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Master's Thesis of Engineering

# **Climate Sensitive Urban Design of Public Open Spaces for Winter Cities: Edmonton, Canada**

겨울도시를 위한 기후민감형 도시설계  
— 캐나다 에드먼턴 오픈스페이스 사례를 중심으로 —

August 2020

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# **Climate Sensitive Urban Design of Public Open Spaces for Winter Cities: Edmonton, Canada**

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## **Abstract**

This project proposes recommendations and a hypothetical design of a future public space in Edmonton, Canada that will be functional in all seasons, including the winter. The results of this research argue that climate sensitive design considerations in the early stages of planning and design are a vital part of creating year-round functional space in winter cities.

Winter was always the season to stay indoors, and the summer was to enjoy the outdoors. This mindset caused the designs of the public realms to lack for four season, year-round usage. Conferences and world events since the 1980s acknowledged the difficulties of winter living but planning practices to date are still design based on the summer mindset. Although there has been neglect for addressing winter discomforts in Nordic cities, winter sensitive considerations are slowly beginning to be a topic of discussion. It is essential to understand that winter and the change of seasonal temperatures affect our annual daily lives, and design considerations can severely impact how spaces are used, especially in the winter.

Discomforts such as coldness, slipperiness, and darkness are some of the neglected considerations for planning outdoor spaces in the winter season. The purpose of this study was to hypothetically design a future public urban space using climate-sensitive considerations in the northern city of Edmonton, Canada. This study applied recommendations and feedback from existing literature, questionnaire results, and in-depth interviews into the design proposal of the future Warehouse Campus Park in Edmonton, Canada.

Results from the questionnaire illustrated that the main reasons for using public spaces were for programming, such as festivals and events. Future spaces must incorporate elements of year-round functionality that could attract users even on non-festival days. The main barriers that climates sensitive design

considerations included operational and maintenance issues, and the mindset that winter continues to be a season that needs to be endured and not celebrated.

Interviews with local planners determined that the most significant hurdle to the incorporating climate sensitive design considerations in Edmonton, was that the Winter Design Guidelines are non-regulatory, making it difficult to enforce. However, in recent years, there has been an increase in interest from private developers and communities for year-round usable spaces. The conceptual designs presented in the in-depth interview outlined that the City of Edmonton is looking at creating a community green space. Downtown Edmonton lacks in open green spaces and children's play areas; therefore, it is crucial to account for those needs in future designs. It is essential to understand that changing the urban form and planning practices in Edmonton has been a slow process. Although the introduction of winter city design was nearly ten years ago, designing for climate sensitive considerations is still a relatively new concept for developers in the city.

Climate sensitive design considerations not only apply to public open spaces but to the public realm in general. This project informs how urban designers can cater to diverse cultures and needs of the population during the colder winter months. Cold temperatures and winter discomforts will continue to be a barrier to the winter enjoyment unless preliminary stages of planning and design include detailed climate sensitive considerations. The purpose of the design proposal was to address winter discomforts in Edmonton and engage in further discussion in the topic of climate sensitive considerations for northern cities.

**Keywords:**

Winter City Design, Climate Sensitive Urban Design, Winter Landscape Design, Open Space Design

**Student ID:** 2018-24202

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# **1.0 Introduction**

## **1.1. Background**

For a long time, the urban settlements located in the northern hemisphere during the cold winter months has been uncomfortable for residents due to the many discomforts of winter living. The winter season in these regions has limited daylight, snow, and often slippery roads that keep residents inside rather than enjoying what the winter season has to offer. The way the urban fabric was designed and organized in all four seasons affects how people will move and interact in the area. In northern cities, the concept of winter cities became an important aspect in improving residents' quality of life by taking into consideration outdoor comfort and the idea of celebrating the winter season. The winter cities' concept encourages cities located in the northern latitudes to embrace the winter cold and consider functional infrastructure that will benefit all four seasons of the year (City of Edmonton, 2006).

Urban planners and designers are critical players in creating policies that shape the urban fabric of cities based on the needs of the local context and population. The planning of urban spaces often occurs in environments where weather conditions are optimal for construction, usually during the green seasons of spring and summer, and there are rarely renderings within the winter context. The designs and plans based on warmer seasons arguably have minimal regard towards the discomforts during the cold, and sometimes harsh winter months. These winter discomforts include low temperatures, snow precipitation, slipperiness, and darkness (Pressman, 1996). A Winter city, as defined by Pressman, has three main properties: below freezing temperatures, snow precipitation, and limited sunshine (Pressman, 1996). Examples of Winter cities



include, but are not limited to Sapporo, Japan; Edmonton, Canada; Helsinki, Finland; and Lulea, Sweden. This harsh, cold winter weather only affects a part of the world for several months a year. Therefore, the urban space design during the colder, snowier months should be significant factors to decision making, but it is often neglected for several reasons. According to Ebrahimabadi, the four main barriers to climate-sensitive winter city design includes factors such as the lack of engagement from policymakers and urban designers; neglecting climate opportunities and perceiving the cold urban climate as a barrier rather than an opportunity; overlooking local experience and the needs of citizens living in cold climate conditions; and the lack of access to climate data and analytical tools that can help urban designers make informed decisions (Ebrahimabadi, 2012).

Public urban spaces and parks, in particular, are an essential part of the urban fabric. Parks bring together communities, is a venue for festivals and events and is an excellent escape for those looking to connect with nature. Neighbourhood parks within communities bring together residents of that area and provide a form of leisure and recreation. Urban parks are especially important for areas of the city, such as the downtown core. A successful downcore has businesses, civic services, and housing, but it also needs to have entertainment, restaurants, and a connection to nature and opportunities for recreation. When tall buildings surround a downtown core, it becomes difficult to incorporate natural elements. Trees and other vegetation are simple addition to a downtown core to make it more vibrant and less mundane, but there are other issues such as lack of sunlight, and the need for watering and draining considerations making it difficult for vegetation to thrive in a dense downtown.

## **1.2. Winter Cities Movement**

The term winter city is defined as cities that experience “prolonged periods of cold temperature (normally below freezing), precipitation (usually in the form of snow and where water is frozen), restricted hours of sunshine or daylight, and which experience seasonal variation”(Pressman, 1988, p. 11).

The discussion of winter cities began in the 1980s when the idea of leisure in the winter seasons began to take an interest in cities located in northern climates. Arguably one of the first cities in Canada to host a Winter related conference was Edmonton. Edmonton hosted the Winter Cities Showcase in 1988, which was among some prominent events that promoted the importance of leisure and recreation during the winter months (Neal & Coles, 1989). The difficulties of winter living were recognized in the early 1980s, especially with annual snowfall and cold temperatures. Hence, The Liveable Winter Cities Association (LWCA) was formed in 1982 following a conference in 1978 for Northern cities around the world to share their knowledge and technology of winter cities (Winter Cities Conference, 2019). The Winter Cities Institute (WCI) then took over the work from the LWCA in 2008 and has continued to provide information for northern communities to connect and share how they are creating sustainable and livable space through promoting livable winter cities (Winter Cities Institute, 2020). The WCI continues to be a valuable network of municipal and town professionals ranging from various disciplines including planning, architecture, and engineering.

### **1.3. Research Questions**

The research questions were formulated to address the issues and the potential of winter city design. The research questions are as follows.

1. How effective is the City of Edmonton's Winter Design Guidelines, and what are the barriers to implementation?
2. What is the level of consideration taken into creating or contributing to year-round four-season gathering spaces?
3. What are some of the improvements and considerations that can be made to improve the process of including winter city design recommendations?
4. What are the potential scenarios of the park development and adjacent areas?

### **1.4. Research Purpose**

This project aimed to propose a hypothetical design of a climate sensitive public open space in Edmonton, Canada. Most winter city design research to date focused on transportation and soft mobility in winter months (Chapman, 2018; Chapman et al., 2017; Ebrahimabadi, 2012), and less on how the design of public urban spaces should cater to the diverse and different demands during the cold winter months.

This project explored the opportunity to design a park in Downtown Edmonton that would have year-round functions for users in the surrounding area. The outcome of this project was to develop a design proposal for a future park in Downtown Edmonton, designed primarily with a winter focus. This project

documents the process of including climate sensitive winter considerations that reflected the needs of residents and the City of Edmonton.

## **1.5. Project Scope**

This project proposed a hypothetical design for the Warehouse Campus Neighbourhood Central Park (Warehouse Campus for short) located in Downtown Edmonton. The project analyzed current recommendations from literature and documents about winter city design that was applied to the park's design. This project designed the Warehouse Campus subject area by taking into considerations for alleviating the issues and barriers of winter cities and taking in recommendations for a more vibrant, livable winter city. Therefore, modelling of the future developments adjacent to the Warehouse Campus Park was done to understand the effect that the surrounding developments would have on the park through wind and sun shadow analyses.

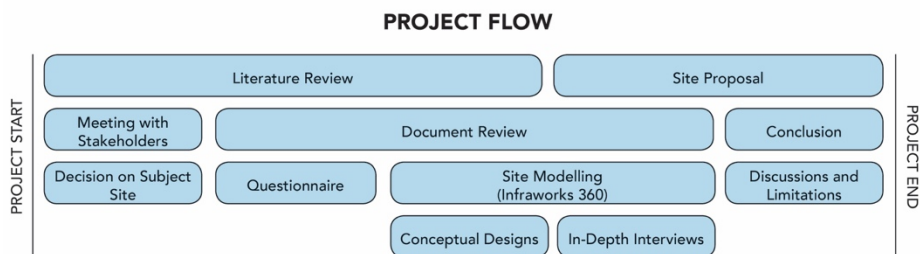
The project was modelled in Autodesk Infraworks, a BIM (Building Information Modelling) software, which will helped visualize the design of the site from all perspectives. Rather than being extremely focused on technical and climatic analytical tools, the design was the outcome of applying recommendations from the existing literature and public engagements. This project was not a collaboration with any public or private entity and was separate from the City of Edmonton. This project will hopefully become a useful term of reference to aiding the future design decisions for the Warehouse Campus Park.

## 1.6. Methodology

This project began with a literature review to understand the concepts, barriers, and recommendations of winter city design. It included a review of how the City of Edmonton policies and guidelines catered to winter city design. Also, other case studies of successful year-round open spaces were included.

The questionnaire received 102 responses and was conducted to understand how the general population of those mostly working and socializing in Downtown Edmonton perceived climate sensitive considerations of public spaces in the Downtown neighbourhood. The questionnaire asked for the participants' perceptions of winter city design in Edmonton, and their expectations for the future Warehouse Campus Park.

The responses from the questionnaire, findings from existing literature and documents were utilized to help develop three conceptual designs for the Warehouse Campus Park, which was modelled into Autodesk: Infraworks. Once the conceptual designs were completed, in-depth interviews were conducted with relevant professionals in Edmonton, who were both knowledgeable in planning and winter city design. The end of the project proposed programming, and climate sensitive recommendations for the future of Warehouse Campus Park.



**Figure 1:** Project Flow

## 2.0 About Edmonton

### 2.1. General Information

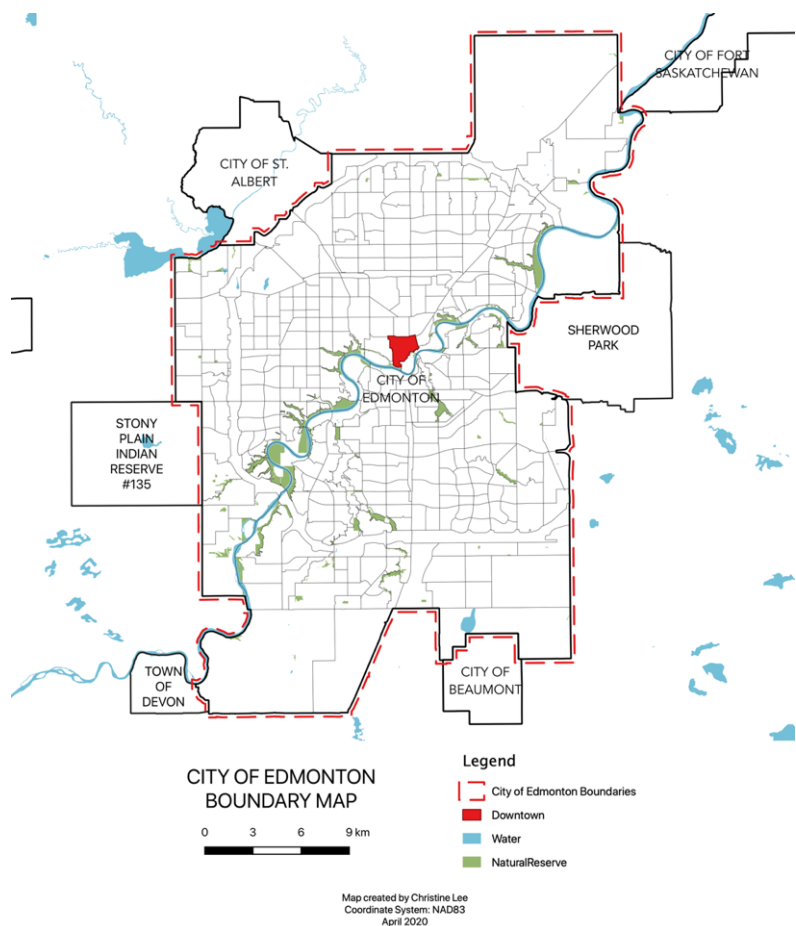
Edmonton, Canada (53.5461° N, 113.4938° W) is the capital city of the prairie province of Alberta (See Figure 2) and is recognized as “North America’s northernmost large city” (City of Edmonton, 2016, pg.6).



**Figure 2:** Capital City Locations and Names of Canada (Natural Resources Canada, 2001)

Covering 684m<sup>2</sup> with 289 neighbourhoods (Figure 3), Edmonton is one of the fastest-growing cities in Canada with a population of 972, 223 people according to the 2019 Census (Statistics Canada, 2020). There is an expectation that by 2044, Edmonton's population will double to 2.2 million residents (City of

Edmonton, 2017a). Edmonton is also younger compared to other cities in the country with the largest population of citizens being between 30-34 years old (City of Edmonton, 2019a), Edmonton has an average age of 37.7 compared to the national average of 41 (City of Edmonton, 2017a). Edmonton is also proud to have one of Canada's largest parks, with the North Saskatchewan River flowing from Southwest to the Northeast direction, giving Edmonton a vast green space known as the River Valley. With “more than 60 kilometres of maintained pathways and 20 major parks” (City of Edmonton, 2020)



**Figure 3:** City of Edmonton Boundary Map

## **2.2. Edmonton Weather**

Edmonton is a city that experiences all four seasons throughout the year, with winter being one of the longest seasons that can last up to 6 months. The summers in Edmonton can reach 35°C and dip to -40°C in the winter with the wind chill. According to the Köppen climate classification, Edmonton is considered under Dfb (warm summer continental) and is projected to remain under that category until at least 2050 (Rubel & Kottek, 2010). The Dfb classification indicates that the average monthly temperatures are below 22°C, with at least four months greater than 10°C (Larson & Lohrengel, 2011). Compared to other Canadian cities in the Winter, Edmonton generally experiences less snow precipitation and is relatively dry (City of Edmonton, 2016). Edmonton and other prairie cities are extremely sunny throughout the year. Edmonton itself has approximately 325 sunny days annually, with nearly 120 of them between the winter months of November to March (City of Edmonton, 2016).

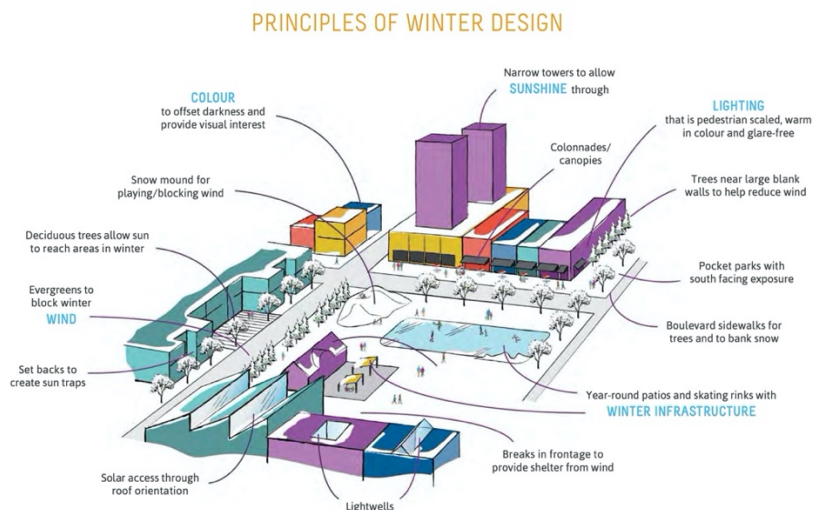
## **2.3. Winter City Edmonton**

Edmonton was chosen for this project for various reasons. The first reason is that Edmonton prides itself as a Winter City and has been a part of early winter city events and conferences such as the Winter Cities Showcase in 1988 (Neal & Coles, 1989). The Winter Cities showcase saw representatives from 160 different communities, and 16 countries, whom all came together to share their ideas on winter “leadership, recreation, infrastructure/ buildings, transportation, and clothing,” which eventually gained international media attention (Neal & Coles, 1989). The City of Edmonton was one of the first cities to actively engage in the winter city movement, because of Arni Fullerton, who was living



in Edmonton and was inspired by other pioneers of the movement: Takeshi Itagaki – Sapporo Japan; Bill Rogers – Minneapolis, USA; and Jack Royle – Winnipeg, Canada (Neal & Coles, 1989).

In 2013, the City of Edmonton approved *For the Love of Winter: WinterCity Strategy Implementation Plan*. The approval of the WinterCity Strategy showed the world how a government body, recognized the values of being a winter city at a municipal level. The WinterCity Strategy was a “blueprint for change” with ten goals based on the four pillars of Winter Life; Winter Design; Winter Economy; and Winter Story (City of Edmonton, 2013). The winter city narrative was further emphasized and supported when the City of Edmonton held an international winter conference called the WinterCities Shake-Up in 2015, and again in 2017. In 2016, the City of Edmonton approved the Winter Design Guidelines, 93-page document on how winter cities should be designing their cities with climate sensitive considerations for the winter.



**Figure 4: Principles of Winter Design.**  
(Winter Design Guidelines, p. 7)

Edmonton is known as Canada's festival city. Not only does Edmonton have many festivals in the summer months, but it also has an extensive list of winter festivals and events throughout the city including: the Flying Canoë Volant; IceOnWhyte; Silver Skate Festival; Edmonton Ice Castles; Tire d'erable; Deep Freeze; Candy Cane Lane; Carnaval des Sucres (Maple Sugar Carnival); and the French Quarter Christmas Market. Edmonton prides itself being a Winter City and plays an active role in promoting many winter festivities throughout the year.

Even though Edmonton experiences up to 6 months of winter, the design of public spaces still needs to be designed for year-round use; this not only includes designing for the short 2-month summers but for 6-months of winter comfort well. When the design of a place includes winter city considerations, it can already have the potential infrastructure and space needed for active usage in all seasons. When public spaces are designed with the summer mindset, climate sensitive winter design considerations are often overlooked and neglected. This neglect in planning causes public spaces to be underutilized when the temperature drops below freezing. By considering the urban design for cold, winter cities, "the adaptation of micro-climate principles can extend the outdoor season for northern countries for up to 6 weeks" (Pressman, 1988).

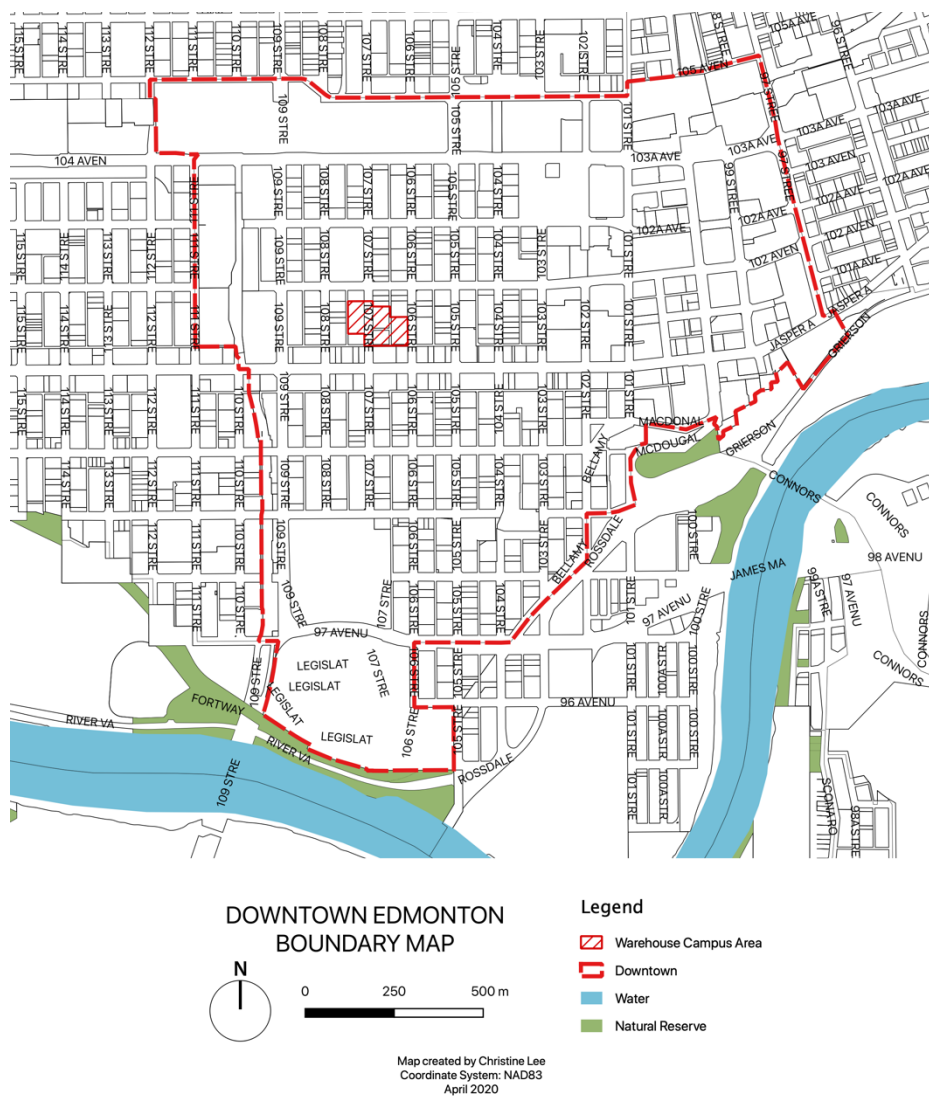
## **2.4. Downtown Edmonton**

Edmonton has a downtown core that is relatively less dense, and for a long time, has seen low building heights compared to other large Canadian cities such as Vancouver and Toronto. The implemented height restrictions on Downtown buildings was due to the City Centre Airport. For the safety and visibility of incoming and outgoing flights, this heavily affected the urban development of the neighbourhood. In 2013, the airport closed down. Subsequently, in 2014, the height restrictions were lifted with the approval of Bylaw 16859 which was the complete deletion of the Airport Protection Overlay (APO) from the Edmonton Zoning Bylaw. The removal of the APO removed height restrictions, allowing the development of taller buildings within Edmonton's Downtown Core. As buildings increase in height, and the Edmonton skyline evolves, Edmonton's Downtown will notice that the public spaces that currently exist within the area begin to be affected by more sun and shadow influences. As the desire to densify downtown becomes more in demand. It will become increasingly challenging to connect citizens and those living and working Downtown to green spaces that will be available year-round.

The downtown core is also a major transit hub with buses and LRT (light rail transit) services that will bring citizens from downtown to the rest of the city. Downtown is built based on a gridiron street structure, with avenues running west-east and streets going north-south. Like many downtowns in Canada, Edmonton has an extensive pedway system that connects office buildings to shopping malls to LRT stations, which also keeps those working downtown inside most of the time. While pedways are a convenient mode of transportation,

it promotes indoor travel, and in the winter, it arguably keeps pedestrians off the streets, creating a less attractive public realm.

There is an abundance of high residential and office towers and surface parking lots that make up the land use in Downtown Edmonton. Compared to the rest of the city, more people commute to Downtown via ETS (Edmonton Transit Service), because of the extensive areas of service and expensive downtown parking (Canadian Urban Institute, 2012). For a long time, Edmonton was known as the “donut city” where citizens go downtown only for work, leaving the Downtown empty outside regular office hours. In recent years, Edmonton has seen multiple large-scale projects such as the Ice District, which is an entertainment district with open space, residential, office, and retail use surrounding the newly constructed \$614 million (CAD) Rogers Place hockey arena that was completed in 2016. Since then, there have been many new towers such as the Edmonton Tower (130m), the JW Marriott Hotel (191m), and the Stantec Tower (248.9m). Furthermore, the 69 storey Stantec Tower is now the tallest building in Canada west of Toronto. Before removing the APO, the tallest building in the city was The EPCOR Tower at 149m. This shows the evolving nature of densification in Downtown, and the push to get the population back into the central core.



## **2.5. Edmonton's Green Network Strategy**

In addition to Edmonton's River Valley, Edmonton has various green spaces in the form of community and neighbourhood parks spread out throughout the city. *BREATHE: Edmonton's Green Network Strategy* recognizes the importance of providing usable outdoor green space to the growing population. *BREATHE*'s goal is to turn Edmonton into a connected green network through the three main concepts of Ecology, Celebration, and Wellness (City of Edmonton, 2017b).

*BREATHE* also visually outlines the existing and future conditions of the open space and parks in Edmonton. Generally, with the projected increase of population in the future, the amount of open space per 1000 residents is projected to decrease. Of all areas, Edmonton's central core neighbourhoods (Downtown and adjacent neighbourhoods) expects to experience a decrease of open space from to average of 6-10 ha per 1000 residents to 0-4 ha per 1000 residents (City of Edmonton, 2017c). The decrease is a result of the central core population doubling to over 40,000 residents in the future from the current Downtown population of around 21,000 residents (City of Edmonton, 2019b). Therefore, it is essential to ensure that the design of future public open spaces is multifunctional, accessible, and useable throughout all seasons of the year.

## **2.6. Warehouse Campus Neighbourhood Central Park**

The Warehouse Campus Neighbourhood Central Park Area (~16,500m<sup>2</sup>) was chosen as the subject site for this area due to how it has already been set out by the City of Edmonton as a place for future green space development. The site currently functions as a surface parking lot, but there have been recent approvals for development in the southwest and northeast corner of the potential park site. The boundaries of the site include 106 street to the East, and

until the alleyway west of 107 Street. The north boundaries go until the end of the surface parking lots, and the alleyway north of Jasper Avenue acts as the southern boundaries.

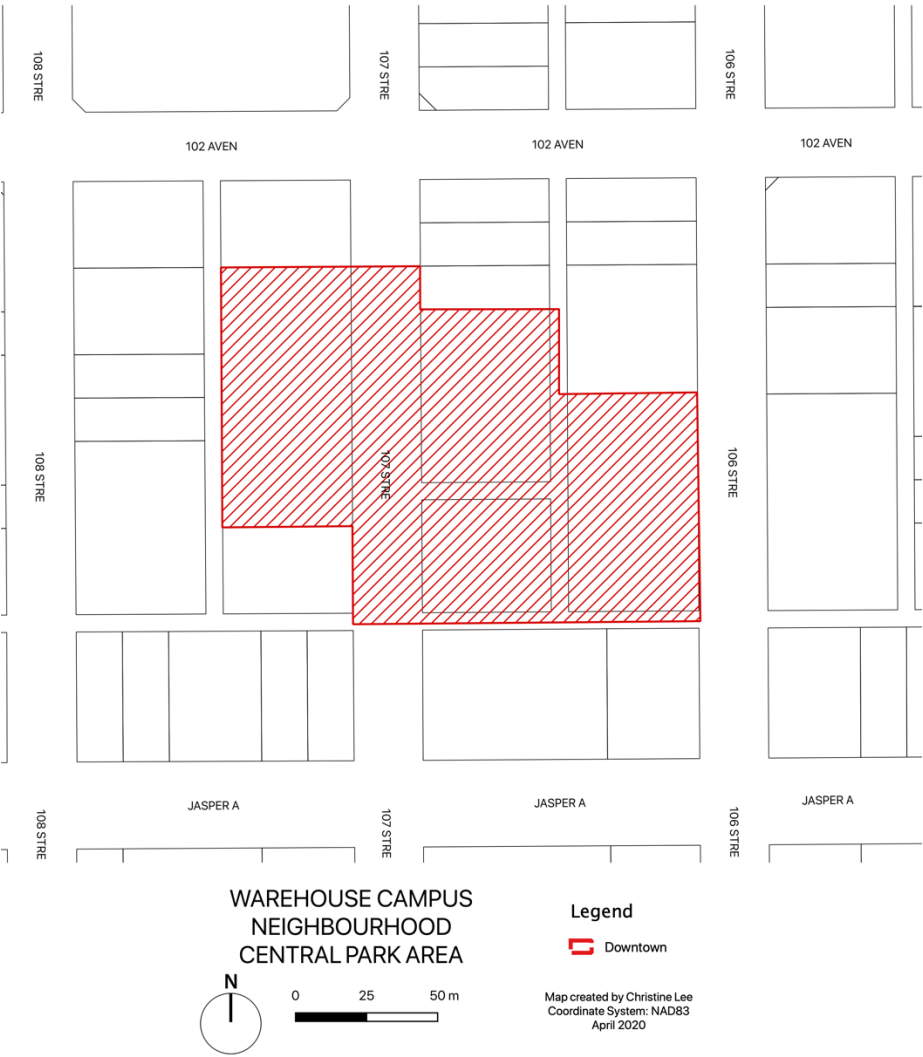


Figure 6: Warehouse Campus Neighbourhood Central Park Area Map

### **2.6.1. Downtown Public Places Plan**

Edmonton's Downtown Public Places Plan (DPPP) is a 20-year vision that implements the BREATHE strategy into more specific plans for the Edmonton Downtown neighbourhood (City of Edmonton, 2019b).

The Warehouse Campus Park is labelled as one of the "big moves" in the DPPP to help integrate and connect users throughout Downtown. The City of Edmonton has already provided funding for purchasing dedicated land to this park (City of Edmonton, 2019b).

The DPPP (2019) outlines that the future of the Warehouse Campus Park envisions a community park with the following proposed programming elements:

1. Exercise + Active Transportation
2. Leisure + Retreat
3. Recreation + Sports
4. Community Gathering
5. Play
6. Washroom
7. Views + Vistas (MacEwan University 107 Street Towers)

The programming proposed was mostly supported through the questionnaire that was completed for this design project (see section 4.3).



## **3.0 Literature Review**

### **3.1. Introduction**

The focus of the literature review had three main parts. The first part was about the outdoor comfort, focused on thermal and wind comfort. The second part covered the barriers and recommendations for winter city design considerations. The last section focused on designing for the user experience, specifically in outdoor spaces. The literature review was utilized to frame the questionnaire that was sent out to the organizations in Downtown Edmonton and welcomed responses from the general public about public spaces in Downtown Edmonton.

### **3.2. Outdoor Comfort**

Of the various discomforts during the winter season, the cold temperatures and wind are among the most uncomfortable. When the design of the public realm does not address or include outdoor comfort elements for the winter, the public realm becomes an undesirable space to linger and socialize. Therefore, it is important that thermal comfort and wind comfort are taken into consideration in the early planning stages of a project.

#### **3.2.1. Thermal Comfort**

In the colder, snowier seasons in northern climates, it is often more challenging to get people to stay outdoors and enjoy the weather. Most of the time, the thermal temperatures outdoors in the winter does not create an ideal environment for long periods of enjoyment, as it would be uncomfortable and too cold to do so in the wintertime. Thermal Comfort, defined as “the condition of the mind that expresses satisfaction with the thermal environment” (The American Society of Heating Refrigerating and Air-Conditioning Engineers,

1997). Thermal Comfort is simulated by combining climate data, CFD (Computational Fluid Dynamics) and solar simulations (Davies & Engineering, 2019). Thermal comfort is especially important in regions that experience extreme weather conditions. While there are many studies on designing for summer thermal comfort, not the same can be said about winter thermal comfort.

In the winter seasons, the outdoor activities level can be based on various elements such as the temperature or the level of snow precipitation outdoors. The level of outdoor comfort is important when designing for outdoor spaces, as it will affect how that space gets utilized in both the cold winter and hot summer seasons. As the definition suggests, the determinants for thermal comfort depend not only on one sole variable but also on the physical, physiological, and psychological adaptations of the individual in response to the outdoor temperature levels (Nikolopoulou & Steemers, 2003). Physical adaptations are the actions that individuals take into changing the environment around them to improve their own thermal comfort levels, and the examples include layering more clothes or grabbing a hot coffee (Nikolopoulou & Steemers, 2003). Physiological adaptation is the gradual process of getting used to the outdoor temperatures through constant repetition; however, this factor alone was lacking in determining thermal comfort levels (Nikolopoulou et al., 2001). Psychological factors also play a factor in the design of thermal comfort. Factors such as the personal expectations and experience of the outdoor space can play an immense role in affecting the psychology of users in these outdoor spaces (Nikolopoulou & Steemers, 2003).

Thermal comfort itself is a concept that is difficult to measure despite available measures and studies. The term itself will vary from place to place, as well as

from person to person. A study conducted in Shanghai found that people who were more accustomed to the temperature differences throughout the year were those who stayed in Shanghai for a more extended period, and those who were relatively new to the city had a lower tolerance to the Shanghai winters (Chen et al., 2015). Everybody functions and has different tolerances to cold temperatures, making it challenging to design a space for a specific group of people. Instead, designs of urban spaces should consider the potential barriers of creating an all seasonal outdoor gathering space at a policy level. In most municipalities across Canada, approvals to specific projects within the city depend on the kinds of policies and guidelines that are in place to guide companies designing or developing within city limits. If considerations for winter city design are not discussed in preliminary designs before the permit's approval, it is difficult to impose new policies and guidelines after a development has been approved (Eliasson, 2000).

Current studies focused on the winter season explore residents' thermal comfort in certain public spaces after the spaces were designed (Chen et al., 2015; Nikolopoulou et al., 2001; Nikolopoulou & Steemers, 2003; Thorsson et al., 2004). The results from these studies discuss how users of the area react to a space that was already designed and constructed and focused on the user's perception of thermal comfort by asking how cold and comfortable they were. However, it does not discuss how their respective subject areas can be re-designed better to accommodate and improve the thermal comfort of users in the area. The discussion on the urban design of the space can be extremely helpful to urban planners, designers, landscape architects, or those in related fields, and it can inform the future design of public spaces.

Research to date has been addressing the thermal comfort of users in an already designed space and about how the future of design spaces should be designed with a winter city focus; however, there is an abundant lack of studies outlining how successful the spaces were designed to accommodate for all seasons.

### **3.2.2. Wind Comfort**

Our urban form can play a significant role in how the wind is received and felt by users at the pedestrian level. While wind is another factor in the weather that the general population perceives the need to endure, factors such as orientation, heights, and widths of buildings can help alleviate the uncomfortable winds, especially during the winter. A study conducted in Shenyang, China investigated different building forms within the Downtown area through Wind tunnel simulations in the winter season and found that compared to high-rise towers, uniform height medium-rise buildings provided a better wind environment (Meng & Setoguchi, 2009). The same study also proposed design considerations for the design of high-rise buildings to have better wind comfort. Tall buildings, given their large surface areas, create larger wind downdrafts to the pedestrian realm; therefore, it was advisable to have podiums; however, it was also noticed that having a podium may potentially affect nearby open spaces (Meng & Setoguchi, 2009).

Similarly, the City of Edmonton Winter Design Guidelines suggests that building podiums are not taller than the height of the road to create a 1:1 ratio between the street width and podium height (City of Edmonton, 2016). However, it should also look into more details of wind downdrafts specific to the type of area, such as podiums being adjacent to large public open spaces. From the study in Shenyang, although podiums may help dissipate wind, more

design considerations such as podium setbacks, creating pocket spaces, and vegetation is other considerations for designing podiums for wind comfort (Meng & Setoguchi, 2009).

In the podcast about Winter Cities called Snow and Tell, discussed the importance of the need to understand the effects of wind, and how wind studies need to be conducted at an early stage to help “future proof the public realm” (WinterCity Edmonton, 2020a). The podcast also discussed how wind studies are often overlooked in how it affects pedestrians and the types of pedestrians, such as children or the senior population, and the way vulnerable groups will experience an area (WinterCity Edmonton, 2020a). Multiple urban design considerations can be considered to improve wind comfort, which include taking into consideration the orientation of street grids, building setbacks, and staggering (Davies & Engineering, 2019). Another consideration refers to the placement and massing of buildings that are adequately placed to ensure that urban canyons flows are skimming on top of buildings to reduce strong winds blowing towards the pedestrian. This was found to be desirable in Toronto, as and other cities located in colder climates (Davies & Engineering, 2019).

Pedestrian wind comfort, widely measured by the Lawson-based Criterion, is used to measure wind comfort at the ground level. Several scholars in the 1970s (Hunt et al., 1976; Isyumov & Davenport, 1975; Lawson & Penwarden, 1975) came up with wind comfort criteria, but it has yet to be developed to be used within the winter environment. The Lawson-based criteria are currently used by CFD (Computational Fluid Dynamics) wind simulations to determine urban areas where different types of activities can comfortably take place outdoors. A study in 1990 compared the various wind comfort criteria’s using 246 subject

areas. The study found that Lawsons & Penwarden’s (1975) criteria were less stringent than other studies and may be problematic for classifying areas with potentially dangerous winds (Ratcliff & Peterka, 1990).

**Table 1:** Wind Comfort Simulations: Lawson-based Criterion, adapted from (Ingrid Cloud, 2019).

<b>Lawson-based Criterion</b>	
<b>Wind Speed</b>	<b>Activity</b>
0.0 – 2.5m/s	Sitting
2.5 – 4.0 m/s	Occasional Sitting
4.0 – 6.0 m/s	Standing
6.0 – 8.0 m/s	Strolling
8.0 – 10 m/s	Jogging
> 10 m/s	Uncomfortable
> 15 m/s	Dangerous

Wind simulations are done through CFD and wind tunnel analyses based on the project's needs and the stage of the design process. CFD compared to wind tunnel analyses are more localized and at a micro-level, whereas wind tunnel provides a general macro-level understanding of wind (WinterCity Edmonton, 2020a). CFD is becoming more widely used due to the convenience of the programs and consistency of results compared to human run-simulations.

### **3.3. Winter City Design**

#### **3.3.1. Barriers to Winter City Design**

In Canada and other Nordic cities, the cold climatic conditions will always be a limiting factor in outdoor activities during the winter season. As discussed earlier, one of the barriers to Winter City Design (WCD) was to find a balance between thermal comfort and the design of a space. It is extremely difficult to design a space that everyone will use or have the desire to use. It is therefore important to have a basic understanding of WCD so that spaces can be designed in efforts to better the lives of those using the space, knowing that the thermal comfort adaptations of physical, physiological and psychological factors play a role in how the space will be utilized in the winter.

There is an apparent lack of spaces designed with a winter focus and the evaluation measures for spaces with such a design focus. This lack does not come as a surprise in Edmonton as many public open spaces such as Churchill Square throughout the winter season are often neglected unless there is a festival occurring. A part of what makes Churchill Square in Edmonton, an unsuccessful space is the lack of active edges surrounding the park with the potential to draw in users (Urban Designer, Interview, 2020 – see section 5.3).

Studies have found that people enjoy feeling warm and the sunlight (Nikolopoulou et al., 2001); however, the term “warm” is also subjective to the person experiencing the temperature differences. The term “warm” in the winter will differentiate the term “warm” used in the spring or summertime. This concept is similar to the findings from Shanghai, where the societal context was found to be very important in its thermal comfort findings (Chen et al., 2015). Even within a Canadian context, temperatures and regulations differ

throughout the country. For example, snow days and the guidelines that local school boards have for indoor recess and snow days are different across the country (The Canadian Press, 2019; Tiffany, 2019). When snow days are declared, it means that school gets cancelled for the day; and on days where there is indoor recess, it implies that the outdoor weather is unsuitable for children in elementary schools to go out and play during the breaks. This concept is important in terms of designing for winter-friendly spaces in Canada. The guidelines that cities put in place for the educational system are although geared towards the youngest population, it provides a good indicator of the temperatures that cities should consider designing their outdoor winter spaces to be adequate for.

The need for interdisciplinary expertise is a significant barrier when it comes to designing winter spaces. Urban planners and designers alike, lack the technical and analytical tools required to create designs that are completely based on climatic principles. Other barriers to including climatic knowledge in urban projects were summarized in a Swedish study that included barriers such as lack of knowledge, lack of technical aspects, city policies, organizational processes, budget, and housing market fluxations (Eliasson, 2000). These findings are supported by another Swedish study at the Lulea University of Technology, where incorporating climate knowledge to urban planning related projects was difficult due to the lack of engagement and interest from participants; neglecting the opportunities to create a climate responsive space in the winter seasons; taking into considerations of the local context and its perception of weather; and lastly, there was a lack of technical tools for planners and architects for the cold climate (Ebrahimabadi, 2012).



Canada, being a large northern country that spreads across six different time zones (National Research Council Canada, 2019), it is evident that there is limited sunshine throughout the day in Canada during the winter months. A typical day in the wintertime in a city like Edmonton, residents will go work before sunrise and finish work with the sun already set. The limited sunshine hours also prompted some provinces and territories to implement Daylight Savings Time (DST), and this means the clocks will turn back one hour in the winter and turn forward one hour in the summer to accommodate for the limited hours of sun. The DST was put in place in efforts to provide residents with an extra hour of sunlight during the winter, but there has been debate over the need for DST as residents did not find it helpful, but more of a hassle.

The limited sunshine is not the only discomfort during the winter season for residents wanting to go outside and walk. In Sweden, other discomforts during the cold season also include the low temperatures, slipperiness, and snow or rain precipitation, with slipperiness being the main discomfort for those going outside in the winter (Ebrahimabadi, 2012). In another study taken across Europe, strong winds, low temperatures, and humidity being too damp or dry were also found to add to winter discomforts (Nikolopoulou & Lykoudis, 2006).

### **3.3.2. Recommendations for Winter City Design**

Designing for a winter climate does not imply that other seasons should be neglected. It is equally important to consider the potential that the space has in all other seasons, such as the spring and summer. There are two overarching approaches to winter city design, as expressed by Pressman (1988). The first approach is the “manipulation of the natural environment” which includes considerations to the orientation, and details in and around the site that will

improve the winter experience; and, the second approach is the “intervention by built form,” which is the concept of adding elements to the natural environment such as arcades, and atriums to protect the users from harsh weather conditions (Pressman, 1988).

“Climate must be seen as a significant modifier for urban spatial form” (Pressman & Zepic, 1986, p. 11). When there are proposals for new buildings, the massing, orientation, and building heights play an important factor in how the climate interacts with the urban form. If designers can design around the climate first, there is a higher chance for a more functional year-round public space. The infrastructure incorporated into winter design should be functional in all seasons, whether that function is the same. For example, an open space can function as a skating rink in the winter and for farmers' markets in the summer. The concept of climate sensitive design in winter cities is to acknowledge that winter discomforts exists and will continue to exist in our daily lives annually. Therefore, it is important to design the urban fabric through a lens that will incorporate and integrate all seasons of the year.

**Providing Choice** - The important factors of creating a space for any public space in any season is creating spaces that are easy to use and give people the choice to be outside. The concept of choice is also a part of the psychological adaptations of perceived control (Nikolopoulou & Steemers, 2003). Choice creates the opportunity for those to use a space voluntarily, therefore making them aware of the outdoor temperature to make the proper physical choices to adapt to their surrounding environment (Thorsson et al., 2004). Other recommendations to improve winter city living are summarized below.

**Physical Interventions** - Planners and architects, although lack the knowledge for climatic analytical tools, can contribute to designing climate sensitive spaces is through physical interventions. Given that outdoor spaces are a part of our daily lives, climate sensitive considerations must be given the priority that gets included in the initial plans of projects (Eliasson, 2000).

**Integration of Uses** - Pressman (1998) argues that mixed-use and integration of uses are vital for the success of winter cities. It is important to integrate the places of work and live and have transit facilities within walking distances to grocery stores and other daily necessities (Pressman, 1988). With uses integrated, it provides a network of accessible spaces and uses, enhancing the functionality and providing a reason for those to use the surrounding spaces.

**Pedestrian safety and protection** are vital in creating a public space for the people, especially those living in northern cities (Erskine, 1968). Infrastructure for the automobile is prioritized over the safety of pedestrians for spaces geared towards the people; therefore there is a need to reconsider the transportation hierarchy and protect pedestrians in the winter season through arcades, and canopies (Erskine, 1968; Henke, 2006; Pressman, 1988; Pressman & Zepic, 1986). Pedestrian protection can be achieved by using “above grade and below grade protective systems” (Pressman, 1996), such as pedway systems seen in various Canadian cities such as Toronto, Edmonton, and Calgary. More recently, these existing pedway systems have been criticized for completely separating users and those of particular social classes to a fully enclosed indoor environment that does not allow citizens to go outside to embrace and experience the winter season (Stout et al., 2018). Another study found that many residents in Edmonton prefer to use the indoor pedway system that

connects restaurants, offices, and shopping to get around, making outdoor usage for spaces such as winter patios challenging (Sanborn, 2017).

**Wind Protection** - During the winter months when strong winds turn fluffy snowflakes into shards of ice, the orientation of the landscape and built elements at an urban space will need to be carefully considered. Southern parts of the site should foster the warm sunshine on a cold winter day, and long casted shadows should be avoided with considerations to building orientation and form (Erskine, 1968). The north and west of the site can also include screening elements with vegetation and physical forms to mitigate northern winds.

**Darkness** is a common discomfort in winter cities. The limited hours of sunshine a day not only sets the image of dull and boring, but it also becomes a safety issue for pedestrians out after sunset. Winter discomforts such as the cold temperatures, chilling winds, and darkness were acknowledged as far back as the 1960s, where Erskine (1968) identified the need and potential of vibrancy with the use of illumination (Erskine, 1968). The dullness of winter can also be alleviated by using colorful landscape elements, such as paving (Pressman & Zepic, 1986).

**Illumination** - In the winter season, when the sun sets early in the day, it is important to ensure that proper illumination is put in place to improve the user experience and act as a form of surveillance. Lighting improves the visual environment through strategically controlling the effects of illumination in a space (WinterCity Edmonton, 2020b). Lighting a space can provide many positive effects and create an inviting environment. It is also important to understand that not everything has to be lit, and some aspects can be left in the dark to prevent unnecessary lighting (WinterCity Edmonton, 2020b). A Danish

study conducted in 2015 found that lighting had the power to create different atmospheres, such as increasing cosiness, and could connect people, to create a sense of community (Bille, 2015). The process of illuminating a space could involve various aspects depending on the type of environment that is desired to be created. It can also create a cozy winter atmosphere, and it can also include temporary and visually artistic lighting elements to draw attention to festivals and events.

**Vegetation** - In the warmer months, flowers bloom, and leaves are growing from trees. In contrast, the winter months will be left with bare vegetation that does not contribute to the winter landscape if considerations to winter vegetations are not given attention. Vegetation in the colder seasons can add pops of green into what otherwise would be a dull and grey winter landscape. Furthermore, smart vegetation choices can also affect the perceived thermal comfort levels (Nouri et al., 2018). Additionally, deciduous trees can be a natural element which improves the urban microclimate through not only providing shade in the summer months but also blocking the cold winds in the winter month (Nikolopoulou et al., 2001; Nouri et al., 2018; Pressman, 1988; Pressman & Zepic, 1986).

Here houses and towns should open like flowers to the sun of spring and summer but, also like flowers, turn their backs on the shadows and the cold northern winds, offering sun-warmth and wind-protection to their terraces, gardens and streets (Erskine, 1968, p. 167).

The design for climate sensitive design in the winter comes down to the simple concept of comfort and choice. If users feel comfortable in an outdoor space; it will be more frequently used and become a successful outdoor space for people to gather. Although available literature related to winter city design dates back

to the 1960s, it is still acknowledged by researchers that there is a lack of climate sensitive urban design considerations in cold, northern cities. Designing a communal space in the wintertime is an interdisciplinary process that requires the expertise of professionals across various sectors. Unfortunately, current literature suggests that there is still a disconnect in all steps of the process. An urban designer, urban planner, transit planner, developer, architect, climatologist, or psychologist, will have different priorities for designing climate sensitive spaces.

**Snow Maintenance** has been flagged by the senior population as a problematic issue when getting around in the winter months (Garvin et al., 2012). Canadian winters involves slippery and snowy sidewalks which becomes a discomfort and inconvenience to many. The Canadian cities of St. John's and Montreal tried to implement the idea of heated sidewalks in Canada; however, it was determined to be unfeasible and too expensive to operate (Bruemmer, 2018; CBC News, 2020). To ensure that sidewalks are cleared efficiently, the sidewalks should be wide enough to fit equipment and have areas for local snow storage, and maintenance.

**Warming Elements** are imperative to successful outdoor winter enjoyment. To encourage more prolonged outdoor usage in the winter season, elements that will allow users to get warm needs to be considered. In South Korea, the Seocho neighbourhood in Seoul began a pilot project for winter seating and warming tents at bus stations. The bus benches were built-in with an electric heating element that allows benches to heat up until 40°C (Lee, 2018). The warming tents ("seoripul igloo") were placed near the bus shelters and were designed with several considerations such as transparency to allow for the bus drivers to

see riders waiting in the tent. The roof was also designed to sustain snow, the durability from being blown over from the wind, and the ability to be taken down and reused in following winters (Korea JoongAng Daily, 2018).

It is imperative to understand that warming shelters are not meant to keep users warm for a long period of time. It functions as a temporary relief from the cold weather outdoors before users go back out with their activities (Lange, 2019). In the winter season, Harvard University transforms its plaza into a winter, incorporating elements like fireplaces, wooden seating, ice rinks, and curling rinks (Project for Public Spaces, 2015). Warming elements can be temporary and not permanent like the bus benches in Seoul; however, it is important to consider which elements would be more beneficial as permanent infrastructure, or a part of seasonal operational installations.

### **3.4. Designing for the User Experience**

#### **3.4.1. Space for All Users**

Creating spaces inclusive for all users increases the chances of becoming a successful vibrant space in the future. Users, young and old, should feel comfortable accessing and getting around the space. The 8-80 cities is a concept where if public spaces and mobility are built for the enjoyment of both 8 and 80 year-old users, then it becomes a space that is a successful space for all users (8 80 Cities, n.d.). Designing for children should involve opportunities for play and areas for recreation, and the enjoyment of the older population should involve seating and universal access to public spaces. A joint study from the Netherlands and Israel states the importance of child-friendly communities to the success of the neighbourhood, and found that non-structured play areas such

as nature playgrounds are more successful as it allows for imagination and more varied and creative play opportunities (Krishnamurthy et al., 2018). In addition to designing for the growth and development of the younger population, design considerations for the aging population are also important. A study in Edmonton interviewed the senior population on their perceptions of the challenges of living in a northern city. Participants in the study were split into summer and winter, and both groups highlighted winter challenges related to snow maintenance, accessibility, and mobility (Garvin et al., 2012). The study also found that the senior population appreciated both indoor and outdoor meeting spaces, however, factors such as litter, and poor upkeep of the space, and the risk of falling and injury in the winter were found to deter interactions going outside especially in the wintertime (Garvin et al., 2012).

#### **3.4.2. Challenges of Downtown Open Spaces**

As Canadian urban centres continue to grow and develop, designing public open spaces in the middle of downtown is not easy. The tall modern glass buildings, in contrast with the grey concrete towers, show how developments in downtowns have generally been a battle of the tallest building and the “thoughtless placement and detailing of tall buildings” (Gehl, 2011, p. 178). These tall buildings, along with minimal setbacks on all sides of the buildings, create uncomfortable places for pedestrians. The narrow alleyways created as a result are often overshadowed by the surrounding tall buildings that create wind tunnels. As the downtown core becomes increasingly dense, the opportunity of creating comfortable open spaces for the public becomes increasingly challenging. Therefore, pedestrian wind comfort and proper sun exposure must



be taken into consideration in the early stages in tall, dense areas like the downtown core.

### **3.4.3. Year-round Public Places**

New York City, home to one of the most populated cities in the United States, has a long history with the battle of tall skyscrapers since the early 20th century. Amid tall skyscrapers, Bryant Park has become a well-known gathering spot for many. Although New York may not experience the same extreme weather conditions as Edmonton, it has four seasons, including winter. Bryant Park is an example of a well-used year-round public space. It comprises the greenery in the summer, but the park also transforms into a space usable for the wintertime by incorporating its winter village program. The program transforms the space into “Manhattan’s Winter Wonderland” with festivals and activities such as markets and ice skating for all ages and physical abilities (Bryant Park Corporation, n.d.). Transformational uses in a space such as temporary skating rinks are magnets to the city centre, and was also found to be “tools for regeneration, place promotion, health improvement, and social inclusion” (Bell, 2009).

What makes this park successful is the accessibility to the park through various entrances and public transportation; it is also economical as many concerts and events are held at the park; and during the winter season, it becomes a central space for winter festivities. Tall buildings surround Bryant Park, and therefore the amount of sunshine that park receives is also limited. In a shadow map done by the New York Times (2016), it found that Bryant park in the Winter months stays within the shadows for a majority of each day (New York Times, 2016). Despite the limited hours in the winter months, Despite the limited hours in the

winter months, Bryant Park still managed to bring the light and vibrancy into the park through illuminations and winter celebrations. The idea of year-round programming can also be summarized below:

Winter cities must be made amenity rich. They must serve as magnets which are attractive to all segments of society. They must celebrate human dignity and be places which. are lively, diverse, festive and creative (Pressman & Zepic, 1986, p.iv).

Most public spaces are designed with the summer mindset; therefore, they only consider the user experience only during those months. Creating year-round spaces not only has to include year-round functions but a year-round feeling of safety and comfort.

#### **3.4.4. Human Scale Elements**

When designing a space for winter use, it is also essential to include other factors that consistently contribute to the overall perception of the space, regardless of seasonal and climatic barriers. Growing cities, in conjunction with the growth of technology, has changed the way cities get built. No longer are the spaces designed for people, but rather for the machines we like to call the automobile. Human scale design is when the surrounding space for people is designed proportionally and comfortably to fit the needs of the human being. It is important to ensure that the users in the area, especially when located in a dense downtown neighbourhood that the surrounding environment adjacent to public gathering spaces are designed with the mind for human scale design. It is imperative that the users of a public space feel comfortable “with physical elements that can be related to the size of our bodies and body parts” (Costamagna et al., 2019, p. 136). The goal of human-scale design is to

encourage users to interact more with the space, as described by Akkerman (2014):

The wholesome experience of memory and the temporality of urban encounters call upon human scale in streetscapes where walk, not speed, and reflection, not luster, come to delineate a space into an urban place. (Akkerman, 2014, p.174)

### **3.4.5. Crime Prevention Through Environmental Design (CPTED)**

Crime Prevention Through Environmental Design (CPTED), is to design infrastructure and public spaces to deter criminal activity, increase the perceived safety and reduce fear and improve the quality of life for the user (Sorensen et al., 2013). The concept of crime and urban design was inspired early on by Jane Jacobs (1961) and her concept of “eyes on the street”:

... there must be eyes upon the street, eyes belonging to those we might call natural proprietors of the street. (Jacobs, 1961, p. 35)

CPTED encompasses five basic elements as outlined by Knapp (2013): Access Control, Surveillance, Territoriality, Maintenance and Image Improvement, and Activity Support (Knapp, 2013). CPTED is incredibly important when designing for public spaces; however, the concepts of crime and safety are often overlooked in the decision-making process, even though researchers found that well-maintained public parks increased social interaction and provided more eyes on the street for surveillance (Knapp, 2013).

Similar to previous studies, the Gehl Institute created a framework for CPTED strategies in three main focus areas of territorial definition, access control, and surveillance. The CPTED Strategies were coupled with Urban Quality Criteria, including Comfort, Enjoyment, and Protection (Gehl Institute, 2017). The Gehl Institute (2017) also recognized the need to design for all seasonal variations.

It included the need to create “opportunities to enjoy the positive aspects of climate,” which further supported the need to include winter city design considerations when designing for public spaces.

**Table 2:** Details of Urban Quality Criteria (Gehl Institute, 2017)

<b>Urban Quality Criteria</b>	
<b>Comfort</b>	<ul style="list-style-type: none"> <li>• Opportunities to walk and cycle</li> <li>• Opportunities to stop and stay</li> <li>• Opportunities to sit</li> <li>• Opportunities to see</li> <li>• Opportunities to talk and listen</li> <li>• Opportunities for play exercises</li> </ul>
<b>Enjoyment</b>	<ul style="list-style-type: none"> <li>• Dimensioned at human scale</li> <li>• Opportunities to enjoy the positive aspects of climate</li> <li>• Aesthetic quality and positive sensory experience</li> </ul>
<b>Protection</b>	<ul style="list-style-type: none"> <li>• Against traffic and accidents—feeling safe</li> <li>• Against crime and violence—feeling secure</li> <li>• Against unpleasant sensory experiences</li> </ul>

## **4.0 Site Planning**

### **4.1. Introduction**

The site planning of the Warehouse Campus Neighbourhood Central Park (Warehouse Campus Park) underwent a design process that related to guidelines and policies outlined in the City of Edmonton. These policies and guidelines were, but not limited to, the Winter Design Guidelines, Transit-Oriented Development (TOD) Guidelines, Main Streets Guidelines, Complete Streets Guidelines, and the Downtown Public Places Plan (DPPP). The conceptual designs incorporated questionnaire results taken from the Edmonton public. After the drafts of three conceptual designs, an in-depth interview was conducted with relevant professionals familiar with winter city design and Downtown Edmonton. The design proposal then took into consideration the responses and recommendations from the in-depth interviews.

### **4.2. Questionnaire**

#### **4.2.1. Purpose**

The purpose of this questionnaire is to investigate whether Edmonton's public spaces should be designed for better winter usage. The goal of the questionnaire was to help validate the findings from the literature review. The questionnaire investigated current perspectives on how public spaces were perceived in Edmonton and how future spaces can be designed. The objectives of the questionnaire were as follows:

1. What are the reasons and barriers of using public spaces during the winter season in Downtown Edmonton?

2. What are the perceptions of designing for climate sensitive spaces in Downtown Edmonton?
3. What is the vision that the participants have towards the future Warehouse Campus Neighbourhood Central Park?

#### **4.2.2. Methodology**

Google Forms was used for this questionnaire due to the ease of distribution. The target audience for this questionnaire was for potential users of the Warehouse Campus Park area. The questionnaire also welcomed responses from the general Edmonton population who are familiar with Downtown Edmonton. A non-probable sample method was used for this questionnaire with a combination of purposeful and snowballing distribution. Purposeful sampling was used to send out the questionnaire via emails to relevant businesses, organizations, and student groups in and around the Downtown neighbourhood. This first method was used to help gain a better understanding of the site area and the opinions of those who understand planning practices and the needs of Downtown Edmonton. The snowballing sampling distribution requested those in the purposeful sample to further distribute to their networks. The questionnaire had a goal to get around 100 responses, which was determined with the advisor to be an adequate number to represent the 21, 171 Downtown residents.

#### **4.2.3. Design**

The questionnaire comprised of 21 questions mixed of multiple-choice, short and long answers questions that could be completed within a 10-minute time frame. The designed questionnaire ensured that it took into considerations the opinions of all the participants. When the questions provided fixed answers,

participants still had the opportunity to add their own options as answers. The questionnaire asked general questions about Edmonton as a winter city, then transitioned to questions about the public space usage in Downtown Edmonton before ending with questions on the Warehouse Campus subject area. The flow of questions was to help give the respondents context before answering more complex and opened-ended questions about the Warehouse Campus subject area. The original questionnaire can be found in the Appendix.

The data collected from this questionnaire grouped similar answers, then responses were ranked in accordance with the frequency of each answer.

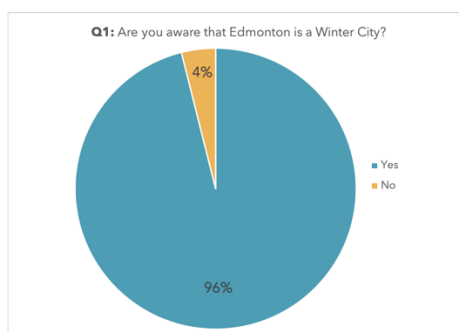
#### **4.2.4. Limitations**

The survey was solely conducted online due to the barriers of geographic location. This project was researched and written remotely in Seoul, South Korea, while the subject area for the project was in in Edmonton, Canada. In addition to the geographical location, the current COVID-19 pandemic around the world has changed how people work. With much of the work transitioning online, and social distancing measures in Edmonton, it was determined that online distribution was the safest and most convenient way to get responses for the questionnaire. This study acknowledges that this online distribution method could have limited the number of people who had access to the questionnaire, such as those with no access to online technologies, rely on door-to-door, telephone, or public meeting interactions.

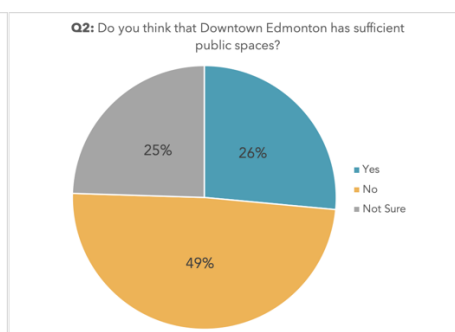
### 4.3. Questionnaire Results

Within three weeks, 102 responses were received for the questionnaire. The majority of the respondents were those who often socialize and worked in Downtown. Other responses came from those living and learning in the neighbourhood. The respondents were mostly referred to the questionnaire via friends or colleagues and from social media posts and newsletters. This indicated that the snowballing sampling was successful because of the understanding and collaboration of recipients who received the initial emails requesting their assistance and expertise.

Generally, the respondents were extremely aware that Edmonton was a Winter City (Figure 7). Although some respondents were unsure if there were enough public spaces in Downtown, nearly half of the respondents indicated that Downtown Edmonton had insufficient public spaces in the neighbourhood (Figure 8).



**Figure 7:** Awareness of Edmonton as a Winter City



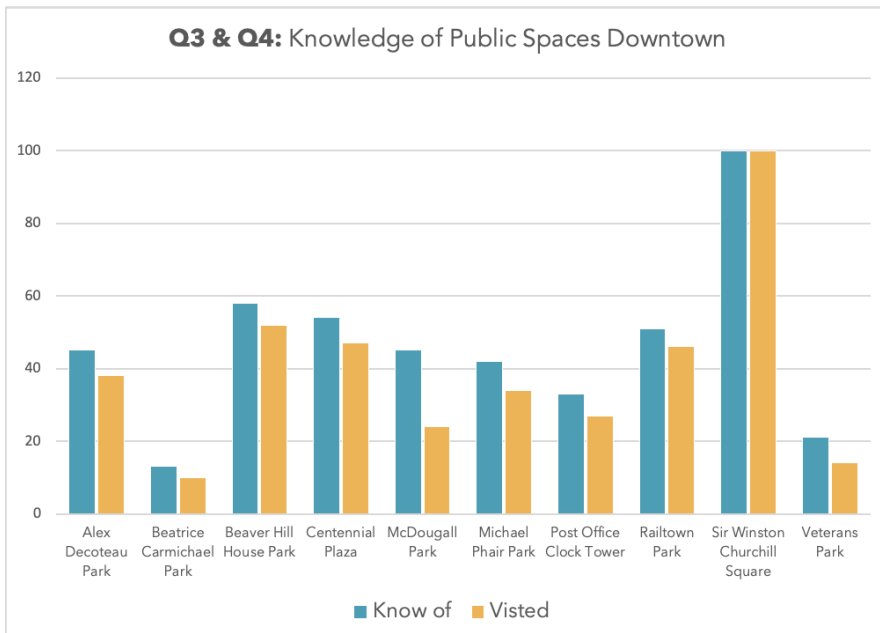
**Figure 8:** Sufficiency of Downtown Public Spaces

According to the City of Edmonton's SLIM maps (Interactive Map), there were a total of 10 parks in the Downtown neighbourhood. The questionnaire asked participants to choose the parks they knew of and which parks they have visited

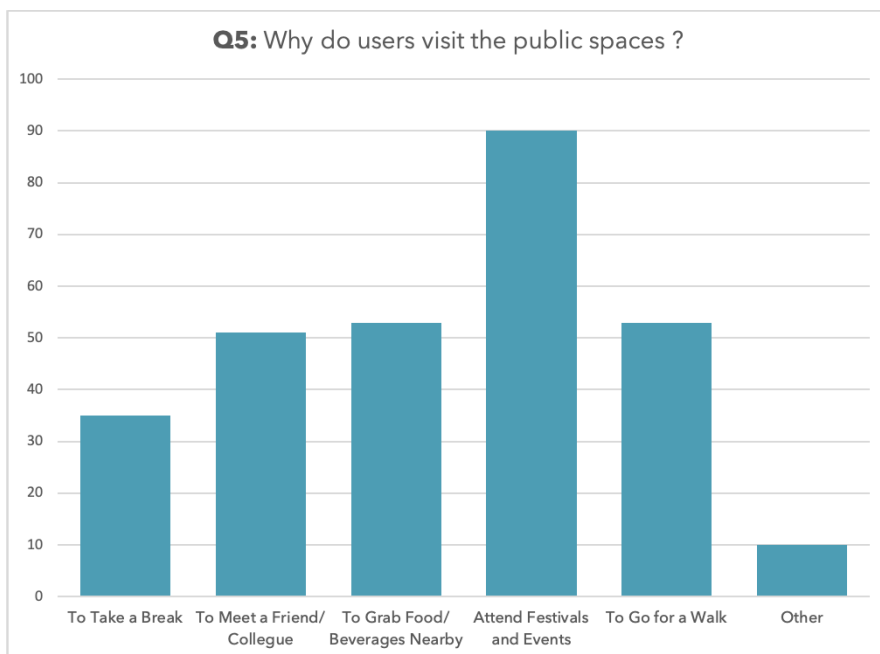


before (Figure 9). Of the 10 parks, the most well-known park was Sir Winston Churchill Square (also known as Churchill Square) in front of the Edmonton City Hall. The least well-known park was Beatrice Carmichael Park, a small park located south of Jasper Avenue and 104 Street. Except for Sir Winston Churchill Square, which was equally known about and visited, the remaining parks in Downtown Edmonton were known, but not necessarily visited by the participants. Churchill Square is the most visited space in Edmonton because it is the venue for many festivals and events throughout the year, such as Nuit Blanche, Taste of Edmonton, and the International Streets Performers Festival. Churchill Square is also a hot spot for food trucks in the summer and known for its movable street furniture. Churchill Square is located in front of City Hall, surrounded by tall office buildings, the Stanley A. Milner Library, and the City Centre Mall.

These questionnaire results suggested that programming such as events and festivals draws users to public spaces. Furthermore, the ability to walk in the park, grab food, or meet people are some of the main reasons why public spaces in Downtown are utilized. Other responses included merely passing through the space to get from one destination to another, to exercise, or to see greenery and nature. The results indicate the need for functional spaces that will attract users to linger, rather than short temporary activities, such as a meeting spot for a friend.

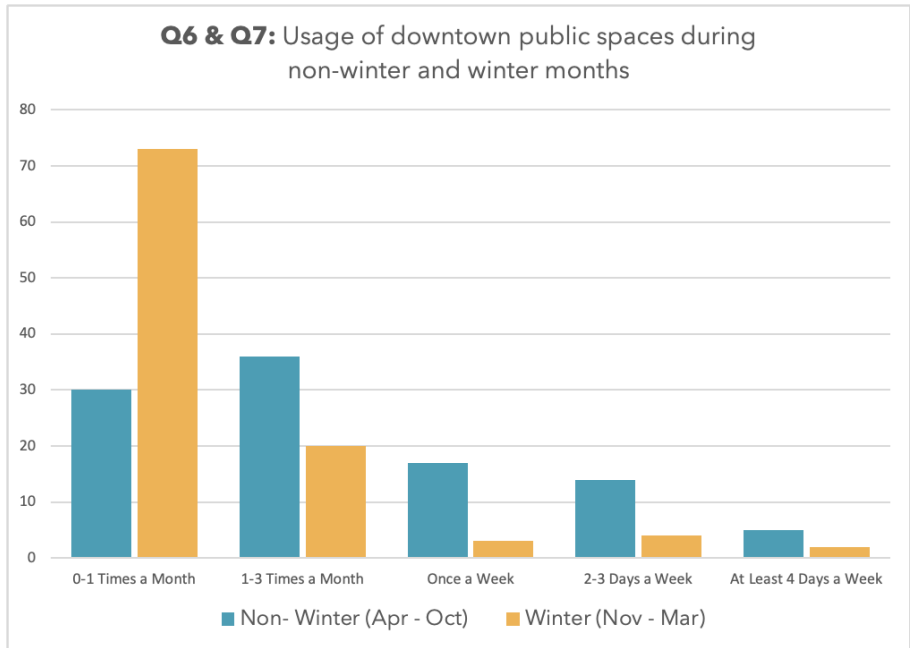


**Figure 9:** Combined Results of how knowledgeable participants were on downtown public spaces.



**Figure 10:** Reasons for visiting public spaces.

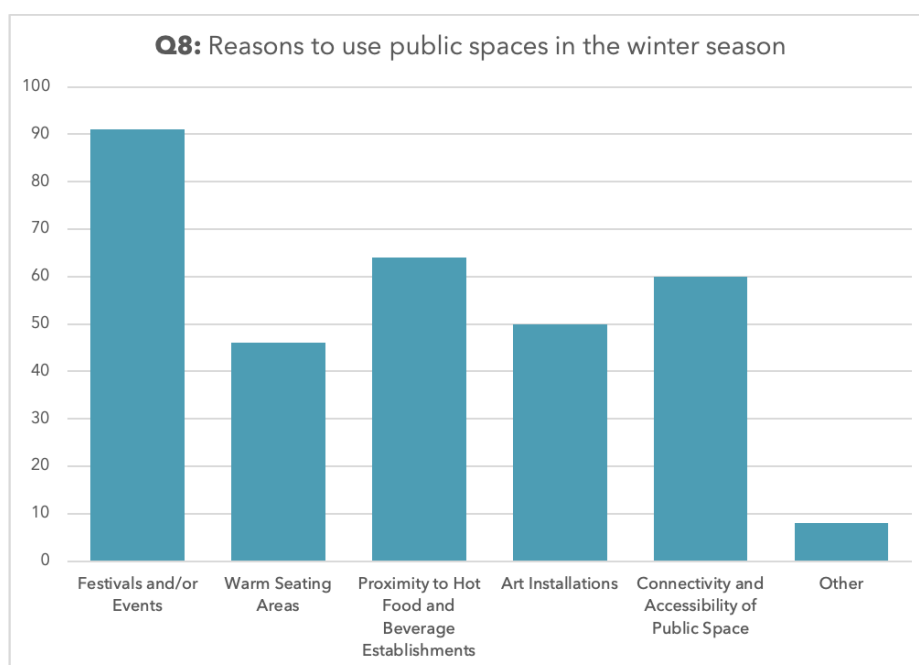
The frequency in the usage of Downtown spaces also differs between the winter (November to March) and non-winter (April to October) months (Figure 11). The purpose of the question was to visualize the differences in usage between seasons. In both winter and non-winter months, most participants visit the spaces 0 to 3 times a month. During the non-winter months, participants were more spread out regarding how often they frequent the public spaces. In non-winter months, most participants visit public spaces at least once a month, and some were going at least four days a week. During the winter months, usage of the public spaces drops dramatically, with over a 200% increase of participants using spaces 0-1 times a month, and frequency of use decreases overall, with no one visiting at least four days a week.



**Figure 11:** Non-Winter vs. Winter Months Public Space Usage.

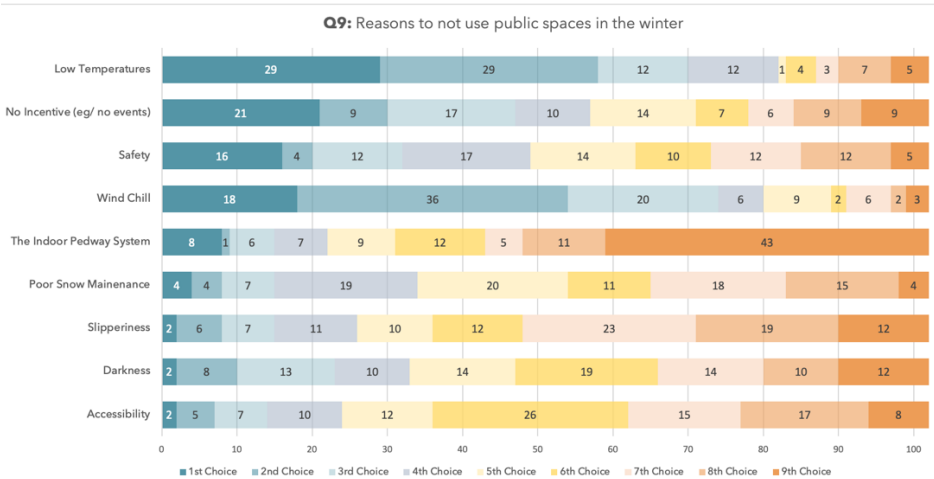
#### 4.3.1. Reasons and barriers of using public spaces during the winter season in Downtown Edmonton

Similar to the reasons for using public spaces in general, winter usage of public spaces also indicated that the primary motive for the public to use it relied heavily on programming, such as having events and programming in the space. Proximity to hot food and beverage establishments and connectivity to the public space may have also led to higher usage of the public space, as indicated by the results in Figure 12. Furthermore, warm seating areas and installations such as public art were also reasons to use public spaces. Other reasons indicated that public spaces are often used for short and brief places to walk through, go on a break, or used as a meeting spot. Safety, photogenic “Instagram worthy” locations, and off-leash dog areas were other notable reasons to use the spaces in the winter.



**Figure 12:** Reasons for using Public Spaces in the Winter.

Interesting results came from the deterrents for visiting public spaces in the wintertime, specifically for Downtown Edmonton as seen in Figure 13.



**Figure 13: Barriers to using public spaces in winter**

Participants were asked to rank the elements of winter discomforts from 1-9. The first choice (1st) indicated the most significant barrier, and the last choice (9th) least effected the participants' decisions to go out and use public spaces in the winter. The results indicated that the low temperatures of Edmonton's winter were a considerable deterrent for public space usage, with nearly 28% (29/102) of the participants choosing that element as their first and second choice. Also, the winter winds and wind chills show similar results with significantly more people choosing it as their second reason. Other main barriers for participants using public spaces in the winter include the fact that there were little to no events or festivals in the spaces to incentivize the use and the overall perception of safety. Notable results from this section indicated that there should be more consideration in snow clearing and maintenance of the public spaces to ensure that users in all seasons can enjoy the space. Also, a

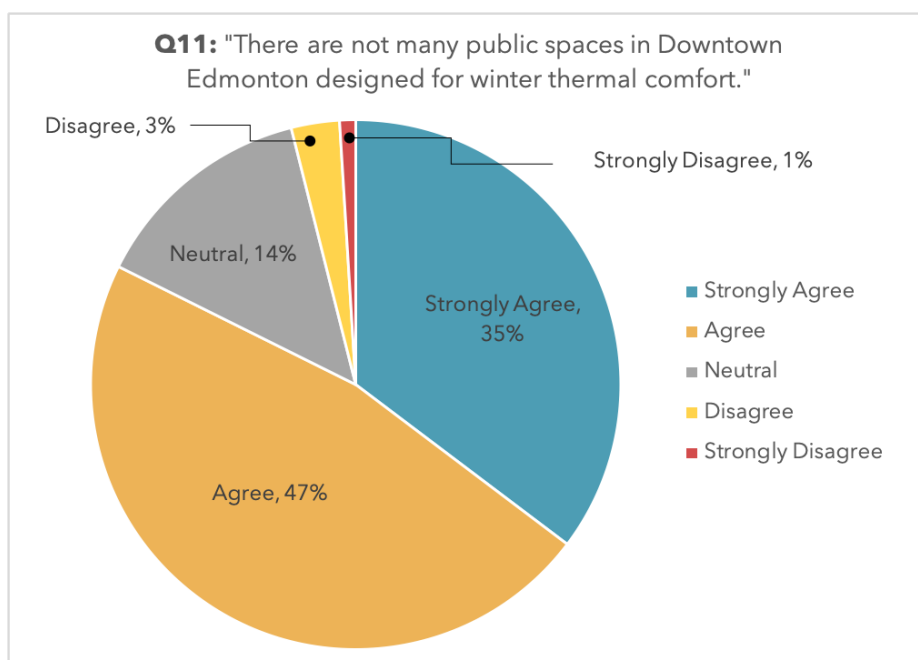
considerable number of participants ranked the elements of accessibility and darkness in public spaces in the sixth position, suggesting that if there are improvements in those aspects, the usage of public spaces in the winter may increase.

The most interesting take away from these findings was that the indoor pedway system connecting the downtown core is the factor that would least impact the participants' decision to go outside and use public spaces. This suggests that although the convenience of the indoor pedway system exists, users will still go outside and use public spaces in the winter, given the factors of low temperatures, safety, wind, and reasons to use the space are addressed. The indoor pedway system may also help facilitate the accessibility and connectivity to the outdoor public spaces, but it may also take away from other public realms.

Lastly, other answers received mentioned that the public spaces in Downtown Edmonton are small in size and are incapable of hosting large events, other than being a meeting spot. Pedestrian protection also lacked warming stations and windbreaks. One participant indicated that access to heat or warmth in the wintertime usually involves sitting in a café, resulting in monetary interactions, which may hinder access to parts of the population. Another issue illustrated from this question suggested the need for bicycle accessibility and infrastructure to public spaces.

#### 4.3.2. Perceptions of designing for climate sensitive spaces in Downtown Edmonton

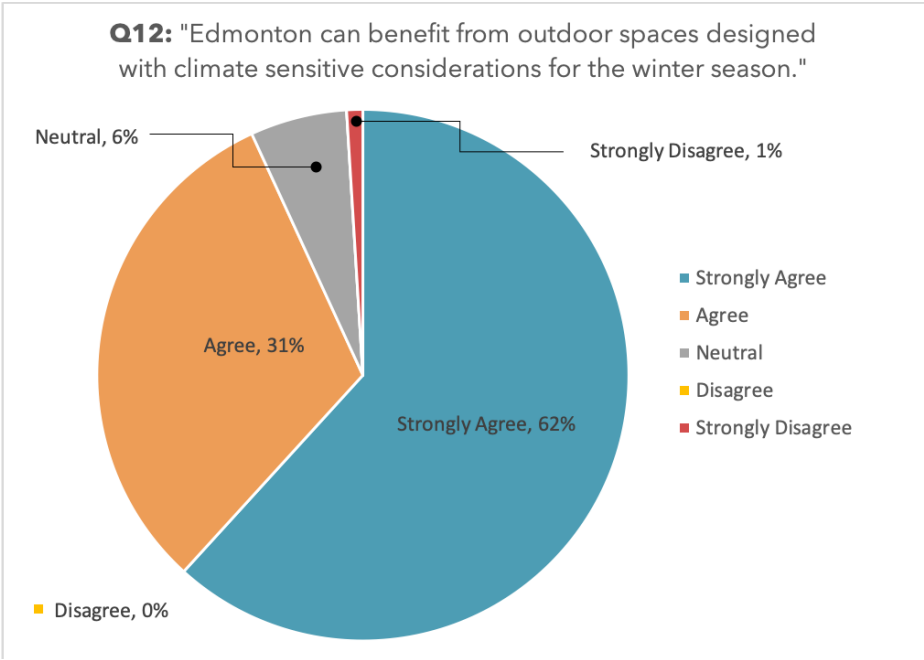
In the questionnaire, participants were also asked to agree with statements related to climate sensitive design of public spaces in Downtown Edmonton. 48 (48%) respondents agreed, and 36 (35%) strongly agreed with the statement that there are not many spaces designed with regard to thermal comfort in Downtown Edmonton (Figure 14). A minority of participants disagreed with the statement indicating that there was some regard to thermal comfort considerations applied in Edmonton's downtown public spaces.



**Figure 14:** Downtown Public Spaces Designed for Winter Thermal Comfort

In another statement, most participants agreed that Edmonton could benefit from outdoor spaces designed with climate sensitive considerations for the winter season. This statement had over 62% (63) of participants strongly agreeing with the statement as well as 31% (32) of others simply agreeing

(Figure 15). Some participants were unsure, and one participant strongly disagreed with this statement. This participant throughout this questionnaire voiced their concern over their hatred of the winter season and how the concept of “love winter” should not be continuously promoted in Edmonton.



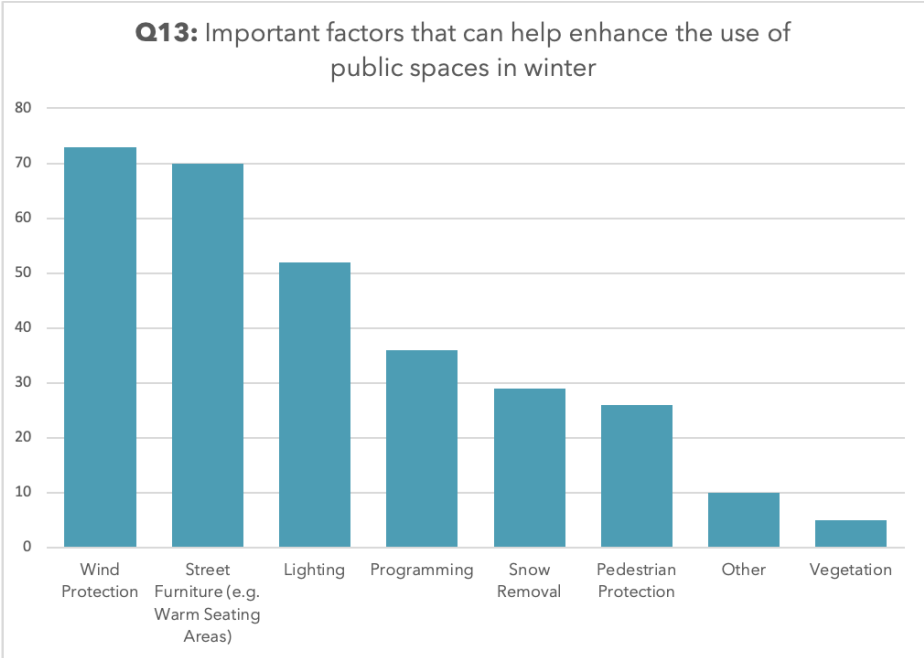
**Figure 15:** How Beneficial are Climate Sensitive Considerations for Edmonton Winters?

Overall, the results from these questions indicated a need to ensure that the design of Edmonton's public spaces has considerations for winter comfort and climate sensitivity.

After asking the participants' perceptions about designing public spaces with considerations to climate sensitivity, participants were then asked on their opinions and recommendations to help enhance the public realm in public spaces during the winter months. The results showed that the top three



considerations that would enhance the public spaces during the winter season were wind protection, warm street furniture, and lighting (Figure 16).



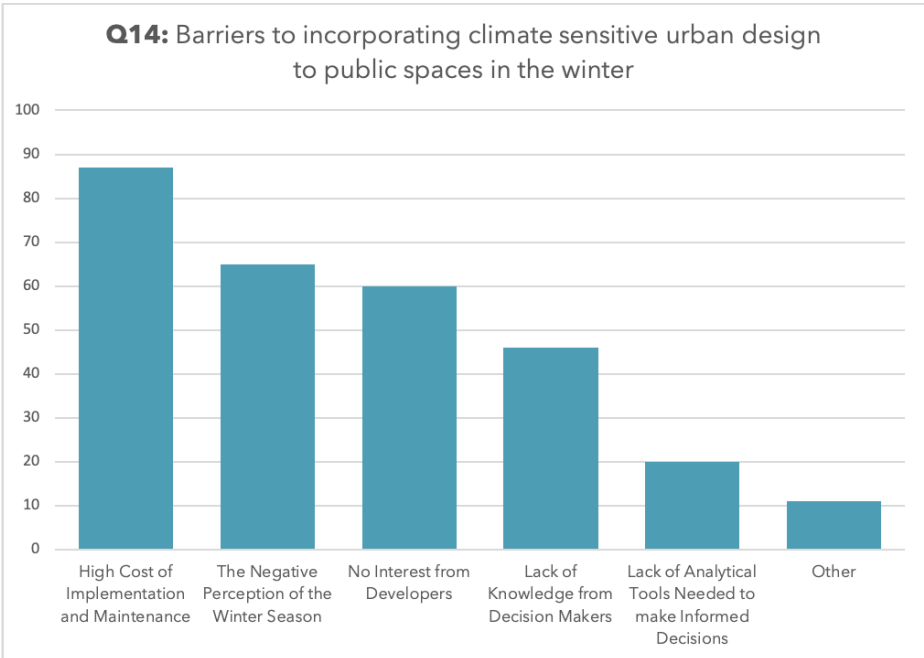
**Figure 16:** Important Factors to Enhance the Use of Public Spaces in Winter.

If these three factors were implemented and considered in the winter design of public spaces, then the following factors of programming, snow removal, pedestrian protection, and vegetation could consequently be improved and considered.

An option not provided by the question involved the perceived safety of the space, which tied into other responses related to improving street animation and lighting. One participant elaborated that other places in the city such as 109 Street and 124 Street were more bright, accessible, and perceived as safer places than Churchill Square and its surrounding areas. Another answer provided by multiple participants indicated that programming such as winter festivals,

markets, accessibility to places to eat and drink, and vending opportunities would help stimulate the usage of the space. Lastly, emphasis on warm seating areas or fire pits was suggested for users to stay outside for more extended periods.

This question also asked participants about their perceived barriers to implementing winter city design (Figure 17). Most respondents valued that the top 3 reasons for lack of climate sensitive design is first due to the high cost of implementation and maintenance of the public spaces, followed by the negative perception of the winter season, and in third is the lack of interest from developers. Nearly half of the respondents also thought there was a lack of knowledge in terms of winter city design from decision-makers. The lack of analytical tools was chosen as the most insignificant aspect of winter city design of all the options presented in the question.



**Figure 17: Barriers to Incorporating Climate Sensitive Design in Winter**

Most of the respondents that provided other answers to this question also criticized the City of Edmonton for not incentivizing and enforcing the implementation of the ‘Winter City,’ and that the Winter Design Guidelines was an ‘empty’ policy. There was also a lack of “incentive for private development projects,” leading to a heavy reliance on public funds and resources. Some participants also view that getting people outside in the winter season was useless if there are no incentives that would spark interest from users. There was also the perception of walkability as a barrier, which suggested that the current infrastructure lacks effectiveness to transport pedestrians through the public realm in Edmonton. Lastly, issues such as the city budget and the “conservative public opinion on government spending” (Questionnaire Participant) prioritized other civic projects, which made it difficult to attract users to the downtown spaces even in the summer months.

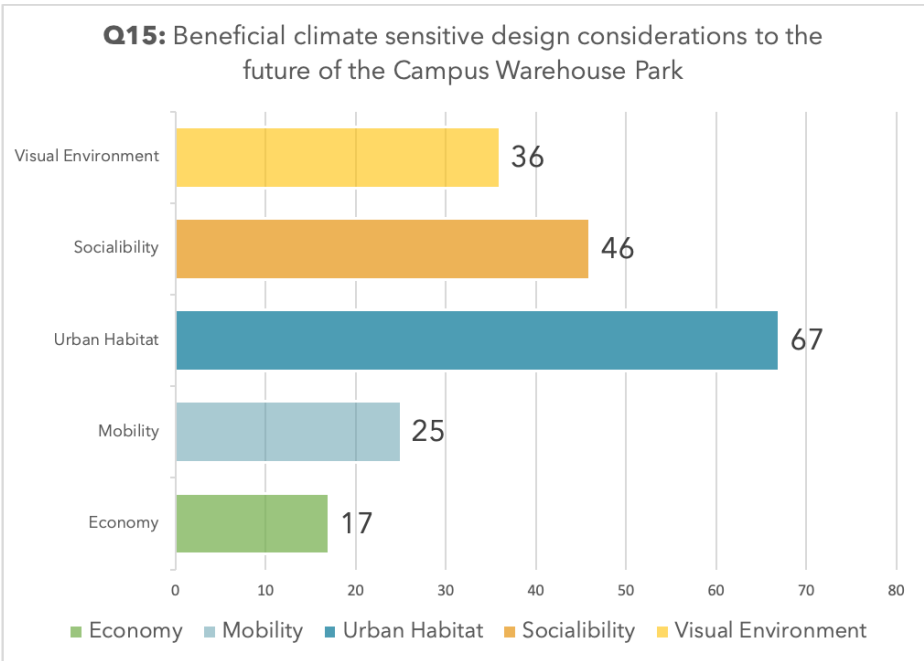
#### **4.3.3. Vision for the Future Warehouse Campus Neighbourhood Central Park**

The last part of the questionnaire allowed participants to be creative in what they envision the future of the Warehouse Campus Park to become. Both the questions proposed in this part of the questionnaire were left open to each participant. While some participants answered in short descriptive words such as “nice” or “good,” many participants provided valuable insights on how the future of the park could be successful as a year-round public space. There were a wide range of answers received; therefore, data organization for these two questions were categorized two times. The first categorization involved picking out keywords from each answer and grouping them based on similarity. The next step of categorized keyword groupings into more general categories.

The first question provided a map of the Warehouse Campus subject area, and asked participants what kind of climate sensitive considerations they would recommend. The general categories used to organize the responses were taken from Pressman and Zepic (1986) and their 5 outlined criteria for better winter living (Table 3). Most of the responses were related to the Urban Habitat of the space, the most frequent subcategory received with 45 response about the need to add some sort of warming element to the park. Warming huts, hot spots, and fire pits were among the suggestions for creating a cozy atmosphere in the park, especially for the winter months with low temperatures and dark skies. Other elements included adding vegetation and vibrancy. Sociability was the second most frequent category. It had 31 responses related to having street furniture that would help users linger and enjoy the space, such as fountains, benches, shelters, and seating areas. Increased programming opportunities, amenities such as washrooms, multifunctional spaces, and improving user experience were other climate sensitive considerations brought up by the respondents. The other categories suggested by the participants involved addressing the winter discomforts of the cold winds, limited sunshine, as well as the need for pedestrian and wind protection elements. Cold winds were suggested to be mitigated through wind protection, especially for people who have no choice but to be outside (such as waiting for the bus). Considerations for the limited sunshine included maximizing sun exposure during the day and incorporating lighting and other illuminating elements to bring life into the public space after sunset. Responses also included the incorporation of active edges for the park via the ground floor of surrounding developments.

Reflective of previous results of this questionnaire, factors such as programming were suggested to bring people to the space such as winter

festivals, events, winter markets, and nearby establishments to allow users to purchase food and drinks. Interesting factors brought up by participants involved the surrounding developments and establishments to the Warehouse Campus Park. Participants indicated that integrating active uses with surrounding commercial and retail establishments could help “enhance the public domain.” Given the Warehouse Campus Park location, it could become very easy for new developments to divert their parking off the street and behind their developments. If that is the case, the Warehouse Campus Park area would “have access to rubbish collection and car parking,” which is unattractive and would turn the park into an uninviting space. It is essential to encourage future developments adjacent to the park to orient ground floor usages that will have the opportunity to spill into and integrate with park functions, which will help avoid undesirable laneway usage facing the future Warehouse Campus Park.



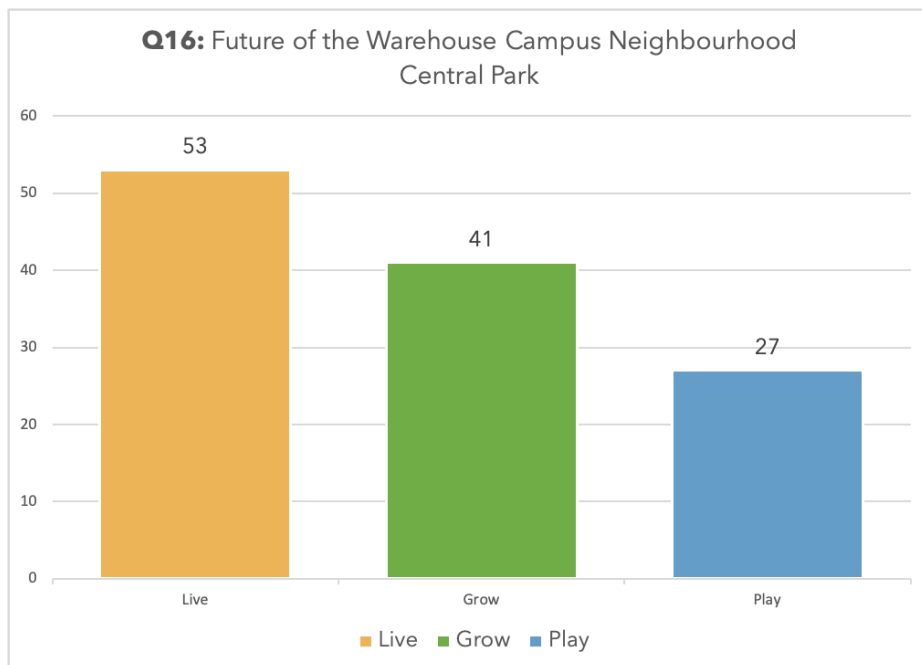
**Figure 18: Future Considerations for the Campus Warehouse Park (Consolidated)**

**Table 3:** Future Considerations for the Campus Warehouse Park (Keyword Chart). The numbers to the right represent the frequency of keywords that were mentioned, and responses can have keywords that belong to multiple categories. Goals of each category was taken from (Pressman & Zepic, 1986).

Visual Environment		
GOALS	<ul style="list-style-type: none"> <li>- Ameliorate quality of built environment in all seasons, with emphasis on winter</li> <li>- Improve use and appearance of publicly owned land</li> </ul>	
keywords	Light: lighting, illumination, sunlight	23
	Vegetation: Trees	9
	Vibrancy: colour, vibrancy, art	8
Sociability (and Public Space)		
GOALS	<ul style="list-style-type: none"> <li>- Improve social contact</li> <li>- Induce positive images regarding winter</li> <li>- Provide more public spaces</li> </ul>	
keywords	Street Furniture: bench, shelter, sit, seat	31
	Programming: activities, festival, event, play	16
	User Experience: pedestrian, people, user	14
	Amenities: Washroom, fountain, skating rink, parking	10
	Vulnerable Population: homeless	2
Urban Habitat		
GOALS	<ul style="list-style-type: none"> <li>- Create climate responsive residential development and related outdoor space</li> <li>- Provide energy efficient housing</li> </ul>	
Keywords	Heating: warm, cozy, heat, fire	45
	Wind Protection: cover, pedways, tunnels	25
	Infrastructure Improvement: roads, streetscape, sidewalks	10
	Operations: maintenance, snow removal/ clearing	7
	Safety: safe, secure, security	7

<b>Mobility</b>		
GOALS	<ul style="list-style-type: none"> <li>- Minimize need for commuting</li> <li>- Reduce hazards of movement</li> <li>- Encourage use of public transit and walking</li> </ul>	
keywords	Access: connectivity, wayfinding, accessibility	15
	Public Transportation: transit, bus, LRT, Corona Station	8
	Indoor Environment: indoor, pedways	6
<b>Economy</b>		
GOALS	<ul style="list-style-type: none"> <li>- High degree of self-sufficiency with respect to food production and energy</li> <li>- Utilize local resources to increase job opportunities</li> <li>- Preserve economy stability</li> <li>- Minimize maintenance and management costs</li> </ul>	
keywords	Vending: food, beverage, café, eat, drink, coffee, restaurant	13
	Surrounding Development: retail, active edges, commercial, businesses	12

The second open-ended question about the Warehouse Campus Park required each participant to complete a sentence on how participants envisioned the future of the park to become. The three general categories organized responses into Live, Grow, and Play (Figure 19). The Live category had the most responses that referred to the future of the park, which included elements of livability and factors to improve the quality of life of those in the area. Overall, participants would like to see a public space in downtown Edmonton to be welcoming, inviting, modern, innovative, and bustling that will attract people to the park space.



**Figure 19:** Future Vision of the Warehouse Campus Park (Consolidated)

For the Play category, which promoted the wellness and socialization of users, had many respondents envision the future of the park for gathering and community building that will ultimately attract users to the park space for simple routines such as taking a break. Other participants would like to see the future Warehouse Campus Park be multifunctional, have programming and festivals that will be able to foster activities, and entertain users.

Responses in the Grow category wanted to see the future space as a future icon and landmark that could be “Edmonton’s most loved park in 20 years,” (Questionnaire Participant) and a park of “national interest.” Ultimately, the park should act as a destination for locals of the surrounding areas to enjoy and be attractive to bring in those from out of town. The park space should be inclusive for all Edmontonians, be universally accessible, and barrier-free.



Responses also included creating a space that is all-season, easily accessible, and connected to surrounding facilities, which would increase the perceived safety and make a space more comfortable. Other unique responses from this question included taking into account the surrounding environment and developments to help foster active edges, improving the quality of life for users, be diverse, flexible, and encompasses elements of warmth and bright lights to enliven the area.

**Table 4:** Future Vision of the Warehouse Campus Park (Keyword Chart). The numbers to the right represent the frequency of keywords that were mentioned, and responses can have keywords that belong to multiple categories.

Live: Livability and quality of life for users		
Keywords	Descriptors: welcoming, free, fun, good, loved, Lively, inviting, enjoy, amazing, interesting, lively, Improved, beautiful, redeveloped, nice, fun	26
	Inclusive, For all, Edmontonian, Barrier Free, Universal	14
	Safe, Comfortable	9
	Living: life, lives, needs	6
	Diverse, Flexible	2
	Pedestrian	2
	Light, Bright, warmer	2
	Tree	2
Grow: Promotes future growth as a community		
Keywords	Modern, Vibrant, Exciting, Celebrating, Innovative, Bustling, Unique, Attractive	19
	Landmark, Icon, Destination	11
	Accessible, Connect	8
	Surrounding Development, active edges	4
	Maintain	1
	Bike	1

<b>Play:</b> Wellness and Community gathering and recreational spaces		
Keywords	Social: together, gather, community, take a break, relax, interactive	17
	Programming: events, festival, activity, functional, entertain, hangout	12
	Usage: year round, all season	6
	Physical Additions: art, street furniture	2
	Open Space, green space	2

#### 4.3.4. Conclusions

The results from this questionnaire resonated with the City of Edmonton's Winter Design Guidelines and existing literature. The vision that the participants had for the park was similar to the general programming of the Warehouse Campus Park outlined within the Downtown Public Places Plan (DPPP). Most of the participants' suggestions indicated that more awareness needs to be focused on creating a destination space that people can linger in, which involved adding warm seating areas and promoting nearby vending opportunities and festivals in the area. Public spaces in Downtown Edmonton needs to be designed and programmed so that there are reasons and incentives for users to go to a space. It is also important to ensure that the area can be inclusive and help mitigate issues such as homelessness in the city.

To summarize, respondents envisioned the future park as a functional community gathering place with amenities and facilities to support the future use of the space. Given the size of the Warehouse Campus Park, it has the potential to be a great community space for events, festivals; however, to ensure that those opportunities arise, it will be important that the existing infrastructure surrounding the park is improved so that the space can be visually attractive,

diverse, and easily accessible by future users of the area. Future developments should also take the opportunity to create active edges around the Warehouse Campus Park.

## **4.4. Warehouse Campus**

### **4.4.1. Introduction**

The purpose of designing the Warehouse Campus Neighbourhood Central Park was to explore the process of designing a public open space through a winter lens. This design explored the possibilities of how the park could look like with future developments and envisioned a park where climate sensitive planning recommendations were seriously considered at the preliminary stages of design. The goal was to create an all-season useable community space for all users of Downtown Edmonton.

In the DPPP, it envisions the future of the Warehouse Campus Park as a Community Park that will be:

It will be large enough to host community events and gatherings while also providing many informal recreation and leisure opportunities suitable for individuals and families. It will support a significant tree canopy and a large green open space. (Downtown Public Spaces Plan, 2019, p. 63)

The City of Edmonton began the process of expropriating nearby lands for this park development and currently has around 1.25 ha or 12,500m<sup>2</sup> (Riebe, 2019), with the total subject site (including 107 Street) is around 16, 500m<sup>2</sup>. There was one business that refused to sell land to the city, which was located just southwest of the Warehouse Campus subject area (Riebe, 2019). Since then, the COVID-19 pandemic forced the business to permanently close; however, it is unsure whether the City has plants to reopen discussion with the business.

#### **4.4.2. Site Visit**

Due to time constraints, the subject site was visited once on Wednesday, March 4, 2020, at 9 am. The site was also informally observed when walking past the area. The current Warehouse Campus subject area is all composed of surface parking lots (approximately 460 parking spots), and the challenge for this park is to be able to design it for future developments and its population. Besides sizeable private surface parking lots, there was also ample street parking on both sides of 107 Street. The alleys located adjacent or within the subject area were in poor condition and used for the sole purpose of laneway servicing, and garbage removal. There were multiple unofficial laneways observed within the subject area, to accommodate for access and circulation in the surface parking lots. The subject site is accessible by 107 street between Jasper and 102 Avenues, and 106 Street to the East.



Given the current conditions of the subject site, no one was observed on-site, although several people were waiting for transit and coming in and out of the Corona LRT station. The bus stops on 107 Street have Edmonton Transit Service (ETS) for the Edmonton region and busses serving the larger capital region such as Strathcona County Transit to Strathcona County and St. Albert Transit (StAT) to St. Albert.

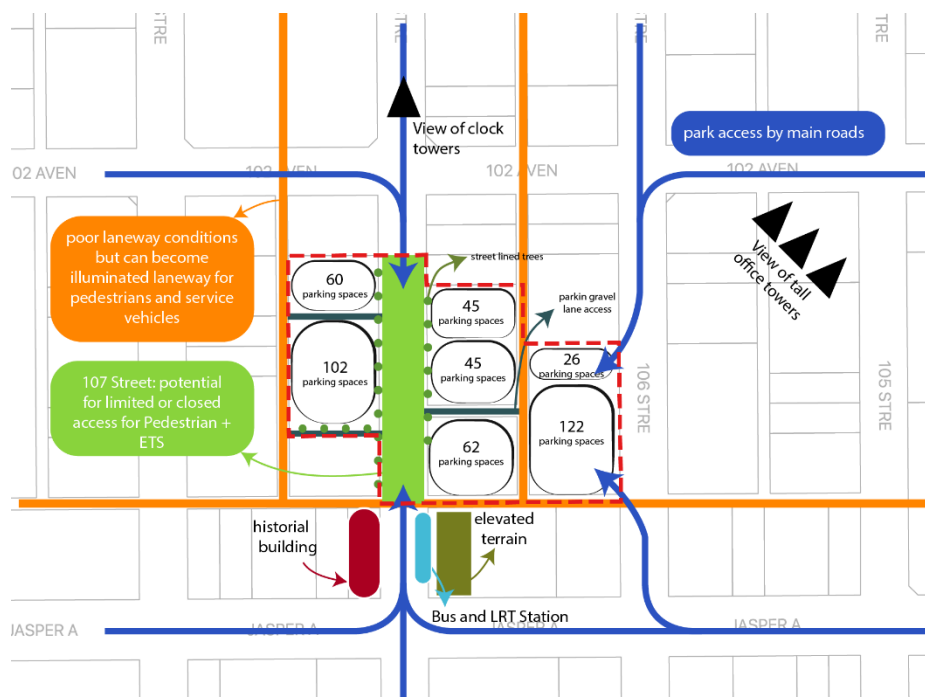
Given that the time of the site visit was on a sunny weekday morning with temperatures around -3°C, many people were seen walking along Jasper Avenue. Even other days when the site was briefly visited, with colder temperatures around -17°C (Wednesday, February 12, 2020), and -10°C (Sunday, February 23, 2020), Jasper Avenue remained a street where pedestrians would mostly walk.

In the site, a few notable views were observed. MacLean Block, built in 1909, is on the City of Edmonton's Register and Inventory of Historic Resources. MacLean Block is located off the southwest part of the subject site coming in from Jasper Avenue. In the subject site, view of the tall buildings east of Downtown was observed, and the clock towers of MacEwan University were observed on 107 Street.

With most of the businesses' rear facing the park, measures need to be imposed to ensure that inconveniences such as parking, and garbage disposal in the rear laneways do not deter from the potential user experience of the area. The subject site was also not located directly adjacent to Jasper Avenue to the South, or 102 Avenue to the North, therefore it is important that the future of the space can be easily identifiable and accessible by future users of the space. Observations of desire lines on the snow (possibly for those wanting to access their vehicles faster) indicated that the future design of this space needs to consider possible desire lines and pathways of users that will help break the gridiron street layout of Downtown. Pictures from the site visit can be found in Table 5.

**Table 5:** Site Visit Pictures

Site Visit	
	
107 Street looking north, views of Grant MacEwan Clock Towers.	Laneway Conditions
	
107 Street looking West from Jasper Avenue, access to subject site	Existing Conditions of site looking East, and view of desire lines
	
Surface Parking Lots West of 107 Street	



**Figure 20: On Site Observations**

## 4.5. Site Analysis

This section of the site analysis will serve as the basis for understanding the Warehouse Campus Park area's current context with data collected from Edmonton Open Data and Environment Canada. The site analysis from this section will help inform future park space decisions and be a valuable resource for those unfamiliar with the site's physical context. Spatial files were combined and adjusted for the purpose of this project through programs such as Autodesk Civil 3D and QGIS.

Google Sketchup was used for the sun shadow analyses, and Autodesk Flow Design was used to provide a general understanding of the wind flows throughout the subject area.

#### **4.5.1. Surrounding Conditions**

##### **Zoning**

The zoning surrounding the site is notably Urban Warehouse Zone, which is why the subject site is temporarily named the Warehouse Campus Neighbourhood Central Park by the City of Edmonton. Within 300 metres of the Warehouse Campus Park area, there are two other noticeable Public Parks Zone. The park to the northeast corner is the most recently built, Alex Decoteau Park; and east of the site is Beaver Hills House Park, and then a much smaller Michael Phair Park further to the east. Directly south of the Warehouse Campus subject area is the Jasper Avenue Main Street Commercial Zone (JAMSC), and the general purpose of this zone is:

... to provide a Zone that accommodates at ground level, predominantly retail commercial, office and service Uses suitable for the Downtown's Main Street, Jasper Avenue, and to ensure that infill developments and the retrofitting and preservation of historical and older buildings incorporate human scale design characteristics to enhance a revitalized, dynamic Main Street atmosphere. (Edmonton Zoning Bylaw 12800, Section 910.9)

There are also some site specific and direct control zones surrounding the subject site for specific developments, and a heritage area zone to the East. Three proposed developments that have been recently approved by City Council surrounding the Warehouse Campus subject site. The purpose of those three developments are as follows:

##### **DC2 (1068)**

To establish a Site Development Control Provision to accommodate a mixed-use development which includes two residential towers connected by a medium rise link building, and street related commercial uses fronting onto Jasper Avenue NW and 108 Street NW. (Charter Bylaw 18899, 2019)



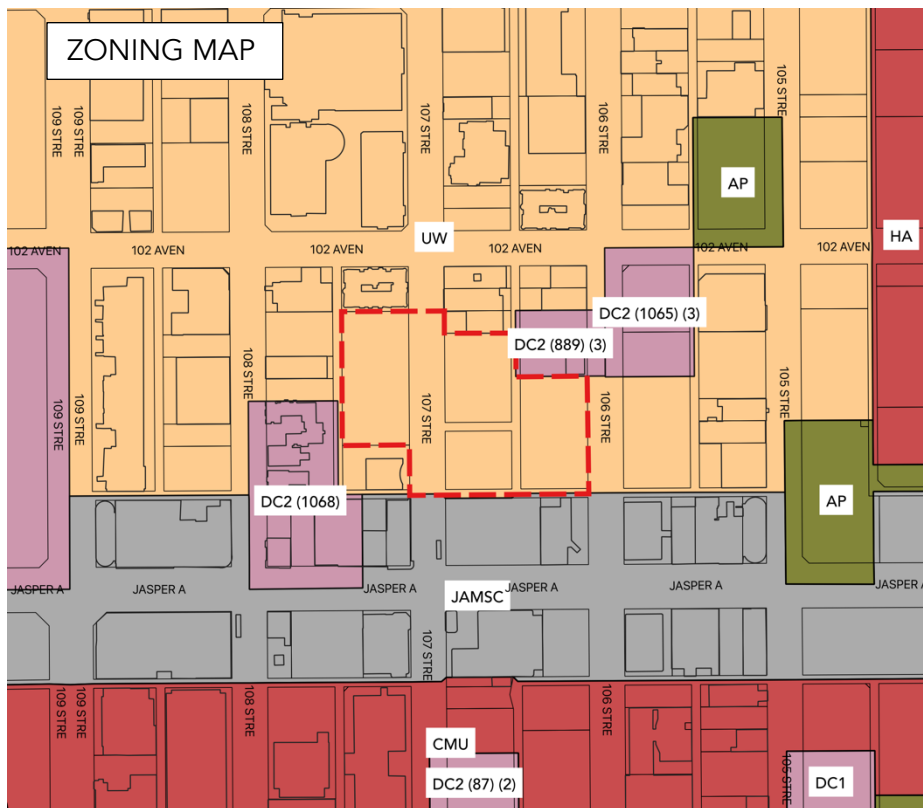
DC2 (889)

To accommodate a 123 metre high (approximately 37 Storeys) Tower with a mixture of Commercial, Basic Service, Community, Educational, Recreational and Cultural Service Use Classes in a podium with Residential and Residential-Related Use Classes above the podium. Regulations are included to ensure integration of future development within the Warehouse Campus Neighbourhood and to provide for an active and inviting pedestrian oriented streetscape and a feature courtyard providing access to the residential lobby. (Charter Bylaw 17246, 2015)

DC2 (1065)

To accommodate two high rise residential buildings with a mixed-use podium that is sensitive to the future downtown park and supports pedestrian friendly streetscape along 106 Street and 102 Avenue. (Charter Bylaw 18838, 2019)

All three developments have plans to include a mixed-use podium to support the street-life that will benefit the new Warehouse Campus Park, given the building interface that is facing the park is designed correctly. However, the current development proposals does not address of integrating uses with the park to encourage more vibrancy surrounding their developments. Since there would be five new residential towers within close proximity to the future Warehouse Campus Park, it is important to ensure that this public open space will be able to cater to all residents of those towers, and the buildings include ground floor usage that will be able to flow into the park space.



## LEGEND



Warehouse\_SubjectArea

## Downtown\_zoning

-  Commercial
-  Direct Development Control
-  Jasper Avenue Main Street Commercial Zone
-  Urban Services - Other
-  Urban Services - Parks
-  Urban Warehouse Zone




**Figure 21: Zoning Map**

**Land Use**

The land use of the Warehouse Campus Area, as previously stated, is currently used as surface parking lots. The area also has multiple sit-down restaurants as well as buildings more than four storeys tall along with other retail establishments. There is a fire station nearby and higher education institutions such as Norquest College directly north of 102 Avenue from the subject site, and MacEwan University further north of 107 Street at 104 Avenue.



## LEGEND

 Warehouse\_SubjectArea


WarehouseSurroundingArea


 Commercial/ Retail

 Fire Station

 Hotel or Motel

 Institutional

 Office

 Park/ Green Space

 Parking

 Recreation

 Residential

 Restaurants

 Warehousing

 Vacant/ Undeveloped Land

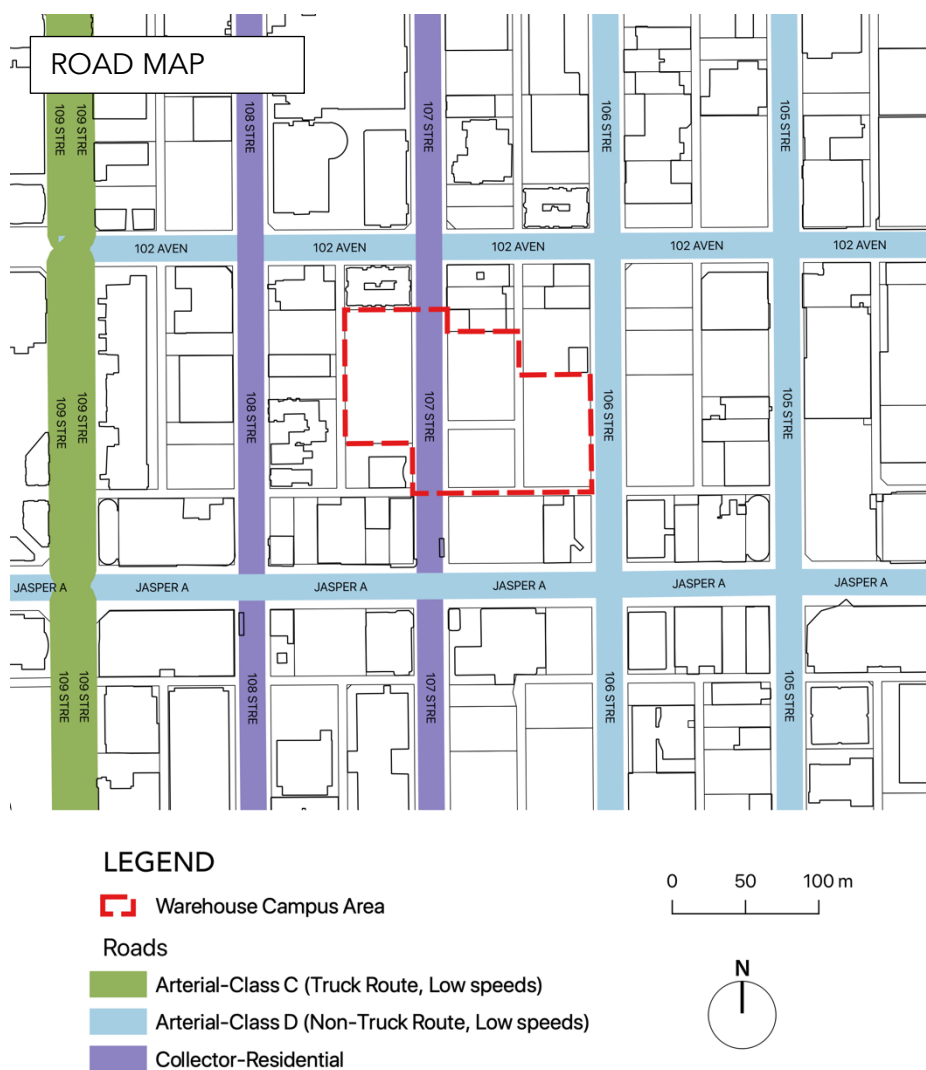
0 50 100 m



**Figure 22:** Land Use Map

## **Roads**

The main arterial surrounding the Warehouse Campus Park site is 109 Street to the west, one of the main connectors to the south of the city, which is commonly used to cross the North Saskatchewan River via the high-level bridge. 102 Avenue and Jasper Avenue serve as arterials to connect the West and East sides of the Downtown neighbourhood. 108 Street (Capital Boulevard) leads directly south into Capital Plaza, the Federal Building, and the Province of Alberta Legislature Grounds. 107 Street also leads south towards the direction of the Alberta Legislature. Both 108 and 107 streets northbound end at 104 Avenue, the location of Grant MacEwan University. The location of both 107 and 108 Street and where they connect, labels both those roads as a collector and residential streets. Surrounding the subject site are also alleyways that are currently in poor condition but has the potential to become pedestrian accessible active edges to the Warehouse Campus Park.

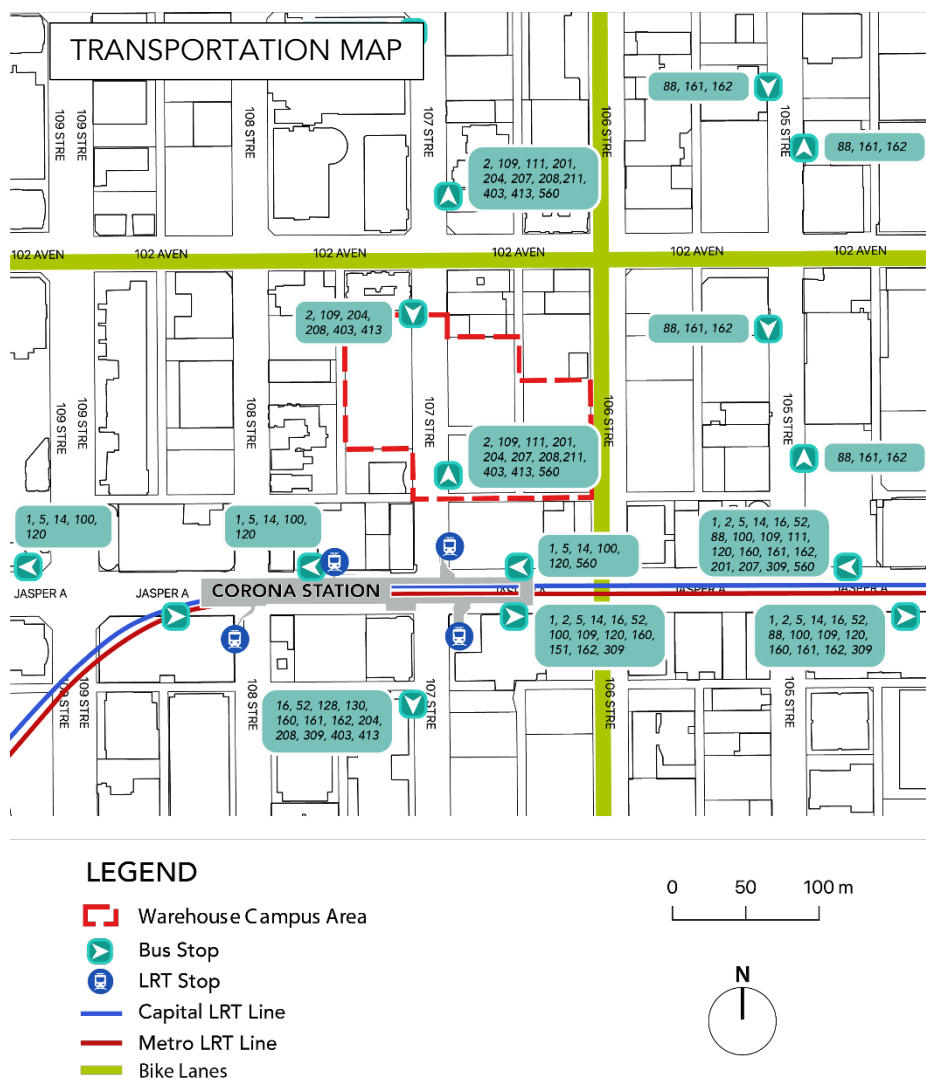


**Figure 23: Road Map**

## **Transportation**

Jasper Avenue, located south of the site, has a road right-of-way (ROW) of 30m, 6 lanes of vehicle traffic, and 4m sidewalks on both sides. 102 Avenue, located north of the site, has a 24m ROW with 3 lanes of traffic and a dedicated bike lane. 107 Street currently has a 24m ROW with 4 lanes, and two of which are for on-street parking with 4m sidewalks on each side. While 107 Street has signs permitting bikes, there is no clear marking for a bike lane going down that street.

The subject site is also well connected to public transportation facilities. 107 Street has an LRT entrance to Corona Station and multiple bus routes serving various locations within and outside of the City of Edmonton limits. The future construction of the new Valley Line LRT will have a station along 102 Avenue that will also be able to connect the users of the Warehouse Campus Park from the northern edge.



**Figure 24: Transportation Map**



#### **4.5.2. Environmental Conditions**

##### **Sun Shadow Analysis**

Given the limited sunshine in the winter season, winter spaces must receive ample sunlight throughout the day. Although the site's existing conditions receive ample sunlight throughout the day even during the Winter Solstice (shortest day of the year), the urban form of surrounding the area will eventually become redeveloped in the future. Therefore, a sun shadow study of the future conditions was conducted with the approved developments to date. The proposed developments (total of 5 residential towers) were 3D modelled and imported into Sketchup for the analysis. The currently approved development proposals (Figure 26) show that the sunniest spots will be the northern part of the future park throughout the winter months.

In the winter, the sun can set as early as 4 pm, which means office workers, and potential users of the area will be experiencing darkness both before and after the regular work hours of 8 am to 4 pm. Therefore, spaces in the winter should also take advantage of potential users during the lunch hours between 11 am and 1 pm, by strategically placing programming in those areas. In the summertime, there is less concern for sun penetration into the site as there will be ample sunlight throughout the day (Figures 27 and 28). The sun analysis conducted also suggested that if the surrounding area to the park is to continue to densify with taller buildings, there will be a need to strategically illuminate and light up the space after dark to ensure that users can comfortably navigate through the park. The sun shadow analysis will be especially important if the parking lot located south of the park gets developed in the future, as that

development will have the potential to overshadow the existing sunny areas in the park.

EXISTING CONDITIONS (WINTER)



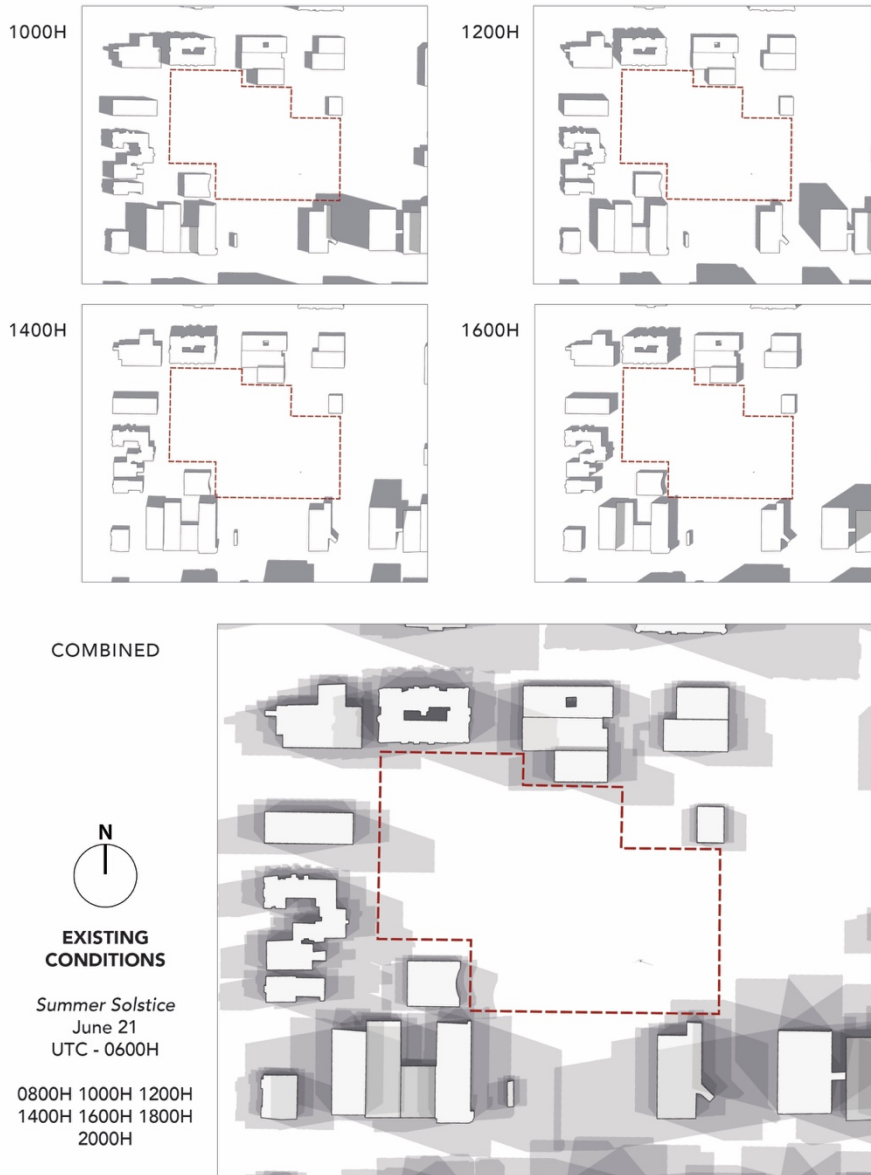
Figure 25: Sun Shadow Analysis (Winter Solstice), Existing Conditions

## FUTURE CONDITIONS (WINTER)



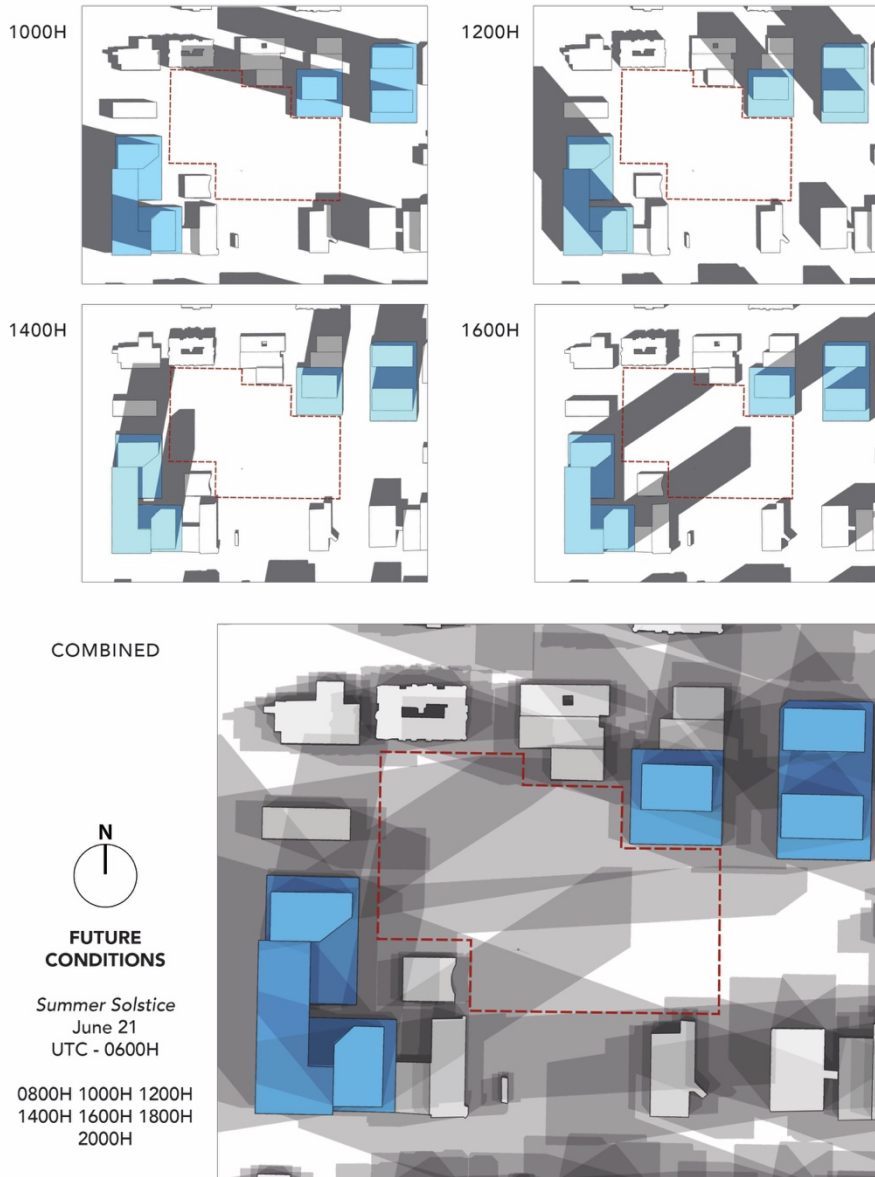
**Figure 26: Sun Shadow Analysis (Winter Solstice), Approved Future Conditions**

## EXISTING CONDITIONS (SUMMER)



**Figure 27:** Sun Shadow Analysis (Summer Solstice), Existing Conditions

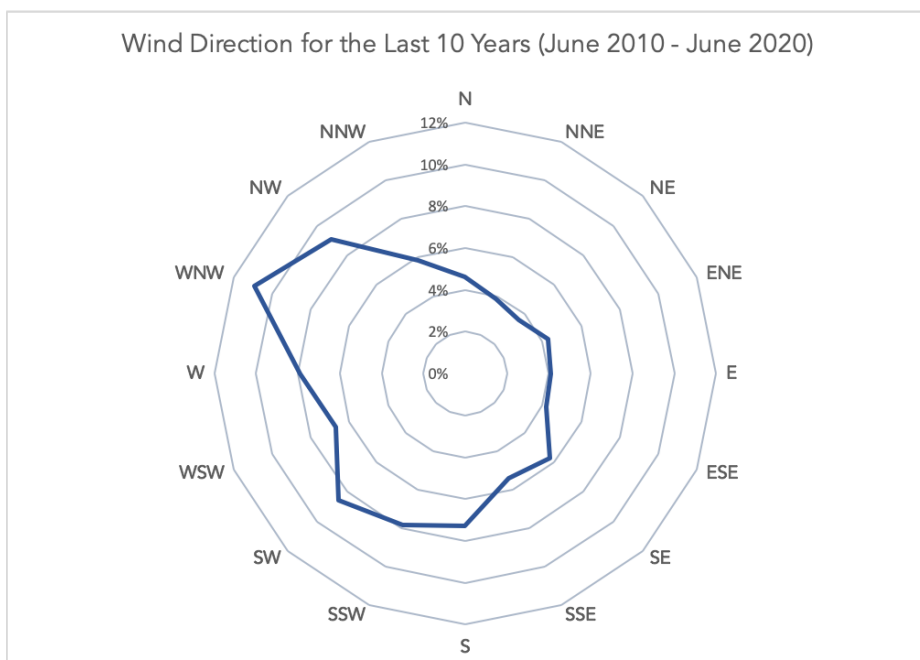
## FUTURE CONDITIONS (SUMMER)



**Figure 28:** Sun Shadow Analysis (Summer Solstice), Approved Future Conditions

## **Wind Analysis**

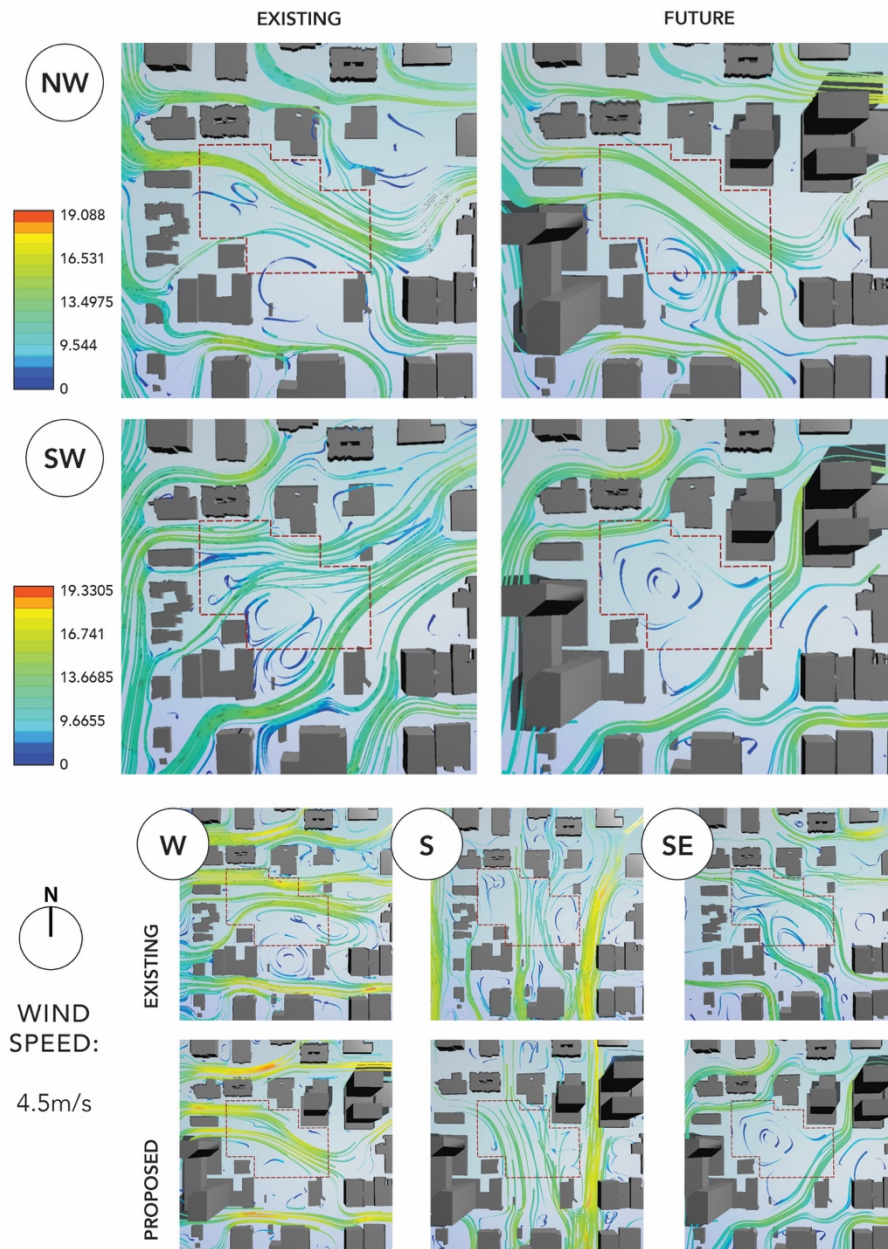
In Canada, the prevailing winds often come from the West directions (Environment and Climate Change Canada, 2013), and more specifically, ranging from the Northwest to Southern directions in Edmonton. In the past ten years, from June 2010 to June 2020, the wind mostly came from the WNW and NW Directions (Figure 29). The average wind speeds in the winter have a higher average at 4.45m/s compared to the summer seasons at 3.2m/s (Table 6). Given that winter has higher wind averages, it becomes even more evident that urban planning and design need to ensure that the outdoor comfort in the winter seasons gets considered in the early stages of design.



**Figure 29:** Frequency of Wind Direction June 2010 - June 2020. Percentage of Frequency was calculated by taking the number of hours per direction divided by 10 years.

**Table 6:** Average Wind Speeds per Season in Canada. (Environment and Climate Change Canada, 2016)

<b>Numerical Values at 30m</b> Latitude = 53.548, longitude = -113.479		
Period	Mean Wind Speed	Mean Wind Energy
Annual	3.86 m/s	61.12 W/ m <sup>2</sup>
Winter (DJF)	4.45 m/s	81.25 W/ m <sup>2</sup>
Spring (MAM)	3.53 m/s	45.88 W/ m <sup>2</sup>
Summer (JJA)	3.20 m/s	36.31 W/ m <sup>2</sup>
Fall (SON)	4.06 m/s	64.75 W/ m <sup>2</sup>

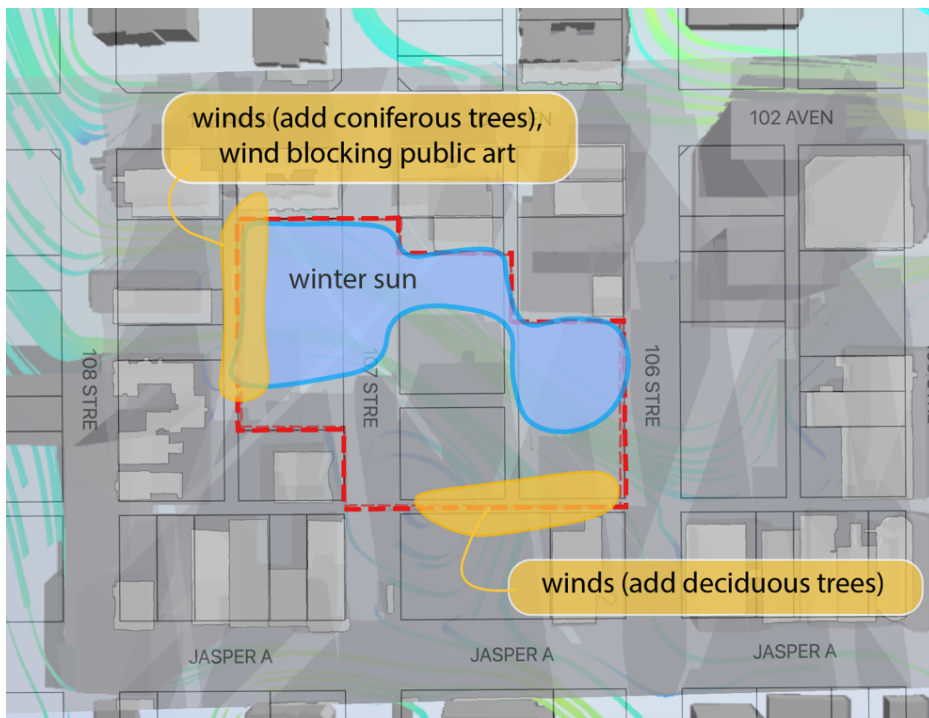


**Figure 30:** Wind Analysis of the 5 most frequent wind directions of Edmonton



## Summary

By combining both the analysis from the sun/shadow and wind analysis, it is clear that the northern parts of the site will be the sunniest parts of the day throughout the winter. Therefore, programming should be considered in those areas to maximize the sunlight potential. The wind should be blocked from the northwest portion of the site with coniferous trees or other elements to block incoming winds. The southern location for wind should consider deciduous trees to allow and maintain the sunlight to penetrate to the northern part of the subject site.



**Figure 31:** Wind and Sun Summary Map

## 5.0 Design Proposal

### 5.1. Guiding Principles

The proposal for the Warehouse Campus Park was designed based on the findings from the literature review, existing guidelines and policies, and the results from the questionnaire. Most respondents from the questionnaire envisioned the future park to be a functional community gathering pace with amenities and facilities to support the future use of the space, which was future supported in the Downtown Public Places Plan (DPPP).

**The Vision:** An all-season, accessible, and multifunctional community public park that will be a destination for all walks of life to enjoy, interact, and connect.

Through this design, the Warehouse Campus Neighbourhood Central Park encompassed the following objectives:

1. **Maximize** sun exposure, and ensure space is well lit.
2. **Wind Protection** through art installations, or vegetation.
3. Provide opportunities for multifunctional and **expandable programming**.
4. Ensure the park is **accessible and well connected**.
5. Create opportunities for implementing **winter infrastructure** such as warming shelters, heated seating areas and fire pits.
6. Encourage **active edges** to support functions inside the park.

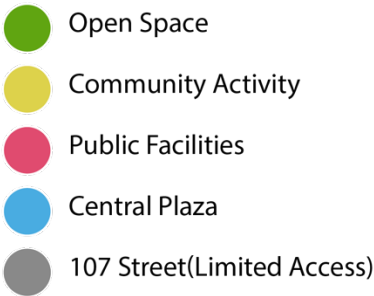
## 5.2. Proposed Programming

The proposed programming for the design was mainly determined by the questionnaire's findings and what the respondents envision the future of the Warehouse Campus Park to become. The Warehouse Campus Park is an extremely large space located in the heart of Edmonton, which is extremely rare to find in large cities; therefore, the proposed programming also took advantage of the availability of potential open green space. The general programming for the conceptual designs is listed below.

1. **Central Plaza:** Area to function as the central gathering space and has potential to turn into a skating rink in the winter. Facilities and vending opportunities should also be nearby.
2. **Dog Park:** Provide an enclosed space for an off-leash dog park.
3. **Recreation:** Opportunities for year-round formal and informal recreational activities for children, and the general public.
4. **Green Open Spaces:** Green spaces that can incorporate functions such as landmarking, provide community spaces, and function as an open field for play or events.
5. **Seating Areas:** Provide unique seating opportunities near other programming, as well as designated seating spaces.

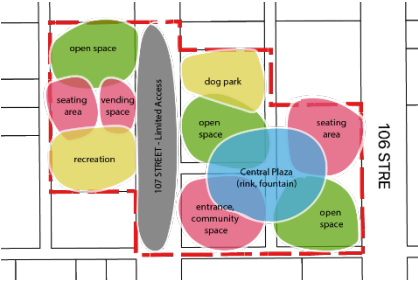

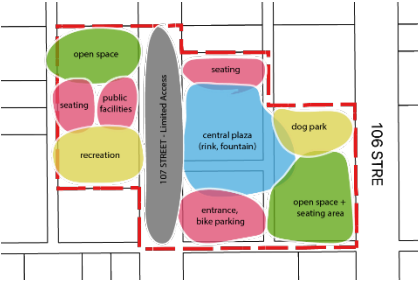

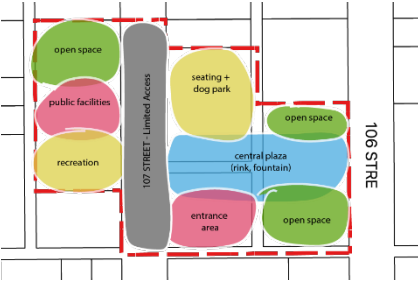

**5.2.1. Conceptual Designs**

Three conceptual designs were proposed and designed based on three different factors: Circulation, Programming, and Wind/ Sun Exposure (See Table 7). The conceptual designs were shown to participants of the in-depth interviews to help achieve a more consolidated and cohesive design proposal based on climate sensitive considerations and needs of the community. The conceptual sketches were based on the assumption that 107 Street will remain as a street, and those future developments would continue to be constructed as planned. The land use for the conceptual designs was categorized as open space, community activity, public facilities, central plaza, and 107 street. More details on programming is in the design proposal (see section 5.4).



**Figure 32:** Legend for Conceptual Designs (Table 7)

Table 7: Conceptual Designs

Conceptual Sketch	Infraworks Model
	
<p>1. Focus of the concept was on the <b>circulation</b>, and how it will be able to connect to allow users to travel the shortest distance and connect both sides of the park.</p>	
	
<p>2. Focus based on <b>programming</b> and ensuring that programs such as open space and seating areas are always placed near each other, and that the central plaza was in a central location.</p>	
	
<p>3. Third concept was based on the <b>wind and sun analysis</b> summary, by placing open space, seating and potential high foot traffic programming in the northern part of the site with most sun exposure.</p>	

### 5.3. In-Depth Interview

The purpose of the in-depth interviews was to have professionals experienced working in the planning industry, specifically in Edmonton, to help gain a better understanding of the results from the questionnaire and their perceptions of winter design in the city. The in-depth interview asked a series of questions based on four different subject areas: Winter Design Guidelines, Potential for Winter Activities, Climate Sensitive Considerations, and the Design Proposal. There was a total of five people interviewed through three different meetings on Zoom. The participants varied from those who worked in the private and public realms of planning and winter city design. The participants were also shown three different high-level conceptual designs via Autodesk Infracore and were asked to use their expertise to critique and provide suggestions for the design proposal. The results from the in-depth interviews are summarized in the following sub-sections and detailed answers can be found in Tables 9-12.

**Table 8:** General Information of Interviewees. \*indicates participants were in one conference call together.

Organization	Position/ Years in Planning Industry
Private	Urban Planning Consultant / 1
Public*	Urban Designer / 30
Public*	Urban Planner / 23
Public*	Winter City Planner / 7
International Festival of Winter Cinema	Festival Director / 10

### **5.3.1. Winter Design Guidelines**

The Winter Design Guidelines for those unfamiliar with Edmonton's context and the other struggles of winter cities may perceive the guidelines as common sense. However, because it can be perceived as common sense, it is often forgotten or clouded by the availability to solve our urban problems with technology. Given the complexity of the urban issues and Edmonton's urban context, it was argued that the Winter Design Guidelines are not common sense since good zoning bylaws can be perceived that way as well.

The idea of winter city design was introduced into Edmonton nearly 10 years ago. It is slowly beginning to get the attention of developers and community leagues because they are beginning to see the value of creating a year-round seasonal space for their users. The City of Edmonton Winter Design Guidelines not only is slowly gaining attention from developers and community leagues. The guidelines have also become a useful tool for events in the winter, such as the International Festival of Winter Cinema, as it "provide[s] automatic answers to questions you may have," (Festival Director) such as questions in terms of siting, and screening orientations.

The biggest issue with the Winter Design Guidelines in Edmonton is that they are not regulated and are just suggestions; therefore, developers do not need to implement them into their projects. Although the Edmonton Design Committee may ask for winter design considerations for new developments, there is still uncertainty of how much of the guidelines will be taken into consideration. Since winter city design is a relatively new concept to developers, there is little proof that winter design considerations can add to the overall attractiveness of their projects. Respondents from the questionnaire believe that there is no

interest from developers for climate sensitive spaces in Edmonton, and the City of Edmonton does not give enough incentives for it. Rather than incentives, interviewees suggested that there be testing tools or programs provided as part of pilot projects, partnerships, and grant programs to make it a more attractive project to test. Additionally, increase education about the cost and benefits of climate sensitive design, and how achievable it can be with minimal expense should be continuously discussed. However, all interviewees agreed that the best way to implement the Winter Design Guidelines was to regulate and require climate sensitive considerations in Edmonton.

**Table 9:** Winter City Guidelines In-Depth Interview Consolidated Answers.  
 \*Answers may be edited for clarity.

[Questions] Winter City Guidelines	
How useful has the Winter Design Guidelines been for you and the work that you do? What are some reasons the guidelines are neglected?	
Urban Planning Consultant	<p>Winter Design Guidelines are non-policy guidelines. Most developers don't know about them and don't need to know about it, unless they are doing a site-specific work DC2. Developers might have a clause to loosely address the Winter City Guidelines and have certain wind protection and take into account the considerations that are usually not well formed. While it's important it doesn't not have teeth to say "okay, we can take this and actually implement it to new or existing development."</p> <p>The way that we design Edmonton over the last 50 years - building downtowns are not conducive to winter city living. There are poor examples of wind blocking, little examples of warming, and poor activation.</p> <p>People also don't recognize the impact of outdoor public life when they constantly use the pedway system... but if working professionals all walk inside, then the streets are empty, less attractive, the businesses don't do as well. The park spaces honestly become a great space for illicit activity because it's just dead spaces. Whether people realize it or not, going indoors all the time actually becomes a dangerous cycle, because it makes the outdoor public spaces much harder to activate.</p>



Urban Designer	<p>Edmonton design committee pushes for winter city considerations so, developers are more aware of it and have some sort of statement to address it, but whether they implement the winter city guidelines is another thing.</p> <p>For a long-time planning and urban design lost basic fundamental design because technology got into the way. So, we can heat anything, and change anything, but now we are going full circle and going back to the beginning.</p>
Urban Planner	<p>Winter City Design is going back to basic principles. With modern technologies, they think they can ignore basic principles. None of it is rocket science but having them isn't enough. You have to implement it, and most capital projects are asking for winter lenses to be considered.</p> <p>Edmonton has been struggling with wind for so long, and now supposedly new wind study guidelines are being developed.</p>
Winter City Planner	<p>Takes a long time to change our urban form in Edmonton. Community leagues [and developers] want the best return of investment for their spaces to have year-round usage. Edmonton is starting to see changes and takes a long time to change infrastructure that has been around for 80 years.</p>
Festival Director	<p>Overall guidelines have been useful in that they provide automatic answers to questions you may have. The guidelines help answer some questions that we may not have in terms of siting, and screening.</p> <p>The Winter Design Guidelines are neglected because they are not put into regulation, it is more of suggestions. Edmonton still designs our spaces for the summer, so the winter guidelines are an afterthought, and you can see that from artist rendering for new buildings. You almost never see a winter rendering for a space in the winter.</p>
What would you see as a reasonable incentive for developers for them to incorporate winter sensitivity into their design proposals?	
Urban Planning Consultant	<p>Developers will actively add extra elements if there is a tangible impact on their own building or will improve their own building's attractiveness and marketability, and that is something they will take advantage of. Winter city is a new idea to developers, so when they</p>

	<p>hear about it, there's no proof that it works so it's not easy for them to see the benefits of it.</p> <p>Not sure if there is a specific incentive other than education and talking to people about the benefit. It can be done with minimal expense, with a little bit of consulting work maybe with the city or winter city planners. In Edmonton, there is a culture of getting behind things, and when they go, they go. And before that it takes a long time before it tips - you have to make it trendy first.</p>
Urban Designer	Usually the engineer says it's okay when wind studies are submitted but there's nothing to verify the wind studies. This should become part of normal business.
Urban Planner	<p>Regulations. Less incentives as you must.</p> <p>With interaction with the public realm, we need to understand the impacts it will have, we need to understand the downdraft and shadowing impact and follow through.</p>
Winter City Planner	Can start with pilot projects to make it attractive for developers to try it through partnerships.
Festival Director	Short of requiring it, it can be density bonusing, grant program, match funding, reimbursement program, or host winter design certifications so developers keep it top of mind. This will make sure developers consider all 4 seasons in their designs.

### 5.3.2. Potential for Winter Activities

From the questionnaire, most respondents would use a public space in the winter if there were activities such as festivals and events in the area. Given that Edmonton's Downtown is growing, hypothetically, citizens in the surrounding area would want things to do, whether it be in the form of festivals or other forms of activation. "If the Warehouse Campus Park is designed correctly, it will eventually become a natural place for people to bring their kids," (Urban Planning Consultant). Rather than having more festivals, there should also be more focus on everyday life. "I want to go to the park every day

to get a hot chocolate, not just during a festival” (Winter City Planner). Accessibility and perceived safety were the main concerns of the park site. If those issues can be addressed, the public would be more comfortable, and that will draw users to gather in the space regardless of festivals.

Creating year-round spaces includes lowering the barrier for accessibility to the infrastructure. Most of the time programmable infrastructure should be considered in the early stages of the design to ensure that the space can be adequately serviced, “so the expense of powering and getting generators are not needed because the site will already have it” (Urban Planner). Furthermore, the infrastructure could consist of simple plug and play facilities where people can come and plug in their equipment and show off their talents. Rather than just focusing on the Warehouse Campus Park as a place to linger, it should also be thought of as a “transportation corridor, and a good place to cut through and walk” (Urban Planning Consultant). This is especially important for the students who currently use 107 Street to connect to Norquest College and Grant MacEwan University.

In Edmonton, the municipality has some large events such as New Years, Family Day and Canada Day. Most of the festivals and events that happen throughout the city are “non-profit organizations, with volunteer community boards” (Urban Planner). Therefore, the City of Edmonton needs to be better at supporting community events. Cities around the world, such as Seoul, South Korea (such as winter skating in Seoul Plaza) put a lot of effort in planning for festivals throughout the year. Often times, these big events require large temporary structures, and in the case of Edmonton, the two major barriers of hosting large events are the cost for non-profit organizations, as well as the

limited storage space available for these temporary structures. Edmonton would have the potential to host events with better designed temporary structures suited for the winter season if the City of Edmonton can find a way to financially support communities and provide storage spaces. “As long as [event planners] understand that the events come with a cost... most of the time the benefit outweighs the cost” (Festival Director).

**Table 10:** Potential for Winter Activities In-Depth Interview Consolidated Answers

\*Answers may be edited for clarity.

<b>[Questions] Potential for Winter Activities</b>	
There are only a handful of festivals that happen specifically in Downtown Edmonton, so do you envision that there will be more festivals in the future? If not, then what are some other reasons you think that users will go use the space?	
Urban Planning Consultant	<p>We have several successful winter festivals, and as soon as you have a large downtown park it's a prime opportunity, and why would you not take advantage of that.</p> <p>If a park like the Warehouse Campus is designed correctly, it becomes a natural place for people to bring their kids, with hilly areas and lots of green space. There is a shortage in these kinds of areas and creates opportunities for gentle recreational for nearby neighbourhoods as well. The park can be used for transportation as well as a place to linger.</p> <p>Winter city planning in general is not winter city planning if it does not account for the homeless and vulnerable population in the wintertime, that is also programmed for them. This population does not have their own spaces, and congregate wherever they can. This is an opportunity to create a space where they feel comfortable being there and have a place to be warm and get food. Natural part of urban living and needs to be addressed especially in the wintertime.</p>
Urban Designer	All-year, all-use is important, and festivals will draw you in, but if the space is comfortable then the rest will come. The way that Bryant Park in New York is used year-round.
Urban Planner	Have infrastructure so that services can be provided at the middle or the edges at the beginning. Infrastructure can be installed at the

	beginning, so the expense of powering and generators etc., are not needed because the site will already have it. It doesn't have to be professional musicians with their equipment and could just be plug and play. This makes it accessible for people living on the margins to showcase their talents and lowers the barrier entry.
Winter City Planner	Instead of festivals, more focus on everyday life. Which Programming and services are available for every day. I want to go to the park every day to get hot chocolate, not just festivals that will draw you in.
Festival Director	If they create public spaces, there will be more festivals to occupy the space. If there aren't, then there is probably a programming problem, lack of access, or funding. I think that access is the most important, getting people access to the space in the winter and all seasons.
Would you say that Edmonton would also be able to support many large events throughout the year [like Korea]?	
Urban Planning Consultant	You could do the same principles but scaled down. It's not cheap to do big festivals. People will be supportive, but it would be hard to fund, and I'm not sure that the city would do it. The COVID-19 pandemic changes a lot, especially for the funding.
Urban Designer	Festivals in Edmonton are usually organized by non-profit organizations, with volunteer community boards. The City is not in the business of putting on events (only New Years Day, Family Day, and Canada Day). The City really resists being the ones putting on the events, so it should be better at supporting community events. If we can put infrastructure in at the beginning, then it can be used by the people.
Urban Planner	
Winter City Planner	First barrier, from only having a few small temporary pieces in Edmonton is storage problems. The City does not have storage for these infrastructures, and other parts of the city are not willing to help with the storage.
Festival Director	As long as they understand that the events come with a cost, and if you do it right then most of the time the benefit outweighs the costs. As long as they understand that, then there will be interest and opportunities to do festivals in the park space.

### **5.3.3. Climate Sensitive Considerations**

This part of the interview focused on understanding the barriers of implementing climate sensitive design, and some of the reasons it is neglected within the planning process. Climate sensitive considerations arguably focuses on creating spaces for the average citizen, not for those living on the margins. The current design of spaces often includes hostile architecture that would deter the vulnerable population from the area, or create barriers that would discourage unwanted practices, such as sleeping on benches. Therefore, there is a fear that additional elements such as heated benches and shelters may attract 'unwelcomed' users and vandalism to the space. "Winter city planning, in general, is not winter city planning if it does not account for the homeless and vulnerable population." (Urban Design Consultant). The winter season is when the vulnerable population is most at risk; therefore, the Warehouse Campus Park is "an opportunity to create a space where they feel comfortable being there and have a place to be warm and get food." (Urban Planning Consultant).

In private developments, climate sensitive considerations such as wind protection and warming elements need to be perceived as beneficial to the entire development. Edmonton, during the 70s and 80s was built for indoor living, because "the mentality [was] that winter has to be endured" (Urban Designer 2020). When planning for events, the International Festival for Winter Cinema considers how the space will be used by the audience and festival-goers, by ensuring the site is near trees to cut winds and ensures the audience can stay warm via tents and fire pits.

Again, the reiteration on the fact that the Winter Design Guidelines are not regulated poses a significant barrier for implementation. Edmonton should no

longer have "blanket regulations" and understand that Edmonton has "unique characteristics, and [the] winters are particularly difficult to live through" (Interview, Urban Planning Consultant).

Interview participants agreed that since warming elements are more of a seasonal addition, they are often neglected in the process. Some of the additional issues with adding elements such as warm heating is the cost of operation and maintenance. The Festival Director indicated that other Canadian cities such as Ottawa have warming elements that often get neglected "because it is only winter for half of the year, a lot of the heating functions fall into disrepair, and by the time [the city] go[es] to fix it, the winter is already over" (Festival Director). Much like how the City of Edmonton operations team puts out planters and maintains spray parks in the short two-month summers season that Edmonton has, the City should also consider adding winter climate considerations into their operations. Given the issues surrounding snow maintenance, the inclusion of local snow storage, and climate sensitive studies such as wind, sun/ shadow, and snow storage locations are especially valuable and need to be addressed in the early stages of new development proposals. Another limitation surrounding snow removal is that "part of the issue is with provincial health regulations, and once [the snow] has been on the road, it is considered a biohazard and has to be hauled away" (Winter City Planner). Climate sensitive considerations vary from different cities, and we have to ensure that we are creating spaces and policies reflective of the local context.

Although Edmonton is one of the fastest-growing cities in Canada, it is still behind in terms of planning and development. Implementing additional aspects

such as warming elements will cost money and additional resources that the City of Edmonton and developers may be unwilling to prioritize.

**Table 11:** Climate Sensitive Considerations In-Depth Interview Consolidated Answers

\*Answers may be edited for clarity.

<b>[Questions] Climate Sensitive Considerations</b>	
Given that Edmonton is a winter city, what are some reasons that wind protection and warming elements are not taken into consideration when designing open spaces?	
Urban Planning Consultant	<p>Depending on the scale of the project, the City will require developers to address the wind issues through wind studies. Developers will work with the architects with wind considerations, but it's a bit of an add on, not a key consideration in the design.</p> <p>It's a process and it will take more and more time. We introduced the winter city design 10 years ago and our industry takes 20-30 years. Our industry is not particularly creative. It's a culture thing for people to buy into the idea of this, and when they buy in, they will contribute.</p> <p>Regulation of context sensitive design plays a huge role. We cannot just have blanket regulations and have to recognize that we have unique characteristics, and that our winters are particularly difficult to live through. So, there is merit that in our zoning we can be descriptive in what to expect. Oftentimes, city regulations are overbearing, but if the regulations can be designed in a way that developers can feel that the benefits outweigh the costs, that might help. There is a growing trend from developers in Edmonton who are interested in the interaction between the people and building - so there is an opportunity to engage those people. In the past it was "how fast can buildings be put up, and how much money can I make"</p> <p>Edmonton has a history of under budgeting, so we end up cutting corners, and the first things that would be cut would be winter design elements, because it is not presented as a core part of the project but an add on to the project.</p>
Urban Designer	Edmonton is built to be inside especially in the 70s and 80s, the mentality is still that winter has to be endured. Look at the pedways.



Urban Planner	Still lots of people and developers in the city that want pedways to link to their buildings.
Winter City Planner	For example, the Blatchford Development has lots of considerations for thermal comfort. Not sure how much is translating as they go further into development, or how much it will get watered down in the future.
Festival Director	<p>We still think of the summer most of the time when we are designing and have the overarching idea that we design for summer, but when we design for bike lanes people complain that it is winter for a majority of the year. It's the same mindset that summer is the time to go outside and winter is the time to stay indoors, when you should be going out all times of the year.</p> <p>The film festival considers winter design in that we host it in an area that is semi surrounded by trees to cut the wind, and we have the audience face the west for sun exposure.</p>
Do you think that because warming elements are more of a seasonal element that it is often neglected in the design process? And what are some issues with incorporating these seasonal elements?	
Urban Planning Consultant	<p>Culturally, we have challenges - honestly these kinds of things will get vandalized in Edmonton. Great things we put in that are public infrastructure that aren't constantly being monitored tend to get vandalized and ruined.</p> <p>Having to wire in the warming elements requires the energy, and engineering considerations that need to take place into the area.</p> <p>When you think of park space - people tend to limit expenses, Look at Hawrelak park. We just have a massive park, green space and concrete huts, and that is the infrastructure for the entire park. We make sure that we have basic infrastructure and just make it as bare bones as possible. This hasn't been a great way of doing things, but Edmonton has utilitarian culture, blue collar culture and when it's too extra they complain.</p> <p>People are really scared of the homeless population and vulnerable population taking over warming shelters in the winter. But if they are the people that need to use it, they are the people that get to use it. We build hostile architecture because we don't want homeless people using the benches. Design should include that population because, when we should be designing cities to help them.</p>

Urban Designer	Cost is a barrier, but we need to make it a part of our operations cycle. In the summer, we go out and put out barrels and planters everywhere, and if we can add heating structures in and make it a part of our DNA, eventually we will get there. We do have to try out a few areas with the heating elements first.
Urban Planner	City invests in spray parks which is very seasonal, so we need to move away from summer state of mind.
Winter City Planner	City of Edmonton doesn't support seasonal elements like ice rinks, it is more of a community thing.
Festival Director	<p>Yes I definitely think so, just an example from Ottawa, lots of the bus shelters have buttons you can press to turn on the heating element, but because it's only winter for half of the year a lot of the heating functions fall into disrepair, and by the time they go to fix it the winter is already over. Maintaining the warming elements does not happen instantaneously so it is often forgotten.</p> <p>Challenge of incorporating the seasonal elements is that people need to get out of the mindset that winter and summer are different and need to think of all seasons. Especially with the increasing change in weather variability with climate change, have to think of the cold days in summer and the hot days in the winter as well.</p>
Edmonton Winters often have issues with snow maintenance, what are some elements that would make the snow clearing process easier? Do you think that future proposals should include climate sensitive plans such as potential snow mounding locations, wind, and sun/ shadow studies?	
Urban Planning Consultant	Yes. All about context, and climate sensitive design that is Edmonton's context.
Urban Planner	Need conversation with the province about their safety regulations in regard to snow removal.
Winter City Planner	Local snow storage is something we should look at more. But part of the issue is with provincial health regulations, and once snow has been on the road it is considered a biohazard has to be hauled away. There are opportunities to use the snow in a different way, and if it's clean snow why haul it away?

Festival Director	<p>They should have climate sensitive plans especially if they are taller buildings or bigger structures and should be in proportion to the size of the proposal.</p> <p>We need to stop expecting property owners to clear the sidewalk space in their homes and have a city-wide cleaning crew so that there is consistency of plowed sidewalks across the city. And that consistency can affect those with mobility challenges for those sidewalks who are not cleared.</p>
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#### 5.3.4. Conceptual Design Evaluations

The last part of the interview showed three conceptual designs to the interviewees and gathered their constructive feedback and evaluation for the Warehouse Campus Park site. Since the start of this research, there were some changes to the park site as follows:

- partial closure of 107 Street within the site will become part of the overall park; and
- the approved development northeast of the site west of 106 street is no longer being built due to financial issues. This lead the City of Edmonton to purchase the three parcels and include a portion of it into the future Warehouse Campus Park; and
- it was confirmed that 106 Street will become a part of the park. It will not be closed, but rather “the road will go through the park rather than the park edging onto the park” (Urban Designer)

Interviewees agreed that it is important to consider desire lines to break up the gridiron street layout in Downtown Edmonton, which can create a more walkable and accessible park space. There should also be considerations to activate park edges with surrounding developments so that users can flow into the future park space.

Downtown Edmonton currently lacks in open green spaces and children play spaces; therefore, the main goal for the Warehouse Campus Park is to fill the gaps of those functions in Downtown. The current programs proposed in the conceptual designs were criticized for being too overprogrammed for the Warehouse Campus Park's needs and vision. "If we want big festivals, it should go in Churchill or Centennial Plaza at the Legislature grounds" (Urban Designer).


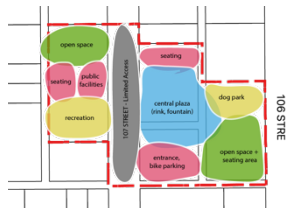
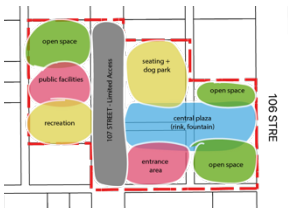
The current northwest corner was identified in the design proposal and the interviewees as a desirable location to include berming and mounding elements to help block the northern winds and function as a toboggan hill in the wintertime. The elevated topography of this corner will also be a "good vantage point to the rest of the open space" (Urban Planner).

Given that the focal point will be the central skating rink in the winter, it is also important to ensure that there are facilities nearby such as washrooms and temporary paving elements to create a seamless transition while users still have skates on. Considerations to temporary structures would also be beneficial to the space in the winter because "everyone wants to go outside in the winter and wants to be comfortable, so [temporary warming structures] almost supersedes the programming" (Urban Planning Consultant).

A well-received factor from the conceptual designs was the tree boulevards on the streets and lining the edges of the central plaza. In terms of the courts, many community leagues have taken out their courts already. Given the high demand for open green space and the Warehouse Park location, it was argued that the courts that would fit 2 to 4 people at a time could be better utilized for other functions.

Overall the conceptual designs took into consideration the climate sensitivity of the area, but it lacked in terms of creating active edges for the park. Given the context and the culture in Edmonton, the proposed designs were perceived to be over-programmed, and therefore some elements were consolidated to ensure that there was sufficient open green space and children play areas. The in-depth interview provided valuable insights on how the park space could be designed. All participants were impressed by Autodesk Infraworks (a BIM program) because it was able to show the site in all angles to help with better visualization of the space. Therefore, there was a lot of back and forth that made the process very interactive, which allowed for an in-depth evaluation of the conceptual designs.

**Table 12:** Conceptual Design Evaluations In-Depth Interview Consolidated Answers  
 \*Answers may be edited for clarity.

[Questions] Conceptual Design Evaluations	
Here are three design options I have come up with based on 3 main factors of Circulation/Connectivity, Programming, and Wind/Sun Analysis. Please provide your comments on each, elements that you think will work and what you think may be potentially problematic. (See Table 7 for more details)	
<div><div></div><div><p>Option 1</p></div></div> <div><div></div><div><p>Option 2</p></div></div> <div><div></div><div><p>Option 3</p></div></div>	
Urban Planning Consultant	<div><div><p><b>General Comments:</b></p><ul style="list-style-type: none"><li>• Use of trees to block winds is really good. Takes into account important elements, designed based on shading and thermal opportunities.</li><li>• Opportunities of programming, and through of height for additional topography, multimodal transportation opportunities (bike parking), great activation.</li><li>• Can have more shelter areas - ability to go into something, and where people can find shelter from the wind.</li><li>• For temporary structures, if they can come down when not needed and only operate in the winter, it would be great. Everyone wants to go outside in the winter, and wants to be comfortable, and that almost supersedes the programming.</li></ul></div><div><p><b>Option 1:</b> Has the programmable areas, and opportunities for events</p><p><b>Option 2:</b> Rink is more centered</p><p><b>Option 3:</b> Good in terms of festivals with food trucks and vendors, has clear areas you can have for different functions; tree boulevards are nice to have; the idea of expandable programming really captured.</p></div></div>
Urban Designer	<div><div><p><b>General Comments:</b></p><ul style="list-style-type: none"><li>• What will the rink look like in the summertime?</li><li>• Look at desire lines and where people will go</li><li>• Requirements from the city - lots of open space, we want a large open space to hang around, throw the frisbee, and kick a ball. What we don't want is to over program it. If you want big</li></ul></div></div>

	<p>festivals it should go in Churchill or Centennial Plaza at the Legislature grounds.</p> <ul style="list-style-type: none"> <li>• One asset not used in the design is the connection with the surrounding properties. In time, we want the surrounding properties to have frontages, to be able to open a coffee shop, or restaurant or retail that opens into the park. So, the alleys will essentially be the shared spaces. The big development to the SW will not pursue that idea and it will be all servicing, so the city is looking at infrastructure along the alley for people to have kiosks, etc.</li> <li>• The biggest asset are the buildings to the north as they will eventually get redeveloped in the future. And the future developments will heavily encourage them to spill out their services into the plaza</li> <li>• Dog park is important, but I would put it in initially for a long-term view to phase it out and at the same time look at other parts of downtown for a larger space for a dog park. Because as the park gets busier there will be more push to get rid of it.</li> <li>• 107 Street will close and become a part of the park. 106 Street will also be included into the park, and the road will go through the park rather than the park edging onto the park. So when you are in the middle of the street, you can walk through it.</li> <li>• The design of 106 will have the same feel of the park - we can't close the road down; the paving should be cohesive compared to the rest of the park paving.</li> <li>• There is a movement now to have play areas for all ages. Small kids use it, and then the teenagers, and at nighttime can be the adults, so it can be quite simplified in terms of incorporated into the landscape.</li> </ul> <p><b>Option 1:</b></p> <ul style="list-style-type: none"> <li>• One thing that designers tend to do is they want to throw everything in, and sometimes simplicity is the best thing. Alex Decoteau works and when they first designed it, they tried to accommodate for everyone.</li> <li>• And not all spaces have to be equal. Some spaces can be green, active, and some can be for dogs. The prime function for this is for the community to have green space.</li> <li>• Option 1 is disjointed cause there are so many different places. The large area to kick a ball around doesn't really exist, except for the central ice rink.</li> </ul> <p><b>Option 3:</b></p> <ul style="list-style-type: none"> <li>• Big linear street around the rink- provides a nice boulevard street - but don't need to break the space up as much as it has</li> </ul>
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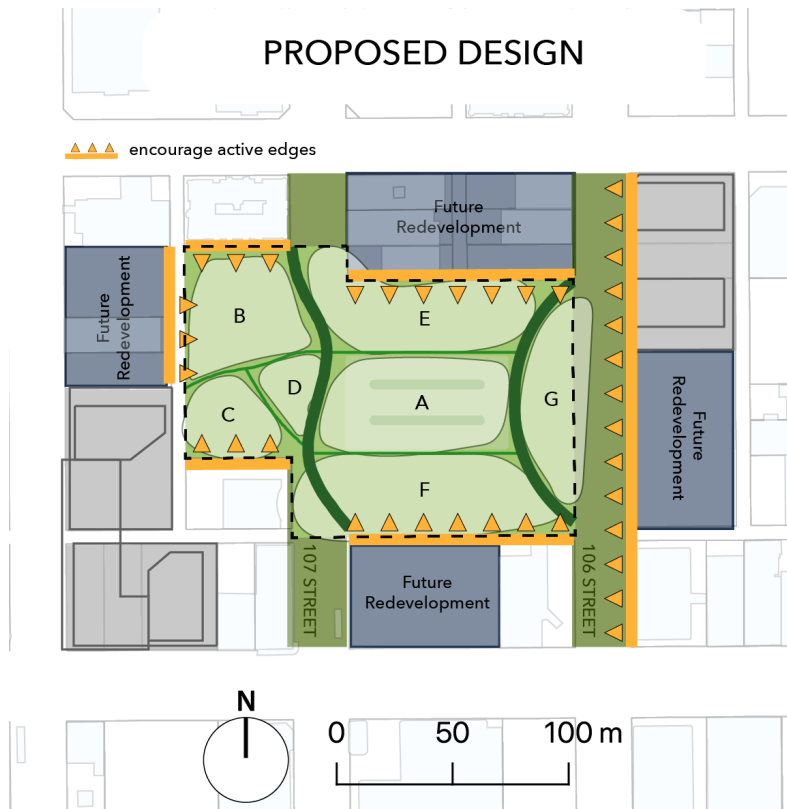
	<p>been. Well framed, people can hang around the edges or around the middle.</p> <ul style="list-style-type: none"> <li>Probably need a path around the rink, but not as grand. Like how it is framed with the trees - it can be lit in the winter, and shoulder seasons.</li> </ul>
Urban Planner	<p><b>General Comments:</b></p> <ul style="list-style-type: none"> <li>Courts - not sure it will be used; I would take racquet sports out. Most community leagues took out their courts already. Especially in an area where there is such a high demand for space. Consider basketball because there are lots of people and less of an elite sport.</li> <li>NW Corner: location for berming, or a hill to block wind and make it bigger and create a toboggan hill. It will also be a good vantage point to the rest of the open space. Raise it up and put a nice screen so it doesn't present a blank wall to the residents of the condo. Since there will be minimal interaction with that building. There will be no alley between the park and the building. Can also build a berm with a building inside of it as well.</li> <li>Sunny spots are for people, shady spots for dogs. Where the sun is in the analysis is where you would want people to congregate in the wintertime.</li> </ul>
Winter City Planner	<p><b>General Comments:</b></p> <ul style="list-style-type: none"> <li>One thing that is really missing downtown is children's play spaces and patio spaces for coffee shops etc.</li> <li>The kids' space, rather than being a standalone kids park with a fence around it, you design it so that it's informal.</li> <li>Some of the best examples are a swing in a tree. Nature based parks. For example, the logs that children can play on can also be a sitting area as well. Can be used at different parts of the day. Look at examples of nature-based parks.</li> </ul> <p><b>Option 1:</b> NE raised/ terraced seating - if that is going to be coffee shops along there then maybe not have the seating against the edge of the building.</p> <p><b>Option 3:</b> I don't like the grid. People don't like shape, they like the shortest route and ability to cut the grid.</p>
Festival Director	<p><b>Option 1:</b></p> <ul style="list-style-type: none"> <li>Make sure that the skating area and curling rink is closer to the centre of the park, and that the vending areas are closer to the entrance and edge of the park so that crowds and noise, which</li> </ul>



	<p>attracts people. It will create a crowd in that area and won't necessarily keep them in that one area.</p> <ul style="list-style-type: none"> <li>• The cafe area should not seem like a destination but a part of the park, and make sure the courts not in full sun and that the terraced area can look over the skating, curling area</li> </ul> <p><b>Option 2:</b> (Best)</p> <ul style="list-style-type: none"> <li>• Serves the focal point with a skating rink in the center, and I like how the tennis and basketball courts are in an area with more shadow so that people are not out in the sun too much and overheat.</li> <li>• More organic, feels haphazard, just different and not everything is neat and tidy. Prefer the more organic paths, since it breaks up the pattern of the grid.</li> </ul> <p><b>Option 3:</b></p> <ul style="list-style-type: none"> <li>• Make sure vending is near the edges, entrance area, and that the skating rink isn't so deep that once you're on the other end you may lose sight of children.</li> <li>• Putting the terraced area closer to the skating rink would be helpful; the NW corner is a good place for mounding</li> <li>• Swap the bike area with the seating, so you don't have people going through with their bikes.</li> </ul>
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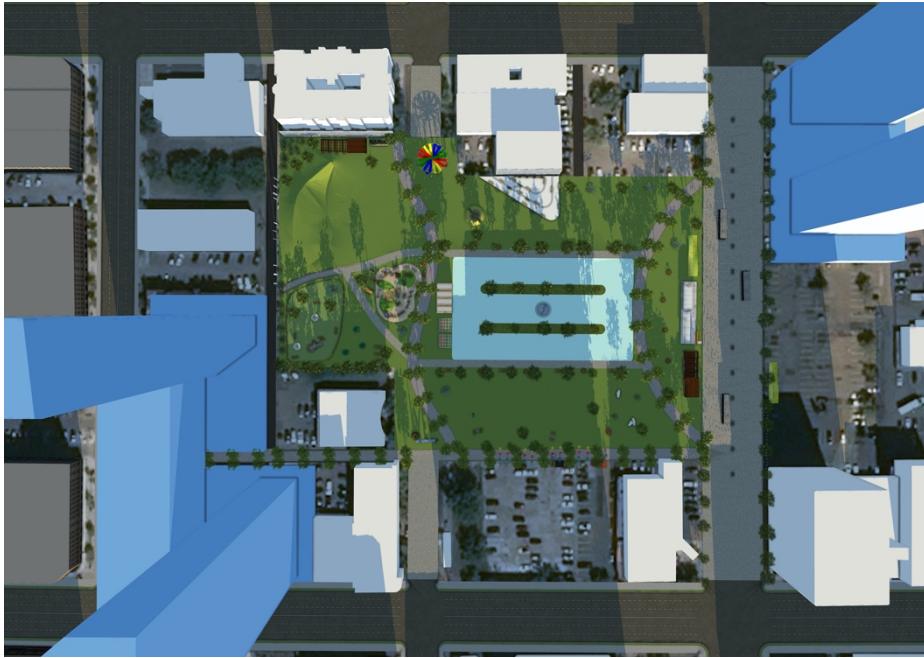
## **5.4. Proposed Design**

The proposed design was the result of taking the conceptual designs and feedback from the in-depth interviews. The design also considered possible future expansions to allow for future activation from adjacent developments from the north. The design's priority was to have a public space designed for climate-sensitive considerations for the winter season. While the design may not be what it looks like when the park gets constructed in the future, it could act as a reference to improve the future design of Warehouse Campus Park. The proposed design took into consideration the future conditions of the site, including the changes to 107 and 106 Streets, and the development on the northwest corner that will no longer being developed. The incorporation of 107 Street to the site brought the total site area to around 18,000m<sup>2</sup>, compared to the original 16,500m<sup>2</sup>. Many of the 3D elements from the proposal were taken from Sketchup's 3D Warehouse and imported to Autodesk Infravworks, therefore 3D models that would best represent the programming and functionality of the proposal was chosen. The proposal represents what the Warehouse Campus Park could look like and winter design elements it should include. The design is hypothetical and should not be viewed as the final and best scenario for the park. The proposed design can be seen in the following figures, and detailed programming can be found in Section 5.5.



- |                             |                      |
|-----------------------------|----------------------|
| A: Central Plaza            | E: Open Green Space  |
| B: Open Green Space         | F: Open Green Space  |
| C: Dog Park and Patio Space | G: Public Facilities |
| D: Children's Play Area     |                      |

**Figure 33:** Design Proposal



**Figure 34:** Proposed Design in Infraworks with Sun Exposure on Winter Solstice



**Figure 35:** Bird's eye view looking SW

## **5.5. Detailed Programming**

This section provides more detailed programming for the design proposal and will show the site programming from different angles taken from the site modelling done in Infracore. Infracore has minimal functions to simulate winter land conditions; therefore, the site was designed to focus on climate-sensitive considerations for the winter season, despite the modelling showing the site in green conditions.

**Table 13:** Central Plaza (Detailed Programming A)

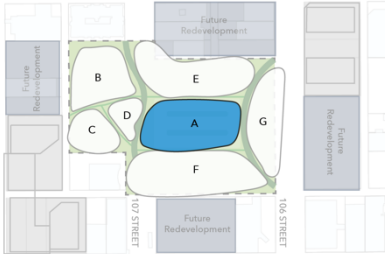
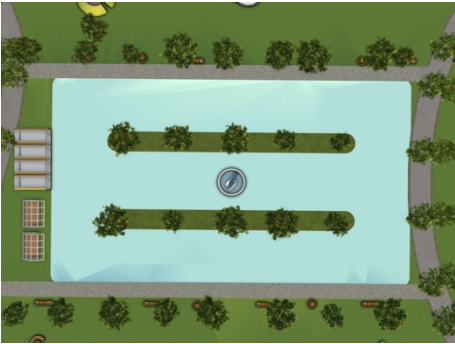
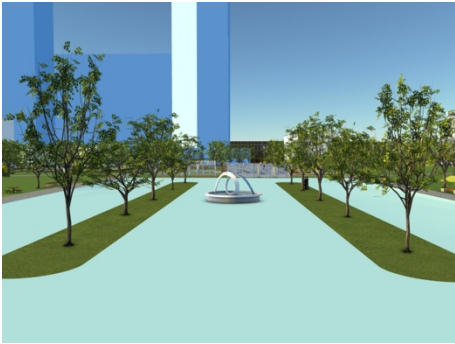

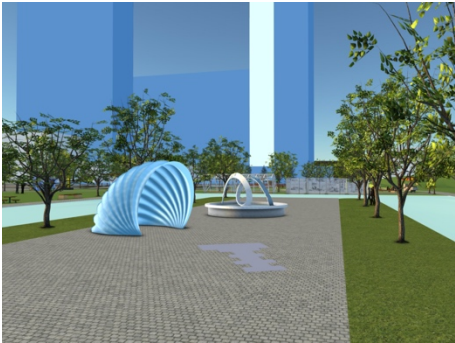
<div><div><div>A / CENTRAL PLAZA</div><div>Approximate Area: 3100m<sup>2</sup></div></div></div>	
<div><div></div></div>	<div><p><b>Function:</b> A multifunctional space with a skating rink in the winter which can become a fountain and open play space in the summer months. The central plaza should have nearby facilities such as washrooms, changing areas that can improve the user experience of the space. The Central Park will have two strips of green space, allowing for tree boulevards and potential seating/</p><p>resting area in all seasons. The design allows the central plaza to be used entirely, or the centre can be a separate use of its own. The proposed size of the Central Plaza can have a rink size up to 3000 m<sup>2</sup>, which is nearly 3 times the size of the rink in front of Edmonton City Hall (~1000 m<sup>2</sup>)</p></div>
<div>Images of Programming</div>	
<div><div>Top View</div><div></div></div>	<div><div>View of Plaza from the East</div><div></div></div>
<div><div>Potential Shelters around Central Plaza</div><div></div></div>	<div><div>Example of Different Use in the Centre</div><div></div></div>

Table 14: Open Green Space (Detailed Programming B)


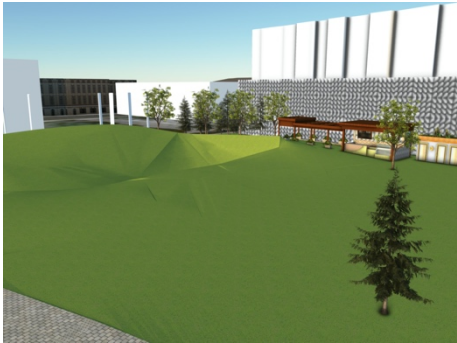
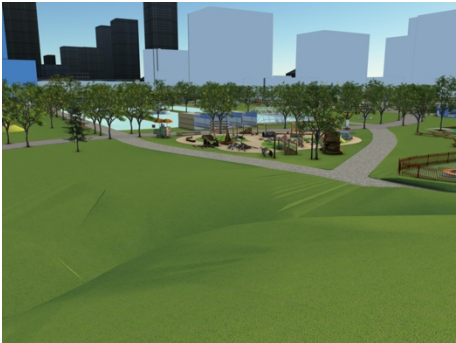
B / OPEN GREEN SPACE	
Approximate Area: 2500m <sup>2</sup>	
	<p><b>Function:</b> Open space that will include berming and other topographical elements to help block the northwestern winds. In the winter, the berm can become a tobogganing hill. The top of the berm can also be a vantage point to the rest of the park site. Other functions in this area include vending opportunities and washroom facilities to help activate the northern edge, which would otherwise be an unattractive interface that would not be actively utilized. Considerations for screening can also be put up along the northern edge. In the winter, this area is for temporary warming elements, such as fire pits. Coniferous trees are placed along the western edge, which will also help block winds.</p>
Images of Programming	
<p>View of Berming and Open Space</p> 	<p>View from Top of Berm</p> 



Table 15: Dog Park (Detailed Programming C)

<div><div>C / DOG PARK</div><div>Approximate Area: Currently 600m<sup>2</sup> (expandable to 1200m<sup>2</sup>)</div></div>	
	<p><b>Function:</b> Off-leash dog park that will allow future residents to let their dogs roam freely in the space. Currently, only half the area is designated for the dog park. The other half serves as a seating and a future area for patios and engagement with the business directly south of the site and will allow the space to expand based on the needs of the evolving space around it. The dog park is placed near the laneway to allow for increased surveillance and activation along the park's western edge.</p>
<div>Images of Programming</div>	
<div>Bird's Eye View</div> 	<div>Eye-level View of Dog Park</div> 



**Table 16:** Children’s Play (Detailed Programming D)




<b>D / CHILDREN’S PLAY</b> Approximate Area: 550m <sup>2</sup>	
	<p><b>Function:</b> A nature-park for children recreation. This space is located near the main circulation paths within the park for increased surveillance. There are seating areas to allow for parents to watch their children. Nature parks allow for more creative children’s play and can be informal recreation for other groups such as teenagers, and adults.</p>
<b>Images of Programming</b>	
<p>Bird’s Eye view of Nature Park</p> 	<p>Eye Level View of Nature Park from South</p> 

Table 17: Open Green Space (Detailed Programming E)



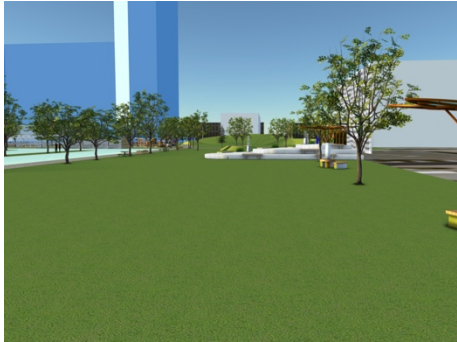


E / OPEN GREEN SPACE	
Approximate Area: 2800m <sup>2</sup>	
	<p><b>Function:</b> This space will get the most sun throughout the day. This open space will function both as seating and informal leisure and recreation—the proposed terraced seating allows for maximum sun exposure during the day. The terraced seating will allow for views of the central plaza, and when possible redevelopments north of the site, it can encourage more people to spill out into the open space and seating areas. In the winter, this area's usage can be for temporary warming shelters and fire pits.</p>
Images of Programming	
<p>Bird's Eye View</p> 	<p>Eye Level View Looking West</p> 
<p>View of Terrace Seating</p> 	<p>View from Top of Terrace Seating</p> 

Table 18: Open Green Space (Detailed Programming F)


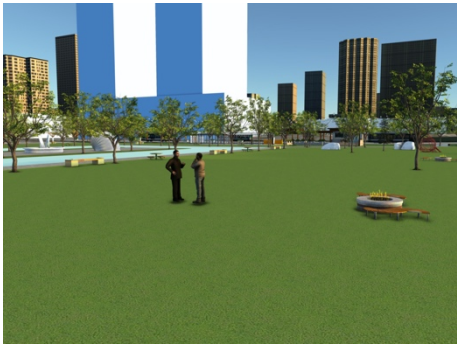

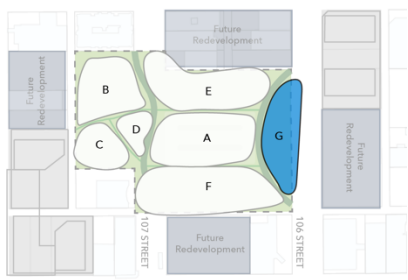


F / OPEN GREEN SPACE	
Approximate Area: 2600m <sup>2</sup>	
	<p><b>Function:</b> The location of this space is to encourage usage from the laneways to spill out into the park. This space can have facilities to support the central plaza, such as washrooms, vending opportunities, and other temporary structures. In the winter, this area can have temporary warming shelters and fire pits. Deciduous trees should be planted along the southern edge to block winds but let the sunshine through in the winter.</p>
Images of Programming	
<p>Eye Level looking NE</p> 	<p>Spillage from Laneways</p> 

Table 19: Public Facilities (Detailed Programming G)

G / PUBLIC FACILITIES	
Approximate Area: 1500m <sup>2</sup>	
	<p><b>Function:</b> To serve as the entrance along 106 Street. It will encompass elements such as bike parking facilities to support users using the bike lanes to access the park. It will include washrooms and a coffee shop and structures to protect patrons waiting for public transportation. This space will serve to engage users and encourage developers along 106 Street to integrate their building uses into the park space.</p>
Images of Programming	
<p>View from SE Corner</p> 	<p>Eye-level View Behind Facilities</p> 

**Table 20:** Internal Circulation (Detailed Programming)

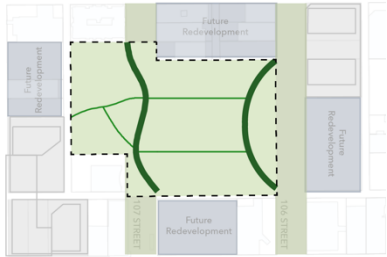
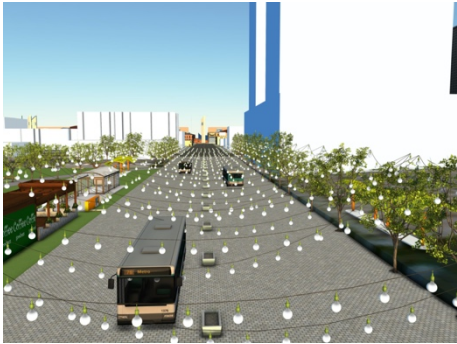



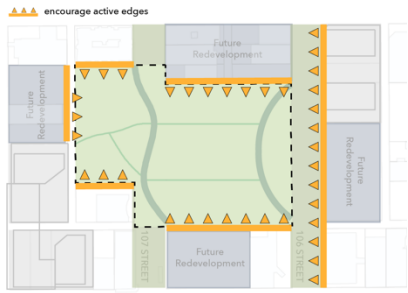


INTERNAL CIRCULATION	
	<p>There are two primary access pedestrian paths, 4m (shown in dark green) into the park. From 106 Street, it was designed based on the concept that users will enter the park in the shortest and most natural way possible, which is to cut diagonally into the park from the corners of the site. The paving of 106 Street should also be consistent with paving in the park and incorporate traffic-calming measures so that drivers are aware that the street is prioritized for the pedestrian. 107 Street is closed, but still needs to have the north-south connection to allow users to cut through to Norquest College and Grant MacEwan University from the Corona LRT Station. The secondary paths, 3m (shown in light green) within site is the west-east connection within the park that will lead to the open spaces, and the Central Plaza.</p>
Images of Programming	
<p>106 Street Bird's Eye View Looking North</p> 	<p>106 Street – Street View Looking North</p> 
<p>107 Street Looking South</p> 	<p>107 Street Looking North</p> 



Table 21: Laneways (Detailed Programming)

LANEWAYS	
	<p>The laneways surrounding the park should become semi-public spaces. This space will allow for adjacent developments to create functioning backdoor usages. The laneways should be well maintained, include different paving elements, and encourage vibrant street life to spill into the park. Laneways should be used as an element of the park to activate the edges, therefore smaller vending options such as food and beverage stands should be located here. The adjacent developments should consider having their laneways be more than just servicing and garbage collection sites, and should be well lit throughout the day to discourage unwanted backdoor activities.</p>
Images of Programming	
<p>Laneway Activation Example</p> 	<p>106 Street Eye Level looking North</p> 

## **6.0 Conclusion**

### **6.1. Designing for Winter Cities**

This project aimed to create spaces that users will be able to use year-round regardless of whether variances. The design proposal prepared at the final stage of this project took recommendations from the general public, researchers, and working professionals to come up with a hypothetical design that would be suitable for winter usage. The outcome of the project documented the process of considering winter city planning at a very high level. While it is possible to get a general idea of certain elements such as sun, an in-depth wind analysis should still be required. Elements such as mobility simulations and transportation simulations could have been used for better planning of the internal and external circulation of the park. Autodesk Flow Design provided a general idea of how the wind will travel, but it may not have truly reflected the real-life conditions of the site. More in-depth wind simulations would have been more beneficial to understand the full context of the wind patterns in the Warehouse Campus Park. Designing a space is an ongoing process, and it will continue to evolve., and thesis aimed to provide valuable insights and design considerations for the future design of the Warehouse Campus Park.

Results determined that there is an apparent lack of spaces designed for climate sensitive considerations in Edmonton, and the largest barrier of winter city implementation in Edmonton is the lack of enforceable regulations. Climate sensitive considerations is an important aspect that needs to be included and become a topic of early stage discussion in Edmonton's planning and design process.

Designing a successful space requires expertise from various interdisciplinary fields and is not the work of one individual or planner. Winter city design ensures that the discomforts of winter living gets addressed in the overall design, but it does not mean that the summer season should be neglected. The narrative surrounding the outdoor enjoyment to the summer seasons hinders the reality that winter exists in Edmonton for up to half a year. It is also important to note that public spaces should be designed to provide a more pleasant outdoor winter experience, and not completely protect the users from the outdoors. Winter city design is more than creating spaces for the winter; it is about creating spaces and can provide recreation to the future user regardless of the season and are considerate to the context of outdoor living conditions.

## **6.2. Project Limitations**

There were a number of limitations throughout this project. Firstly, the research and for this project was conducted in Seoul, South Korea, while the subject area was in Edmonton, Canada. This project took around 4 months, with only one formal site visit. Given the short timeline, the project was still manageable since the researcher was knowledgeable in the planning and context of Edmonton. The existing literature about winter city design was overall lacking, much of the literature dated from the 1970s and 1980s were missing references and may have included personal opinions. More implementation of winter city design needs to happen to allow for more winter city design focused research opportunities in the future. This project required extensive engagement from participants to fill out the questionnaire and do the in-depth interviews; therefore, the project relied heavily on the availability of participants and their responses of winter city design. Some responses received from the



questionnaire were vague, and one-worded, making it difficult to analyze and categorize.

The planning environment is always changing, and information found online may not be up to date. Since the beginning of the project, there were multiple changes to the site and new internal information that would eventually change the way it would be designed in the future. This included the residential tower on the northeast corner of the site no longer being built, closure of 107 Street for the park space, and inclusion of 106 Street. This showed how volatile planning can be, and that designing a space is an ongoing process.

Designing is also an interdisciplinary process that requires knowledge and expertise from various fields. The design proposal took into consideration the analyses that planners and those with limited knowledge in analytical tools could easily and quickly complete. However, more in-depth analyses and collaborations with interdisciplinary fields should be required for future climate sensitive designs in Edmonton.

### **6.3. Future Considerations**

Edmonton has been practicing the same planning process for so many decades that new concepts such as winter city design, although introduced 10 years ago, are just beginning to gain attention. Further changes to the planning process in Edmonton, is that the City of Edmonton recently got rid of minimum parking requirements. This removal of minimal parking requirements provides opportunities to densify Edmonton, which may shift attention towards the need for well-designed, year-round public spaces as land for parks becomes scarcer.

The largest barrier to incorporating winter city design was the lack of funding for climate sensitive considerations in the winter. With the additional economic effects of the COVID-19 pandemic, Edmonton's future will experience budget cuts; therefore, it becomes more important to prioritize the need for climate-sensitive design considerations in the early stages of planning to avoid additional costs in the future. The later climate sensitive design considerations come into play; the more the details of the project will change, and the more expensive it becomes. These considerations include the sun shadow analysis, wind analysis, and local snow storage.

The questionnaire and in-depth interviews for this project relied heavily on online platforms to help communicate and spread awareness of this study. This pandemic showcased a possible shift in the way communication and public consultations may be conducted in the future. The COVID-19 pandemic in Edmonton began in the winter season in March, which caused lockdowns and social distancing measures. This highlighted that the future design of spaces may not only focus on the enforcement of climate-sensitive considerations in Edmonton, but public spaces that will also allow for adequate social distancing. Edmonton needs to realize that instead of focusing on the need for spray parks that will be used 2-months of the year, it needs to invest in infrastructure that will last through the 6-month winter season. Although the idea of winter cities is gaining more attention in Edmonton, it continues to be a difficult concept that will require regulations to enforce the City of Edmonton's Winter Design Guidelines, and other climate sensitive design considerations.

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# Appendix

## Questionnaire (Google Forms)

### Climate Sensitive Urban Spaces in Edmonton

I would love to hear your opinion on how Edmonton's public spaces are used during the cold, winter seasons!

Hello! My name is Christine Lee, and I am a proud Edmontonian who has graduated from the BA Planning Program in 2017 from the University of Alberta. I am now doing my masters in the Interdisciplinary Program in Urban Design at Seoul National University and am currently writing my thesis about winter public spaces in Edmonton. My thesis topic is Climate Sensitive Urban Design of Public Open Spaces for Winter Cities: Edmonton, Canada.

Climate Sensitive Design is the combination of urban design with considerations to the effects of climate. "Climate-sensitive design considers the impacts of the built form, and leverages design to manage the surrounding microclimate" (Sanborn, 2017).

The purpose of this questionnaire is to investigate whether public spaces in Edmonton can be designed for better winter usage. The results from this survey will help inform a hypothetical design of a subject site in Downtown Edmonton through climate sensitive design principles. The results from this project will also help inform the future design for public spaces in Edmonton and other Northern cities. This questionnaire should take approximately 10 minutes to complete.

Please note that this project is being conducted under the supervision of Prof. Yumi Lee, a faculty member in the Graduate School of Environmental Studies (GSES) at Seoul National University. This project is not affiliated with the City of Edmonton.

Participation of this survey is voluntary and you can withdraw your participation at any time. The responses from this survey will remain anonymous and no individuals will be identified in the results.

For more information on this project, please do not hesitate to contact myself, Christine Lee at [leechristine@snu.ac.kr](mailto:leechristine@snu.ac.kr)

**\* Required**

1. In order to continue with this survey, please indicate your consent to participate by checking the box below: \*

*Check all that apply.*

☐ I understand that I am agreeing to participate in this project, and I give my consent for the researcher to use my responses to the survey questions for the purposes of their project.



2. 1. Are you aware that the city of Edmonton is a Winter City? \*

*Mark only one oval.*

☐ Yes

☐ No

3. 2. Do you think that Downtown Edmonton has sufficient public spaces? \*

*Mark only one oval.*

☐ Yes

☐ No

☐ Not sure

4. 3. Here are a list of public spaces in Downtown Edmonton. Check all the ones you know of: \*

List compiled from City of Edmonton SLIM Maps

*Check all that apply.*

- ☐ Alex Decoteau Park
- ☐ Beatrice Carmichael Park
- ☐ Beaver Hill House Park
- ☐ Centennial Plaza
- ☐ McDougall Park
- ☐ Michael Phair Park
- ☐ Post Office Clock Tower
- ☐ Railtown Park
- ☐ Sir Winston Churchill Square
- ☐ Veterans Park

5. 4. Here are a list of public spaces in Downtown Edmonton. Check all the ones you have visited before: \*

List compiled from City of Edmonton SLIM Maps

*Check all that apply.*

- ☐ Alex Decoteau Park
- ☐ Beatrice Carmichael Park
- ☐ Beaver Hill House Park
- ☐ Centennial Plaza
- ☐ McDougall Park
- ☐ Michael Phair Park
- ☐ Post Office Clock Tower
- ☐ Railtown Park
- ☐ Sir Winston Churchill Square
- ☐ Veterans Park

6. 5. Why do you go to the public spaces listed above? (Choose multiple) \*

*Check all that apply.*

- ☐ To take a break
- ☐ To meet a friend/ colleague
- ☐ To grab food/ beverages nearby
- ☐ Attend festivals and events in the space
- ☐ To go for a walk

Other: ☐ \_\_\_\_\_

7. 6. How often do you use the public spaces in Downtown Edmonton during non-winter months (April - October)? \*

*Mark only one oval.*

- ☐ 0-1 times a month
- ☐ 1-3 Times a month
- ☐ Once a Week
- ☐ 2-3 days a week
- ☐ At least 4 days a week

8. 7. How often do you use the public spaces in Downtown Edmonton during the Winter Months (November - March)? \*

*Mark only one oval.*

- ☐ 0-1 times a month
- ☐ 1-3 Times a month
- ☐ Once a Week
- ☐ 2-3 days a week
- ☐ At least 4 days a week

9. 8. What are some reasons that will make you use or visit a public space during the winter season? (Choose multiple) \*

*Check all that apply.*

- ☐ Festivals and/or events
- ☐ Warm seating areas
- ☐ Proximity to hot food and beverage establishments
- ☐ Art installations
- ☐ Connectivity and accessibility of public space

Other: ☐ \_\_\_\_\_

10. 9. From 1 to 9, please rank why you would not use public spaces during the winter seasons in Downtown Edmonton. \*\*\*

(1) being your top reason for not using the spaces. \*\*The form will display an error if you choose more than one answer per column. Please make sure each row gets paired with one number, and no numbers are repeated in the process.

Check all that apply.

	1	2	3	4	5	6	7	8	9
Low Temperatures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wind Chill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Darkness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Accessibility	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Poor Snow Maintenance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Slipperiness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
No incentive (eg/ no events)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The Indoor Pedway System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

11. 10. If there are other reasons for not going outside in the winter months not listed above, please write it below:

\_\_\_\_\_

12. 11. How strongly do you agree with the following statement? "There are not many public spaces in Downtown Edmonton designed for winter thermal comfort." \*

Mark only one oval.

- ☐ Strongly Agree  
☐ Agree  
☐ Neutral  
☐ Disagree  
☐ Strongly Disagree

13. 12. How strongly do you agree with the following statement? "Edmonton can benefit from outdoor spaces designed with climate sensitive considerations for the winter season." \*

Mark only one oval.

- ☐ Strongly Agree  
☐ Agree  
☐ Neutral  
☐ Disagree  
☐ Strongly Disagree

14. 13. What do you think are important factors that can help enhance the use of public spaces during the winter months? (Choose 3) \*

You can also choose "Other" and input your options.

Check all that apply.

- ☐ Wind Protection  
☐ Street Furniture (e.g. Warm seating areas)  
☐ Vegetation  
☐ Lighting  
☐ Snow Removal  
☐ Pedestrian Protection  
☐ Programming

Other: ☐ \_\_\_\_\_

15. 14. What are some barriers to incorporating climate sensitive urban design to public spaces in the winter? (Choose top 3) \*

You can also choose "Other" and input your options.

Check all that apply.

- ☐ High cost of implementation and maintenance  
☐ Lack of knowledge from decision makers  
☐ No interest from developers  
☐ Lack of analytical tools needed to make informed decisions  
☐ The negative perception of the winter season

Other: ☐ \_\_\_\_\_

16. 15. This is the location of the Warehouse Campus Neighbourhood Central Park. What are some climate sensitive design considerations that you think will be beneficial to the future of this public space? \*

More information on this subject site can be found here:

[https://www.edmonton.ca/projects\\_plans/downtown/warehouse-campus-neighbourhood-park.aspx](https://www.edmonton.ca/projects_plans/downtown/warehouse-campus-neighbourhood-park.aspx)



17. 16. Complete this sentence: I envision the future of the Warehouse Campus Neighbourhood Central Park to be \_\_\_\_\_. \*

18. 17. Downtown Edmonton is where I primarily ... \*

Mark only one oval.

- ☐ Work  
☐ Live  
☐ Learn  
☐ Socialize  
☐ Own Business  
☐ Other: \_\_\_\_\_

19. 18. Location or Name of Organization

Address of where you work, have business, live, learn or socialize. A general building name, area, name of business/ organization name or area is sufficient (i.e Joey Bell Tower or 104 St and Jasper)

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20. 19. Please rate how satisfied you are in how the City of Edmonton promotes Winter Activities \*

Mark only one oval.

	1	2	3	4	5	
Very Unsatisfied	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very Satisfied

21. 20. (Optional) Please use the space below for other comments on this project if needed.

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22. 21. Lastly, how did you find out about this questionnaire? \*

Mark only one oval.

- ☐ Friend/ Colleague  
☐ Social Media  
☐ Email  
☐ Other: \_\_\_\_\_

## Abstract in Korean

# 겨울도시를 위한 기후민감형 도시설계 — 캐나다 에드먼턴 오픈스페이스 사례를 중심으로 —

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본 연구는 캐나다 에드먼턴의 미래 오픈스페이스에 대한 계획과 가상의 설계를 제안하여 겨울을 포함한 모든 계절에 활용할 수 있도록 하는 것을 목적으로 한다. 본 연구의 결과는 기후민감형 도시설계에 대한 고려사항이 겨울도시에서 연중 내내 기능적인 공간을 만드는데 필수적인 부분이라고 주장한다.

현재까지 설계된 대다수의 오픈스페이스는 일년내내, 사계절 동안 기능할 수 없다. 겨울은 항상 실내에 머물기 위한 계절이었고, 여름은 항상 야외활동을 즐기는 계절이었다. 이러한 사고방식은 전 세계의 계획 관행에 뿌리내렸고 겨울 민감형 계획으로의 변화를 조금씩 시작하고 있다. 1980 년 이후 컨퍼런스 및 세계 행사들은 겨울 생활 문제를 인정해왔지만, 현재까지 계획관행은 여전히 여름의 사고방식에 바탕을 둔 디자인이다. 겨울과 계절에 따른 온도변화가 우리의 일상에 영향을 미치며, 특히 겨울철에 디자인방식은 공간이 어떻게 사용되는지에 많은 영향을 줄 수 있음을 이해하는 것이 중요하다

낮은 기온, 미끄러움, 어두움과 같은 불편함은 겨울철 야외 공간을 계획하는 데 고려되지 않는 요인들이다. 본 연구의 목적은 캐나다 북부 도시 에드먼턴에서 기후민감형 설계요소들을 활용하여 미래의 공공 도시 공간을 가상으로 설계하는 것이다. 본 연구는 캐나다 에드먼턴에 있는 미래 웨어하우스 캠퍼스 공원(Warehouse Campus Park)의 가상설계를 위해 기존문헌, 설문조사 및 심층인터뷰의 결과를 적용했다.

설문조사 결과는 공공 공간을 사용하는 주된 이유가 축제나 이벤트와 같은 프로그램을 위한 것임을 보여준다. 미래 공간의 설계는 축제일이 아닌 날에도 사용자를 끌어들일 수 있도록 연중 기능성의 요소를 통합하는 것이 필수적이다. 기후민감형 설계의 주요 장벽은 운영 및 유지 관리 문제뿐만 아니라 겨울은 견뎌야하며, 환영받지 못하는 계절이라는 사고방식을 포함한다.

에드먼턴 있는 도시계획가와의 인터뷰에서 에드먼턴 겨울 디자인 가이드라인(Winter Design Guidelines)의 가장 큰 장애물은 해당 문서가 비규제적이어서 시행하기 어렵다는 것이다. 그러나 최근 몇 년 동안 연중 사용 가능한 공간에 대한 민간 개발자 및 커뮤니티의 관심이 증가하고 있다. 심층 인터뷰의 대상자에게 제시된 개념적 설계는 에드먼턴 시가 지역사회 녹색공간 조성을 검토하고 있음을 단적으로 보여준다. 에드먼턴 다운타운이 가장 부족한 것은 열린녹지공간과 어린이 놀이 공간인 만큼 미래의 디자인에서 이러한 요구를 충족시키는 것이 중요하다. 에드먼턴의 도시 형태와 계획 관행을 바꾸는 것은 느리게 진행되어 왔으며, 겨울도시를 위한 기후민감형 도시설계는 거의 10년 전에 도입되었지만, 이러한 설계는 여전히 도시의 개발자들에게 상당히 새로운 개념이다.

겨울도시를 위한 기후민감형 도시설계는 공공 오픈스페이스 공간뿐만 아니라 일반적인 공공 영역에도 적용 되어야한다. 도시설계와 계획의 사전 단계에서 구체적인 고려를 하지 않는 한 추운 날씨와 겨울의 불편함은 계속해서 겨울을 즐기는데 장애가 될 것이다. 본 연구의 설계는 완벽한 디자인을 제시하는 것이 아니라, 북부 국가에서 매우 필요한 기후민감형 도시설계의 주제에 관여하는 설계이다. 본 연구의 결과는 도시 디자이너들이 추운 겨울 동안 어떻게 다양한 문화와 사람들의 요구를 충족시킬 수 있는지를 알려주는 데 도움이 될 것이다.

#### **주요어:**

겨울도시, 기후민감형 도시설계, 캐나다 오픈스페이스, 캐나다

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