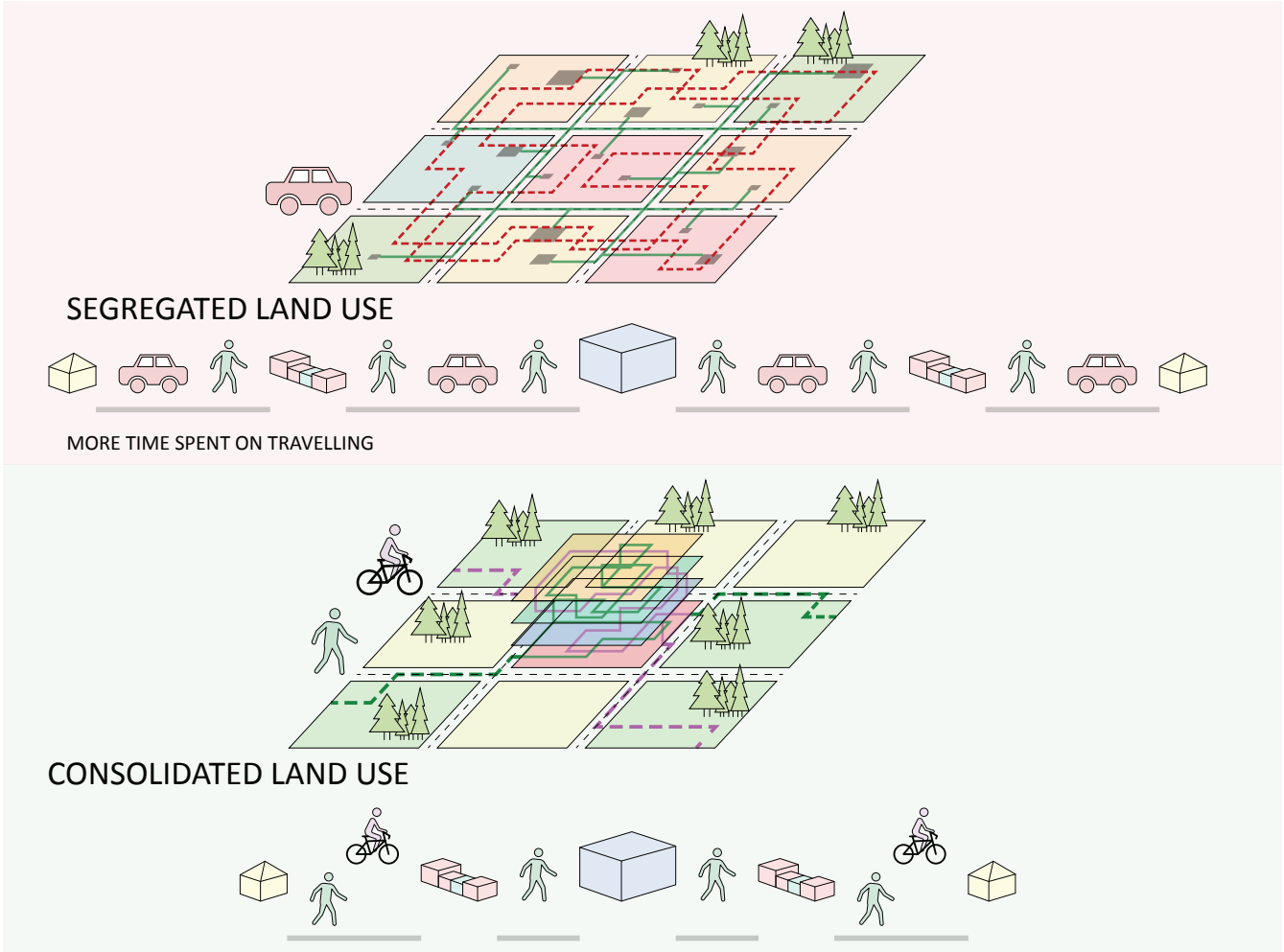


Figure 31

DIVERSITY

Grain of the City. Graphical representation of how consolidating land uses may promote less time spent on travelling between points of interest and promote active transportation for adjacent residents; thereby allowing for more green space and decreased dependency on cars for safer streets.

The Walkable City

The Walkable City was a report of the verdicts made from a survey comparing the preference of residents that reside in downtown and uptown Toronto. The aim of the research was to extrapolate preferences and key components that people consider influential in making a neighbourhood more walkable or not. The result was then compared with evidence of the actual method of travel, engagement in physical activity and body weight of citizens. This indicates many crucial components to contemplate when designing for the revitalization of a community.

A series of questions concentrated on tradeoffs in regards to neighbourhood features that allow for active transportation, such as the proximity to shops and services, and willingness to integrate a variety of housing types. Comparisons continue in associating prospects of living at a smaller dwelling, downsizing lots to reduce commute to work, school or other crucial points of interests. Streets that prioritizes designing for active transportation and transit and the range of food store size that allows citizens to walk to at ease. Amongst the results of those who currently reside in auto dependent communities, the conclusions reveal significance in implementing a range of housing types to acclimate for a mixed-use community. With intentions of incorporating public recreation and the opportunity to reach small and medium sized food stores through more connected streets. It was a tradeoff many were willing to take even if it results in smaller lots and homes. This outlines the problems suburban citizens endure and struggle with in the lack of walkable features in the current built landscape. The survey results indicate the citizens' desires and what the city should pursue when redeveloping or revitalizing neighbourhoods.[32]

As assessed by the survey, residents disclose that in a less walkable community, the tendency is to drive more often and farther. Giving in to accepting the inconvenience, there is less utilitarian walking and less frequency in taking the public transit as well.[33]

When locating where to reside, citizens reveal priorities in affordability, ease of walking, access to transportation, proximity to shops and services and closeness to range of food shops.[34] In summary, across GTA, 74 percent of citizens stated a strong preference for a walkable community and on the contrary, only 6 percent of citizens stated a strong preference for auto-oriented community. In the city of Toronto, there was an emphasis on having nearby shops, services and the variety of food stores for residents to access on foot.[35]

Another aspect of neighbourhood design that the report focused on was the correlation between physical activity of residents and whether it actually relates to the choice of travel method. The result identifies factors of population density, employment density, land use mix and overall street design that affect the use of active transportation in a neighbourhood. However, noting that these factors do not interfere with recreational walking or cycling but geared towards utilitarian walking.[36]

Walkability was based on density, referring to the proportion of people dwelling on a hectare of land. In addition, it also assesses the relationship of land used for retail and commercial uses in comparison to parking spaces. Mixture of land use describes how programmatically diverse the neighbourhood is in order to serve different purposes. Lastly, intersection density indicates the connectivity of roads and the distance between intersections, in contrast to distant crossings or presence of innumerable cul-de-sacs.[37] When transforming existing neighbourhoods, the inclusion of pedestrian short cuts are a simple way to reconnect paths. The connectivity of roads is directly correlated to convenience and travel distance, which can hamper utilitarian walking and the implementation of active transportation.

Researchers were mindful in collecting data from a varying level of income and neighbourhoods with different walk score. However, some drawbacks indicated was that out of the 1,525 surveys done, only 25 percent of interviewees were representing residents outside of the metropolitan centre. It includes 5.3 percent less of men, 11.4 percent more of post-secondary educated people, and 11.4 percent less of immigrants. Possibility biased by residents of the downtown core, and underrepresenting men, immigrants and over representing university educated people.[38] Nonetheless, these results reveal astounding factors for how the hub can be supported in suburbia with a pressing need for walkable communities.

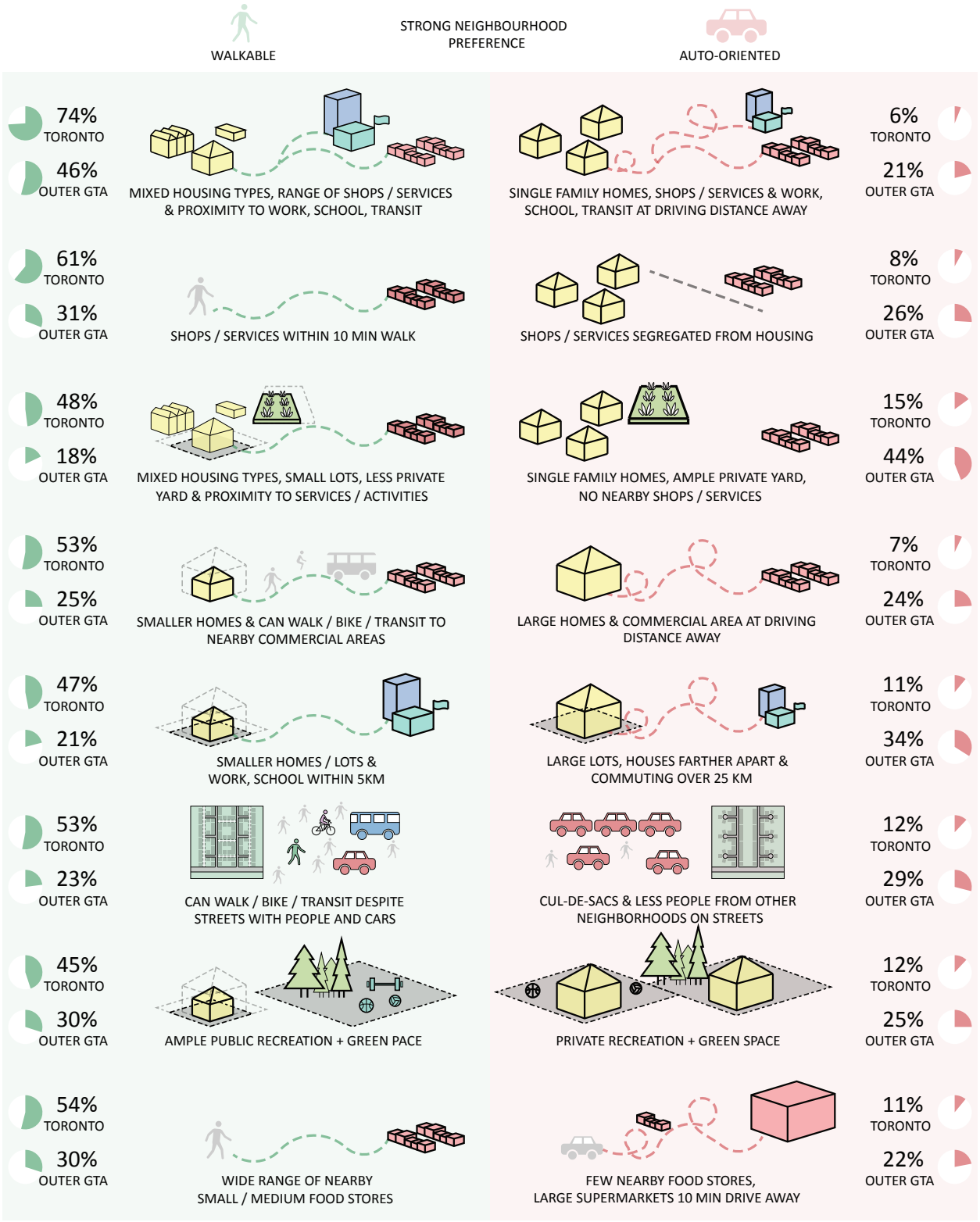


Figure 32

THE WALKABLE CITY

Graphical representation of survey results questioning preferences and trade-offs in comparing walkable and auto-oriented neighbourhoods.

2.3 Physical Comfort

"We shape our buildings; thereafter they shape us."[39]

Building Comfort

Every component in a building is a design decision and has the capability to enhance the experience of the occupants with mindfulness in design.

Physical comfort is to address environmental extremes within the building. It is to ensure that unnecessary stress is avoided through having to adapt to interior conditions, such as high temperatures, strong airflows or loud noise. Since the 1980s, research was executed on the impact of building environment; the feeling of sickness or inefficient productivity was then referred to as Sick Building Syndrome. Further studies show that it also affects one's mentality as well as the build up of illnesses that may not be prominent until over a long period of time.[40]

Consequently, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) established comfort standards to assure the execution of responsible building design and operation. In addition, this also outlines that the success of ventilation systems do not only address heating and cooling but also refrains the distribution of odors and noise.

Building systems gave way to controlling the indoor environment of buildings. The hub explores opportunities of broadening the building envelope in creating districts to separate parts of the building into sections that can open up to the fluctuations of the outdoor atmosphere. Inherently, allowing parts of the building to be disconnected to reduce the load on building systems. Although the purpose of buildings are to shield humans from the harshness of the outdoors, the change of natural environments can be desirable on days of less extreme weather conditions. The office space may be fully enclosed and relying on mechanical systems; meanwhile, the event hall may be susceptible to being exposed to the external environment. The interior and exterior environment can be married with the intention of use depending on programmatic requirements. This opens up the hub to bring an environmental awareness to occupants

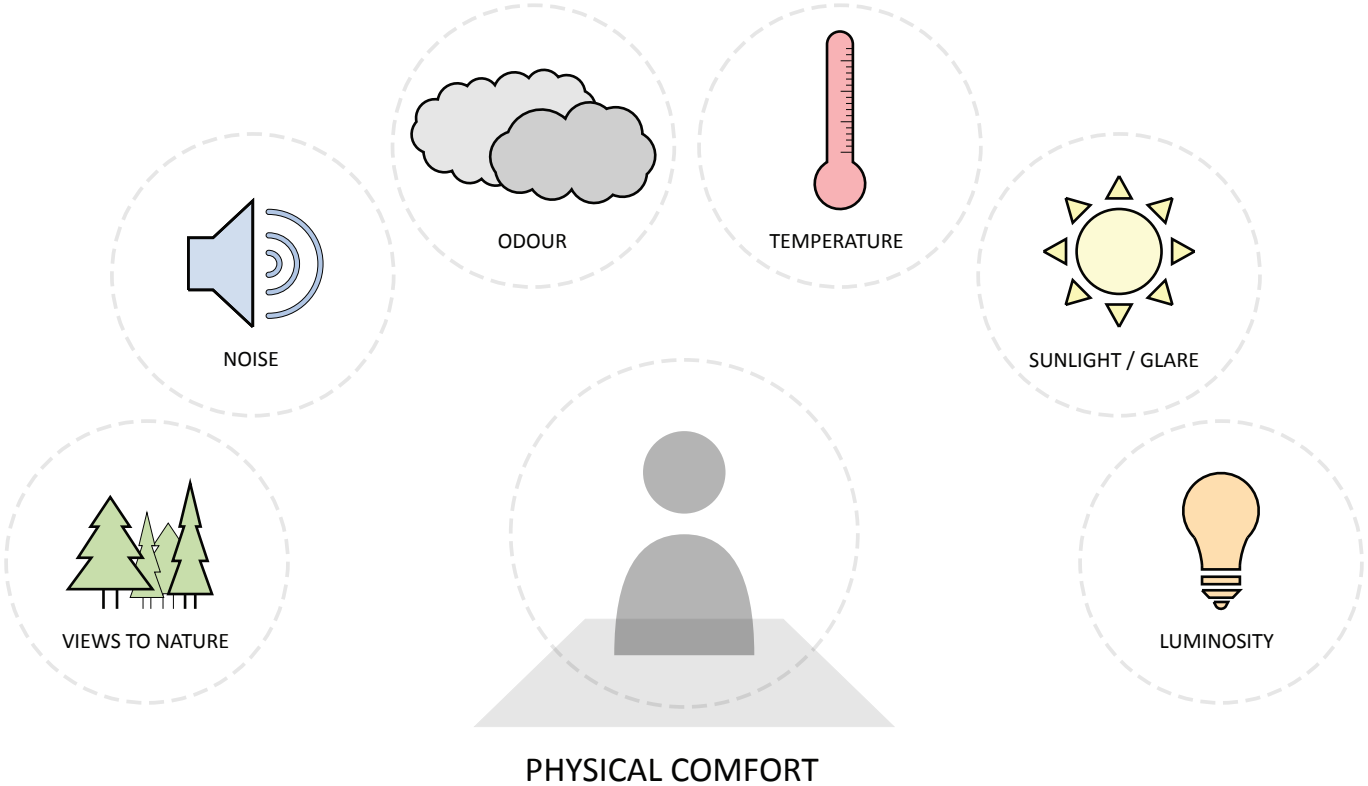


Figure 33

PHYSICAL COMFORT

Factors that may affect physical comfort in the building environment.

and diversify the type of comfort individuals seek. It suggests a notion of embracing the change in nature and to not always be housed in perfect conditions.

Moreover, sustainability can be implemented into the hub in various methods in the design methodology and implementation of passive strategies in heating, cooling and lighting. The use of sustainable materials and local sources can reduce the environmental footprint of the building. Architectural details that enhance the performance of the building inherently reduces load on mechanical systems during operations.[41] In addition, the hub could attain seasonal programmatic uses, where parts of the building may be inaccessible during certain times of the year. Another iteration could be allowing for programmatic change in relation to time of day, such as adapting an institutional space by day into a cultural event space by night. The hub strives to allow variability in environmental conditions depending on programmatic uses through reducing reliance on mechanical systems.

Accessibility

Physical comfort also encapsulates basic building services, such as elevators, bathrooms, parking, cleaning and maintenance. Since any disruptions or deficiencies would affect the functionality of the building and interrupt the occupants, the crucial role of building services can affect the habitability of the building.[42]

Similarly, universal design needs to be implemented to truly serve more members of the public. From the basic requirements outlined in the building code for universal washrooms, ramps, corridor widths, building designs should exceed the outlined and strive for enhancing the building experience for more users. Beyond mobility impairment there are also cognitive disability, hearing loss and vision loss that can benefit immensely. Through simple design gestures such as brail handrails, and variety in material finish, people with vision loss can navigate more easily when enabled to differentiate spatial environments.

Possibilities could extend to using technology to fully encompass the capabilities of universal accessibility. A simple example would be induction-loop assistive listening devices, blocking out unnecessary ambient noise to help those with hearing loss. Glazing systems that are responsive to the atmosphere, reducing glare and maximizing daylight can be beneficial to those with hearing loss and are more dependent on visual senses. These design strategies do not necessary only cater to those with disabilities but enhances the overall building quality of physical comfort. In the design of the hub, it is also an exploration of how the built environment can accommodate to varying needs and raises qualities that can be considered in designing physical comfort.

Sensors

"The ability to tag physical objects and transform anyone carrying a smartphone into a potential data point has remarkable and far-reaching implications. It's not evolutionary; it's revolutionary."[43]

Information technology is enabling analysis with far more insights through data as sensors and data points are increasingly common and contribute to the greater data pool. Integrated communications approach refers to conglomerating the base building infrastructure, allowing the various building systems to convey between one another and functionally work together. Resulting in a system that reacts to data instead of solely operating with the push of an on-button.[44] The implication of this stretches to building operations as well. Real time data points reveal information such as the number of people in the building, distinguishing whom are regular comers and those that are just visiting, the energy consumption and temperature of the given area.[45] Thereby, enabling energy efficiency through increased performance from building systems that complement and coordinate systematically. Building automation is said to be an estimated 30 percent saving in annual operation costs of a building.[46]

Mobile applications are already underway in synchronizing with building systems, giving customizability to individuals to control the immediate environment such as lighting and noise.[47] Emerging technology is revolutionizing how people experience a building. Mobile applications are allowing the immediate environment to be customized and conditioned according to personal preference, the energy saving model can also better cater to occupant comfort.

The challenge of this is the sheer overflow of data and being able to extrapolate the potentials of how it could be used. When presenting new technology and its related gadgets, it is important to maintain the user-friendliness to ensure usability.

The Edge

Renowned for being the smartest building in the world with its technology, the Edge is the office space for Deloitte in Amsterdam. It is enveloped in information technology; lighting panels in the ceiling are bursting with 28,000 sensors that capture motion, light, temperature and humidity.[48] Remembering the light and temperature preference of individuals, it adjusts the immediate work environment without deliberate adjustments each time.

Innovative thinking is represented throughout the building design, with 2,500 workers sharing 1,000 desks; the idea is to revitalize people from fixed work locations and traditional views of working.[49] Architecturally, it encompasses a central 15-story atrium for natural ventilation. The slanted gesture of the atrium emphasizes the spatial quality of its height but also facilitates rainwater collection for reuse. It incorporates an aquifer thermal energy storage system, to store heated water from summer to add warmth to the building during winter. In addition, it incorporates a vast amount of space for bike storage and encourages the use of electric cars with charging stations provided.[50] The building harvests and generates enough energy to run all of its operations with solar panels lining the façade.

The fine grain of the information technology extends to obtaining data from coffee machines that were replaced with larger milk compartments due to the overwhelming popularity of lattes and cappuccinos.[51] Reducing the load on building operations, it diminished the need to replenish the milk as often and amplified occupant experience to not find it empty when seeking their desired caffeinated drink.

Figure 34

THE EDGE DESIGN VISUALIZATION
The North facing 15 storey atrium is centered around workspace, enacting as the ventilation driver of the building.

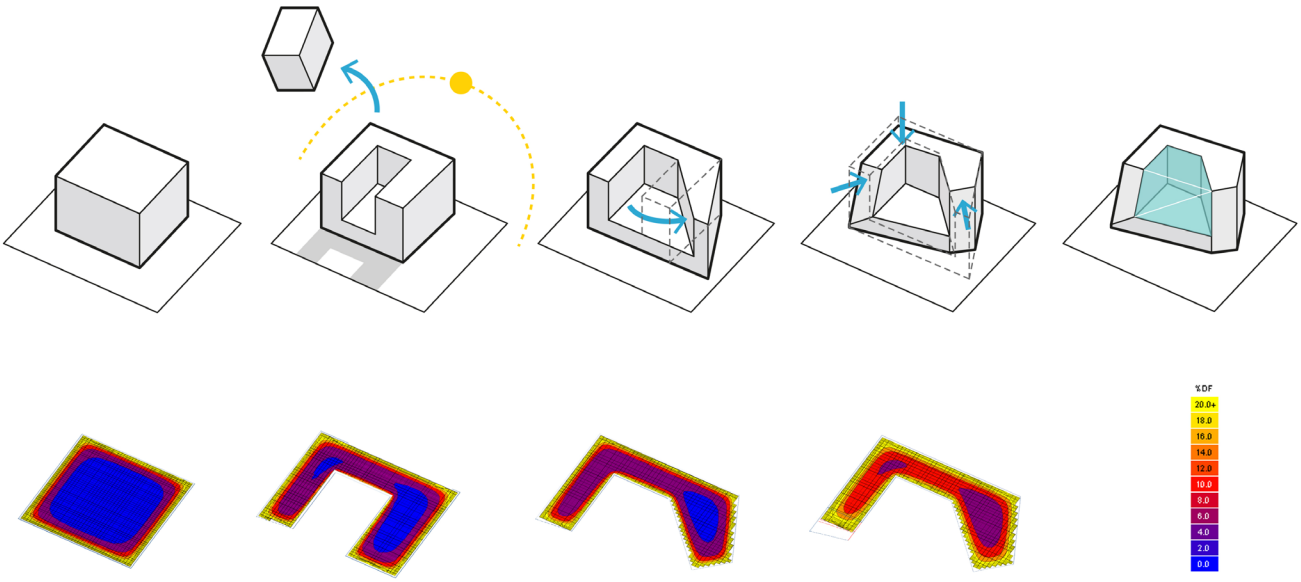


Figure 35
THE EDGE DESIGN DIAGRAMS - FORM EVOLUTION & DAYLIGHT ANALYSIS
Sculpting the form of office space in regards to maximizing daylight.

A mobile app was created to connect users of the space together. Linked to individual schedules, it assigns and allocates desks. The mobile application allows staff to check into a meeting room with a QR code that gives immediate access to connect to the lighting, heating, blinds and presentation screen.[52] It can be used to find colleagues and even ordering a dinner recipe that results in a prepared bag of groceries at the end of the workday.[53]

The setback of the technologically driven analysis is that patterns may infer a degree of logic to what is happening but behaviourally, occupants may not follow accordingly. Meeting rooms can be booked through the application, but it ends up being exploited by people who are just looking for an additional parking space.[54] The intentions are great and possibly only require further iterations to refine the functionality of the app and the building.

The efficiency of the building overall is enhanced with the system. When there are less occupants in the building, a portion of the building would be shut down to reduce any need of ventilation, lighting and cleaning services.[55] There are many lessons learned as the Edge sets a precedent for the integration of systems and merging technology within architecture to enhance occupant experience.

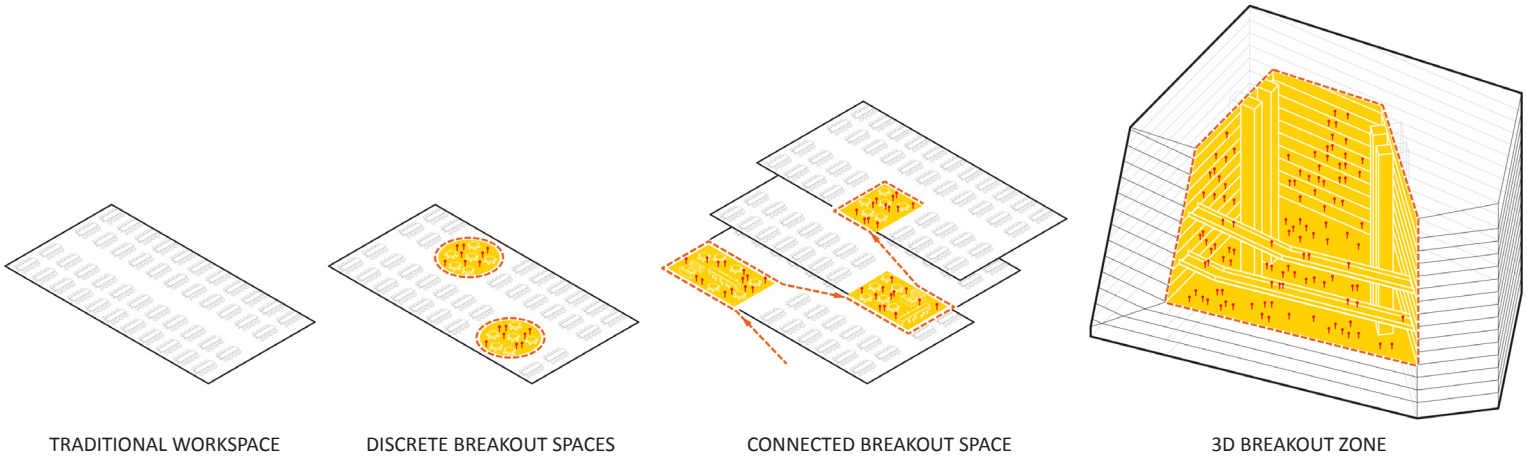


Figure 36

THE EDGE DESIGN DIAGRAMS - EVOLUTION OF WORKSPACE

Inclusion of unallocated net space intended for gathering, meeting and break-out spaces.

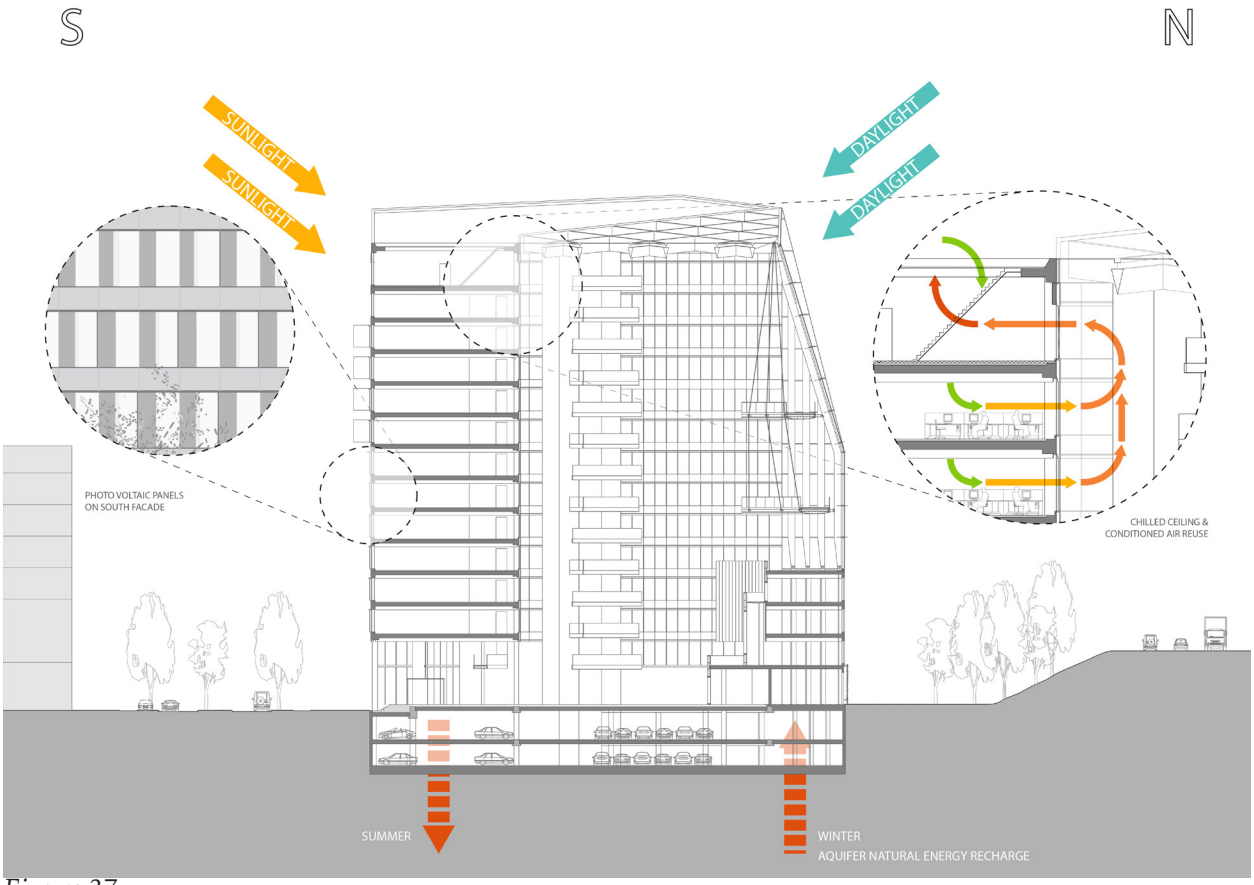


Figure 37

THE EDGE DESIGN DIAGRAMS - HVAC SYSTEMS & PASSIVE STRATEGIES

Hvac integrated within ceiling system in offices for fresh air supply that is then expelled into atrium which is equipped with an underfloor system. Aquifer thermal energy to utilize seasonal difference and load bearing structure as thermal mass on South facade with shading devices on glazed North facade.

2.4 Psychological Comfort

Perception

Humanity is capable of sensory and cognitive processes, it is the element that enables individuals to connect to the world at large and relate to one another.[56] Psychologically, human cognition is intersensory; where multiple sensory systems work in collaboration. Ergo, when the body undergoes physical discomfort, it is reflected emotionally through anger or distress, which in turn influences one's cognition. The unconscious mind takes visual cues of the built environment and in conjunction with other sensory systems creates an impression.[57] Neuroscience reveals how multiple sensory parts of the brain interact and establish the richness of the environment and the perception of the space.[58] Hence, to utilize this at the hub, factors that affect environmental cues should be taken into considerations, such as sight lines, spatial connectivity, colour, transparency, noise and temperature control.

The idea of comfort varies for everyone as individuals each have their own preferences and perception of what conditions give this sense to them. Taking warmth as an example, it is a sensory response of physical factors such as temperature and humidity. In conjunction with psychological considerations, distinctive to each person, preference is a unique set of components that constitutes for the feeling of warmth.[59] This demonstrates the importance and addresses how physical and psychological comfort is closely related and co-dependent.

Consciously or unconsciously, in varying levels, many factors contribute for one's emotional health such as social relations, physical health, and the spatial environment one is situated in.[60] By being exposed and immersed in the built world, understanding that every element is designed, placed and decided by someone reveals how malleable perception may be. The body constantly informs the psyche through senses and with an interpretation of cognition, the condition of comfort is established. It is important to realize the impact the built environment bestows on cognition when designing the hub to allow for psychological comfort.

Author, *Sarah Williams Goldhagen* affirms, "Built environment shapes who we are and how we move through the world physically, socially, and cognitively, as well as in the sense of how we construct and reconstruct our identity."[61] It serves as a reminder and realization of the importance in how building systems and building elements coincide, consistently and closely affecting its inhabitants.

Environmental Cognition

To understand the impact that the built environment has on the occupant psychological comfort, environmental cognition must be defined. It is described as the way in which one absorbs from the social physical environment based on the amalgamation of perception, cognition and emotion. Simultaneously, it takes shape through the development of the cognitive system, it is an accumulative learning procedure.[62] This evolving process takes shape throughout one's life; hence, the same space can give a different impression on people with different experiences. Determined by individual past experience, philosophies, principles and impressions, the extrapolated environmental cognition can fluctuate.[63]

Due to the fact that it involves perception and emotion, these aspects can be difficult to cater to. However, the human psyche is brought up through common schemas within the built world. Distinct symbols and shapes have connotations attached, such as the size and height of a room may indicate its use and level of privacy. Throughout history, the built environment has been renewing itself to better cater to occupants, as technologies arise to develop into a well-rounded supporter and provider of convenience and comfort, psychological needs to be recognized. However, the way in which it is integrated to cater for different uses requires design.

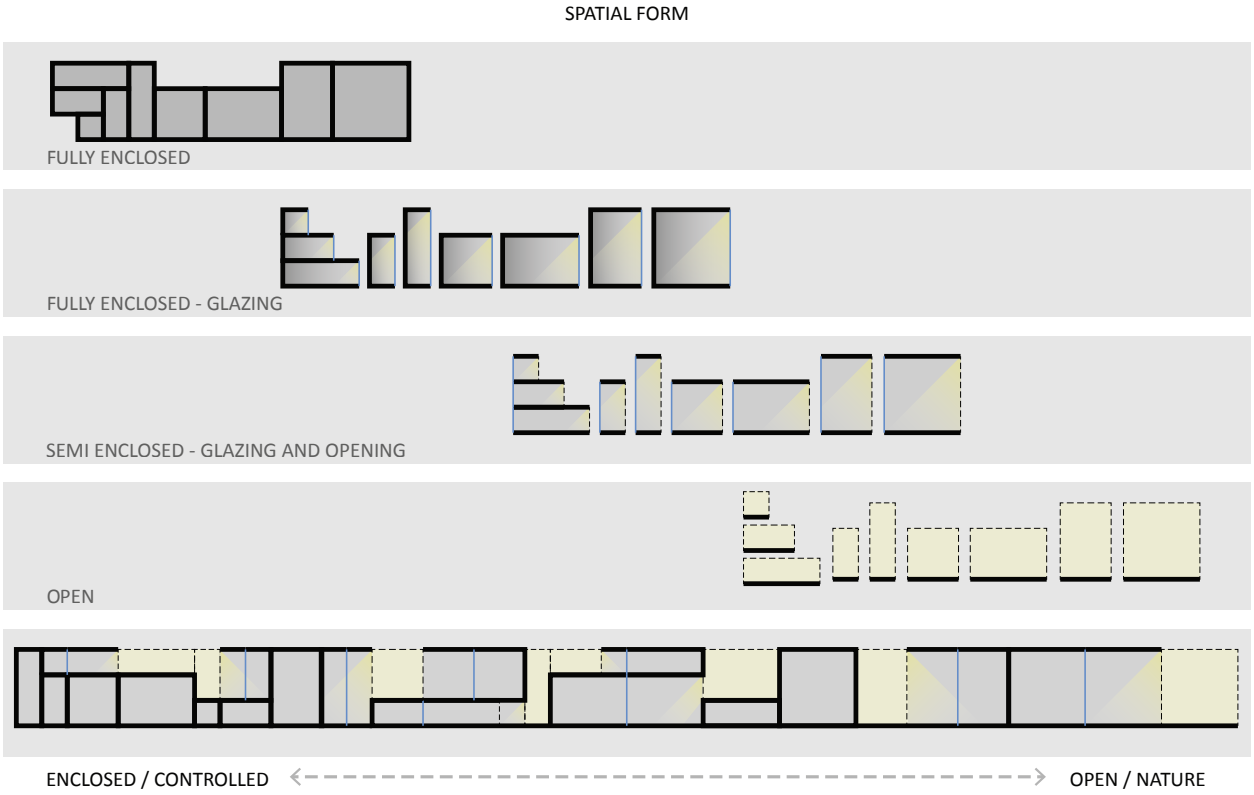


Figure 38

SPATIAL FORM

Sectional graphical exploration of fully enclosed, controlled environments to open, natural outdoor atmospheres. Suggesting the diversity in spaces simply with relations to height difference and daylight permeability.

Functional Comfort

Functional comfort is identified through the effectiveness of a space in assisting the occupant to perform an intended task. A space depleted of functional comfort entail occupants scrambling to solve spatial environmental problems instead of focusing on the specified task at hand.[64] Functional comfort complements physical and psychological comfort. It constitutes for providing the adequate elements such as air quality, thermal comfort, spatial comfort, privacy, lighting quality and noise control.

Conventionally, functional comfort is governed by building management to fulfill daily operations. The hub strives to provide an environment that is controllable by occupants to provide flexibility. As mentioned previously, sensors and technology can manipulate integrated building systems through a mobile application. The building itself can be designed to operate in parts for the option of expanding outdoor environments. The hub aims to give the choice to occupants, through diversity of spatial conditions and flexibility to manipulate it to cater to individual comfort.

Figure 39
PARK
Power of nature to calm and provide outdoor amenity space.

Relationship to Nature

Understanding that the psyche reacts differently to environments, it can better indicate the features in which designers should take into account when constructing the ideal atmosphere for inhabitation. A study was done to physically evaluate the benefits of being immersed to a natural landscape. Results are astonishing as it demonstrated how the exposure to a natural landscape was able to calm an aggravated heart rate within twenty seconds. When it extended to a mere three to five minutes, it was enough to even lower an individual's blood pressure levels.[65] This experiment demonstrates the power of natural landscapes and how much humans rely on visual cues.

The site of the hub is concentrated to locate within the suburbs to benefit from the proximity to nature. Integrated with parkland and open green spaces, it allows the public to easily connect to natural resources. It is the breathing grounds for recreational activities and trails to support the livelihood of suburbia.

Figure 40

COLOUR PSYCHOLOGY INTERIOR DESIGN

Bold, vivid colours implemented in discrete ways of interior design to prompt effects of psychology.

Visual Sense

Realizing the potential of visual cues, it is worthwhile to understand the cause and effects in which the psyche processes through the sense of sight and realizing how humans inherently put emphasis on sight alone.[66] Without physical touch, the visual senses are capturing the surfaces, edges and materiality, analyzing the space based on its haptic qualities.[67] The mind captures and evaluates the environment simply through visual cues.

Colour psychology is an individual discipline that focuses on the effects of colour on human psyche. Muted, cool tones are typically associated with calming emotions, where bold, saturated colours suggest energy and active feels. A study evaluated the effects of the colour red by dominating a room with the colour and one without. Participants were separated into the two rooms to write a test and results revealed that participants in the red room did in fact score lower, being distracted and aggravated.[68] However, this is beneficial for the design of different programmatic elements, where creative activities such as brainstorming can utilize colour psychology, by using red colours to evoke imaginative energy.

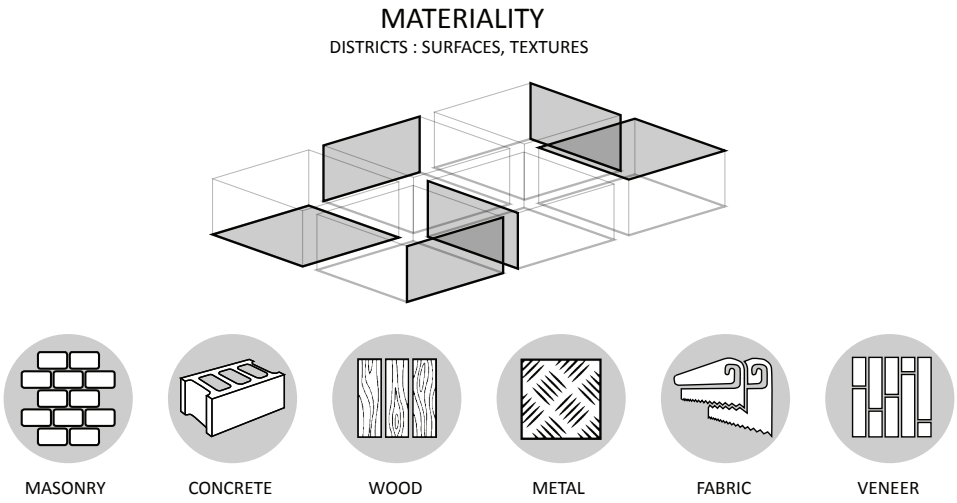


Figure 41
MATERIALITY
Potential usage of different textures on surfaces to create distinct districts and compartmentalize a building.

Materiality

Materiality is crucial in creating the desired spatial atmosphere of a space. In relation to visual and haptic senses, materials also affect auditory and olfactory senses; hence, it can be applied as a method of cognitive mapping, to distinguish districts of spaces.[69] Since the mind is also able to form a cognitive map, the effects of visual perception can help occupants in navigating at an unfamiliar place, especially for those with impairment.[70] At the hub, each district can be associated with a material to distinguish the use, such as metallic surfaces at the workshop in relation to its industrial properties. Materiality, similar to colour psychology can be influential in the creation of spatial atmosphere to address psychological comfort for the occupants of the hub.

Behavioural Design

Behavioural design constitutes for the impact of design cues and prompts that can imply the functional use of the space. Properties outline the features that affect the position of the user. Short-term seating can be inferred with elements such as a bench, or seating lacking back support, in comparison to an ergonomic office chair that demonstrates comfort even with prolonged sitting time. It involves designing for the different postures of the human body, through elements that suggest the use of the space and advise the behaviour of users. An example of such would be the serene atmosphere of a gallery space in contrasts to a buzzing fast food restaurant affects occupants' behaviour instinctively. Space embodies meaning through architectural semiotics and components, intrinsically influencing behaviour through cognitive and emotional cues.[71]

Position informs the dynamics of the posture, ranging from reflective to active. Reflective positions are more relaxed, useful for observation and reflection.[72] Comfort limits creativity, which may be undesirable for spaces that are intended for generating ideas.[73] Hence, an environment may lack chairs to encourage users to stand or use of red colours to evoke imagination. Furthermore, the body language can signal motives and emotion, affecting the dynamics of a space. For example, a room where occupants are standing, with room to move around releasing tension, suggests a shorter duration of stay and encourages more active participation.[74]

By influencing the posture or position of a person, orientation is used on occupants. The open concept encourages users to be engaged in a multifaceted orientation, allowing everyone to see, hear, and converse with each other.

The direction in which tasks are carried out is related to the surface used. Vertical surfaces provide a communal visibility that enacts as a display.

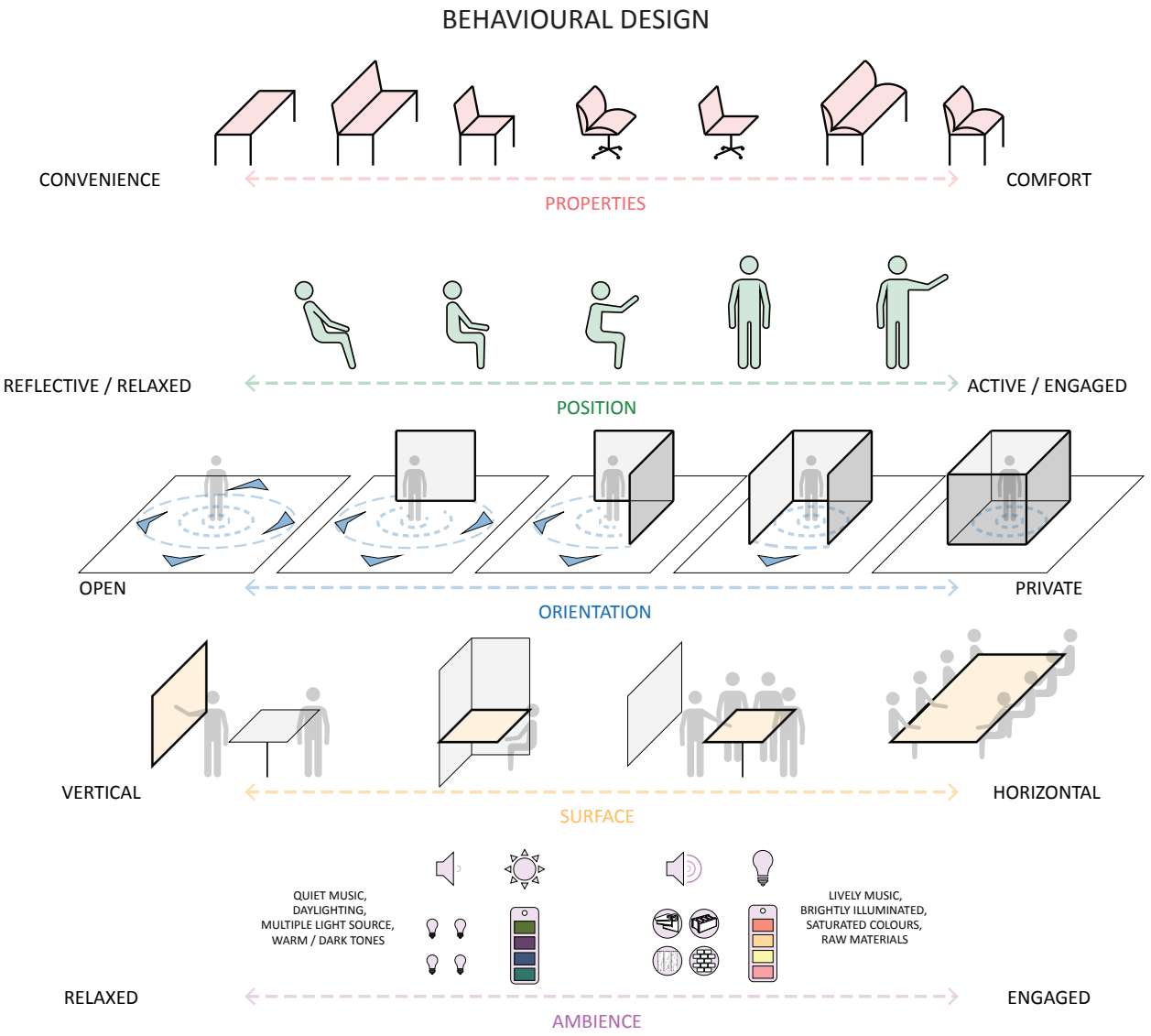


Figure 42

BEHAVIOURAL DESIGN

Graphical representation of the factors that affect behaviour of occupants and how space can be designed to facilitate uses.

Conversely, horizontal surfaces are generally associated with work.[75] An interchangeable surface orientation may be useful in giving more dynamics to a common space, perhaps allowing for spontaneous creativity at unplanned meetings.

The ambience of a space is the spatial atmosphere and mood created. It can be manipulated through lighting, materiality, noise, odors and colour. Where a relaxed lounge space is usually composed of soft surfaces, warm, dark tones and serene music. On the contrary, energetic spaces are lined with bright, bold colours, ample daylight and lively music.[76]

In addition, furniture becomes crucial in creating the atmosphere, which can support the program of the space. Flexible furniture convey a more carefree atmosphere where users can cater the space according to specific needs, where fixed furniture suggests more rigidity in maintaining order of the space. Psychological comfort entails designing for the user experience in the built environment. Cognitive neuropsychology can define, prompt and support different needs of spaces; hence, truly allowing design to be catered to the occupant.

Conclusion

Demographic change in the surrounding cities of Toronto presents the opportunity in the evolution of suburbia to provide comfort at the hub. The goal of the proposal is to eliminate commute and provide an environment that nurtures a healthy well-being for occupants, which includes physical, functional and psychological comfort. Hence, it is crucial to understand the components that may contribute to the notion of comfort prior to designing the hub. Consequently, manipulating these components to give flexibility for individuals to cater to individual notions of comfort through mindfulness in design and the capabilities of technology.

3.0

ARCHITECTURE AS INFRASTRUCTURE OF CULTURE

FRAMEWORK OF HUB

3.0 Architecture as Infrastructure of Culture: Framework of Hub

3.1 History of work/office

Evolution of the Work and Office

In the evolution of office spaces, there have been constant shifts in focus as different concerns and technology gave a better understanding on the impact from qualities of a work environment. During the 1880's, construction advancement in materiality and equipment gave way to the beginning of high-rise buildings that surpass twelve stories high. Around this time, the Taylorist office erupted as a method of reducing the need for workers to move around. The characteristics are identified with desks that are organized in a repeating pattern, similar to a production line in factories. The intent was focused on the business productivity, but for the individual, it allowed an environment with natural ventilation and day lighting to permeate.[1]

In the 1930's, workdays elongated as electricity became more affordable. Standardization began and the office was merely an enclosed area characterized by mechanically regulated temperatures and constant artificial lighting to service workers. It sprouted a work culture to neglect time, as it was possible to work without the disruption of darkness that the night brings with electricity.[2]

Historically, people were overworked in poor conditions without attention put on worker's well-being. Businesses prioritized productivity and the lack of concern led to workers being neglected. Meanwhile, management of these companies failed to realize the unhealthy mentality employees were put under also impeded on efficiency. This describes what is later defined as Sick Building Syndrome (SBS) for the inadequacy in buildings that leads to unhealthy workers and unproductivity.[3]

Until the 1960's researchers analyzed the positive correlation of motivation, productivity and the presence of social networks. Transforming the traditional aspects of the office, there was merit in accommodating for the employee comfort.[4]

In 1967, the well-known cubicles were launched in the attempt to deliver privacy and help workers concentrate, entitled the Action Office. This led to floor plates being lined with private offices on the perimeters for the higher authorities, while leaving central areas for the typical cubicle layouts that lack the benefits of day lighting.[5]

The evolution of building technology transformed the conditions of the office interior space. While more speculations relate psychological impact and illness manifestation at the office, there are increasingly more opportunities to improve the way the built environment serves the employees. As companies are allocating a significant portion of expenses in the office and workers' are dwelling in it for a significant portion of their time, the attention in the office space design is rising.

The establishment of the office sprouted from a need to bring workers together that allowed management to have surveillance of employees more easily.[6] The emphasis in working was on execution, meaning there was minimal analytical aspect to being an employee. Given the right tools, the priority was to ensure that workers are diligently executing the assigned tasks. The office structure, spatially and managerially demonstrated this interaction with the uniform divisions and layout.[7] Hence, leading to the commencement of the infiltration of cubicles in the office landscapes.

Mass Production

Building design prior to digital computation was largely governed by linearity, right angles, and the grid system. The advantages being its standardized modularity saved construction cost and simplified the construction process. It allowed the engineering of systems to be established quickly with regular solutions that demanded little alterations to the previous design. However, the repetitive execution of this building system then governed the building itself.[8] Decisions of other components began following the structure instead. There are dangers to standardizing workplace design since it bypasses individuality and preferences; the monolithic interior layout jeopardized the psychological satisfaction and functional comfort without the workspace being adaptable to one's needs.

Figure 43

CUBICLES

Traditional workspace demonstrate privacy and littler interaction with others.

Figure 44

OPEN OFFICE

Modern workspace priortizes communication, visual connection and collaboration.

Cubicles. Open Plan

In the recent years, there was an explosion in the presence of open plan offices as it was modular and cheap for businesses to set up. This standardization was very desirable, the fact that it was economical in space and money, up to 20 percent in cost savings.[9] Over time, the open office transformed office cultures to become more interpersonal. In the contemporary office landscape, the shift is now putting emphasis on space that supports collaboration and communication. Tearing down the divisions of individuals physically and symbolically, the office was reconfigured for more transparency and adjacency between groups.[10] Teams are able to be situated in close proximity and communicate quickly and more often with an open plan office.

The easy set up for companies provided great benefits until recent studies have now revealed that, 90 percent of these workspaces are correlated with heighted levels of stress and blood pressure.[11] There was simply too much unnecessary information and distractions for individual to focus on the task at hand. While cubicles segregated individuals to focus on independent work, the open office overly connected people. This was a realization of needing different environments for different types of work. Thus, there is a growing trend in allowing for adaptability in workspaces that can suit the preference of the individual worker.[12]

The evolution of the workspace is redefined by goals of businesses and in the recent years, some of the priorities have been shifted to focus on an environment that cultivates collaboration and communication. The diversity of environments in the contemporary office is dissecting through allocating space for lounges and cafes for more informal meetings.[13] The hub follows suit, through providing a variety of environments and customizability in the workspace, individuals' desire of comfort can be addressed physically and psychologically.

Satellite Offices

In the 1990s, satellite offices were established as a reaction to urban centralization and to provide more flexibility to the office. The new typology of the satellite office supported a workplace closer to home and minimized time spent on commute.[14] However, cubicles mostly dominated the office landscape of those times and disconnected people from amenities that the office in the city provides. In a sense, people were merely commuting to a different location.

Generations' Different Demands

Baby Boomers grew up in a very different context than the Millennials. Consequently, the aspect of lifestyle and standards of living were established based on a very diverse scope. Each to own specialization and skills, the workforce still need the experience of the past generations to cultivate and educate the upbringing of the next generations. The struggle is accommodating for individual's varying demands of teamwork, interaction and management. Technological advancement is not where this struggle stems from, but the mentality of individuals.[15] Operationally, affecting how companies function, from processes, compensation and training structures.

The bridging of generations in the workforce with such drastic difference is unparalleled.[16] There are upward trends in the proportion of total employment made up of workers aged 55 and over, with 15.5 percent in 2006, it raised 3.2 percent in 5 years.[17] Researchers speculate that 48 percent of Baby Boomers are not expecting to retire even after the age of 65, with 13 percent expressing to continue working into the age of 70s. Millennials continue to join the workforce. By 2020, half of the workforce would be made up of Millennials and by 2025, over 70 percent.[18] Beyond demographic trends, the mentality and values are what drive the vigorous change in society.[19]

Now, in the 21st century, there is a clear focus on humanizing the office. Beyond the scope of equipping the employee with the necessary tools, companies are extending to cater to the other needs of workers such as child-care, physical exercise, medical care and recreation.[20] Millennials are brought up with a mentality that values factors such as collaborative work and favoring environmentally sustainable urban offices over suburban office parks.[21] The blurring line on the definition of work brought the hub to include other aspects of life adjacent to the office. Today, the dynamics of a job is different than what it used to be; hence, expectations from the workers adapted as well.

Figure 45

MILLENNIAL'S WORKSPACE

Increasing amount of workspace adjacent to cafes and informal settings. Generations' different demands and expectations of the workplace.

Globalization. Mobility of Work

"Over the last decade, digital technologies have transformed the world. They've redefined the way people communicate, collaborate, shop, travel, read, research, watch movies, gather information, book vacations, manage finances, and do so many more things. At the same time they've turned the modern enterprise upside down and remapped everything form sales to the how items flow through the supply chain."[22]

Theoretically, the world is getting smaller as people are connected through digital platforms. However, globalization is posing difficulty for regional planning as the projection of work in the long term is fluctuating.[23] The Internet of things are supporting and enabling the mobility of the workforce. Without being situated in a designated place and time, flexibility can benefit the stress of a modern dweller immensely.

The mobility of the workspace adds a digital platform to the typology of offices. Cloud based computing nurtures globally distributed teams and support networks of people beyond the immediate proximity of the stationary office. Large corporations are broken into smaller team organizations; dispersed physically, yet function as one with the help of technology. Consequently, benefits the company to speed up decision-making and execute tasks more rapidly.[24] It also allow companies to scavenge and the recruit talent from anywhere in the world.[25] Subsequently, developing a need for better employee retention tactics.

Technology has added a globalized network to architecture, it demands for a change in typology of how spatial design is executed. The mobility of work presents benefits that can reconstruct the mundane static office landscape. While work from home already exists, the hub allows the workforce to be spread out while being able to collaborate and host impromptu meetings. It supports a change in environment outside of the home office and provides different conditions of space to facilitate a variety of tasks.

Territoriality

Visibility, closeness to others and surrounding circulation, contributes to dictating privacy and impede on the sense of territoriality. In the office, the feeling of territory over individual office, workstation and group territory of team space can impact the execution of work. Studies experimented with people whom are usually in private offices to be reallocated to an open workstation. To no surprise, the sudden lack of privacy, rise in ambient noise resulted in displeasure. Criticism was targeted towards confidentiality, regardless of whether the work was actually confidential or requires to be done alone. The results demonstrate an intrinsic relationship of how people relate factors of privacy to social status and job rank. Regardless of the physical features of furniture, arrangement, and partition height, the detest that was especially found in senior staff.[26] It points out the significance of environmental empowerment and importance in allowing users to define and personalize their own space.[27] In addition, it also reveals the mentality that generations have in the presence of hierarchy of the office.

The hub emphasizes on providing this sense of customization to users. Flexible furniture allows groups to reorient spaces according to different programs, such as an event hall that could then be transformed into a gallery space.

Sense of territoriality can be done in a variety of ways. A method being, setting up boundaries or limiting access to different areas, such as allocating specific spaces to individual teams.

Under-designing also signifies a chance for users to personalize the environment for a sense of territoriality. Elements such as decorations or movable elements give a sense of perceived control; since there is a process involved and provides adjustability for individual comfort.[28]

Diversity of Space

The office design is challenged as technology, globalization and generations are coming together creating a new demand in spatial organization.[29] The built environment can be altered under the influence of many disciplines such as organizational psychology, work sociology, ergonomics and industrial engineering. Building layout designates the location of districts and overarching organization. Physical characteristics signify ambient conditions, which can be altered by components such as colour, furniture, size, temperature, air exchange, luminosity, ambient noise and surrounding smells.[30]

Environmental cues often distinguish how the space is used, such as the formality of meetings; the size of a meeting room and its furniture may indicate the seriousness of the agenda. Similarly, the enclosed nature of these rooms indicates the level of focus and privacy required.

Comparatively, large centralized areas appeal to groups of a substantial size, describe a more informal, collaborative nature.[31] Open environments describe transparency between individuals; it presents constant exchange of noise, visuals, and smell. However, this can be demanding for such perpetual heightened senses, which is often correlated to stress inducing. Conversely, open plans may benefit more for small groups or individual teams, away from unnecessary disturbances.

When emphasis is put on creating contentment and reducing any stress and frustration of an environment, a designer can create spaces with the information gathered about human behaviour.[32] To accommodate vast differences and varying needs of comfort, a diversity of spaces is foreseen as a growing trend in the workplace. In conjunction with the mobility of work, companies are recognizing the importance of focusing on the quality of good workplace design.[33] Through providing a diversity of spaces, occupants can utilize different types of space to meet the functional requirements of individual, group, or collaborative work. In conjunction, it is able to set a base for different social and psychological relationships within the workplace.[34] In conclusion, everyone has diverse personalities and preferences, in order to enhance the office environment, it is important to provide a workspace that can be enjoyable to successfully support work being done.

The inclusion of multiplicity of spaces at the hub, allows occupants to have a choice for the environment desired depending on the nature of the task. With reduced dysfunction, there is less aggression and inherently benefits the well-being of inhabitants.[35] Informal meeting stations, lounge spaces encourage communication when a brief meeting eliminates need to involve the intricacies of booking a room.

The hub utilizes interstitial spaces to facilitate its adjacent programs. Meeting rooms are supported by nearby café and lounge spaces as a gathering space and for users to be caffeinated prior to entering a

meeting. As an example of how programmatic uses are coherent and feed into each other for user experience.

Diversity of spaces can be integrated through the building layout and design, ranging from group areas that are stimulating collaboration to individual quiet zones for independent work.[36] The meaning of workspace is diversifying with the elimination of designated desks; it presents a non-territorial aspect of work that is allowing the office to become more mobilized.[37] The range of programmatic elements further differentiates the atmospheres the hub offers, redefining the traditional workspace to become adjacent to amenities and facilities.

Amenities

An essential part of the hub is to incorporate amenities. In order to remove the stigma that only large corporates can be the sole providers of amenities adjacent to the workplace. The hub connects the suburb to recreation without the need to trek to the city centre. However, some argue that the inclusion of amenities translates to the notion of having employees stay longer hours to work more. Inherently, it requires an office cultural and management change to eliminate the stigma of working overtime.

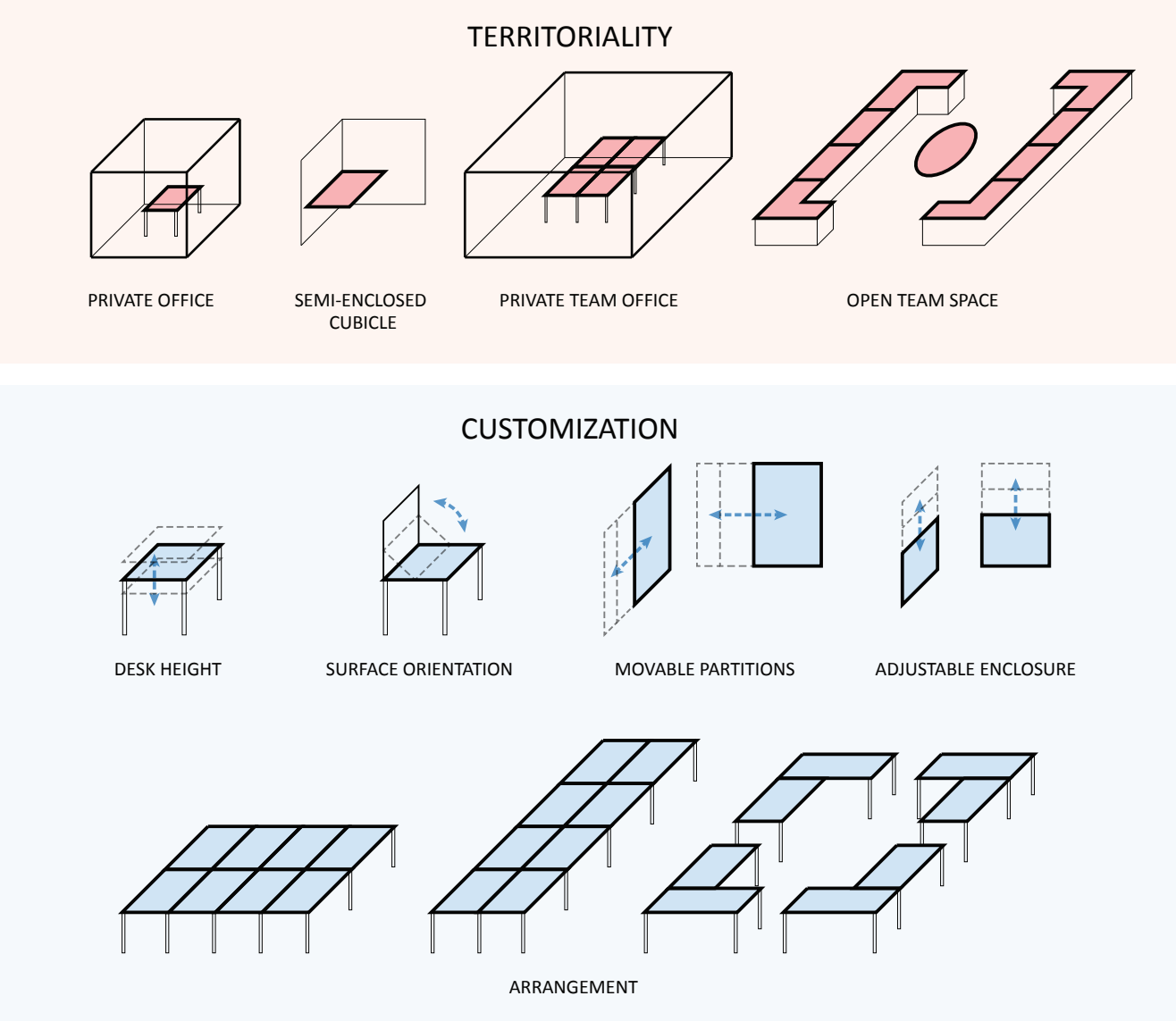


Figure 46

ENVIRONMENT EMPOWERMENT

Strategies in how placemaking can be implemented through developing a sense of territoriality in the midst of flexible coworking spaces.

Components of the Workplace

The hub suggests revitalization in workplace organization, stepping away from the downtown office towers. Hence, one needs to understand the components of the workplace; the conventional office is generally made up of areas of the home base, gathering space, threshold and support structure.

Home base denotes the primary space that the individual or group returns to for the execution of work. Whether it is physical or digital, it enacts as the sanctuary of the team, with a fundamental gravitational pull that allows the team to anchor work and identify itself with. Key aspects of it consist the necessary tools and resources, accessible storage for work in progress, opportunity to exhibit involvement and share, and a society to connect, to discuss ideas and insights.[38]

Gathering space refers to a meeting area that varies in the spatial environment. A drop-in space is typically informal for a quick stop that involves little intervention. A curated room is set up for intended purposes with a freedom for adjustments. Self-service space signifies an event space that allows for variation in configuration to accommodate to different needs.[39] Thresholds and transitions describe the connecting spaces between points of interest. The treatment can significantly impact the overarching built environment, since it signifies change in atmosphere and often where movement is consistent.[40]

Support structures are the designated areas that sustain functions, often related to mailrooms and printing areas. The location and quantity of support structures are crucial in efficiently feeding and facilitating tasks and to accommodate surrounding programs to adequately manage usage.[41]

Governed by behaviour of various programmatic elements, strategic placement of the components can create a network of cultivating connections between adjacent spaces; similar to a bookstore, which consist areas focused for different age groups.[42] There are opportunities in the configuration of these interstitial spaces to harness the movement of people. Implementing sight lines can cultivate a sense of belonging with an acknowledgement of being part of the greater community. Transparency and views allow people to acknowledge the approach of someone and the chance to connect with others. Deliberately allowing for breaks and opportunities to socialize is crucial for information to process and mentally absorb, harnessing the benefits of different spaces.[43]

"Sometimes a longer walk to get coffee may be better than a shorter one."[44] Encounters along the way may be more valuable in the age of collaborative work. The hub challenges to break the barriers of clear definition of spaces and allow informal spaces to interweave for atmospheres to diversify, connect and support spontaneous collaboration.

Square San Francisco

The typology of the work hub supports the idea of a sharing culture, which is a future workplace trend.[45] Space sharing allows for interdisciplinary staff to inhabit and reconfigure the office tower. In San Francisco, Square's office incorporated elevators that stop at every multiple floors. This was an initiative to encourage spontaneous interactions between different employees inhabiting separate office spaces. The notion of unplanned meetings is rising in popularity as people beginning to see the importance of collaboration. This includes the informal spaces such as coffee bars and booth seating as spatial requirement of an office expands beyond the cubicle. In addition, open spaces can accommodate for varying activities and size of groups as well.[46] It inspires the hub to allow for a distribution of spaces to allow for unplanned interactions.

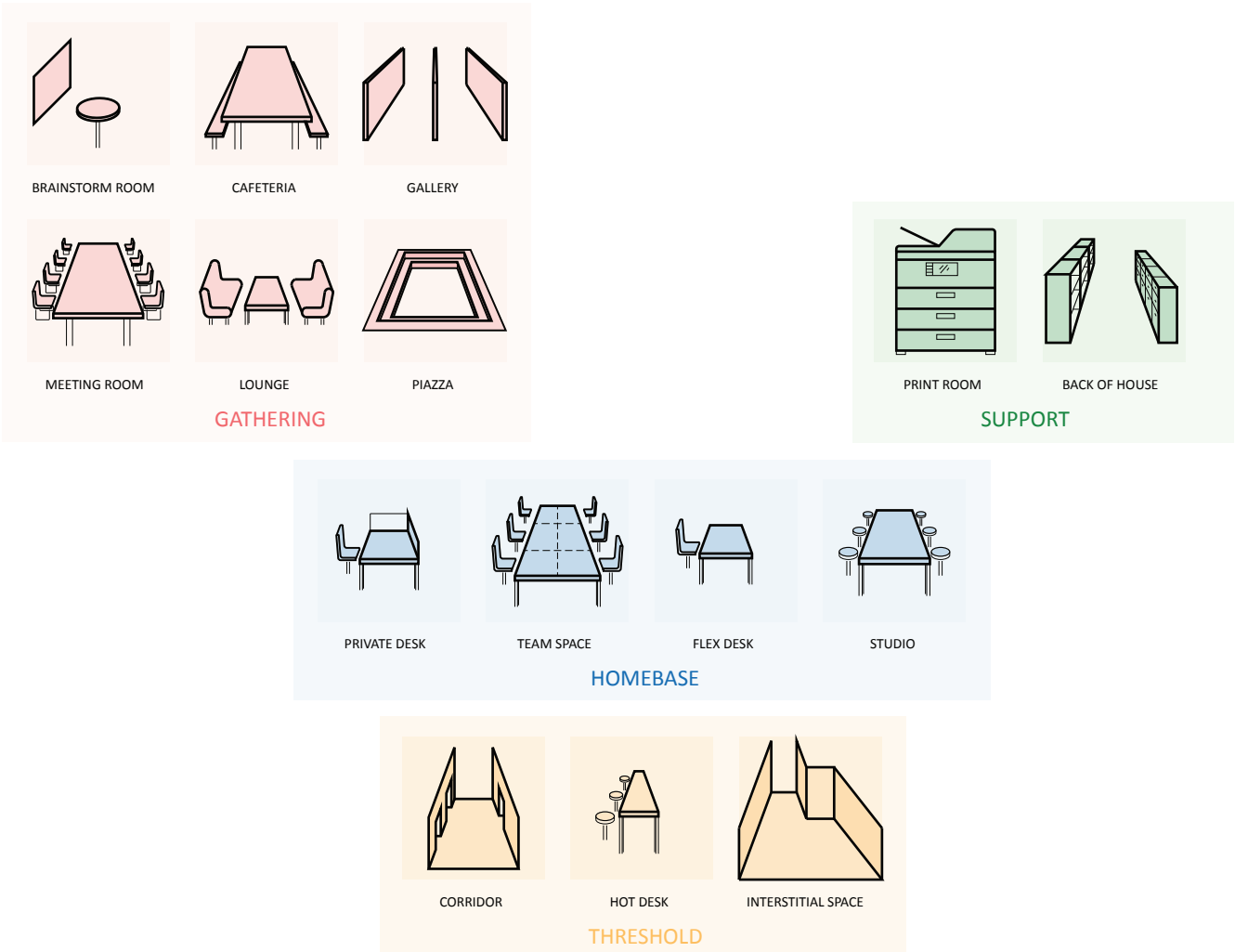


Figure 47
SPATIAL DESIGN
Components of the office.

3.2 Change in Office Structure

Advancement in technology drove the need for knowledge-based work. The office is no longer focused on supervision; it strives for performance, sharing, collaborating and communication. Office space typology is changing and evident in the ever-growing presence of atrium spaces, and inwardly facing office buildings that provide visual and psychological connection between floors and departments.[47] However, the current work landscape may not be prepared for the drastic change in relocating to the hub.

The change in office configuration extends to how businesses are structured. Modernity is breaking down the hierarchical office pyramid with the cultivation of another office culture, one that celebrates in the success of a group rather than individuals. The balance between work and life is also captivating more attention. Studies and pilot programs reveal economically sounding results for both the individual and corporation when work hours are shortened. [48] Indicating that the dynamics of work has been shifting, signifying an opportunity for the built environment to accommodate.

Evolution of the Organization

Technological advancement has restructured many industries and sectors of the modern day society. Speculations foresee businesses utilizing technology to give rise in smaller team structures that are dispersed worldwide.[49] Digitalization changed the nature of work. While mechanization took over most of the labour intensive occupations, modern occupations are flourishing in knowledge-intensive mentality and services.[50] Moreover, companies are scavenging for talent than vice versa.[51] The business structure needs to readapt to retain employees.

Dissimilar to traditional ways of work, the future organization needs to implement new principles. Operationally, deploying innovative collaboration techniques, diminishing hierarchy to function as small entities and encouraging innovative ideas are strategies to broaden opportunities for both the individual and the business.[52] As the scope of work is redefined, improvisation led to an increasing collaborative measure between various sectors and industries. Specialization of diverse disciplines are crossing paths, forming multidisciplinary teams.[53]

Ultimately, the hub is to accommodate for the changes in future work trends and to support different types of work. The scheme of the hub is to provide the platform where disciplines can interact within the office space and utilize the benefits of interdisciplinary workspace.

Efficiency vs. Effectiveness

Micromanaging have always had a negative connotation for good reasons. For example, when managerial roles watch over the shoulders of employees, the focus becomes concentrated on productivity rather than quality of work. Not only is it impractical, it neglects to acknowledge "efficiency versus effectiveness; doing the right things and doing things right."[54] Cultivating effectiveness translates to nurturing innovation, sharing of knowledge, educating one another, and as an outcome employees become more decisive and collaborative; thereby, minimizing workflow.[55]

In contrary, companies neglect to see benefits in the change of office managerial structure in conjunction with workspace layout, as it doesn't seem economically sound. However, behaviour is influenced by the spatial elements depending on the construct of one's cognitive and emotional build-up.[56] When employees are able to find comfort physically and psychologically, there are less distractions and disruptions that take away from the focus to concentrate on specific duties of the job.

From the perspective of businesses, when constructing an office space, businesses need to acknowledge how valuable the environment can cost when it directly affects its inhabitants. Without being able to have a basic psychological comfort in a space, needless to say, one's attention would not be able to be focused. The hub calls for transformation of the office managerial structure to facilitate work efficiently and effectively.

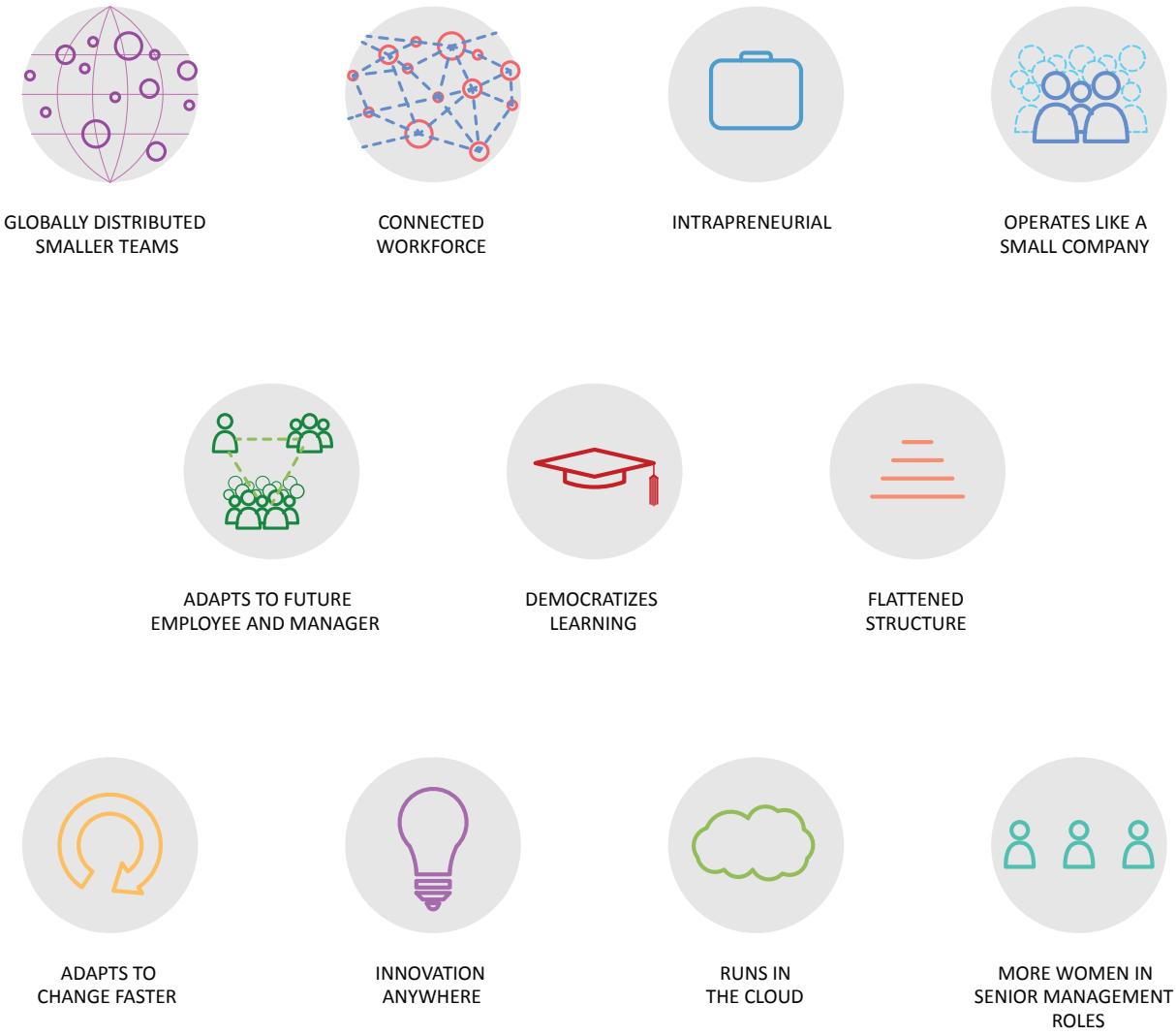


Figure 48

14 PRINCIPLES OF THE FUTURE ORGANIZATION

Projected principles of the future organization affecting how businesses are structured.

Fostering Sense of Belonging

The office culture plays an important role in the mentality of the staff. For companies to retain talent, employees' sense of belonging is crucial. The measure of office personalization and the type of work assigned can hinders one's longevity with the company. In addition, research suggests that by incorporating employees into the decision making process, it enables psychological comfort. [57]

In the event of reconfiguring the office, companies can seek the opinions of employees. It allows employees' voice to be heard in a constructive manner and engages them to recognize the cause and effects of inputting opinions. It also translates to the feeling of autonomy or control that workers have in the office environment, unconsciously satisfying psychological demands of control.[58] This refers to environmental empowerment, consulting employees in regards to workspace-related decisions and opportunities for engaging in providing suggestions on how it should be defined. This proposes the idea of a continual feedback system at the hub during the construction and its operations, allowing further changes to be made to constantly adapt to community concerns.

Work. Life. Balance.

The continuous skyrocketing cost of living is also pushing the next generation of consumers to become dependent on a sharing culture. Subscription-based goods and services are on the rise; with businesses such as UBER providing ridesharing and AirBNB providing accommodations.

The hub suggests a distribution of workspaces that accommodates beyond just startups or freelancers. It targets individuals and employees of large corporations, increasing the chances of exchange through physical social interaction; prospects arise for the struggling small businesses. The hub is a platform for the individual to explore, meet others and encounter opportunities; and in turn, companies are able to recruit through the hub. Without the burdens of building management, companies are able to focus on business development.

The business model of the hub could be a subscription-based service, similar to a membership. By sharing the back of house and support spaces, the running cost of the facility is distributed and minimizes the startup cost for new businesses. By conglomerating small entities, there are opportunities to obtain group discount such as shipping costs. The demand of affordable, flexible office space would be intangible for small companies in the traditional office typology, let alone being able to provide an environment that focus on well-beings of individuals.[59] The ability to provide workspace adjacent to amenities has always been the attractor that only large corporates were able to provide. However, it shouldn't be relegated as a luxury if it can be achievable through different methods such as the establishment of a hub.

Similar to large technological companies, amenities are an integral part of the office hub. It suggests that the office space does not only provide for the tools needed for work but for nurturing a healthy community. As work life balance is becoming indistinguishable, many people are seeking for a social life beyond career opportunities at the workplace.[60] Hence, shared interests and hobbies are integral to bonding and cultivating company culture.

Distinction between coworkers and neighbours may be concerning to some when it identities blur. However, a study was done to observe the changes when employees' personal issues were supported by managerial roles. The relief allowed workers to get better sleep, become healthier and feel less stress. Meanwhile, further studies demonstrated how the effects even trickled down to the family.[61]

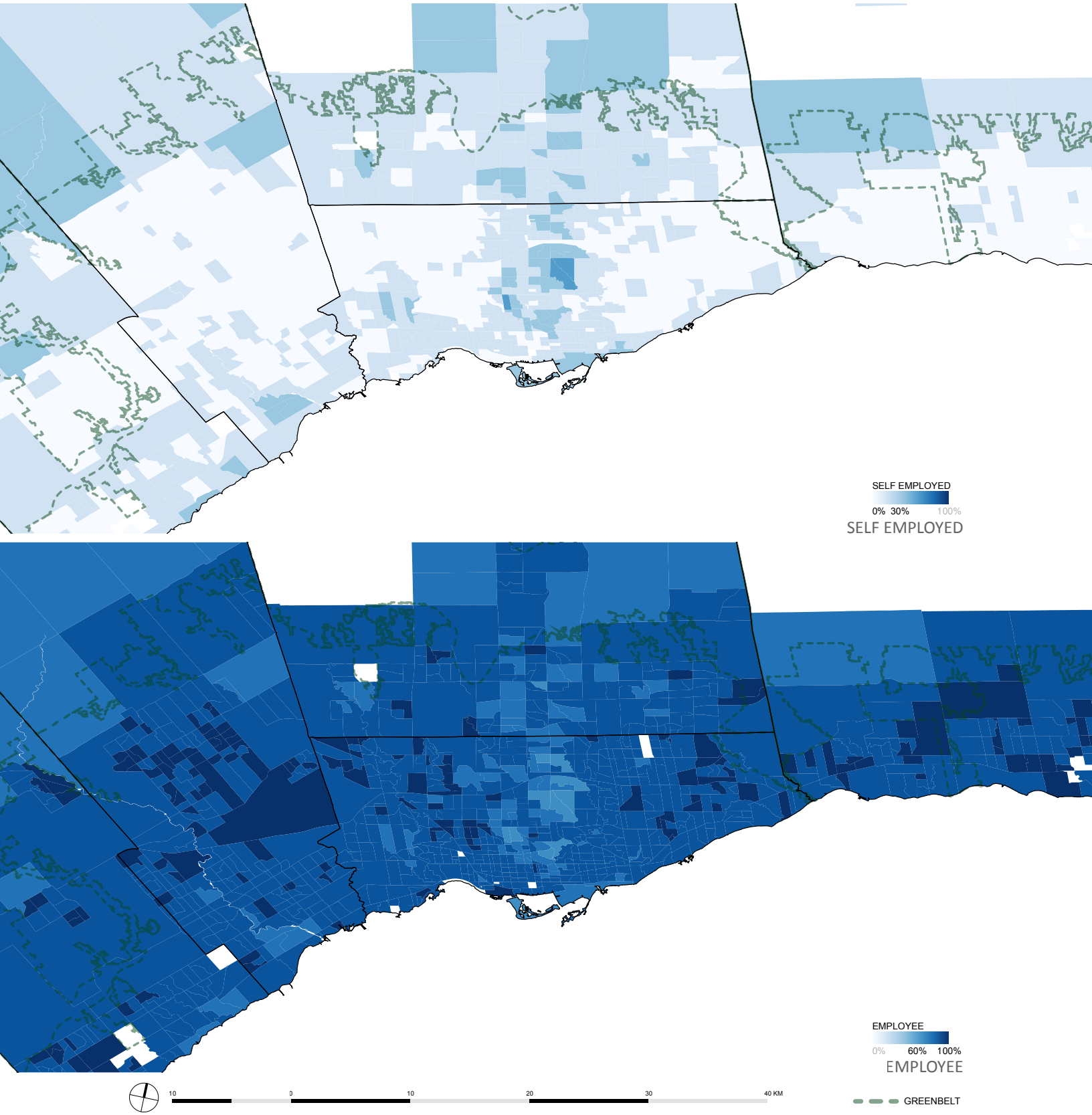
While work and life balance may be thrown off scale or become undefined, the pros and cons of access to work are debatable. Another survey collected the opinions of employees, indicating the inherent fear employees have at the thought of flexibility. Even though more than half express feelings of being supported, the other half also feel that the exchange for flexibility would be a step back from advancing in their career.[62] Despite being given the flexibility, the dread of consequences still lies within the company culture and mindset of employees.

Career advancement aside, employees are searching for methods to add more flexibility to daily

Figure 49

SELF EMPLOYED VS. EMPLOYEE

Geographical representation of where self employed and employees reside.


SELF EMPLOYED
0% 30% 100%
SELF EMPLOYED
EMPLOYEE
0% 60% 100%
EMPLOYEE
10 0 10 20 30 40 KM
GREENBELT

life; this is shown through the demand of different workplace options locally or a desirable coworking location.[63] Despite the easy access to work, it takes the company culture and mindsets to counterbalance the work-life balance equation. The intervention of the hub may suggest getting the access to work at all hours, but fundamentally, no one should feel obligated to work nonstop.

While work place and time is becoming more flexible, the emphasis should steer away from having to balance well-being and the ability to succeed in a career.

Humanizing the workplace pose great benefits for the business. Upon analyzing 250 global companies, *Morgan Jacob* believes that given a desirable workspace, adequate tools and an engaging culture, people genuinely desire to be present at work.[64] Traditionally, majority of an office running cost are ongoing despite workstations only being occupied 50-60 percent of the time.[65] Desk sharing allows for regaining the lost operation cost and offers flexibility for employees. With ample variety of spaces, employees are provided with preferable workspaces. As a whole, it is able to support cultural change, with opportunities to interact with others, expanding social networks. More importantly, allowing for individuals' well-being to thrive and companies to retain talent.

30 Hours a Week

In Sweden, a pilot program of reducing the workweek to 30 hours lasted for two years, reporting that work was done in greater efficiency with 15 percent of less sick absences. Reducing workday hours resulted in healthier, happier employees; in some cases, the effects even extended to reducing the stress of their children as well.[66] It substantiates the claim of connecting human happiness to health and productivity because when workers spent less time at work, there was more time to allocate for the family.

Amazon also piloted a similar study, where all employees are reduced to only working 30 hours a week, proportionally receiving 75 percent of salary, and able to retain all benefits. For the local economy, it meant more people are employed.[67]

At Gothenburg's Sahlgrenska University Hospital, a comparable experiment was conducted in the orthopedics unit. To compensate for the lost hours of operation, 15 new staff was added while 89 nurses and doctors are on a six-hour workday. Though more expenses were needed, there was a 20 percent increase in operations, bringing more revenue. Meanwhile surgery waiting times were cut shorter and patients were able to return to work and inferred rippling positive effects on the economy.[68]

From the perspective of businesses, there was significantly less interest in leaving the organization. With fewer turnovers, and a possibility of bringing more people into the workforce, this implies great benefits to the economy. Individual businesses are actually getting more effective work done without tiring employees. In addition, research confirms that human attention span is only able to concentrate on specific tasks for a few hours.[69] Shortening work hours translated to companies saving cost of unproductive employees, talent retention but for gaining families' well-being too.

The user experience of the employee constitutes for the ability of the office to equip and support individuals to perform tasks with efficacy. Providing a diversity of space to accommodate for varying needs, the hub includes areas of collaborative team workspace to solitude individual concentration booths. Financially, it is speculated that experiential offices, offices that value culture, technology and the workspace environment, make a quadruple profit, experience a 40 percent less staff renewal rate and in the end, require 24 percent less employees.[70]

It's not necessarily working longer hours but working more efficiently and effectively. Modernization is moving away from correlating the time spent sitting at a desk as the measurement of productivity.[71] Time management involves prioritizing, setting attainable goals and inherently taking the necessary actions to achieve targets. Urging the balance of work and life, the hub requires support of businesses to understand the renewal on the modern concept of work.

Flex Hours

Flex hours denote giving employees a degree of flexibility in scheduling one's day. Depending on the scope of work, it may be ideal to implement flex hours. Beyond the core working hours, the only reason modernization still need core working hours is to be able to meet and gather with others at specific times. With the thought of globalization, information and communication technology can facilitate meetings that are more convenient for all, irrelevant to location and time.[72] Conversely, this is opening up hours

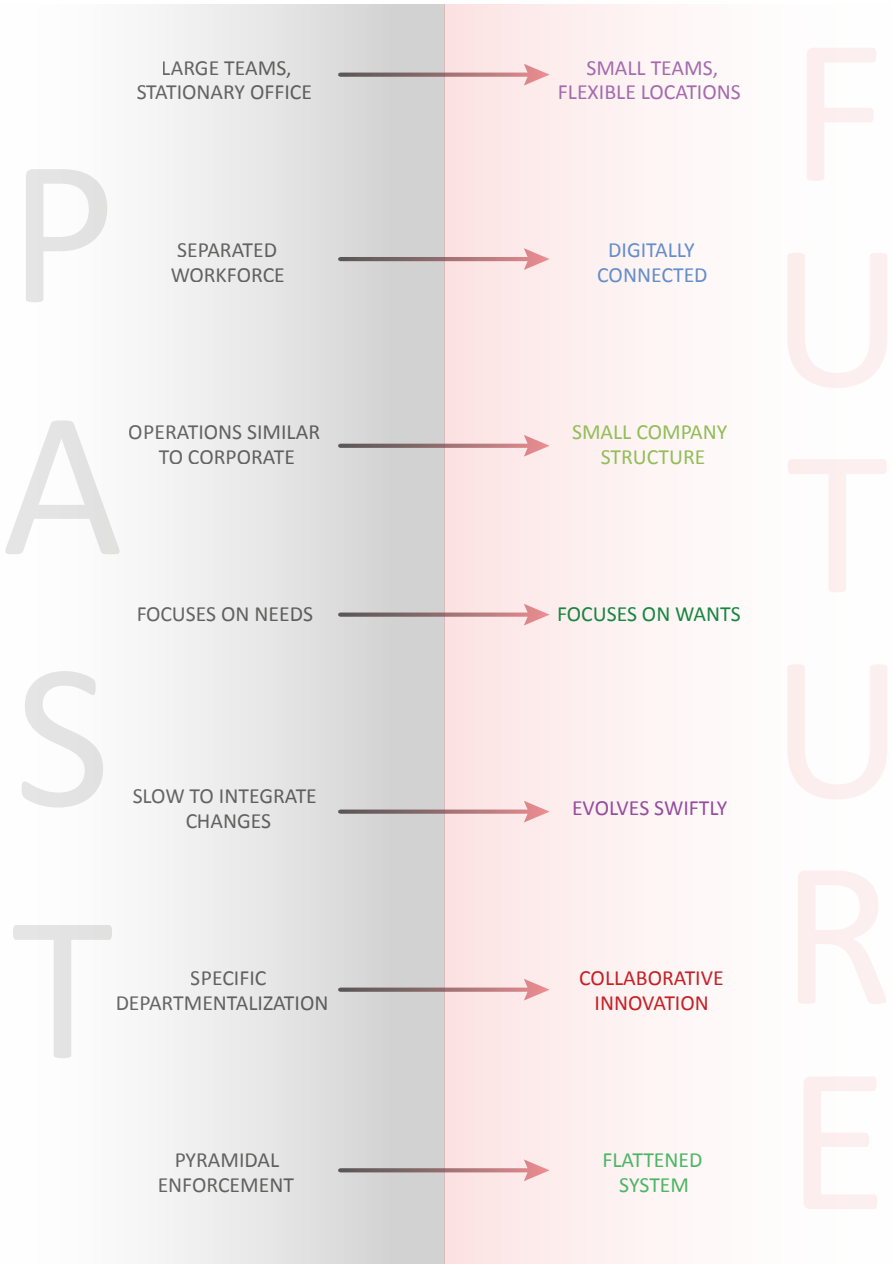


Figure 50

EVOLUTION OF THE ORGANIZATION

Comparison and projection of past and future approach on office operations.

outside of the typical work hours to accommodate for different needs of the office.

Allowing flexibility in working hours gives opportunity to the hub to be a transformable space. While furnishing can address individual workspaces to be adaptable; programmatically, spaces in the hub can transform uses at different hours of the day.

Nurturing Office Culture

Fundamentally, change in spatial organization in the workplace does not lead to office cultural change; however, the effort in implementing environmental design and awareness in spatial organization demonstrates the values of the company in employees' user experience.[73] Beyond the spatial aspect, work culture and attitudes are reflective of the business values and goals.

"Old organizations are based on force and new organizations are based on trust."[74]

Separation between work and personal life are demolishing, as technology gives access to work at any given time and the inclusion of social life at the workplace, the traditional hierarchical model is inadequate to the new model of work. Reformation is needed in the company culture that communicates and collaborates horizontally rather than focusing on pyramidal enforcement. In an innovative era, value is placed on ideas of any form, and not a systematic relay of enforcing power and labour.

Nonetheless, the design of the workplace echoes the culture, behaviours, and priorities, through the built elements and spatial configuration.[75] From operations to spatial customizability, the hub strives to foster a sense of belonging and flatten company structure with coworking collaborative spaces.

Figure 51

7 PRINCIPLES OF THE FUTURE EMPLOYEE
Changing nature of the role of employees in the office.

Social Interactions

Business operations are improvising with the growth of socialization and renewed collaborative strategies.[76] When work departed from lingering on supervision and emphasized performance, methods of encouraging socialization and interaction was burgeoning.[77] Implementing an internal social network may even further equip an employee's skill set and establish a bond in the workplace. Encouraging a strong cultural environment is also a tool for workers to interact and share knowledge.[78]

Technology has enabled the workforce to work from home, but neglected the importance of direct physical human interaction. By repositioning the conventional office space to the suburban fabric, or restructuring the interior layout to accommodate a larger variety of environments, spontaneous social interactions are encouraged to nurture a bond within the community. Scott Wyatt, NBBJ's chairman affirms, "the social side of work may soon be the only reason we have office buildings."[79]

On the opposite end of the spectrum, employees of large corporates who are situated within business campuses end up only knowing the people amongst the same boat, lack diversity in social network.

In the past, workspace delegated for individuals accounted for 70-80 percent of the office floor plate, also known as "I" space and the residual 20-30 percent of communal space was referred to "we" space. As knowledge-based work reign and diversity of spaces are growing, the new office space ratios are looking at 30-40 percent of "I" space.[80] Transformation is already happening and opportunities lie in the treatment in allocating the enlarging "we" space.

The theory of need satisfaction identifies human's inherent motivation from needs, which include social needs of self-esteem and self-realization.[81] Sociality nature of human beings value interaction with one another, without conflicting aspirations, the workspace can encompass social networks within a suburban neighbourhood at the hub. Grasping on the basic collaborative tool of communication, occupants in the hub can foster a culture as a member of an office and the community.

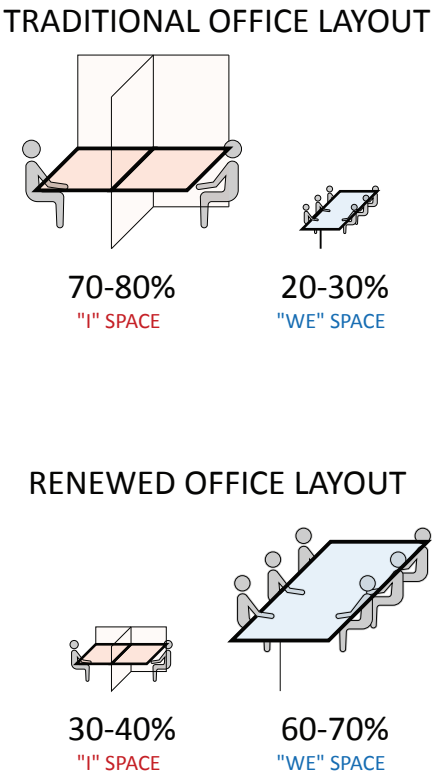


Figure 52

I SPACE, WE SPACE

Graphical representation of traditional office layout that is heavily dependant on private workstations and the renewed office layout that promotes interactions and social networks.

Axel Springer

Europe's major digital publishing company, Axel Springer is adding a new building in Berlin and it is a design proposal by OMA. The new building is at the centre of the campus, with an atrium that offers views connecting to the existing buildings. [82] The design methodology concentrates on the revitalization of the office landscape, where collaborative spaces governed the shape of the structure. To maintain solitude, private work areas, traditional workspaces surround the perimeters of the floor plates, as it opens up towards the diagonal central atrium, stepping terraces and bridges brings a drastically different environment to the communal spaces.

The public is welcome to the building with the ground floor featuring studios, event and gallery spaces, cafeteria and restaurants. Above ground, there is a meeting bridge for guests to observe the company in action. In addition, the rooftop bar is accessible to the public and serving as a haven for the tired workers looking for a spot to relax.[83]

From the traditional printing press, Axel Springer is transitioning into digital media. The evolution is evident in the design of the new office, envisioning interconnections of workspaces and informal meeting areas, while maintaining formality in individual work. It distinctly offers a gradation of privacy for employees to adapt and cater to their needs. The journalists can find seclusion for individual work in more enclosed areas and be able to socialize in more communal spaces as well. The unique atrium design offers functionality and breaks up the mundane office landscape despite being contained in a simple façade. It brings the idea of bridging terraces and the power of prioritizing interior spatial form to govern the design of the hub. The atrium allows daylight to penetrate and distinguishes a gradation of public and private space from the centre towards the perimeter of the building. The function driven form reveals the occupant-focused design that sets the Axel Springer as a precedent for the hub.

3.3 Community Engagement

Complete Communities

In the prospects for the growth of the Greater Golden Horseshoe, the extended metropolitan area around the city of Toronto, the government of Ontario has indicated the pursuit of building complete communities. It was defined to provide the support of everyday lives, where different jobs, services and facilities are within easy access. Catering to varying income and household size, it should address to give a healthy lifestyle through submerging an adequate amount of parkland and open spaces. Therefore, giving rise to prospective recreational activities and support of active transportation. In order to minimize travel to reach a workplace or services, there needs to be a transformation in the development of the suburban landscape.[84] The contemporary urban planning strategy is to allow communities to be more immersed within their own neighbourhoods and engage with the immediate environment, by linking the individual with the context, it encourages innovation and collaboration such as providing coworking space.[85]

Opportunity to Socialize

The goal is to design for the local citizens. Observations have indicated that travelling short distances are linked to one's satisfaction; however, it does suggest it being a reasonably minimal commute.[86] Through the location of situating within existing neighbourhoods, the hub would still require a short travel to encourage the use of active transportation.

The focus is to also target establishing relationships within the community to encourage a collaborative environment. Social networks affect how one identifies themselves, as well as the sense of belonging within a larger group.[87] Hence, it is important to establish an open and welcoming culture to maintain the livelihood of the community.

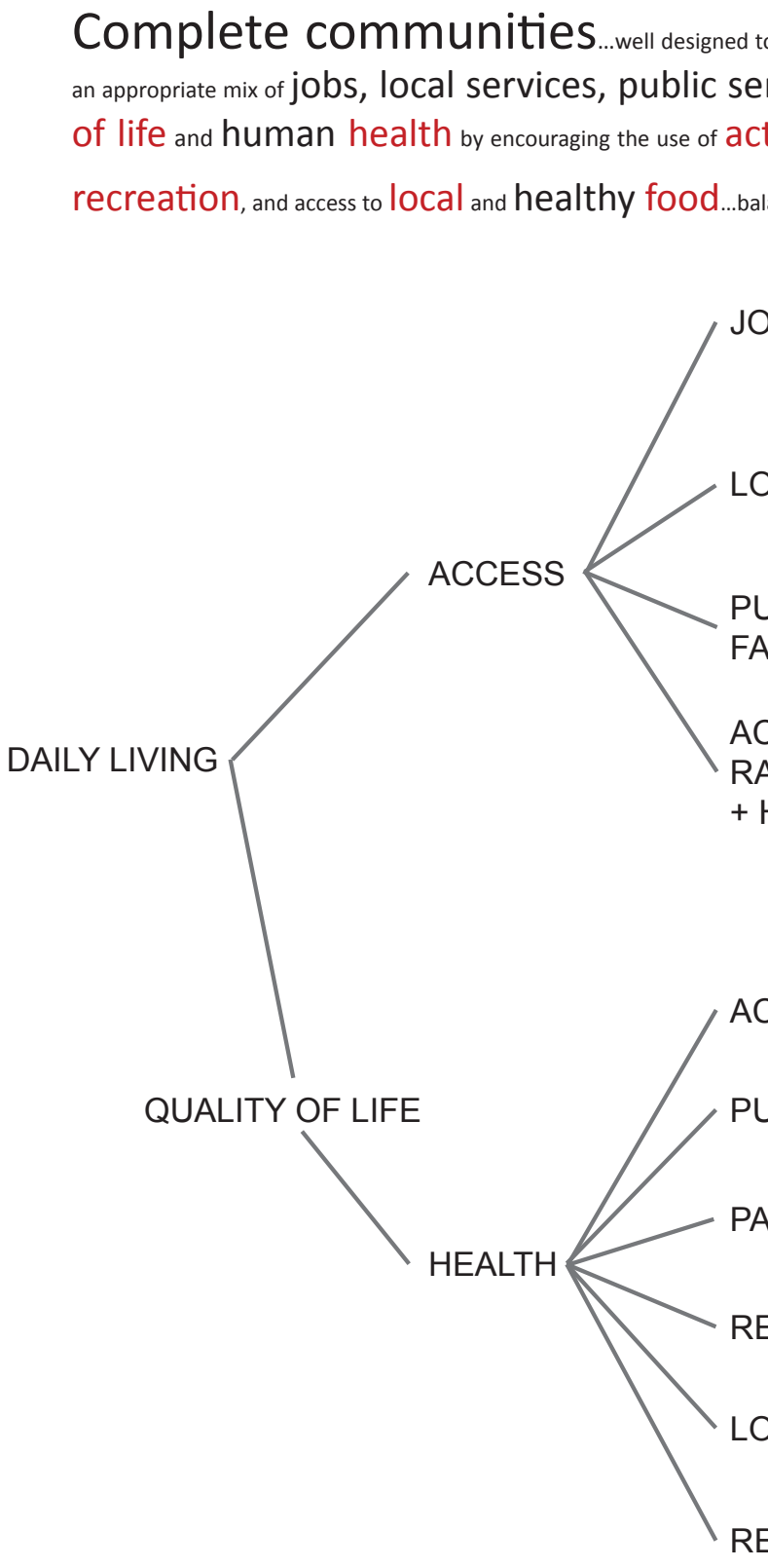


Figure 53

PROGRAMMATIC FRAMEWORK

Breakdown of the possible program to be implemented in a hub to accommodate for the needs of a complete community.

o meet people's needs for daily living throughout an entire lifetime by providing convenient access to rvice facilities, and a full range of housing to accommodate a range of incomes and household sizes...support quality tive transportation and provide high quality public open spaces, adequate parkland, opportunities for ance of jobs and house...reduce the need for long distance commuting.

Growth Plan for the Greater Golden Horseshoe 2017

OBS	COWORKING SPACE	• MEETING ROOM • INDIVIDUAL PRIVATE TASK • GROUP • SMALL SCALE MANUFACTURING
OCAL SERVICES	DAYCARE, PET GROOMERS	• DAYCARE • PET GROOMERS • RETAIL • GROCERIES
UBLIC SERVICE ACILITIES	HEALTHCARE, PLACE OF WORSHIP	• MEDICAL CENTER • PLACE OF WORSHIP • TRANSPORTATION
CCOMMODATE ANGE OF INCOME HOUSEHOLD SIZE	COHOUSING	• BEDROOM • LIVING SPACE • KITCHEN • PRIVATE GREEN SPACE • WASHROOM
CTIVE TRANSPORTATION	WALK, BIKE	• WALKING / BIKING TRAILS • FITNESS CENTER
UBLIC OPEN SPACES	PIAZZA	• PERFORMANCE PIAZZA • MARKETPLACE
ARKLAND	PARK, TRAILS	• CONNECTION TO PARK • WALKING / BIKING TRAILS
ECREATION	SPORTS FACILITIES, AMENITIES	• ICE RINK • SWIMMING POOL • RESTAURANTS • BAR • EVENT SPACE
OCAL FOOD	COMMUNAL GARDEN	• COMMUNAL GARDEN • COMMUNAL KITCHEN
EDUCE COMMUTING	BIKE SHOP	• BIKE SHOP • BIKE STORAGE • CHANGE ROOMS

In the recent years, there has been immense population growth in the townships surrounding the city of Toronto. In Milton alone, the population soared by 71 percent in four years. To the north in Markham and Vaughan, the population density increased by 25 and 31 percent. The sprawl into suburban communities brought over 750,000 residents.[88] The immense rise in population identifies the audience that would benefit from the establishment of the hub in each of these communities. Hence, it is crucial to recognize how the office space can hinder its immediate context of the adjacent community and influence the local economy.[89] The growing population translates to be increasing potential of the hub. Since the hub is situated within residential neighbourhoods, it gives way to manifest community bonding between the incoming and existing residents.

By integrating the hub into residential areas, it would develop a sense of belonging and security for locals of the community. By including a mix of housing size, unit types, facilities and amenities; the neighbourhood can celebrate the intermixing of age and cultures at the hub. The convenience of its location allows the rekindling sense of community between residents through commonly used public spaces.[90] Hosting events and workshops as a networking medium, a sense of community can reverse the social isolation and truly revitalize the ubiquitous form of modern cities.[91]

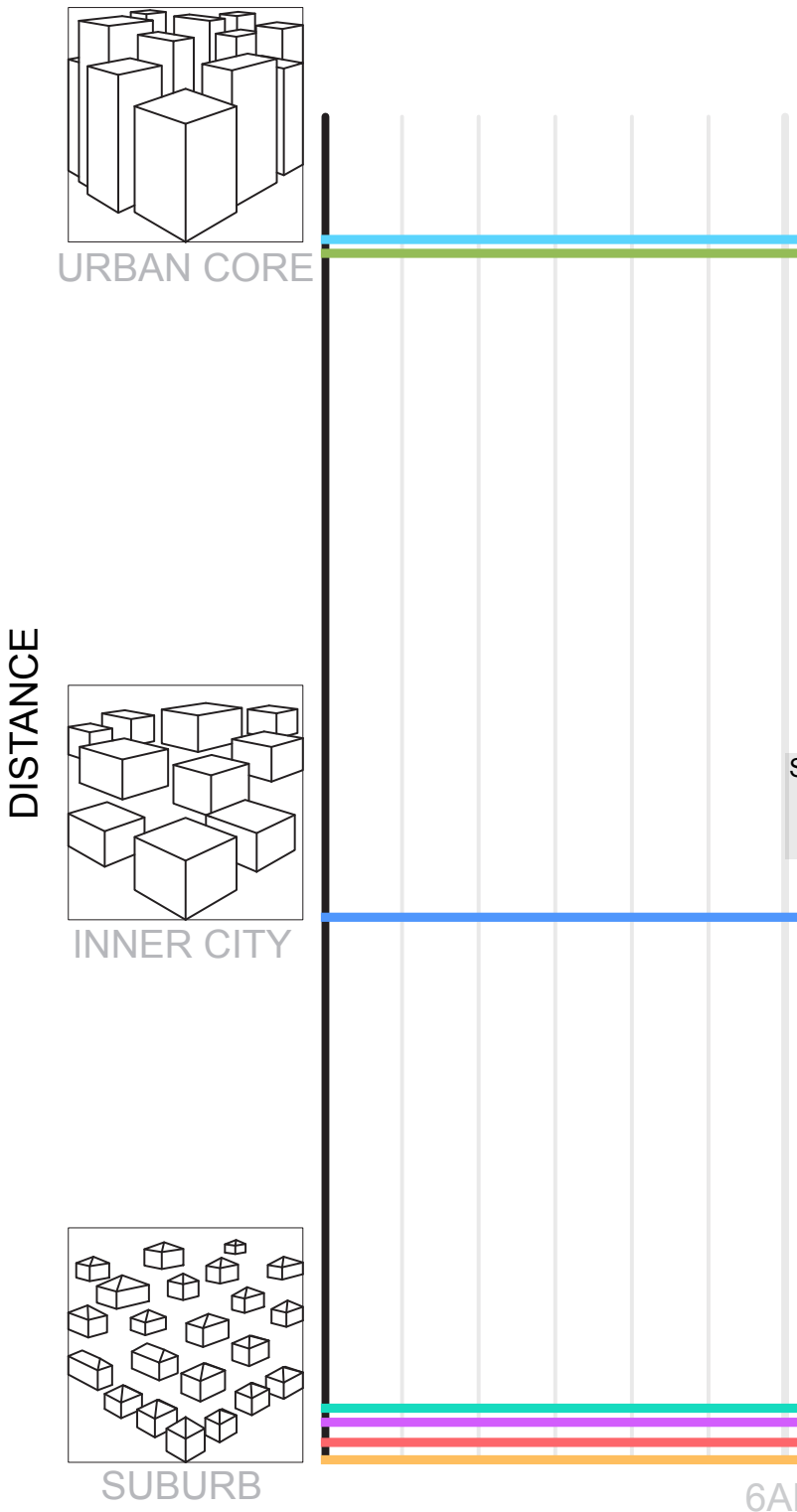
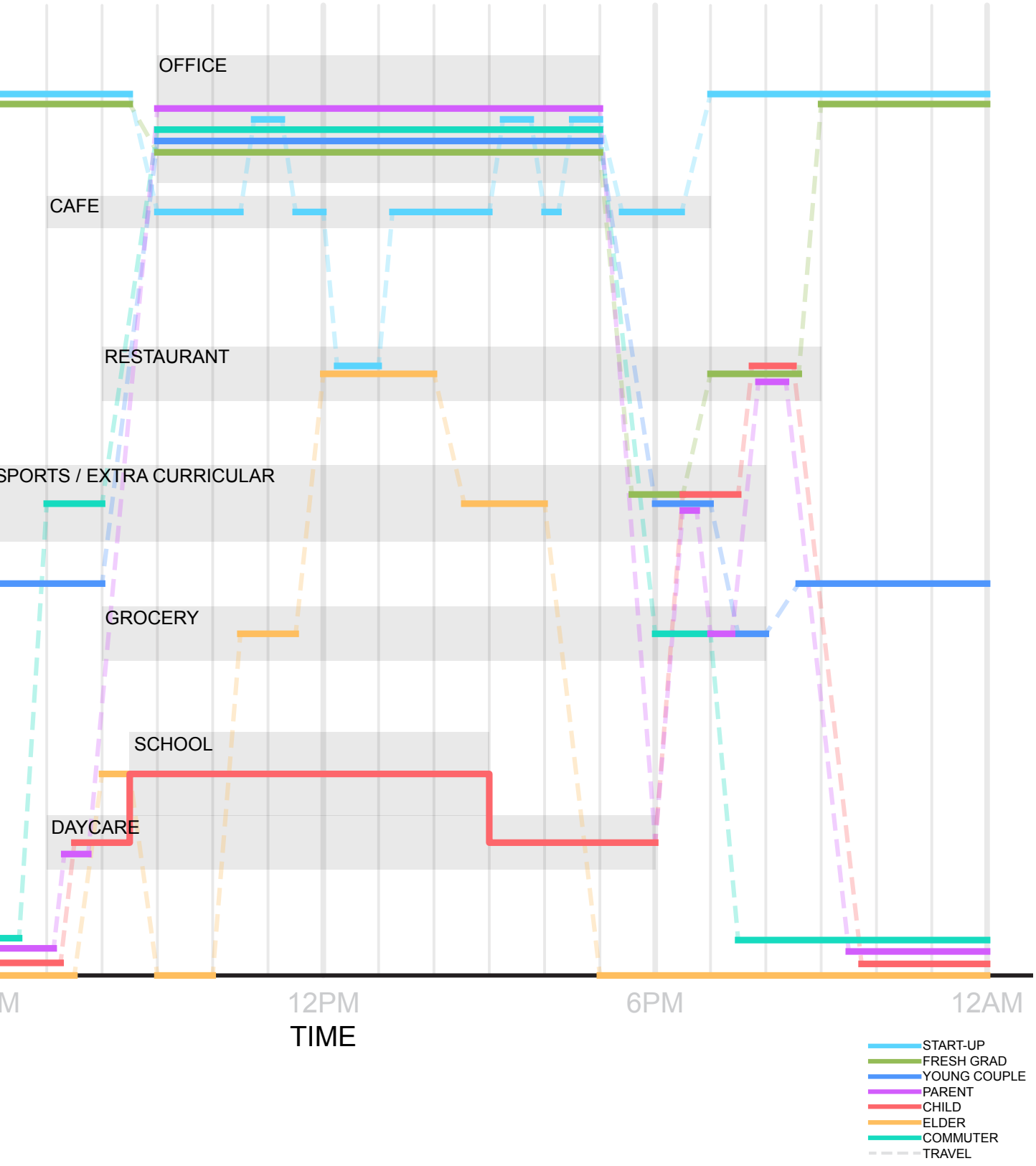


Figure 54

JOURNEY IN THE DAY OF...
Scenarios of how different residents of the community may cross paths during different times of the day and time spent on travelling between points of interest.


OFFICE
CAFE
RESTAURANT
SPORTS / EXTRA CURRICULAR
GROCERY
SCHOOL
DAYCARE
12PM
6PM
12AM
TIME
START-UP
FRESH GRAD
YOUNG COUPLE
PARENT
CHILD
ELDER
COMMUTER
TRAVEL

Flexibility. Mobility.

Digital technology presented a world that is virtually connected. Many industries have had to readapt its business scheme with the birth of social media, cloud computing and mobile applications[92].

Through a mobile application, users can tap into knowing availabilities of spaces, book meeting rooms and connect to community events. Extending to internal social networks and customizing immediate environments, it can also develop into connecting with the other hubs at large.

For individuals or travellers, the hub can be accessed on a short-term basis. Supporting travel and work, the hub serves to provide flexibility. For the neighbourhood, users can use other facilities and amenities, eliminating the need to trek to multiple places; many errands can be done at the hub. For those who do not have access to an automobile, it can be problematic in the car dependent suburban city.

The centralization of the hub becomes a node for transportation. It reduces the need to have public transit spread out, interweaving small streets. By implementing a shuttle service, the hub can collect residents to the hub and then connect to the larger transportation network.

Mobility constitutes for allowing occupants to have easy access to the site, node to connect to public transportation and diminishing the need for cars.[93] Designed with pedestrians in mind the reliance on cars may slowly wean off with adequate phasing and street strategies.

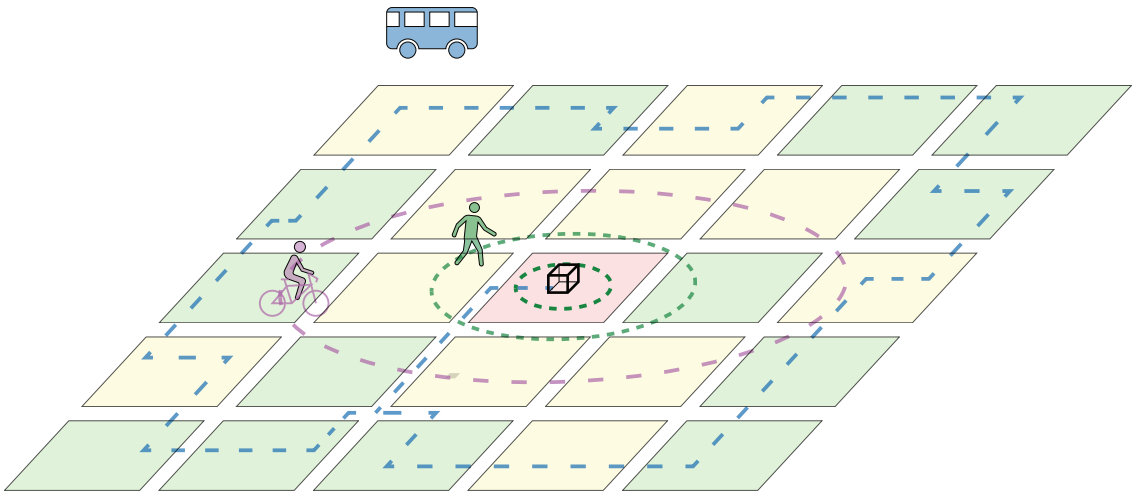


Figure 55

FLEXIBILITY, MOBILITY

The presence of the hub to be oriented based on proximity to residents. Reachable by a short walk or bike trip to encourage active transportation. Potential to provide a shuttle service to allow the hub to enact as a transportation hub connecting to other transit methods to minimize the presence of private automobiles and underserviced route of buses.

Safer Streets

In order to rigorously encourage the use of active transportation, a safe environment is needed.[94] In the landscape of the suburb, roads were designed with a priority given to the automobile. Creating walkable neighbourhoods can be challenging where citizens also heavily value green space, want to reduce traffic, enhance town centres and get a better quality of life.[95] By consolidating land uses and translating into diverse programmatic features, citizens no longer need to travel to multiple places by car.[96] The need for a car to easily travel to multiple points of interest is diminished. Consequently, the reduction in the surrounding traffic can be used to attract the use of active transportation and to regain land used for parking to become green spaces.

From the city perspective, simple interventions can be executed to increase pedestrian safety. Street safety can be achieved through strategies such as traffic calming, by reducing speed limits or integrating traffic signal phasing concentrated for pedestrian.[97] In London, the introduction of reduced speed zones of 30 kilometers per hour resulted in 42 percent decrease in fatal injuries.[98] Physically, intersections can include markings specific to cyclists or buffer zones to separate the different modes of transportation.[99] Reconfiguring roads to allow for more connected streets, increase in density for vulnerable population, minimizing trip distances to allow accessibility are all strategies that can be easily implemented into the existing neighbourhood.

The hub also advocates for active transportation by including end-of-trip accommodations. This includes bicycle storage, repair workshops, change rooms, and showering facilities. Possibilities extend to incorporating small-scale interventions, such as motion detected lighting in dark alleyways. The motive is to allow pedestrians to detour less through more path connections, to incentivize the non-use or non-ownership of private automobiles. Overall, reducing the need to drive allows residents to raise awareness in road safety; thereby, increasing viability of active transportation in suburbia.

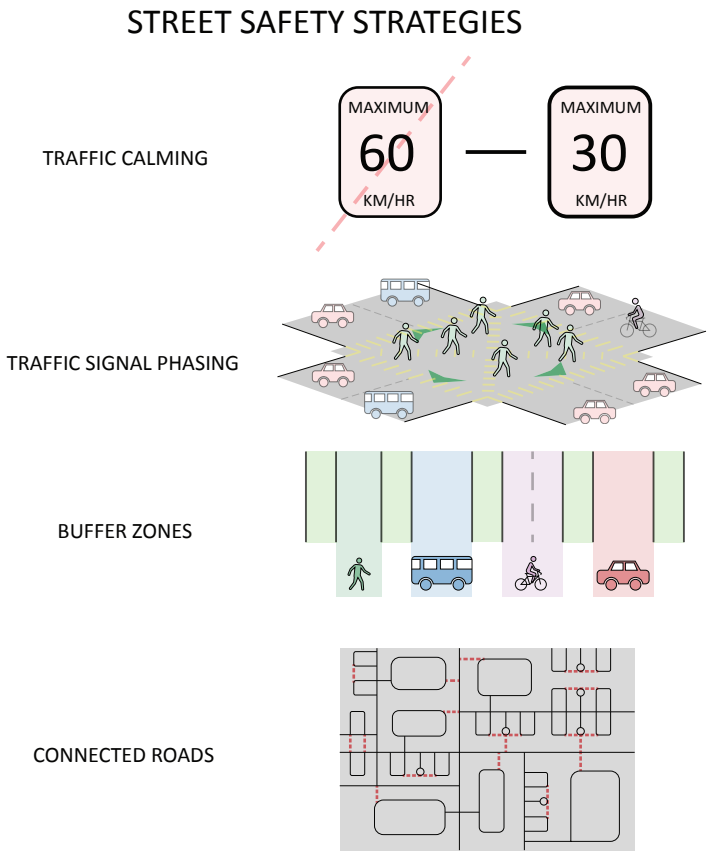


Figure 56

STREET SAFETY

Strategies in creating complete streets for facilitating the incorporation of active transportation in the suburb.

3.4 Renewed Business Structure

Ecosystem of Attractors

Architecture is embedded with a power to intervene and fortify connections on the individual, group and company. The intrinsic tie between the "building, behavior and business"[100] is empowering.

Development of the hub aims to bring centrality to neighbourhoods as population grows. Instead of sprawling to new land, there are opportunities within the existing built fabric to intensify and improve the quality of life and well-being of the suburban city.

NDSM Shipyard

What is known today as European's largest incubator and cultural hotspot is located in Amsterdam. The NDSM shipyard was revitalized from an abandoned industrial land.[101] Using the principle of 'stad-als-casco', city as framework model, it was financed by the hundreds of users, which allowed maximal freedom in this bottom-up approach of construction.[102]

Casco, means the basic framework of a ship. Since the occupants were relying on the collective funding gathered, the development, design and construction was an actively shared commitment.[103] It has been in operation since 2007, housing 80 studios and businesses, 12 theater workshops and an indoor skate park. The overarching structure is made of steel and concrete. Each studio or office is situated in custom container offices and are then finished with own preferences, with an encouragement for individualization.[104] The internal streets to access the offices are illuminated with skylights. Now it has developed into one of the major tourist attractions, the uniqueness and outcomes of its success was unforeseeable but sprouted from a desperate need when artists needed a space.

Figure 57
NDSM SHIPYARD
Bottom-up approach to revitalizing abandoned industrial land.

Figure 58

NDSM SHIPYARD
Business incubator and artists' studios, individual customized workspace connected by communal areas.

Figure 59

NDSM SHIPYARD
Structure framework to accommodate for more shipping container workspaces.

Bottom-Up Approach

The construction of the hub requires actors from different disciplines. By implementing a bottom up approach, it allows the program of the hub to be shaped by the needs of the community and characterized by the neighbourhood it is situated in. To cultivate a sense of security and comfort, allowing users to personalize, it can activate a sense of autonomy when there is contribution into the make up of the space.[105] The role of the architect becomes the mediator and designer, implementing the requirements of the community into the basic framework of the hub. It allows for the partnership of private and public sectors to develop the land and provide services, with the opportunity for housing development to follow. With the hub being a subscription-based membership, the operations can mimic the NDSM shipyard allowing small companies and office teams to customize spaces. The hub strives for an approach to offer flexibility, customization and adaptability.

To develop the hub with a bottom up approach, a basic framework would be executed first. Since, a sense of responsibility sprouts with immersion and contribution of the building process.[106] The local community would have the opportunity to participate in further iterations of the hub, to cultivate a sense of belonging. In conjunction with phasing strategies, development and programmatic elements are based on components demanded by the local neighbourhood. Hence, the bond between governing bodies and users form when there are common goals and needs to be acted upon.[107]

Since the hub introduces a very diverse method of development, it allows the chance for feedback from different members of the community post construction to relief tension and ease concerns from residents and local businesses. Furthermore, the changing dynamics of the workplace can be addressed as needs change.

Functionally, the space would inherit the culture of the community, reflecting values and behaviours; the space becomes an expression of culture.[108] The customization of the hub in each neighbourhood can celebrate in its uniqueness.

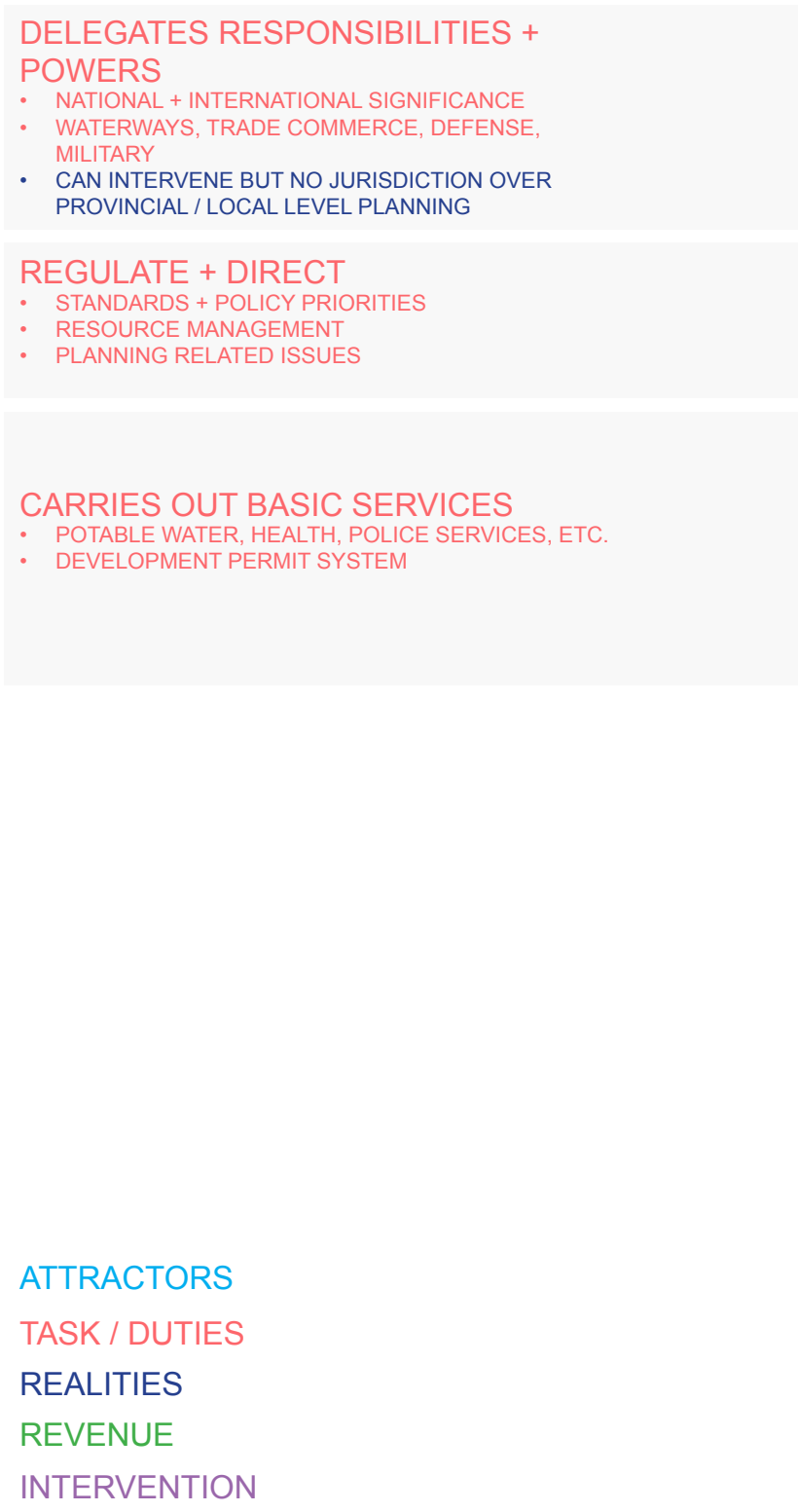


Figure 60
EXISTING AND NEW ACTORS & ATTRACTORS
Potential effects of bottom-up approach of the hub.

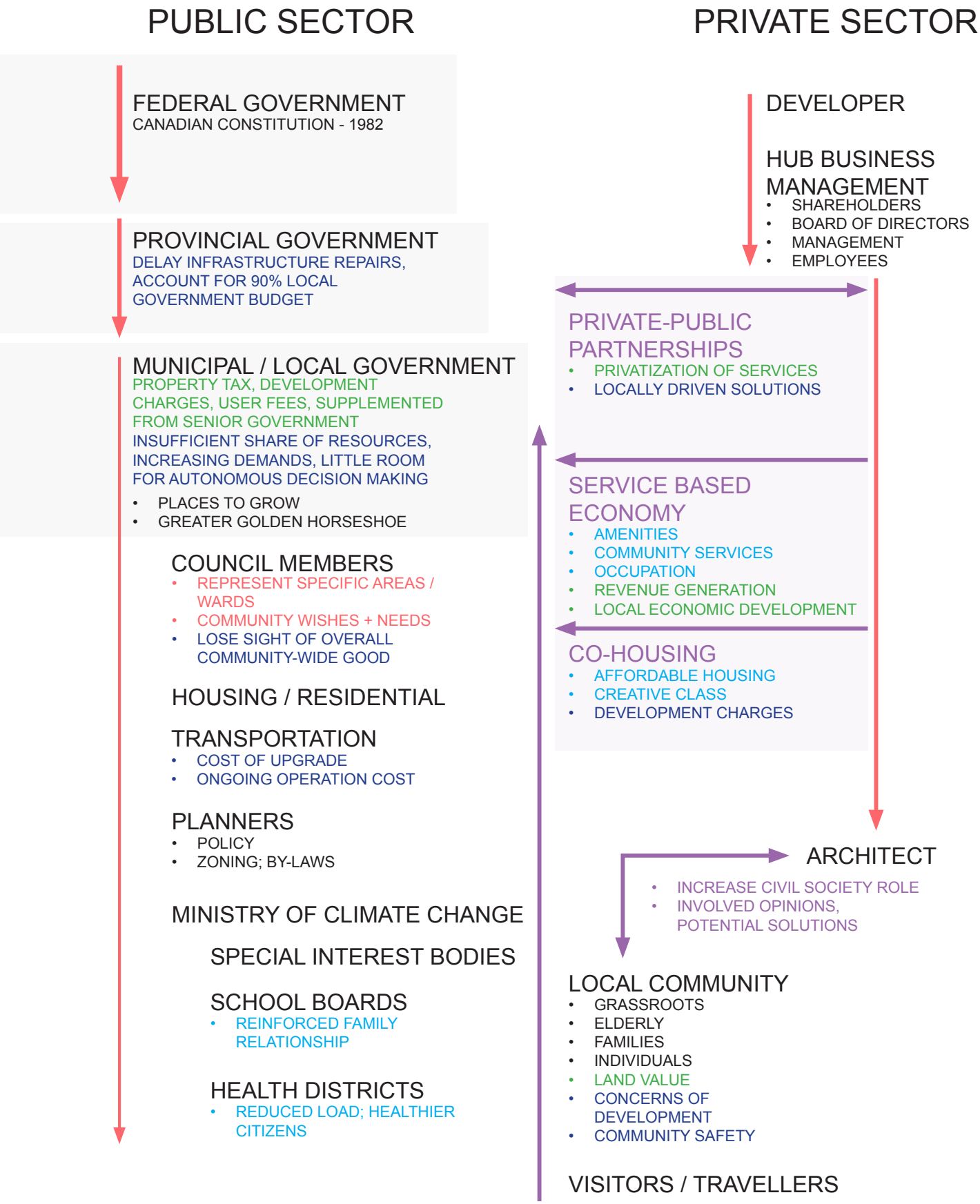
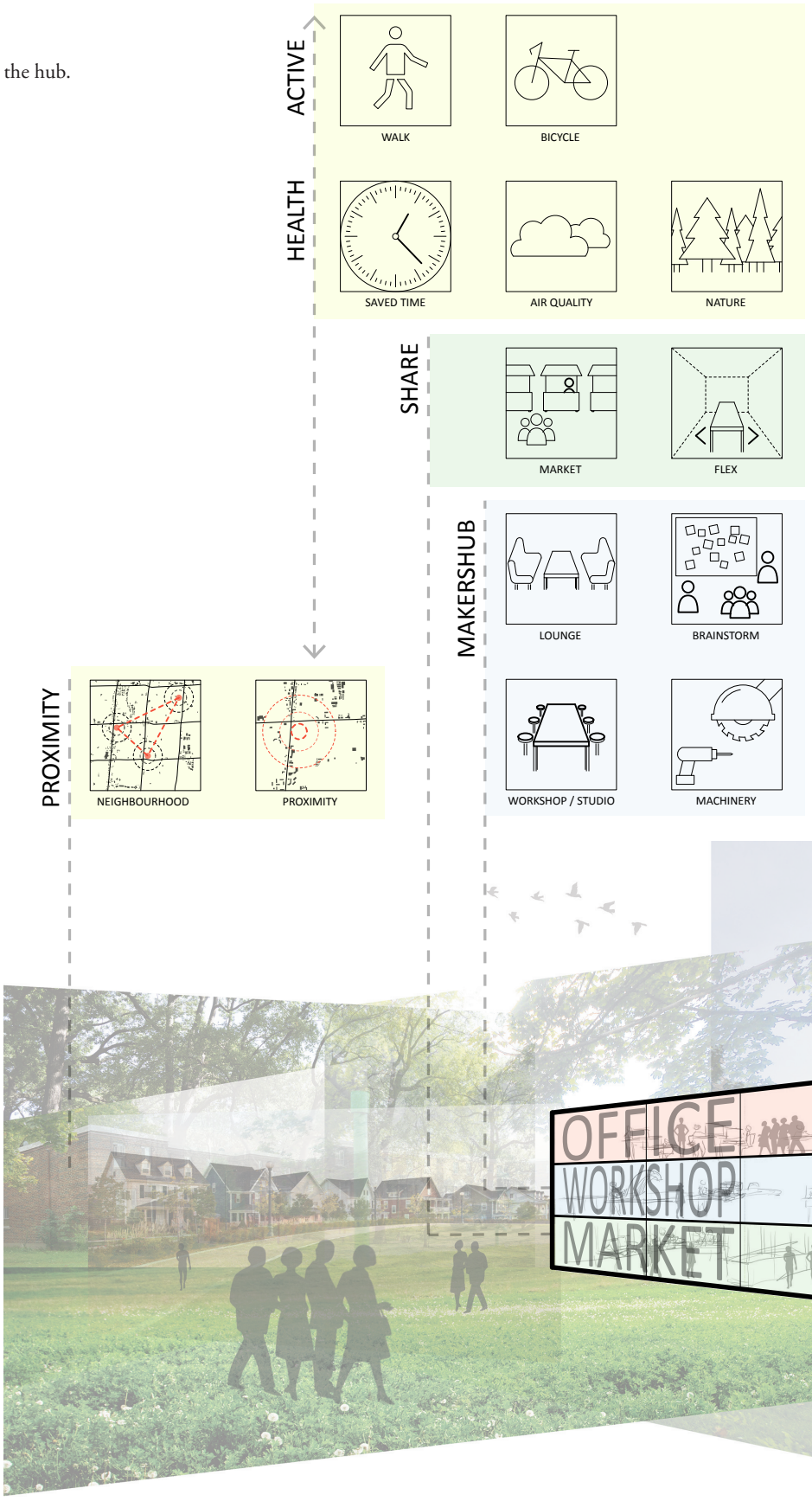

PUBLIC SECTOR
PRIVATE SECTOR
FEDERAL GOVERNMENT
CANADIAN CONSTITUTION - 1982
PROVINCIAL GOVERNMENT
DELAY INFRASTRUCTURE REPAIRS, ACCOUNT FOR 90% LOCAL GOVERNMENT BUDGET
MUNICIPAL / LOCAL GOVERNMENT
PROPERTY TAX, DEVELOPMENT CHARGES, USER FEES, SUPPLEMENTED FROM SENIOR GOVERNMENT
INSUFFICIENT SHARE OF RESOURCES, INCREASING DEMANDS, LITTLE ROOM FOR AUTONOMOUS DECISION MAKING
• PLACES TO GROW
• GREATER GOLDEN HORSESHOE
COUNCIL MEMBERS
• REPRESENT SPECIFIC AREAS / WARDS
• COMMUNITY WISHES + NEEDS
• LOSE SIGHT OF OVERALL COMMUNITY-WIDE GOOD
HOUSING / RESIDENTIAL
TRANSPORTATION
• COST OF UPGRADE
• ONGOING OPERATION COST
PLANNERS
• POLICY
• ZONING; BY-LAWS
MINISTRY OF CLIMATE CHANGE
SPECIAL INTEREST BODIES
SCHOOL BOARDS
• REINFORCED FAMILY RELATIONSHIP
HEALTH DISTRICTS
• REDUCED LOAD; HEALTHIER CITIZENS
DEVELOPER
HUB BUSINESS MANAGEMENT
• SHAREHOLDERS
• BOARD OF DIRECTORS
• MANAGEMENT
• EMPLOYEES
PRIVATE-PUBLIC PARTNERSHIPS
• PRIVATIZATION OF SERVICES
• LOCALLY DRIVEN SOLUTIONS
SERVICE BASED ECONOMY
• AMENITIES
• COMMUNITY SERVICES
• OCCUPATION
• REVENUE GENERATION
• LOCAL ECONOMIC DEVELOPMENT
CO-HOUSING
• AFFORDABLE HOUSING
• CREATIVE CLASS
• DEVELOPMENT CHARGES
ARCHITECT
• INCREASE CIVIL SOCIETY ROLE
• INVOLVED OPINIONS, POTENTIAL SOLUTIONS
LOCAL COMMUNITY
• GRASSROOTS
• ELDERLY
• FAMILIES
• INDIVIDUALS
• LAND VALUE
• CONCERNS OF DEVELOPMENT
• COMMUNITY SAFETY
VISITORS / TRAVELLERS

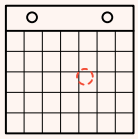
Figure 61
FRAMEWORK OF HUB
Possible facilities and services to include in the hub.



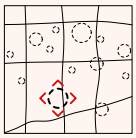
BUSINESSES

GLOBAL NETWORK

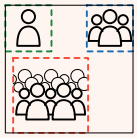
HUMAN RESOURCES



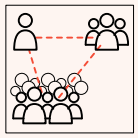
MONTH-MONTH



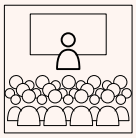
FLEXIBILITY / TRANSFER



ALL SIZES

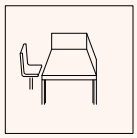


NETWORKING

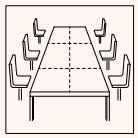


PRESENTATION

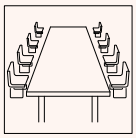
SPACES



INDIVIDUAL



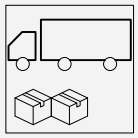
GROUP



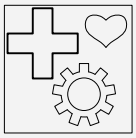
MEETING

SUPPORT

OFFICE SUPPORT

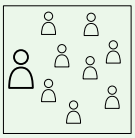


SHIPPING

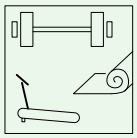


BENEFITS

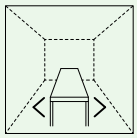
AMENITIES



DAYCARE

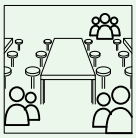


GYM

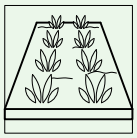


FLEX

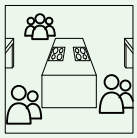
COMMUNITY



WORKSHOPS



COMMUNAL GARDEN



COMMUNAL KITCHEN

3.5 Precedents

WeWork

A global network made up of 264 buildings, spread out in 58 cities, WeWork provides the workspaces for companies the size of 1 to over 500 people.[109] Due to the expansive conglomeration of businesses, it has the ability to negotiate discounted rates for external goods and services. In addition, it gives access to HR services, financing and healthcare benefits. It runs on monthly terms and continues to be the breathing grounds for businesses to network and mingle with potential clients and investors.[110]

"To create a world where people work to make a life, not just a living."[111]

The motive is to humanize work, with dynamic environments. It internalizes the risks associated with office space and supports small businesses, with a comparable 25 percent in cost savings for the typical office space.[112] Membership gives access to all WeWork offices worldwide, and in addition to basic utilities of internet, office equipment and refreshments, there are networking professional events, social events, lunch and learns and wellness programs to extend the confinements of traditional office space. The mobile application connects users to book spaces, discover events, connect with other members, job postings and receive announcements from building management.[113] The workspace varies with private phone booths to lounges, cafes, and common open areas. Membership type is differentiated by use, where hot desk allows the use of any desk that is available, dedicated desk is entitled to specific workstation with lockable storage. Private offices are independent rooms and there are also options to have custom built space for teams of twelve or larger.[114]

Currently, there are two WeWork locations in Toronto one at Richmond downtown core and another at Bloor and Yonge. Two additional locations are just announced, projected to also be in the Entertainment and Financial Districts of the urban core. WeWork situated in Toronto acknowledging that it houses half of the nation's largest corporate headquarters. It integrates itself to also prioritize the recognition in arts and media, with unique interior design expressed at each office.[115] It makes use of the existing space and retains exposed brick, while adding custom art pieces to enlighten the space.

WeWork is the precedent for the business structure of the hub, with similar priorities of humanizing work to cater for individuals. It removes office space management out of the hands of businesses and allows focus concentrated on business development. Minimizing start up costs, resources are shared to eliminate expansive capitals. However, to stabilize customer base and provide convenience, WeWork locations are focused within the downtown core where the hub aims to interject into the suburban fabric.

"We transform buildings into dynamic environments for creativity, focus, and connection. More than just the best place to work, though, this is a movement toward humanizing work. "

...where companies and people grow together.

"To create a world where people work to make a life, not just a living"

https://www.wework.com/mission

ANZ Centre

The ANZ Centre in Australia is a precedent for portraying the spatial quality of the hub. The design intent was to create a new image of an urban campus, with an emphasis on creating an engaging productive environment. Utilizing colour psychology, dynamic environments are created in conjunction with the choice of furniture and layout. While prioritizing collaborative approaches, the organization was based on maximizing natural daylight penetration with an outward dilating hierarchy of shared space.[116] Ranging spatial qualities are created with scale and complexity; the building has a total net area of 83,600m^2 with 13 varying floor plates.[117] Being the largest single tenant office building in Australia, it holds 6,500 people. The mindful design of systems in energy, water and waste brought the title of 6 Star Green Star, and bears as an example of environmental and socially sustainable building. It also strives to involve the public through its form and relation to the neighbouring waterfront. Programmatically, the ground plane incorporates public programs of café, gallery and visitor centre.[118] In attempts to bring people together, the ANZ Centre demonstrates many components for the hub to take precedent.

Figure 62
ANZ CENTRE
Central atrium for daylight penetration.

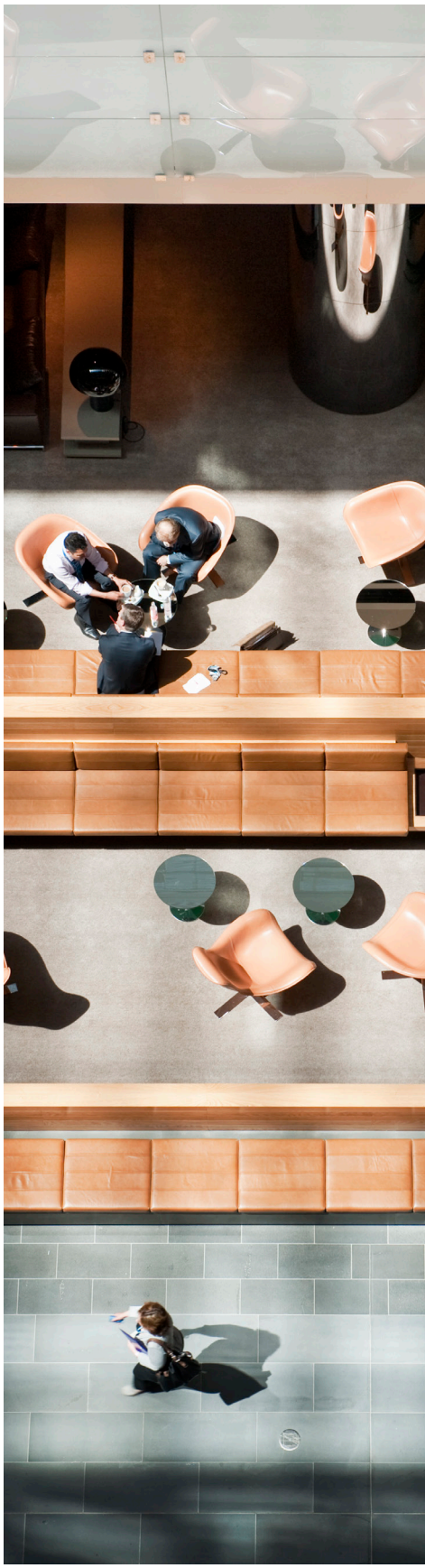
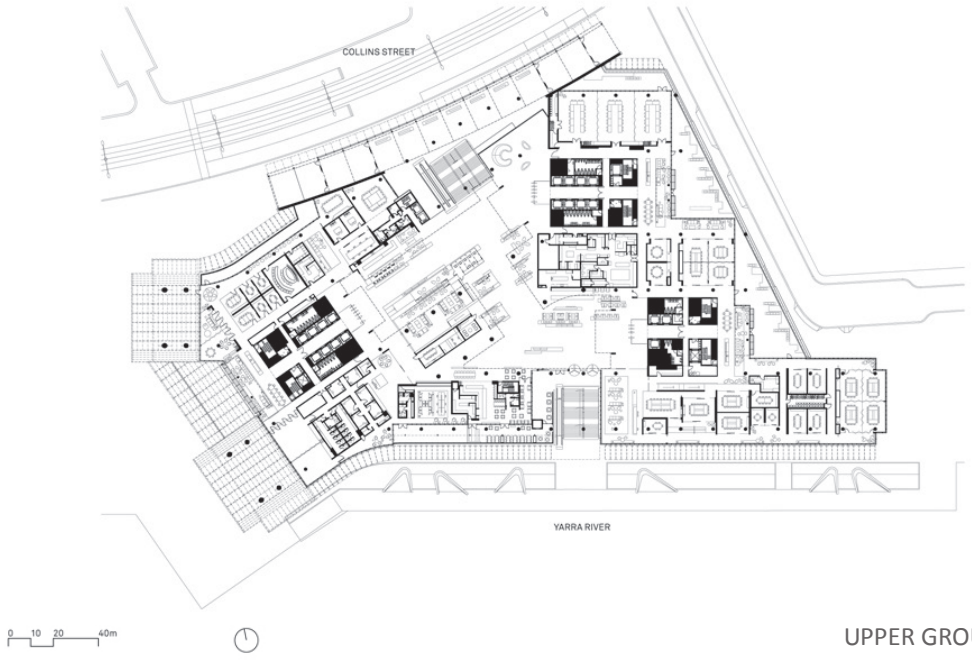


Figure 63

ANZ CENTRE

Flexible workspaces for different needs, usage of bold colours and informal meeting spaces adjacent to path of travel.



UPPER GROUND FLOOR PLAN

Figure 64
ANZ CENTRE FLOOR PLANS
Designed to foster communication through gradations of communal spaces.

LEVEL 2 FLOOR PLAN

LEVEL 9 FLOOR PLAN

PGA Tours Lakeside Headquarters

PGA Tours Headquarters in Florida demonstrates some of the principles of what the hub aims to offer. The motive behind the new headquarters was to reconfigure the separated staff from segregated buildings into one. The company also realized the change in the nature of work and wanted to enrich the experience of the staff and visitors with the new building. To address the global business, media and technology, the PGA Tours office aims to spark collaboration between sectors of employees.

The new 187,000ft^2 building is situated beside a lake, designed with biophilia as a principle, it utilizes ample daylight and natural air. The structure of the building features a warm wood material; with five skylights to allow daylight to flood the space, and large overhangs to minimize unwanted solar gain.[119] The roof also holds the photovoltaic panels to provide sustainable energy. Connecting to the green landscapes, it is bound by glazing and an atrium between the main two bays of the building. With intermediate 20-foot wide bridges, informal gathering spaces are found throughout the building. Terraces line the ends of the building bays, to cultivate creativity and support a flexible, mobile workforce. With occupant well-being in mind, the quality of the built environment became a priority. The inclusion of a 1.3 kilometer trail within the adjacent forest accounts for physical health of the employees.[120] With regards to the site, the building demonstrates seamless transition of spaces varying from private to public and enclosed offices to transparent natural landscapes.

Figure 65

FOSTER + PARTNERS PGA TOURS LAKESIDE HEADQUARTERS

Design concept visualization revealing visual connections and relations to intermediate spaces with regards to green spaces beyond.

Figure 66

FOSTER + PARTNERS PGA TOURS LAKESIDE HEADQUARTERS
Diversity in spatial forms ranging in height and permeability to outdoor environment.

4.0

ARCHITECTURE AS MEDIUM OF REVITALIZATION

DESIGN ITERATION

4.0 Architecture as Medium of Revitalization: Design Iteration

4.1 Infiltration, Greyfield Interpretation

Context

The following design proposal is to stand as a framework of a typical strategy with a specific design catered to the project site. It is to be implemented with a bottom-up approach to adapt the opinions of the community through additional future phases of the project. The site was chosen to be located in an area saturated with existing housing in Vaughan, as it is one of the major sources of commuting in the Greater Toronto Area. In this strategy, it explores how a strip plaza in the suburban landscape has the potential to become a hub through the benefits from its' proximity to surrounding facilities. With existing access to transit and an intensifying density in housing, the underutilized strip plaza has the potential to become the home of the hub. This is an exploration in how to reconfigure components of an underutilized strip plaza into a community office hub.

The intervention is to utilize the building as an architectural device to bring people together to connect work, life, and play. It is a place for the community to host events, workshops, and socialize. Within the community context, it can support daily living, through the integration of services, utilities and workspaces. To create a nearby hub of interconnections with less secluded public space and a node for transit to provide access into the city, the community is involved in activity engaging with one another. The hub itself serves as an incentive for residents to reduce use or need of ownership in automobiles, from its proximity to the existing neighbourhood. Furthermore, simple gestures such as expanding the ground network of paths allow residents to take advantage of active transportation more easily. Thus, this will inherently reduce the need for motored vehicles and reinforce a safer community overall.

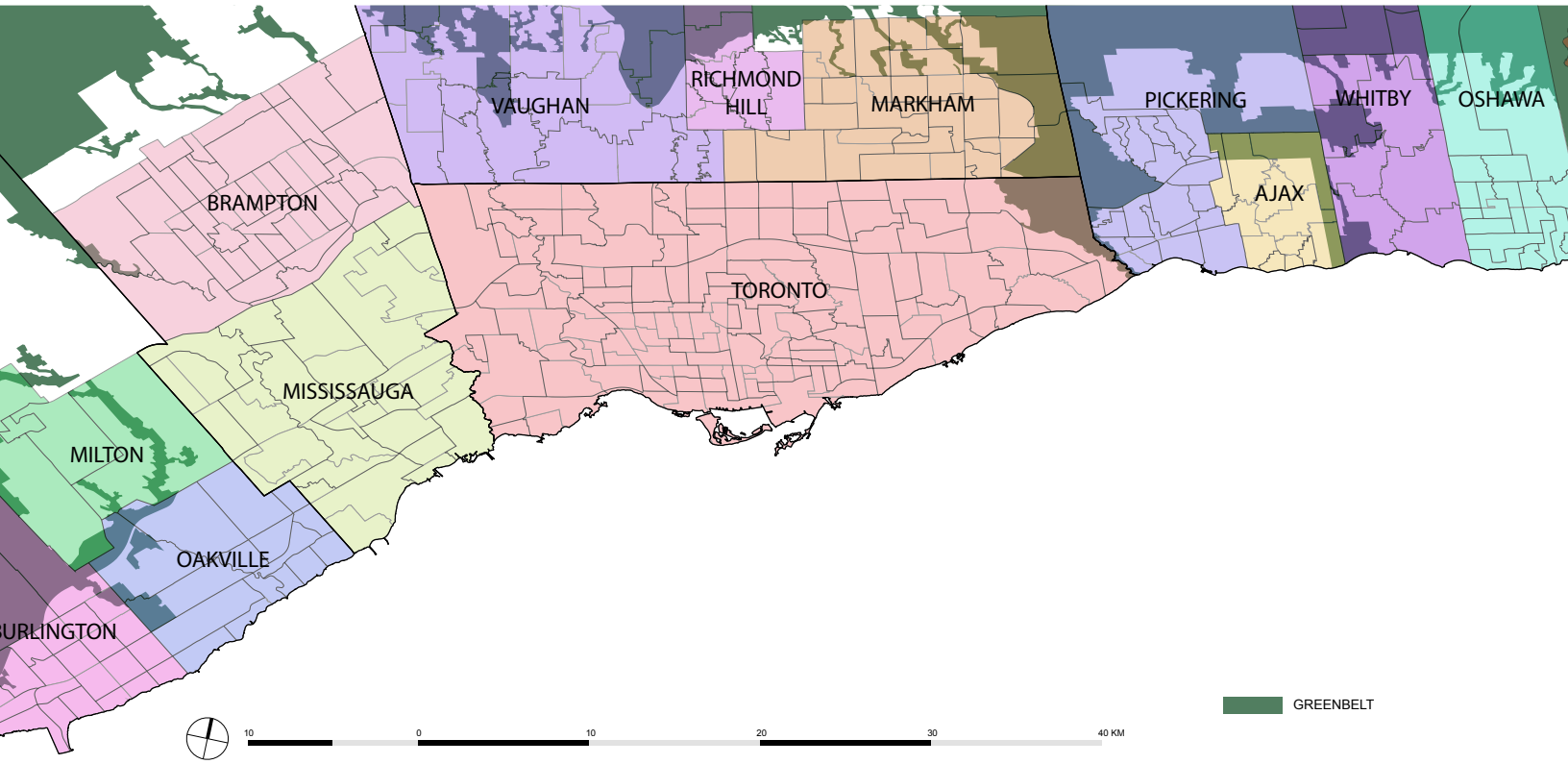


Figure 67

GREENBELT AND NEIGHBOURHOODS
Greater Toronto Area and adjacent cities.

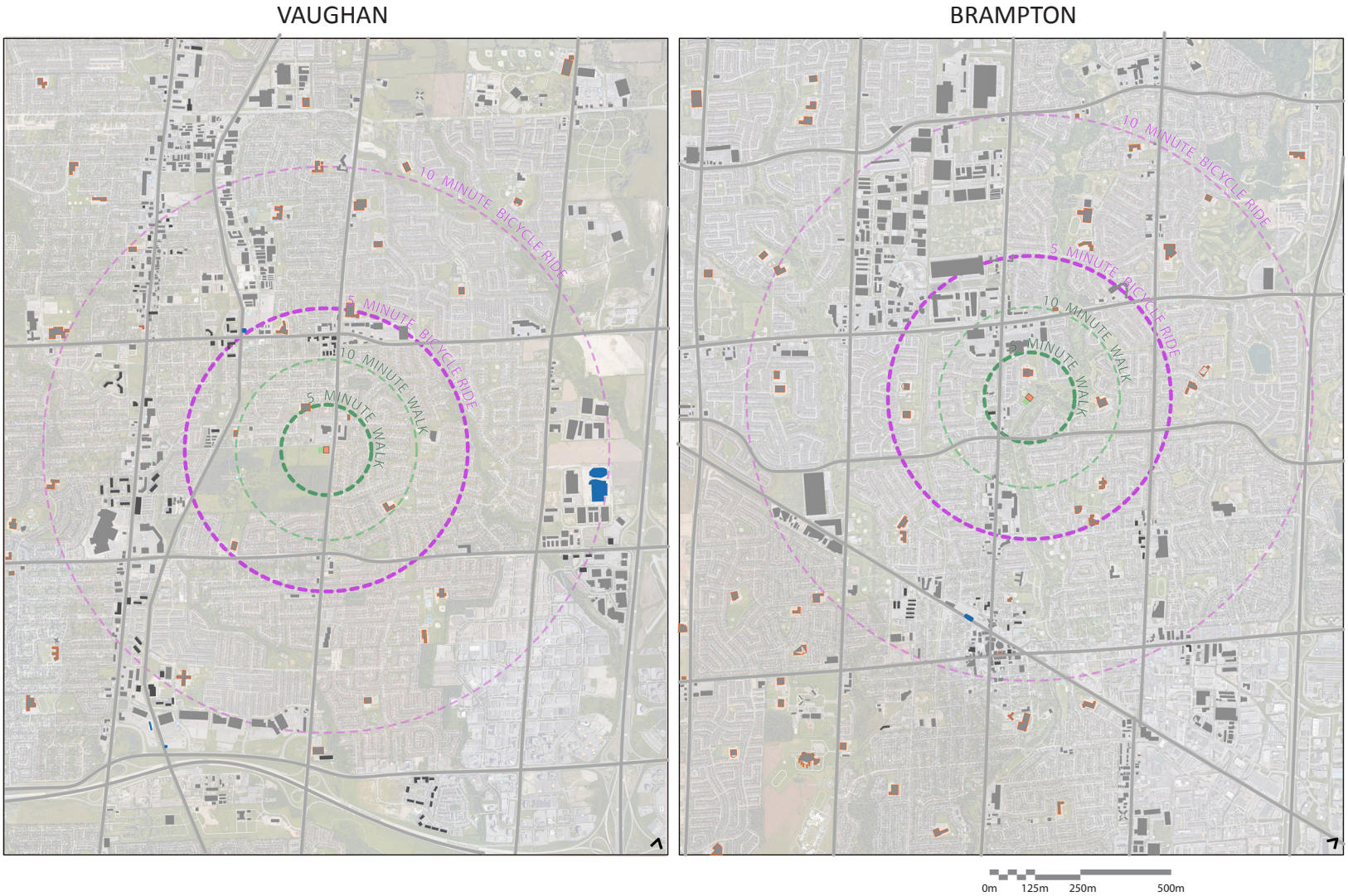
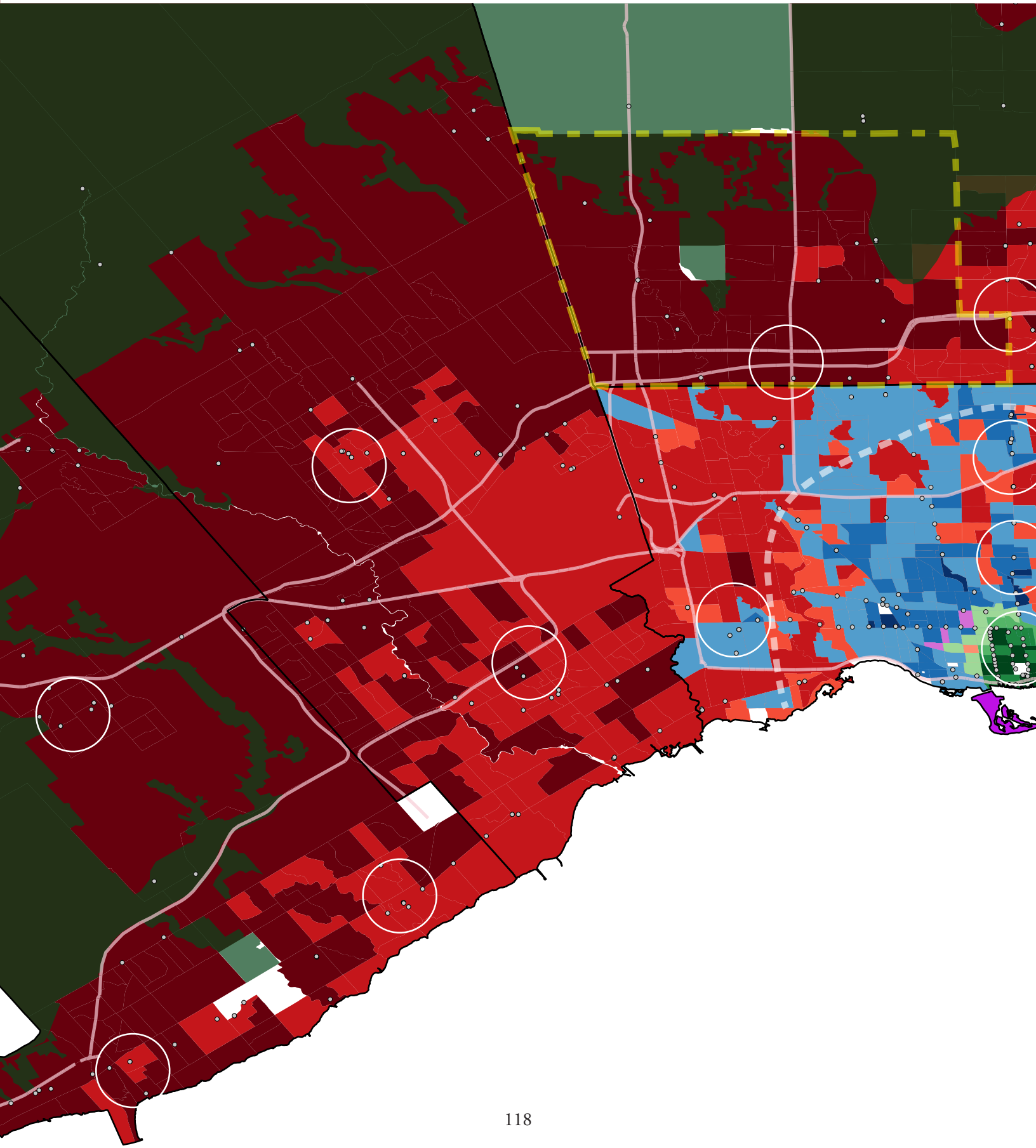


Figure 68

POTENTIAL SITES

Locating the hub within existing residential neighbourhoods in cities of concentrated source of commuters. Exploration of adjacency to schools for access.



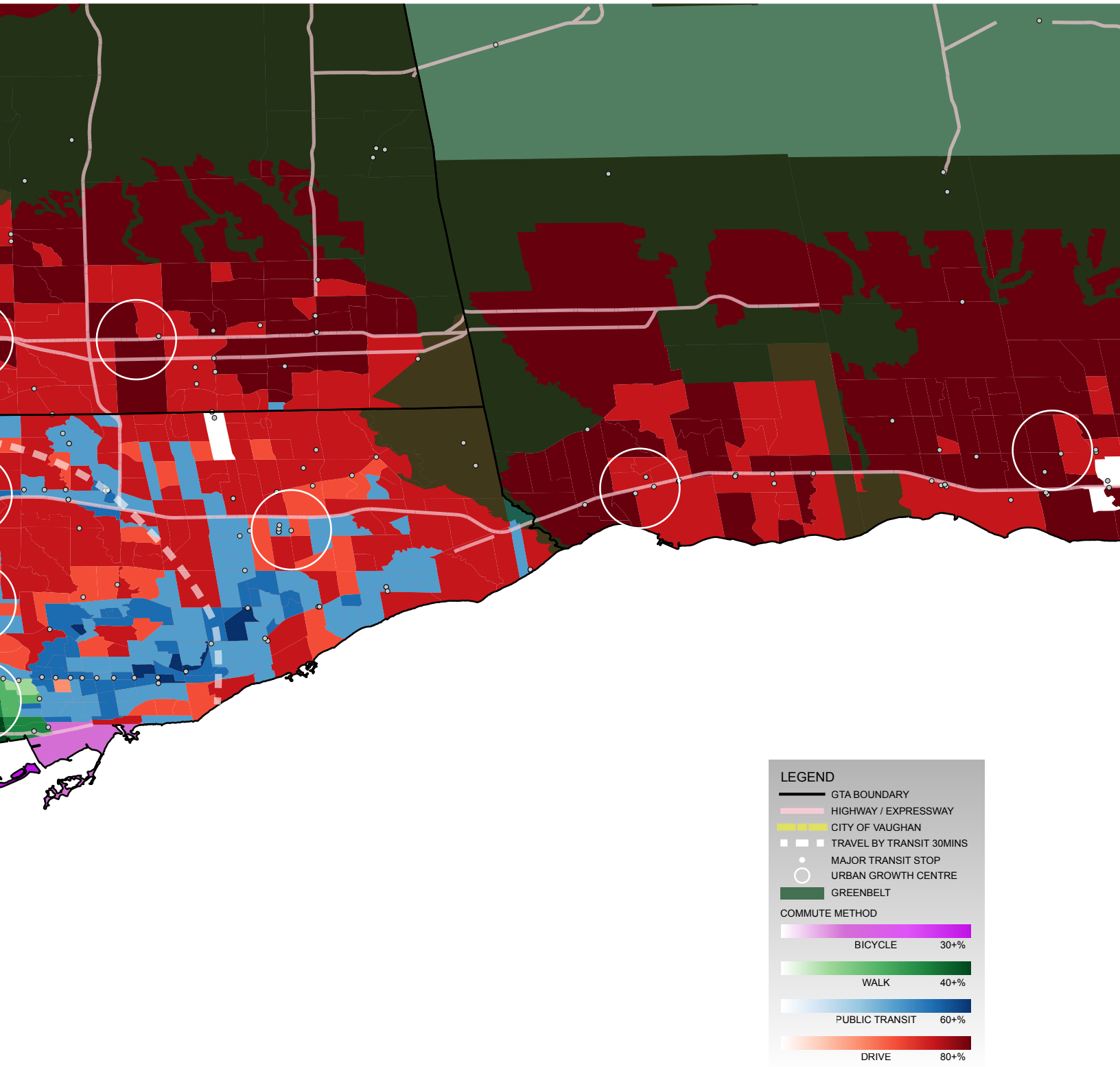


Figure 69

COMMUTING TO WORK IN TORONTO
Concentration of commuting travel methods by location in relation to projected urban growth centres and public transit services.

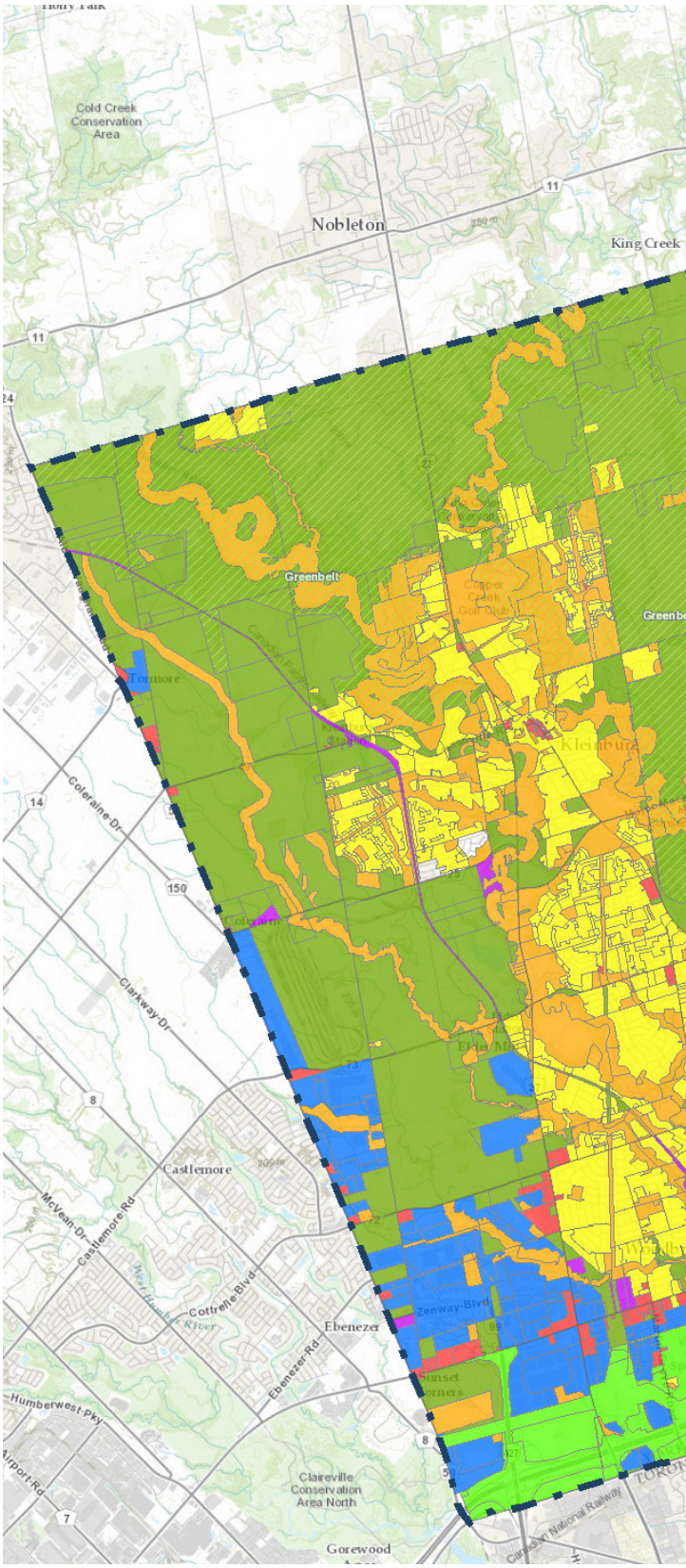
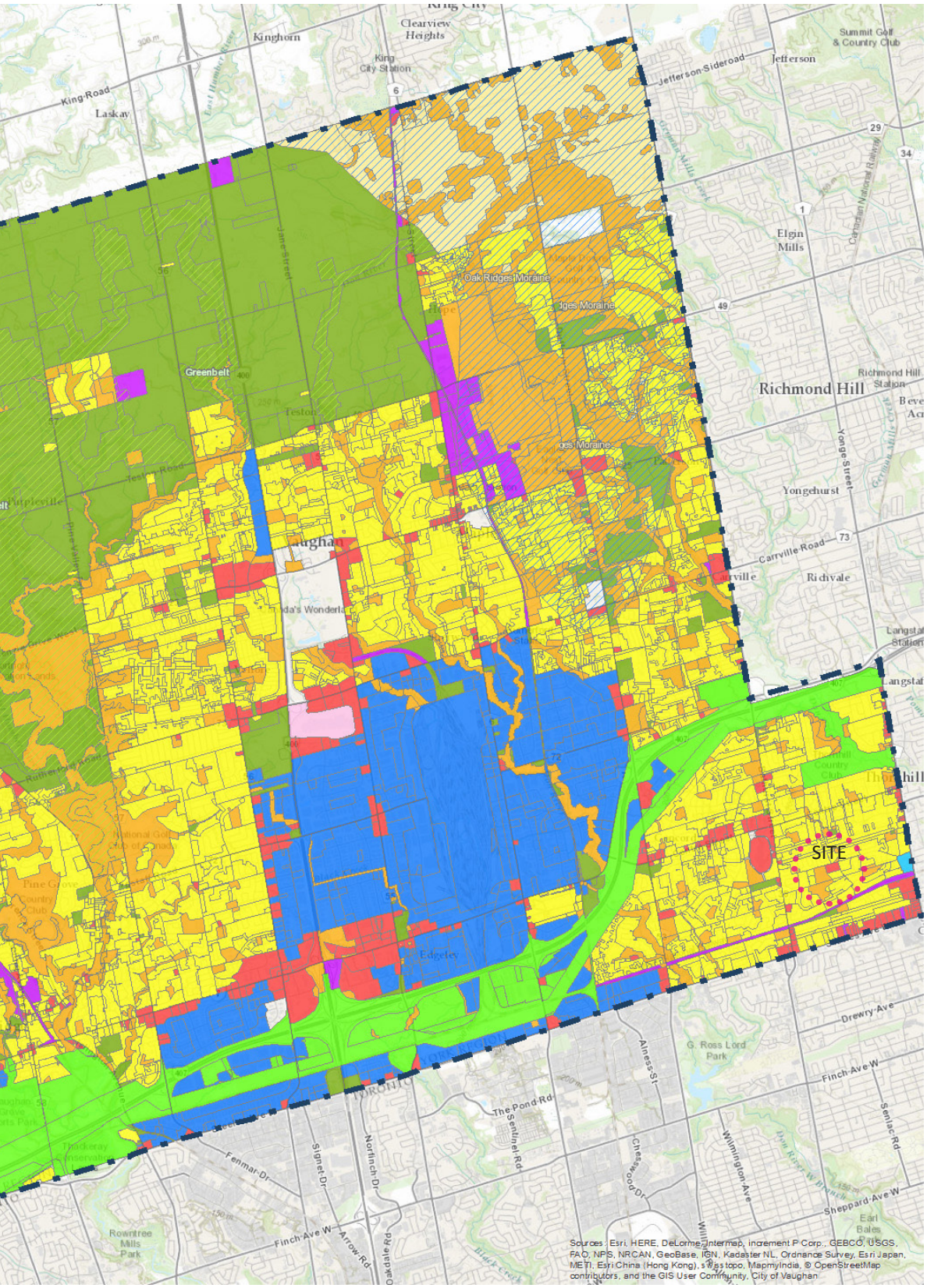


Figure 70

VAUGHAN ZONING

Land use zoning defined by the city revealing concentrations of residential areas of potential sites for the hub.

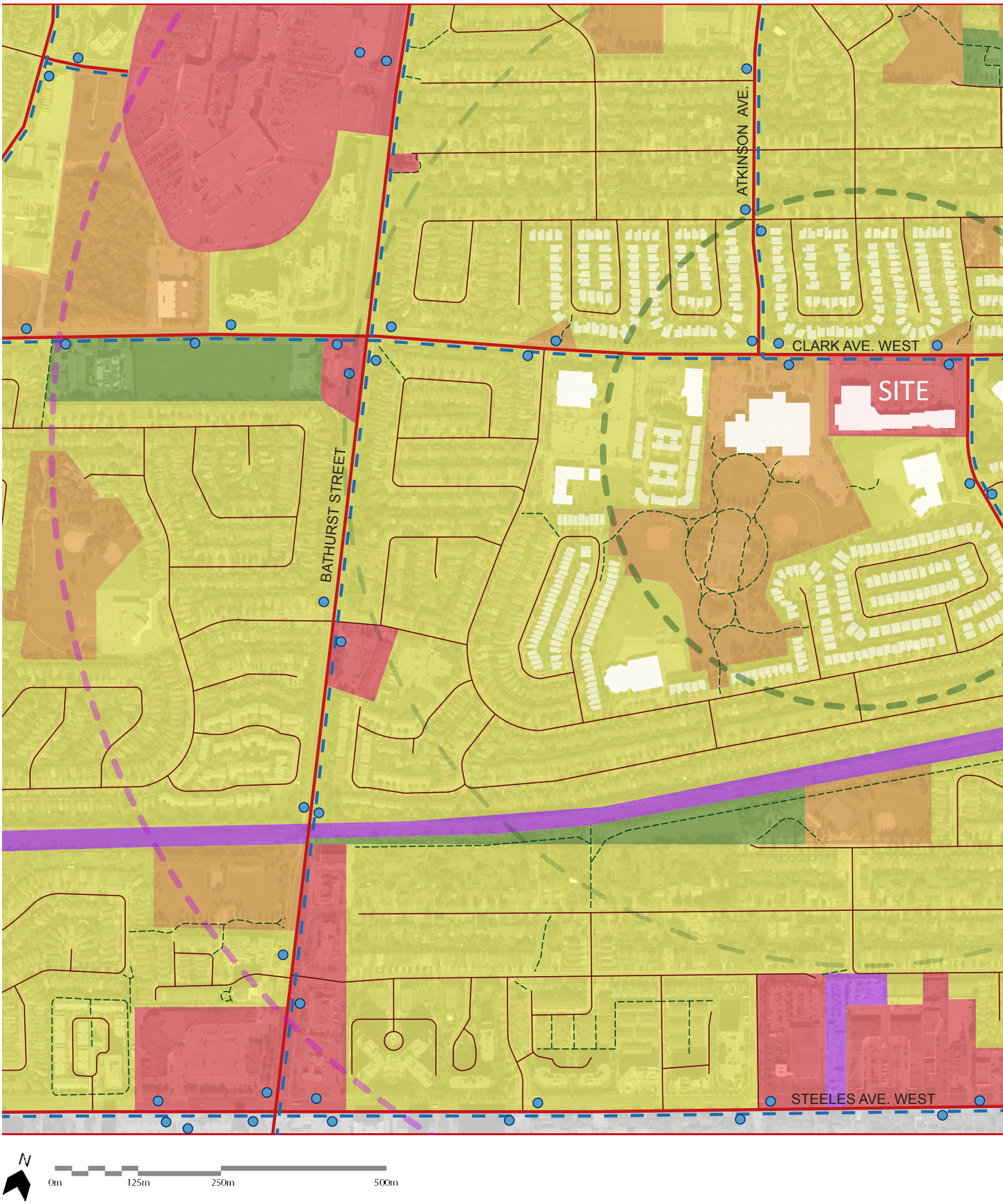


Legend

City Boundary

Zones

- Oak Ridges Moraine Area
- Greenbelt Area
- Agricultural
- Commercial
- Commercial/Residential
- Employment
- Industrial
- Open Space
- Parkway Belt
- Residential
- Shopping Centre District
- Oak Ridges Moraine


ATKINSON AVE.
CLARK AVE. WEST
SITE
BATHURST STREET
STEELES AVE. WEST
N
0m
125m
250m
500m

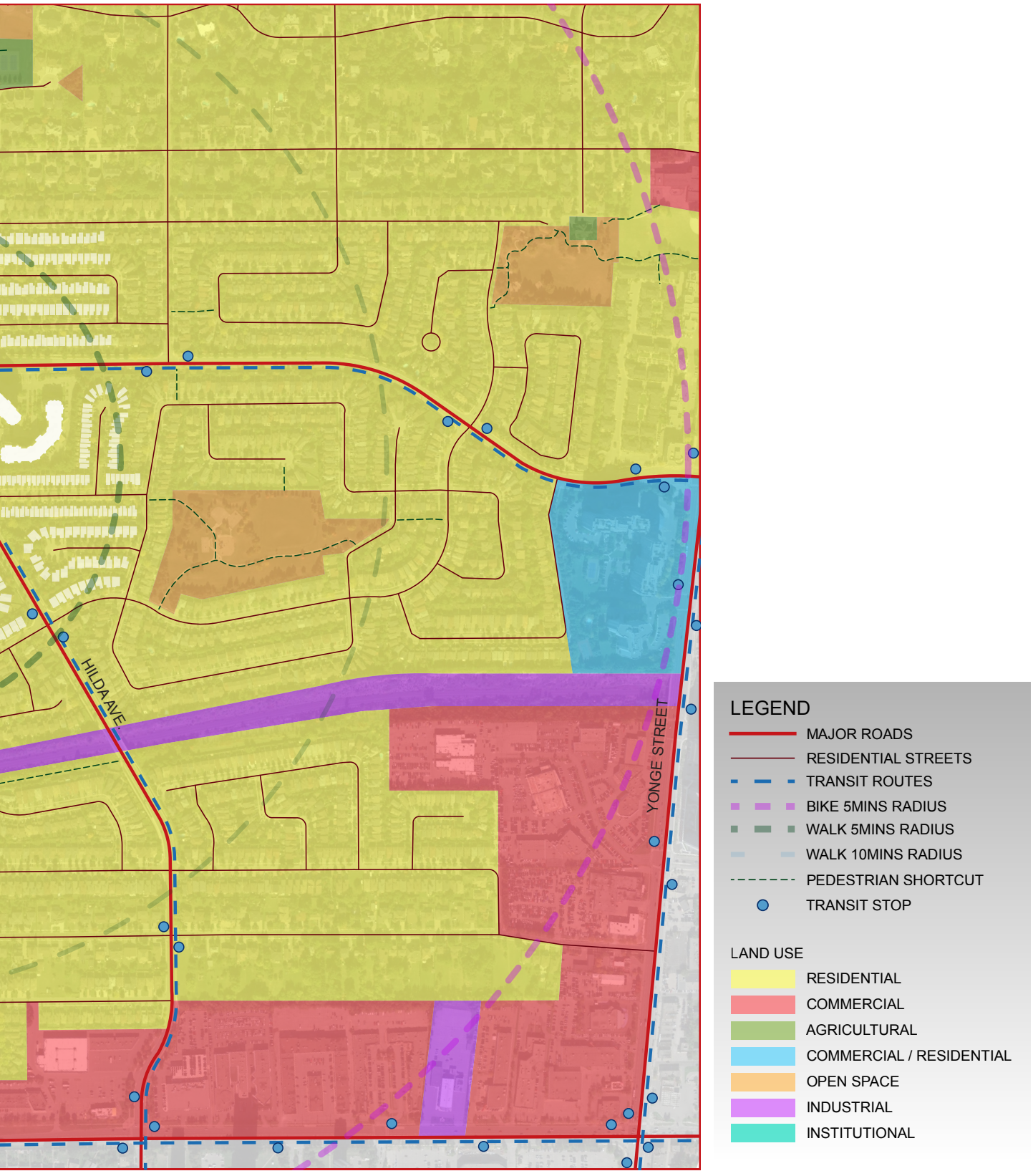
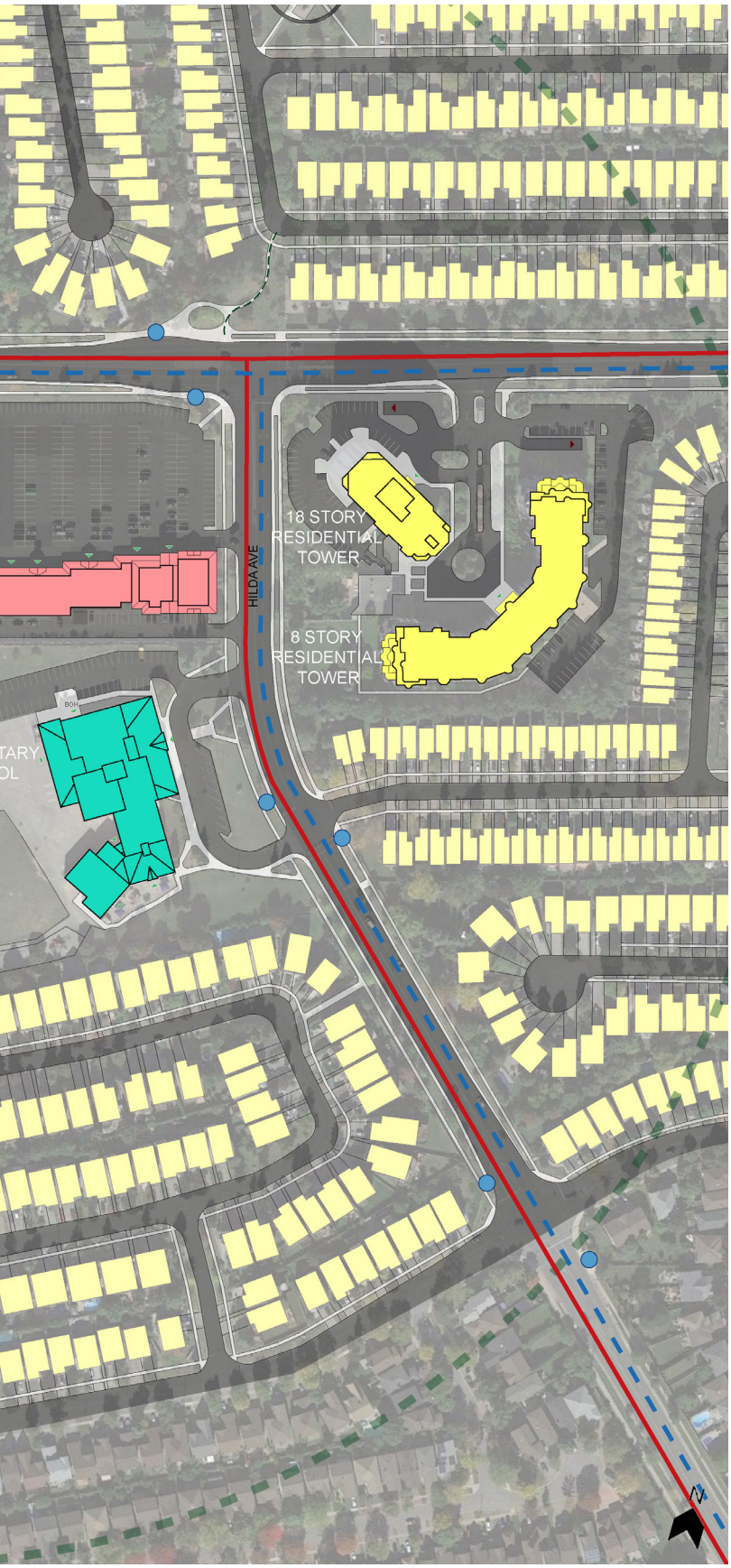


Figure 71

SITE CONTEXT PLAN

Land use of context surrounding site, indicating expansive residential areas and the potential of reaching the site by walking or biking.


ATKINSON AVE
CLARK AVE. WEST
8 STORY
RESIDENTIAL
TOWER
ORTHODOX
SYNAGOGUE
COMMUNITY
CENTRE
RETAIL
PLAZA
TOWNHOUSE
COMPLEX
ELEMENTARY
SCHOOL
DISTRICT
PARK
ELEMENTARY
SCHOOL



Existing

North of the city of Toronto, is the city of Vaughan, a commute journey can easily take over an hour during rush hour. The site is due southwest of the intersection of Clark Avenue and Hilda Avenue. Situated in a residential area dominated by two story single-family homes, the presence of cul-de-sac is not uncommon. Roads branch to crescents and by car it takes about three turns before being on a more dominant road. The inaccessible design of the neighbourhood predetermined that it is not catered for utilitarian walking. There are minimal direct path connections in the street network, creating long detours despite being geographically close.

Nearby, there is a Jewish synagogue beside a Jewish elementary school. In close proximity, there are two other schools serving the neighbourhood, a catholic and public elementary school.

Due west of the site are thirteen multi-bedroom townhouse complexes, built in 2000. Next-door is an eight story residential building, housing 125 units ranging from one-bedroom units to three bedroom units, catered to families and seniors.[1] It is also equipped with a day care centre for children up to the age of 5 in preparation for school.

Immediately on the east side of the site are two residential complexes, an eight story and eighteen story apartment building.

Figure 72

EXISTING SITE PLAN

Presence of strip plaza and abundant parking spaces adjacent to a community center, schools and single family houses. Residential density is intensifying with townhouses and mid-rise apartment buildings.

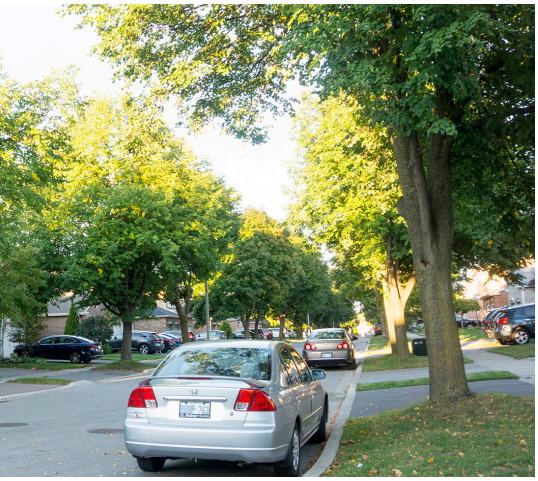
Figure 73

EXISTING SITE PHOTOS

Typical suburban neighbourhood with intensifying residential tower and nearby strip plaza.
A. Entrance to community centre. B. View of outdoor skating rink and district park beyond.
C. Nearby elementary school. D. Strip plaza parking lot indicate distance from street edge.
E. Set back of strip plaza. F. Proximity of residential towers to transit stop.
G. H. Inner residential street lined with single family homes.


C


F




ATKINSON AVE
CLARK AVE. WEST
HILDA AVE
COMMUNITY CENTRE
RETAIL PLAZA
ELEMENTARY SCHOOL
A
B
C
D
E
F
G
H

Figure 74

EXISTING COMMUNITY CENTRE PHOTOS

Facilities accessible to public for neighbouring community. Indoor swimming pool, sports court, hockey arena and waiting area.

On the south side, is a district park connecting to the houses beyond. There are baseball diamonds, tennis courts, basketball courts, soccer fields, and a playground at the park. Just north of the park is the community centre. With an outdoor skating rink, the indoor facilities include a hockey arena, swimming pool, racquet sport courts, fitness gym and an indoor track. There are also a number of enclosed meeting rooms and the option to rent the spaces for events and conferences.


POOL • FITNESS • ACTIVITY ROOMS
CAUTION
ATTENTION


Got game?


ATKINSON AVE
CLARK AVE. WEST
COMMUNITY CENTRE
RETAIL PLAZA
HILDA AVE
ELEMENTARY SCHOOL

Figure 75
EXISTING SITE PHOTOS
Strip plaza targetted for access by automobile.

The existing strip plaza is comprised of a drug store, grocery store, coffee shop, three food shops, two banks, a book and gift store, convenience store, hearing aid centre, and clothing store. With over 100 parking spaces, the building is set back from the street frontage of Clark Avenue, a common typology of suburban strip plaza, indicating that it is mostly accessed by car.

The site has a walk score of 67 and transit score of 59 and is deemed as somewhat walkable with good options for public transit.[2] However, for commuters, a trip to downtown Toronto would be well over 45 minutes regardless of the transportation method.


Sobeys
KOSHER MARKET


Sobeys


ATKINSON AVE
CLARK AVE. WEST
COMMUNITY CENTRE
RETAIL PLAZA
ELEMENTARY SCHOOL

Site

Submerged into an existing, developed neighbourhood, this site benefits from its proximity to neighbouring schools, synagogue and community centre. There is already an intensification of residential towers with the park as a common resource. The hub would bring centricity to the neighbourhood and projects to intensify the current population by implementing housing strategies as well. The lifestyle of the existing community can be enriched through the conglomeration of facilities, design of the site and architectural gestures.[3] The objective is to accommodate for different stage of life, for individuals, couples, start-ups that struggle to set up a financial base; for travellers and elders to still be integrated into the community.

The design strategy extends and carves into the existing pedestrian street typology to give more active transportation options to access the hub. The goal is to create and encourage an active transportation environment and simply have most of the neighbourhood be able to walk or bike to arrive at the hub.

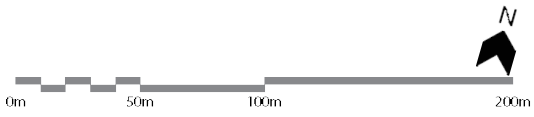
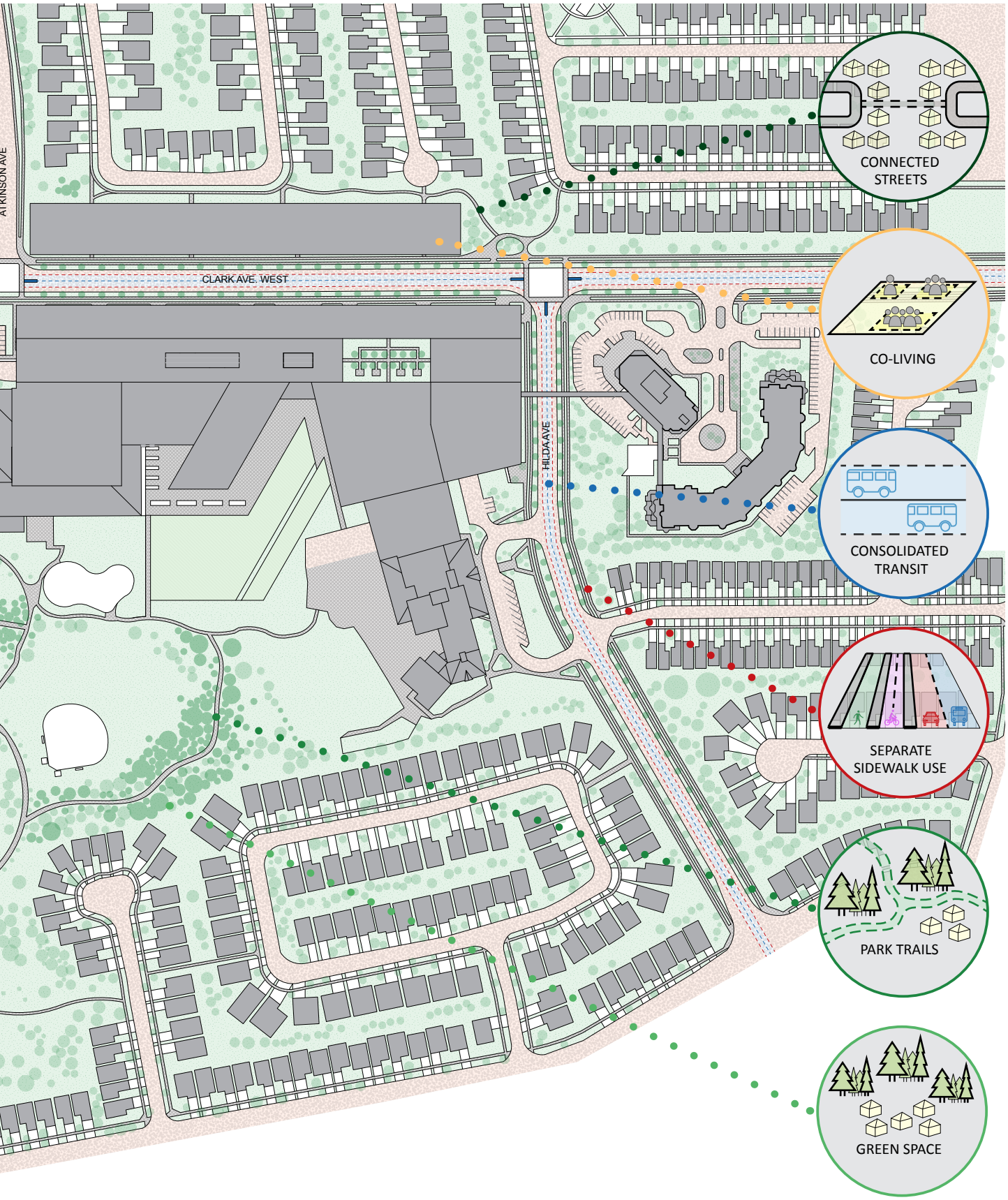


Figure 76

SITE PLAN

Reimagining the street network to allow for buffer zones between modes of transportation. Additional paths to connect to site at large to encourage active transportation to the hub.


ATKINSON AVE
CLARK AVE. WEST
HILDA AVE
CONNECTED STREETS
CO-LIVING
CONSOLIDATED TRANSIT
SEPARATE SIDEWALK USE
PARK TRAILS
GREEN SPACE

4.2 Method, Design Principles

Proposal

The basic framework treats architecture as the infrastructure for the community. The building is to not be defined by a single purpose but to complement, consolidate, and maintain the existing facilities. Through creating different districts, each catering to different purposes and time duration of the visitor. Beyond workstations, the program includes facilities such as daycare, healthcare centre, grocery store, studio and gallery. The principles for its spatial organization are connection, variety and visibility. With ample diversity of spatial conditions, workspaces are weaved in with the access to recreation and relaxation spaces. While circulation organization retains a level of gradation of privacy, from the ground to upper levels, and from the core to the perimeter.

Accommodate for Stages of Life

The program of the hub was extrapolated from the notion of complete communities outlined by the city. A place where members of the community can come together at a place that can provide a space and with equipment to help execute their work. The hub serves as a platform for knowledge sharing and opportunities for businesses to launch. By bringing the workplace into the community, commuters can save time and energy to reorient the way of life. Work at home jobs can have the option to step out and socialize with other members of the community. Different age groups can exchange experience and knowledge to create a bond in the neighbourhood.

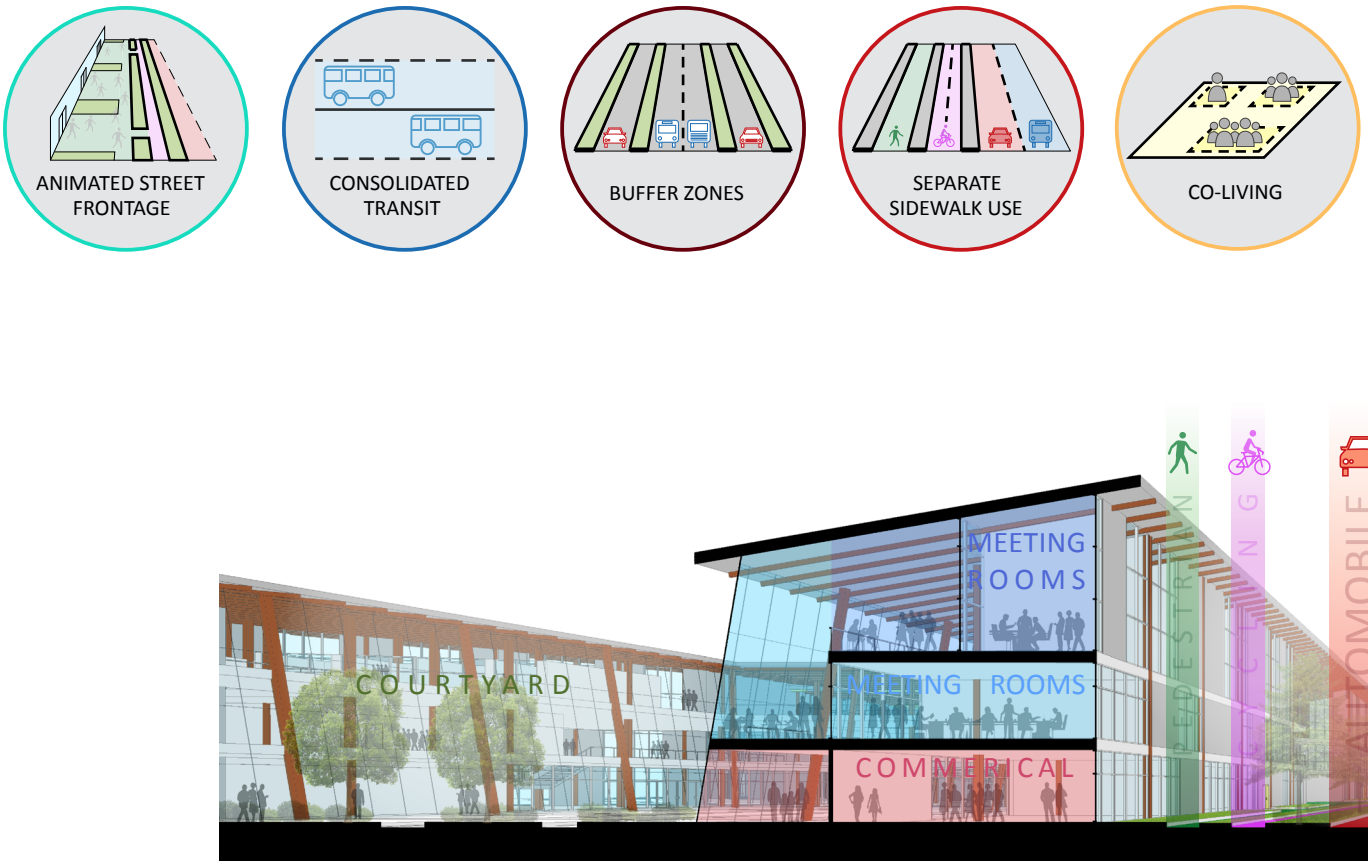


Figure 77

STREET SECTION

Relationship of hub to street and additional housing options. Intensifying density of living along street edge with co-living strategy.

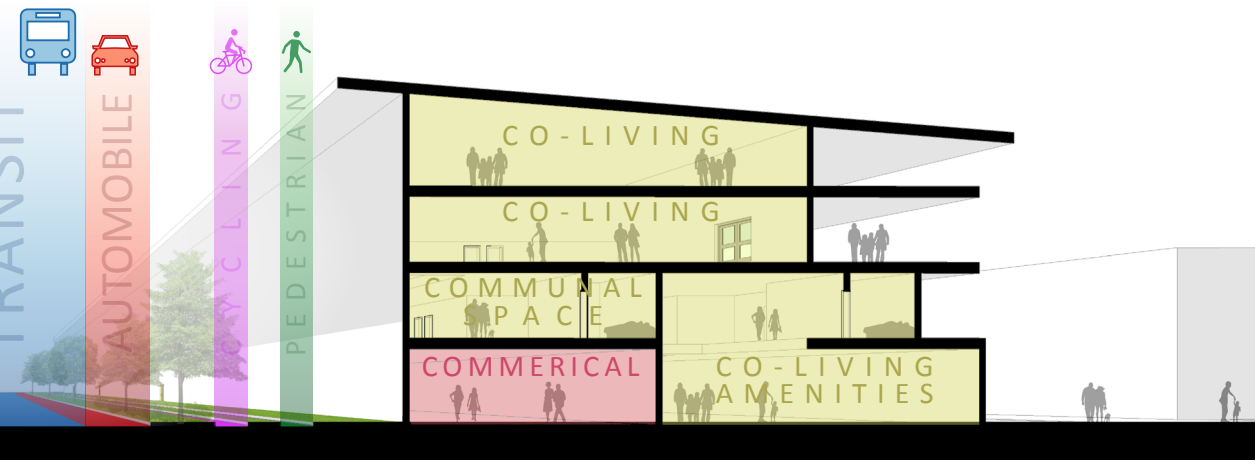
Less Vehicles, Increased Safety

To illustrate the need for active transportation, the average adult over the age of 18 is advised to exert at least over 150 minutes of moderate to vigorous physical activity every week by the Canadian Physical Activity Guidelines.[4] This translates to merely 30 minutes of physical activity, which can be easily achieved with a 2 kilometer walking trip or a 7.5 kilometer biking trip 5 days of the week.

On the road, Clark Avenue is reconfigured to separate users of the road and include buffer zones between vehicular transit, bikes and pedestrians. Intersections are to allow for signal phasing for specific users of the road such as pedestrian scrambles. In addition, by reducing vehicular speed to 30 kilometers per hour, it would discouraging the use of motored vehicles; thereby, increase street safety for all users and encourage active transportation.

Co-living

The proposal involves reconfiguring the north side of Clark Avenue across from the site of the hub. Introducing more living options for the vulnerable population, co-living includes shared communal space for a number of private units. This allows for housing at a lower cost, since utilities are to be shared, it also adds a viable option for short-term rental to travellers. With retail at grade, it can illuminate street life and add eyes on the street for safety concerns of local residents. The construction of housing also adds direct connections to existing streets, eliminating detour from the cul-de-sacs for pedestrians to gain access to the hub.



4.3 Proposed Building

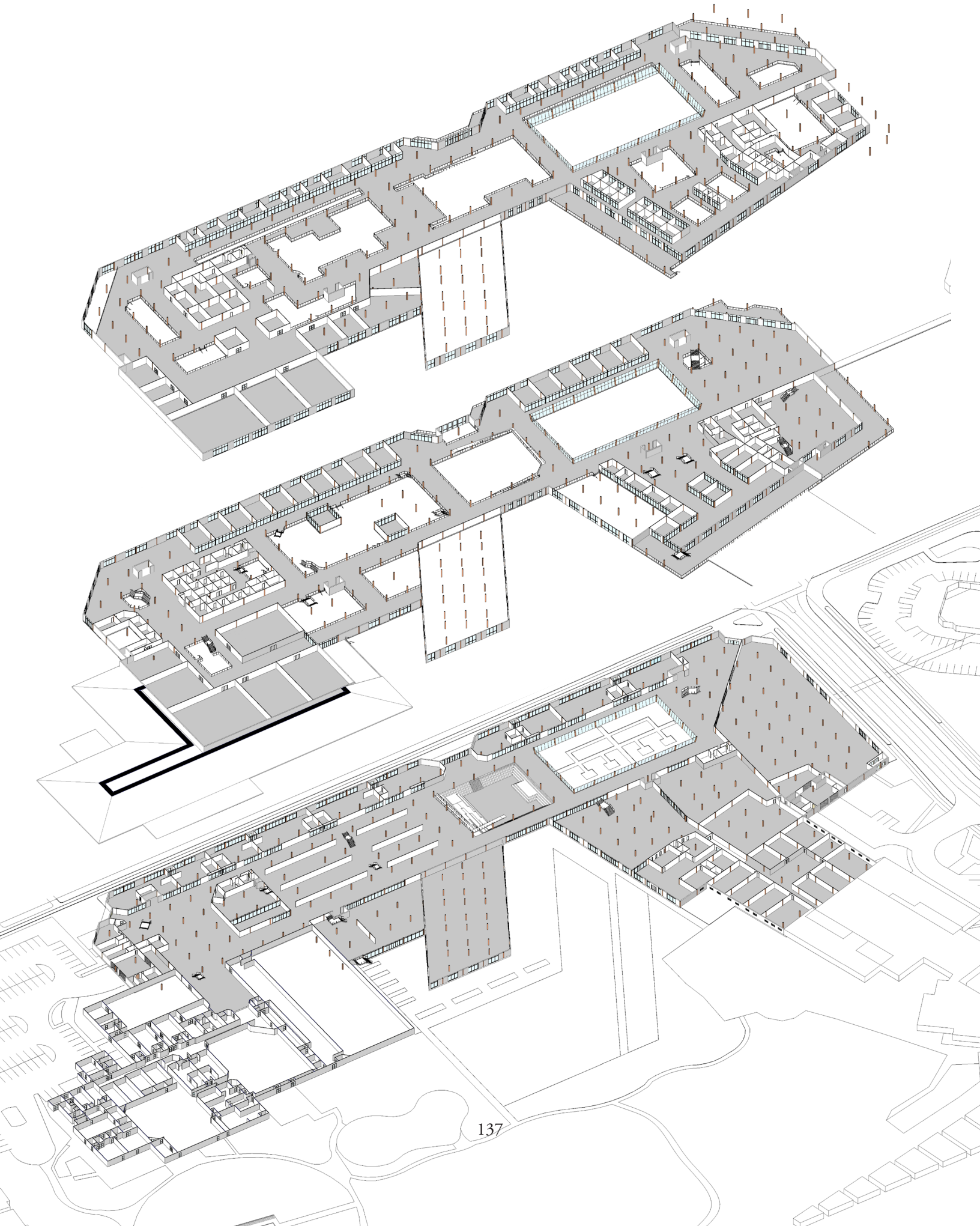
Programming for the Community

The ground floor features a grocery store, closer to the apartment buildings and street edge. Along the north edge are commercial shops and on the west is a workshop for bike repair, bike storage and change rooms for end of trip facilities of active transportation users. A renewed access to the existing community centre is adjacent to a lounge, café space, drug store and medical centre. The south side of the building consists of a pre-function lounge that leads to the event hall beside it and a secluded outdoor courtyard, which the event hall can open up as an extension for private events. Near the public school side of the building, on the east, is the day care centre and the communal dining hall and kitchen. In the centre of the building are three features that denote the more public open areas of the hub, which consist of the marketplace for small businesses, the piazza for casual gatherings and the outdoor courtyard that diffuses the noise to the rest of the building while providing views and connectivity. One of the main entrances coming into the hub is at the centre along Clark Avenue, where the occupant is immediately immersed into the piazza and exposed to the connection of the communal garden and park beyond.

The second floor contains meeting rooms along the north and a food court on the west serving the existing community centre and incoming workers. There are theatres and lounge space for a darker, tranquil zone in contrast to the other areas above the existing community centre. The wide corridors are lined with hot desks, informal work, meeting and lounge areas overlooking the market and piazza below. The east end features an open communal work area, with a terrace facing the street. Adjacent to the connection to the apartment buildings is the fitness gym with a two-story terrace. On the south side is the concentration of more long-term workstations for team offices. For more intimacy, there are areas of lower and higher ceiling depending on the desired degree of openness.

The third floor offers smaller meeting rooms, stepping back from the floor below on the north side of the building. The medical centre below leads up to the entrance of the library with ample activity rooms and worktables. The south side offers a gallery space beside artists' studios and the workshop with equipment for the community. The east end steps back as the extension of the open communal workspace. The gym is comprised of several private fitness and dance studios to offer classes. The team office area is open to below with smaller team offices, sharing the access to terraces as it offers a view and opens up to the district park beyond.

Figure 78
DISTRICTS
Subdivisions in hub in relation to surrounding context, uses and to promote chance of unplanned meetings between occupants.



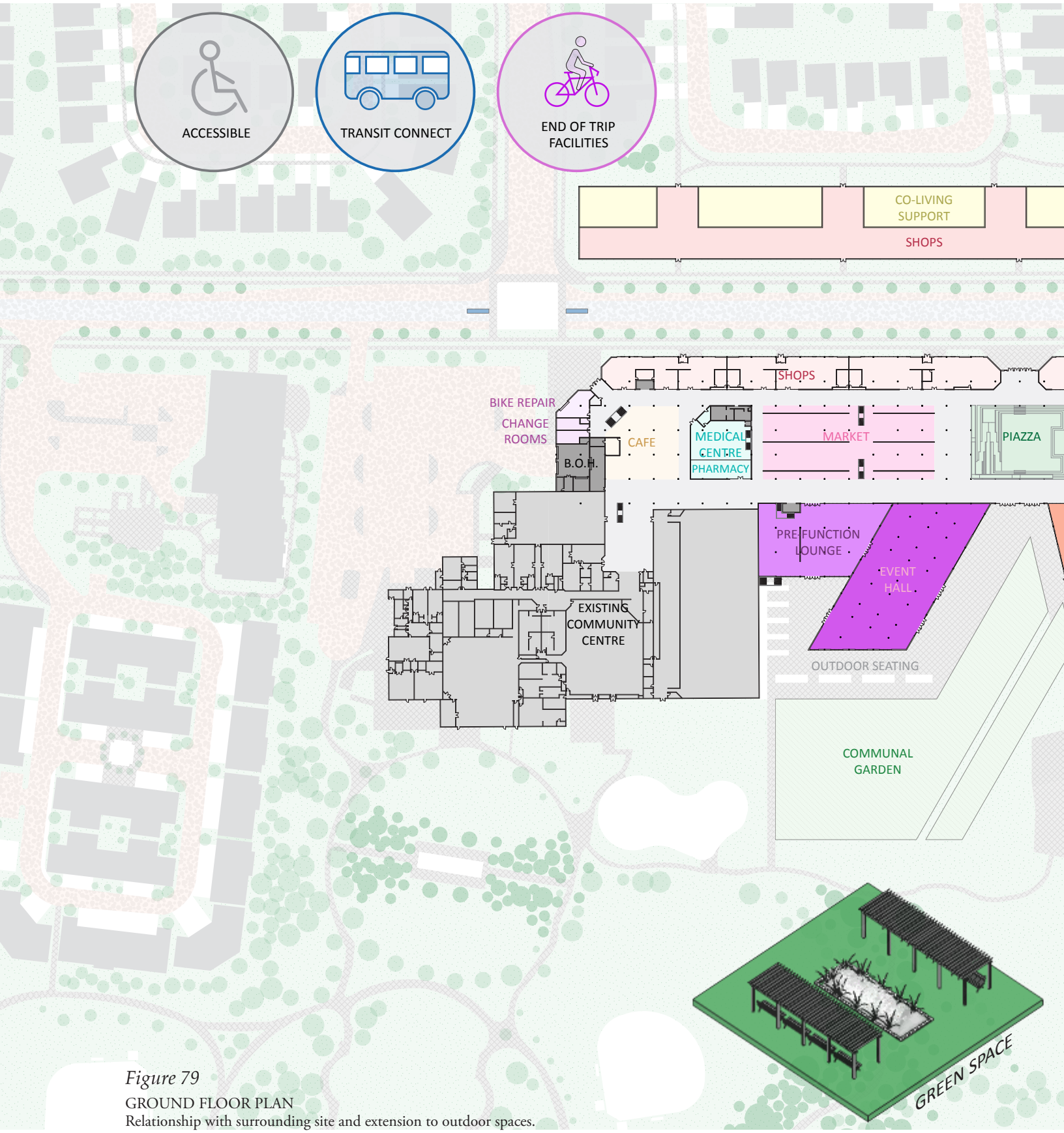
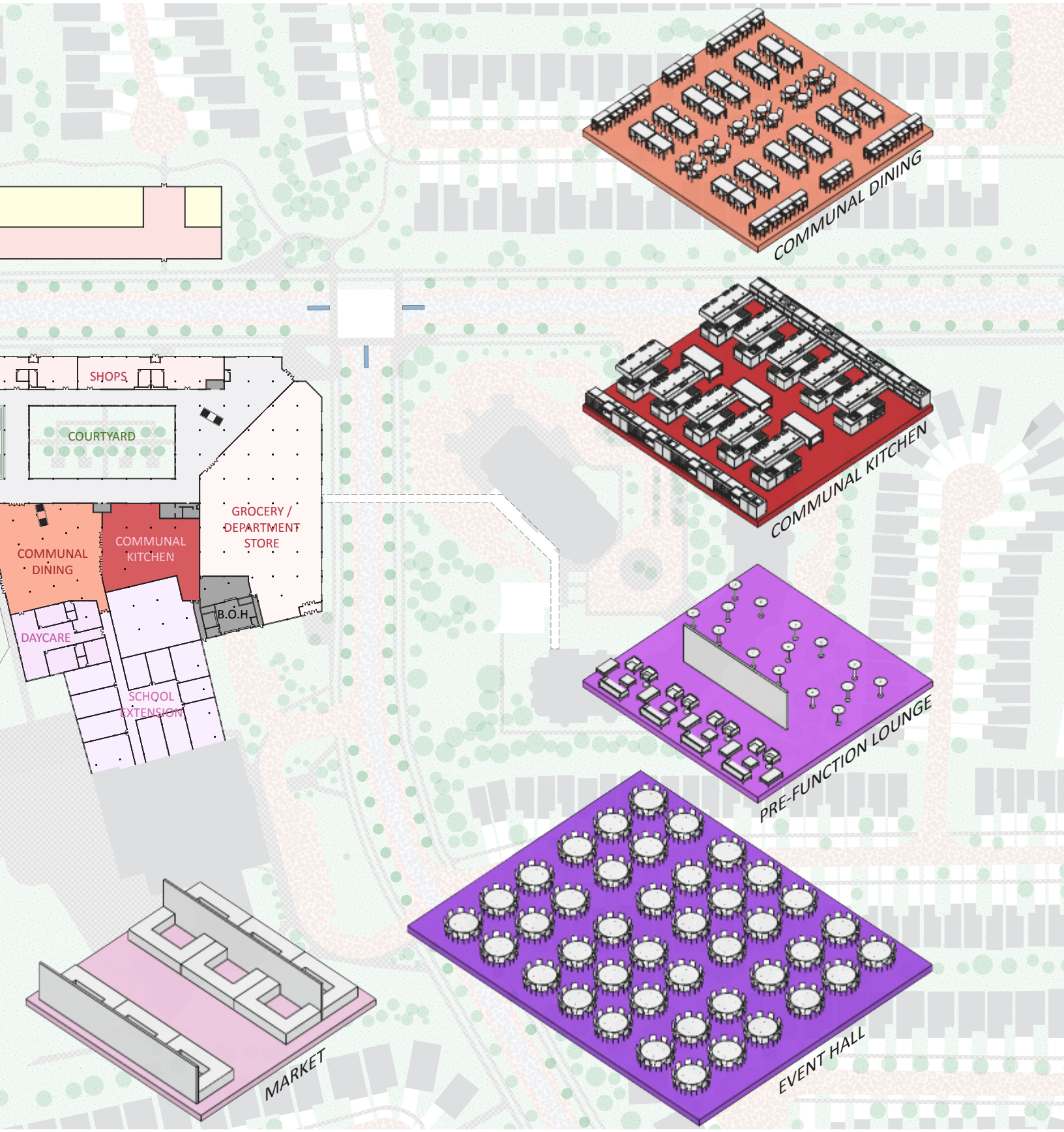


Figure 79
GROUND FLOOR PLAN
Relationship with surrounding site and extension to outdoor spaces.


COMMUNAL DINING
COMMUNAL KITCHEN
PRE-FUNCTION LOUNGE
EVENT HALL
MARKET
SHOPS
COURTYARD
GROCERY / DEPARTMENT STORE
COMMUNAL DINING
COMMUNAL KITCHEN
B.O.H
DAYCARE
SCHOOL EXTENSION

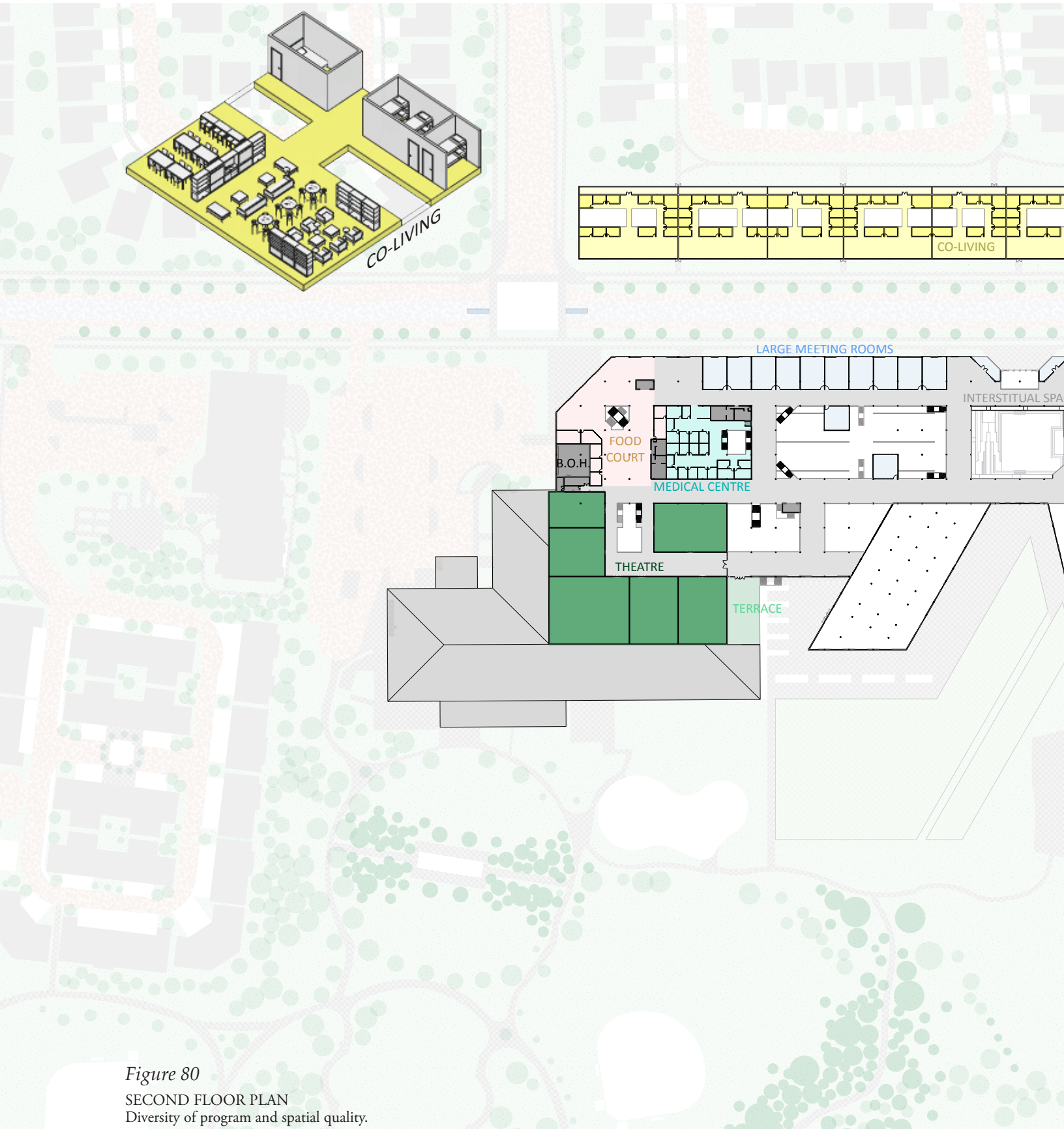
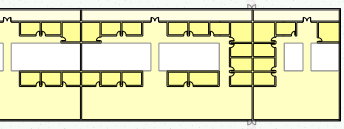
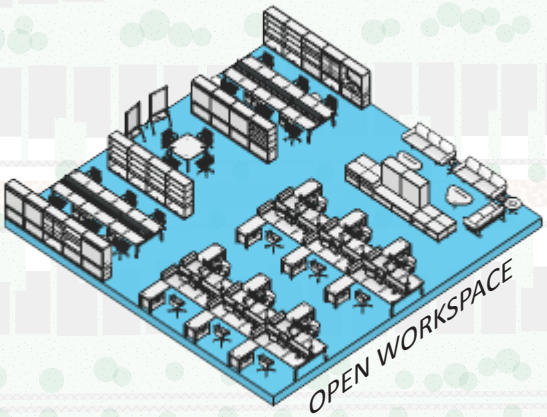
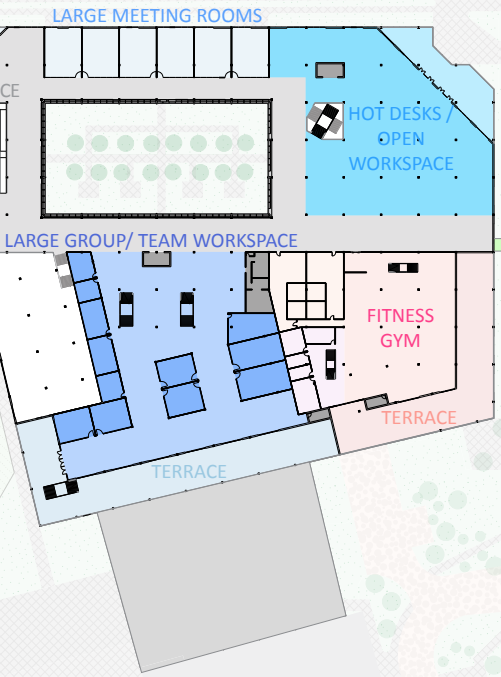


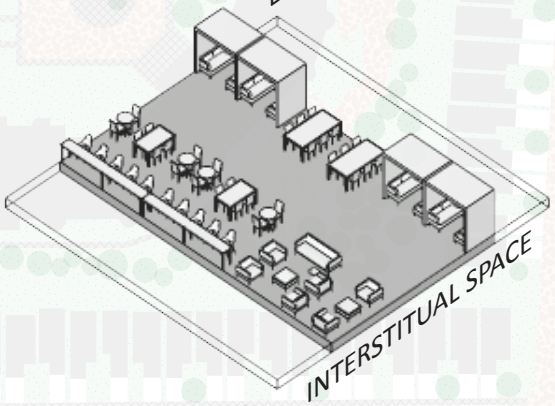
Figure 80
SECOND FLOOR PLAN
Diversity of program and spatial quality.

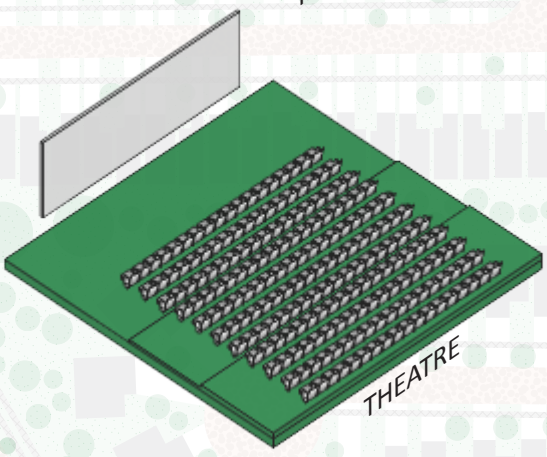



OPEN WORKSPACE


LARGE MEETING ROOMS
HOT DESKS / OPEN WORKSPACE
TERRACE
PEDESTRIAN BRIDGE
LARGE GROUP/ TEAM WORKSPACE
FITNESS GYM
TERRACE
TERRACE


LARGE GROUP WORKSPACE


INTERSTITUAL SPACE


THEATRE

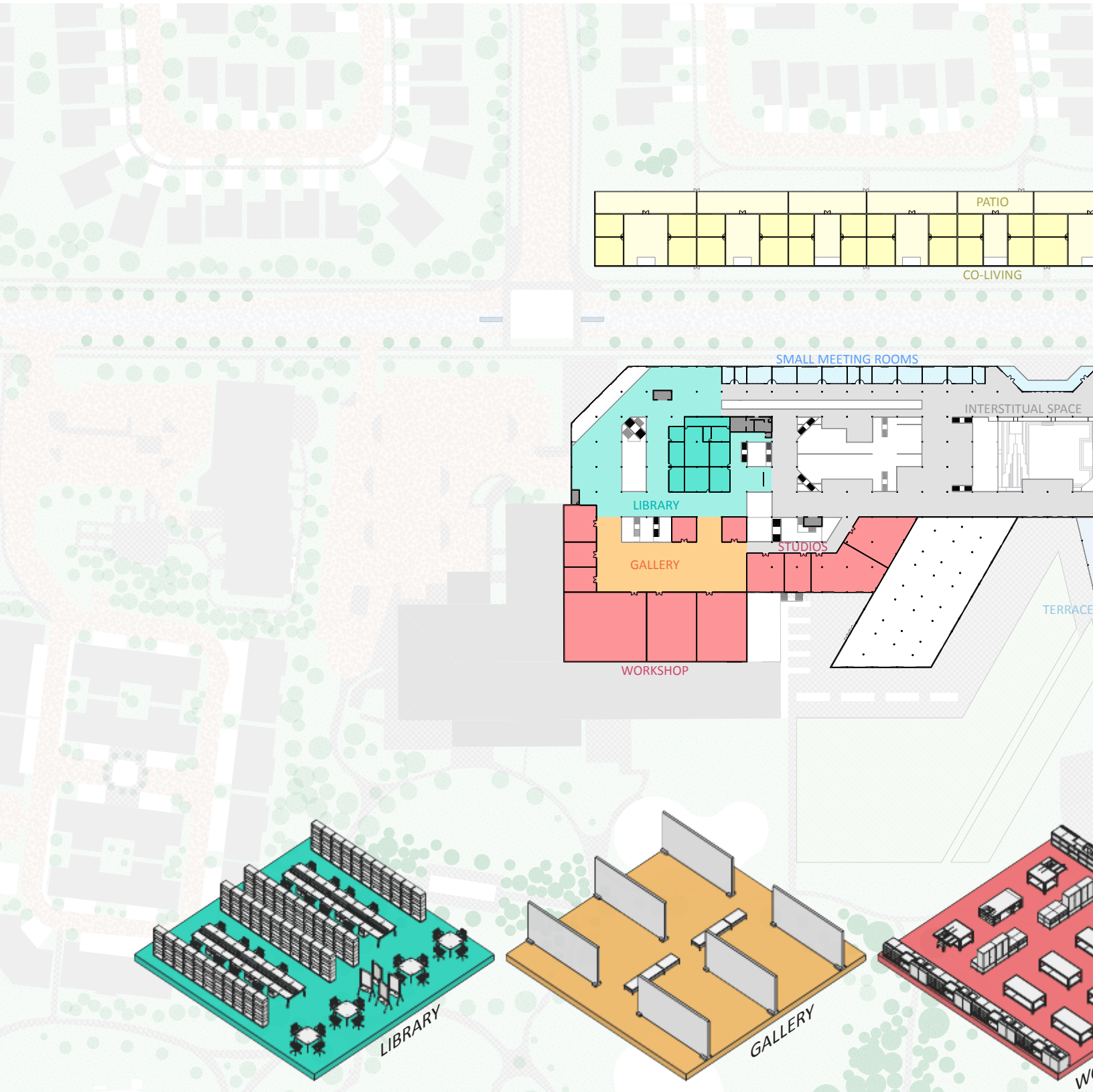
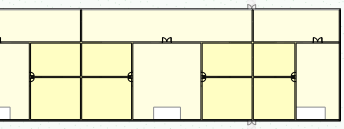
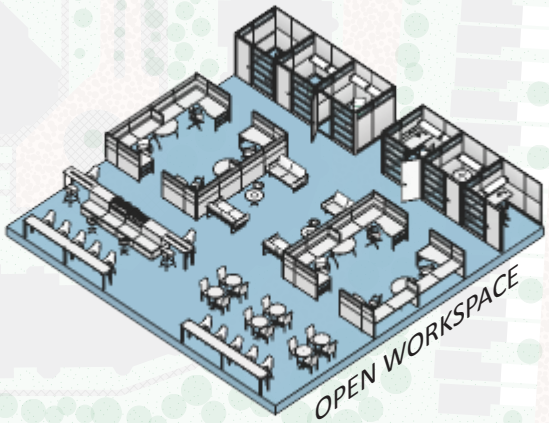
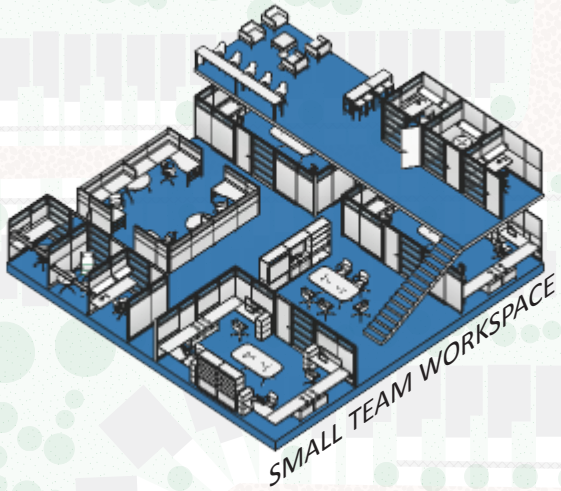


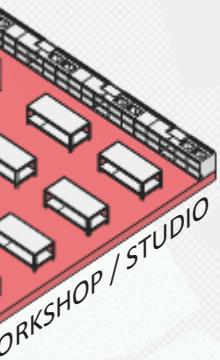
Figure 81
THIRD FLOOR PLAN
Private spaces of programs, with relation to spaces below.



PEDESTRIAN BRIDGE







Diversity of Spaces

Different conditions of spaces were created through floor plate variations. Each district of programmatic use has a central area and a gradation of privacy as it steps away from the central spine of the building. Stepping floor plates and different terrace conditions allow for the opportunity of opening up the space to be unconditioned at times of the year. Variation was also achieved with the roof gesture to provide different ceiling heights and amount of daylight penetration.

Spatial Organization

Architecturally, the spatial organization of the hub sprouted from providing a diversity of conditions. Through adjacency of different programs, visibility and visual connection played an important role in how different programs could benefit with the ambient environment and proximity to surroundings.

Circulation

The building is designed based on the possible time duration of occupants with districts catered for different uses. However, minimizing circulation was not prioritized in the design of the hub. To allow for spontaneous interactions of occupants, the wide corridors become part of the amenity and workspace to serve as lounges, hot desks and informal meeting areas to give flexibility in uses.

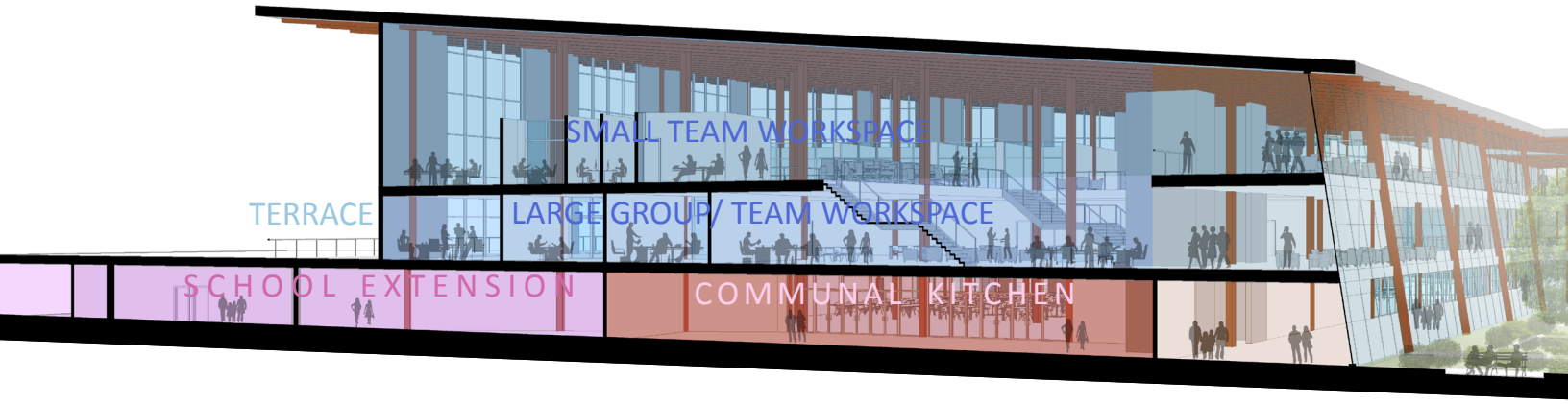
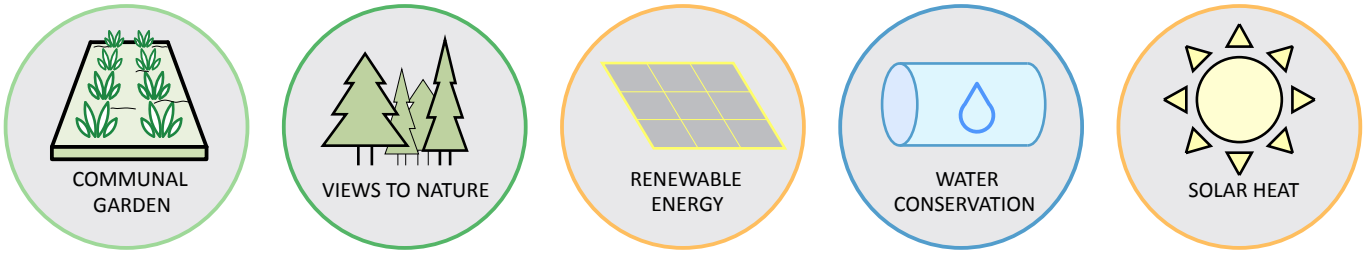
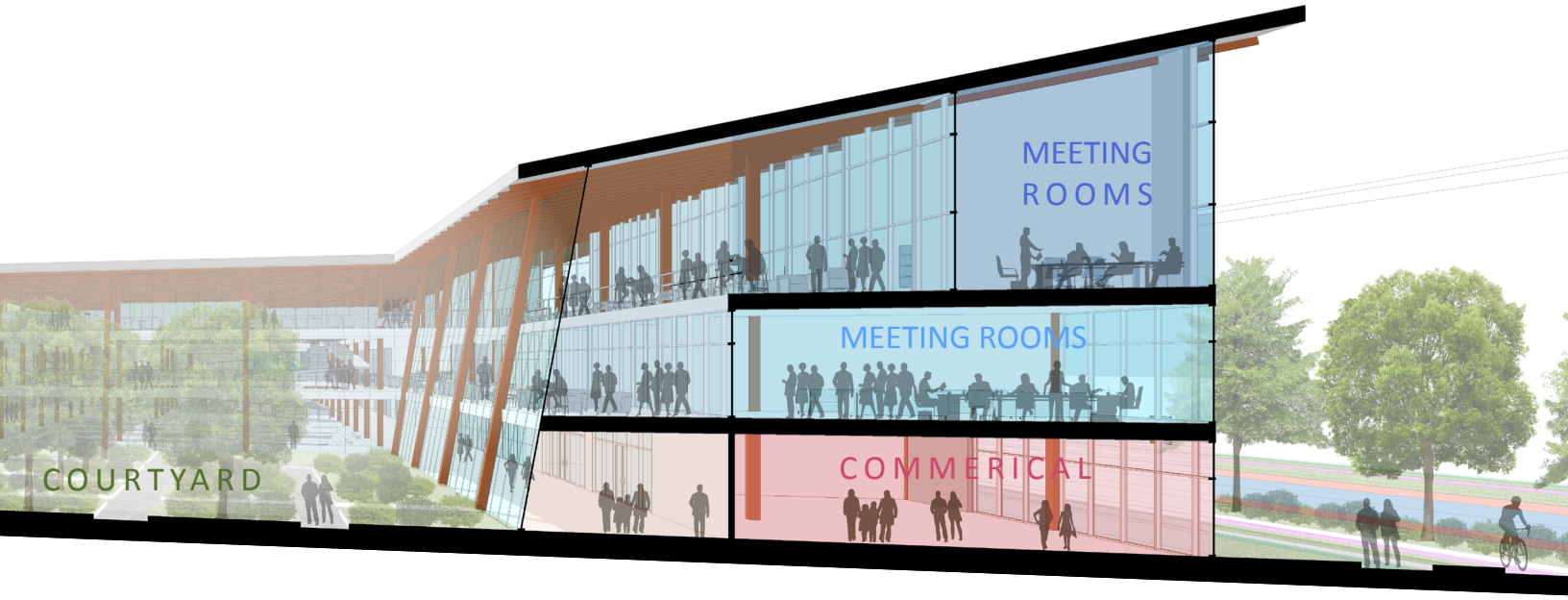
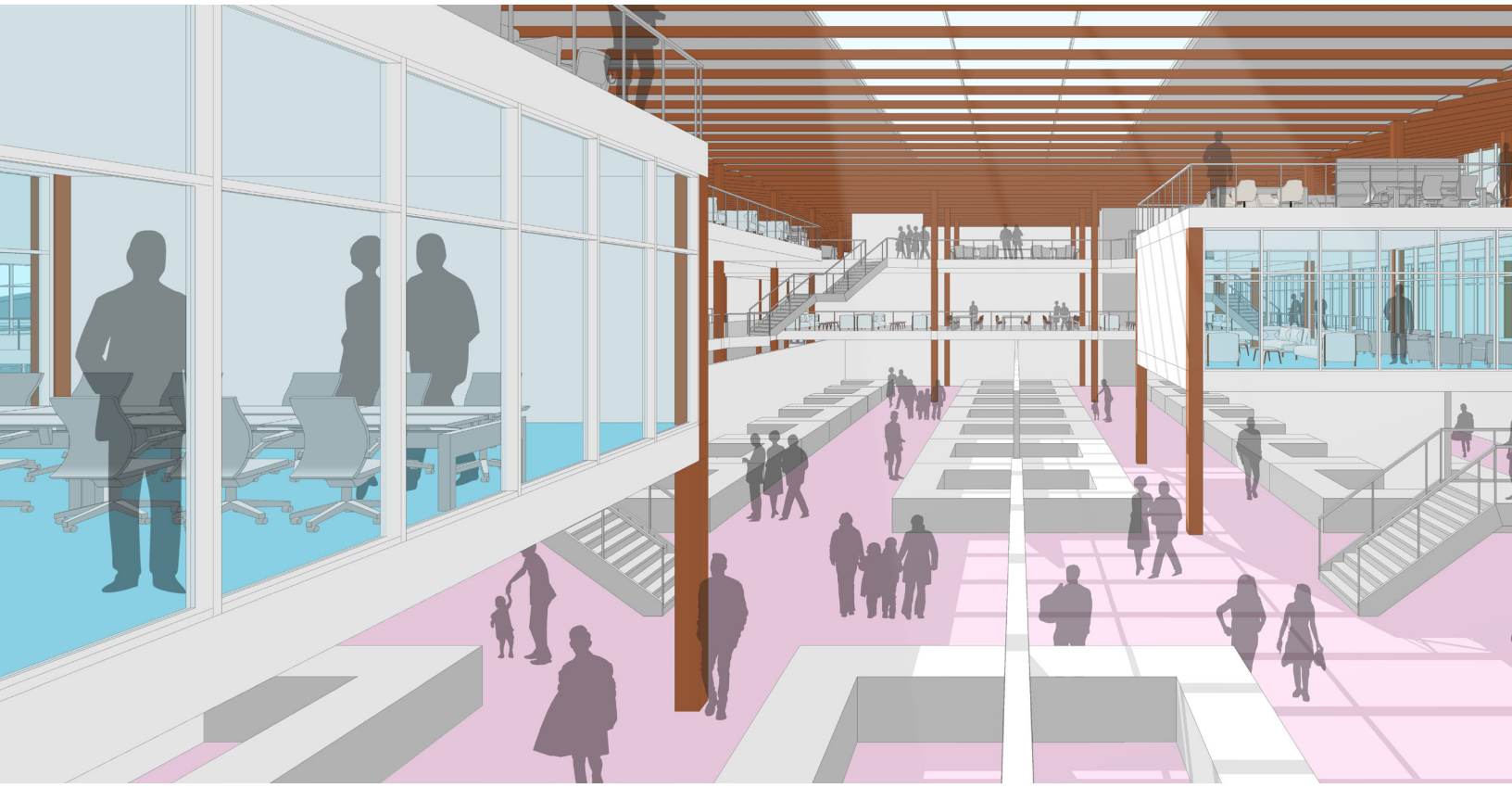


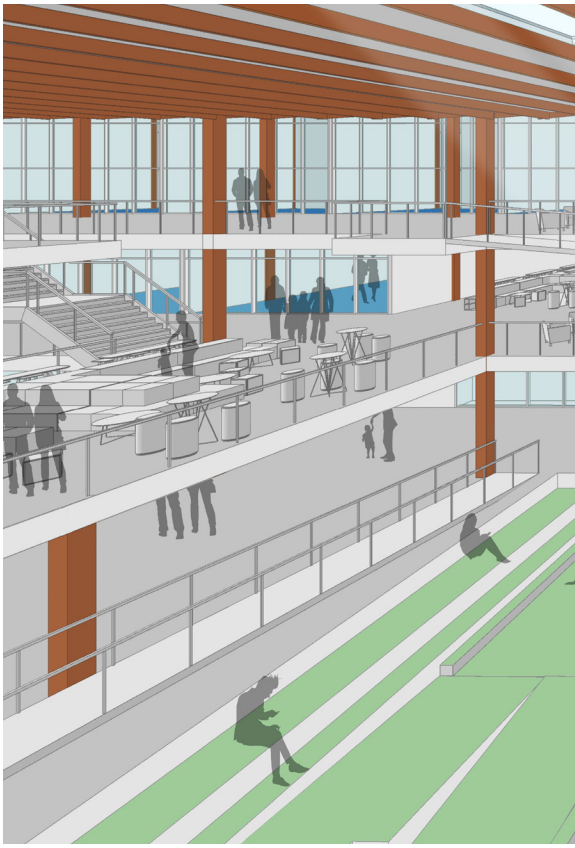
Figure 82

BUILDING SECTIONAL PERSPECTIVE
Relation of interior and exterior spatial quality.


COMMUNAL GARDEN
VIEWS TO NATURE
RENEWABLE ENERGY
WATER CONSERVATION
SOLAR HEAT


MEETING ROOMS
MEETING ROOMS
COMMERICAL
COURTYARD

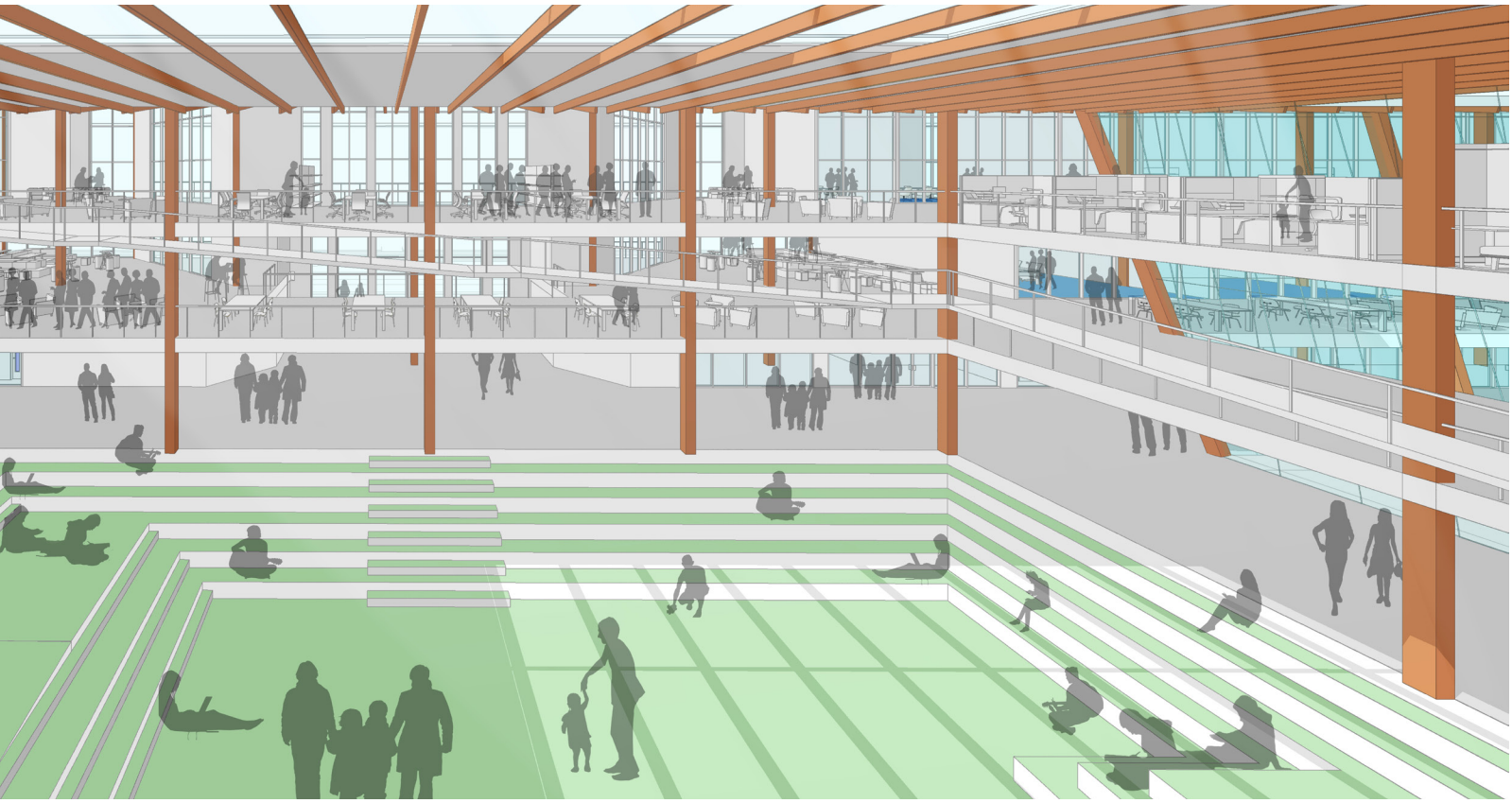


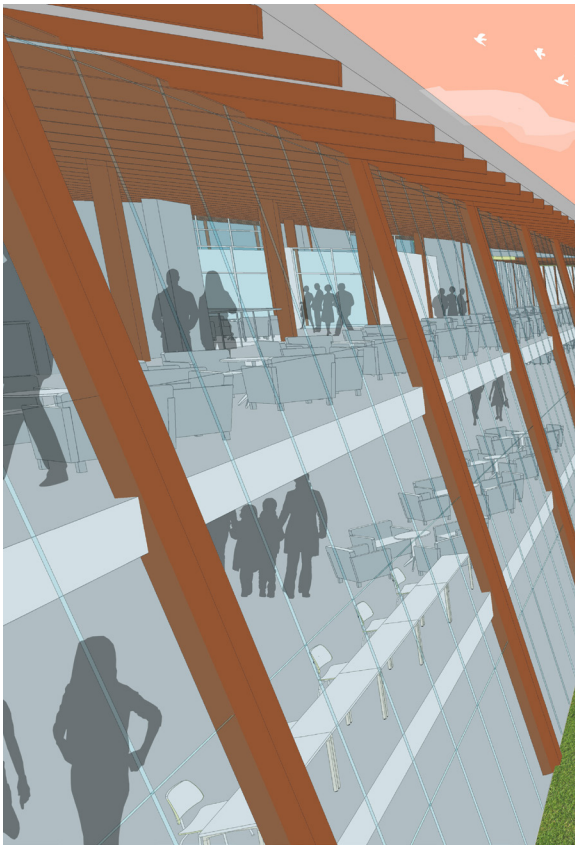


VIEW OF SUNKEN PIAZZA

Figure 83
INTERIOR PERSPECTIVES
Visibility and connectivity to different programs of hub.

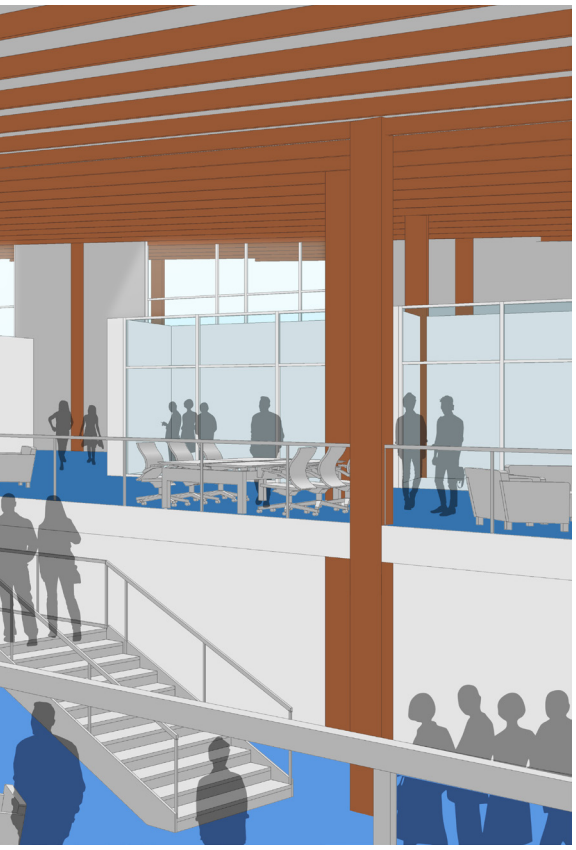
VIEW OF MARKETPLACE





VIEW OF COURTYARD

Figure 84
INTERIOR PERSPECTIVES
Diversity in spatial quality throughout the hub.



VIEW OF GROUP / TEAM OFFICE SPACE

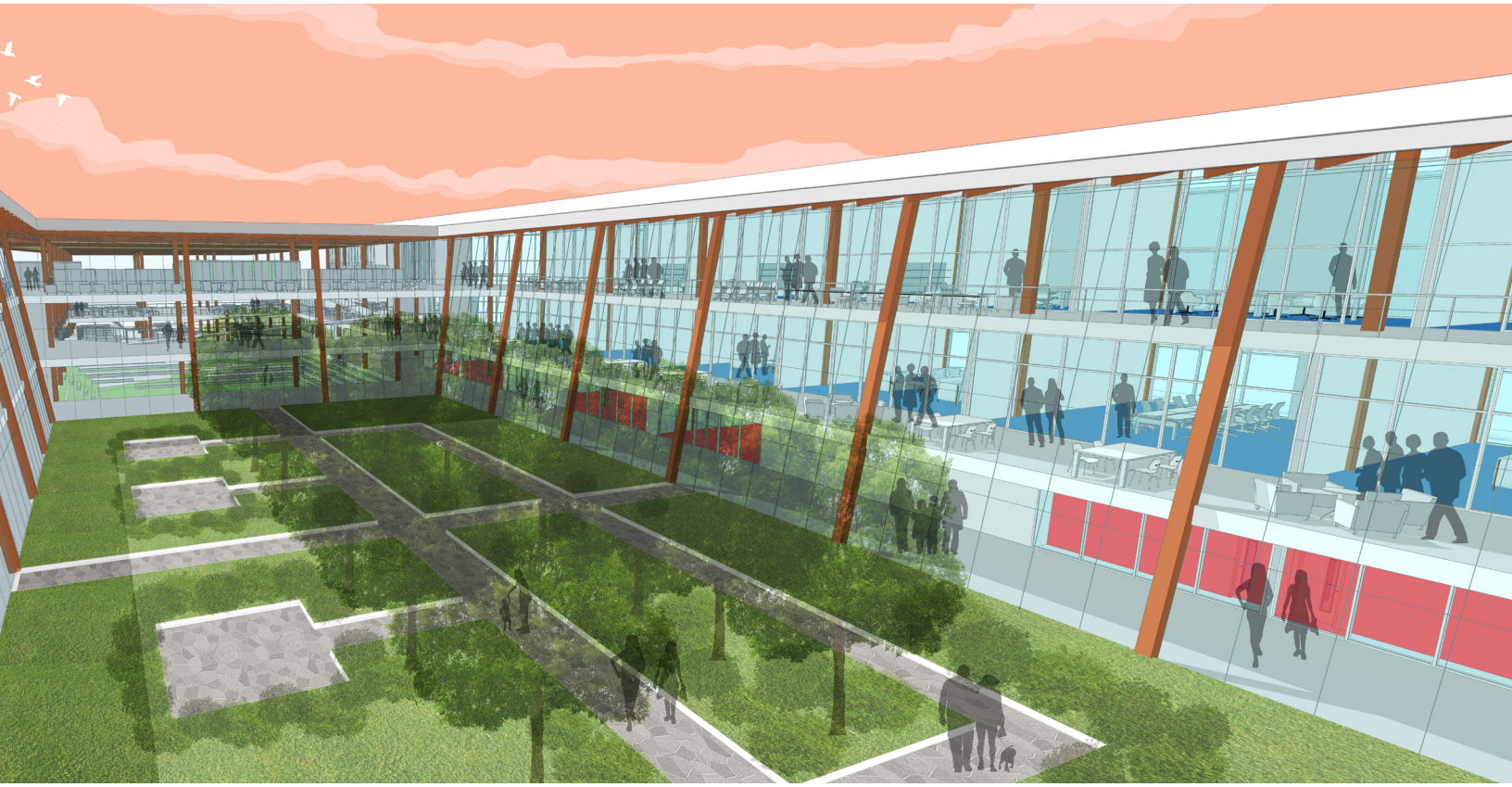


Figure 85

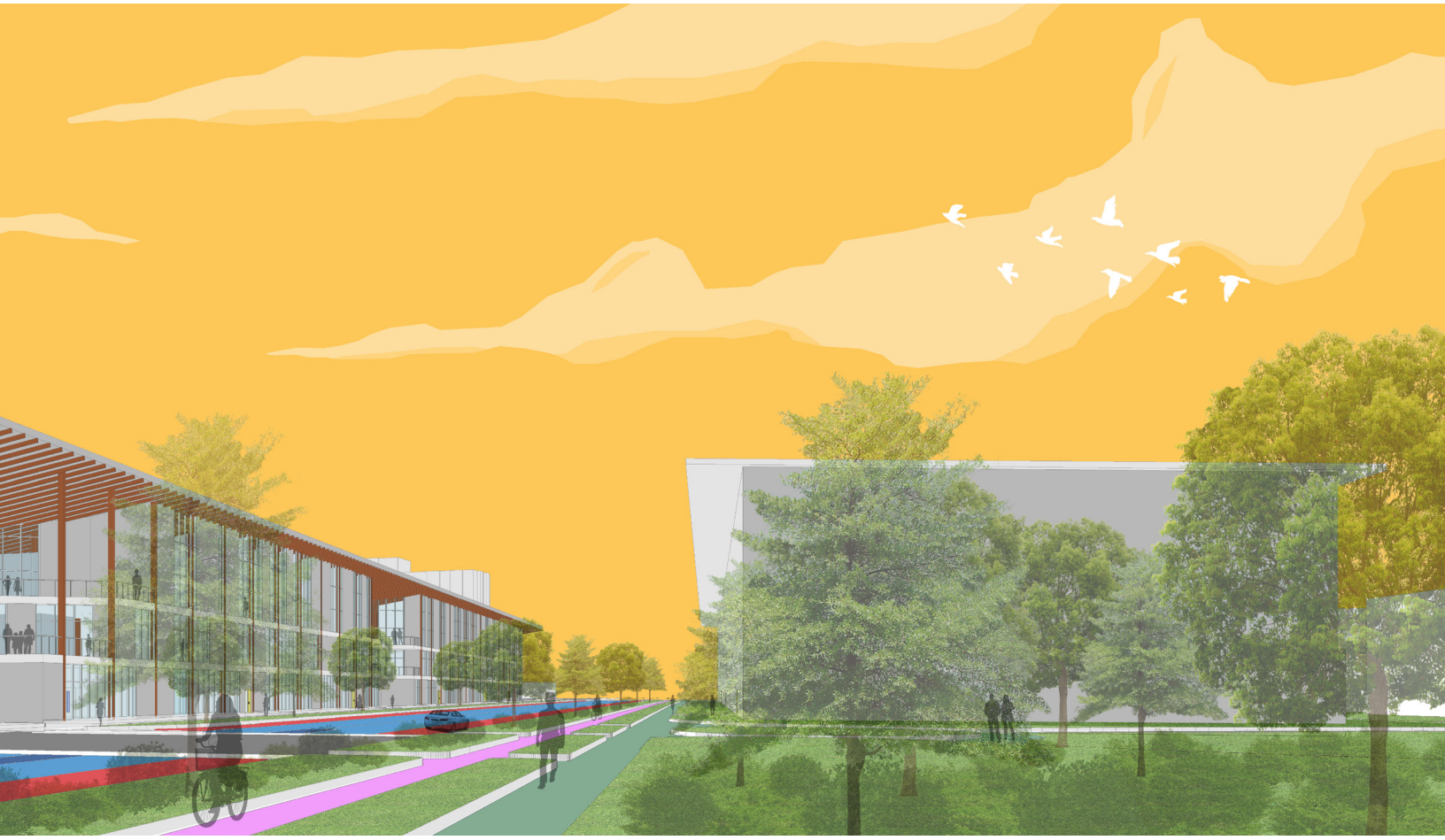
SOUTHWEST PERSPECTIVE VIEW

EXTERIOR PERSPECTIVES
View of courtyard adjacent to event hall.

Figure 86
EXTERIOR PERSPECTIVES
View of hub from the elementary school.

SOUTHEAST PERSPECTIVE VIEW

Figure 87
EXTERIOR PERSPECTIVE
Street view of hub in relation to road and new housing.



NORTHEAST PERSPECTIVE VIEW

4.4 Environmental Education

Sustainability

To bring in sustainability education and environmental awareness to the hub and community, passive strategies are implemented in the design of the building. The massing of the building took the sun path into consideration to maximize day lighting. Large overhangs and outdoor terraces allow conditioned indoor spaces to be set back to avoid solar heat gain in the summer, while allowing for the low angle winter sun to penetrate. The individual districts of program also allow areas to be sectioned off for an extension of the outdoor unconditioned space. This gives the opportunity to reduce the load on mechanical systems for days where the weather cooperates.

The sloped central courtyard allows for more views to nature and daylight penetration.

The communal garden serves to integrate an agri-food network to the neighbourhood. Adjacent to the communal kitchen, it can bring more affordable ways in cultivating produce and reduce the need for relying on shipped goods. The adjacency to the park and public school also offers the opportunity for children to participate and gardening as family activities.

In term of materiality, the building is mass timber framing, it is sustainable and the simple construction method also allows for adaptability in future phases of the hub.

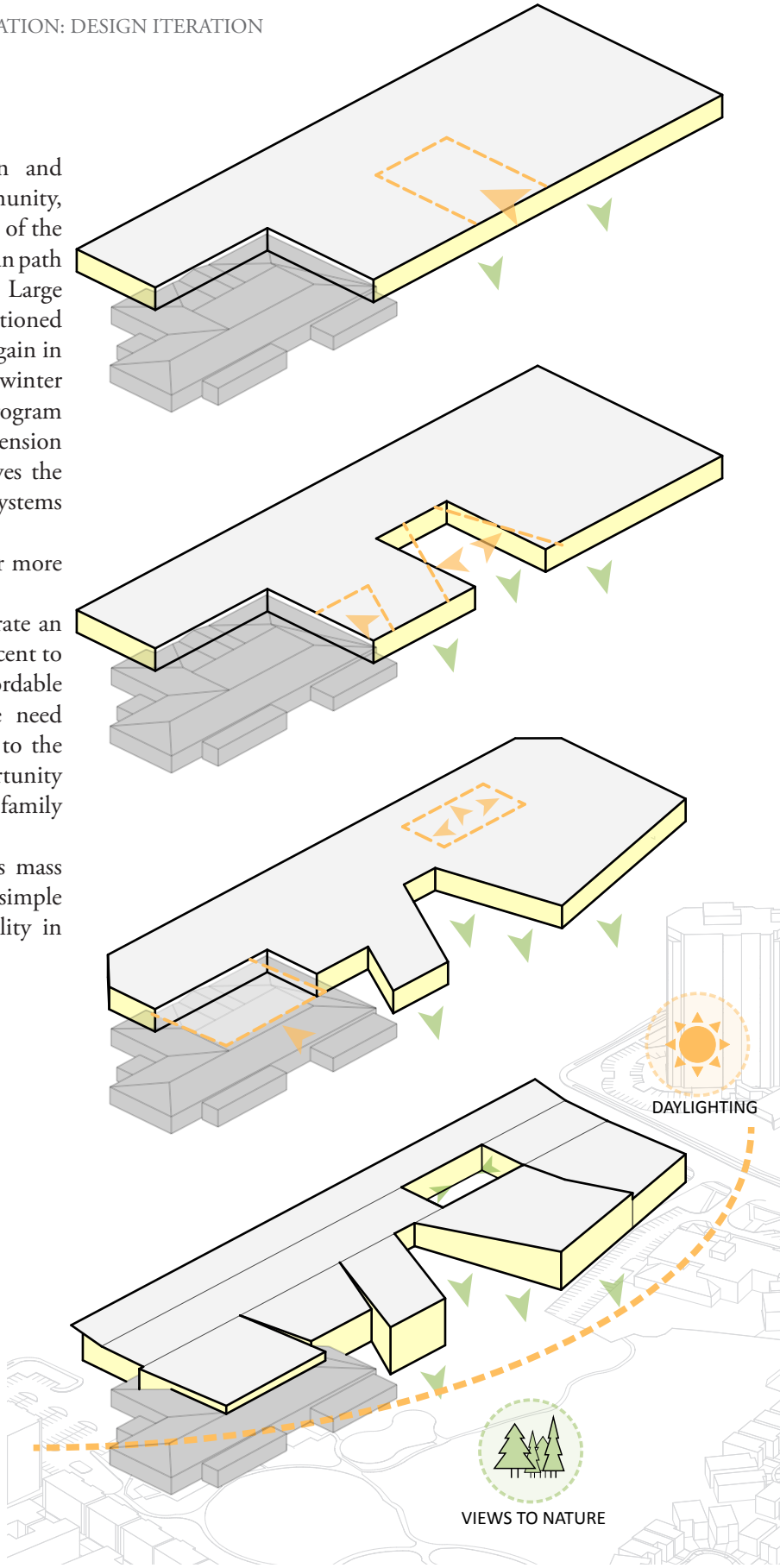


Figure 88
MASSING DIAGRAM
Daylighting, views to nature and relation to surrounding site governed building massing.

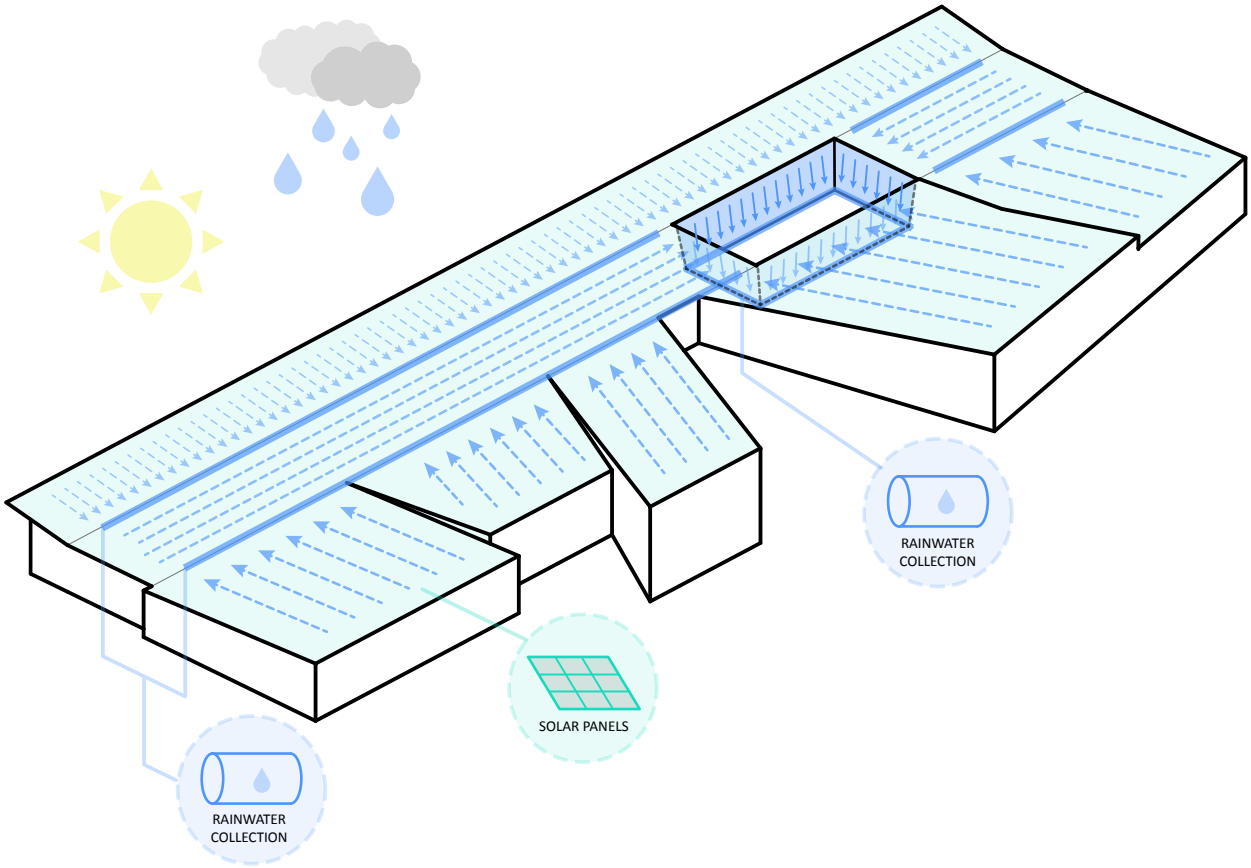


Figure 89

SUSTAINABILITY DIAGRAM
Raintware collection, photovoltaic panels and passive strategies implemented in design gestures of hub.

Roof

The roof gesture supplements the distinct districts and the degree of how public or private the space is internally. More importantly, it serves as directing the flow of rainwater to be collected and reused. The slanted central courtyard also becomes a feature on a rainy day as water trickles down the sloped glazing. The ubiquitous form of the roof also allows for ample photovoltaic panels to harvest renewable energy.

4.5 Phasing

The proposal of the hub is an immense development and requires phasing to let the community adjust to the changes. Despite the presence of home offices in the existing neighbourhood, the idea of coworking will need time for companies to adapt. Implementing the street safety strategies to encourage active transportation to relief dependency on cars are lifestyle changes needed in the suburban fabric. Many components conjoin to facilitate these changes, despite many of which are already ongoing as proven by trends in the office place. The hub demonstrates how the effects can be influential in the context of the suburban community, as it aims to revitalize the lifestyle of the suburb to build a unified community.

CONCLUSION

FUTURE IMPLICATIONS

5.0 Conclusion

5.1 Key Points

The typology of the hub integrating into the suburban fabric is to provide the daily needs to support work and recreational activities. However, it can be problematic as there is the concern of an overarching pressure for people to work more. Nonetheless, it is ultimately a decision made by the employee and requires a change in company culture. Whether a workplace is situated close or far away from home, the intention of working overtime is a decision. The extent and role of a designer is to create the atmosphere for supporting positive interactions.1 The hub enacts as providing convenient access, in hopes to dilute isolation of the modern city through consolidating the major points of interest. Expectantly, by allowing the office place to be close to home, the time saved from long distance commuting can then be utilized resourcefully.

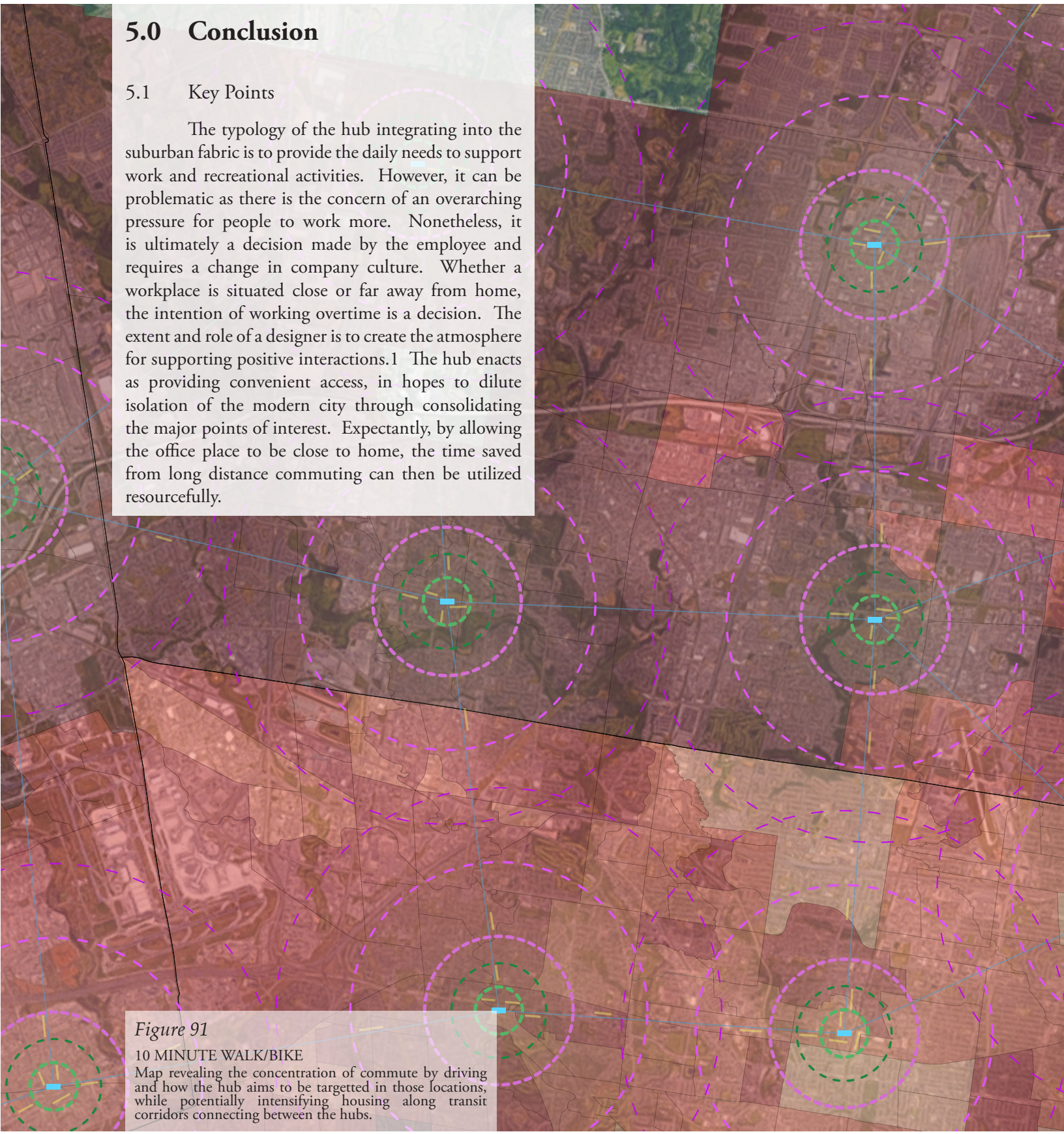


Figure 91

10 MINUTE WALK/BIKE

Map revealing the concentration of commute by driving and how the hub aims to be targetted in those locations, while potentially intensifying housing along transit corridors connecting between the hubs.

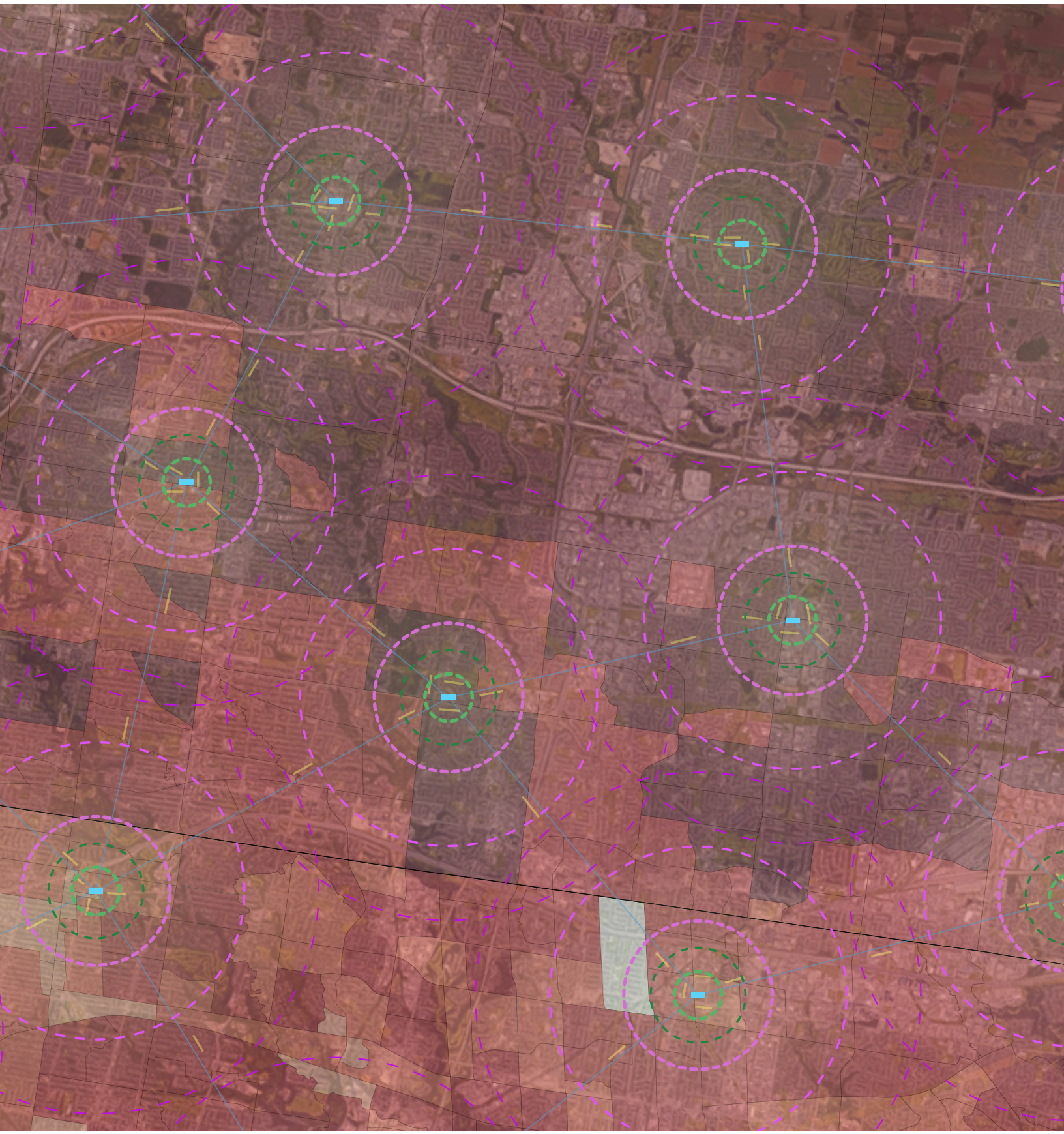


Figure 92
TORONTO
Imagining how the future implications of the hub may redefine the continual developments of the Greater Toronto Area.

5.2 Future Implications

Opportunity to Reimagine the City

It is projected that in the next fifteen years, almost half of the buildings in America would have been inhabited after 2006; in other words, every other building will be newly constructed.2 This presents a large opportunity in reconfiguring the city. The hub is proposed to be present in existing suburban neighbourhoods. Addressing to the mobility of work, it can reduce or eliminate the need of commute. Redistributing the population allows the urbanized downtown core to relieve stress from further densification, since people do not necessarily need to concentrate together for the access to work.

The integrated transportation network can be supported beyond the projected urban centres.3 Instead, with numerous hubs throughout the extended metropolitan cities surround the city of Toronto, the Greater Golden Horseshoe area, the ease of access can further encourage reducing the use of private automobile on the road.

Phasing Out Dependency on Cars

Injuries and fatalities mostly occur at intersections or major arterials roads, putting pedestrians and cyclists at risk and in many cases it is related to speed4. To introduce a safer environment for active transportation, the strategy is to slowly reduce the speed limit to wean the traffic going through nearby streets of the hub.

The current proposal of the hub is presented to be after the adaptation of the community in support of coworking space and the intensification of housing adjacent to the site. There are no parking spaces directly on the site at this phase of the hub, assuming that active transportation is commonly used to arrive at the hub.

Future Transit

On a larger scale, urban planning and public transit, can introduce fare based on travel distance, to encourage the use of transit for short distances, such as between hubs. In addition, to enlarge the audience of each hub, shuttle buses can bring people to the hub instead of buses that intertwine small residential streets. This can reduce the traffic load further and diminish the dangers of smaller streets and allow the hub to be the medium that connects people to the main transit systems that connect hubs of different communities.

Goals

Walkable neighbourhoods are intended to be citywide and not independent stand alone developments, to eventually establish the support of an integrated network.5 Projecting into the future, the proposal of the hub integration in existing suburban communities aims to transform the Greater Toronto Area to beyond the projected urban growth centres. The proposal raises possibilities of a dense network of the hub where long distance commuting is no longer necessary through increased mobility and greater distribution of work supported by digital technologies. In addition, the hub stands to facilitate a future where roads can become more focused in accommodating for other users of the road. The intervention aspires to transform the segregated suburban landscape into complete communities that function together as a network between cities, yet individually act as nodes to serve individual communities for a revitalized modern suburban life.

LETTERS OF COPYRIGHT PERMISSION

SPRINGER NATURE LICENSE
TERMS AND CONDITIONS

Jun 19, 2018

This Agreement between University of Waterloo -- Connie Lei ("You") and Springer Nature ("Springer Nature") consists of your license details and the terms and conditions provided by Springer Nature and Copyright Clearance Center.

License Number	4372540813244
License date	Jun 19, 2018
Licensed Content Publisher	Springer Nature
Licensed Content Publication	Journal of Urban Health
Licensed Content Title	Urban Planning for Healthy Cities
Licensed Content Author	Hugh Barton, Marcus Grant
Licensed Content Date	Jan 1, 2011
Licensed Content Volume	90
Licensed Content Issue	1
Type of Use	Thesis/Dissertation
Requestor type	non-commercial (non-profit)
Format	print and electronic
Portion	figures/tables/illustrations
Number of figures/tables/illustrations	1
Will you be translating?	no
Circulation/distribution	<501
Author of this Springer Nature content	no
Title	Revitalizing Suburbia
Instructor name	n/a
Institution name	n/a
Expected presentation date	Aug 2018
Portions	Figure 1

Robert Park <RPark@plparchitecture.com> Fri, Jun 8, 2018 at 4:38 AM
To: connie lei <leiconnie@gmail.com>

Hi Connie.

Thanks for getting in touch.

Of course, we would be very happy for you to use The Edge as a case study.

I attach a brochure we have produced on the project in PDF form – and we also have a pack of information which includes drawings, which you can download here:

Good luck with the research.
Robert Park

Adam Ross <ARoss@hassellstudio.com> Thu, Jun 7, 2018 at 7:28 PM
To: connie lei <leiconnie@gmail.com>
Cc: Slavica Habjanovic <shabjanovic@hassellstudio.com>

Hi Connie
Thank you for making contact and for showing interest in ANZ Centre. I've uploaded some images to the below link. Are you able to please credit all interior shots to Earl Carter and all exterior shots to Peter Bennetts?

Let me know if you have any issues accessing the images.

Adam

Adam Ross Senior Communications Advisor
E ARoss@hassellstudio.com

HASSELL

Josie Amato <josie@cocoproductions.com.au>
To: connie lei <leiconnie@gmail.com>

Hi Connie,

Thanks for being in touch and seeking permission from Earl, I had a chat to him this morning and he said it was fine for you to go ahead and use this as part of your thesis.

Good luck with it!

Cheers

Josie

JOSIE AMATO EXECUTIVE PRODUCER

COCO PRODUCTIONS PTY LTD
208/78 INKERMAN STREET, ST KILDA 3182
T +613 9533 8822 | M +61 411 115 628
www.cocoproductions.com.au

Foster Enquiries <FosterEnquiries@fosterandpartners.com> Tue, Jun 19, 2018 at 11:57 AM
To: "leiconnie@gmail.com" <leiconnie@gmail.com>

Dear Connie,

Thank you for your enquiry. You can only use the pictures attached.

Regards

ENDNOTES

[1] Statistics Canada. "Commuting to Work: National Household Survey, 2011." Minister of Industry. Accessed Nov 21, 2017. http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011003_1-eng.pdf.

[2] World Health Organization. "Constitution of WHO: Principles." World Health Organization. Accessed Jun 29, 2018. http://www.who.int/about/mission/en/.

[3] Filion, Pierre, et al. *Canadian Cities in Transition : Perspectives for an Urban Age*. 5th ed. Toronto: Oxford University Press, 2015, 22.

[4] Sewell, John. *The Shape of the Suburbs Understanding Toronto's Sprawl*. Toronto: University of Toronto Press, 2009, 18.

[5] Simmins, Geoffrey. "Urban and Regional Planning." The Canadian Encyclopedia. Accessed May 21, 2018. https://www.thecanadianencyclopedia.ca/en/article/urban-and-regional-planning/.

[6] Filion, 20.

[7] Ontario. "Provincial Policy Statement, 2014." Ministry of Municipal Affairs and Housing. Accessed November 28, 2017, 38. http://www.mah.gov.on.ca/Page10679.aspx#Figure+1.

[8] Ibid, 1.

[9] Perrotta, Kim, et al. "The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health." Toronto Public Health. Accessed Feb 22, 2018, 9. https://www.toronto.ca/wp-content/uploads/2017/10/9617-TPH-walkable-city-report.pdf.

[10] Ontario. "Growth Plan for the Greater Golden Horseshoe 2017." Ministry of Municipal Affairs. Accessed November 28, 2017,
10. http://placestogrow.ca/index.php?option=com_content&task=view&id=430&Itemid=14.

[11] Ontario, Provincial Policy Statement, 2014, 6.

[12] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 67.

[13] Ibid, 69.

[14] Ibid.

[15] Ibid, 72.

[16] Ibid, 75.

[17] Barton, Hugh and Marcus Grant. "Urban Planning for Healthy Cities." *Journal of Urban Health* 90, no. S1 (Oct, 2013): 129-141. doi:10.1007/s11524-011-9649-3. http://www.ncbi.nlm.nih.gov/pubmed/22714703.

[18] Legrain, Alexander, et al. *Am Stressed, must Travel: The Relationship between Mode Choice and Commuting Stress*. Vol. 34 Elsevier, 2015, 142.

[19] Lindgren, April. "Suburban Ring Around Toronto Packs 'Em In." *CanWest News,* Mar 14, 2007. http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/461279268?accountid=14906.

[20] Sposato, Robert G., Kathrin Röderer, and Renate Cervinka. "The Influence of Control and Related Variables on Commuting Stress." *Transportation Research Part F: Traffic Psychology and Behaviour* 15, no. 5 (May 8, 2012): 581-587. http://www.sciencedirect.com.proxy.lib.uwaterloo.ca/science/article/pii/S1369847812000472.

[21] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 2.

[22] Legrain, 142.

[23] Bell, Stephanie, et al. "Avoiding the TRAP: Traffic Related Air Pollution in Toronto and Options for Reducing Exposure." City of Toronto. Accessed Feb. 22, 2018,
2. https://www.toronto.ca/legdocs/mmis/2017/hl/bgrd/backgroundfile-108070.pdf.

[24] Perrotta, 4.

[25] Bell, ii.

[26] Ibid, 12.

[27] Ibid, 20.

[28] Bell, ii.
[29] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 12.
[30] IndEco Strategic Consulting Inc., Toronto Public Health, and City of Toronto, Transportation Services. *Road to Health: Improving Walking and Cycling in Toronto*. Toronto: Toronto Public Health, 2012, 11.
[31] Perrotta, 2.
[32] IndEco, 5.
[33] Ibid, 10.
[34] Perrotta, 2.
[35] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 2.
[36] Perrotta, 4.
[37] IndEco, 5.
[38] Perrotta, v.
[39] Lynch, Kevin. *City Sense and City Design : Writings and Projects of Kevin Lynch*, edited by Banerjee, Tridib, Michael Southworth. Cambridge, Massachusetts: MIT Press, 1990, 36.
[40] Ibid.
[41] Ibid.
[42] Sewell, John. *The Shape of the City : Toronto Struggles with Modern Planning*. Toronto: University of Toronto Press, 1993, 16.
[43] Krupat, Edward. *People in Cities : The Urban Environment and its Effects*. Cambridge: Cambridge University Press, 1985, 25.
[44] Ibid, 47.
[45] Ibid, 19.
[46] Lynch, City Sense and City Design, 38.
[47] Ibid.
[48] Ibid.
[49] Sewell, The Shape of the Suburbs Understanding Toronto's Sprawl, 176.
[50] Ibid, 180.
[51] Lynch, City Sense and City Design, 37.
[52] Solomon, Lawrence. *Toronto Sprawls a History*. Toronto: University of Toronto Press, 2007, 82.
[53] Goldhagen, Sarah Williams. *Welcome to Your World : How the Built Environment Shapes our Lives*. 1st ed. New York: Harper Collins Publishers, 2017, 25.
[54] Perrotta, vi.
[55] McKeown, David. *Transportation Priorities and Investment for a Healthy Toronto*. Toronto: Medical Officer of Health, 2013, 5.
[56] Perrotta, vi.
[57] Ibid, 5.
[58] Ibid, 4.
[59] Filion, 265.
[60] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 70.
[61] Sobel, Lee S. *Greyfields into Goldfields : Dead Malls Become Living Neighborhoods*, edited by Greenberg, Ellen, Steven Bodzin and Congress for the New Urbanism. San Francisco: Congress for the New Urbanism, 2002, 13.
[62] Statistics Canada. 2017. *Vaughan, CY [Census subdivision], Ontario and York, RM [Census division], Ontario* (table). *Census Profile*. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed July 27, 2018).

[63] Statistics Canada. 2017. *Ontario [Province] and Canada [Country]* (table). *Census Profile*. 2016 Census. Statistics Canada Catalogue no. 98-316-X2016001. Ottawa. Released November 29, 2017. https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/index.cfm?Lang=E (accessed July 27, 2018).
[64] Ontario. "About Ontario." Government of Ontario. Accessed Dec 5, 2017. https://www.ontario.ca/page/about-ontario.
[65] Ibid.
[66] Ibid.
[67] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 1.
[68] Ibid, 11.
[69] Statistics, Commuting to Work: National Household Survey.
[70] Ibid.
[71] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 2.
[72] Ibid, 33.
[73] Ibid, 34.
[74] Perrotta, 27.
[75] IndEco, 4.
[76] Ibid, 5.
[77] Perrotta, v.
[78] Ibid, 27.
[79] Ontario. "Co-Ordinated Land use Planning Review." Government of Ontario. Accessed Dec 5, 2017, 3. http://www.mah.gov.on.ca/Page10882.aspx.
[80] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 3.
[81] Ibid, 1.
[82] Ibid.
[83] Ontario, Provincial Policy Statement, 2014, 7.
[84] Ibid, 42.
[85] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 5.
[86] Advanced Architecture Contest. *City Sense : Shaping our Environment with Real-Time Data : 4th Advanced Architecture Contest*, edited by Cappelli, Lucas, Institut d'Arquitectura Avançada de Catalunya, organizer of meeting and Institut d'Arquitectura Avançada de Catalunya. Barcelona: Actar, 2012, 20.
[87] Greengard, Samuel. *The Internet of Things*. Cambridge, Massachusetts: MIT Press, 2015, 37.
[88] Grech, Chris and David R. Walters. *Future Office : Design, Practice and Applied Research*. London: Routledge, 2008, 63.
[89] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 11.
[90] Ibid, 2.
[91] Lynch, City Sense and City Design, 40.
[92] Ibid, 41.
[93] Goldhagen, 25.
[94] Melcher, Katherine, Barry Stiefel, and Kristin Faurest. *Community-Built : Art, Construction, Preservation, and Place*. New York: Routledge, 2017, 12.
[95] Ibid, 12.
[96] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 11.
[97] Greengard, 28.
[98] Ontario, About Ontario.
[99] Ibid.
[100] Ibid.
[101] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 10.

[102] Kratz Harrison. "Maximizing Millennials: The Who, how, and Why of Managing Gen Y." . Accessed September 21, 2017. https://onlinemba.unc.edu/blog/geny-in-the-workplace/.
[103] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 2.
[104] Filion, 444.
[105] Statistics Canada. "The Shift to Smaller Households Over the Past Century." Statistics Canada. Accessed Mar 28, 2018. https://www150.statcan.gc.ca/n1/pub/11-630-x/11-630-x2015008-eng.htm.
[106] Sandow, Erika and Kerstin Westin. *The Persevering Commuter – Duration of Long-Distance Commuting*. Vol. 44 Elsevier, 2010.
doi://doiorg.proxy.lib.uwaterloo.ca/10.1016/j.tra.2010.03.017. http://www.sciencedirect.com.proxy.lib.uwaterloo.ca/science/article/pii/S096585641000056X.
[107] Axisa, Jeffrey J., Darren M. Scott, and K. Bruce Newbold. *Factors Influencing Commute Distance: A Case Study of Toronto's Commuter Shed*. Vol. 24 Elsevier, 2012.
[108] Legrain, 142.
[109] Filion, 131.
[110] Ibid, 143.
[111] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 48.
[112] Ibid, 38.
[113] Beauregard Mario. "Toronto Workers Suffer Longest Commute." *Canadian HR Reporter,* Sep 12, 2011, sec. 24. http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/895978884?accountid=14906.
[114] Sposato, 587.
[115] Llewelyn, Davies Yeang and Great Britain Commission for Architecture and the Built Environment. *Better Places to Work*. London: Thomas Telford, 2005, 13.
[116] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 2.
[117] Ibid, 12.
[118] Ibid, 31.
[119] IndEco, 4.
[120] Ontario, Provincial Policy Statement, 2014, 13.
[121] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 23.
[122] Ontario, Provincial Policy Statement, 2014, 13.
[123] McKeown, 4.
[124] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 3.
[125] Lynch, City Sense and City Design, 41.
[126] McKeown, 1.
[127] Lynch, City Sense and City Design, 40.
[128] Ontario, Provincial Policy Statement, 2014, 16.
[129] Perrotta, 18.
[130] Ibid.
[131] Toronto Public Health. "The Walkable City, Backgrounder." City of Toronto. Accessed Feb 22, 2018. https://www.toronto.ca/wp-content/uploads/2017/10/8e88-TPH-walkable-city-backgrounder.pdf.
[132] Perrotta, v.
[133] Ibid, 2.
[134] Ibid, 7.
[135] Ibid, 10.
[136] Churchill, Winston. House of Commons, October 18, 1943.
[137] Bluyssen, Philomena M., Sabine Janssen, den Brink Van, and Yvonne De Kluizenaar. *Assessment of Wellbeing in an Indoor Office Environment*. Vol. 46 Elsevier, 2011, 1.

[138] Martens, Yuri and Hermen Jan van Ree. *Planning Office Spaces : A Practical Guide for Managers and Designers*. London: Laurence King, 2010, 28.
[139] Grech, 28.
[140] Greengard, 34.
[141] Grech, 143.
[142] Cellan-Jones, Jane Wakefield, Rory. "Tomorrow's Buildings: Is World's Greenest Office Smart?" *BBC News,* Apr 6, 2016. http://www.bbc.com/news/technology-35746647.
[143] Grech, 142.
[144] Belton, Padraig. "How the Tech Industry is Redesigning the Future Workplace." *BBC News,* May 1, 2015. http://www.bbc.com/news/business-32523448.
[145] Cellan-Jones.
[146] Randall, Tom. "The World's Smartest Office Building Knows how You Like Your Coffee." Bloomberg. Accessed September 18, 2017. http://www.bloomberg.com/features/2015-the-edge-the-worlds-greenest-building/.
[147] Cellan-Jones.
[148] Randall.
[149] Cellan-Jones.
[150] Randall.
[151] Cellan-Jones.
[152] Randall.
[153] Brislin, Paul, Gary Lawrence, and Arup Associates. *Unified Design*. Chichester, England: John Wiley & Sons, 2008, 97.
[154] Goldhagen, 55.
[155] Brislin, 100.
[156] Fischer, Gustave Nicolas. *Individuals and Environment : A Psychosocial Approach to Workspace*. Berlin: Walter de Gruyter, 1997, 28.
[157] Goldhagen, Introduction XXX.
[158] Ibid, 85.
[159] Stokols, Daniel. "Environmental Psychology." *Annual Review of Psychology* 29, (1987): 253-295.
[160] Fischer, 27.
[161] Grech, 30.
[162] Goldhagen, 19.
[163] Brislin, 90.
[164] Ibid, 100.
[165] Goldhagen, 70.
[166] Grech, 37.
[167] Fischer, 27.
[168] Ibid, 18.
[169] Doorley, Scott. *Make Space : How to Set the Stage for Creative Collaboration*, edited by Witthoft, Scott. Hoboken, New Jersey: John Wiley & Sons, 2012, 43.
[170] Ibid, 43.
[171] Ibid, 44.
[172] Ibid.
[173] Ibid, 45.
[174] Klerk, Sunica d. "Infographic: The Evolution of the Office." ArchDaily. Accessed September 22, 2017. http://www.archdaily.com/517945/infographic-the-evolution-of-the-office/.
[175] Ibid.
[176] Bluyssen, 1.

[177] Klerk.
[178] Ibid.
[179] Vischer, Jacqueline C. *Towards an Environmental Psychology of Workspace: How People are Affected by Environments for Work*: Architectural Science Review, 2008, 97.
[180] Grech, 10.
[181] Goldhagen, 63.
[182] Belton.
[183] Martens, 23.
[184] Belton.
[185] Morgan, Jacob. "3 Things to Know about Employee Experience." *HRNews* (Mar 8, 2017). http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/1875396146?accountid=14906.
[186] Martens, 23.
[187] Schittich, Christian. *Work Environments : Spatial Concepts, Usage Strategies, Communications*. Munich: Birkhäuser, 2011, 15.
[188] Grech, 147.
[189] Born, Nicholas and Elad Drori. "What Factors Will Transform the Contemporary Work Environment and Characterize the Future of Work?" . Accessed Oct 23, 2017. http://digitalcommons.ilr.cornell.edu/student/78.
[190] Statistics Canada. "Portrait of Canada's Labour Force: National Household Survey, 2011." Minister of Industry. Accessed Nov 21, 2017, 5. http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011002-eng.pdf.
[191] Born.
[192] Schittich, 15.
[193] Klerk.
[194] Belton.
[195] Greengard, 27.
[196] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 2.
[197] Morgan, Jacob. "Evolution of the Organization Pt. 1." The Future Organization. Accessed September 21, 2017. https://thefutureorganization.com/evolution-organization-1/.
[198] Born.
[199] Grech, 28.
[200] Ibid, 29.
[201] Rapoport, Amos. *The Meaning of the Built Environment : A Nonverbal Communication Approach*. Tucson: University of Arizona Press, 1990, 22.
[202] Born.
[203] Fischer, 53.
[204] Grech, 15.
[205] Deasy, C. M. and Thomas E. Lasswell. *Designing Places for People : A Handbook on Human Behavior for Architects, Designers, and Facility Managers*, edited by Lasswell, Thomas E. New York: Whitney Library of Design, 1985, 13.
[206] Vischer, 97.
[207] Deasy, 15.
[208] Grech, 16.
[209] Martens, 25.
[210] Vischer, 97.
[211] Doorley, 40.
[212] Ibid, 42.
[213] Ibid, 42.

[214] Ibid, 43.
[215] Ibid, 55.
[216] Ibid, 56.
[217] Belton.
[218] Morgan, Evolution of the Organization Pt. 1.
[219] Davies, Alice. *The Style of Coworking : Contemporary Shared Workspaces*, edited by Tollervey, Kathryn. Munich: Prestel Verlag, 2013, 7.
[220] Klerk.
[221] Alderman, Liz. "In Sweden, an Experiment Turns Shorter Workdays into Bigger Gains." *The New York Times,* May 20, 2017a. https://www.nytimes.com/2016/05/21/business/international/in-sweden-an-experiment-turns-shorter-workdays-into-bigger-gains.html.
[222] Morgan, Evolution of the Organization Pt. 1.
[223] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 11.
[224] Morgan, Evolution of the Organization Pt. 1.
[225] Morgan, Jacob. "14 Principles of the Future Organization." The Future Organization. Accessed September 20, 2017. https://thefutureorganization.com/14-principles-future-organization/.
[226] Doorley, 51.
[227] Morgan, Evolution of the Organization Pt. 1.
[228] Grech, 11.
[229] Fischer, 28.
[230] Grech, 29.
[231] Ibid.
[232] Schittich, 15.
[233] Vischer, 97.
[234] Dominus, Susan. "Rethinking the Work-Life Equation." *New York Times,* Feb 25, 2016. https://www.nytimes.com/2016/02/28/magazine/rethinking-the-work-life-equation.html.
[235] Ibid.
[236] Davies, 7.
[237] Morgan, 3 Things to Know about Employee Experience.
[238] Martens, 21.
[239] Alderman, Liz. "In Sweden, Happiness in a Shorter Workday Can't Overcome the Cost." *The New York Times,* January 6, 2017b. https://www.nytimes.com/2017/01/06/business/sweden-work-employment-productivity-happiness.html.
[240] Weller, Chris. "Here's Why Amazon's New 30-Hour Workweek is such a Great Idea." Business Insider. Accessed September 14, 2017. http://www.businessinsider.com/amazon-30-hour-workweek-great-2016-8.
[241] Alderman, In Sweden, an Experiment Turns Shorter Workdays Into Bigger Gains.
[242] Weller.
[243] Morgan, 3 Things to Know about Employee Experience.
[244] Belton.
[245] Schittich, 16.
[246] Grech, 11.
[247] Ibid, 10.
[248] Doorley, 38.
[249] Born.
[250] Klerk.
[251] Morgan, 3 Things to Know about Employee Experience.
[252] Belton.

[253] Grech, 10.
[254] Fischer, 55.
[255] OMA. "Axel Springer Campus." OMA. Accessed Feb 12, 2018. http://oma.eu/projects/axel-springer-campus.
[256] Ibid.
[257] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 10.
[258] Advanced, 13.
[259]Legrain, 142.
[260] Goldhagen, Introduction xxxii.
[261] Lindgren.
[262] Llewelyn, 13.
[263] Kelbaugh, Doug. *The Pedestrian Pocket Book : A New Suburban Design Strategy*. New York: Princeton Architectural Press, 1989, 15.
[264] Melcher, 12.
[265] Greengard, 26.
[266] Llewelyn, 13.
[267] Ontario, Provincial Policy Statement, 2014, 15.
[268] Sobel, 12.
[269] Ibid.
[270] IndEco, 6.
[271] Ibid, 50.
[272] Ibid, 6.
[273] Grech, 12.
[274] De Klerk, Eva. "NDSM Shipyard." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/ndsm-werf/.
[275] De Klerk, Eva. "Tours & Talks NDSM." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/rondleiding/.
[276] De Klerk, Eva. "The City as a Framework." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/de-stad-als-casco/.
[277] De Klerk, Eva. "Art City NDSM." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/kunststad/.
[278] Fischer, 28.
[279] Deasy, 28.
[280] Melcher, 15.
[281] Doorley, 38.
[282] WeWork. "WeWork Coworking and Office Space." WeWork. Accessed Nov 28, 2017. https://www.wework.com/.
[283] WeWork. "WeWork Why WeWork? what is WeWork?" WeWork. Accessed Nov 28, 2017. https://www.wework.com/why-wework.
[284] WeWork. "WeWork Mission." WeWork. Accessed Nov 28, 2017. https://www.wework.com/mission.
[285] WeWork. "WeWork Why WeWork? what is WeWork?.
[286] Ibid.
[287] WeWork. "WeWork Richmond Street West." WeWork. Accessed Nov 28, 2017. https://www.wework.com/buildings/richmond-street-west--toronto.
[288] WeWork. "WeWork Coworking in Toronto." WeWork. Accessed Nov 28, 2017. https://www.wework.com/l/toronto.
[289] Borges, Sofia, Sven Ehmann, and Robert Klanten. *Work Scape : New Spaces for New Work*. Berlin: Gestalten, 2013, 222.

[290] Hassell Studio. "ANZ Centre." Hassell Studio. Accessed October 11, 2017. https://www.hassellstudio.com/en/cms-projects/detail/anz-centre.
[291] ArchDaily. "ANZ Centre / Hassell." ArchDaily. Accessed October 11, 2017. http://www.archdaily.com/90709/anz-centre-hassell/.
[292] Lynch, Patrick. "Foster + Partners Designs Lakeside Headquarters for the PGA Tour." ArchDaily. Accessed Feb 12, 2018. https://www.archdaily.com/887420/foster-plus-partners-designs-lakeside-headquarters-for-the-pga-tour.
[293] Foster + Partners. "Foster + Partners Designs the New Global Home of the PGA TOUR." Foster + Partners. Accessed Feb 12, 2018. https://www.fosterandpartners.com/news/archive/2018/01/foster-partners-designs-the-new-global-home-of-the-pga-tour/.
[294] York Region. "OHR Somayach Residential Centre." York Region. Accessed Jun 29, 2018. https://www.york.ca/wps/portal/yorkhome/support/yr/housing/housinglocations/ohrsomayachresidentialcentre/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOI9Hd09PTy8Dbz8TSycDRwN_B29jMwtDFx9zPULsh0VAQEAdhQ!/#.W4ez4i0ZNTZ.
[295] Walk Score. "Clark Ave W and Hilda Ave." Walk Score. Accessed Jun 29, 2018. https://www.walkscore.com/score/clark-ave-w-and-hilda-ave-vaughan-on-canada.
[296] Sobel, 25.
[297] Canadian Society for Exercise Physiology. "Canadian 24-Hour Movement Guidelines: An Integration of Physical Activity, Sedentary Behaviour, and Sleep." Canadian Society for Exercise Physiology. Accessed Mar 28, 2018. http://csepguidelines.ca.
[298] Deasy, 18.
[299] Goldhagen, Introduction xviii.
[300] Ontario, Growth Plan for the Greater Golden Horseshoe 2017, 4.
[301] IndEco, 5.
[302] Kelbaugh, 17.

BIBLIOGRAPHY

Advanced Architecture Contest. *City Sense : Shaping our Environment with Real-Time Data : 4th Advanced Architecture Contest*, edited by Cappelli, Lucas, Institut d'Arquitectura Avançada de Catalunya, organizer of meeting and Institut d'Arquitectura Avançada de Catalunya. Barcelona: Actar, 2012.

Alderman, Liz. "In Sweden, an Experiment Turns Shorter Workdays into Bigger Gains." *The New York Times,* May 20, 2017a. https://www.nytimes.com/2016/05/21/business/international/in-sweden-an-experiment-turns-shorter-workdays-into-bigger-gains.html.

———. "In Sweden, Happiness in a Shorter Workday Can't Overcome the Cost." *The New York Times,* January 6, 2017b. https://www.nytimes.com/2017/01/06/business/sweden-work-employment-productivity-happiness.html.

ArchDaily. "ANZ Centre / Hassell." ArchDaily. Accessed October 11, 2017. http://www.archdaily.com/90709/anz-centre-hassell/.

Axisa, Jeffrey J., Darren M. Scott, and K. Bruce Newbold. *Factors Influencing Commute Distance: A Case Study of Toronto's Commuter Shed*. Vol. 24 Elsevier, 2012.

Barton, Hugh and Marcus Grant. "Urban Planning for Healthy Cities." *Journal of Urban Health* 90, no. S1 (Oct, 2013): 129-141. doi:10.1007/s11524-011-9649-3. http://www.ncbi.nlm.nih.gov/pubmed/22714703.

Beauregard Mario. "Toronto Workers Suffer Longest Commute." *Canadian HR Reporter,* Sep 12, 2011, sec. 24. http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/895978884?accountid=14906.

Bell, Stephanie, Stephanie Gower, Barbara Lachapelle, Christopher Morgan, Kelly Drew, Ronald Macfarlane and Monica Campbell. "Avoiding the TRAP: Traffic Related Air Pollution in Toronto and Options for Reducing Exposure." City of Toronto. Accessed Feb. 22, 2018. https://www.toronto.ca/legdocs/mmis/2017/hl/bgrd/backgroundfile-108070.pdf.

Belton, Padraig. "How the Tech Industry is Redesigning the Future Workplace." *BBC News,* May 1, 2015. http://www.bbc.com/news/business-32523448.

Bluyssen, Philomena M., Sabine Janssen, den Brink Van, and Yvonne De Kluizenaar. *Assessment of Wellbeing in an Indoor Office Environment*. Vol. 46 Elsevier, 2011.

Borges, Sofia, Sven Ehmann, and Robert Klanten. *Work Scape : New Spaces for New Work*. Berlin: Gestalten, 2013.

Born, Nicholas and Elad Drori. "What Factors Will Transform the Contemporary Work Environment and Characterize the Future of Work?" . Accessed Oct 23, 2017. http://digitalcommons.ilr.cornell.edu/student/78.

Brislin, Paul, Gary Lawrence, and Arup Associates. *Unified Design*. Chichester, England: John Wiley & Sons, 2008.

Canadian Society for Exercise Physiology. "Canadian 24-Hour Movement Guidelines: An Integration of

Physical Activity, Sedentary Behaviour, and Sleep." Canadian Society for Exercise Physiology. Accessed Mar 28, 2018. http://csepguidelines.ca.

Cellan-Jones, Jane Wakefield, Rory. "Tomorrow's Buildings: Is World's Greenest Office Smart?" *BBC News,* Apr 6, 2016. http://www.bbc.com/news/technology-35746647.

Davies, Alice. *The Style of Coworking : Contemporary Shared Workspaces*, edited by Tollervey, Kathryn. Munich: Prestel Verlag, 2013.

De Klerk, Eva. "Art City NDSM." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/kunststad/.

———. "The City as a Framework." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/de-stad-als-casco/.

———. "NDSM Shipyard." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/ndsm-werf/.

———. "Tours & Talks NDSM." Eva De Klerk. Accessed Dec 13, 2017. http://www.evadeklerk.com/en/rondleiding/.

Deasy, C. M. and Thomas E. Lasswell. *Designing Places for People : A Handbook on Human Behavior for Architects, Designers, and Facility Managers*, edited by Lasswell, Thomas E. New York: Whitney Library of Design, 1985.

Dominus, Susan. "Rethinking the Work-Life Equation." *New York Times,* Feb 25, 2016. https://www.nytimes.com/2016/02/28/magazine/rethinking-the-work-life-equation.html.

Doorley, Scott. *Make Space : How to Set the Stage for Creative Collaboration*, edited by Witthoft, Scott. Hoboken, New Jersey: John Wiley & Sons, 2012.

Filion, Pierre, Tara Vinodrai, Ryan Christopher Walker, and Markus Moos. *Canadian Cities in Transition : Perspectives for an Urban Age*. 5th ed. Toronto: Oxford University Press, 2015.

Fischer, Gustave Nicolas. *Individuals and Environment : A Psychosocial Approach to Workspace*. Berlin: Walter de Gruyter, 1997.

Foster + Partners. "Foster + Partners Designs the New Global Home of the PGA TOUR." Foster + Partners. Accessed Feb 12, 2018. https://www.fosterandpartners.com/news/archive/2018/01/foster-partners-designs-the-new-global-home-of-the-pga-tour/.

Goldhagen, Sarah Williams. *Welcome to Your World : How the Built Environment Shapes our Lives*. 1st ed. New York: Harper Collins Publishers, 2017.

Grech, Chris and David R. Walters. *Future Office : Design, Practice and Applied Research*. London: Routledge, 2008.

Greengard, Samuel. *The Internet of Things*. Cambridge, Massachusetts: MIT Press, 2015.

Hassell Studio. “ANZ Centre.” Hassell Studio. Accessed October 11, 2017. https://www.hassellstudio.com/en/cms-projects/detail/anz-centre.

IndEco Strategic Consulting Inc., Toronto Public Health, and City of Toronto, Transportation Services. *Road to Health: Improving Walking and Cycling in Toronto*. Toronto: Toronto Public Health, 2012.

Kelbaugh, Doug. *The Pedestrian Pocket Book : A New Suburban Design Strategy*. New York: Princeton Architectural Press, 1989.

Klerk, Sunica d. “Infographic: The Evolution of the Office.” ArchDaily. Accessed September 22, 2017. http://www.archdaily.com/517945/infographic-the-evolution-of-the-office/.

Kratz Harrison. “Maximizing Millennials: The Who, how, and Why of Managing Gen Y.” . Accessed September 21, 2017. https://onlinemba.unc.edu/blog/geny-in-the-workplace/.

Krupat, Edward. *People in Cities : The Urban Environment and its Effects*. Cambridge: Cambridge University Press, 1985.

Legrain, Alexander, Naveen Eluru, and Ahmed M. El-Geneidy. *Am Stressed, must Travel: The Relationship between Mode Choice and Commuting Stress*. Vol. 34 Elsevier, 2015.

Lindgren, April. “Suburban Ring Around Toronto Packs ‘Em In.” *CanWest News,* Mar 14, 2007. http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/461279268?accountid=14906.

Llewelyn, Davies Yeang and Great Britain Commission for Architecture and the Built Environment. *Better Places to Work*. London: Thomas Telford, 2005.

Lynch, Kevin. *City Sense and City Design : Writings and Projects of Kevin Lynch*, edited by Banerjee, Tridib, Michael Southworth. Cambridge, Massachusetts: MIT Press, 1990.

Lynch, Patrick. “Foster + Partners Designs Lakeside Headquarters for the PGA Tour.” ArchDaily. Accessed Feb 12, 2018. https://www.archdaily.com/887420/foster-plus-partners-designs-lakeside-headquarters-for-the-pga-tour.

Martens, Yuri and Hermen Jan van Ree. *Planning Office Spaces : A Practical Guide for Managers and Designers*. London: Laurence King, 2010.

McKeown, David. *Transportation Priorities and Investment for a Healthy Toronto*. Toronto: Medical Officer of Health, 2013.

Melcher, Katherine, Barry Stiefel, and Kristin Faurest. *Community-Built : Art, Construction, Preservation, and Place*. New York: Routledge, 2017.

Morgan, Jacob. “14 Principles of the Future Organization.” The Future Organization. Accessed September 20, 2017. https://thefutureorganization.com/14-principles-future-organization/.

———. “3 Things to Know about Employee Experience.” *HRNews* (Mar 8, 2017). http://search.proquest.com.proxy.lib.uwaterloo.ca/docview/1875396146?accountid=14906.

———. “Evolution of the Organization Pt. 1.” The Future Organization. Accessed September 21, 2017. https://thefutureorganization.com/evolution-organization-1/.

OMA. “Axel Springer Campus.” OMA. Accessed Feb 12, 2018. http://oma.eu/projects/axel-springer-campus.

Ontario. “About Ontario.” Government of Ontario. Accessed Dec 5, 2017. https://www.ontario.ca/page/about-ontario.

———. “Co-Ordinated Land use Planning Review.” Government of Ontario. Accessed Dec 5, 2017. http://www.mah.gov.on.ca/Page10882.aspx.

———. “Growth Plan for the Greater Golden Horseshoe 2017.” Ministry of Municipal Affairs. Accessed November 28, 2017. http://placestogrow.ca/index.php?option=com_content&task=view&id=430&Itemid=14.

———. “Provincial Policy Statement, 2014.” Ministry of Municipal Affairs and Housing. Accessed November 28, 2017. http://www.mah.gov.on.ca/Page10679.aspx#Figure+1.

Perrotta, Kim, Monica Campbell, Shawn Chirrey, Larry Frank and Jim Chapman. “The Walkable City: Neighbourhood Design and Preferences, Travel Choices and Health.” Toronto Public Health. Accessed Feb 22, 2018. https://www.toronto.ca/wp-content/uploads/2017/10/9617-TPH-walkable-city-report.pdf.

Randall, Tom. “The World’s Smartest Office Building Knows how You Like Your Coffee.” Bloomberg. Accessed September 18, 2017. http://www.bloomberg.com/features/2015-the-edge-the-worlds-greenest-building/.

Rapoport, Amos. *The Meaning of the Built Environment : A Nonverbal Communication Approach*. Tucson: University of Arizona Press, 1990.

Sandow, Erika and Kerstin Westin. *The Persevering Commuter – Duration of Long-Distance Commuting*. Vol. 44 Elsevier, 2010.

Schittich, Christian. *Work Environments : Spatial Concepts, Usage Strategies, Communications*. Munich: Birkhäuser, 2011.

Sewell, John. *The Shape of the City : Toronto Struggles with Modern Planning*. Toronto: University of Toronto Press, 1993.

———. *The Shape of the Suburbs Understanding Toronto’s Sprawl*. Toronto: University of Toronto Press, 2009.

Simmins, Geoffrey. “Urban and Regional Planning.” The Canadian Encyclopedia. Accessed May 21, 2018. https://www.thecanadianencyclopedia.ca/en/article/urban-and-regional-planning/.

Sobel, Lee S. *Greyfields into Goldfields : Dead Malls Become Living Neighborhoods*, edited by Greenberg, Ellen, Steven Bodzin and Congress for the New Urbanism. San Francisco: Congress for the New Urbanism, 2002.

Solomon, Lawrence. *Toronto Sprawls a History*. Toronto: University of Toronto Press, 2007.

Sposato, Robert G., Kathrin Röderer, and Renate Cervinka. "The Influence of Control and Related Variables on Commuting Stress." *Transportation Research Part F: Traffic Psychology and Behaviour* 15, no. 5 (May 8, 2012): 581-587. http://www.sciencedirect.com.proxy.lib.uwaterloo.ca/science/article/pii/S1369847812000472.

Statistics Canada. "Commuting to Work: National Household Survey, 2011." Minister of Industry. Accessed Nov 21, 2017. http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011003_1-eng.pdf.

———. "Portrait of Canada's Labour Force: National Household Survey, 2011." Minister of Industry. Accessed Nov 21, 2017. http://www12.statcan.gc.ca/nhs-enm/2011/as-sa/99-012-x/99-012-x2011002-eng.pdf.

———. "The Shift to Smaller Households Over the Past Century." Statistics Canada. Accessed Mar 28, 2018. https://www150.statcan.gc.ca/n1/pub/11-630-x/11-630-x2015008-eng.htm.

Stokols, Daniel. "Environmental Psychology
." *Annual Review of Psychology* 29, (1987): 253-295.

Toronto Public Health. "The Walkable City, Backgrounder." City of Toronto. Accessed Feb 22, 2018. https://www.toronto.ca/wp-content/uploads/2017/10/8e88-TPH-walkable-city-backgrounder.pdf.

Vischer, Jacqueline C. *Towards an Environmental Psychology of Workspace: How People are Affected by Environments for Work*: Architectural Science Review, 2008.

Walk Score. "Clark Ave W and Hilda Ave." Walk Score. Accessed Jun 29, 2018. https://www.walkscore.com/score/clark-ave-w-and-hilda-ave-vaughan-on-canada.

Weller, Chris. "Here's Why Amazon's New 30-Hour Workweek is such a Great Idea." Business Insider. Accessed September 14, 2017. http://www.businessinsider.com/amazon-30-hour-workweek-great-2016-8.

WeWork. "WeWork Coworking and Office Space." WeWork. Accessed Nov 28, 2017. https://www.wework.com/.

———. "WeWork Coworking in Toronto." WeWork. Accessed Nov 28, 2017. https://www.wework.com/l/toronto.

———. "WeWork Mission." WeWork. Accessed Nov 28, 2017. https://www.wework.com/mission.

———. "WeWork Richmond Street West." WeWork. Accessed Nov 28, 2017. https://www.wework.com/buildings/richmond-street-west--toronto.

———. "WeWork Why WeWork? what is WeWork?" WeWork. Accessed Nov 28, 2017. https://www.wework.com/why-wework.

World Health Organization. "Constitution of WHO: Principles." World Health Organization. Accessed Jun 29, 2018. http://www.who.int/about/mission/en/.

York Region. “OHR Somayach Residential Centre.” York Region. Accessed Jun 29, 2018. https://www.york.ca/wps/portal/yorkhome/support/yr/housing/housinglocations/ohrsomayachresidentialcentre/!ut/p/a0/04_Sj9CPykssy0xPLMnMz0vMAfGjzOI9Hd09PTy8Dbz8TSycDRwN_B29jMwtDFx9zPULsh-0VAQEAdhQ!/#.W4ez4i0ZNTZ.