

**Environ(mental) Architecture: How Architecture Shapes Our Mental Health
Through the Use of Public Space**

by

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ABSTRACT

This thesis examines the potential of architecture to improve mental health through the design of public space. To determine the programmatic needs of a site, this document uses a human perception framework to analyze the existing street conditions. This creates a built environment that allows for improved mental well-being of the public through positive social interactions.

By implementing a design tool kit, this project aims to support the architectural process of creating public space that promotes positive well-being in an urban community. This examination will be three-fold: through human-focused design rather than object-making design, the restorative benefits through the integration of nature, and the sensorial qualities of architecture in its material and formal composition.

This research develops a programmatic system that promotes positive social interaction through the design of a public square in Halifax, Nova Scotia.

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CHAPTER 1: INTRODUCTION

Thesis Outline

This thesis will explore the impact of the built environment on well-being through the design of public space. This project will use the social characteristics and needs of those suffering from mood and anxiety disorders to define and measure well-being. Those suffering from mood and anxiety disorders represent a group of the most socially vulnerable population. Using their needs as the criteria for design, this thesis aims to promote architecture that focuses on the well-being of all its users, beginning with its most vulnerable. As Mahatma Gandhi famously said “A nation’s greatness is measured by how it treats its weakest members.” This thesis will focus on three primary design principles to promote well-being for users within a public sphere: anthropocentric, biophilic, and sensory design. Focusing on the human experience of architecture through these elements, this thesis will explore how architecture can promote positive social interactions for all users by exploring the needs of those most vulnerable in public spaces.

This thesis uses mood and anxiety disorders as the catalyst for understanding the effects of social situations on one’s well-being, as people with these disorders are greatly impacted by social interactions and public spaces. Though there is a growing awareness about mental illness, many people continue to live in silence about their mental health issues. Those suffering from mood and anxiety disorders are greatly impacted by their illness everyday, with 35% reporting they are unable to continue working and 27% reporting some form of removal from their social environment (Government of Canada 2016).

It is important for architects to understand the significance of architecture on mental health, as architects play a role in shaping both the physical and mental world of their users. With current rates of city development and growth, the role of the architect is more apparent than ever. With more than 50% of the world population living in urban areas (which is expected to increase to 66% by 2050), it is important to understand the effects of urban development on mental health (United Nation 2014).

It is therefore imperative that this design process begins from a human-focused design approach to architecture, rather than an object-making approach. With the user’s well-being as the forefront of all design decisions, this thesis will explore several aspects of anthropocentric design to create public spaces that promote well-being through a thorough understanding of social behavioural characteristics.

With an increase in density of the built environment, the amount and variety of nature is often left to suffer. Neurological research shows that nature can have a large impact on one's physical and mental well-being. This thesis will examine the effects of nature on mental health through its ability to promote restoration and strengthen social relationships. Further, it will examine how this can be integrated into architecture through the biophilic design of both landscape and imitation of nature in architecture.

The perception of space has many factors and although everyone has their own personal lens in which they view the world, humans as a species generally perceive their built environment in a similar way. By analyzing the sensorial properties of architecture – through touch, sight, sound and smell – this thesis will explore the application of these elements in architectural design. This will serve to improve personal perception of space through natural and artificial application of light, material and form.

These design principles can be applied to an architectural project of varying scales. For the purpose of this thesis, these principles will be applied to Gottingen Street in Halifax, Nova Scotia. The street itself is an important public architectural element that becomes the canvas for the application of these theories. Using the principles of space (as place of movement, rest or gathering), with the basic architectural elements of form (floor, wall and roof) and programmatic function (necessary, optional and social), this design framework will suggest a kit of parts for designing architectural interventions in public spaces. This thesis will explore how public architecture can be used to reconnect the fabric of a street in a way that promotes positive social interactions through a focus on designing for mental well-being.

Mental Health

1 in 10 Canadians over the age of 18 identify as having a mood and/or anxiety disorder (Government of Canada 2016). Through the examination of research and architectural theories on environmental psychology, this thesis will categorize the needs and effects of architecture on well-being. This qualitative research will create a framework for understanding how architects can use public spaces to promote positive social interactions to strengthen the collective mental health of the community.

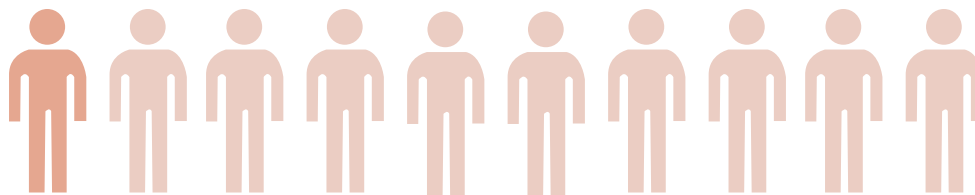


Figure 1.1 : Prevalence of Mental Health Disorders in Canada
1 in 10 Canadians aged 18+ report having a mood and/or anxiety disorder (Government of Canada 2016).

Defining Mental Health

The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) defines mental disorders as a manifestation of a behavioural, psychological or biological dysfunction in an individual. This may be in the form of distress (painful symptoms) or disability (impairment in one or more important areas of function) (American Psychological Association 2013, 20).

Mood disorders are characterized by the extreme lowering or elevation of a person's mood. 50% of people who have an episode of major depression will experience a recurrence. Though there is no single cause of mood disorders, severe stress greatly increases the likelihood of an initial episode. A common form of mood disorder is seasonal affective disorder (SAD). SAD meets the same criteria as general mood disorders; however its reoccurrence is specific to the time of year (typically during winter) and is lessened or nonexistent during the remainder of the year. Due to Canada's latitude and lack of sunlight during the winter months, many people suffer from undiagnosed forms of SAD. This makes designing for well-being even more significant in northern countries such as Canada, where many people experience mild to severe swings in mood (American Psychological Association 2013, 160-1).

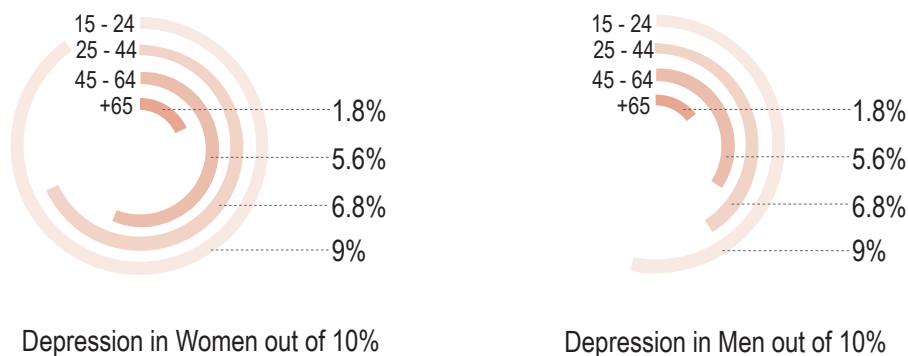


Figure 1.2 : Prevalence of Depression in Canada by Age Demographic
Depression is twice as high in women than in men (Government of Canada 2016).

Mood Disorders

are characterized by the lowering or elevation of a person's mood. Mood disorders have no single cause, 50% of individuals who have an episode of major depression experience a recurrence. Stress can predispose individuals for an initial episode.

Anxiety Disorders

are characterized by excessive and persistent feelings of nervousness, anxiety, and even fear. People worry excessively about ordinary, everyday situations. People often expect the worst to happen even when there is no evidence that it will.

Major Depressive Disorder

Five (or more) of the following symptoms (nearly every day)

1. Depressed mood
2. Diminished interest or pleasure in most activities
3. Significant weight loss or gain
4. Insomnia or hypersomnia
5. Psychomotor agitation or retardation
6. Fatigue or loss of energy
7. Feelings of worthlessness or excessive or inappropriate guilt
8. Diminished ability to think or concentrate, or indecisiveness
9. Recurrent thoughts of death or suicidal ideation
10. Distress/impairment in social or occupational areas
11. Not attributable to the physiological effects of a substance or other medical condition

Social Anxiety Disorder

- A. Marked fear or anxiety about one or more social situations
- B. Fear or showing anxious symptoms and being negatively evaluated for them
- C. Social situations almost always provoke fear or anxiety
- D. Social situations are avoided or endured with intense fear
- E. Fear and anxiety is out of proportion to the actual threat
- F. Fear, anxiety or avoidance lasts more than six months
- G. Distress or impairment in social, occupational areas
- H. Not attributable to the physiological effects of a substance or other medical condition
- I. Symptoms are not better explained by the symptoms of another mental disorder

Seasonal Affective Disorder (SAD)

Is characterized as a recurrent major depressive disorder that occurs at a specific time of year (typically winter season) but is lessened during other times of the year.

Generalized Anxiety Disorder

Is characterized by excessive anxiety and worry about a number of events or activities. The intensity, duration or frequency of the anxiety and worry is out of proportion to the actual likelihood or impact of the anticipated event.

Agoraphobia

Is characterized by excessive fear or anxiety about two or more: using public transportation, being in open spaces, being in enclosed places, standing in line or being in a crowd, being outside of the home alone.

Figure 1.3 : Definitions from the Diagnostic and Statistical Manual of Mental Disorders (American Psychological Association 2013, 160-1 & 202-3).

Anxiety disorders are characterized by excessive and persistent feelings of nervousness, anxiety and even fear. People suffering from anxiety disorders worry excessively about ordinary, everyday situations making day-to-day tasks difficult to complete (American Psychological Association 2013, 202-3).

Mental health is part of psychological well-being, but how do we define “well-being”? The term well-being elicits varying feelings and thoughts depending on the needs and expectations of the individual and therefore designing for well-being becomes a difficult thing to navigate. For this reason, this thesis will be using mood and anxiety disorders as the catalyst for understanding the effects of social situations on one’s well-being.

Statistics

Mental health disorders affect a large percentage of the Canadian population. Roughly 3.5 million Canadians use health services specifically for mood and/or anxiety disorders. Though there is little data on the rates of mood and/or anxiety disorders in those under 18; 70% of those with existing mood and/or anxiety disorder report that the symptoms began in childhood. It is also most common that the symptoms and diagnosis will persist into old age. Rates of mental illness among adults aged 70 - 89 are projected to be higher than any other age group by 2041. These statistics outline the impact of mental illness on all age groups, as well as the potential effect mental health issues could have on the health care system. 50% of individuals suffering from mental illness require some form of job modification to continue working, while 35% report having to stop working altogether due to their illness. This accounts for more than six billion dollars in lost productivity costs, paired with the strain on mental health services throughout the lifetime of each individual (Mental Health Commission of Canada 2012).

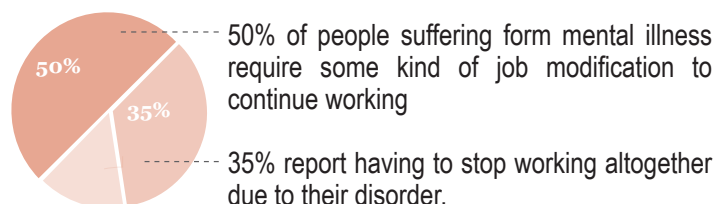


Figure 1.4 : Impact of Mental Health on Job Modification
Mental health problems and illness account for more than six billion dollars in lost productivity costs (Mental Health Commission of Canada 2012).

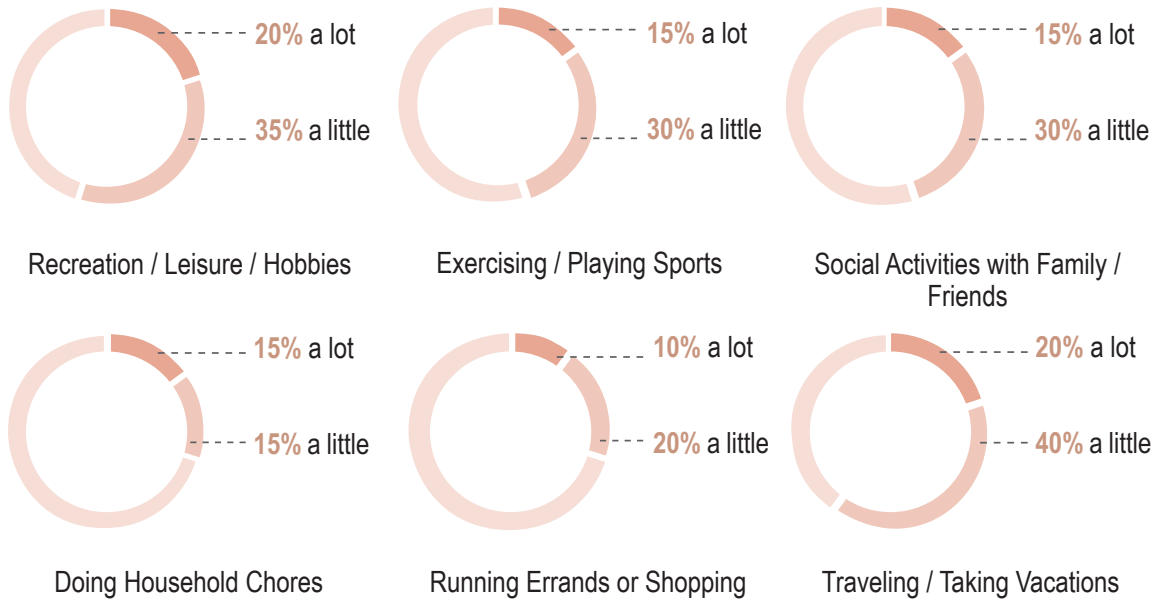


Figure 1.5 : Level of Difficulty Experienced with Basic Activities (Mental Health Commission of Canada 2012).

Role of the City

With more than 50% of the world population living in urban areas (which is expected to increase to 66% by 2050), it is important to understand the effects of urban development on mental health (United Nations 2014). This is especially true in Canada where roughly 80% of the Canadian population lives in urban areas. With more people moving to city centers the need for architectural development is increasing drastically, this increase in population density often results in a decrease to the well-being of the general population.

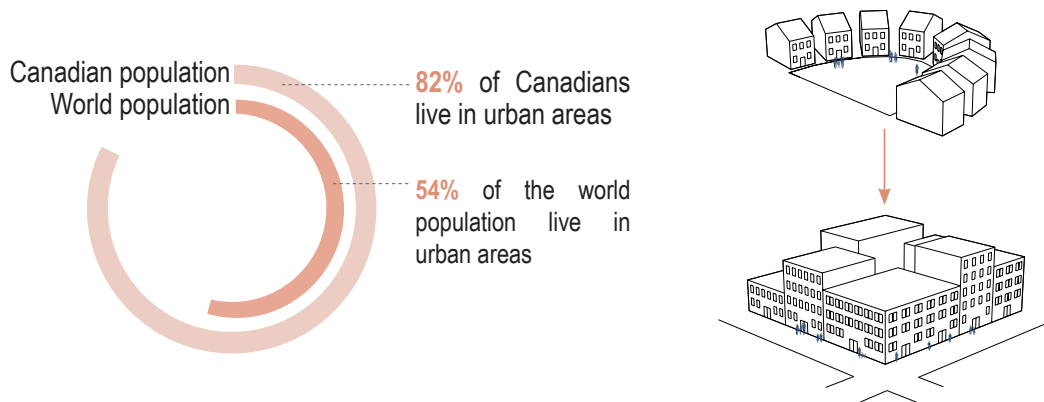


Figure 1.6 : Population Percentage in Urban Areas

More than 50% of the worlds population currently lives in urban areas (United Nations 2014). Based on data collected from 20 different studies since 1985, it was found that mood and anxiety disorders were significantly higher in urban areas compared with rural areas (Peen et al. 2010, 84-93).

There are many variables to consider in determining the effects of one's habitat on their mental health, such as access to medical facilities, cultural variations and general size and density of one urban city relative to another. Typically, urban centers have higher rates of social problems and environmental stressors. Cities with high population densities statistically have higher rates of crime, mortality, social isolation, air pollution and noise. High rates of crime have been linked to an increased sense of physical and emotional vulnerability. These personal discomforts have been linked to mental distress and, therefore, mood and anxiety disorders. Though the exact connection is still unclear, these social issues are often connected to higher rates of psychiatric disorders (Freeman 1978, 113-24).

Since 1985, there have been 20 population survey studies completed on the differences between urban and rural areas. In 2010, Peen et al. (84-93) completed a meta-analysis (a statistical analysis that combines the results of multiple scientific studies) of 20 population survey studies. Using a pooled odds ratio (determines the odds that an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of that exposure) to calculate for the total prevalence of psychiatric disorders (specifically for mood, anxiety and substance use disorders) in urban versus rural environments. Based on the pooled odds ratio, mood and anxiety disorders were found to be significantly higher in urban areas compared with rural areas. Though only 3 of the 20 population studies used came from Canadian research and data, these findings prove that the issue of mental health problems in urban environments is common in many countries, thus decreasing the 'cultural' impact on urban dwelling and mental health disorders. This larger sample size also decreases the potential for miscalculation of the data.

Though the exact connection between urban dwelling and mental health disorders is still unclear, there is significant research and data to conclude that it is important to consider the impacts of living within an urban area on one's well-being. It is therefore important for architects to consider the impact of the urban atmosphere on its inhabitants, and the role that architects play on creating and improving these spaces for the users. With a better understanding of how our urban environment shapes the well-being of its inhabitants, the following chapters will be examining how a human-focused design approach to architecture can teach us about designing in the urban context. This will be examined through emphasis on nature in biophilic design and human sensory perception of material and formal composition.

CHAPTER 2: DESIGN PRINCIPLES

Anthropocentric Design

Anthropocentric design is defined as human-focused architecture rather than object-making architecture. Human beings are social creatures and are thus greatly impacted by those around them. The social and cultural norms of an individual greatly influence their perception of those around them, as well as dictating their behaviours in varying social situations. Through the study of social psychology these actions and reactions have been quantified to better understand how architects can design public spaces to benefit the behavioural needs of their users.

Those suffering from mood and anxiety disorders are particularly sensitive to social interactions, especially in the public sphere. This chapter will be examining social behaviour through the study of proxemics, social environmental stressors, as well as crowding versus density, to better understand how architects can use design to reduce social anxieties and promote positive social interactions in public space.

Rules of Proxemics

Proxemics is the study of how people organize their social space. More commonly referred to as “personal space”, the rules of proxemics explore the social and physical factors that influence one’s behavior in an attempt to maintain personal comfort (Ellard 2015, 132).

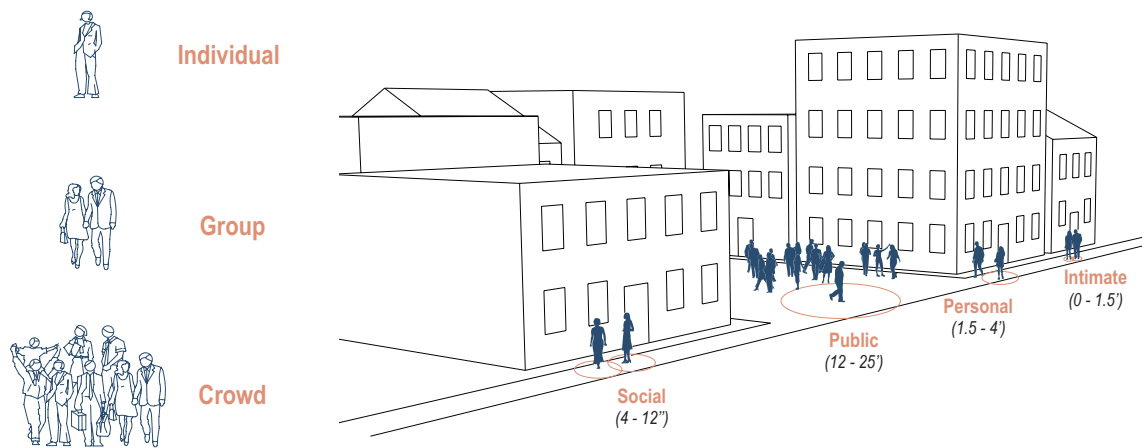


Figure 2.1 : Rules of Proxemics

Edward Hall's "Hidden Dimensions" (1969, 8) outlines Four Spatial Zones: *intimate*, *personal*, *social* and *public*. *Intimate distance* (0 – 1.5 feet apart) describes when the presence of another individual is unmistakable, there is physical contact or a high probability that physical contact may occur. As the name suggests, the zone of *intimate distance* is best reserved for close relationships between two or more individuals or when program influences social norms, such as on a busy bus or in a nightclub. *Personal distance* (1.5 – 4 feet apart) also known as one's personal "bubble", is the space one tries to maintain between oneself and others. This distance is easily visualized and generally understood between individuals as it is commonly referred to as keeping someone at "arms length". *Social distance* (4 – 12 feet apart) is the distance at which talking is still possible but visual detail in the face is not perceived – people are not touching and don't expect to. *Public distance* (12 - 25 feet apart) is the distance at which people move around those that they do not know and don't intend on communicating with. This zone of distance can be best represented in the situation of choosing a picnic spot amongst others in a park. One would pick a spot far enough away at which the other groups conversation can not clearly be overheard, providing a sense of anonymity in a social setting.

One's perception of space will influence how long one will stay and how often one will return. Keeping the Four Spatial Zones in mind while design public space can ensure that the proper intentions of a space will meet the corresponding social expectations. For example, a bench intended for two people could be 3.5 feet wide, giving each person 18" (the typical width of a chair) leaving 5" between the two individuals. If the two individuals are well-acquainted this bench would be well-enjoyed, however if the two individuals are strangers and don't wish to interact with one another then this bench would be socially uncomfortable, most likely causing one to leave or the second not to join in the first place.

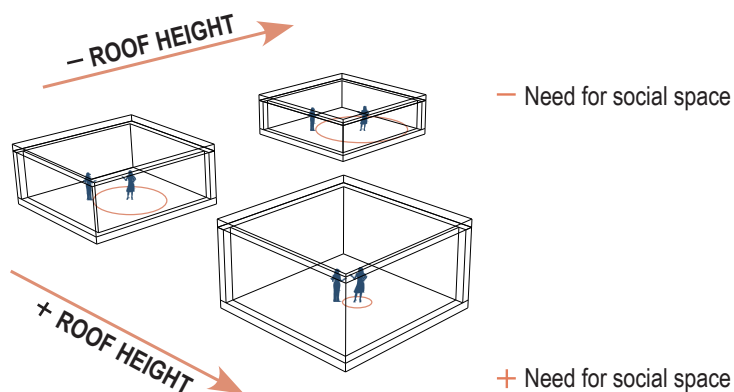


Figure 2.1 : Distance of Separation

The higher the roof in a space the less distance is perceived to be needed between individuals that are engaged in conversation/interaction (Cochran and Urbanczyk 1982, 137-40).

Architecture adds another layer to understanding proxemics, as it influences the perception of space to the user through the volume of space, by both the boundaries created by walls and the depth created by ceilings. Research by Cochran and Urbanczyk (1982, 137-40) were interested in the effects of ceiling heights on the amount of personal space needed during social interactions. Their research found that as the distance between the ceiling and the top of one's head decreases, the desire for more personal space between individuals increases. This research illustrates the importance of thinking of proxemics when designing public space to promote positive social interactions through the anticipation of social behaviour.

Environmental and social behaviours are the product of underlying cultural values and rules that govern how people will typically interact in social situations. A driving component of this is Social Territories, which Altman (1975, 124-5) outlines in three categories: *primary*, *secondary* and *public*. *Primary territories* are occupied by a permanent individual or group, this space is "off-limits" to those that are not part of the group. An example of this would be the teacher's lounge in a school which is off-limits to students, or the kitchen of a restaurant which is off-limits to customers. *Secondary territories* are spaces that are often occupied by a single individual or group but is still open to others. An example of this would be a bar where the regulars make up the day-to-day occupants, but new visitors are still welcome to join. *Public territories* are places that are occupied by any individual or group for short periods of time and may not be on a set or regular schedule, such as public parks, libraries or benches. Though a building may be open to the public, not all aspects of the building are always open to everyone. Due to inherent social constructs that encourage people to avoid places that appear off-limits or private, the clearer a buildings *primary*, *secondary* and *public social territories* are delineated, the more a building will be used.

The rules of proxemics attempt to take into account all of the environmental and social rules, to better understand how people situated themselves in relation to others and their surroundings. Understanding these rules can help architects during the design process to create buildings that promote positive social interactions to improve the mental well-being of the public.

FIVE CATEGORIES OF SOCIAL ENVIRONMENTAL STRESSORS



Physical Threats



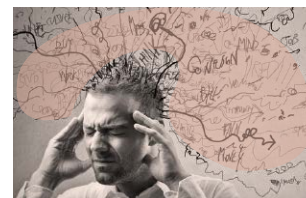
Overstimulation



Over "Demandingness"



Stimulus Deprivation



Distracting Stimuli

Figure 2.2 : Susan Saegert Five Categories of Social Environmental Stressors (1976, 218-23)
 Physical Threats - China's Jilin city, photographed by Sun Xin (Shields and Hecimovic 2019)
 Overstimulation - Times Square, photographed by Michael Grimm (Warekar 2017)
 Over "Demandingness" - Richelieu Stair, Odessa, Russia, i.e., Ukraine (Library of Congress 1890)
 Stimulus Deprivation - Through the Woods, photograph by Sebastian Zapata (C G Record 2017)
 Distracting Stimuli - Person Over Thinking Things (Nikunj Ji 2015)

Social Environmental Stressors

Social environmental stress is the stress created from being around other people in social situations. All social situations have a level of social environmental stress, but it depends on the relationships, actions and perceived intentions of others that determines how much stress will be perceived by the occupant. For most people social situations create little-to-no stress, however just the thought of being in a social situation is enough to cause discomfort and stress for those suffering from mood and/or anxiety disorders (Halpern 1995, 70).

Susan Saegert (1976, 218-23) breaks stress-inducing qualities of the environment into five categories: *physical threats*, *overstimulation*, *distracting stimuli*, *over "demandingness"* and *stimulus deprivation*.

Physical threats refer to exposure to extreme weather conditions such as extreme cold, heat, wind, rain or snow. Research by Griffitt, Veitch and Lanzetta (1971, 92-8) measured human interpersonal affective behaviour (how people perceive others, i.e. how much they like or dislike someone new) under high and low population density and high and low temperatures. Their research found that extreme temperature and high density resulted in the most negative interactions with others.

As previously mentioned, an increase of competing stimuli can easily become overbearing to one's cognitive processing, leading to *overstimulation*. This can be broken down into three forms: *stimulus, information or decision overload*. *Stimulus overload* is the result of intense, surprising or complex stimuli that is competing for one's attention. *Information overload* is the result of constant long-term exposure to important social and/or physical cues from one's environment, that may affect the behaviour or actions of the individual. *Decision overload* is the result of confounding information that clashes or interferes with existing plans, social constructs or expectations of one's environment. New York's Times Square is one of the best-known places of *overstimulation*. The flashing billboards and advertisements all competing to gain your attention creates *stimulus overload*. The large groups of people and cars all trying to move through the small and confusing space causes *information overload*. Deciding which way to go causes a *decision overload* as you attempt to manoeuvre through the crowd, street performers and honking cars.

Similar to *stimulus overload* is *distracting stimuli*, which refers to the extraneous stimuli that competes with one's current action or activity by pulling one's attention away from their current task. This could be a distracting TV at a restaurant while trying to have an important conversation with a friend or difficulty finding the kitchen utensils in a poorly laid out department store.

Over "*demandingness*" is the needed amount of attention, effort and resources to engage with the physical environment. This can be more than just a cognitive effort but can include physical, monetary or temporal demands. An example of this could be the difficulty of maintaining a conversation, while simultaneously walking up a steep set of stairs, as it requires both your attention not to trip on the steps, as well as your physical focus to ensure proper breathing during this strenuous exercise.

Unlike the other forms of stress, *stimulus deprivation* is the absence or lowering of sensory input, this causes decreased activity which can lead to hyper-excitability or stress from the lack of cognitive function. An example of this could be the feeling of boredom or a perceived slowing of time while driving on a empty country road.

Being able to define and categorize social environmental stressors will help in the design process of architecture, by minimizing the negative effects of the built environment on those vulnerable to social interactions within the public sphere.

Crowding versus Density

Another major form of social environmental stress is crowding. Though crowding is a subjective perception, density is an objective form of measuring the number of people per square area. There are two forms of density: *spatial density* and *social density*. *Spatial density* is when the number of occupants remains the same while the available space is decreased. *Social density* is when the amount of space remains the same and the number of occupants increases (Halpern 1995, 70).

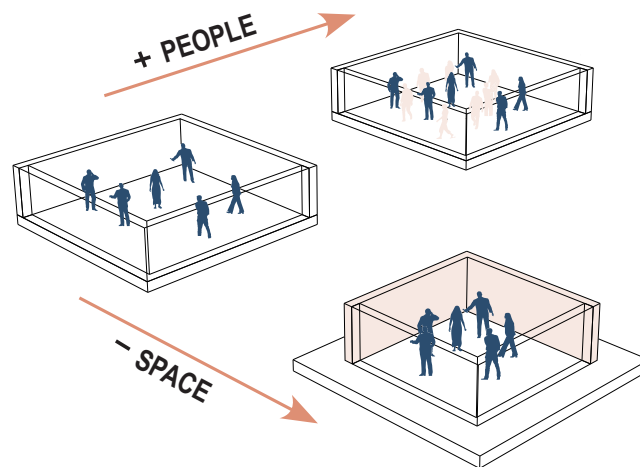


Figure 2.3 : Social Density versus Spatial Density

Animal research on crowding by Calhoun in 1973 found some alarming results in their research of animals who experience severe overcrowding. For their research, Calhoun placed several rats in a safe enclosure free from predators and with access to food and water. While the population quickly increased, as was expected, once the population grew too large and overcrowding became apparent, there were increased rates of disease, behavioural disturbances and infant mortality. The test was repeated several times. In one case the population eventually became extinct after the stress of overcrowding resulted in such adverse effects to the population that no future births were successful. Since all external factors (climate, access to food and water) were controlled, the only variable that could have caused these severe effects was the overcrowding of the rat population. Though the inability to procreate had the most detrimental effect on the survival of the group, many rats showed some form of behavioural disturbances, most commonly as self-destructive behaviours (Halpern 1995, 70-89). This behavioural change gives a startling insight into the potentially damaging effects of overcrowding in humans. By focusing on design elements that alleviate the sense of spatial and social density, architecture can prevent the adverse effects of crowding within public space.

Though most people may notice when a space begins to feel crowded and some may even feel the sense of stress or anxiety that ensues, those suffering from mood and/or anxiety disorders can feel anxious simply from thinking about being in a crowded space. Many studies have been conducted to better understand the behavioural responses to crowding. The most common results show that people tend to (a) withdraw from those around them due to an increased sensitivity to others or (b) have negative interpersonal affect behaviours (this is observed from decreased personal connection to others, i.e. making less eye contact and avoidance of physical contact). Though this is the direct response to crowding, similar results were found when individuals were told to expect a large crowd when entering a lecture hall. A study by Baum and Greenberg (1975, 671-9) found that when individuals were told to expect crowding, their behaviours reflected those in crowded situations. As a result of expecting the room to become crowded, the individuals would more often chose isolated seating positions, particularly in corners or against walls rather than in the centre. They avoided contact with others – looking less at the door to see who was entering, avoiding eye contact, or engaging less with those around them. When both groups were asked to rate the amount of crowding in the space, those that were told to expect crowding reported the space to be more crowded than those told nothing. These behavioural changes, that occur as the result of the expectation for crowding, are very important when designing public social spaces that are commonly associated with crowds.

A large factor in crowd-induced stress is the importance of subjective control – one's ability to have control over the situation that they are in. One largely governing factor of this control is described by psychologists as internal or external locus of control. Those with internal locus believe that they can influence surrounding events and therefore their outcomes, while those with external locus tend to blame outside forces for controlling their responses and reactions. Neuropsychological research shows that those suffering from social anxiety have less internal locus of control than most individuals (Halpern 1995, 109). It is important for architects to understand the potential psychological limitations of the building's occupants, so they can design spaces that ensure the occupant's comfort by increasing their sense of personal control in the event of social environmental stressors.

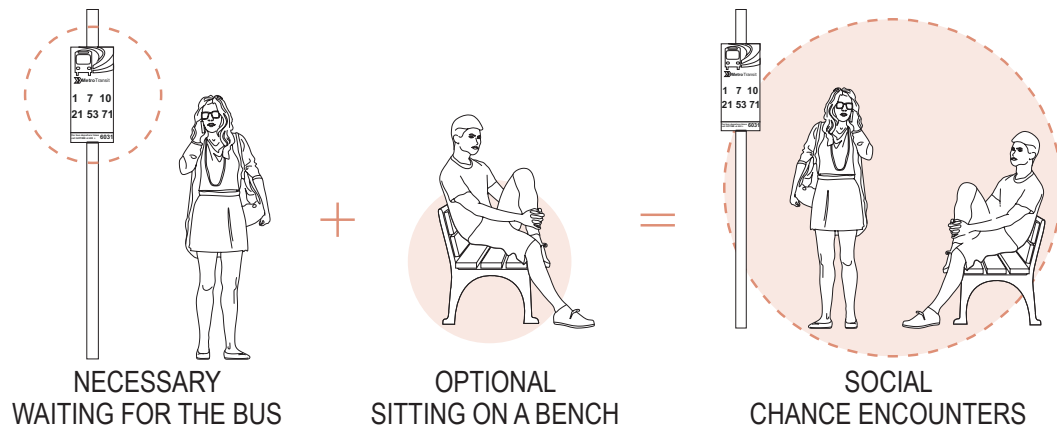


Figure 2 .4 : Three Types of Outdoor Activities

Three Types of Outdoor Activities

As previously discussed, those suffering from mood and/or anxiety disorders have trouble completing day-to-day tasks, especially those that are in the public and social realm. This thesis will explore Jan Gehl's (1987, 11-15) Three Categories for Defining Outdoor Activities to understand and categorize activities based on the demand of the physical environment. Gehl's three categories will create a foundational understanding of outdoor activities in relation to designing public spaces that promote positive social interactions. Gehl's three categories include *necessary*, *optional* and *social activities*.

Necessary activities are described as compulsory activities, such as going to school or work, running errands, or shopping. These are everyday activities that would take place throughout the year, though they are influenced by the changing of the seasons, they are still necessary for day-to-day life (Gehl 1987, 11).

Optional activities are greatly influenced by external conditions – when weather and place invite them. This includes running or walking for fresh air, sitting to enjoy a view, or sunbathing. The range of *optional activities* that take place are greatly impacted by the quality of the surrounding environment, and therefore can change drastically during different times of year or under spontaneous physical change, such as new construction or extreme weather changes (Gehl 1987, 11-3).

Social activities are dependant on the presence of others in public spaces, such as children playing, greetings and conversations or, most commonly, passive contact – that is simply seeing and hearing other people. These activities can also be described as resultant activities, since they evolve from

activities linked by the other two activity categories. There are social interactions that emerge from people being in the same space, meeting, passing by, or being within view of others. The degree of social interaction that arises from *social activities* is the product of what and how people are being brought together, in other words, the quality of the *necessary* and *optional activities* in the public space. Understanding how *social activities* will arise, depending on the context of the activity, is an important element for designing public space with the intention to help those suffering from mental health issues (Gehl 1987, 14-5).

Understanding the relationship of *necessary*, *optional* and *social activities* to one another within a public space, such as along a street, one can see how interconnected these activities are. Gehl (1987, 16) describes life between buildings as “comprise[ing] the entire spectrum of activities, which combine to make communal spaces in cities and residential areas meaningful and attractive”. Gehl believes that though the *necessary* and *optional activities* have been examined thoroughly over the years in a variety of contexts, it is the role of the *social activities* to weave together all activities into one connected network that has been overlooked (1987, 16).

By combining the psychological understanding of human social behaviour and Gehl’s categories of outdoor activities, this thesis will focus on designing social spaces that promote positive social interaction within the public sphere. This will be demonstrated through the cross programming of *necessary* and *optional activities*, to create new social opportunities that may previously have seemed unattainable to those suffering from mood and/or anxiety disorders.

Biophilic Design

Nature evokes in us feelings of beauty, joy, spontaneity and creativity. This return to our wild sides, seems essential for realizing our full potential (Hester 2006, 305).

Role of Nature

With the majority of Canadians living in urban communities and the density of cities increasing, the amount and quality of green space that one has access to is decreasing. Though city developers are concerned with preserving urban green space, the demand for large-scale inner-city housing and other services is focused more on creating low-cost housing that maximizes the number of units per square foot. As a result, urban green space is often forgotten about or given little priority (Groenewegen et al. 2012, 997). As previously mentioned, there is a clear link between access to

nature and increased well-being and as such, green spaces need to be designed with biodiversity and cyclical changes of the environment in mind. A strong sense of biodiversity is achieved through varying types/size of trees, time of year for fruit production, as well as varying foliage colour throughout the year. The variety of flora increases the diversity of local fauna, as well as creates positive visual variation that can create strong feelings of restoration and relaxation.

Cognitive Benefits of Interacting with Nature

For most people, being outdoors and in contact with nature can be a rewarding experience, alleviating feelings of stress and mental fatigue. But why is this? Research in cognitive psychology (Berman, Jonides and Kaplan 2008, 1207) has termed the restoring of cognitive function as the Attention Restoration Theory (ART). ART separates attention into two components: *involuntary attention* (where attention is captured by inherently intriguing or important stimuli) and *directed attention* (where attention is directed by cognitive control). As previously discussed, there are five types of social environmental stressors: *physical threats, overstimulation, distracting stimuli, over “demandingness”* and *stimulus deprivation*. The ability to ignore these stressors uses *directed attention* and overuse of one’s *directed attention* can lead to feelings of stress or mental fatigue.

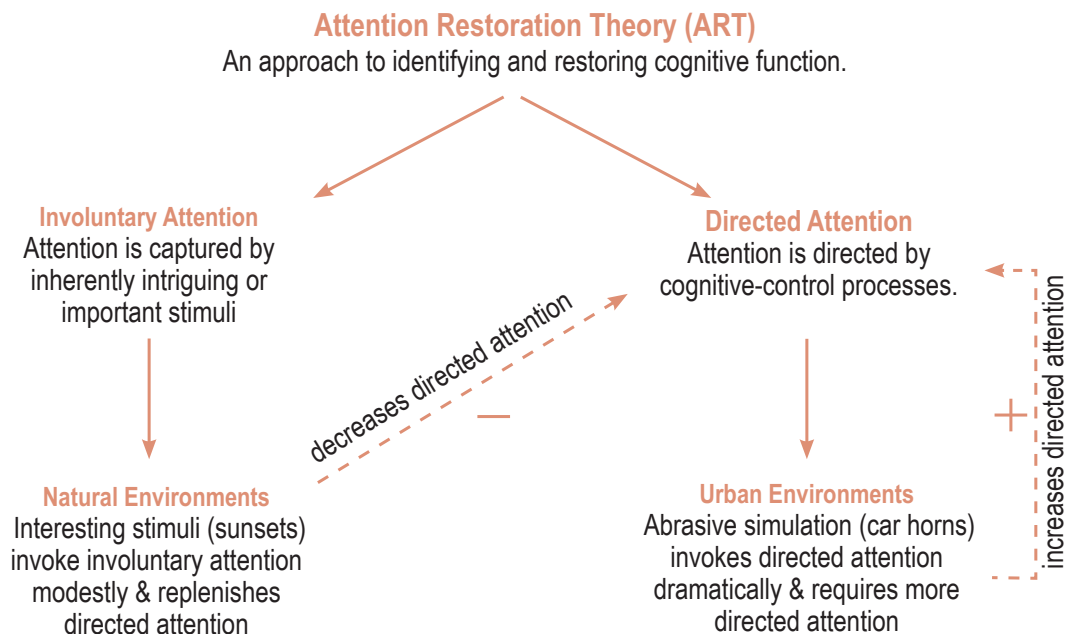


Figure 2.2 : Attention Restoration Theory (ART)

Viewing natural environments uses involuntary attention which allows directed attention a chance to restore, which creates a feeling of relaxation and restoration to one’s mental state (Berman, Jonides and Kaplan 2008, 1207).

ART describes restoration as the recovery of *directed attention* (Berman, Jonides and Kaplan 2008, 1207). Natural environments with intriguing stimuli (a sunset over the mountains) use involuntary attention allowing *directed attention* a chance to replenish or rest, creating a feeling of relaxation and invigoration to one's mental state. Whereas urban environments have distracting stimuli (cars honking) that dramatically capture one's attention, requiring additional *directed attention* to overcome this disruption from one's task. Urban environments are high in environmental stressors and therefore require more *directed attention* than natural environments. The ability to decrease the use of *directed attention* plays an important role in successful cognitive and emotional function. Research in ART also shows that a decrease in *directed attention* from natural environments can improve short-term memory and tasks that require an increase in *directed attention* (Berman, Jonides and Kaplan 2008, 1207). This research is important as it quantifies the benefits of the natural environment on cognitive function and reminds architects of the importance and possibility of creating built environments that provide a sense of calm through decreasing *directed attention*.

Since the development of this theory in the late 1900s, many psychologists have worked to determine further application of this theory within the modern urban city. Research by Groenewegen et al., in 2012 (1997), concluded that this restorative feature of nature may be due to evolutionary responses to natural settings that are safe and favourable to one's well-being and therefore survival. This research also examined the amount of nature required to create these positive benefits finding that "micro-restorations" are even possible from viewing nature from a window. These "micro-restorations" can help replenish directed attention and build resilience against stress. Research in stress recovery found that viewing images or videos of natural environments can lead to faster recovery times than viewing images or videos of the built environment.

Architecture has the opportunity to increase involuntary attention through the integration of nature with the design of public spaces. For example, a busy street could use trees to block sound and sight stimulation of traffic by creating a visual and auditorily boundary between pedestrians and the cars on the street. Another potential for architects would be through the choice of material and form of the building to mimic local natural materials and elements of nature. It is therefore the role of the architect to consider how nature can be integrated into the design process to create the maximum benefit for its users.

Social Benefits of Interacting with Nature

Green space plays an important role in creating a sense of community and promoting positive social interactions with others. Research by Groenewegen et al, (2012, 997-8) found that greenspace can increase the feeling of integration within a community as it increases opportunities to meet and create social ties to one's neighbours. Their research on mental health rates among individuals living in urban areas found that those with limited access to greenspace (within a 1 km radius of their home) had higher incidences of anxiety and depression than those that had access to large amounts of greenspace. Those with larger amounts of greenspace also noted lower rates of loneliness and felt a strong sense of social support in their neighbourhood. A sense of community or belonging helps create a stronger social network that helps decrease feelings of loneliness, which is a leading factor in decreased mental well-being.

A study in 1997 by Coley, Kuo and Sullivan (468) examined the effects of natural influences (trees) on the use of outdoor public space in two Chicago public housing developments. Through observational data collection the researchers found that natural landscaping encourages greater use of outdoor public space, in particular public spaces with trees attracted more people, more frequently. The data further showed that dense groupings of trees (five or more), and those that were located close to public buildings, attracted larger groups of people, particularly mixed groups of children and adults. This data emphasizes the importance of natural landscape development for promoting social gathering and interactions.

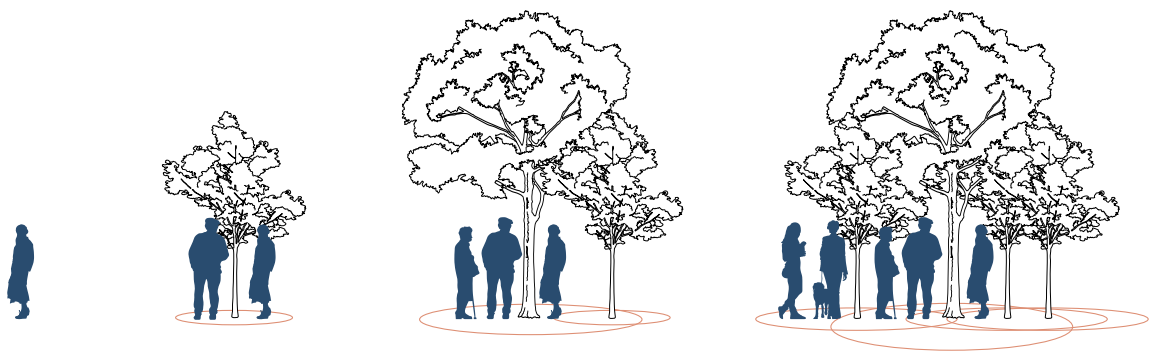


Figure 2.3 : Benefits of Natural Landscapes for Promoting Social Gathering and Interaction
Dense groupings of trees (five or more), and those that were located close to public buildings, attracted larger groups of people, particularly mixed groups of children and adults (Coley, Kuo and Sullivan 1997,468).

Research in cognitive psychology on the effects of nature on well-being creates a precedent for architects to explore the role of nature within the design process. The integration of nature in architecture has the opportunity to greatly impact the well-being of its users. Though there are cognitive benefits to viewing natural environments, the social benefits of greenspace play an equally important role on mental health and social well-being.

Biophilic Design

Naturalness refers to the emotional and physical benefits gained from contact with nature. Though these benefits are greatest from direct interaction with nature, it has been determined that the same benefits can be triggered by imitation of nature through architectural elements. Biophilic design looks to create these connections by leveraging or inserting instances of nature, natural patterns, or spatial conditions into the built environment to recreate the same physiological responses.

Yannick Joye's *Architectural Lessons from Environmental Psychology* (2007, 313), discusses the imitation of nature in architecture as a way to mimic the positive responses from a natural environment within a built environment. He discusses three primary research findings. First, that the realness of the stimulus is not what governs the response but rather the association with the real thing. This frequently occurs through the perception of a face or smile among inanimate objects – such as the front of a car or an electrical outlet. This perception of a face results in the association of human characteristics on the object, thus anthropomorphizing and adding personal feeling to the object.

Secondly, that due to the symbolic representation of nature throughout history in art for aesthetic enhancements, we have become conditioned to perceive the representation of nature as the real thing, thus triggering the same restorative responses (Joye 2007, 313).

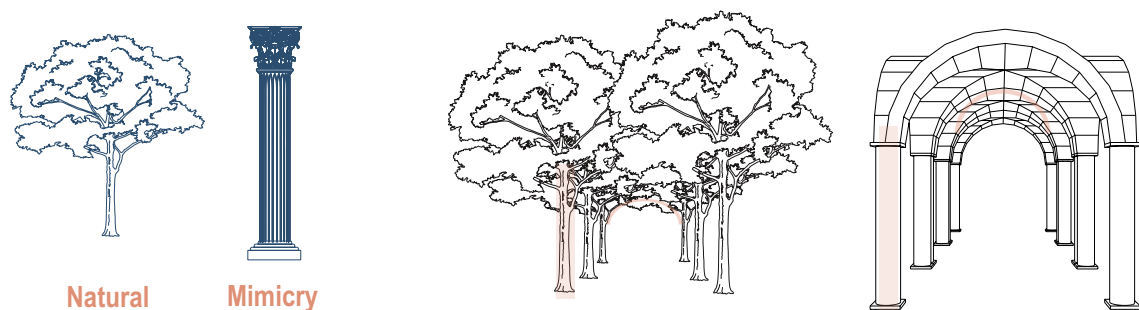


Figure 2.4 : Imitation of Nature in Architecture

Finally, research indicates that preferences of natural settings can be statistically predicted by underlying geometric characteristics, and that it may be these fractal geometries (the repetition of a basic shape) that trigger the restorative responses. Further research shows that there is a mathematical structure in scenes of nature that our brains are genetically programmed to seek out. Fractal geometries are common amongst plants (think of a fern frond – the shape of the frond exists on several scales, from one arm of the fern, to a single branch to the individual leaves) this basic shape is repeated throughout the plant structure. This research indicates that the draw to natural scenes may be most influenced by the predictability of the repeating patterns of the fractal geometries (Joye 2007, 315).

Joye's research shows the potential for architecture to create the same positive neurological responses through the integration of nature in the built environment. Since this is possible, the role of the architect is not only to design natural landscapes, but to incorporate natural elements into the design of buildings to improve the mental and social well-being of its users.

What the artist tries to do (either consciously or unconsciously) is to not only capture the essence of something but also to amplify it in order to more powerfully activate the same neural mechanisms that would be activated by the original object (Ramachandran and Hirstein 1999, 17).



Figure 2.8 & 2.9 : Examples of Biophilic Architecture - Oriente Station & La Sagrada Familia Interior
Oriente Station, photographed by Giovanni G (Shutterstock 2014)
La Sagrada Familia Interior, photographed by Chris Urban (Pixel 2017)

Sensory Perception

I confront the city with my body; my legs measure the length of the arcade the width of the square; my gaze unconsciously projects my body onto the facade of the cathedral, where it roams over the mouldings and contours, sensing the size of recesses and projections; my body weight meets the mass of the cathedral door, and my hand grasps the door pull as I enter the dark void behind. I experience myself in the city, and the city exists through my embodied experience. The city and my body supplement and define each other. I dwell in the city and the city dwells in me (Pallasmaa 2012, 43)

One's conscious experience of walking down a street may seem simple and routine, but at a subconscious level the brain is interpreting environmental stimuli through the sensory system to give meaning to one's experience of their external surroundings. In this way, the human body is in constant interaction with its surrounding environment, further emphasizing the responsibility of architects in creating a built environment that affects the emotional perception of its users. There are five different stimuli involved in sensory perception: chemical, mechanical, electrical, light and temperature. These five stimuli can be processed by one or more of "the senses" (vision, hearing, touch, smell and taste), for example light reflecting off a glass window may grasp one's visual attention while simultaneously warming the body through receptors in the skin.

Stimuli perception is processed by the brain at two levels: initially translating the basic information to a higher cognitive level, followed by the brain referencing personal experiences and information to contextualize the stimuli at an emotional level, i.e. processing the shape and edges of an object into the curves and form of one's favourite mug (Bernstien 2010, 123-4).

This thesis will focus on the influence of architecture on three of the five sensory perceptions: visual, auditory and haptic (the sensations derived from the sense of touch or in relation to a physical object). While visual and auditory cues form one's initial perception of their surroundings, the haptic sense is a crucial component in further strengthening one's spatial experience of the built environment. Looking at architecture through the lens of sensory perception, further emphasizes the importance of materiality in architecture.

A major part of this subconscious processing is focused on interpreting and responding to one's built environment. This processing can result in behavioural changes (walking down select streets over others) as well as cognitive changes to one's mood (feeling of apprehension while coming around a blind corner). These changes mostly go unnoticed on a conscious level, but subconsciously the human brain is processing these changes in the built environment and responding accordingly.

The stimuli from one's external environment is typically processed at a subconscious level, leaving little perception of stress. Those suffering from mood and anxiety disorders, however, are often very aware of environmental stimuli and therefore experience heightened levels of stress. Though the conscious feeling of stress is perceived by those suffering from mental health issues, the neurological responses from the external stressors is the same for everyone. Negative external stimuli can cause the sympathetic nervous system (SNS) response known as "fight or flight". The SNS responds to this stress by signaling the adrenal glands to release hormones (adrenalin and cortisol) to help prepare the body to deal with the external threat. These hormones cause an increase in heart and respiratory rates, the dilation of the blood vessels in the arms and legs, as well as changes to digestion (increasing glucose levels in the bloodstream). Acute or short-term stressors result in the same response from the nervous system as major threats. Though this is the body's natural response to stress, prolonged or frequent stimulation of the SNS can have severe negative effects to the respiratory, cardiovascular and musculoskeletal systems of the body (American Psychological Association 2019).

An experiment by Colin Ellard (2015, 130), a professor of cognitive neuroscience, tested the effects of external stimuli on the body by comparing the heart rate and perspiration levels of those who self-identified as stressed versus those that did not. He decided to test this effect while travelling in Mumbai, where he was forced to cross a large multilane road without a crosswalk or traffic regulation. Though he found the task extremely stressful, when asking locals about this daily experience most disagreed, seeing it as a routine part of their day. Ellard decided to measure the SNS response of locals crossing the street to determine the subconscious levels of stress from this task. Ellard's experiment found that though locals perceived the task of crossing the street as not stressful, their bodies responded to the stress of the task with increased perspiration and heart rate. This experiment illustrates that though people may be adaptive and psychologically resilient to environmental stressors, at a cognitive level the human body's SNS is overwhelmed and in a state of fight or flight.

With human adaptation to environmental stimuli, the mind may seem okay with the stimulation, however at a chemical level the body is under great stress, creating many negative long-term effects to one's physical and emotional well-being. By addressing the needs and vulnerabilities of those suffering from mood and anxiety disorders as the baseline for designing public space, architectural design can benefit the well-being of everyone.

Experiencing Buildings

Exploring the cognitive perception of architecture has led many psychologists to explore the effects of the built form on its occupants. A 2013 study by Vatanian et al. (10446-53) examined the effects of architectural form on individuals by measuring behavioural and neurological responses to assess aesthetic judgment and approach-avoidance decisions (whether one would rather enter or leave a space). While in a fMRI (functional magnetic resonance imaging) machine, participants were presented with photographs of various interior spaces, while the fMRI measured brain activity by detecting changes in blood flow to varying regions of the brain. The images showed three varying conditions of the space: curvilinear or rectangular space, open or enclosed space and high or low ceilings. The results of the experiment were collected both verbally from the participant, as well as from neurological data from the fMRI. The results coincided with previous research - that curved spaces were perceived as more aesthetically appealing than rectangular spaces – based on the self-reporting of the participant, as well as the data from the fMRI. Data from the approach-avoidance testing fMRI proved a preference to enter and remain in the room of a curved space, however the participants perception of their decision to stay in the room was not dependant on the curve of the walls.

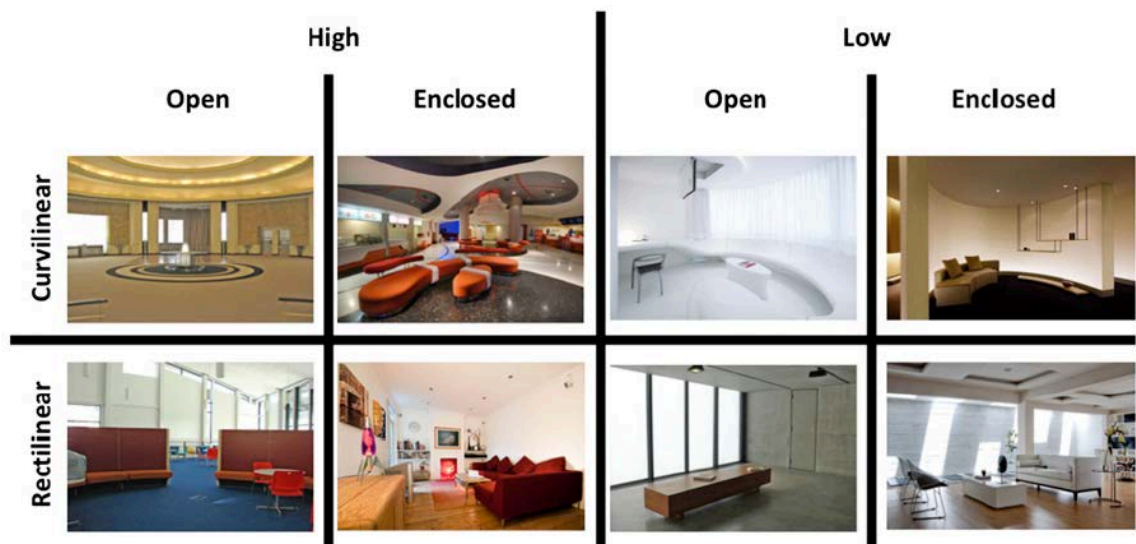


Figure 2. 15 : Examples of Stimuli Used in the Study by Vatanian et al. (2013, 10447)

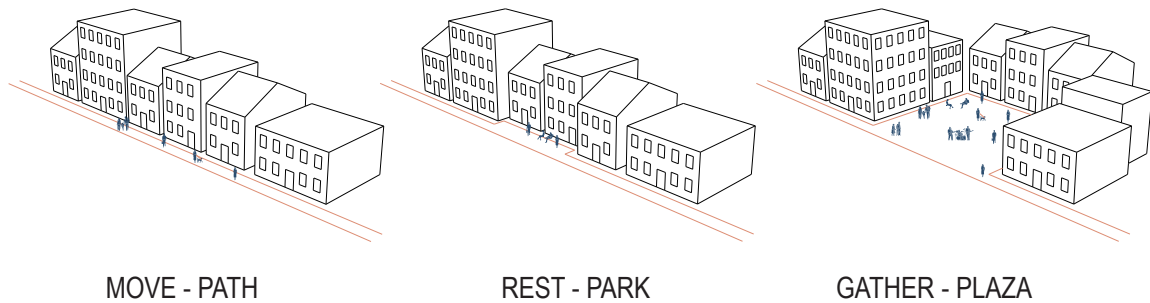


Figure 2.14 : Applying Jan Gehl's Close Encounters with Buildings
Depending on the way the buildings meet the edge of the street, the street becomes a way of moving, resting or gathering

Jan Gehl's *Close Encounters with Buildings* (2006, 29-30) examines the role and experience of a building at the pedestrian scale. Close encounters with buildings can be divided into movement and visual opportunities. Movement can be parallel (walking past or alongside the building), perpendicular (walking in or out of the building) or stationary (standing or sitting next to the building). Since people are always engaging with the ground-floor facade of the building, it is an important element for architects to consider in their designs. Defining the ground-floor of a space has many behavioural impacts on the occupants. This has been studied and termed the Edge and Support Effect. The Edge Effect is people's preference to stay at the edge or outside of a space, allowing them to have a good view of the space while maintaining a discreet presence. The Support Effect, which refers to the preference to stand or sit within a nook, corner or near a column, as these provide a defined space, as well as psychological and physical support. It is these edges and transition zones between buildings and public space that have the greatest opportunity to create moments of social activity and interaction between the interior program of the building and the exterior street life.

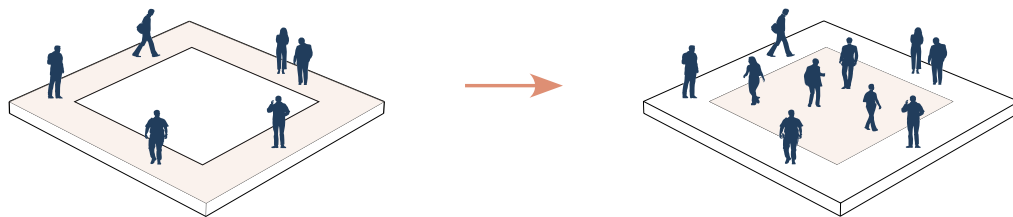


Figure 2.15 : Edge Effect
Peoples preference to stay on the outside or edge of a space.

Visual opportunities of experiencing architecture is tied to the sight lines of the viewer and the potential vantage points of the building. People typically tilt their heads downward about 10 degrees while walking, rendering the field of vision for above only about 50 degrees and the field of vision below about 75 degrees. This is important for understanding the design of building facades as one must be at significant distance to see the full height of the building (Gehl 2006, 32-3). Due to biological evolution, the human eye is designed to perceive and process sensory information while moving at 5 km/h. Architecture that matches this walking pace has more detail, which is intended to be seen from the close range of the pedestrian. However, with the development of the car and the average speed of movement increasing to 60 km/h, architecture along roads used by vehicles began using larger signs and placing less emphasis on small details that cannot be perceived by the driver moving quickly along the street. This has resulted in many buildings being built for the movement of those in cars, leaving pedestrians to walk along buildings that are unintended for their perspective. As pedestrians interact primarily with the ground-floor of the building facade, due to the angle of sight, the ground-floor is what is noticed and remembered the most. The more variation and detail at the ground-floor of the building, the more the urban environment is perceived as inviting and engaging, resulting in a more positive experience for the user (Gehl 2006 33-4).

It is desirable to be able to see out of buildings, and preferably into them, so that the activities inside the buildings and outside in public space are connected visually and thus can enrich and inspire each other (Gehl 2006, 30.)

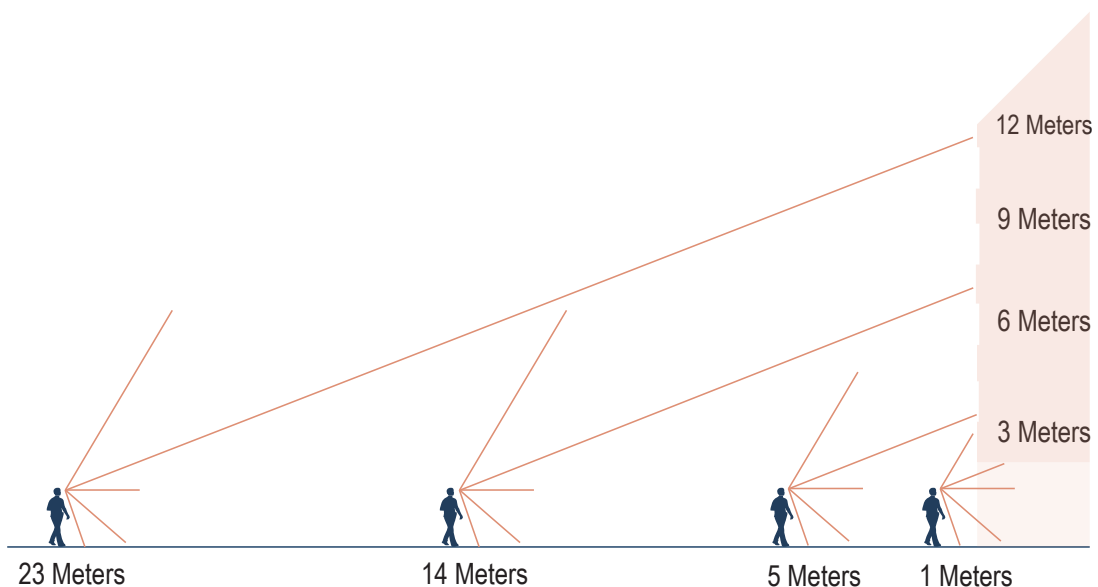


Figure 2.16 : Effective Viewing Distance

Experiencing Streets

A single building may have a strong impact on those passing by, but it is the combination of buildings, parks, and empty lots that have the greatest impact – by creating a street network. Jan Gehl (2006, 29-47) describes the experience of the street as the urban scene at eye level and breaks down these experiences into six categories: *scale and rhythm*, *transparency*, *appeal to senses*, *texture*, *diversity of functions*, and *vertical facade rhythm*.

As previously discussed, the *scale* of the street is in reference to the speed at which one is interacting with it - as a pedestrian (5 km/h scale) or as a driver (60 km/h scale). A *scale* of 5 km/h is diverse and enriching to the senses. The street can be either inviting with many doors or openings that allow for communication between the outside and inside of the building or distant, providing no variation or interaction with others. How individual buildings are perceived at the street level creates a *rhythm* for those passing by. The *rhythm* can be monotonous with no variation that engages with the pedestrian or it can be rich in sensory experiences through varied form, colour/textures and program (Gehl 2006, 30-3).

Transparency refers to the opportunity to engage with both the inside and outside simultaneously - both the inside looking out, as well as the outside looking in. This ability to engage with both the interior of the building and the exterior of the street simultaneously enhances both experiences for the user. This *transparency* not only helps create visual connection between the two spaces, but also creates a sense of safety through this connection to others (Gehl 2006, 39-40).

The ability of the street to *appeal to senses* - through seeing, listening and touching - can only occur if the built elements of the street create sufficient time for the user to connect with their surroundings, which will in turn create moments of movement, rest and gathering (Gehl 2006, 32-3).

Texture refers to the material properties of a building and can be achieved through architectural details of the building's form or material composition. The ability to reach out and touch different materials along a building's facade promotes interaction with the building. This can be emphasized through unique use of common materials or the integration of natural materials, such as wood, that naturally draws people in with its familiar and tactile properties (Gehl 2006, 40-3).

Regarding the *diversity of function* category, the more diverse the functions of the buildings, the more people are brought to the street, increasing opportunities for social interactions (Gehl 2006, 42).

In relation to the rhythm of the street is the *vertical facade rhythm* of a building. A building with primarily vertical rhythm makes walking along the street more interesting and makes the walk seem quicker. As opposed to a facade with predominately horizontal attributes, which creates a longer perspective at eye level, making distances seem farther and the walk longer (Gehl 2006, 41).

Through the consideration of these architectural elements at the street level, architects can improve the perception of the street to those walking by. This consideration addresses the needs and vulnerabilities of those suffering from mental health issues, as the design principles are focused on the sensory perception at the human scale, which in turn greatly impacts the well-being of all users.

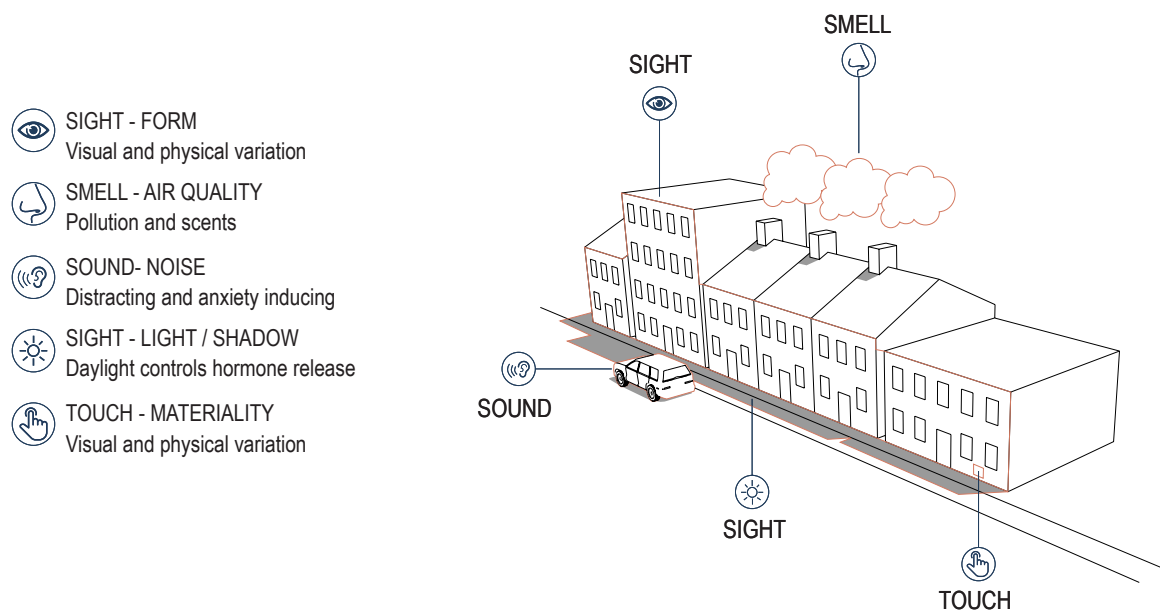


Figure 2.17 : Haptic Senses in the Public Realm

CHAPTER 3: DESIGN

Site

This thesis will explore the application of architecture in the design of public space within the urban context, to reduce environmental stress and improve well-being through positive social interactions of a community. The design principles previously outlined, create a framework for understanding the potential role of architecture as a way of shaping and improving the well-being of its users. Though their application is not limited to any one city or country, for the intentions of this thesis, we will be examining Gottingen Street in Halifax, Nova Scotia as a test site for the application of a new public square.

Situating

Gottingen Street is situated on the east side of the Halifax Peninsula, running northward from Citadel Hill to the North End of the city. Gottingen is one of the oldest streets in Halifax and is still home to one of the oldest churches in town (The Little Dutch Church now called the Church of St. George). Gottingen has a rich history and has been the subject of several historical evaluations, including an article by Nathan Roth and Jill L. Grant, *The Story of a Commercial Street: Growth, Decline and Gentrification on Gottingen Street, Halifax*. In their article they describe the early beginning and history of this diverse street.

During the early to mid-twentieth century, Gottingen became the major commercial street of the North End neighbourhood. While more affluent parts of the city were predominantly white, the North End was integrated, with working-class blacks and whites sharing the streets. Postwar suburban residential and economic growth and mid-century large-scale urban renewal projects greatly affected Gottingen Street, leading to lower property values, a smaller customer base, and a weakened commercial base on the street. By the end of the twentieth century, Gottingen Street was described as Halifax's "most feared neighbourhood." (Roth and Grant 2012, 38)

With this street's unique history within Halifax and its relatability to other historic streets of major cities, Gottingen provides an interesting backdrop for the application of this thesis' design principles. Focusing on the most urban portion of Gottingen, it's south end between North and Cogswell Street, this thesis will explore the programmatic needs of the street and surrounding community to create an infill design project. This project will focus on promoting well-being through the three-fold application of human-focused design rather than object-making design, the restorative benefits through the integration of nature, and the sensorial qualities of architecture in its material and formal composition.

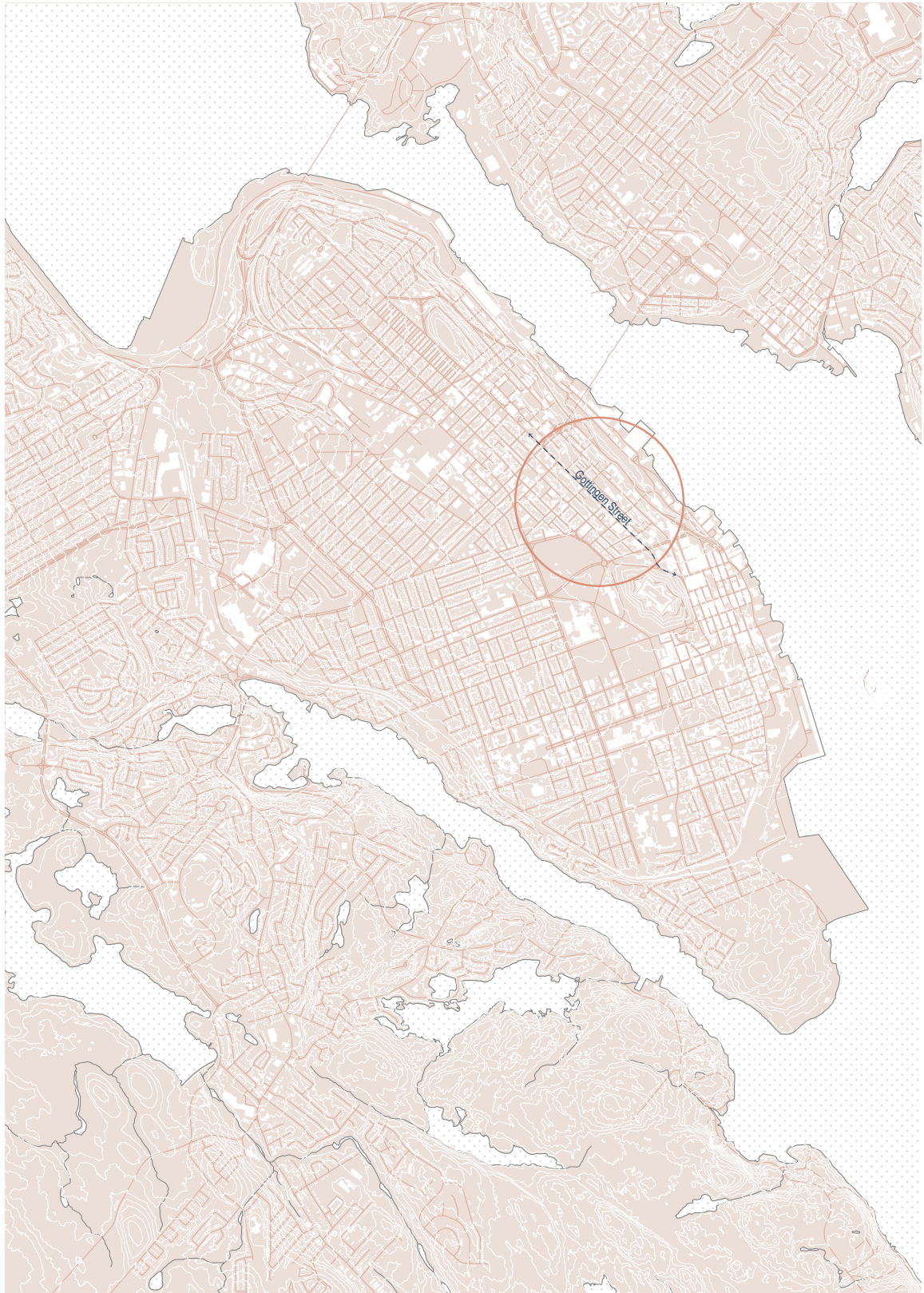


Figure 3.1 : Context Site Map of the Halifax Peninsula
Five minute walking radius surrounding the most urban portion of Gottingen Street

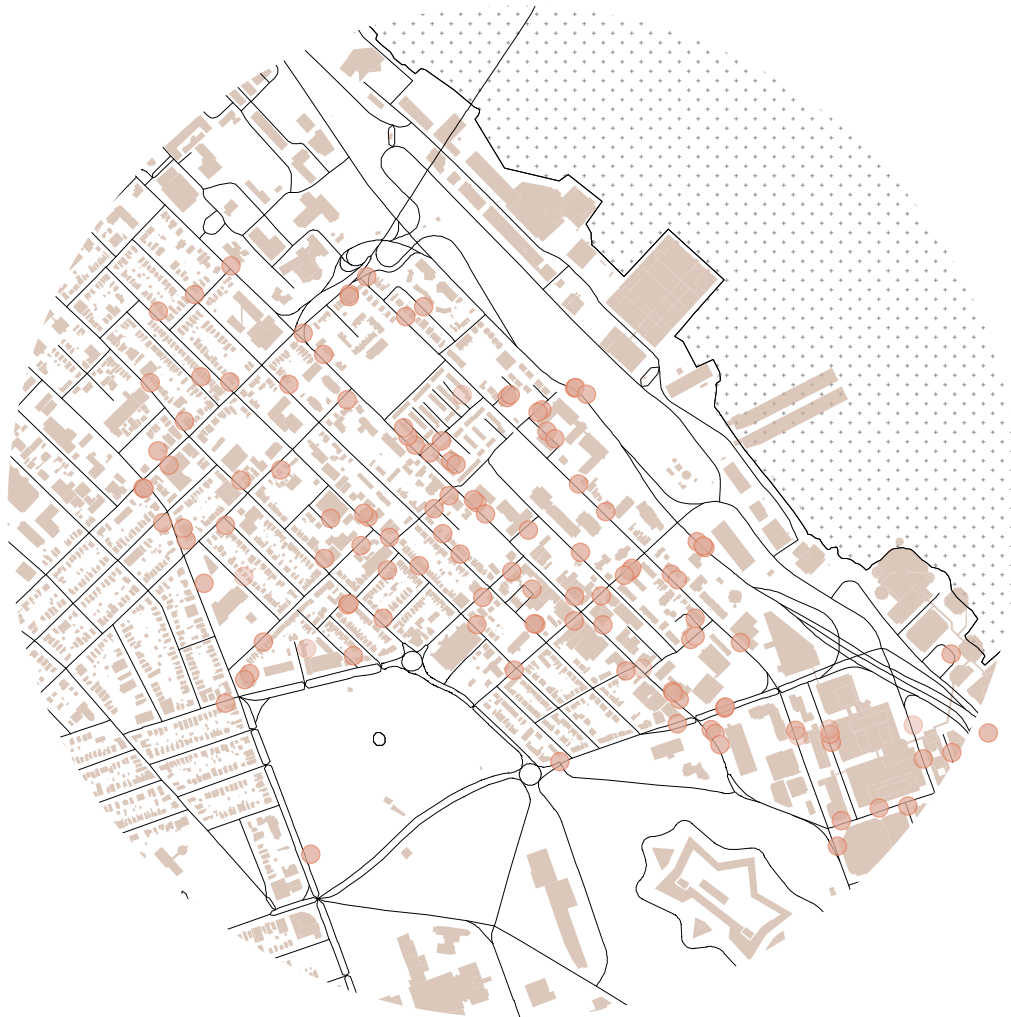


Figure 3.2 : Site Analysis of Gottingen Street and Surrounding Area (enlarged)
Incidences of crime in 2017

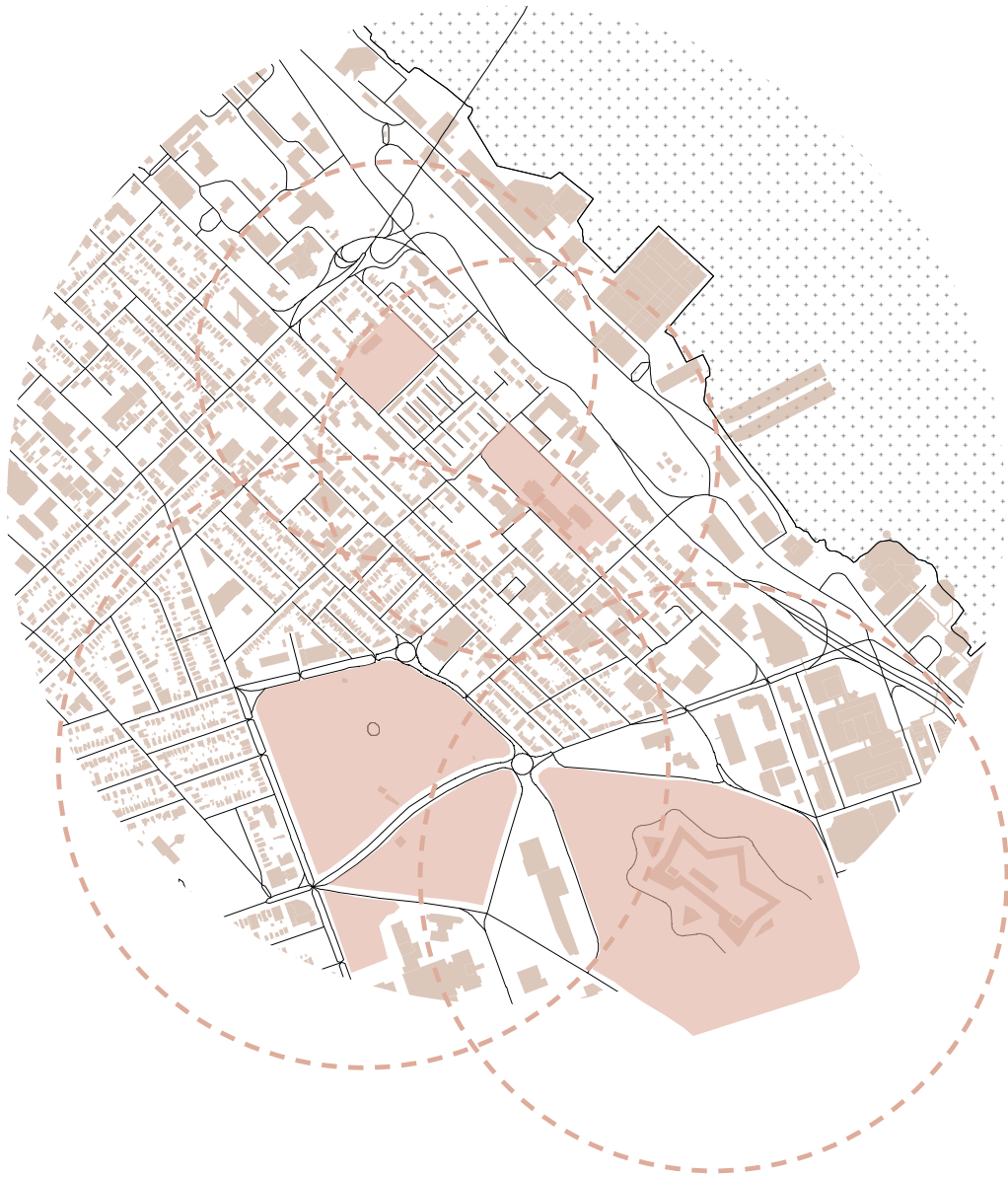


Figure 3.3 : Site Analysis of Gottingen Street and Surrounding Area (enlarged)
Circles indicate 1 km walking radius surround parks and greenspace

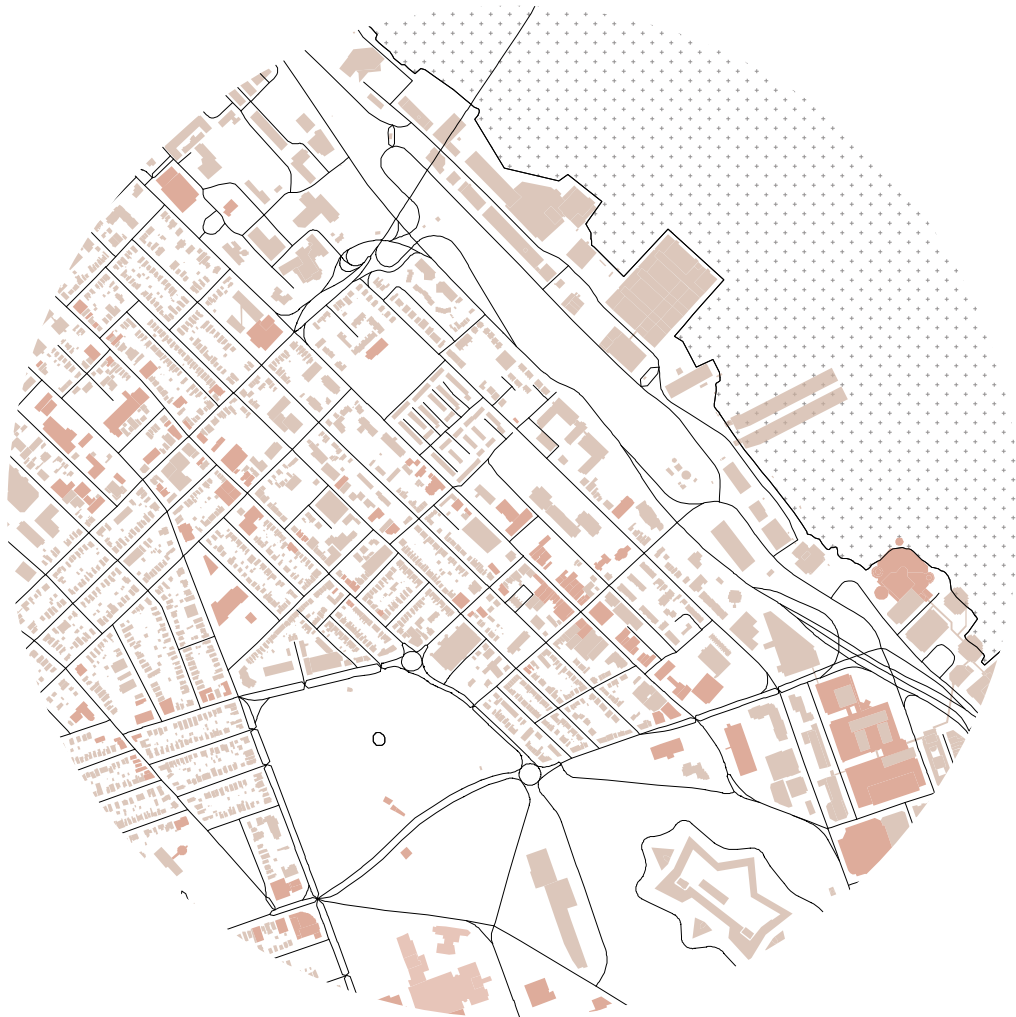


Figure 3.4 : Site Analysis of Gottingen Street and Surrounding Area (enlarged)
Coloured buildings indicate public buildings

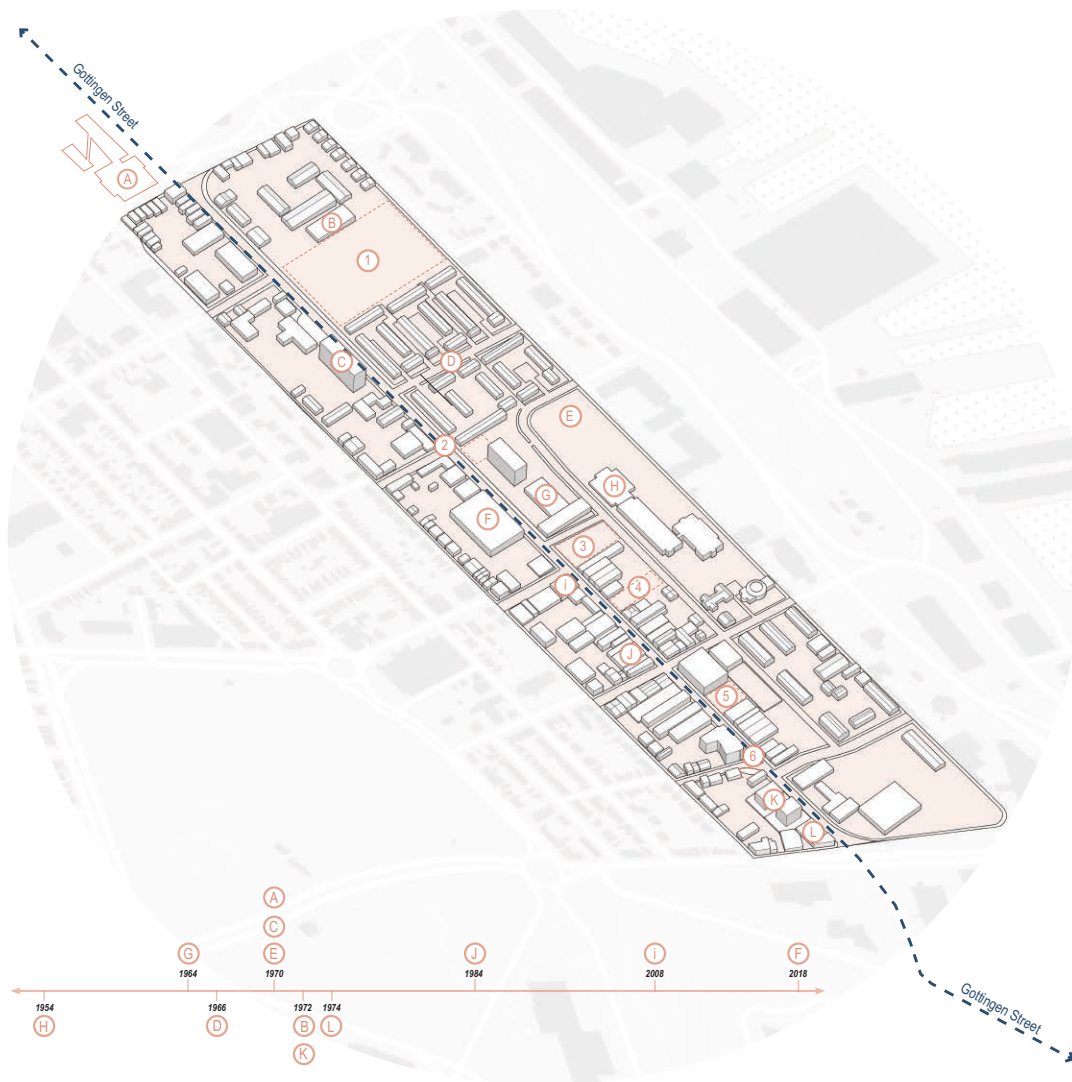


Figure 3.5 : Site Analysis of Potential Sites and Existing Buildings
 Analysis of the existing buildings as a way to understand the history and development of the culture and community of Gottingen Street



Figure 3.6 : Site Analysis of Existing Buildings

To better understand current conditions of Gottingen, this thesis will examine 12 prominent existing buildings in order to contextualize the history and development of the culture and community of Gottingen Street.

Starting at the north end of the street is Northwood Manor (a). This apartment complex was funded by the non-profit organization Halifax Senior Citizens' Housing Corporation, offering independent, supportive and assisted living for senior citizens. Northwood Manor's program Seeds of Success is a mental health and wellness support program, aimed at promoting positive mental health and healthy living through group activities such as gardening, talk therapy and a variety of creative activities. Seeds of Success believes that healthy living is achieved through a balance of social, physical and emotional development (Northwood 2019).

Situated at the north end of the street is a small public park which is home to the George Dixon Community Centre (b). The park houses a playground, tennis/basketball courts, horseshoes, and splash park. The Community Centre provides public access to boardrooms, kitchen facilities, multi-purpose rooms, audio-visual rooms, pottery studio, and a gym (Halifax 2018).

Across the street from the George Dixon Park is The Sunrise Manor (c), a 10-storey building operated by the Halifax Regional Housing Authority. The building has been the subject of several articles due to numerous issues over the past few decades, including a fire in 1999 and extreme incidences of bed bugs and cockroaches. The Halifax Regional Housing Authority has spend millions of dollars on attempting to improve living conditions of their residents, however the building continues to have issues, leaving low-income and vulnerable inhabitants to suffer due to their inability to find other affordable housing in the city (McGregor 2016).



(D) Uniacke Square

Built : 1966



(E) Hope Blooms Greenhouse

Built: 1970 Renovations: 2010



(F) Velo Apartments

Built : 2018

Figure 3.7 : Site Analysis of Existing Buildings

d) Uniacke Square, photograph by Chronicle Herald (Hamlyn 2017)

e) Hope Blooms Greenhouse, photograph by Matthew Jarsky (Jarsky 2016)

f) Velo Apartments, photograph by Velo Apartments (Velo Apartments 2017)

Adjacent to George Dixon Park is Uniacke Square (d). One of the most famous housing projects in Halifax, Uniacke Square was built in 1966 and consists of 250 units. It was initially built to house those living in Africville (located on the southern shore of the Bedford Basin), which was torn down as part of an urban renewal project. Africville was founded by refugees of the War of 1812, the Underground Railroad, and the American Civil War. Though Africville paid taxes, the city of Halifax did not provide services such as paved roads, running water or sewers. After continued neglect from the City – including adding a fertilizer plant, slaughterhouses and prison to the area of Africville – the area of Africville became a very undesirable part of the city, even leading to health issues for its inhabitants. Against the desires of the Africville inhabitants, Halifax developed Uniacke Square to house those that would be displaced from the redevelopment of Africville, to further develop the land for industrial use. Though the move to Uniacke Square was not well received and continues to house predominately an African-Canadian population, the square has created a sense of community through a parent resource centre, a small church, an office of the Salvation Army, as well as a community-based recording studio (Tattrie 2014).

Situated between Maitland and Brunswick Street (running parallel to the east side of Gottingen) is the Murray Warrington Park, which houses the Hope Blooms Garden and Greenhouse (e). The mission of Hope Blooms is to empower at-risk youth to be actively engaged in building environments that directly impact the social determinants of health in their communities. The organization uses the products of their garden to make herb dressing, which is sold in grocery stores on the peninsula, with proceeds funding education for youth in Halifax's urban centre (Hope Blooms 2019).



Figure 3.8 : Site Analysis of Existing Buildings

Opened in January 2018 the Velo Apartments (f), a five-storey 103-unit apartment complex with one- and two-bedroom units, provides rental units catering to working professionals and students looking for conveniently located apartments near downtown (Burke 2016).

Across from the Velo Apartments is the Halifax North Memorial Library (g), which opened in 1964 to commemorate the 1917 Halifax Explosion. In addition to providing books, magazines, CD's and DVD's for rental, the Library provides access to computers for individual use, group use, as well as training sessions in computer literacy. The library is also attached to the YMCA Work Centre which provides employment services – including career planning, job searches, career development, recruitment and planning (YMCA 2019).

Situated beside the Hope Blooms Garden and Greenhouse is St. Patrick-Alexandra's School (h). Built in 1954 the school was closed in 2007 when students at St. Patrick-Alexandra's and Queen Elizabeth were combined and moved to Citadel High School on the southwest side of Citadel Hill. In 2012, the building was sold to Jono Developments after being deemed no longer needed by the City. Jono Developments has not released any final plans as to what they plan to do with the site. The site has the potential to create more housing or commercial space that could greatly impact the density and value of Gottingen and the surrounding area (Pearson 2016).

Situated on the corner of Cunard and Gottingen Street is The Rebuilding (i), a transition housing complex that is funded by Shelter Nova Scotia. Built in 2012, The Rebuilding provides housing for 19 men who have previously lived at the Metro Turning Point Shelter, to readjust to community living. These individual apartments provide independent living while still offering individualized support for its inhabitants. The building was named by its occupants in honor of the opportunity the apartments provide in the “rebuilding” of their lives (Shelter Nova Scotia 2019).

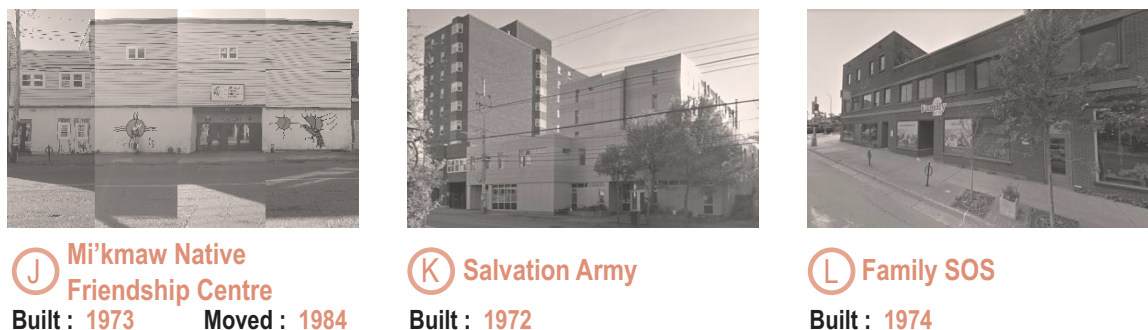


Figure 3.9 : Site Analysis of Existing Buildings (enlarged)

Situated near the corner of Cornwallis and Gottingen Street is the Mi'kmaw Native Friendship Centre (j). Originally opened in 1973 on Harris Street, it was moved to Gottingen Street in 1984. The Centre is one of 119 Friendship centres across Canada running nine core programs that provide structured social-based programming for urban aboriginal people. The Centre is focused on being a focal point for the urban aboriginal community by providing a variety of community functions and events (Mi'kmaw Native Friendship Centre 2019).

Situated at the south end of the street is a Salvation Army Centre (k), which houses a men's shelter, addiction centre, chapel, dining hall, half-way house, as well as family services, including clothing centre, food bank and various community programs. The Salvation Army provides support for local, vulnerable populations (The Salvation Army 2019).

Next door to the Salvation Army is Family SOS (l), a local, non-profit, child centered organization directed toward building strong and healthy families through programs for parents, youth and children. The organization describes their goal as providing proactive services and support to families and communities in need that adapt as their needs and families evolve (Family SOS 2018).

With the existence of programs such as Seeds for Success, the George Dixon Centre and Hope Blooms, as well as the wide variety of communities, including those living in Uniack Square, The Rebuilding, and members of the Mi'kmaw Native Friendship Centre, it is apparent that the necessity and desire for public social programs have and will continue to be in-demand by the community of Gottingen Street. With the street's rich history and continued development of social programs, Gottingen Street is an exemplary site for the application of this thesis.

Street Analysis

To analyze the sensorial properties of Gottingen Street, Figure 3.10 creates an organized representation and analysis of the following five factors: the amount of *natural daylight*, the amount of *artificial night light*, *activity at building thresholds*, *material analysis*, as well as a *photographic elevation* of both the west and east side of Gottingen Street.

Natural daylight is represented by the two inner yellow rectangles, which mark the amount of light that reaches the street as the sun passes behind the buildings on both the east and west side. The darker yellow indicates more light reaching the street, while the lighter yellow represents less light, often due to the size and proximity of buildings to the street. During the collection of this data, it became apparent that people stood and walked along the portions of the street that had more direct light throughout the day.

Artificial night light is represented by the two outer rows of yellow rectangles, which mark the amount of light that emanates from the buildings along Gottingen Street. The darker the colour, the longer or more light the building produces – this analysis begins to describe which places are open late and therefore indicates where there is nightlife along Gottingen Street.

Activity at building thresholds is indicated by the solid black line. This line indicates the amount of activity at each building threshold along both sides of Gottingen Street. The closer the line is to the center, the less people are using the thresholds throughout the day, highlighting public versus private.

Material analysis is represented by the coloured squares – at the outermost portion of the diagram – indicating changes in material/colour of the buildings along Gottingen Street. Empty lots and side streets are represented by the absence of a square, while greenspace and parking lots are represented by green and grey squares in a second row below.

At the outermost portion of the diagram is a continuous *photographic* collage showing the building elevations along Gottingen Street. Overlaid on the elevations are vertical pink bands, which represent the numerous bus stops along the street, while pink circles indicate public seating.

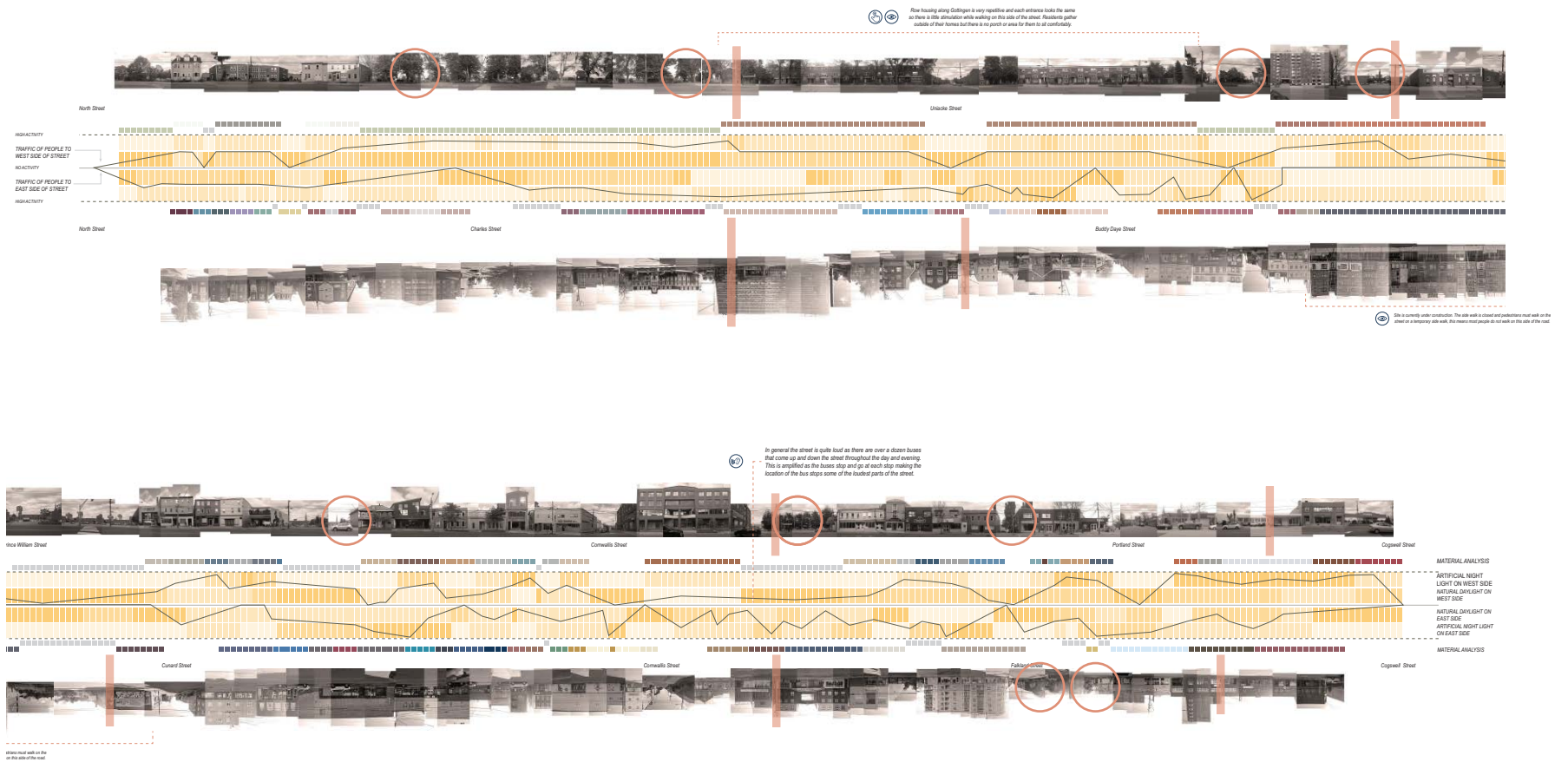
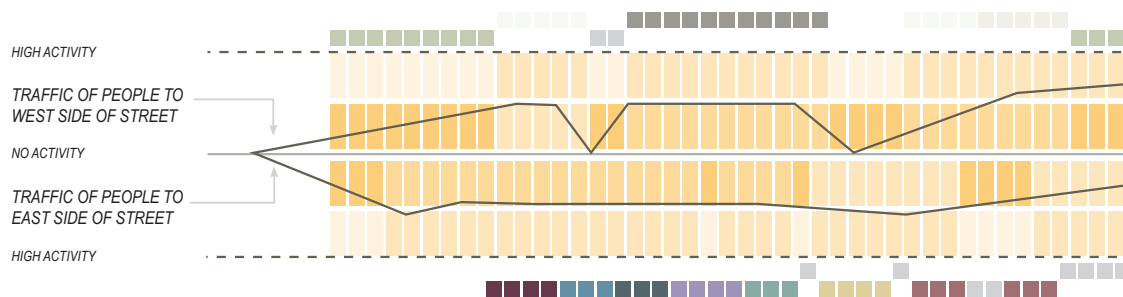


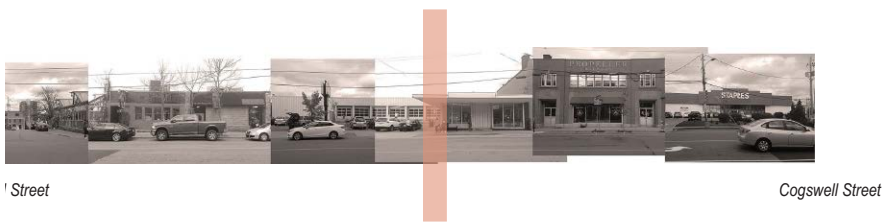
Figure 3.10 : Street Analysis of Sensorial Properties



North Street

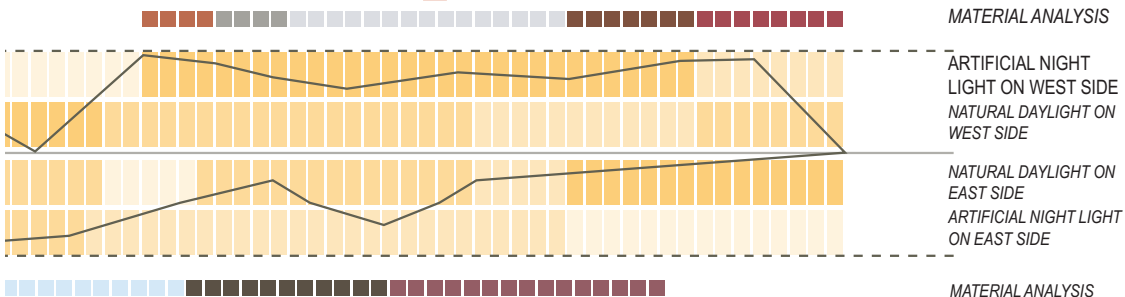


North Street



Street

Cogswell Street



Cogswell Street

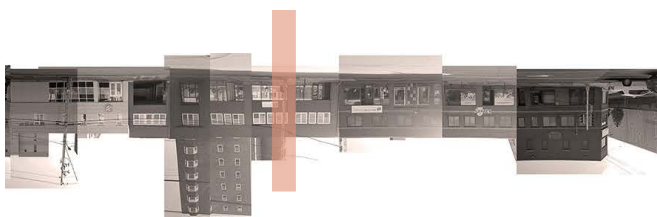


Figure 3.11 : Street Analysis of Sensorial Properties (enlarged)

Public Seating along Gottingen Street creates moments of rest and gathering by allowing individuals or small groups of people a chance to pause while walking down the street. Figure 3.12 & 3.13 show the various seats along Gottingen Street. At the northern end of George Nixon Park is an entry with seating along a wall amongst the trees (1). This entry to the park seems frequently used as it leads to the community center and playground located within the park, however it doesn't seem that people stop to sit here. At the south end of George Nixon Park is another entry with seating amongst the trees (2). The park seems to have few users and even fewer that stop to sit here. Between Uniacke Square and the multi-storey Ahern Manor is an empty slab of concrete with several benches facing inwards (3). Regardless of its proximity to Gottingen Street and Uniacke Square, it is almost always unoccupied. This is most likely due to the general lack of care provided to the benches, as well as the lack of interesting surroundings. Outside of the library there are several benches facing both north and south (4). The building is set back from the street allowing a quiet place to read, eat lunch or chat with a friend, however there is only one type of seating, so it is not that accommodating and does not provide a place to put anything down. There are two benches along the public laneway (5)

VARIOUS PUBLIC SEATING ALONG GOTTINGEN STREET



① Seating Along Park Entry (N)



② Seating Along Park Entry (S)



③ Seating Next to Uniacke Sq.



④ Seating in front of the Library



⑤ Benches along Public Laneway

Figure 3.12 : Photos of Various Public Seating Along Gottingen Street

that can sit 1 - 2 people. Though the laneway is used somewhat often, the benches seem to not be used, as they are often in the shade and provide no visual stimulation. There is a small bench for 2 or 3 people next to Edna's, a local restaurant (6). It is mostly used by friends pausing to sit, eat and catch up. People passing by often stop to say hi and comment on the nice seat. Additionally, people gather at the benches on the corner of Falkner (7) throughout the day and night. It is usually people from the Salvation Army, probably due the fact that this site gets a lot of light and can accommodate many people. These groups often gather on the benches outside of the Salvation Army (8), typically starting first thing in the morning, waiting for the building to open, and staying until very late at night.



⑥ Small Bench Besides Edna's



⑦ Seating on Corner of Falkner



⑧ Seating Outside Salvation Army

Figure 3.13 : Photos of Various Public Seating Along Gottingen Street

Site Selection

After identifying Gottingen Street as the test site for the application of this thesis, the exact location of the site was determined, with six potential sites initially identified: George Dixon Park, Heron Walk, Prince William Street Parking Lot, Gottingen Mural Parking Lot, the Parking Lot/Bus Stop Across from Global Television, and the Parking Lot on the Corner of Falkner/Gottingen. This thesis will use Jan Gehl's Quality Criteria to quantify the appeal of each site based on three categories: *protection*, *comfort* and *enjoyment*. By asking several questions about each site, this evaluation assigns a numeric value to each category to determine the current condition of the site. The sites are scored out of 3 (3 meaning yes, 2 meaning in-between and 1 meaning no). The three categories (protection, comfort and enjoyment) are further broken down into three, six and three parts, respectively. To interpret these parts, Gehl asks several questions to assist with quantifying the observations of the site into the respective numeric score. Figure 3.14 and 3.15 provide a photograph of each site with a brief description in each of the three categories..



① George Dixon Park

Protection : 3 + 1 + 2

- Large trees create a barrier from the noise and danger of the street
- Very little lighting and activity at night
- Little shelter from wind, rain or sun

Comfort : 3 + 3 + 3 + 3 + 1 + 3

- No stairs making it very accessible
- Many options for sitting, standing
- with multiple views or elements to look at
- Options for exercising and playing
- No options for people to talk

Enjoyment : 2 + 2 + 3

- Scale of the park and trees does not fit with surrounding buildings
- Options to enjoy climate - little shelter or winter options
- Beautiful park and decent building

Total = 32



② Heron Walk

Protection : 1 + 2 + 1

- Very little barrier from the noise and danger of the street
- Proximity to houses creates some activity at night
- No shelter from wind, rain or sun

Comfort : 1 + 1 + 2 + 1 + 1 + 1

- Only stair access
- Benches but they are not inviting as there are no options for views, activities or ways to gather

Enjoyment : 1 + 1 + 1

- Very tall building adjacent not to human scale
- Not designed to take account of weather
- Not a pretty part of the street

Total = 13



③ Prince William St Parking Lot

Protection : 1 + 2 + 1

- No barrier from the noise and danger of the street
- Proximity to bars creates some activity at night
- No shelter from wind, rain or sun

Comfort : 2 + 1 + 1 + 1 + 1 + 1

- Options for mobility
- No options for standing, sitting, talking or activities
- Very little to look at

Enjoyment : 1 + 1 + 1

- Adjacent buildings are large and don't interact with the space
- Not designed to take account of weather
- Not a pretty part of the street

Total = 14

Figure 3. 14 : Site Analysis of Potential Sites
Using Jan Gehl's Quality Criteria to evaluate potential design sites

Protection is broken into three parts: protection against (a) traffic and accidents, (b) harm by others, and (c) unpleasant sensory experiences.

Comfort is broken down into six parts: options for (a) mobility, (b) to stand and linger, (c) for sitting, (d) for seeing, (e) for talking and listening/hearing, and (f) for play, exercise and activities.

Enjoyment is broken into three parts: (a) scale, (b) opportunities to enjoy the positive aspects of climate, and (c) experience of aesthetic qualities and positive sensory experiences.

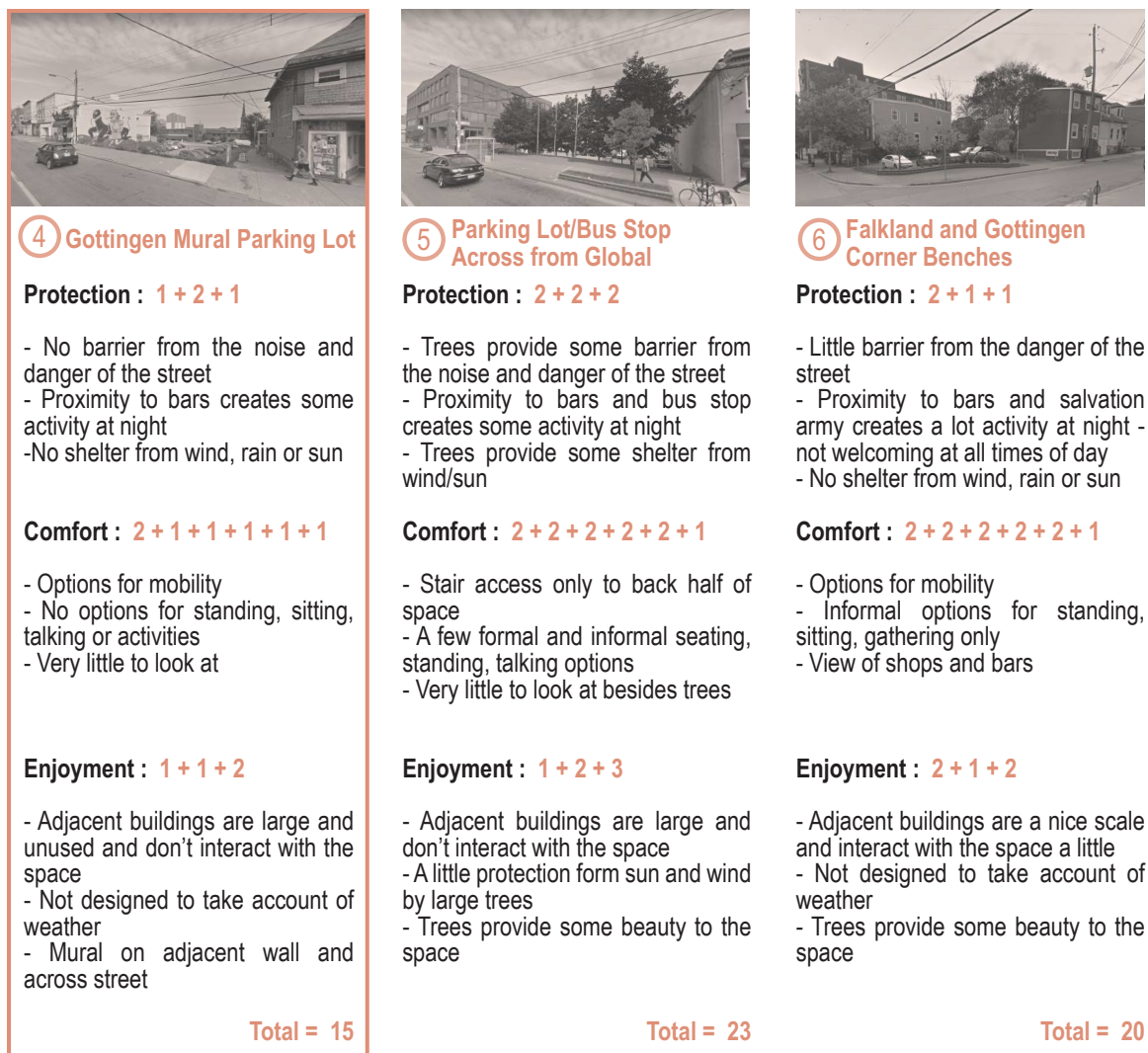


Figure 3. 15: Site Analysis of Potential Sites (continued)
Using Jan Gehl's Quality Criteria to evaluate potential design sites

By answering the 12 questions from each of the three categories, Gehl's Quality Criteria creates a systematic approach to evaluating the current conditions of a site, in order to better understand the potential of a design intervention. Figure 3.14 and 3.15, show the scores from each category, as well as a total score of the site.

After evaluating each site, it became clear that site (4) the Gottingen Mural Parking Lot, would be the most beneficial site on Gottingen Street to develop for a public space – with its central location, large size, iconic mural and historic Public Laneway. Additionally, the site received one of the lowest scores from Gehl's 12 Criteria, and could potentially have the most to gain, making this parking lot the ideal test site for the application of this thesis.

Program

This thesis has outlined the many benefits of human-focused architecture and designing for vulnerable populations, to create public space that is inclusive to all users. Since people suffering from mental health issues are an invisible minority, the architecture must address the programmatic needs of all users. This thesis will analyze potential users, types of social interactions, as well as existing programs on Gottingen Street, to determine the potential program of the public square.

User Analysis

For the intentions of this thesis potential users have been broken into five user groups: *students*, *workers*, *homeless people*, *families/children* and the *elderly*. To better understand the programmatic needs of each user group, this thesis examines each group in several categories: daily and yearly presence in public spaces, the amount of required public space and the importance of nature.

Students - With the wide variety and density of post-secondary institutions in Halifax, there are many students living and commuting downtown. With new housing projects such as the Velo apartments, the theatre lofts and many homes converted into rental units, there are many students moving to this part of the city. With many commercial stores and restaurants along Gottingen Street, there are many places for students to meet with friends, study, eat and go out. The numerous buses that run along Gottingen also provide an easy way for students to come and go to different areas of the city.

Workers - Gottingen street is also home to many retail stores, several office buildings and many side streets full of various housing types - this means that there is a large working population that either commutes to or from Gottingen Street.

Homeless People - As previously described, there are many public non-profit programs on Gottingen Street, making it a common place for homeless people to gather. With the Salvation Army providing daily meals, shelter and social services, there are often many homeless people gathered or walking along Gottingen. As the user analysis indicates, homeless populations use a wide range of yearly and daily public spaces, therefore the development of public programming and space greatly impacts their day-to-day lives.

Families/Children - The neighbourhoods surrounding Gottingen Street are made up primarily of detached houses inhabited by families and children. With schools, parks and community centres within walking distance, many families and children are seen throughout the neighbourhood.

Seniors - As previously mentioned, there are several senior housing complexes and programs on Gottingen Street. Even though there are many elderly people living on Gottingen, not all areas of the street are accessible to those with limited mobility. It is important for the design of public space to identify both the programmatic and physical needs of its users, to ensure that all public spaces are inclusive to all users regardless of their physical abilities.

FIVE POTENTIAL USER GROUPS



STUDENTS

Description :
There are many new options for housing in the area, many places to meet up with friends, study, eat and go out, as well as access to transit to get downtown and to school quickly and easily.

Age :
18 - 30 Years

Presence : Daily Presence : Yearly



WORKER

Description :
There are many option for housing: apartments, attached and detached housing, as well as an easy commute for those going downtown and many offices in the surrounding area.

Age :
18 - 65 Years

Presence : Daily Presence : Yearly

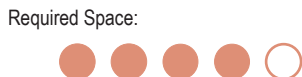


WORKER

Description :
The salvation army provides meals, shelter and social services that being many vulnerable people to the area, as a result there are several other buildings that provide services for them.

Age :
18 - 75 Years

Presence : Daily Presence : Yearly

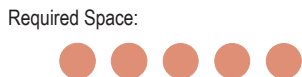


FAMILIES / KIDS

Description :
There are many family homes in the area as well as several amenities within walking distance including schools, parks, playgrounds, splash pak and community centres which offer art classes.

Age :
0 - 16 Years

Presence : Daily Presence : Yearly



ELDERLY

Description :
There are several elderly community housing developments in the area, elderly users need amenities within walking distance as well as accessibility to public spaces.

Age :
60 - 90 Years

Presence : Daily Presence : Yearly

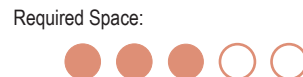


Figure 3.16 : User Analysis

Scales of Social Interactions

With the focus of this thesis on human-centered design. This project will examine social interactions on three scales: *individually*, *groups* and *crowds*. Looking at the different social qualities of the three scales helped to identify the needs of the user in relation to access of space, sensory qualities and programmatic use to identify potential program typologies. This is represented in Figure 3.17.

This diagram illustrates the three scales of social interaction in relation to public spaces along Gottingen Street. Examining social interactions at three different scales provides insight into the different qualities and needs of users at each scale to improve well-being through positive social interaction in public spaces. The three scales are connected through movement along paths that create moments of rest or gathering. This is done both at the site scale as well as at street scale - with the sidewalk connecting social programs up and down Gottingen. Understanding these three scales helps to ensure that the architecture reflects the needs of the social interaction of the *individual*, the *group* and the *crowd*, by applying this to the basic architectural elements of ground, wall and roof.

The primary scale, being individual interactions, is connected with the architectural element of the ground plane. This program has an emphasis on natural elements, especially light and smell, as it is about the connection between surrounding spaces. This results in program that is about moments of pause or rest, which is created through flexible programming typologies such as a bench.

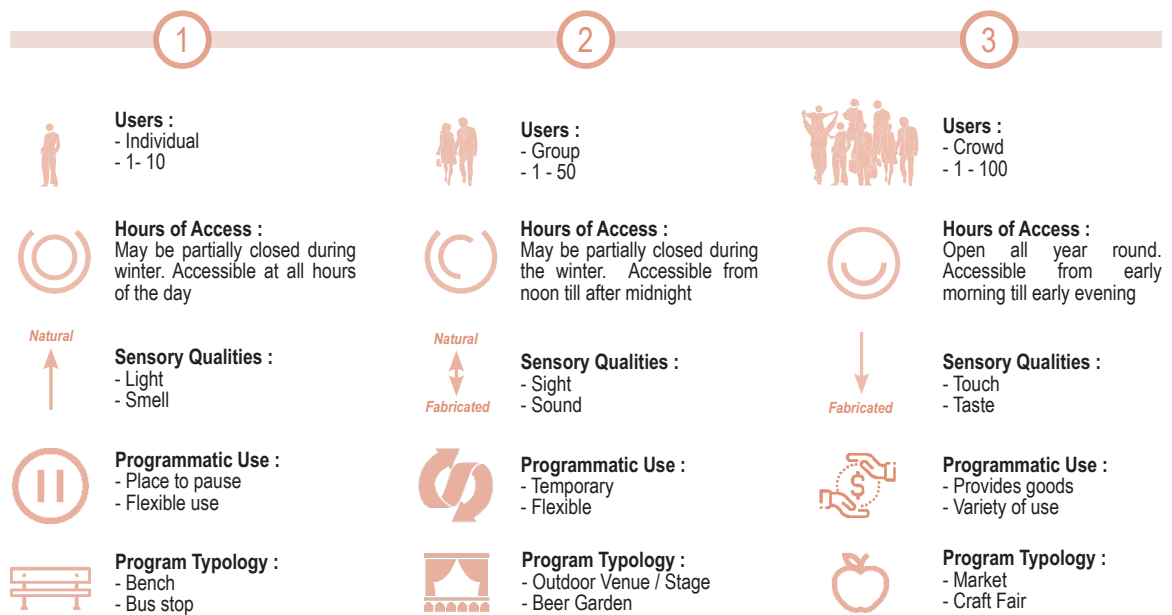


Figure 3.17 : Three Scales of Social Interaction

The secondary scale is about small group interactions and is connected with the architectural element of ground and wall. This program creates an emphasis on a view, creating a balance between the built and the natural environment, while providing flexible or temporary programming with varying uses. The program typology of the group is centred on creating social interactions focused around sight and sound, as these work to draw groups in and provide a shared sensorial experience.

The tertiary scale is about social interactions amongst a crowd. This is represented in architecture through creating an enclosed space with ground, wall and roof. With the combination of all three architectural elements, this program becomes more about fabrication in both physical form of the space, as well as the program through the exchange of goods. This results in a programmatic typology that plays on the sensorial properties of touch and smell to promote social interactions through shared resources.

This thesis explores the application of all three scales of social interaction, and the complementary program typology within one public square, as a way to improve well-being through the positive social interactions as an *individual*, a *group* or a *crowd*.

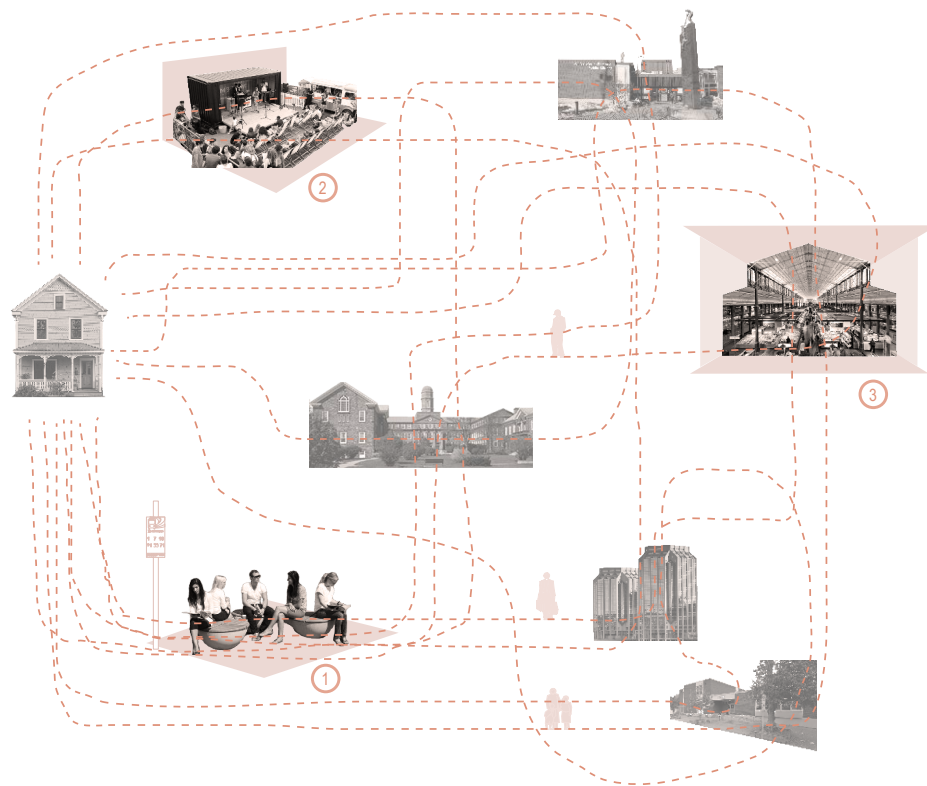


Figure 3.18 : Three Scales of Social Interaction

Program Analysis

Figure 3.19 illustrates the analysis of the existing and potential public programs on Gottingen Street, showing which buildings are commonly used by each user group, as well as identifying missing programs. Combining this analysis with the program typologies of the three social interactions, indicates that the three programs that could most benefit social interactions and well-being would be a bus stop, an outdoor venue and a market.

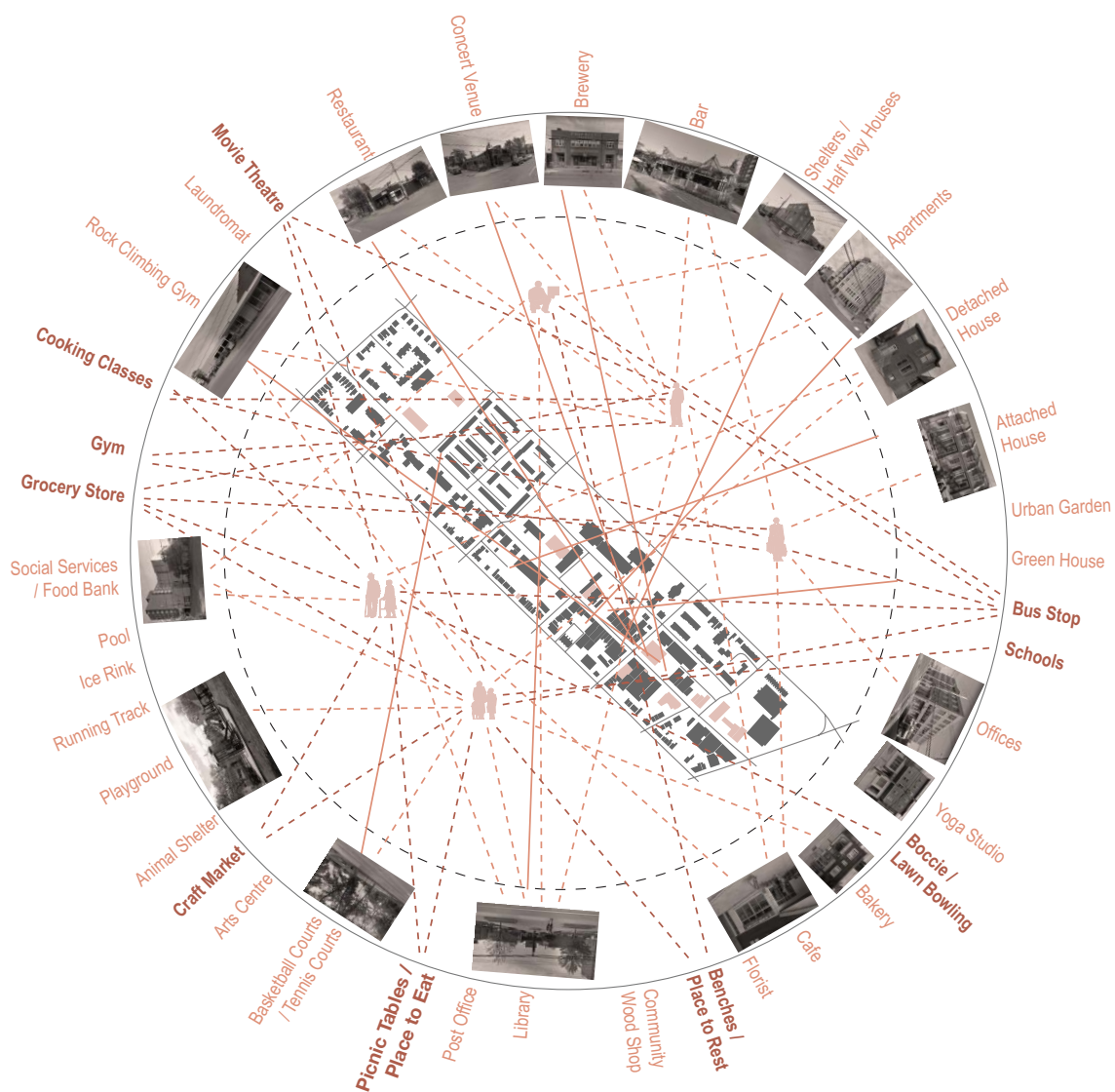
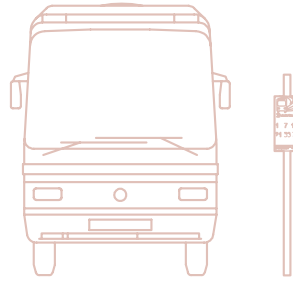


Figure 3. 19 : Program and User Analysis
Evaluation of existing and potential programs based on their location and user base



BUS STOPS

With 15 different buses running up and down Gottingen Street each day, there are 12 stops between North and Cogswell Street. With only eight of these stops providing seating – which is limited, only enough for one or two people – the bus stops on Gottingen do not place an appropriate amount of focus on a highly used and necessary public service. Therefore, this thesis will focus on creating a central bus stop that provides ample seating and protection from rain and snow.

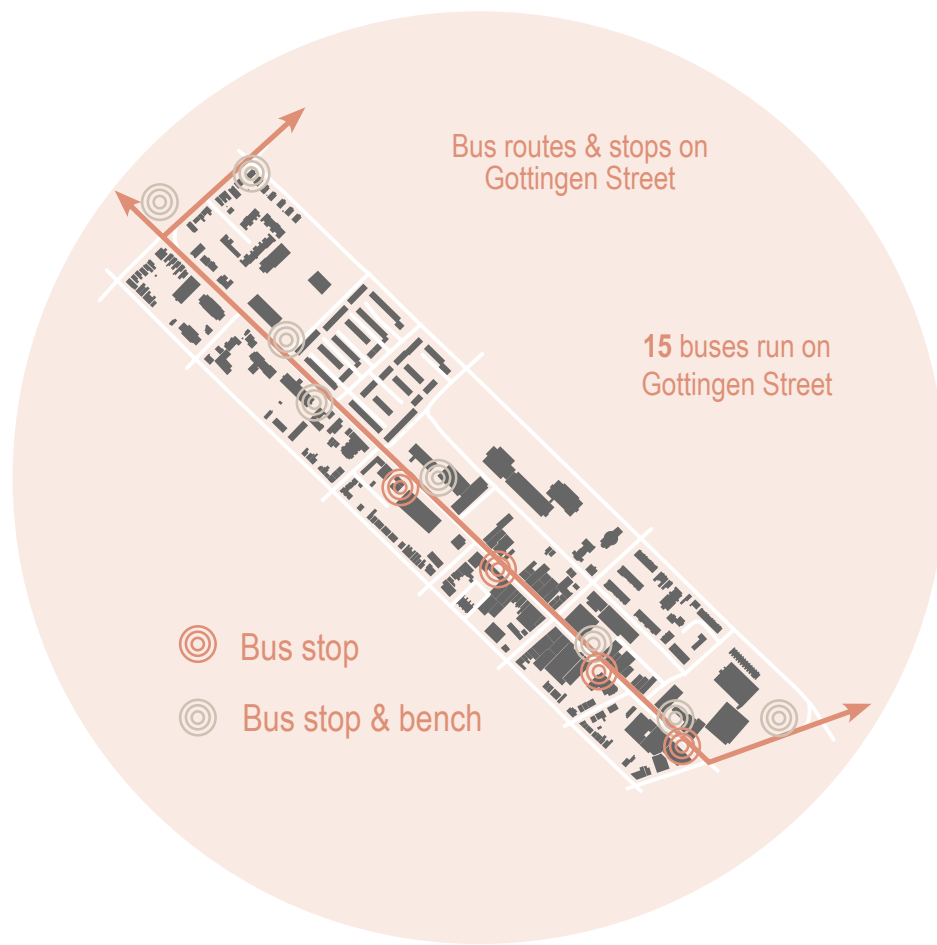


Figure 3.20 : Program Analysis - Bus Stops



OUTDOOR VENUE

Gottingen Street has a very active nightlife and hosts many year-round concerts, including the Halifax Pop Explosion, night markets and local bands. There are more than ten bars and restaurants open past midnight that house these events. Gottingen Street is known for its LGBTQ2S+ community and for bars home to local bands, however there is no designated outdoor venue space. This thesis will explore the potential application of a outdoor venue space that can be used throughout the year by all members of the community.

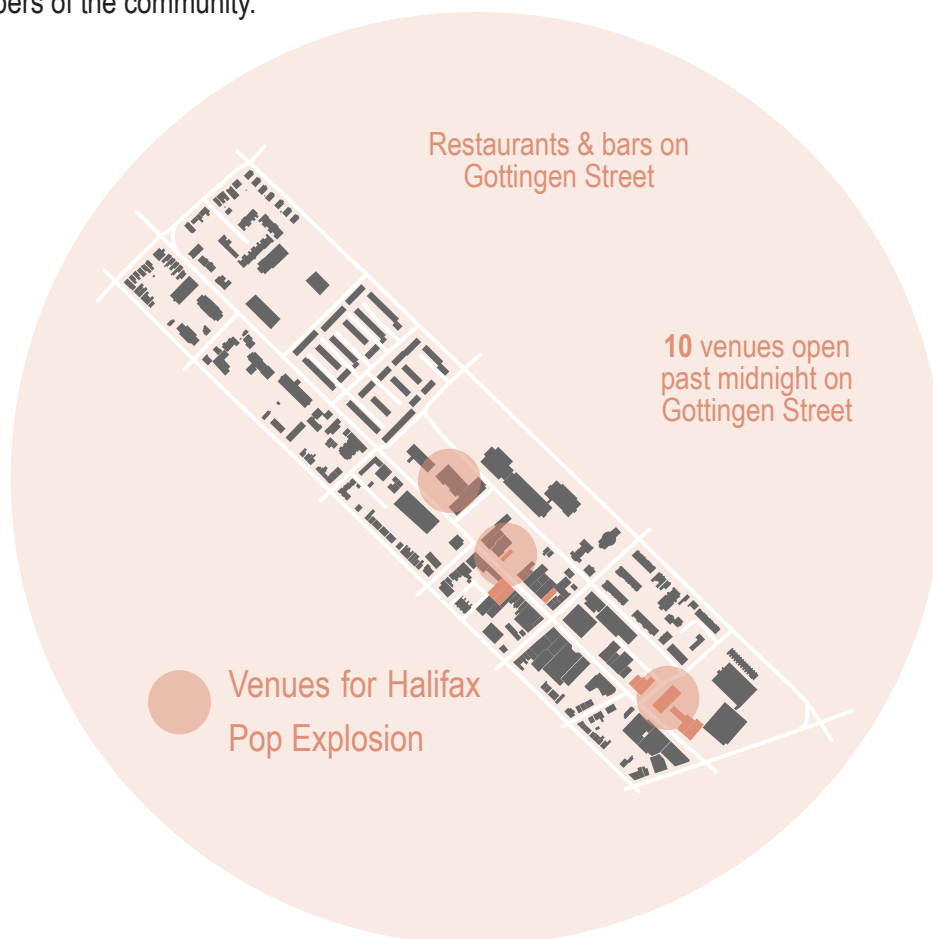
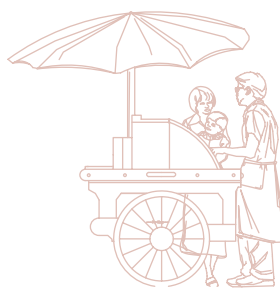


Figure 3.21 : Program Analysis - Venues



MARKET

Gottingen Street has been a food desert for 30 years. In 2013, The Carrot, a community co-op grocery store opened – supporting four full-time staff and providing fresh produce for its 950 members. Even though it had many supporters, it was not able to achieve enough funding to remain as a non-profit, so it was closed after a year of being open. The nearest grocery store is more than 1.5 km away, leaving two convenience stores, that provide little-to-no access to fresh produce, as the only places to buy groceries.

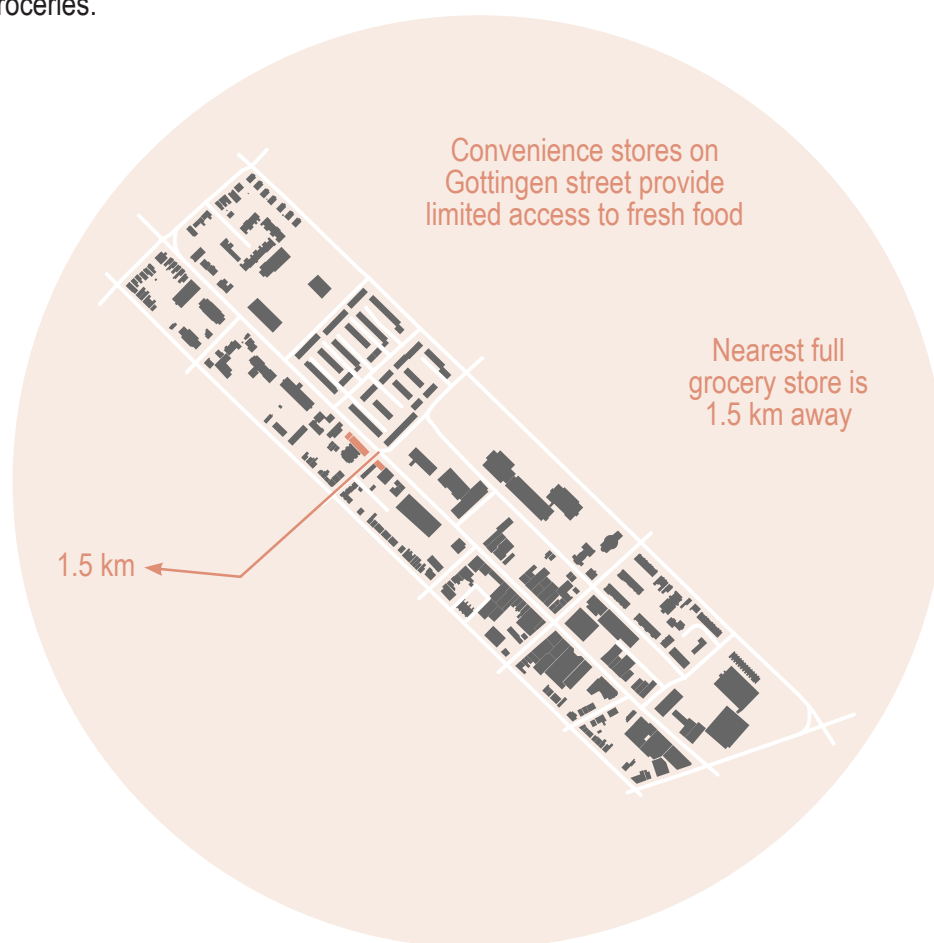


Figure 3.22 : Program Analysis - Access to Food

Design Application

Biodiversity

Having determined the site of the public square, an examination of the existing trees around the area showed that not only were there very few, they were mostly all the same species – alders, elms and poplars. As previously mentioned, a key element of biophilic design and the restorative benefits of nature is through biodiversity. Biodiversity is achieved through varying types/size of trees, time of year for fruit production, as well as varying foliage colour throughout the year. After examining varying indigenous species of trees and plants – both in relation to type, foliage colour and production of seeds and berries to increase local fauna – six new plants were chosen for their varying qualities to provide positive visual variation that promotes restoration and relaxation. Each ring within Figure 3.23 represents different species of trees or plants, illustrating the different foliage colour throughout the year, as well as the difference in scale.

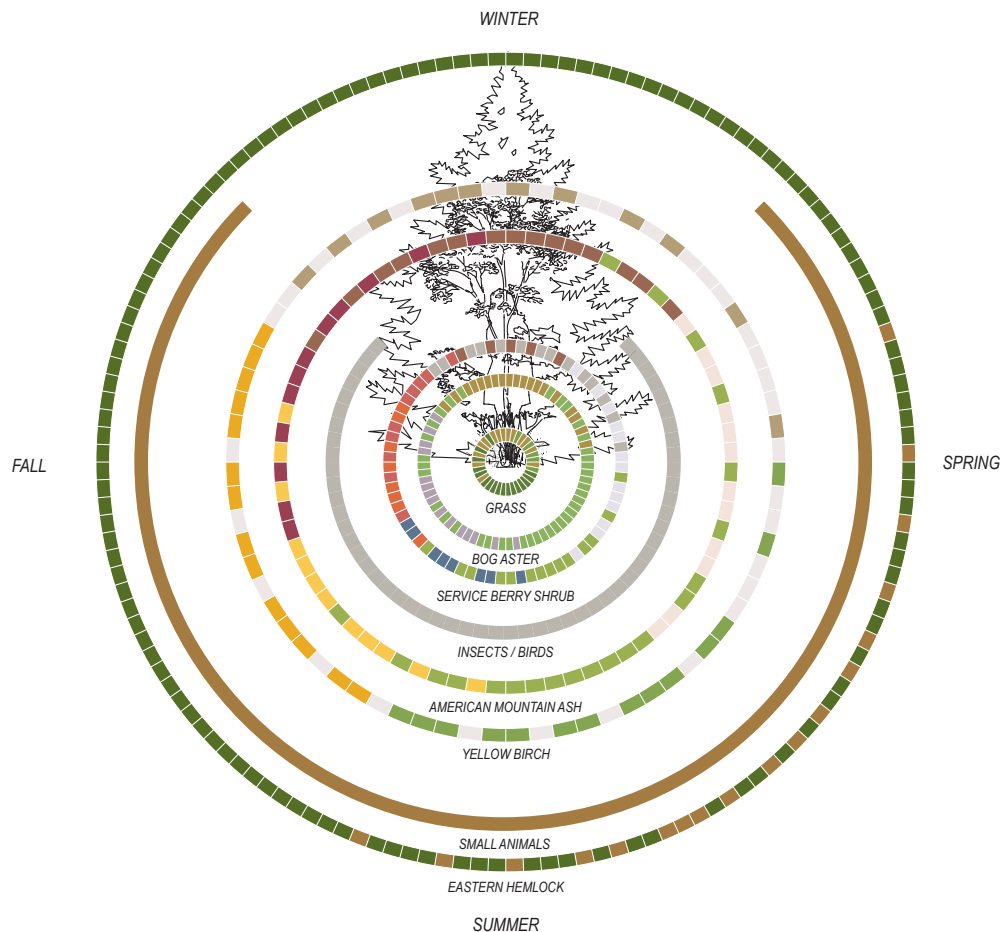


Figure 3.23 : Biodiversity of Halifax Flora and Fauna - Represented Seasonally

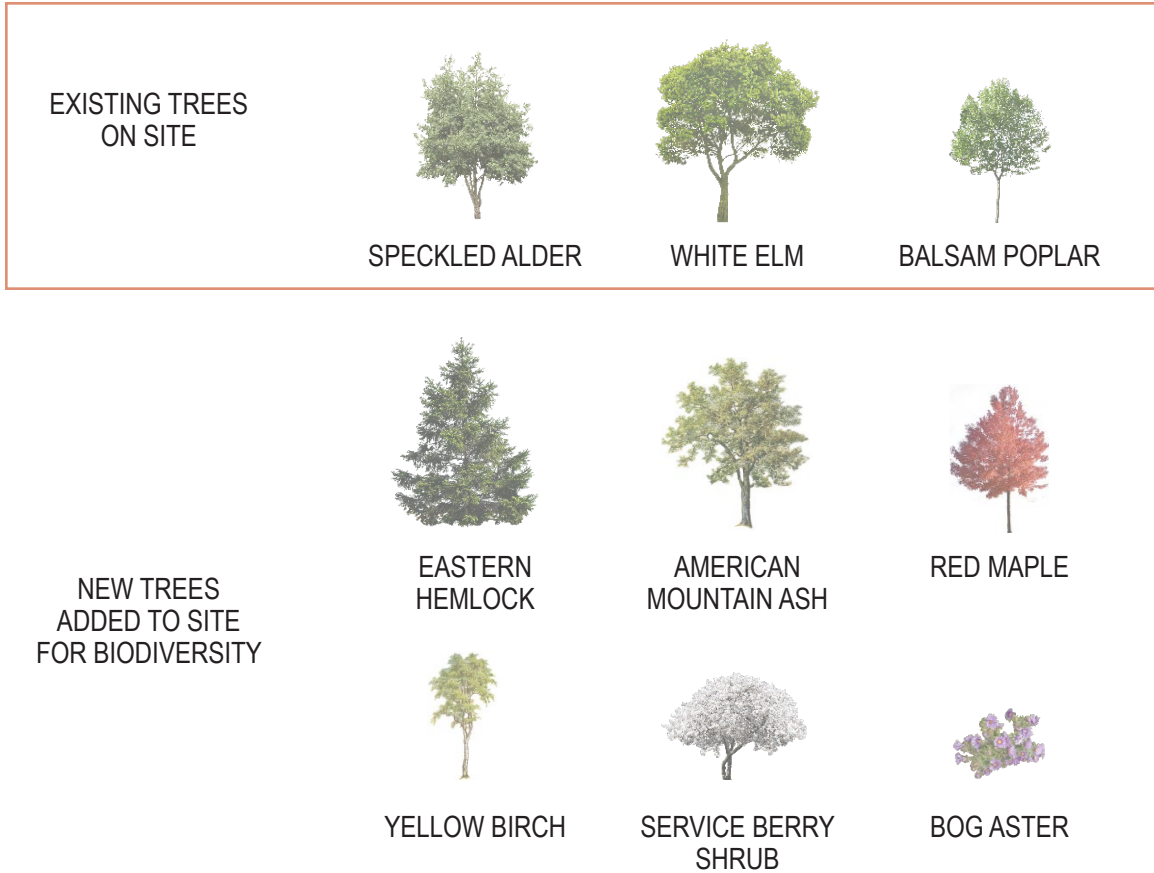


Figure 3.24 : Existing and New Trees on Site

In addition to providing visual variation, the different species provide varying sensorial qualities including: auditory divide from cars on the street, visual divide between users, and spatial divide of spaces. This allows the trees to become an architectural element of the site design.

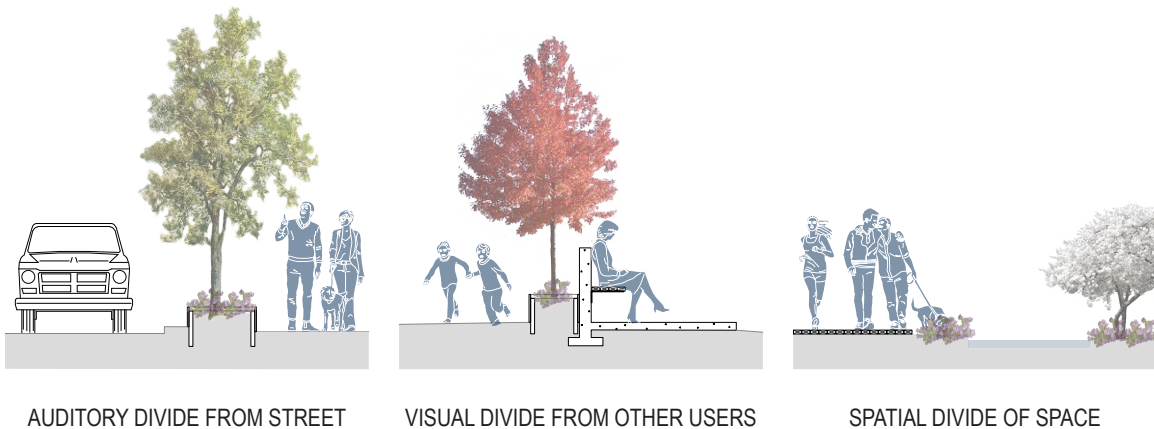


Figure 3.25 : Sensorial Qualities of Trees

Imitation of Nature

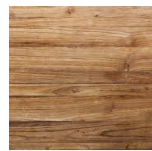
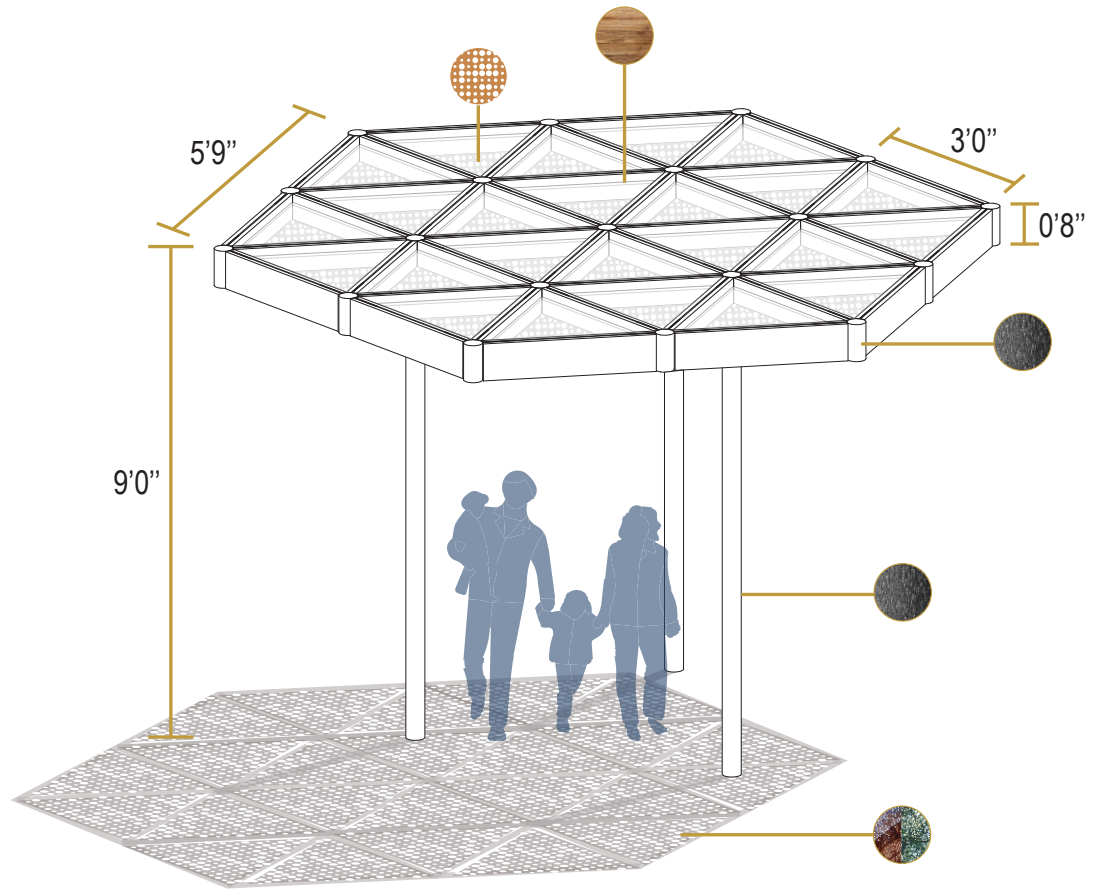
As mentioned earlier, a key component of biophilic design is the imitation of nature. Examining trees from their architectural elements the qualities of trees can be divided into the corresponding architectural elements of ground, wall and roof. The shadows cast through the leaves define the edges of the ground plane, the trunks of the trees define the boundaries of space, as would walls of a building, and the canopy of the trees define the limits of the space, as would the ceilings of a roof. Breaking down the architectural elements of trees into these three categories creates a framework for thinking about how an architectural canopy structure can mimic the sensorial qualities of nature.

The roof structure of the canopy is made of wood beams that mimic the interlocking structure of branches, with perforated corten that imitates the shadows cast through the leaves of a tree, while also providing shelter from rain and snow. The shadows define the ground plane as it provides shade during the day and light during the evening. The columns of the canopy are made of brushed steel to mimic a sense of strength to the structure. Minimizing the circumference of the columns defines the space without creating a visual divide between spaces. The canopy structures create a defined space of use to increase social gathering, as well as act as landmarks or beacons to draw people into and through the site.

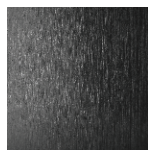
In addition to the canopies to draw people into the site, there is a central water feature, which creates visual stimulation that naturally draws people in, as well as providing an auditory buffer as the frequency from moving water naturally blocks loud sounds. The water feature also has the ability to change programs based on cyclical needs and desires, such as providing a skating rink during the winter and a splash park during the summer.



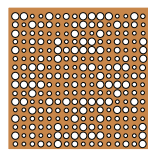
Figure 3.26 : Seasonal Program of Water Feature



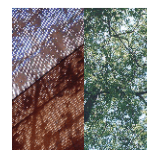
Wood



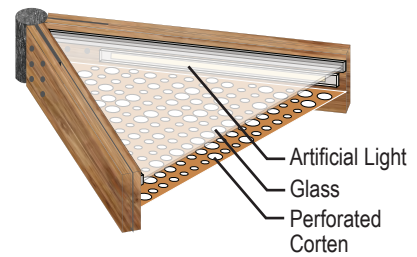
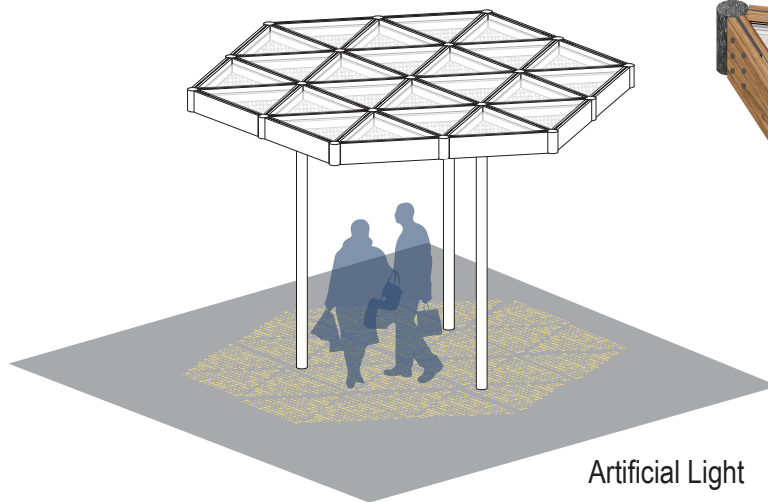
Brushed Steel



Perforated Corten



Imitation of Tree Leaves



Panel Detail

Figure 3.27 : Imitation of Nature & Canopy Design

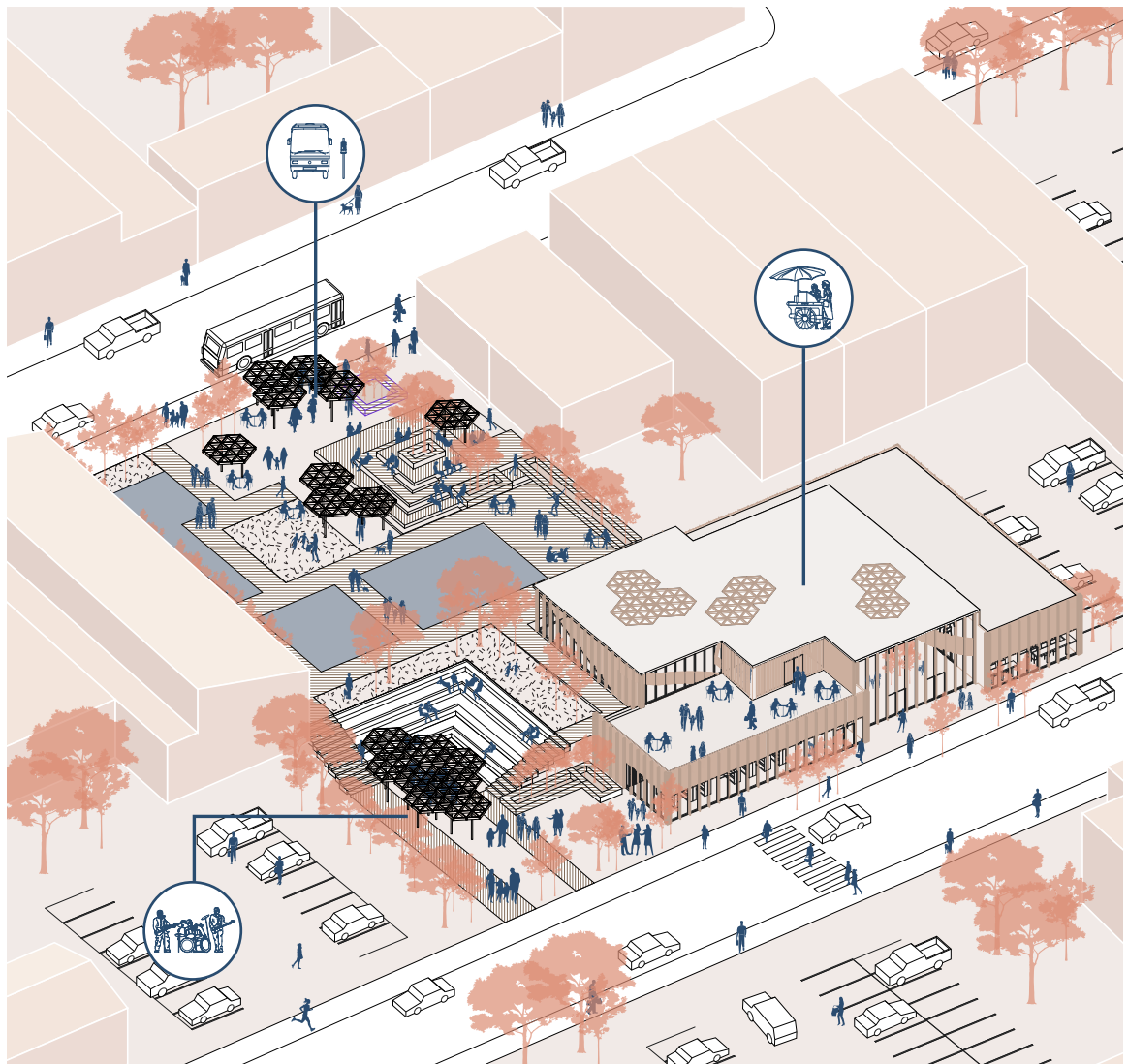


Figure 3.28 : Site Axo

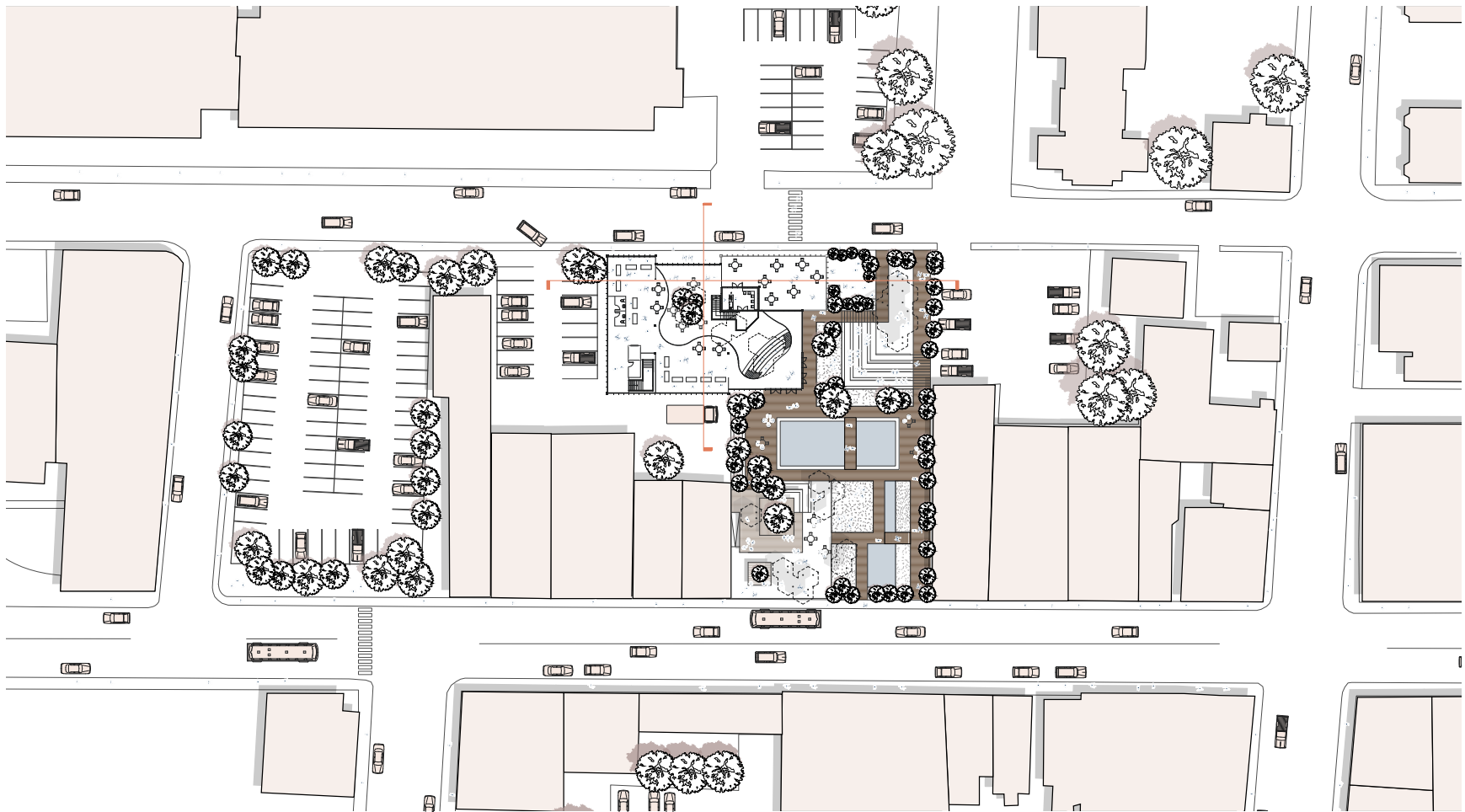


Figure 3.29 : Site Plan



Figure 3.30 : Elevations

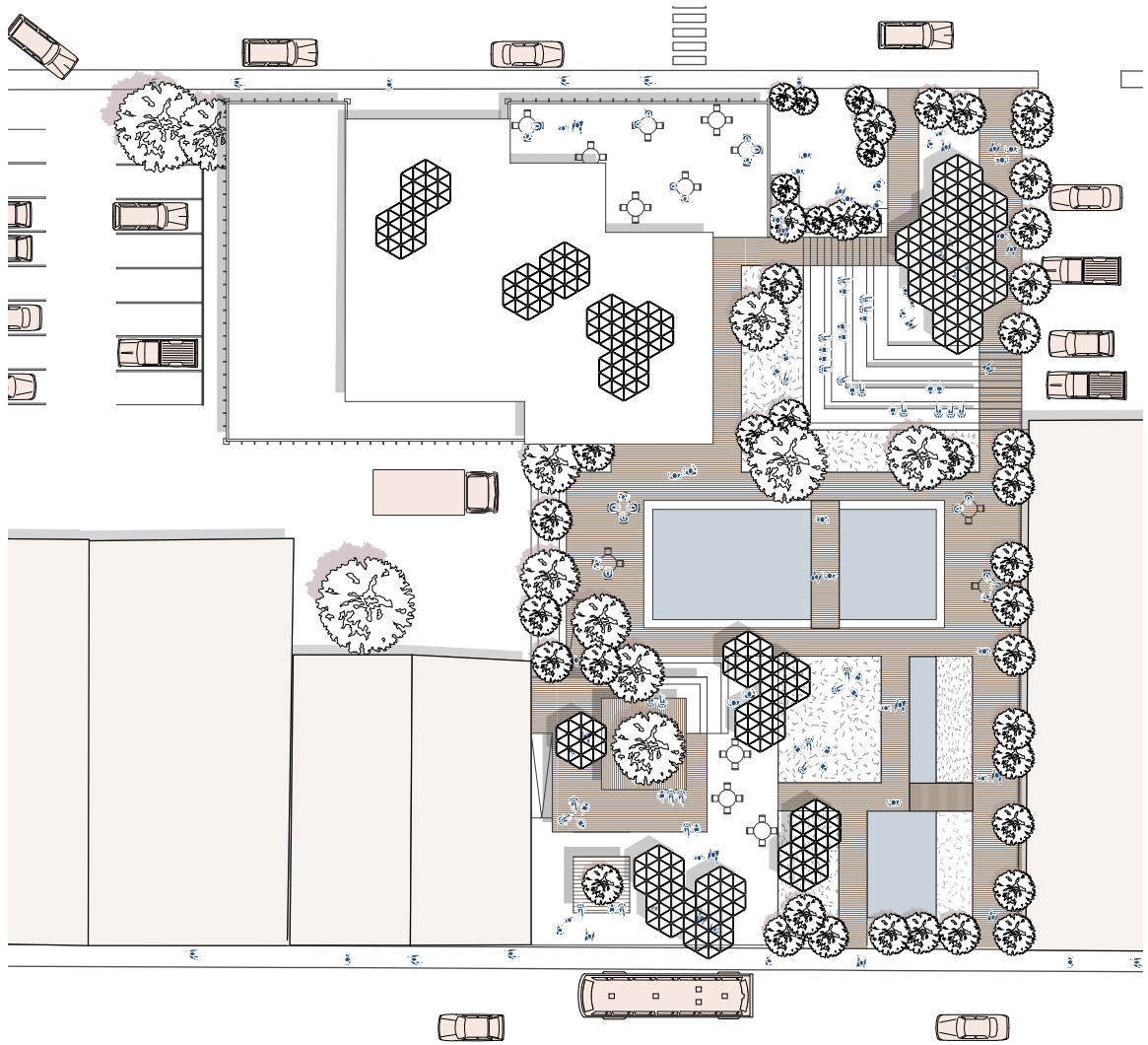


Figure 3.31 : Site Plan (enlarged)

Bus Stop

Beginning from Gottingen street is the new bus stop with adjacent seating space. The close proximity of this program to the street will encourage users to stop and rest while also drawing people into the site and to the other public programs. With the cross programming of the bus stop as a *necessary activity* and sitting, that allows for a moment of rest, as the *optional activity*, this site encourages *social activity* through chance encounters.



Figure 3.32 : Bus Stop Render



Figure 3.33 : Bus Stop Activity Types

Outdoor Venue

Behind the water feature is a social stair that defines the edges of an outdoor venue space. Though it is an outdoor space and would be predominately used during the warmer months, its programmatic variations would center around the changes throughout the day rather than the year. It would provide a space for people to eat, as a *necessary activity*, while those using the stairs to move through the site, as an *optional activity*, could pause to enjoy people playing music, creating social interactions. With the outdoor venue's proximity to the market and lower street (Maitland), the venue's canopies draw people into the site as they see and hear the social interactions taking place.



Figure 3.34 : Outdoor Venue Activity Types



Figure 3.35 : Stage Render

Market

Next to the stage at the back side of the site is the Market. With access from both above, off Gottingen Street, as well as from the street below, Maitland, the Market connects both streets with its public atrium. The atrium also connects the *necessary activities* of the grocery store with the *optional activities* of the retail spaces, creating *social activities* through the flexible programming of the public atrium. As an example, the public atrium creates *social activities* either through work spaces, farmers markets or exhibition spaces. The Market also has a social stair, as an alternative to the outdoor venue, to provide a place for seating, performances, and community events, during the winter months.

The organic shape of the interior mezzanine, as well as its vertical members, imitate the rhythm and materials of nature. The roof structure imitates the structure of the canopies outside, with large wood beams that span the ceiling. While large skylights within the roof structure allows for natural light to enter the atrium while also maintaining a connection to nature through seeing the passing of the sun over the course of the day and the imitation of nature through the similarity to a tree's canopy.

The first floor has fixed programming, while the second floor has an open concept, allowing for various uses, as well as the ability to grow with the needs of the community. The café and outdoor patio provide a more diverse experience of the site, allowing for people to get a bird's eye view of both the social atrium and the waterfront down the hill.



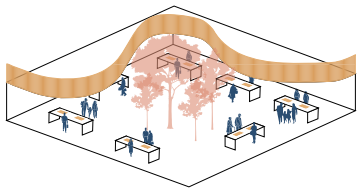
Figure 3.36 : Market Activity Types



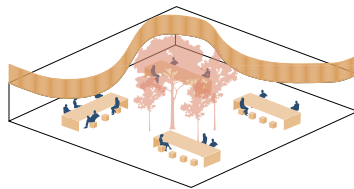
Figure 3.37 : Market Plan (enlarged)



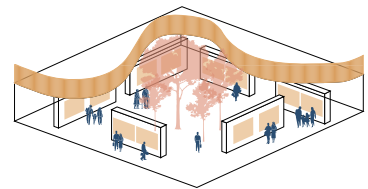
Figure 3.38 : Market Atrium Render



Weekends - Market Space



Week Days - Work Space



Week Nights - Exhibition Space

Figure 3.39 : Flexible Program of Market Atrium

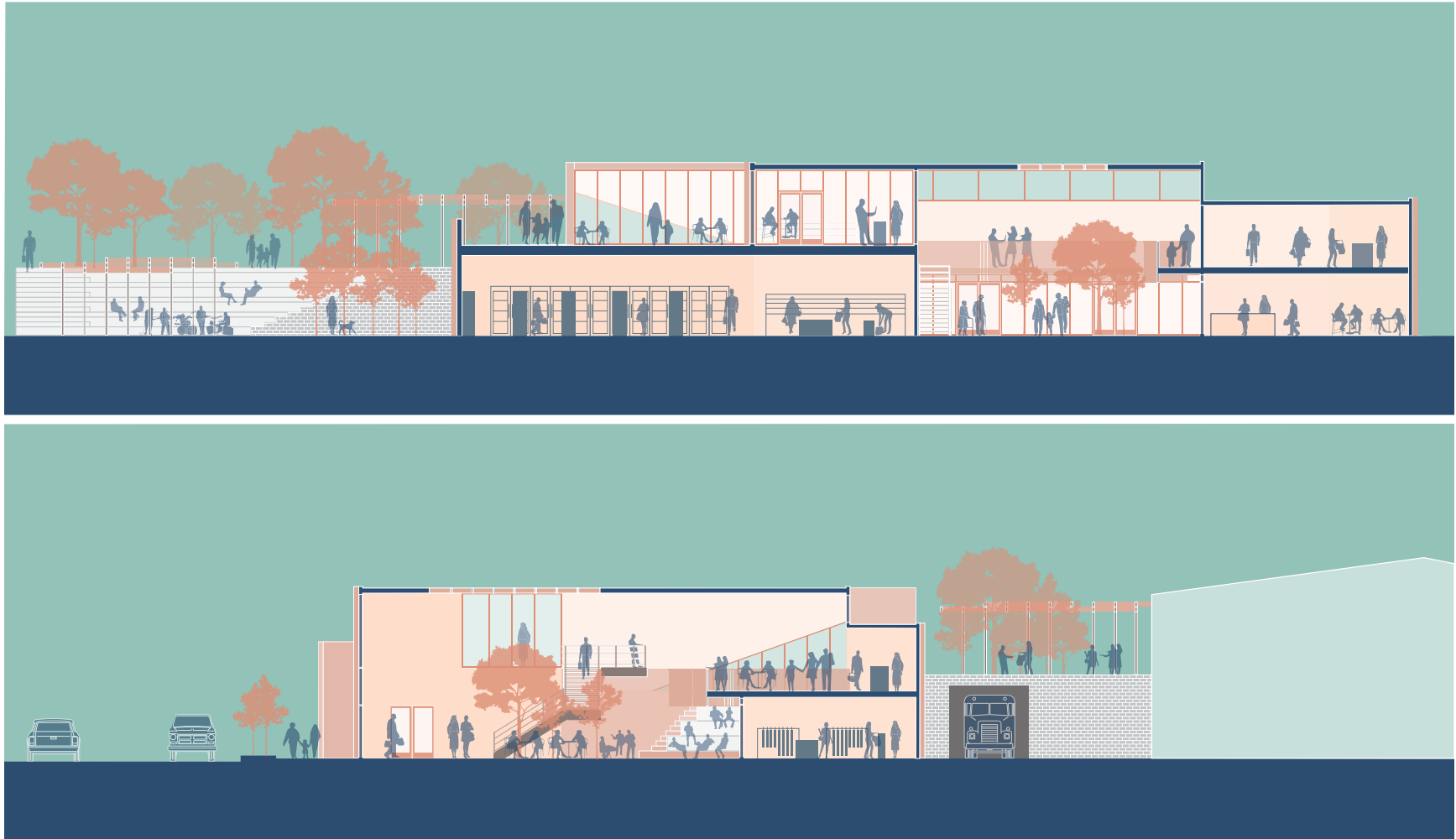


Figure 3.40 : Site Sections

CHAPTER 4: CONCLUSION

Though this document has focused on this one particular site, as it combines all three scales of social interactions, further application of this thesis could be applied to create a network through the design of several sites along the entire street. A series of these public programs would promote positive social interactions to strengthen the collective mental health of the community through site specific programming at the three varying scales of social interactions.

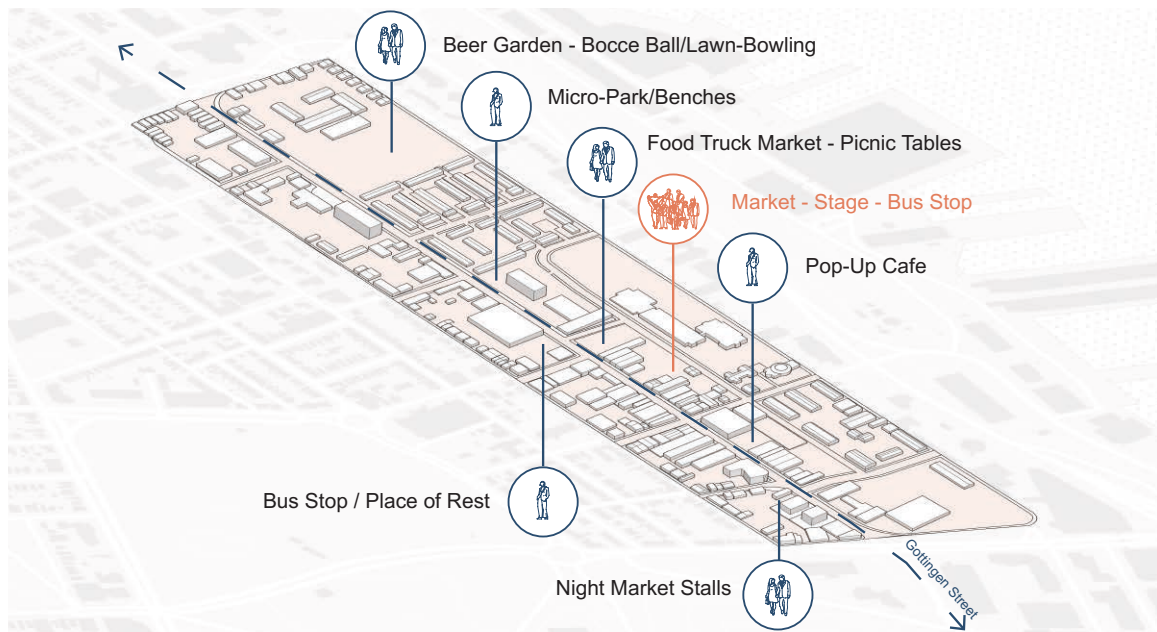


Figure 4.1 : Future Street Development/Iterations

In summary, this thesis project takes a human-focused approach in the design and integration of a public space in an urban context. Using the needs of the most socially vulnerable members of society as the criteria for design, the Gottingen Street location, and in particular the site chosen with its proximity to social services, serves as an exemplary canvas for implementing these design principles. The intention of this thesis is to provide respite from environmental stressors, through the integration of nature and design focused on the sensorial qualities of architecture. Using Gottingen Street as the backdrop for its application, this thesis explores these theories through the design of a public square - home to a bus stop, outdoor venue, and market - and the cross-programming of necessary and optional activities to create unique and meaningful social interactions, benefiting the well-being of the users, through the resultant social activities.

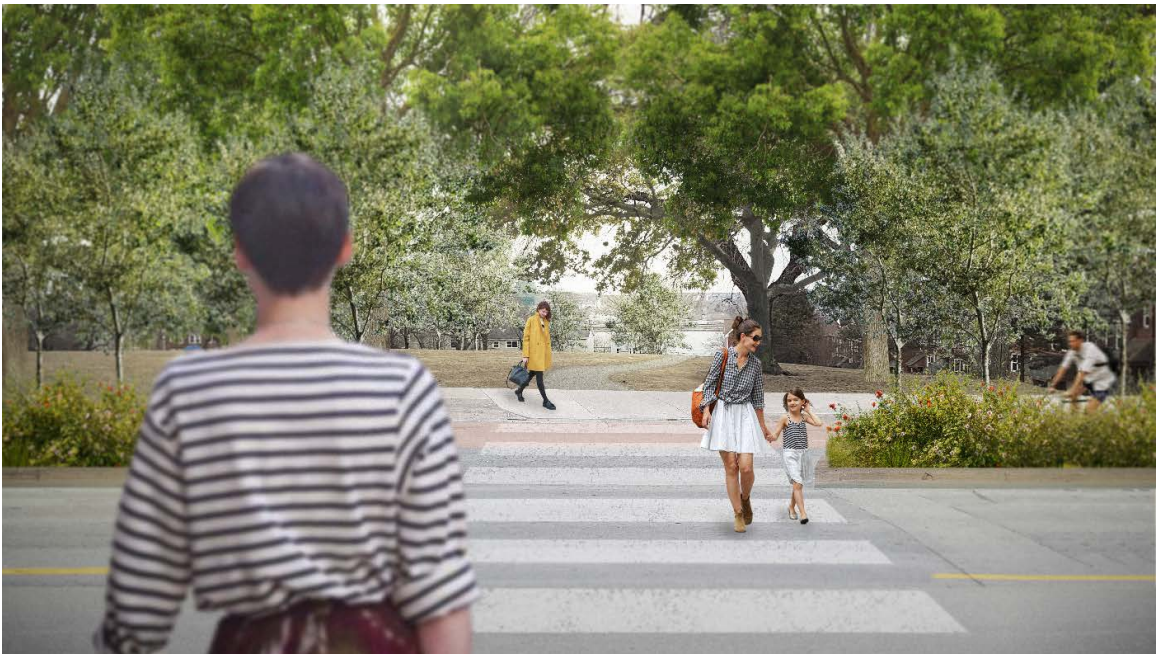


Figure 4.2 : Street Render



Figure 4.3 : Street Render

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