Inhabiting Lost Space:
Restoring the Urban Fabric with the Power of Nature

by

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

Contents

Abstract

The urban landscape of Halifax's Peninsula is constantly changing due to climate change and rapid urbanization, damaging the city and its infrastructure. The congestion of the city and degradation of the natural environment have induced the dramatic disappearance of empty spaces and increased the need for undeveloped open spaces; urban voids. Realizing these spaces are becoming a scarce commodity, architecture must fabricate with ecological urbanism; an approach to design that puts nature at the forefront.

This thesis argues for urban development that creates a harmonious relationship between the user, the space, and the environment through ecological urbanism. The end product proposes a 'stitch', a new park that brings green space to the city center and generates microclimates for humans to relax and break away from the city's concrete jungle. By combining theoretical analysis and pragmatic design, this thesis conceptualizes the potential of inhabiting lost space with the power of nature.

Acknowledgements

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Chapter 1: Introduction

The Climate

The year is 2050, it's midday, and the sun is at its highest. The sun is pouring from the sky and beating the earth's surface with blazing force emanated by the black pavement. All are punished with no escape. No one is protected, not even the ones taking shelter. The sky is dark, the clouds are grey, and the clouds are about to rain down. Ocean waves are rising and falling. What once was a calming sensation to many, now drowns fear into all. The sea is hungry and we are the ones feeding it. No one is protected, not even the ones raising their seawalls. It's Christmas morning. There are no more Christmas trees, the snow is no more, and all but empty rain puddles remain. The sun is out and the little boy who was gifted new skates can't test them out because the frozen pond has melted. No one is protected, not even the ones waiting for colder weather.

The climate's livelihood in 2050 [The Problem]

In the context of the natural environment, we have now entered an age of extreme climate change. Set against the global phenomena of ubiquitous urbanization, these environmental changes are impacting people, the spaces they inhabit, the cities they construct, and the natural environment in which they live.

The Tourist

Just arriving in a new city, the tourist taxis into what she thought was downtown. The traffic grew denser, the streets wider, the buildings taller, she was being vacuumed by an endless landscape of high-rises. At ground level, she could discern what were restaurants, coffee shops, and corner stores, while above sat the endless supply of housing units -- The taxi stops.

The tourist removes herself and is now on foot. She is now on a long crowded street with restaurants on either side. She was soon stopped in her tracks by what seemed to be an empty space. A sense of uneasiness took over -- she was in a place of confusion, suspicion, and negativity. She found herself in a void, where anyone would hesitate to venture, littered with parked cars, no human-scaled street lamps, and not a person to be seen or heard. She felt isolated and divided from city life -- she was not coming back.

She utters “We need quality space in cities.”

The tourist lost in the urban void [The Challenge]

The progressive urbanization, congestion of the city, and degradation of the natural environment have induced the dramatic disappearance of empty spaces and increased the need for undeveloped open space, also known as ‘urban voids’; unused, underused, and misused spaces that are typically seen as incoherent with their surroundings and out of context (Akkerman 2009, 205-218).

The Forest

Down below, light and shadow dance across the uneven ground. Wet from the spring rainfall and curled brown leaves washed up against the side of fallen branches. Birds sing high above the trees that seem to disappear into the sky.

Just on the brink of the concrete city lies a green oasis; a space to relax and enjoy the outdoors. A place of harbor and refuge from the unforgiving heat and growing civilization.

This space provides freedom of expression and allows one to develop a harmonious relationship with their surroundings. Harnessing local resources and building within limits, every species is working towards its niche, innovating from the bottom-up towards greater diversity, and through that diversity, greater resilience.

The power of nature [The Restoration Strategy]

Infrastructure and urban development rely heavily on the basic conditions in that the natural world is consistent. What do you do when the past is no longer a guide to the future? How can architecture predict change? We must look to nature. In this sense, it is appropriate to say that it is time for designers to understand how mimicking nature and designing with ecological urbanism can be applied at multiple urban scales in the design of sustainable and resilient cities (McHarg 1969).

The Biologist

The Biologist wakes to the sounds of birds. He has been coming to the forest, looking to nature for inspiration. Every year, he questions why the city does not learn from nature. How do we let nature back into the city? How can we re-balance the city's relationships with surrounding areas? How can we mimic nature in our urban developments?

"Cities will continue to grow, but we cannot let them sprawl and consume more nature. We can satisfy the city's desperate need for quality space using urban voids. But, nature must be integrated into our architecture and infrastructure to create these quality public spaces, connect cities, and take on the urban climate crisis."

How can we mimic the forest and develop a habitat that protects the ground level from extreme weather, offers a platform for local vegetation to thrive, and generates a microclimate for humans to relax and break away from the city's concrete jungle?

Ecological urbanism in urban voids [The Stitch]

New urban development must apply the principles of biomimetics to urban voids to achieve urban resilience, adapt our cities to the urban climate crisis, and create a harmonious relationship between the user, the space, and the environment [stitching the city back together].

Chapter 2: Inhabiting Lost Space

Problem: Fragmented Fabric

Photograph of climate change and cities (Milestone System 2021)

Climate change is a global phenomenon that is largely impacting urban life. Rising temperatures, rising sea levels, and the increase in the number of extreme weather events (e.g. drought, extreme heat, hurricanes, flooding) are just some of the climate impacts affecting the infrastructure, housing, livelihood, and the health of urban life (Jahren 2020).

With the growth of the urban population, cities are rethinking the role of quality space and public life. These quality spaces help cities adapt to the realities of climate change. When designed effectively, these spaces can help mitigate coastal flooding, capture carbon, and foster a sense of community. But as city centers become more urbanized, quality public space gets increasingly difficult to provide (Gehl 2010).

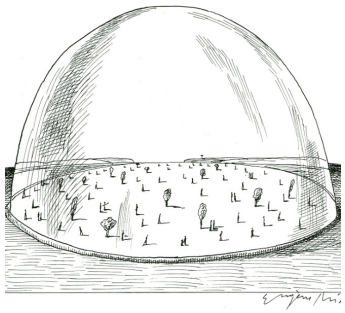
Climate Crisis

Photograph of brick factory smoke stacks in the town of Nahrawan in Baghdad, Iraq, (Al-Sudani 2022)

Around roughly 250 million years ago, during the Permian Age, the formation of Pangea caused immense volcanic eruptions that burned forests four times the size of Korea. This produced a large volume of carbon dioxide that ended almost all life on planet Earth, which was eventually known as the Earth's third mass extinction; the worst to date. Today, we are currently heading toward a sixth mass extinction evidenced by cities adding carbon to the atmosphere at a considerably faster rate than ever before (Wallace-Wells 2019, 8).

More than half of the carbon emitted into the atmosphere comes from the past three decades. We have done as much

damage to the fate of the planet and its ability to sustain life since 2006 and all the centuries that came before. The world we live in is speeding blindly towards a four-degree Celsius increase by the year 2100. This would mean, many regions around the world would be deemed uninhabitable due to direct heat, desertification, and flooding (Wallace-Wells 2019, 9).



The End of Nature: The rise of greenhouse gases and our warming earth, 1989; Illustration by Eugene Mihaesco (McKibben 1989)

In 1989, Bill McKibben declared “The End of Nature,” stating that the forces of wilderness, weather, animals, and plant life have been so transformed by human activity, they are no longer truly natural. The arrival of climate suffering will be one of the terrible stories of the coming decades as modernity continues to pave over nature building by building. In order to change the story, architects, planners, and designers alike are attempting to stabilize the planet’s temperature (Wallace-Wells 2019, 136-137). As Nathaniel Rich stated in his book *Losing Earth: A Recent History,* if we speak about climate as only a political issue, it will suffer the fate of all political issues. If we speak about climate as only an economic issue, it will suffer from the fate of all moral crises subjected to cost-benefit analysis. The first requirement to address the problem is to speak honestly. Everything about the natural world is changing constantly, therefore the way we conduct our lives needs to change drastically as we are all threats to our own future (Rich 2019, 150).

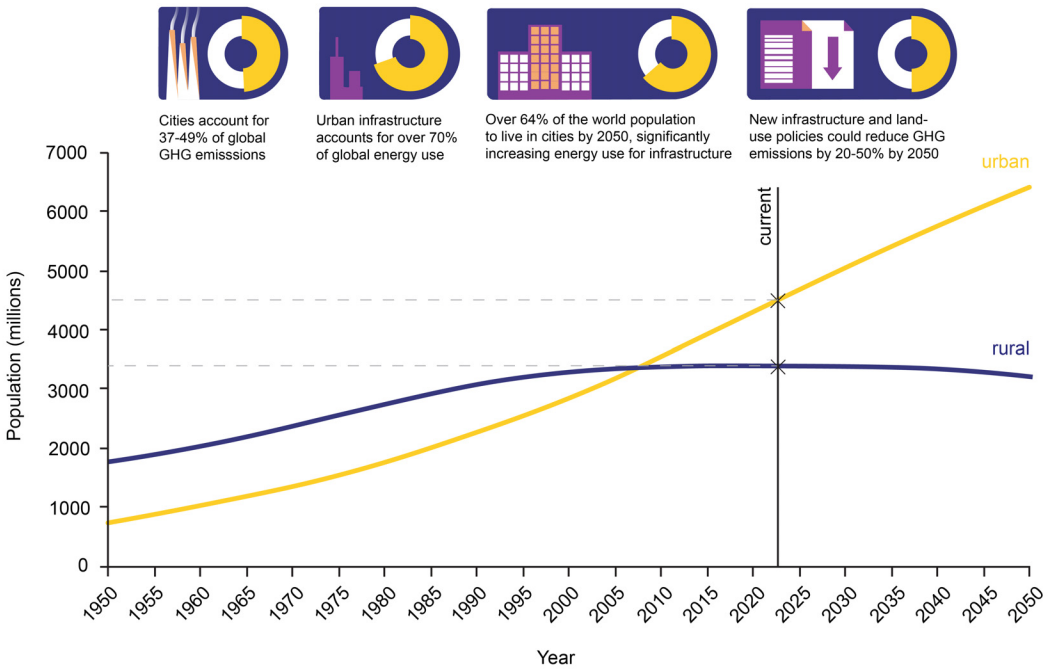
Coal train on Ashtabula Transit Line (Newark Advocate 1912)

In the 19th century, the built environment reflected the needs of industry (e.g., railroads, the car). In the 20th century, those same environments were made to reflect the need for capital. Today, we are seeing the increase in demand and survival of the climate crisis: seawalls, carbon-capture plantations, solar arrays, and global urbanization (Wallace-Wells 2019, 137).

The Dense City

Global urbanization is a process where people move from rural to urban areas enabling city centers to grow and in some ways expand. This process is highly influenced by the notion that increasing the number of dwelling units and mixed-use spaces per acre is the key to becoming part of the solution to climate change because it encourages efficiency and conservation (Ritchie and Roser 2018).

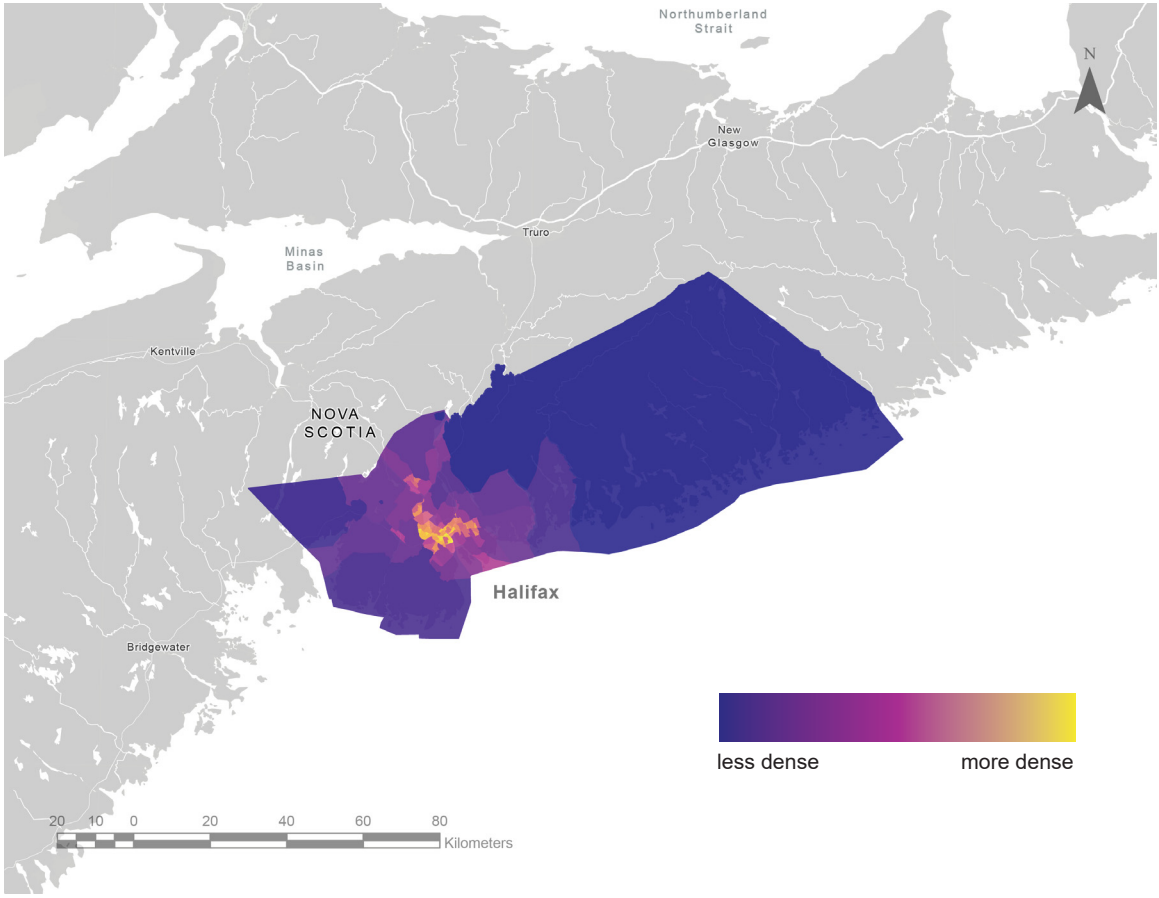
For most of history, people across the world lived in small communities far from urban centers. Over the past few centuries, this trend has shifted dramatically. There has been a mass migration of populations shifting from rural to urban areas. About half of the global population now lives in urban centers and nearly 70% of people will be living in urban areas by the year 2100 (Ritchie and Roser 2018).



Urban and rural population from 1950 to 2050 (World Urbanization Prospects 2018)

In this visualization, we see estimates from the UN World Urbanization Prospects on the number of people globally who live in urban and rural areas. More than 4.3 billion people now live in urban areas; over half of the world's population lives in urban settings.

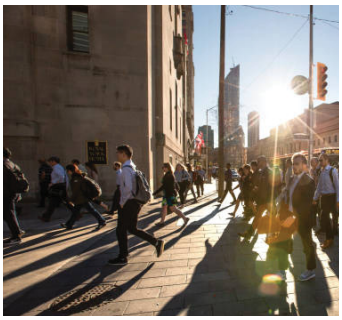
As we look at examples like Halifax, the Centre Plan drafted in 2017 aims to encourage growth without sacrificing the things that are important to neighborhoods and communities (Inniss 2022). Since 2016, downtown Halifax's population has grown nine percent according to Statistics Canada. The waterfront downtown area -- bounded by Salter, Blowers, Queen, Lower Water, and Hollis Street -- was the fastest-growing neighborhood in the urban area. This trend, along with other neighborhoods is expected to continue, as Halifax aims to accelerate activity, and positive development in the city's downtown core (Inniss 2022).



Halifax Regional Municipality urban density map (Base map from Esri Canada 2020, Census data from Halifax Open Data, 2020)

Halifax or the Halifax Regional Municipality (HRM), the capital of Nova Scotia, has been described as one of the 'largest cities of the future." Halifax is expected to have an estimated population of 445,000 in the year 2030 (0.58% growth rate). Moving into the urban center, the population is roughly 300,000 with a density of 1,077 people per square kilometer (Inniss 2022).

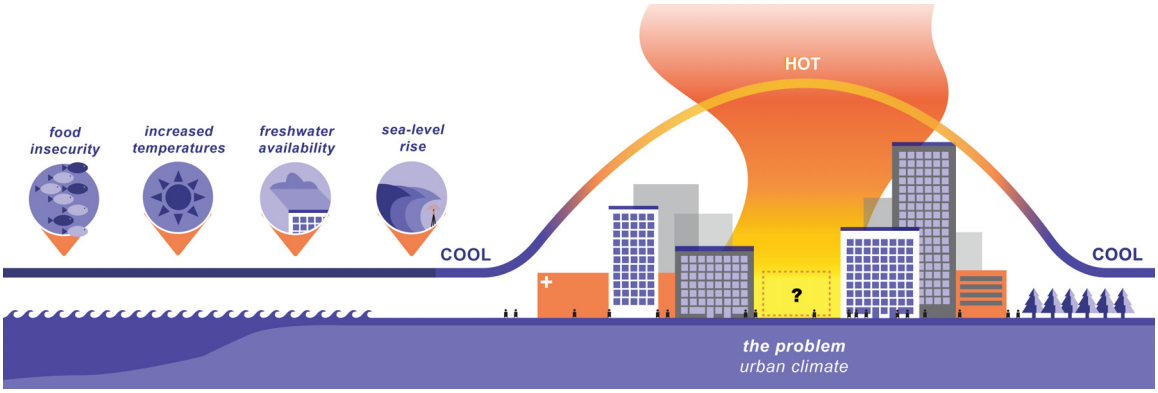
Although urbanization provides some positive development, extensive urbanization is known to result in adverse effects on the users, the space, and the natural environment. Due to this rapid rise in population and urbanization, dense cities such as Halifax are intensifying the negative process of the urban climate crisis (Jahren 2020).



Photograph of Toronto morning rush hour (Kriemadis 2018)

City users; either human or non-human species are affected by the urban climate crisis as it contributes to high daytime temperatures, reduced nighttime cooling, and higher air pollution levels. This, in turn, contributes to heat-related deaths and illnesses such as general discomfort, respiratory difficulties, heat cramps, heat exhaustion, and heat stroke (Health Canada 2022).

The natural environment in cities is also impacted by the urban climate crisis. For example, as heat islands raise the demand for electricity in the summer, the companies that supply this electricity typically rely on fossil fuel plants that pollute the air by releasing greenhouse gas emissions (e.g. carbon dioxide). These pollutants in turn are harmful to human health, contribute to poor air quality, and produce higher day-time temperatures (Health Canada 2022).



Implications for cities on the front line of changing climate

Urban centers account for more than half of the world's population, with most of its economic activity and the majority of energy-related emissions intensifying the urban climate crisis. The role of cities in reducing emissions and protecting their inhabitants is central to effective climate policies.

The urban climate crisis also has an impact on the spaces we inhabit. The progressive urbanization, congestion of the city, and degradation of the natural environment have increased the need for undeveloped open space. As cities compete to become more liveable, providing this open space is proving extremely difficult but important in the success of climate-sensitive cities (Health Canada 2022).

Set against this global phenomenon of rapid urbanization, these extreme environmental changes are impacting users, the spaces they inhabit, and the natural environment in which they live. Therefore, providing quality public space must be of the utmost urgency in restoring the fragmented fabric.

Challenge: Need for Quality Public Space

With the glimpse of global challenges related to the urban climate crisis, achieving the vision of lively, safe, sustainable, and healthy city spaces has become a general and urgent desire (Gehl 2010, 6). The important factors in producing quality public spaces are the human dimension, the physical condition, and peaceful cohabitation -- a combination of good inviting city space, a certain critical mass of people who want to use it, and the ‘acceptance’ of the natural world.

The Human Dimension

The human dimension is often overlooked, neglected, and phased out. A common feature of almost all cities, regardless of status, treat the people that use city space unfairly -- limited space, barriers, noise, pollution, and poor conditions are typical for city dwellers. This has not only reduced the opportunity for public life to thrive but has also placed the social and cultural functions of city space under siege (Gehl 2010, 3).

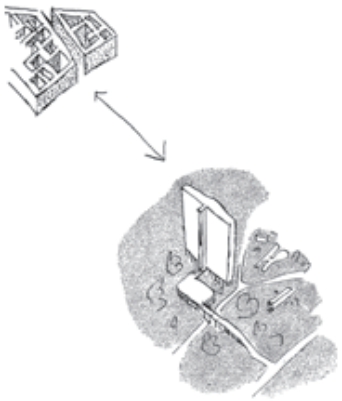


Diagram depicting ideology of modernists rejecting the city and city space, shifting their focus to individual buildings. Diagram from Propos d'urbanisme by Le Corbusier, 1946 (Gehl 2010, 4)

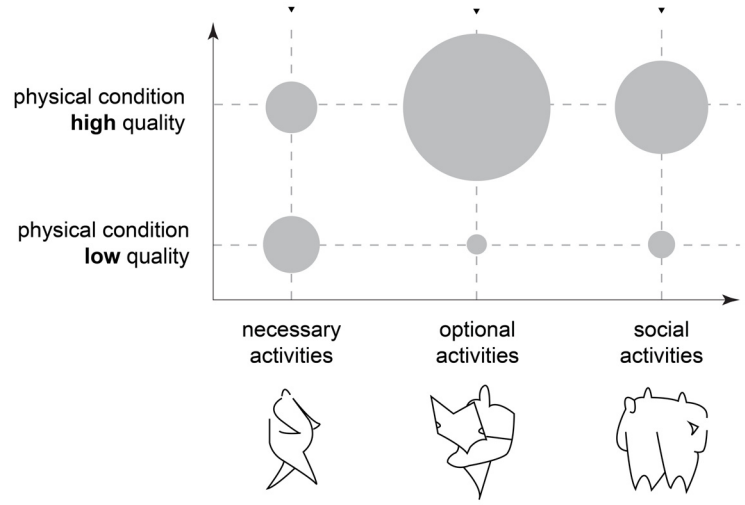
The human dimension — overlooked, neglected, phased out (Gehl 2010, 2)

In 1961, Jane Jacobs published her book *The Death and Life of Great American Cities.* She emphasized that the ideology of modernism in cities has separated the uses of the city and has put too much attention on free-standing individual buildings. This has put an end to urban space and has promoted city life devoid of people. As competition for city space intensifies, the conditions for urban life and pedestrianism have become less dignified year after year (Jacobs 1961).

Jane Jacobs became the first strong and heard voice to call for a shift in the way we build cities. As cities continue to grow rapidly, there must be a deeper focus on the needs of the people who use cities. Reinforcing pedestrianism and the human dimension is what cities need to increase the quality of public space and produce lively, safe, sustainable, and healthy cities (Gehl 2010, 3)(Jacobs 1961).

The Physical Condition

The quality and character of public space are influenced based on the physical condition of invitation -- protection, security, and reasonable space. Protection from poor outdoor conditions makes activities such as walking, stopping, resting, staying, and conversing more plausible. For obvious reasons, the state of the climate and the natural environment are important factors in the quality and character of spaces. If it is too cold, too hot, or too wet, use of this space is almost always rendered impossible. If conditions are tolerable, the extent of public life grows (Gehl 2010, 21).



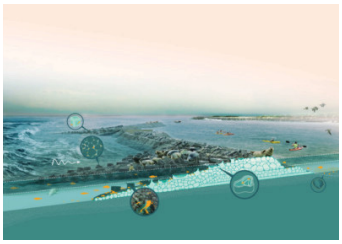
Graphic representation of the connection between the physical condition and quality space and outdoor activity (Gehl 2010, 21).

The introduction of cars has been a decisive way of creating confusion about the scale of cities. All infrastructure being scaled to cars and dense buildings has had an immense impact on new urban development. For example, parking lots made for 20 to 30 cars fills the same amount of space as a good city square. Principles of good human scale must be naturally part of the urban fabric to invite quality public space back into city centers (Gehl 2010, 55). By improving

the physical condition, we strengthen the quality of space and city life.

Peaceful Cohabitation

In the built environment, it is vital to understand what it means to expand architecture beyond “designing for us”; beyond an environment conceived for human consumption and comfort. Architecture must address the global, city, and site ecosystem as a shared space for all species because, after all, humans are not the only city dwellers (Lawson and Nguyen-Van 2020, 1-22).



Scape Studio, Diagram of Living Breakwaters, Staten Island, NY, 2022 (Scape Studio 2022a)

Biodiversity is largely under threat as evidenced by the Global Biodiversity Outlook report published in September 2020 by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Biodiversity loss; the reduction or disappearance of living beings, has rapidly increased at an alarming rate, largely as a result of human activity (Lawson and Nguyen-Van 2020, 1-22). Biodiversity loss has many consequences, not only for the natural environment but also for human beings. Some of those consequences include affected soil and water quality (fundamental to food production), pollution of pests (who damage crops), and increasing carbon dioxide emissions due to the capacity of forests and oceans to absorb emissions (Lawson and Nguyen-Van 2020, 1-22). Therefore, safeguarding nature is the most important change in mindset that we need for the future. If we look after nature then nature will continue to look after us.

Scape Studio, Photograph of Town Branch Commons, Lexington, KY, 2022 (Scape Studio 2022b)

If better city space is provided through the human dimension, the physical condition, and peaceful cohabitation, we can achieve a harmonious relationship between the user, the space, and the natural environment. But the question

still stands: Where can we provide space and how is that accomplished?

Recovering the Urban Void: Providing Quality Space in the Fragmented City

As cities continue to densify, providing and finding quality public space is becoming extremely difficult to find. The urban void; spaces that fragment the urban fabric and produce problems for cities also have great potential for public life and quality public space (Giovanni 2018, 3).

The progressive urbanization, congestion of the city, and degradation of the natural environment have increased the need for undeveloped open space, also known as urban voids; unused, underused, and sometimes misused spaces that are typically seen as incoherent with their surroundings and out of context.

These lost spaces or gaps in the urban fabric are being created all around the city. Often shaped by modern planning ideologies, design movements, and social and commercial factors, these voids become obsolete. Remaining mostly vacant and devoid of identity, these spaces often give place to negative phenomena such as vandalism, crime, and garbage dumps. These void spaces are realized as interrupting the urban tissue (Giovanni 2018, 1-22).

Although remaining largely unused, these negative plots of land have great potential of fostering public space, public life, and the public realm. High-density cities are aiming to identify urban voids and their public life potential in being a catalyst for regenerative built environments that satisfy a relationship between life, space, and buildings.

Image of urban voids, New York, New York (Gordon 2014)

Restoration Strategy: Stitching with Nature

This new type of urban development and regenerative environment exists in the near future when Halifax's fragmented relationship between the users, the space, and the natural environment is restored through this new paradigm of "ecological urbanism". Knowing that infrastructure and new urban development today rely heavily on the basic conditions that the natural world is consistent. How can architecture predict change?

Nature has had many years to understand what works and what lasts on this earth; largely in part to natural selection and evolution. Nature adapts to the earth's cyclical processes and so can our buildings. It is time for designers to understand how mimicking nature and designing with ecological urbanism can be applied in the design of sustainable and resilient cities for the user, the space, and the environment. This would mean learning from and mimicking the functional basis of biological forms, processes, and systems tested by the environment and refined through evolution.

Urban voids ask for stitching with nature: built infrastructure is introduced in these void spaces to both support the transforming fabric, and the fragmented relationship between the users, the space, and the natural environment.

Thesis Question

So, with this built infrastructure, this thesis asks: “How might architecture contribute to creating regenerative built environments in urban voids that satisfy a harmonious relationship between the users, the spaces they inhabit, and the natural environment in which they live? How can we achieve responsible architecture in a public setting?”

I will attempt to answer this thesis question by investigating the agency of designing with nature in large-scale sites of urban voids in the ‘densifying’ downtown area of Halifax, Nova Scotia. It argues that designing with nature in urban voids will create regenerative built environments that challenge the framework of new urban development to benefit the fragmented urban fabric, the ever-changing environment, and the aforementioned harmonious relationship.

Chapter 3: Activating with Nature

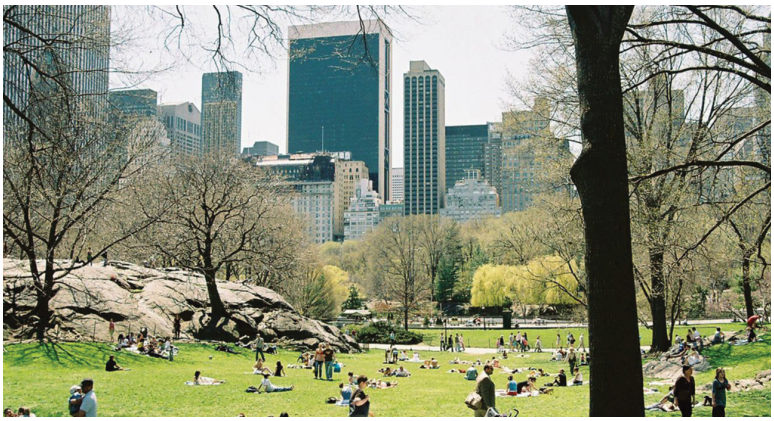
Defining Nature

Nature is not a place or thing, but is a set of ideas for which many cultures have no name. Conflicting ideas of nature coexist and they affect perception and action (Williams 1980, 67-85). The idea of nature consists of biological, physical, and chemical processes that create and sustain life, the earth, and the universe.

Image depicting city centers that are smog-free and full of thriving green ecosystems, with more cyclists and pedestrians than cars (Meyer 2023).

In this view of the natural world, as structured by processes and shaped by human activity, we must design cities accordingly. The scale and complexity of cities are beautiful but their impact on the planet shows how short-cited cities can be. Cities are vulnerable to the climate change crisis, biodiversity loss, pollution, and waste. To rebuild our cities and combat these vulnerabilities, we should first let nature back in. This could be in the form of parks, green roofs, plantings, etc. to naturally cool our cities. Boosted through design, we need urban infrastructure to rebalance the cities' relationship with their surroundings.

How can we combine nature and architecture to benefit the city's users, spaces, and natural environment?



Finding urban nature (Smith n.d.)

Today, there is a recognition that nature should be used to enrich architecture and safeguard future generations. The plethora of concepts for natural-setting designs are plenty. It is not about saving the environment, it is about being in complete harmony with natural systems, ecological conditions, and biological habitats.

Environmental theorists thankfully have provided us a platform for environmentalists, scientists, biologists, planners, architects, and communities to unite, research, and design new ways of improving urban quality of life worldwide through ecological urbanism (McHarg 1969). By embracing ecological urbanism, we may create cities in symbiotic harmony with nature.

Photograph of Harbin Qunli Stormwater Park (Turenscape 2011)

What is ‘Ecological Urbanism’?

Ecological urbanism is to create ‘artificial ecosystem’ cities that achieve the same interdependent efficiencies and life-preserving redundancies as natural ecosystems. This, in turn, transforms current linear patterns of energy into a closed-loop system where waste becomes energy (Mostafavi 2010). Ecological urbanism has the potential to

be the new bridge between urban design and ecology. One that projects design as a vital element to the transformation of cities and goes beyond addressing form.

The theory and practice of ecological urbanism have a long history, a strong foundation to support it, and built works to demonstrate its benefits.

Portrait of Leon Battista Alberti (GoodReads 2013)

Historical Roots

In the fifteenth century, Leon Battista Alberti curated a treatise on architecture that advocated that the siting and design of cities should be adapted to the character of their environment to promote health, safety, dignity, and pleasure (Alberti 1988, 35-36). Alberti proved his point by cataloging the disasters suffered by cities that disregarded the power of nature (Alberti 1988, 35-36). George Perkins Marsh, a pioneer environmental thinker, warned against cities along with Alberti. He proposed to become a coworker with nature in the reconstruction of the damaged fabric (Marsh 2003).

Portrait of Lewis Mumford (History Central 1966)

Author, critic, and historian Lewis Mumford promoted an integrative approach to cities. He argued that a new sense of form will spread through design when a more organic understanding is achieved between city and region, and urban and rural environment (Mumford 1991, 164). To Mumford, this new form “must include the form-shaping contributions of nature, of river, bay, hill, forest, vegetation, climate, as well as those of human history and culture, with the complex interplay of groups, corporations, organizations, institutions, and personalities” (Mumford 1991, 164).

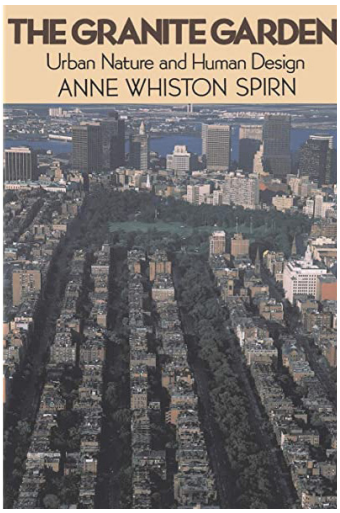
Influenced by Mumford, Kevin Lynch, a seminal figure in the field of urban design, stated that the city is a human habitat and should be judged on how well it sustains human life.

He explored the role of nature and the features it has on enhancing the identity, legibility, and coherence of the city. In his latest book, *Wasting Away*, Lynch takes an ecological approach to managing resources and waste (Lynch 1981).

And lastly, according to Ian McHarg, the best way to occupy the spaces of the city and modify the earth is best designed with regard to urban ecology and the natural landscape. Cities could avoid major disasters and become truly regenerative while gaining a stronger sense of place and identity (McHarg 1969).

Supported Foundation

Important concepts of ecological urbanism include: cities are part of the natural world, cities are ecosystems, and cities are habitats. These fundamental concepts are the foundation from which to derive principles for ecological urbanism design approaches. In 1984, these concepts were laid out in *The Granite Garden: Urban Nature and Human Design,* based on the work done by researchers and practitioners in a series of fields (Spirn 1984).



The Granite Garden: Urban Nature and Human Design (Sprin 1984)

Despite overwhelming evidence, the belief that the ‘city is apart from nature’ has dominated how the city is perceived, how it is built, and continued environmental stress. Human activities and urban form interact with natural processes to create typical urban climates, soils, hydrology, plants, animals, and flows of energy (Spirn 1984, 1-12). Therefore, the key is for cities to recognize that we belong to nature and must design with, instead of against the flows of nature. This does not just include imitating the shape of natural features but adapting urban form to the natural processes of the city. With that, designers can accommodate change through ecological urbanism (Spirn 1984, 1-12).

New York's Central Park: How should we design cities to make the most of urban ecosystems? (Spatari n.d.)

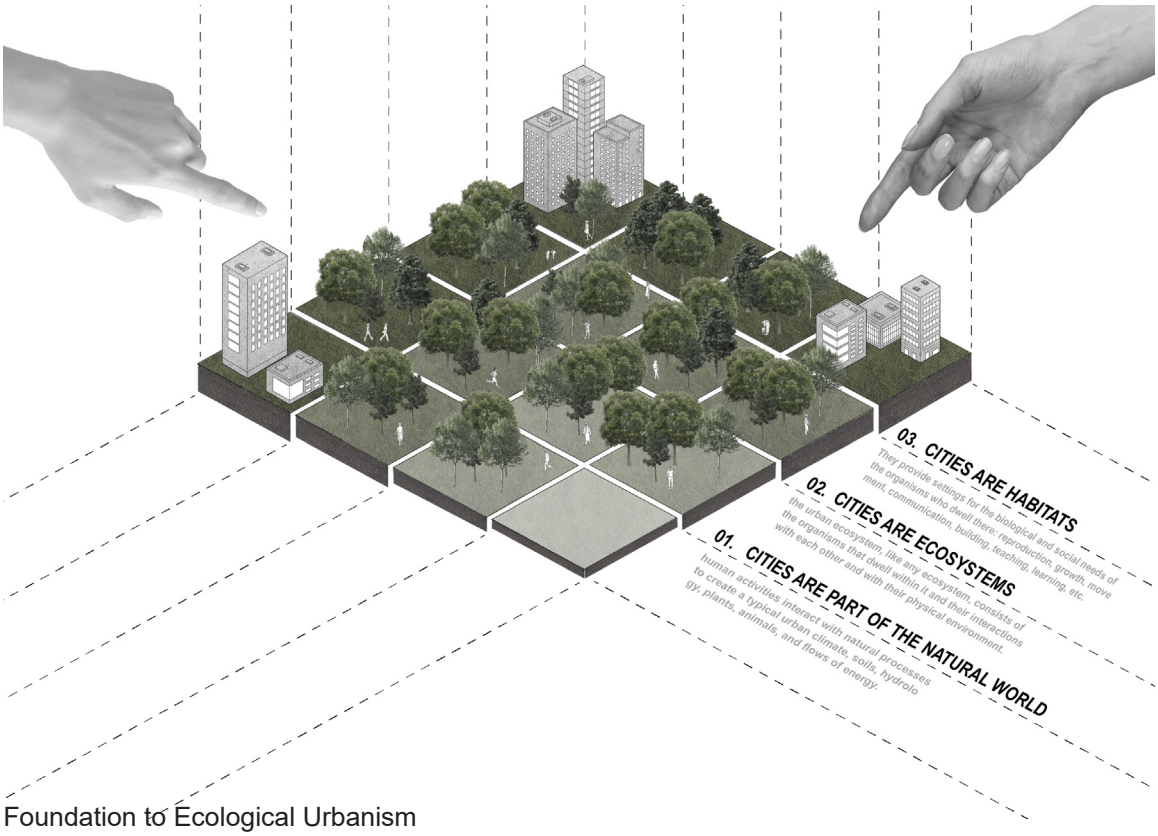
Cities are ecosystems. The urban ecosystem, like any ecosystem, consists of the organisms that dwell within it and their interactions with each other and with their physical environment (Pickett and Grove 2009, 1-32). It is also an open system that has flows of energy, materials, information, processes, people, and goods as resources are imported, transformed, consumed, and exported. The less efficiently these flows are used, the more waste and contamination are released (Wolman 1965, 179-190).

The key to this concept is to design cities as well as every park, building, and district as a whole ecosystem. This means not only thinking about form, structure, and materials but thinking about how it fits and contributes to urban life as a "closed" ecological system. This would result in fewer imports and consumption of resources, producing fewer wastes, and recycling wastes as resources (Spirn 1984, 244-275).

Cities are habitats. Cities have places for living for individuals and groups (not only humans but other non-human species). From microbes to trees, from birds to fish, and mammals to insects. These provide settings for the

biological and social needs of the organisms who dwell there: reproduction, growth, movement, communication, building, teaching, learning, etc. And yet, cities are ill-adapted to the needs of their inhabitants evidenced by vulnerabilities to natural hazards, contamination of the air, and reduction in biodiversity (Spirn 1984, 244-275).

The key to this last concept is to design the city as a life-sustaining habitat. Every design should enhance the quality of life for the user. Kevin Lynch explains this best by stating that measuring good city form in terms of how well urban form can sustain life, how it is perceived, and how well the environment 'fits' (Lynch 1981).

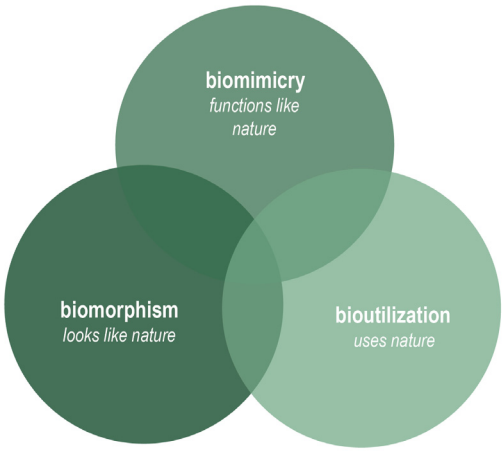


Foundation to Ecological Urbanism

Ecological urbanism is an ecological approach urgently needed both as a remedial device for the contemporary city and as an organizing principle for new cities. Ecological urbanism views the fragility of the planet, its resources, and its waste as an opportunity for design innovation. The problem confronting our cities and regions must achieve a status quo, one that has the capacity to accommodate the conflicting condition between ecology and urbanism (Wolman 1965, 179-190).

Architectural Translation

To implement the supported foundation of ecological urbanism, urban design must take place in the built environment. The plethora of briefs and design concepts for natural setting objects demonstrate an interest and need in the development of inhabited landscapes; where nature and architecture meet. The 3 most common and effective architectural translations of ecological urbanism are biophilic design, biomorphic architecture, and biomimicry.



Bio-inspired Methodologies

Bio-inspired design can take many forms with each approach having produced useful, sustainable, and disruptive innovations.

The theory of biophilia symbolizes the love of nature. An extension of this theory, biophilic design, might seem recent, but the concept has been used for decades in architecture. Biophilic design recognizes that nature has evolved for more than 99% of its history in response to natural adaptation (Kellert 2015). It seeks to satisfy our human need to affiliate with nature in a building and city setting. Thus, the guiding principle is to connect humans and nature through architecture to promote well-being and quality of life because humans are most positive when architecture and nature coexist (Kellert 2015).

The most effective way of accomplishing this relationship is when natural materials are used in their most raw and unprocessed state. When translated to architecture, biophilic design incorporates elements like organic materials, natural light, airflow, and sometimes water features (Kellert 2015). A prime result of this nature-oriented future today is The Jewel, a nature-themed environment and retail complex located at Changi Airport. The main centerpiece is the world's tallest waterfall surrounded by layers of natural forest.

Photograph of The Jewel, Singapore

The Jewel is compromised of layered gardens, entertainment activities, a hotel and more than 300 and dining facilities (Morando 2019).

The next contemporary approach to be influenced by nature is biomorphic architecture. This type of architectural translation adopts the idea of embracing nature's shapes and patterns (Helmy 2022). Biomorphism attempts to turn naturally organic shapes into functional structures. The shows the overlap between biology and architecture to illustrate its effect on structural improvement and design creativity. These applications can create a more flexible, durable, and high-performance structure in terms of form, force, and materials (Helmy 2022). A strong example of this

approach is the Beijing National Stadium located in Beijing, China. Popularly known as and inspired by the Bird's Nest, the stadium uses interlocking steel parts to resemble a lattice of twigs.

Outside the Beijing National Stadium during the 2008 Summer Games (Peter23 2011).

The last and arguably the most effective architectural approach to ecological urbanism is biomimicry; a multi-disciplinary approach to sustainable design that goes beyond using nature as inspiration for aesthetics (Benyus 1997). This type of architectural translation studies and applies construction principles found in natural environments and species and uses them as a measure, a mentor, and a method (Benyus 1997).

These dominant spheres of sustainable architecture have emerged as a mediator between humans and the living world. Bio-inspired architecture aspires to make the built environment ecologically and psychologically healthier, which could prove critical to regenerative built environments (Benyus 1997). By embodying the natural world and building our foundations on millions of years of natural engineering and evolution, we can guarantee that human urban habitats can bring positive biological outcomes (Benyus 1997).

Approach to Biomimicry

Although each methodology varies, bio-inspired approaches have all cultivated functional, sustainable, and stunning designs to cultivate regenerative built environments.

Biomimicry brings relief (Biomimicry Institute 2022a).

Biomimicry is generous (Biomimicry Institute 2022b).

Biomimicry gets us to sustainable solutions faster (Biomimicry Institute 2022c).

Biomimicry changes the lens in which we view the world (Biomimicry Institute 2022d).

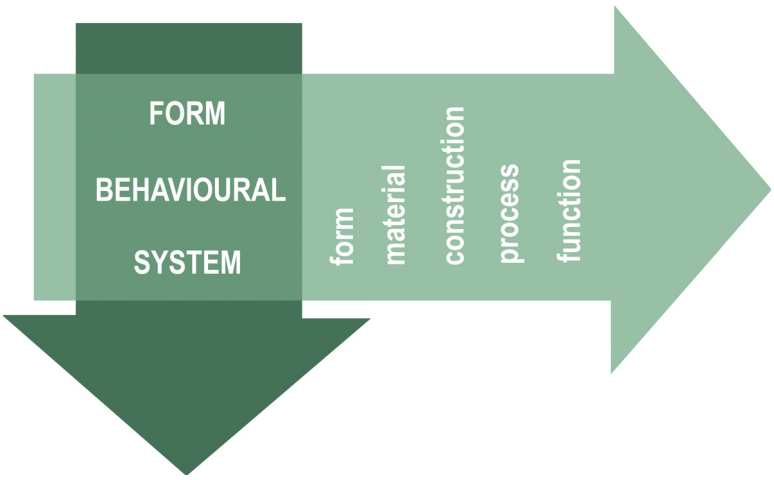
What & Why?

Throughout architectural history, we have developed ways to separate from our natural environments. We have learned to harness and use stored energy that is designed to resist natural flows (Mostafavi 2010). This process is the root of our current problem and has caused us to design ourselves out of nature. Conversely, nature builds with the flow of the environment and is constantly adaptive or 'breathing' (Mostafavi 2010). For example, a forest harnesses local resources and builds within limits. Every species is working towards equilibrium, innovating from the bottom up, and striving for greater resiliency. Mimicking or translating this process through architecture is known today as biomimicry (Benyus 1997).

Coming from the Greek word *bios*, meaning life, and mimesis, meaning to imitate, biomimicry or biomimetic architecture is a rapidly emerging idea that draws on analyzing, observing, and taking inspiration from nature. Biomimicry in architecture involves researching and executing construction principles derived from the strategies used by species alive today. After billions of years of learning from nature, the fossils are a failure but what remains is the secret and the solution to survival. According to Janine Benyus, when we look for what is truly sustainable, the only model that has worked in the natural world. For all the challenges we face today, nature is the solution (Benyus 1997).

Levels of Mimicry

The application of biomimicry can benefit our built environment through site design, construction, and operation to reduce the negative impact on the natural environment. The knowledge that is derived provides architectural design solutions through three levels of application scope: form, behavioural, and system.



Levels and dimensions of biomimicry

Form

Nature creates a comprehensive set of varied forms. These forms thrive in their respective natural environments. The form, shape, or pattern of a building is inspired by these natural organisms (Benyus 1997).

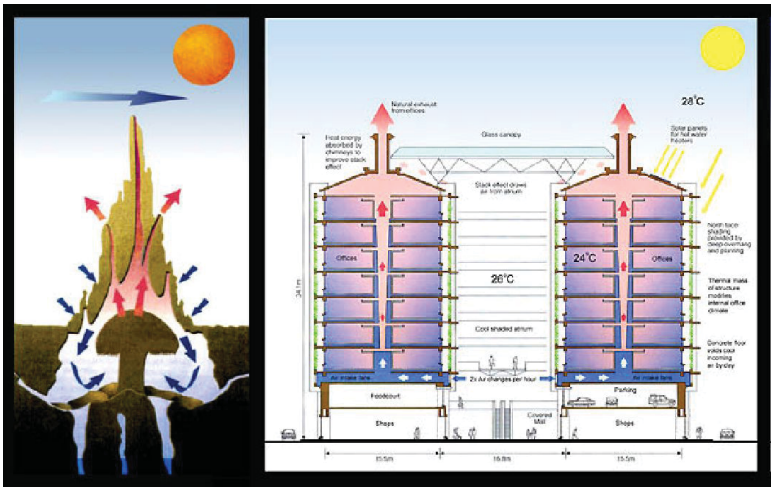
Outside the Gherkin Tower (Foster+Perkins 2023)

The most effective example of this level is the Gherkin Tower located in the heart of downtown London and designed by Normann Foster. The tower takes on a hexagonal skin on the exterior of the building derived from the Venus Flower Basket Sponge. The building's hexagonal structure fights stress just like how the lattice-like exoskeleton of the sponge fights underwater currents (Foster+Perkins 2023).

Behavioral

It is not the organism itself that is mimicked, but its behavior and how the organism interacts with its environment. There are a great number of organisms facing the same environmental conditions that humans face. These organisms solve their problems within their limits of energy and material available to them (Benyus 1997).

Perhaps the most famous example of this is the East Gate Center, a large office and shopping center in Zimbabwe, Africa (AskNature 2021). Architect Mick Pearce and engineering firm Arup took a cue from large termite mounds and their clever system of air pockets, which drive natural ventilation through connection. The system uses only ten percent of the amount of energy a conventional air conditioner users to keep air circulating (AskNature 2021).



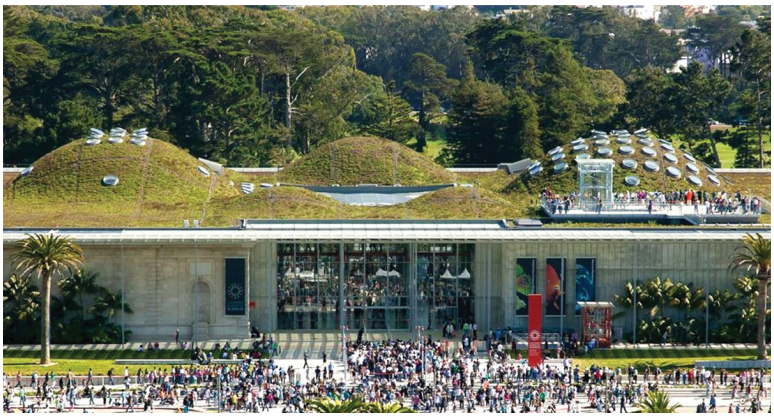
A schematic diagram showing the natural ventilation used in the Eastgate building in Harare (AskNature 2021).

System

The mimicking of ecosystems is an integral part of biomimicry. This advantage of designing at this level can be used in conjunction with the other two levels (Benyus

1997). This level deals with closed-loop systems so there is no by-product. Executed on both the building and city scale, this level mimics how each architectural component works within a system to bring out a successful component (Benyus 1997).

A great example of this is California's Academy of Science Museum's green roof designed by architect Renzo Piano (Velazquez 2017). Its undulating green roof not only mimics the slope lines of surrounding landscapes but uses the most cutting-edge energy-efficient strategies, daylighting, and rainwater harvesting systems. Together, these components formulate a closed-loop system (Velazquez 2017).



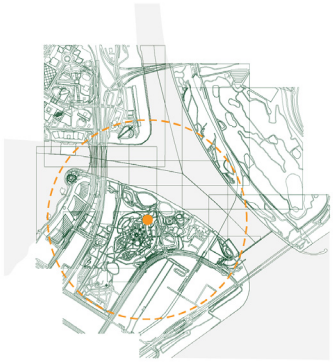
California Academy of Sciences (CAS) living roof
(Velazquez 2017)

Nature's Urban Relationship

To address the significant challenges cities are facing, cities must reconnect the built environment with nature, give equal access to nature to all city dwellers, and foster an economy based on the sustainable use of nature. This is accomplished through biomimicry; a nature-based solution that uses nature as a model, measure, and mentor to put nature's lessons into practice. As evidenced by the case

studies below, by investing in nature-based infrastructure, cities can secure their future, increase their livability, build resilience, and achieve a harmonious relationship between the users (humans and non-human species), the space (undeveloped open space; urban voids), and the natural environment (land, air, water, and plants).

Nature and User: Gardens by the Bay



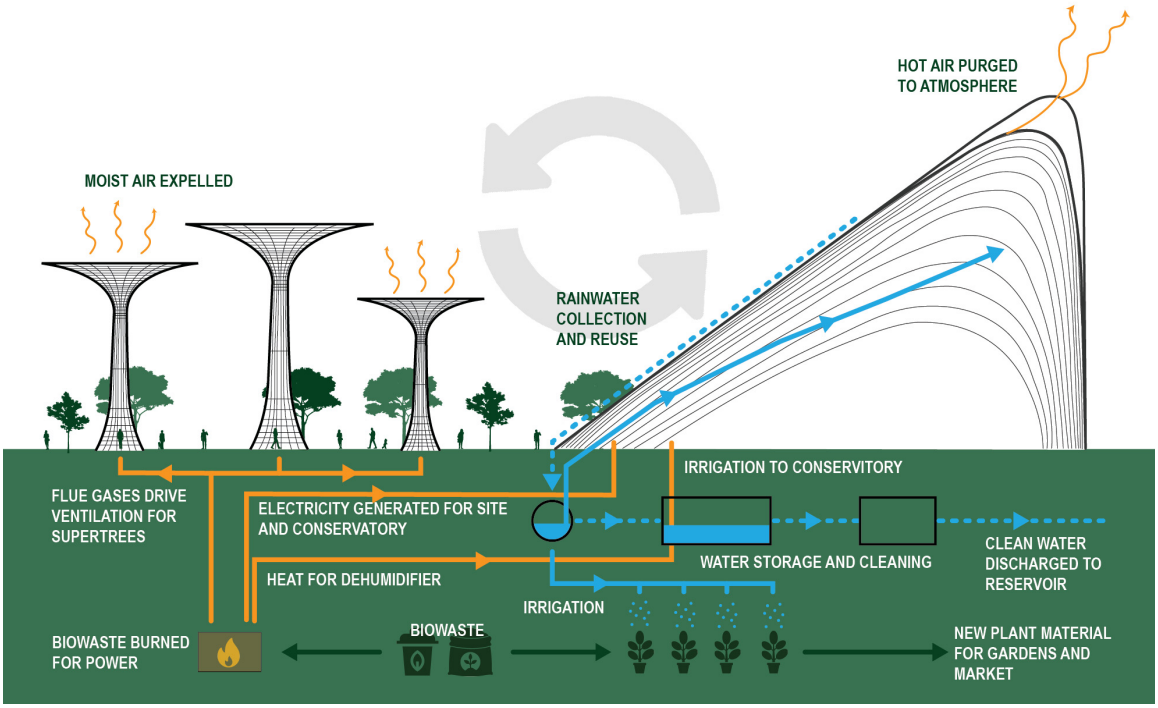
Site map of Gardens by the Bay located in Bedok South, Singapore

Gardens by the Bay; a 250-acre landscaping project initiative from Singapore's National Parks Board, is home to eighteen solar-powered 'Supertrees' (GA 2023). Designed by landscape architects Grant Associates and Wilkinson Eyre, these 25 and 50-meter-high artificial trees create harmony between the living and the artificial (artificial protecting the natural). These Supertrees are designed to mimic natural trees using a collection, absorption, and distribution system that disperses heat and rainwater to various temperature-controlled areas in the gardens (GA 2023).

The Gardens by the Bay has become a global phenomenon and has attracted over 12-million visitors a year to experience the horticultural attractions (Craig Sheppard 2023).

On top, photovoltaic solar lenses collect energy to not only sustain energy but also feed the Supertree systems and the buildings on site (GA 2023). The steel exoskeleton supports vertical gardens of tropical flowers and other plant life embedded and weaved into the framed structure to maximize foliage. Beneath the vertical forest, visitors are provided shelter from Singapore's hot and increasing temperatures (GA 2023).

Gardens by the Bay has proven that humans use nature as a major resource of information providing models that can be replicated in terms of transition and adaptation. This requires humans to converge our economic systems and activities with the great system of nature which our very own survival depends on. In nature, there is no waste, everything is recycled infinitely. Therefore, mimicking these processes help humans propel toward technologies that create conditions conducive to life, rejecting urban toxins and reducing carbon emissions.



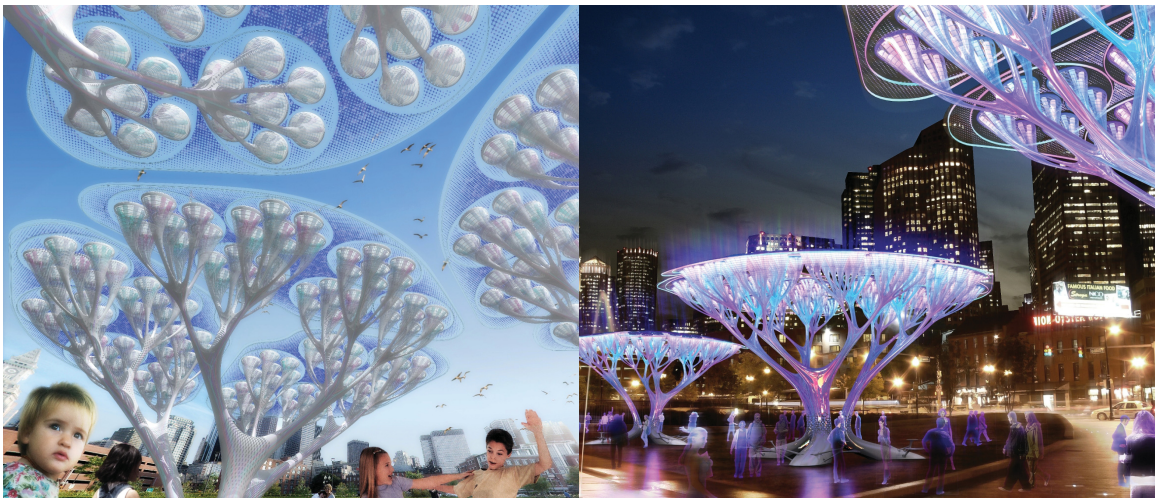
Gardens By the Bay closed loop system

Nature and Natural Environment: Boston Treepods

Site map of Boston Treepods located in Boston, Massachusetts

Although these pods are not designed to replace trees, the Boston Treepod mimics the capacity of natural trees to clean the air. By using a humidity swing technology developed by Dr. Klaus Lackner, the Treepod Initiative, led by Influx Studio and ShiftBoston, looks to help towards the achievement of Boston's goals in carbon reduction programs (Zimmer 2011).

The Treepod imitates the umbrella-shaped crown to optimize the canopy coverage to provide maximum shading surface and wind flow. This high-tech system allows the energy-efficient capture of carbon dioxide from the air, thus closing the carbon cycle and creating a valuable product (Zimmer 2011). The Treepod harnesses energy with the host of photovoltaic towers to harvest enough energy to feed the system itself and its urban lighting function. With several of these trees grouped, the artificial urban canopy can define places to be, produce a social role in the community, and allow people to interact with the tree and each other (Zimmer 2011).

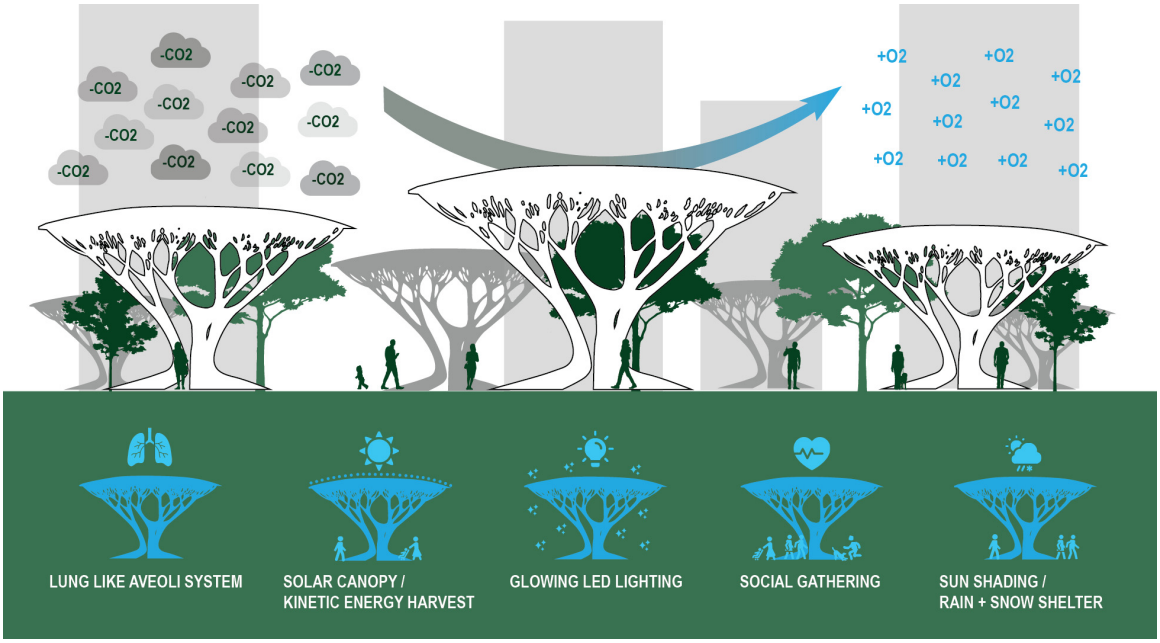


Boston Treepod; a new concept of artificial urban trees which absorb CO2 and propose to embody and artificially enhance the most important biological characteristic of natural trees (Influx Studios 2011).

The concept of biomimicry is based on a key idea that “nothing is lost, nothing is created, and everything is transformed.” A philosophy that aims to balance the way our planet’s resources are used (Helmy 2022).

The application of biomimicry can benefit the natural environment by contributing to sustainable building materials and projects. Biomimicry’s life principles create a culture of bottom-up building, self-assembly, optimizing rather than maximizing, adapting, evolving, using friendly materials, and engaging in symbiotic relationships. This allows architectural products to ‘fit in’ with the natural environment (Helmy 2022).

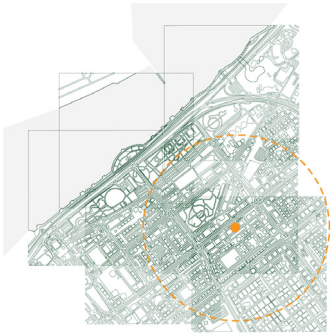
By emulating what a typical biological system does: energy creation, carbon sequestration, and rainwater harvesting, we can fabricate an artificial climate that ‘fits in’ with the surrounding environment. By rethinking the way our buildings are nested systems within a larger system, we can create a collaborative relationship, that conserves resources, energy, and money.



Boston Treepod systems diagram

Nature and Space: Oasys + System

Designed by Mask Architects founders Oznur Pinar Cer and Danilo Petta, the Oasys System was one of ten winners of the ‘Cool Abu Dhabi Challenge’, a global design competition between more than 1,570 participants and 67 different countries (Mask Architects 2023a).



Site map of Oasys + System located in Abu Dhabi, United Arab Emirates

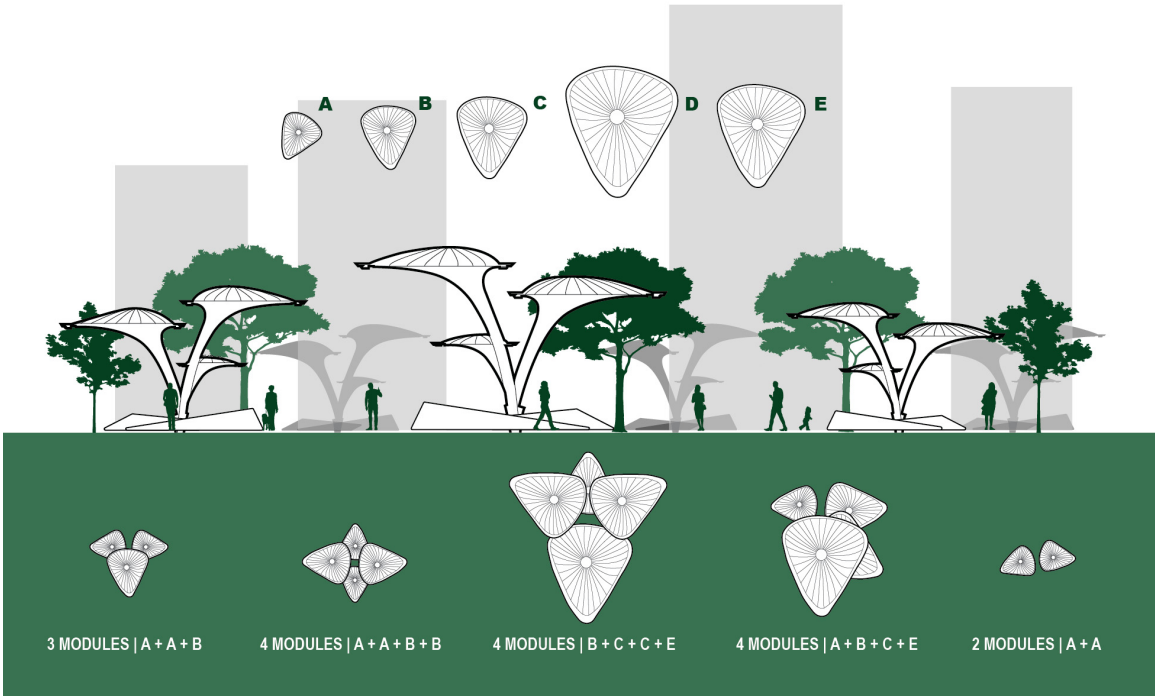
Inspired by palm leaves, the Oasys System transforms overheated leftover spaces into climate-comfortable habitable areas for all residents to enjoy. While keeping residents socially and physically engaged with their surroundings during a daily routine, the Oasys aims to answer all issues of modern urban and social development that are faced in such environments by creating a barrier from heat, UV rays, noise, and wind (Mask Architects 2023a).

Due to its flexible design, any outdoor functions are adapted easily into an Oasys concept mechanism that can be replicated to form a network of hubs that act as islands of harbor and refuge. The modular design allows the groupings

Oasys+Systems: the artificial breathing palm modular structure system located in the middle of the city in order to transform spaces into a comfortable habitable area (Mask Architects 2023b).

of the palm structure to be implemented in various spaces of all scales and environments (Mask Architects 2023a). Along with keeping the temperature low and controllable, the sites will also have trees surrounding the structure to create an extra eco-space that not only deflects wind and sounds, creates fresh air, but also creates a habitat and sanctuary for biodiversity. These thermal comfort systems will become important to public and private spaces to address the dangers of climate while producing effective social gathering spaces for the city to grow (Mask Architects 2023a).

The application of biomimicry can benefit the built environment through modularity. From the knowledge collected from observing nature, biomimetic architecture can produce ecologically sound landscapes by protecting and enhancing large unprotected open spaces. This means biomimetic architecture is suitable for the rehabilitation and ‘stitching’ of urban voids; urban space that is misused, unused, neglected, or abandoned.

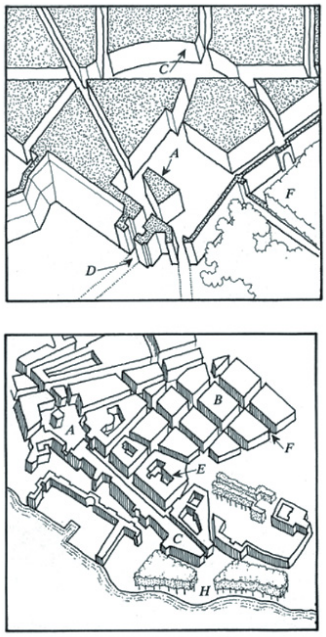


Oasys + System modularity diagram

Chapter 4: Unpacking the Void

Defining the Undefined

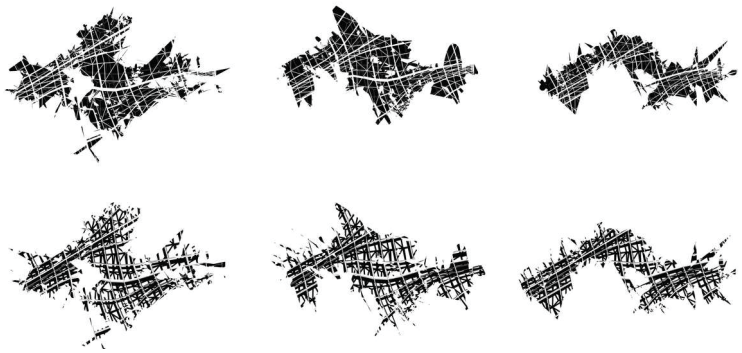
Identifying and understanding the problem urban voids have on the city is important in representing the challenges and potentials these spaces can provide for architecture. Attempting to represent and define its meaning, formation, typology, and negative influence is crucial in determining the underlying value and benefits they offer.



Types of urban voids and solids (Trancik 1986, 102)

These void spaces have no relation with their context and without proper function or activity, stay obsolete or stand out from the city's fabric. In addition to their obvious consequences, these places of abandonment open up space and offer opportunities to conceptualize an alternative type of public space (Pineiro 2020).

The nature, appearance, and quality of the urban void almost always vary from context to context. For this reason, the explanation of the term 'urban void' is varied from source to source. As landscape architect James Corner pointed out, a void cannot and should not be labeled because naming it, claims it in some way (Pineiro 2020). By defining the void, extracting principles, and applying them to site selection, this chapter will attempt to unpack the void.



City of Collective Acts, West LA (Joel Kerner 2012)

What is ‘Urban Void’?

Urban voids in Halifax’s fabric

Before defining ‘urban void’, it is important to define ‘void’ itself. The term void means ‘to be without’ or ‘being without something’ or ‘lack thereof’. Hence the urban void is interpreted as an urban space without a social realm (Pineiro 2020). The deserted leftover space from industrial grounds, the vacant demolition site of a city block, and an empty parking lot used as a shortcut - these are urban voids. A barren, uncultivated, unused plot of land, or left-over space with no articulated function waiting to be defined by the city.

In literature, urban voids are sometimes interchanged with other words to suggest urban voids - gaps, leftovers, wastelands, or lost spaces. Akkerman (2009) suggested that the term urban void has never been defined, Trancik (1986) refers to these spaces as ‘lost spaces’, and Narayanan (2012) simply called these spaces ‘voids’. Therefore, even though theorists use different terminologies, all are referring to the same void space.

This also holds true for the way theorists investigate and describe the voids’ meaning, formation, typology, and negative influence. According to Trancik (1986), these lost spaces are created due to urban designers’ ill-master planning approaches which produced undefined spaces that in turn produce unused space. This is often the case along railroad lines, highways, old military yards, unused industrial sites, and parking lots. Trancik defined these spaces as a negative, lost, and low human activity.

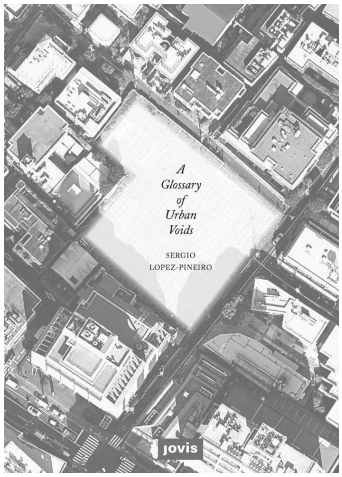
Lynch described urban voids as neglected, unused, and wasted spaces. He argued that these spaces are the consequence of contextual fixed functions such as highways, railways, bridges, or parking lots. His argument

Author	*Term Used*	*Definition*
Trancik 1986, pg. 3 - 4	Lost Spaces	"Urban voids are undesirable urban areas that are in need of redesign, anti-space, making no positive contribution to the surroundings or users. They are ill-defined, without measurable boundaries and fail to connect elements in a coherent way."
De Sola-Morales 2013	Terrain Vague	"A stretch of land of an urban nature which is strange compared to the productive nature of the city. 'Vague' which means absense also creates an expectation where invisible questions of identity are hidden."
Jacobs 1961 pg. 257	Border Vacuum	"Massive single uses in cities have a quality in common with each other. They form borders and borders in cities usually make destructive neighbours."
Akkerman 2009, pg. 205	Void	"Void is usually considered as the absense of constructs within a defined space." "Urban void, however, has never been defined."

The term urban void from source to source

'Urban Void' as a construct is not clear. Different authors have proposed different definitions of the term urban void. It order to understand the term, it is important to look at this definitions.

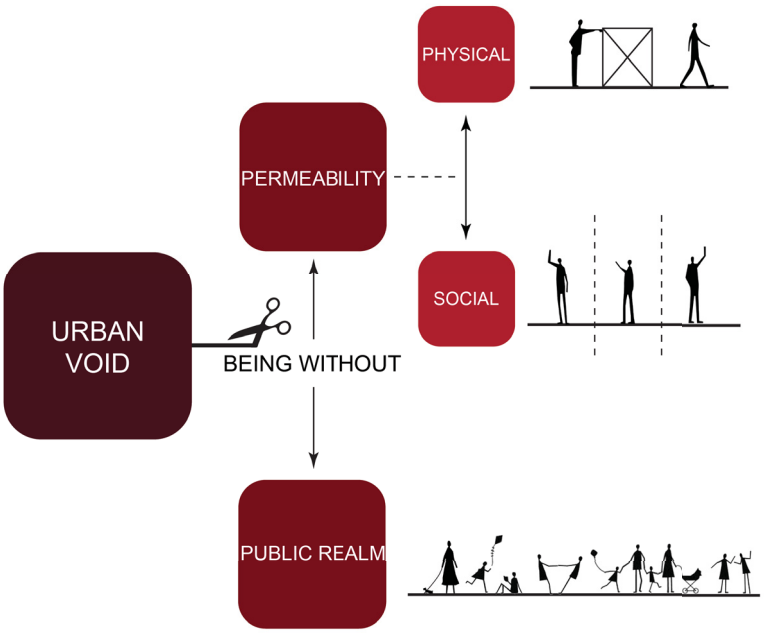
produced two types of lost space: spaces for unknown functions (leftover undefined space) and spaces for specific uses (poor long-term potential). Lynch strongly believed in the reuse and relief of these spaces by increasing flexibility, long-term usage, and regard for the human dimension (Lynch 1981).



A Glossary of Urban Voids (Pineiro 2020)

According to Certeau (1988), urban voids are formed by administrations blindly distributing different zoning by-laws to different parts of the city and rejecting spaces that don't fit. He argued for three different void types; 'naturals' that are located around metropolitan areas, 'interiors' which are located in built cities caught between the compact city and new urban development, and 'interstitials' which are located close to natural and artificial infrastructure (typically have a linear shape). These spaces have been forgotten about and have in turn created blind spots throughout the city. He argues that these wasted spaces have the potential in weaving the city together but there is an important role in managing their longevity (Certeau 1988).

Therefore, according to these theorists, the term ‘urban void’ is defined as unwanted, underused, and or neglected spaces within the city’s fabric; under-designed and escaping our ‘mental map’ (Nelischer 2015, 20-21). These void spaces are devoid of function, lack of people, lack of aesthetic value, and lack of identity. Despite their negative impact, urban voids can also be seen as an opportunity and potential resource for improving community life.



What is ‘urban void’? Urban voids can be seen as a place without permeability and public realm.

Formation

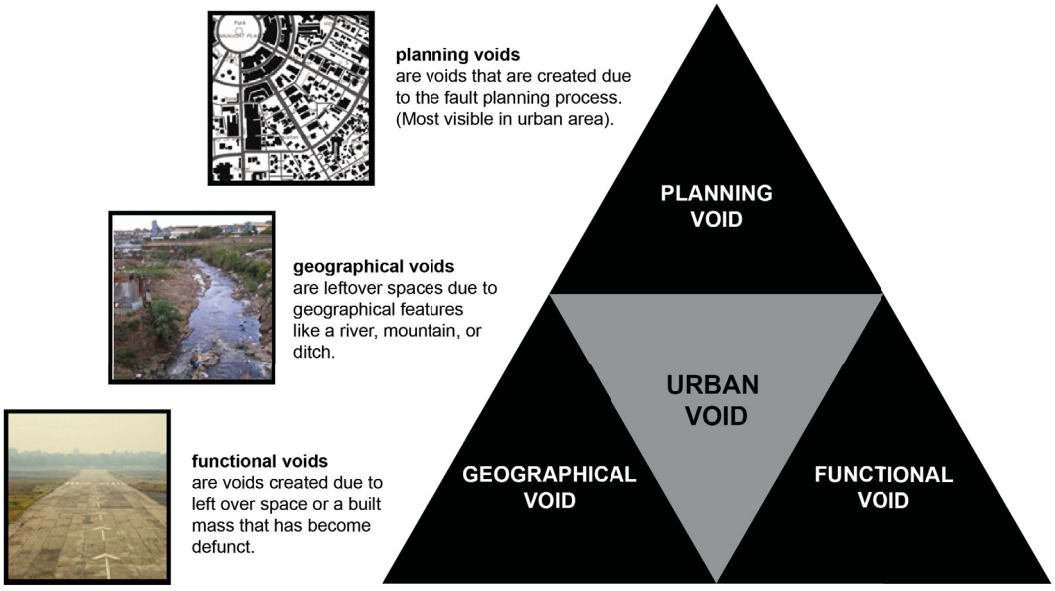
Urban voids are the consequence of natural boundaries (e.g. rivers, marshes, mountains, woods, etc..) and artificial boundaries such as city infrastructure (e.g. bridges, motorways, malls, industrial sites, etc..). According to Narayanan, urban voids are formed by three main factors: planning factors, functional factors, and geographical factors (Narayanan 2012).

Planning Factor

Planning voids are the result of faulty urban planning. These types are the most visible in a given urban area when spaces are not being used as the designer intended. The Modernist Movement instilled many design approaches unsuitable for the planning of cities (Trancik 1986). Emphasis was given to creating isolated vertical icons or individual buildings that completely ignored the spaces around them (Trancik 1986). This resulted in no relationships with adjacent buildings and the street creating a 'vacuum' in the fabric of the city (Jacobs 1961).

Functional Factor

Functional voids are created due to leftover spaces being defunct or unused by city dwellers. These spaces are typically associated with being under litigation or government property where the reallocation of functions is a long grueling process to undertake. These are typical by-products of



Void typology according to Narayanan

An urban void is created mainly due to three factors. These factors that create an urban void can also become the basis for classification of these urban voids.

post-industrialism which include closed industrial sites, empty void space under bridges, spaces along the edge of highways, and unused train yards.

Natural Factor

Natural factors produce urban voids that become the by-product of geographical context; natural barriers (e.g. rivers and mountains) and artificial barriers (e.g. highways, and bridges) (Narayanan 2012). These edge conditions lead to the abandonment or desertification of people resulting in spaces and buildings in the city's fabric being either uninhabitable or devoid of life and function (Wroblewski 2015, 466-474).

Negative Influence

Urban voids introduce many negative impacts on the communities and urban fabric they exist in. These impacts are classified as social, economic, environmental, and aesthetic impacts.

A 'Bypassed' urban resource (Bhaskaran 2018)

Due to their haphazard utilization, urban voids have social stigmas where criminal activity is known to take place. This threat to public security turn these space into trash dumps and other informal uses such as homelessness and illegal housing (Rahmann and Jonas 2011). These urban spaces usually transform into 'the trashes of the city', places that in addition to the physical collection of dirt and garbage, weaken the aesthetic aspects of the city - thus generating a concentration of various social problems.

Economic problems include the void space decaying surrounding areas by preventing investment and development. This in turn typically leads to a decline in property value (Goldstein 2001). In addition, economic

disinvestment and increased taxes significantly affect urban and commercial spaces and tourism operations.

The environment is also harmed due to visual pollution and public health risk. These unattractive voids impact the city's appearance and quality of life (Goldstein 2001). Due to the large dimension and openness of some voids, the cohesion of the city's urban fabric is affected. Despite urban voids being introduced as having complicated negative impacts on the urban fabric, they still provide a great opportunity for urban development through environmental value, social value, economic value, historical value, and aesthetic value.

Potential Values

Urban void development is becoming more common and the importance of its reuse and transformation is increasing. Cities are recognizing the potential these spaces provide and are acting upon them. When urban voids are properly incorporated into the fabric of the city, the narrative of the city can change for the better. The potential values urban voids can provide are environmental, social, economic, historic, and aesthetic value.

Environmental Value

Urban voids can provide environmental benefits to enhance the city's quality of life. Void space can be a great space to foster green infrastructure and ecological urbanism to promote ecosystem health. The greening of void space improves the quality of life, reduces pollution, and positively affects public health (Kim 2016, 486).

These urban voids can support biodiversity by preserving natural habitats for a wide range of living organisms: plants, insects, mammals, etc. (Kim 2016, 486). A series of void

spaces provide the opportunity to create a green network that supports climate change adaptation and plays a role in reducing the urban heat island impact. For example, in Detroit, a greening program is using urban voids to increase vegetation cover by maximizing ecosystem services and improving overall community air quality. Fourteen-hundred vacant lots were ‘greened’ and approximately fourteen-hundred vegetable gardens were installed to support the sustainable urban regeneration process (Kim 2016, 486).

Social Value

Urban voids can also provide great potential to strengthen social relations and reflect the opportunity to connect communities together. Void space is primarily able to compensate for the shortage of open spaces that high-density cities are in desperate need of. These spaces can also accommodate a variety of functions and social activities such as public open spaces, gardens, plazas, and parks (Omar and Saeed 2019, 585-600). Along with functions, urban voids provide opportune spaces for social services such as entertainment, restaurants, cafes, agricultural centers, and educational centers (Omar and Saeed 2019, 585-600).

A network of connected voids in the urban fabric can offer different levels of interactions and types of temporary/ permanent uses. These could be seasonal celebrations, a place for buying and selling, farmer’s markets, and temporary shelter in the form of housing. An example of an urban void providing social value is an educational center in Gillespie Park, a 3.4-hectare void transformed into a natural reserve that provides environmental education to

the public and holds a community annual festival attended by approximately two thousand people per year (Kim 2016).

Economic Value

Urban voids have great potential to improve economic activities in the city and provide an opportunity for investment and job creation. The reuse of void spaces can offer development at a low cost and a catalyst for community and small local businesses to support economic revitalization. Not only does this provide local communities to grow their income, but it allows the value of the property and its surroundings to improve (Jegou 2016).

For example, as a result of an economic crisis in the city of Craigavon, Ireland, twenty-five percent of the city was abandoned, leaving vacant land unattended, unused, and uncared for. A program was installed for the temporary reuse of these spaces bringing life back to the city and providing a clean appearance to the streets and the overall safety of the public (Kim 2016, 486).

Historical Value

At the level of historical value, urban voids are sometimes represented as an integral part of the city and reflect the city's historical past (Jegou 2016). Reusing these spaces while considering their historical past can enable strong support for historical memory, identity, and character of the city's architecture (Jegou 2016).

For example, the town of Catania, Italy did a reuse project on a degrading and abandoned factory. The final product was a library and language laboratory that gave back to the Catania community and its unique architectural identity (Cirelli 2002).

Visual and Aesthetic Value

The presence of urban voids negatively impacts the appearance of the city and the interconnectedness of the city's fabric. The reuse of these spaces in creative ways can fix the perception and improve the visual connection with other parts of the city (Kushwah and Rathi 2017, 196-203). As evidenced by the values above, urban voids provide great potential in weaving the city together and creating a stronger fabric of the city between the user, the space, and the natural environment.

Void Methodology

The Criteria

As the notion of void space becomes defined by various theorists, we begin to understand both the complexity, issues, and potential the urban space has on the urban fabric. After processing and incorporating the definitions, factors, negative influences, and potential values of the urban void, a set of criteria are defined based on scale, edge, and landscape conditions. These principles will give clarity to the range of voids that exist within Halifax's urban fabric.

Scale

Void space can be classified into three scales: pocket voids, moderate voids, and large-scale voids. Pocket voids are described as the in-between spaces that are classified as wasted potential with the common defining characteristic of their small scale. Typically, a pocket void occupies one to two municipal lots and is no more than one acre. Large-scale voids on the other hand are known to take large amounts of space creating an uneasy, unwanted, and unpleasant

feeling for pedestrians (loss of identity) Examples of these are typically oversized streets, large unnecessary parking lots, and abandoned buildings.

Edge

The boundary conditions of the urban void can range from a hard edge (barriers) to a more human-friendly soft one (open). Lacking atmosphere and unable to sustain public life, hard edges only facilitate fast pace traffic, giving little to no regard for the human dimension and the physical condition. Hard edges create a rigid border between void and human. Facilitating soft edges allows for proper invitation by extending the space and introducing the notion of horizontal relief.

Landscape

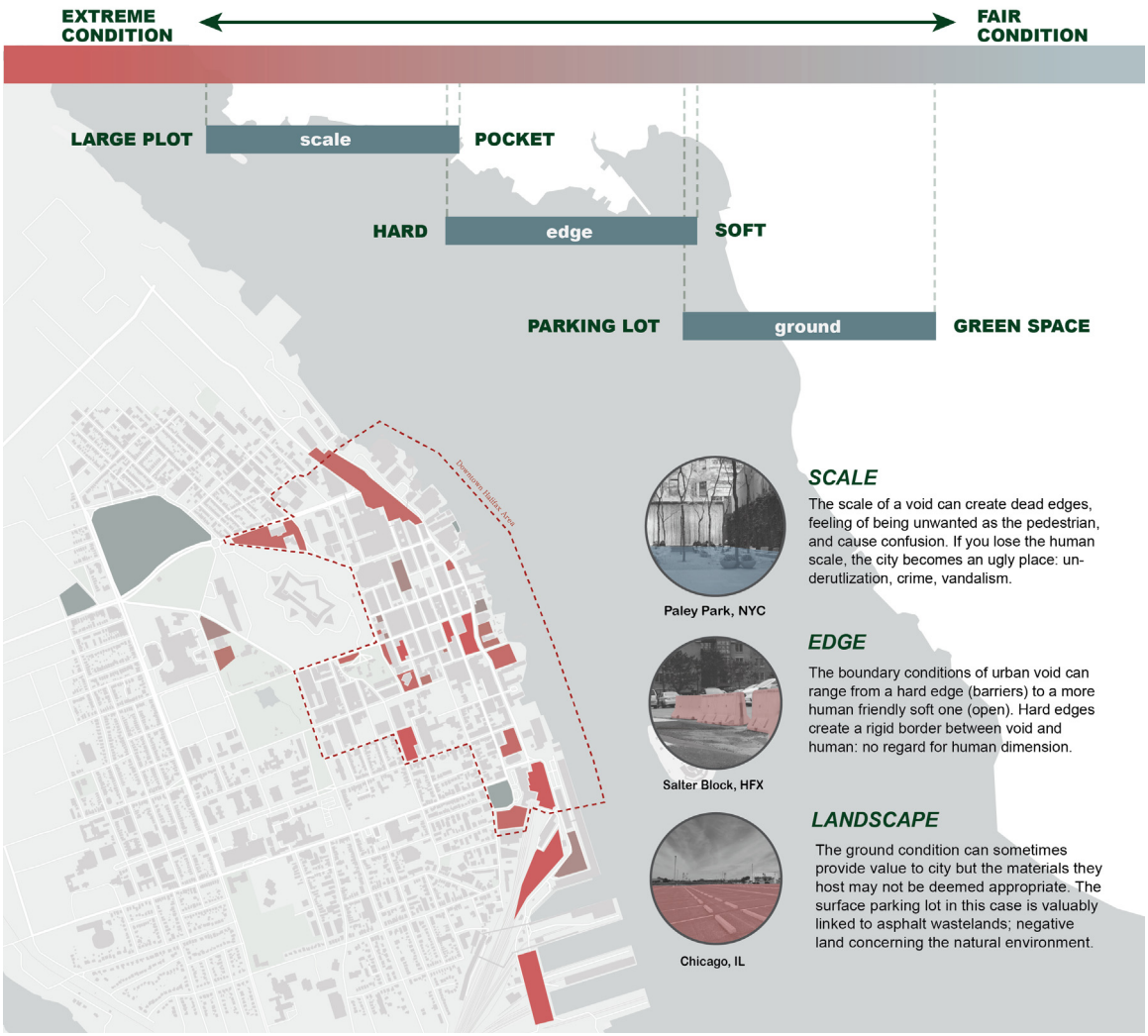
The ground condition within the urban void can sometimes provide value to the city but the landscape material they host may not be deemed appropriate. For example, the surface parking lot, inappropriate in the majority of cases has the common feature of unexpressed urban neglect. As a large part of the urban landscape, the parking lot is inappropriately linked to asphalt wastelands; negative land concerning environmental issues. On the other end of the spectrum, green public voids such as the Halifax Common

Aerial view of the Halifax Common (Shaunl 2015)

brings a lot of value to the environmental success of cities and architecture.

Extreme to Fair Condition

Given the criteria above, we start to derive and understand the spectrum of voids ranging from extreme to fair conditions. On one end of the spectrum, the fair condition is known to have proper scale, soft edges, and bring value to the landscape. At the other end of the spectrum, the extreme condition is known to have poor scale, hard edges, and negative impacts on the landscape.

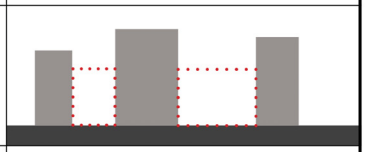
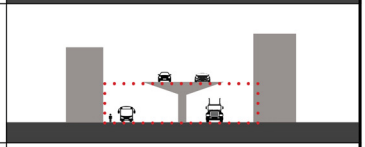
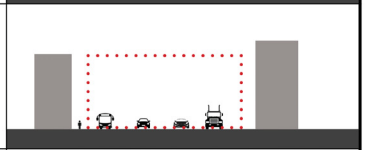


Spectrum voids within the Halifax urban fabric

The Extreme Condition

Halifax's downtown area is mainly filled with urban voids to the extreme condition. These types of voids can be categorized into four types: edge and buffer voids, infrastructure voids, transportation voids, and large-scale voids. Edge and buffer voids are the most common type that creates dead edges and wasted potential. Infrastructure voids are waste of usable spaces below urban infrastructure creating a gap in the urban context. Transportation voids are road infrastructure taking up large amounts of space making by-passers feel unwanted, unsafe, and unprotected. The last but most common type is the large-scale void; large undefined spaces such as parking lots, unused land, and abandoned spaces that disrupt the flow of the city.

Given that the large-scale void is the most common type, the design portion of this thesis will investigate the large-scale void and the empty parking lot.

URBAN VOID NO.	TYPE OF VOIDS	DESCRIPTION	ISSUE	DIAGRAM
1	EDGE & BUFFER VOIDS	In-between spaces, Marginal spaces, Residual Spaces	Leftover spaces that create dead edges, feeling of unsafe space, wasted potential sidewalks	
2	INFRASTRUCTURE VOIDS	Dead space in and around public infrastructure	Waste of usable space, illicit activities, becomes a gap within the context	
3	TRANSPORTATION VOIDS	Oversized street, over supplied street	Road infrastructure taking large amount of space, unsafe for pedestrians, character and identity is lost.	
4	LARGE SCALE VOIDS	Parking lots, unused land, and abandoned spaces	The scale of the void creates dead edges, feeling of being unwanted as pedestrian, misused space.	

Extreme condition void types

The Empty Parking Lot

> Parking lots could be significant public places, contributing as much to their communities as great boulevards, parks, or plazas. For all the acreage they cover, parking lots have received scant attention. It's time to change that; it's time to rethink the lot! (Ben-Joseph 2012).

Towns and cities have devoted an enormous amount of land to parking spaces that go unused. According to a study done at the University of California in 2011, the United States has approximately 800 million parking spaces (three for every vehicle on the road) that cover 25,000 square miles of land. The land tied up in these parking spaces could be used in better ways (Ben-Joseph 2012).

As Joni Mitchell sang back in 1970, we've paved paradise and put up a parking lot. The mindset she had is what many cities and towns are in, as users look around and see asphalt wastelands where life once sat in the form of houses, historic buildings, businesses, and even green space. More communities are converting their parking wastelands or urban voids into more valuable assets.

How can we 'depave' parking lots so paradise can grow again as parks, urban farms, public gardens, etc.?

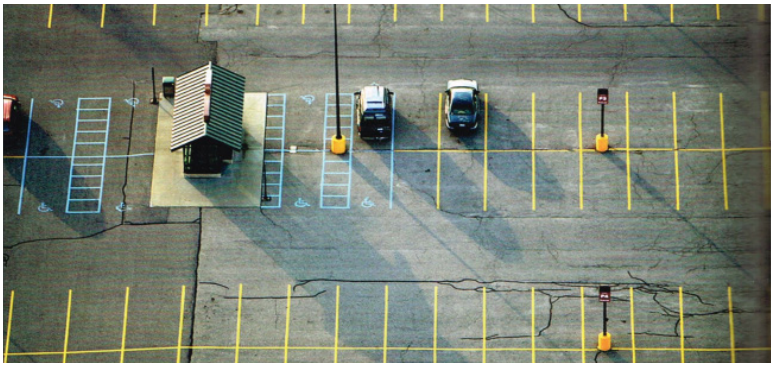
They paved paradise and put up a parking lot (Schmidt 2008)

Rethinking a Lot

Being a part of the urban landscape, they have a huge impact on environmental issues and the way we perceive the city. A common feature of the parking lot is their state of neglect, but what makes them special is their unexpressed urban potential. Even though they will always be linked to the constant need for automobiles, they can also be seen from the perspective of designing public space.

The parking lot can be fertile ground for artistic, cultural, and social uses. For instance, in the USA, parking lots are used for eating, drinking, and social matter before a football game. During 'tailgating', barbeques, tables, chairs, and games transform the parking lot into a common space where communities come to develop (Ben-Joseph 2012).

In his book *Finding Lost Space: Theories of Urban Design*, Roger Trancik defines the parking lot as an undesirable area that needs redesign - antispaces, making no contribution to its surroundings or users. Trancik asserts that they offer tremendous opportunities for urban redevelopment and creative infill projects. The surface parking lot may indeed be an urban void space but is an essential part of the built environment. They are the unplanned urban rooms that are waiting to be filled in the urban fabric (Trancik 1986).



Re-thinking a lot (Ben-Joseph 2012)

In 1946, landscape architect Ian McHarg painted a dreadful picture of the urban landscapes of today and tomorrow: “the atmosphere is polluted, climate and microclimate have retrogressed to increased violence, a million acres of land are transformed annually from farmland to hot-dog stand, diner, gas station, rancher and split level, asphalt and concrete, billboards and sagging wire, parking lots and car cemeteries, yet slums accrue faster than new buildings, which seek to replace them.” This dreadful picture of car cemeteries is what provides us with a blank canvas to accommodate new environments. As planners and designers, a new approach and model are needed to reform the blank canvas.

Halifax parking lots

Downtown Halifax large scale voids occupied by ground-level parking. (Base map from Esri Canada, Parking data from Ben Macleod 2022)

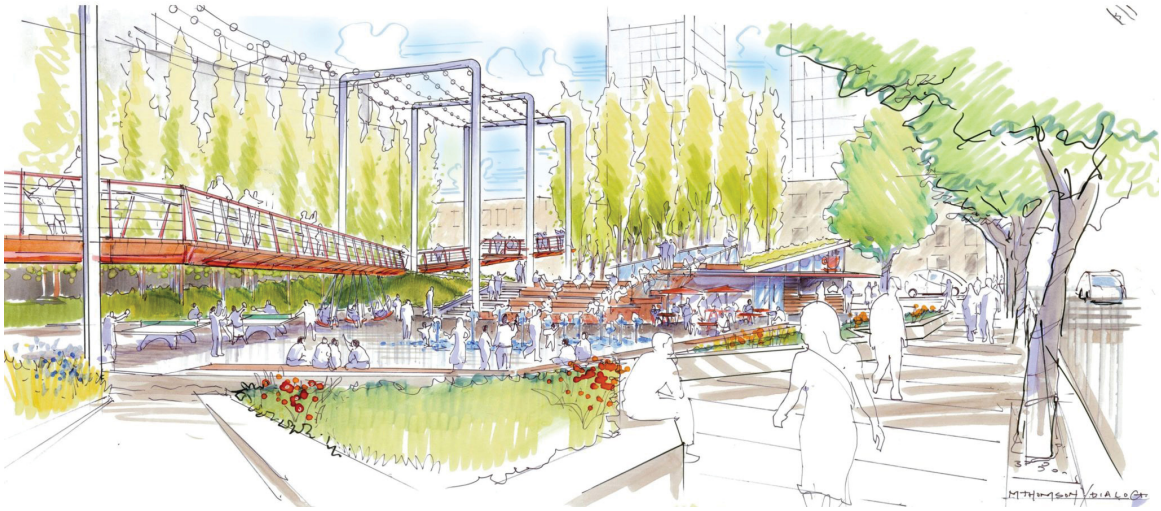
Case Study: Rainbow Park

Rainbow Park, formerly a parking lot and urban void, is located in downtown Vancouver at the northeast corner of Smithe and Richards Street. The name appropriately reflects the bridging of diverse people and communities the park brings together. Designed by Dialog, the park intends to improve the neighborhood's livability and do much more than just improve the void space. It serves more than 25,000 people who live and work within a 5-minute walk of the park (Earthscape 2023).

Photograph of Rainbow Park (City of Vancouver 2022)

A vibrant and inclusive space in downtown (Dialog 2020)

This community-oriented park acts as the 'neighborhood's porch' in downtown Vancouver's dense urban core. It may be small in size but has a huge community impact. The 0.8-acre lot, previously occupied by a surface parking lot is home to a multitude of assets such as public washrooms, a Kafka cafe, a three-story playground, an interactive water feature, an elevated pathway, and much more (Earthscape 2023). Although being a fairly new development to the downtown urban fabric, the community plaza has taken full advantage of its blank canvas. As the park continues to gain traction, the urban void has fulfilled its stitching potential.

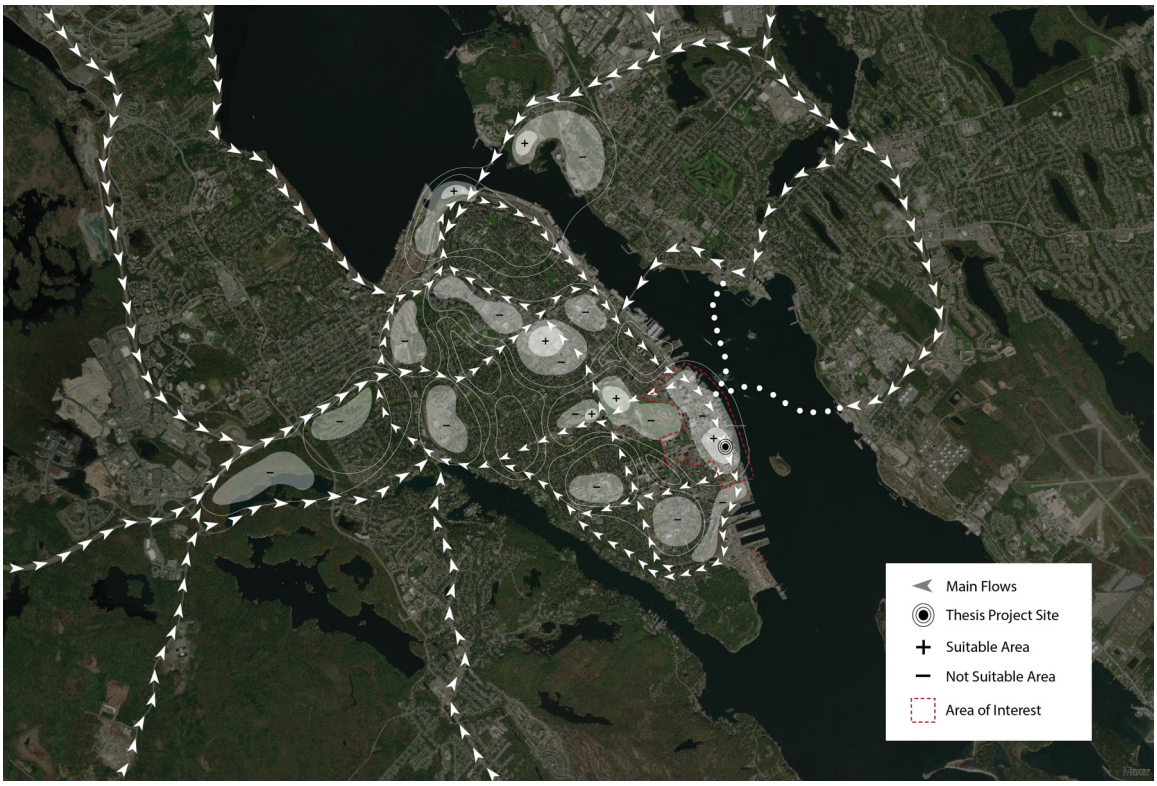


Sketch of Rainbow Park (Dialog 2020)

Chapter 5: Introducing the Site

The Weather Map

Analyzing the potential areas in Halifax, where implementation of nature is more probable, the Main Circulation Map takes into account existing flows, the density of the built environment, and the concentration of people. Located at the edge of Halifax's downtown area, the site of this thesis design, Salter Block, is positioned at a vital node. The site is essential, not only for its proximity to the city center but also because of its adjacent relation to the existing flows that go through it. The next section will investigate the site's urban context around the site and realize its faults and parameters for crafting the stitch.



Main circulation map of Halifax peninsula (Satellite Image from Google Maps 2022).

Salter Block

Images of Salter Block

The site of Salter Block is the ideal example for the concept of urban voids because although problematic due to its large scale and complex context, it possesses great potential to become a solid testing site and canvas for further development of the design stitch. The contemporary vision for the city of Halifax must include social and cultural touch. Enhancing both the social and cultural identity of the neighborhood, thus creates strong links in-between different epicenters of the city, like a backbone structure. With the main focus put on unpacking the void of Salter Block, the end product is to catalyze urban life and improve the quality of life for the user, the space, and the environment through a network of voids around the city of Halifax.

Important void spaces, neglected and full of potential, are left in key areas where usually we have a lack of urban life. In the case of Salter Block, the site is located in Halifax's most prominent downtown location; the Halifax Waterfront, making it a unique connection point. The problem with the site is mainly its lack of urban life due to the high level of car traffic and the site's dedication to the parked car, which deprives the site of important factors needed for a vibrant public space. Having studied and defined the basis of an urban void, it is apparent the potential a parking lot, such as Salter Block has. The space offers an opportunity between downtown and the Port of Halifax for creating a new public space that creates a continuous cultural fabric - inviting locals and visitors alike without inhibition to pass through, rest, and socialize.

Parameter Analysis

The Base Map

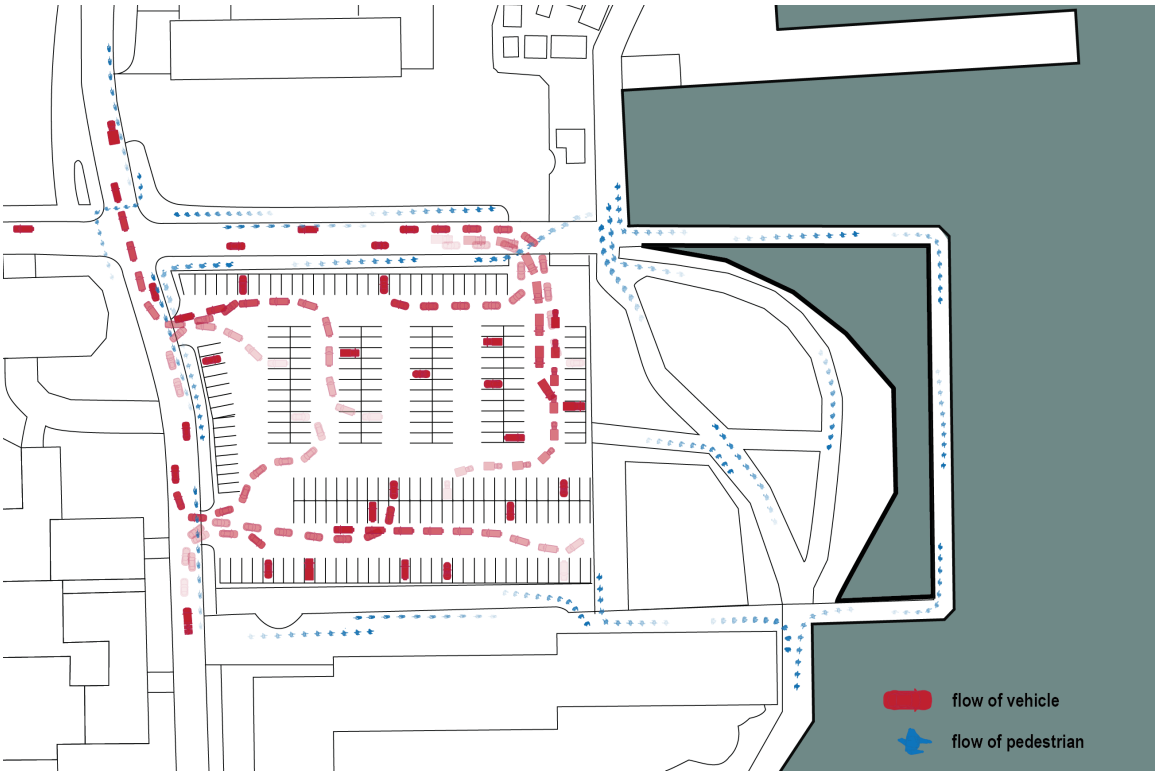
The Base Map indicates the site's context programmatically, spatially, and accessibly. The site is located in a central Halifax neighborhood with good mobility connections towards it. The predominant usage of the site and its void context are surface parking lots, which not only obstruct the flows going through it but deter the user from the space itself. An important flow to note is the public transport systems that surround the site. This means a steady traffic of people will be experiencing the site as a transit zone on a daily basis. How can the design of the site be changed to attract the attention of people toward its potential?

Salter Block and context base map

Scale Analysis

Creating a successful public domain means not only understanding the physical environment but also the flows that go through it. Fluctuating in type and predominant usage, modern cities have a variety of modes of transport intertwined in a mobility network. Many contemporary cities put emphasis on their public transport system paving the way for more human-friendly environments. However, Salter Block's surrounding system is dominated by the car, pushing aside other manners of transport and ultimately losing proper scale.

In dealing with typologies of mobility, it is important to note the functionality of a certain system. Even though Salter Block is dominated by the car, times have changed, perceptions have evolved, and this concept is in the past. It is time for spaces to be scaled to the pedestrian.

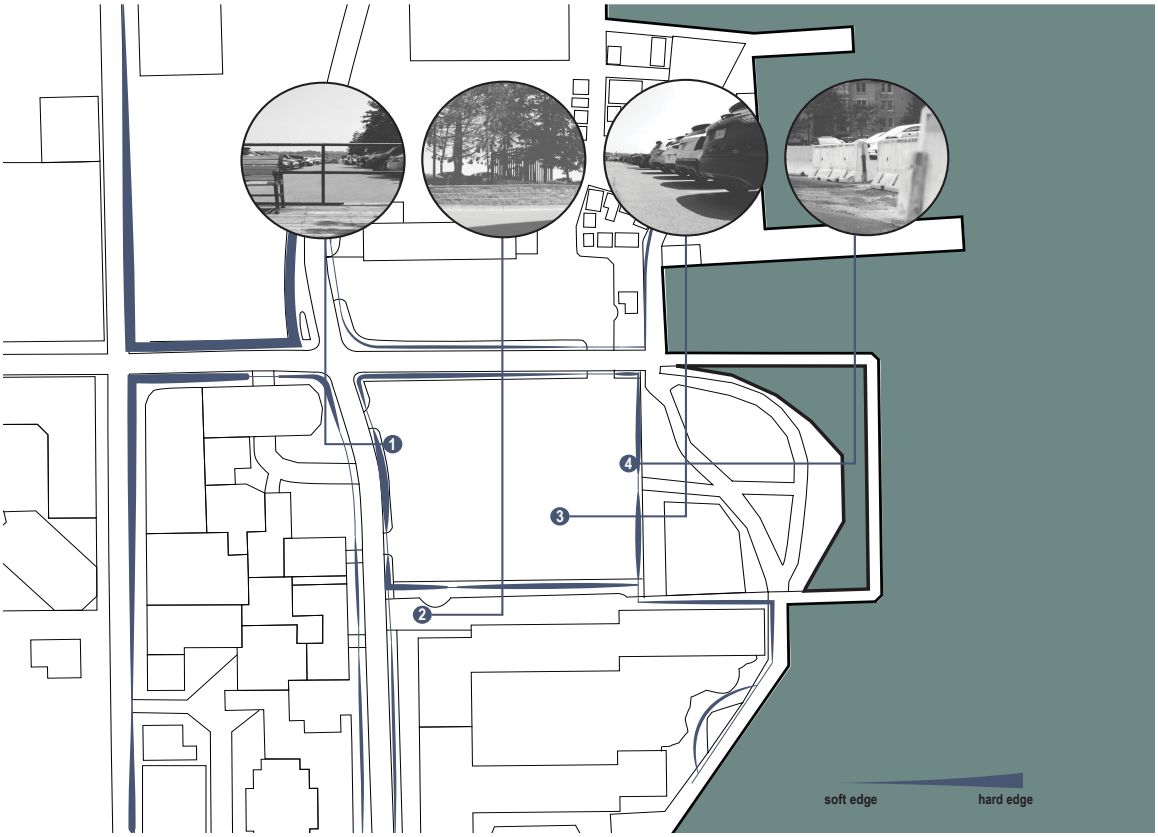


Salter Block site flows (The Vehicle versus The Pedestrian)

Edge Analysis

Studying the boundaries of the site of Salter Block shows the dominance of a hard edge as opposed to a more human-friendly soft edge the typical public space strives for. The hard edges within the site are guardrails, concrete dividers, and the use of the automobile. The site's inability to sustain public life is demonstrated by the edge condition and its ability to facilitate the flow of the automobile present in the area (giving little to no regard to the human dimension).

As shown below, it is clearly visible how strong the hard edge is, creating a hard border between the built environment and the urban void. Although the dimensions of the site are set, the hard edge of its boundaries can be translated into a more human dimension, by introducing the notion of horizontal relief (Gehl 2010).



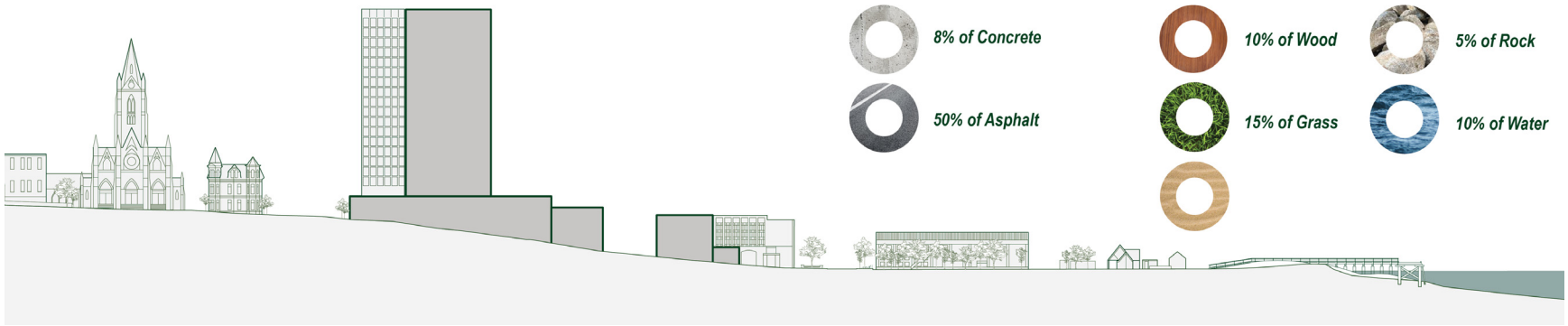
Edge condition of Salter Block

Landscape Analysis

As an extension of the waterfront during the industrial period, the site has come a long way since its installment and is made up of both vibrant and neutral materials like concrete, asphalt, grass, sand, wood, rock, and water (from street to water's edge). The materials combined create a magnificent image and a strong distinctive atmospheric presence.

Although the water's edge materials are vibrant, the concrete and asphalt of the surface parking lot are damaging to the landscape. After water, concrete is the most widely used substance on the planet, but its effect on the landscape speaks a large amount of danger to the planet.

Water flowing over flat pavement exposes the water to pollutants of surface debris and asphalt. This polluted water then flows into sewage networks, which then empties into lakes, rivers, streams, and larger bodies of water such as the Halifax Harbour. During the asphalts conversion process, a significant quantity of harmful gases are released into the atmosphere. This is a similar process for concrete or cement, which requires high levels of heat and substantial emissions.



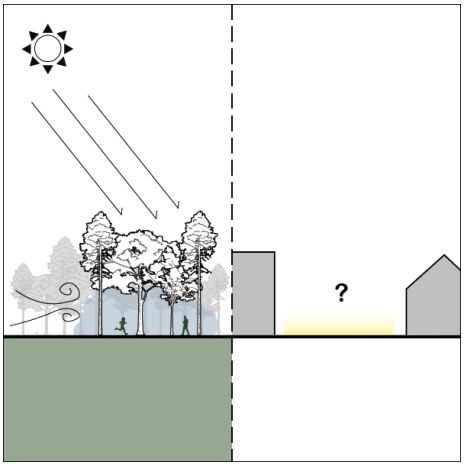
Landscape condition of Salter Block

Addressing Parameters

Scale, Edge, Landscape

The project responds to three conditions altered by the urban void: the scale, the edge, and the landscape. To address these concerned parameters, the stitch looks to biomimicry for solutions.

Scale enables movement across the city landscape. City users, like the tourist, primarily inhabit or use continuous areas of the streetscape. They are typically unwilling to cross large open spaces; urban voids. In a city landscape, fragmented by voids, movement is restricted to corridors that are appropriately scaled by buildings.

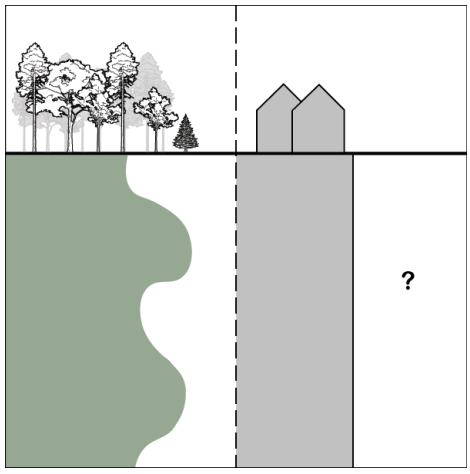


The scale condition in the urban landscape is disconnected by the urban void. How can we reconnect the fragmented space?

Similarly, in the forest, interior forest species such as the ground-dwelling beetle or understory bird inhabit continuous areas of landscape and are unlikely to cross large open clear-cuts due to heat sensitivity. The success of the damaged forest and its clear cuts rely heavily on the integrity and rigidity of a series of trees and their trunk; also known as a patch. These patches (groups of trees) are left behind as seed generators, intended to act as refuge and

support for forest fauna and enable its recolonization to regrow. This process, known as patch retention harvesting allows these large open clear-cuts to be properly scaled to promote the recovery of biodiversity corridors within clear-cuts during regeneration. How can we replicate this strategy in the urban landscape?

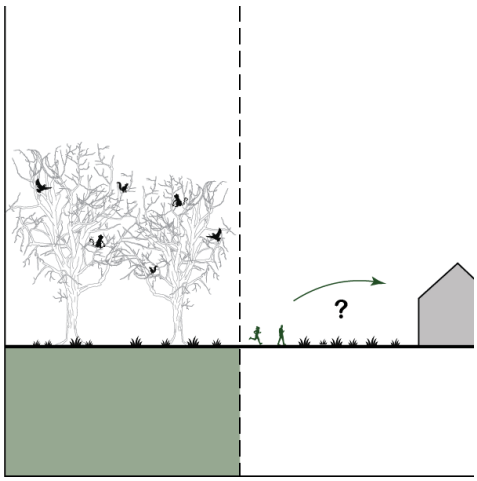
At the edge of an urban void, transition spaces represent the boundary and barrier conditions between the city landscape and urban void space. These hard-edge transition spaces play a large role in disrupting engagement and the human dimension within the space. In an urban void such as Salter Block, the edge is hard, abrupt, and disruptive. This is caused by the man-made barriers that surround the site but also the usage and functionality of the space for the automobile).



The edge condition of the urban void is hard and a barrier to the fabric of the city. How can we gradually extend the cities fabric into these urban voids?

In the forest, the edge of the canopy is gradual or soft, ideal for the species that require dense cover or protection from the sun. These natural transition zones are structurally diverse as conditions on each side overlap or blend together due to the tree's canopy. How can we replicate this strategy in the urban landscape?

In an urban void, the landscape is overexposed and unprotected from intense climates, reducing the resiliency of the void to produce quality public space and be at peaceful cohabitation with nature. Urban voids are replacing the natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. This exact issue is increasing pollution levels, heat-related illnesses, and the urban heat island effect.



The landscape condition in the urban void is unprotected and overexposed to intense climates. How can we protect the ground microclimate from increasing effects of the urban climate crisis?

In the forest, the landscape is protected from the tree and its branches. The branches, that grow from the trunk of the tree help transport nutrients to the leaves and help support the leaves that make up the canopy. This system of branches allows species like the squirrel to move above the landscape and appreciate the natural spaces below. How can we replicate this strategy in the urban landscape?

To support the users, spaces, and natural environments, of the fragmented fabric, the stitch interventions should preserve the critical void space over time until the void is fully restored as quality public space. This will be achieved by replicating the strategies analyzed and studied from nature.

A fragmented city landscape, lingering points of urban voids, several hundred yards of hard edges, and countless corridors disrupted (Base map from Esri Canada).

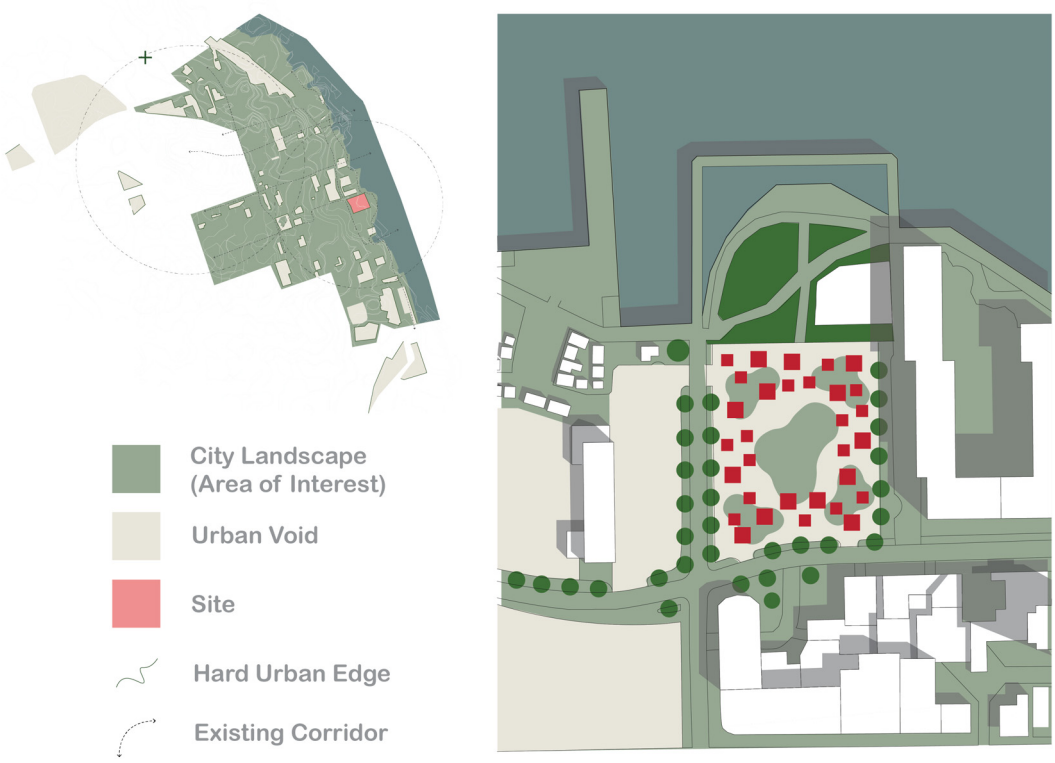
The long continuous chain of urban voids form impassable terrain for the user. The cut landscape produces countless linear areas of hard edges. These fragmented strips of public land must be given back to nature.

Punctuated Interventions

Canopy, Branch, Bark

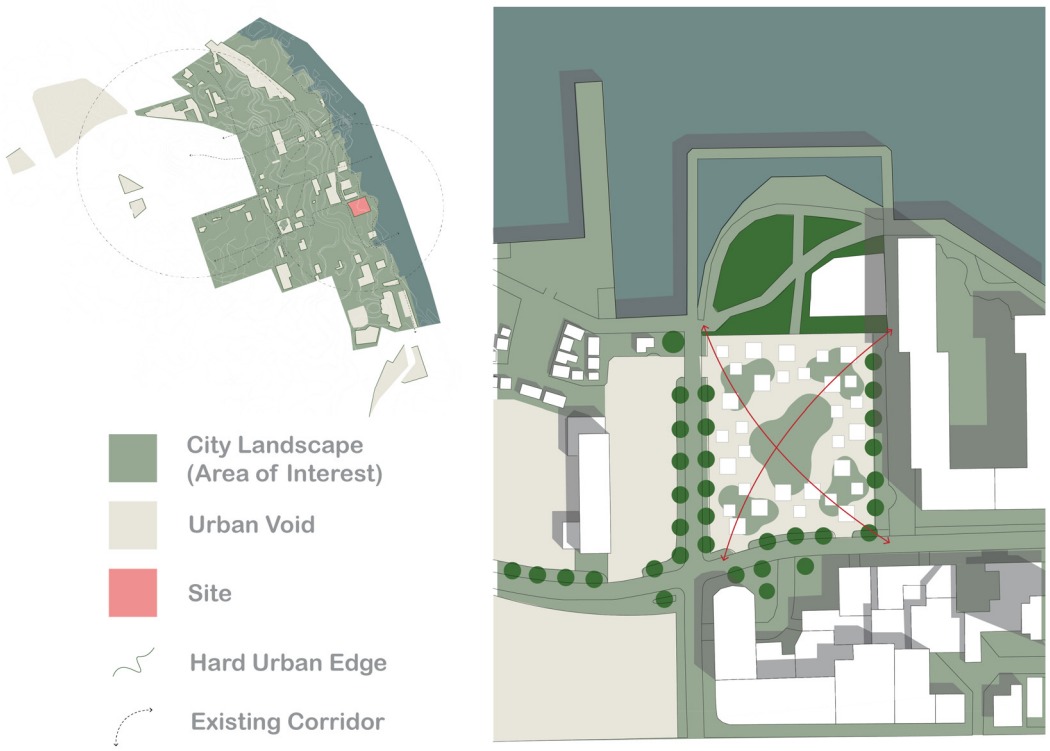
To replicate or mimic these strategies, the stitch interventions are added in sequence to the void, beginning with the most urgent and progressing as the missing effects of the first reinforce the next.

The first punctuation addresses the user and the edge condition. A series of ‘Canopy’ structures are built to soften the edge of the void by offering a simple and sculptural destination for temporary use that allows residents to relax, refresh, and relish in the outdoors. Protecting the ground levels from overexposure and offering respite from increasing temperatures. This creates the first incentive for human engagement and allows visitors to spend time within the void.



The Canopy addresses the user and the edge condition.

Next, the project addresses the natural environment and the landscape condition. The void introduces the ‘Branch’, an elevated space that connects all points of access within the void. With the intention of leaving minimal impact on the landscape and safeguarding nature, the walkway will seem to float above the void to encourage peaceful cohabitation with nature in the form of grass, local vegetation, and urban wetlands.

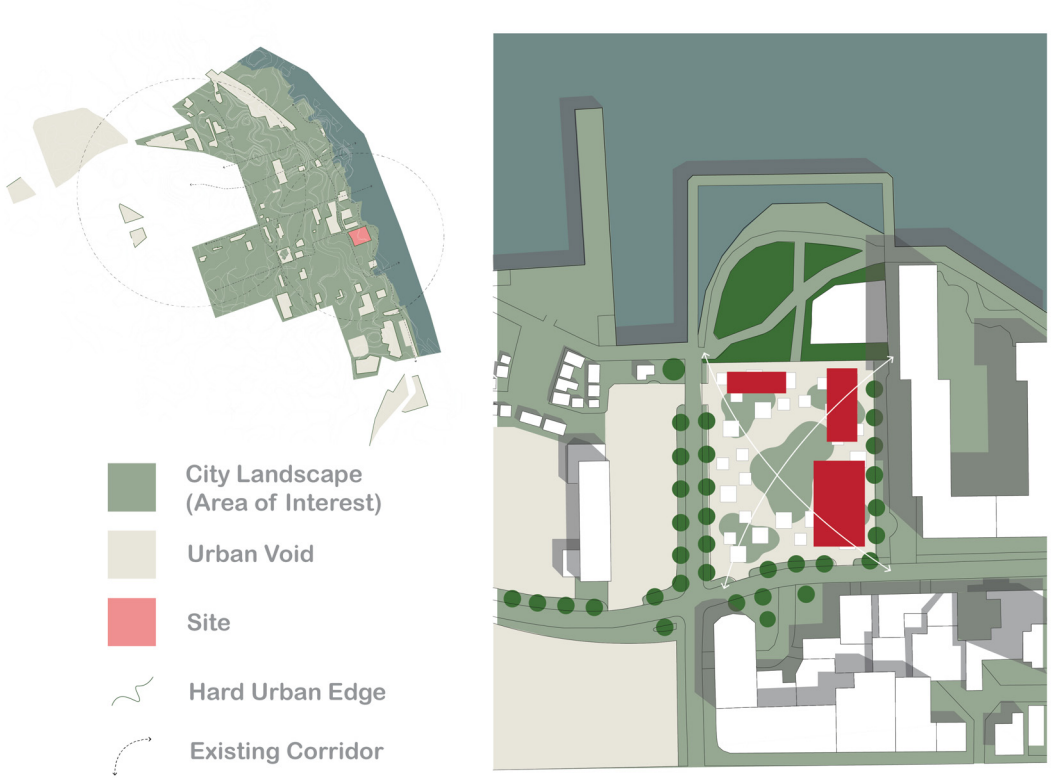


The Branch addresses the natural environment and the landscape condition.

As the stitch and the urban void gain traction, a permanent home for activity known as the ‘bark’ addresses the space and the scale condition. A series of buildings will weave together the openness and density of void space - an interim repair to diversify the structure of the void space and the physical condition. Properly scaled forms will be designed and sculpted to create a comfortable ‘human

scale' experience in the public realm that allows for physical and visual permeability and proper invitation; protection, security, and reasonable space

These interior spaces will not only attract considerable foot traffic but also promote long-term usage in the void to address the fabric's continuous need for social engagement and human participation.



The Bark addresses the space and the scale condition.

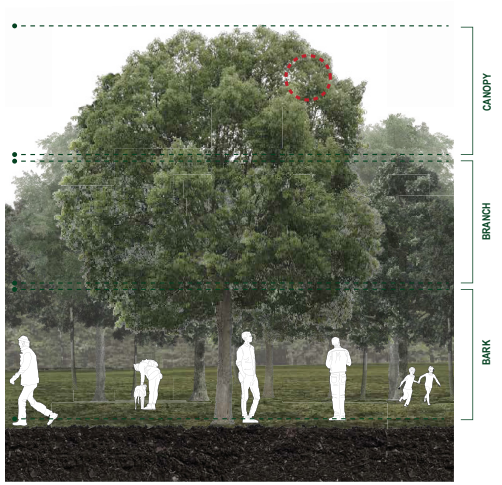
Chapter 6: Crafting the Stitch

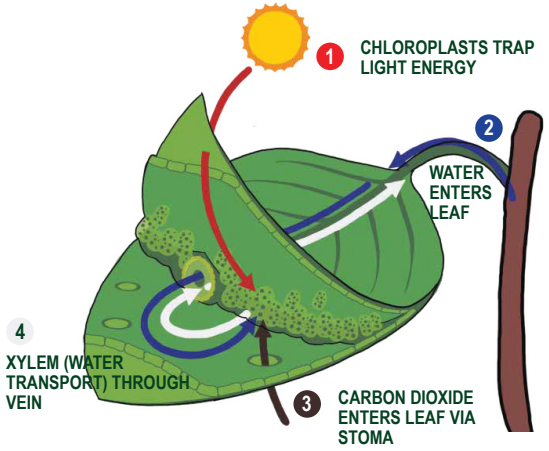
Reclaiming Lost Space Through Mimicry

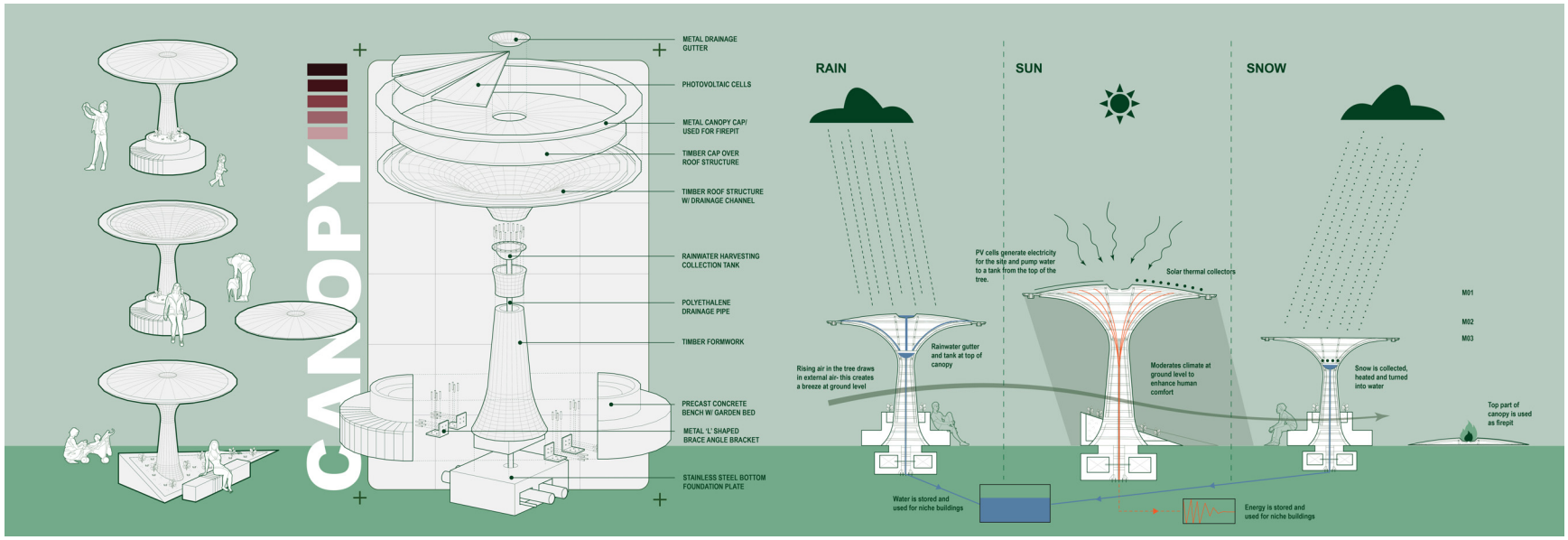
The Canopy

These artificial canopies will embrace and promote user involvement and protect the visitor from intense climates. Taking direct influence from the crown of the tree, the Canopy will bend, bevel, and bow in stark beauty. From a birds-eye view, the circular form will match the circular stature of natural trees from above. On the ground level, the modular design of 8, 10, 12, 14, and 16 feet high canopies will enable each Canopy to be appropriately scaled to the function and size of the void while allowing for easy replication and systems integration. In nature, the canopy layer refers to the dense ceiling of leaves formed by closely spaced forest trees. It is described as providing protection from strong winds and storms while more importantly absorbing sunlight and precipitation, leading to a sparsely vegetated understory layer. Similar to how trees behave, the canopies will showcase innovative environmental technologies and

The Canopy and human dimension





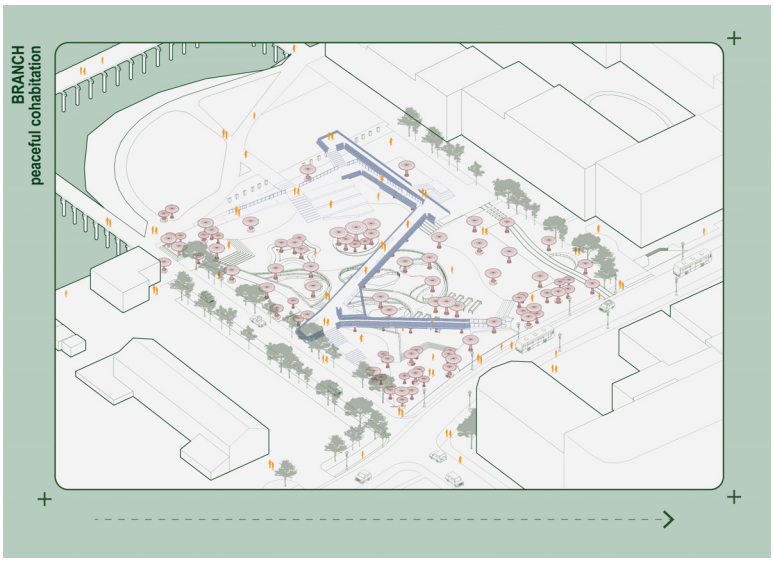


The Canopy form and behaviour

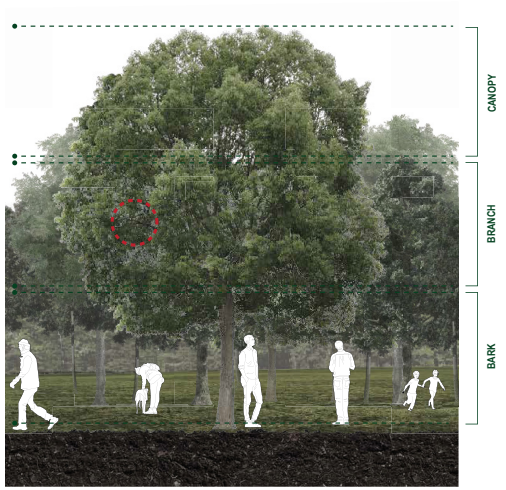
become an integral part of the overall site environmental systems. In addition to the creation of habitat and shaded spaces, the roof structure of each Canopy collects solar energy through inbuilt solar panels and harvests rainwater through a rainwater collection device.

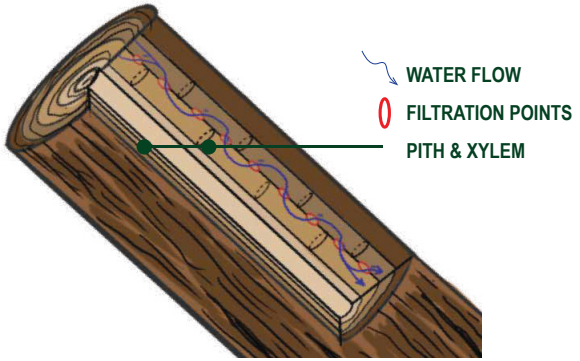
The Branch

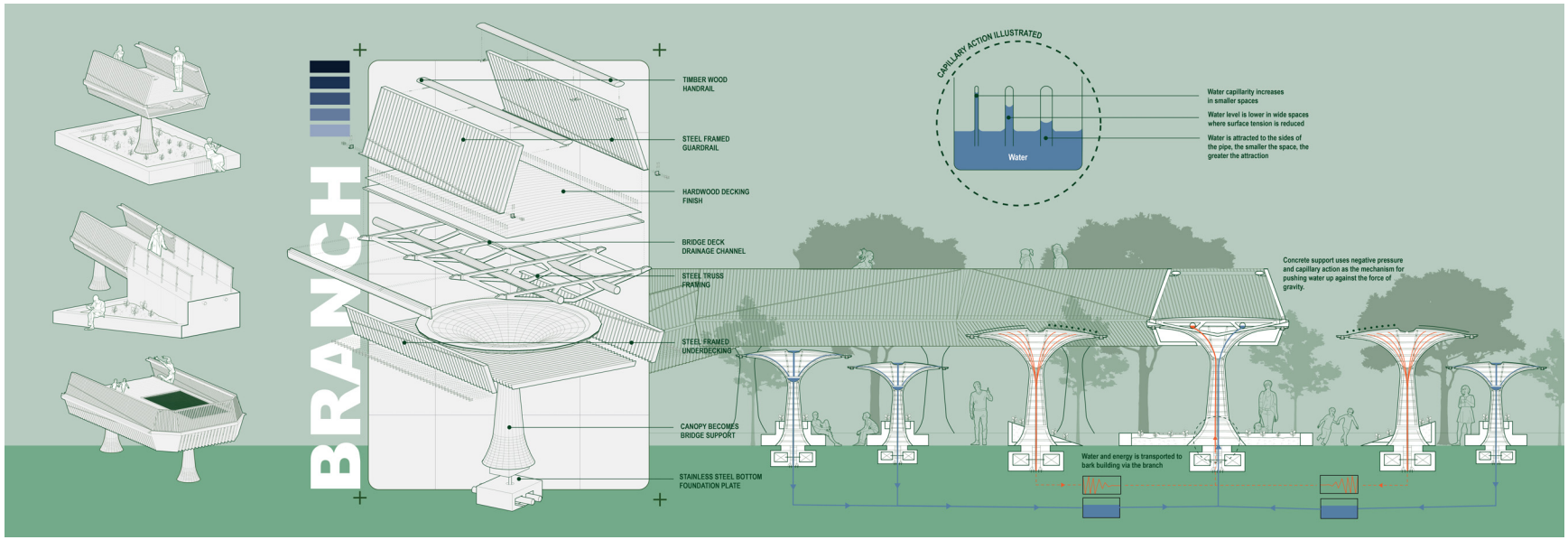
Accompanying the canopies, the Branch will join the voids entry points together and integrate neatly into the city's existing flows. Taking inspiration from nature's tree branch, the overall form of the bridge is based on the unsymmetrical and organic shape a branch has while seeking to complement its natural setting. In nature, the tree branches are referred to as thick arms that grow directly from the trunk and help transport water, sugar, and nutrients to the leaves and canopy of the tree. They are described as important vessels that carry water from the soil to the leaves and the rest of the tree. Similar to how the tree branch behaves, the 'Branch' will contain a network of tubes that take rainwater harvested from the canopies and transport it to the surrounding building, thus acting as a nutrient-transporting system.



The Branch and peaceful cohabitation







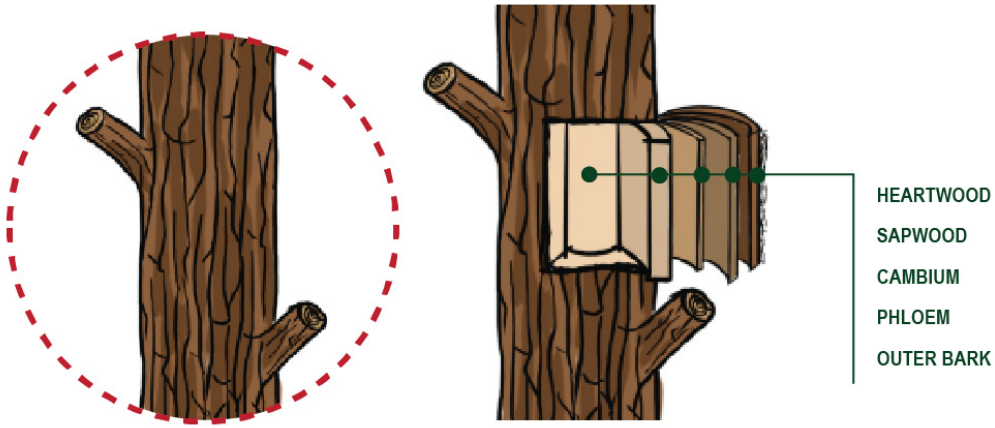
The Branch form and behaviour

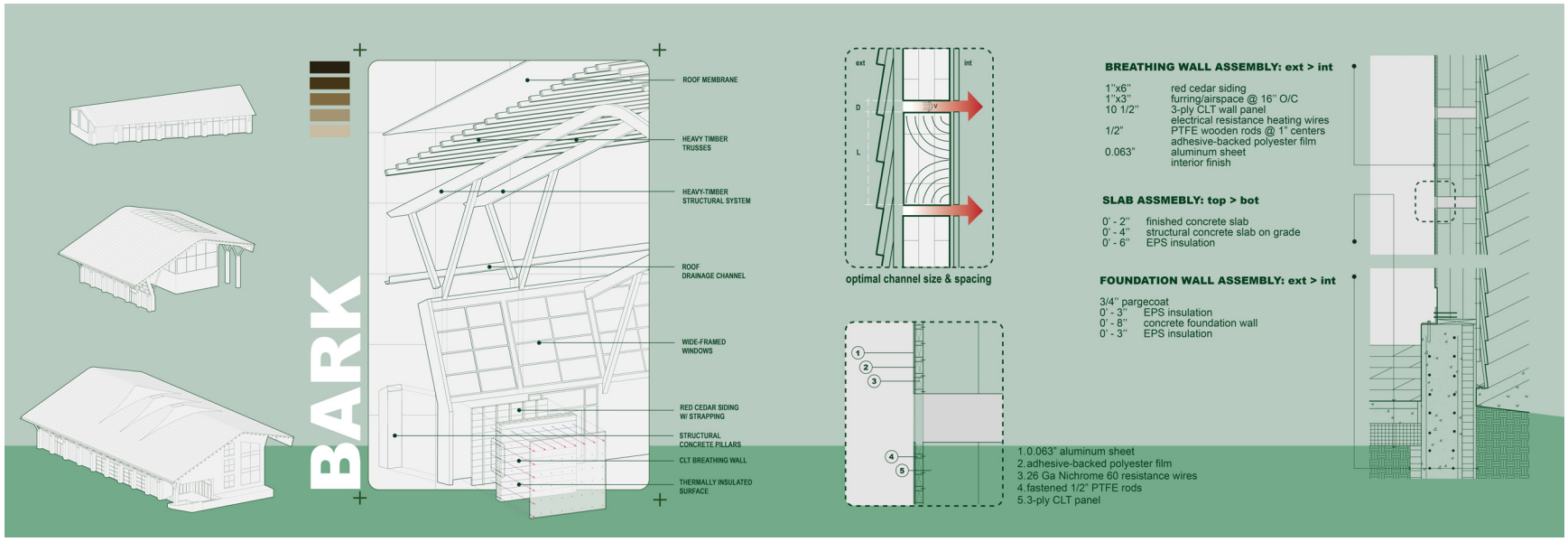
The Bark

Situated along the edge of the void is the Bark; the heart of the project and the completion of the stitch. The public building will attract considerable foot traffic providing a home to a cafe, community kitchen, urban garden, and public market. Mimicking the outer bark of the tree, the building's wall system will not only act as protection from the outside world but will help keep moisture out with a form of respiration or breathing wall. Inspired by the concept of creating an adaptive wall system that can breathe similar to biological skins, the breathing wall consists of three layers that aim to minimize direct sunlight, allowing air to flow through it, and an internal layer that controls ventilation. The principle of this wall introduces air channels into a solid so that the outgoing conduction heats the incoming air. This technique makes insulation and cladding materials redundant and helps to simplify the HVAC systems.

Marrying the form and function of mature trees into void space will weave the void's spatial conditions into perfect symbiosis.

The Bark and physical condition



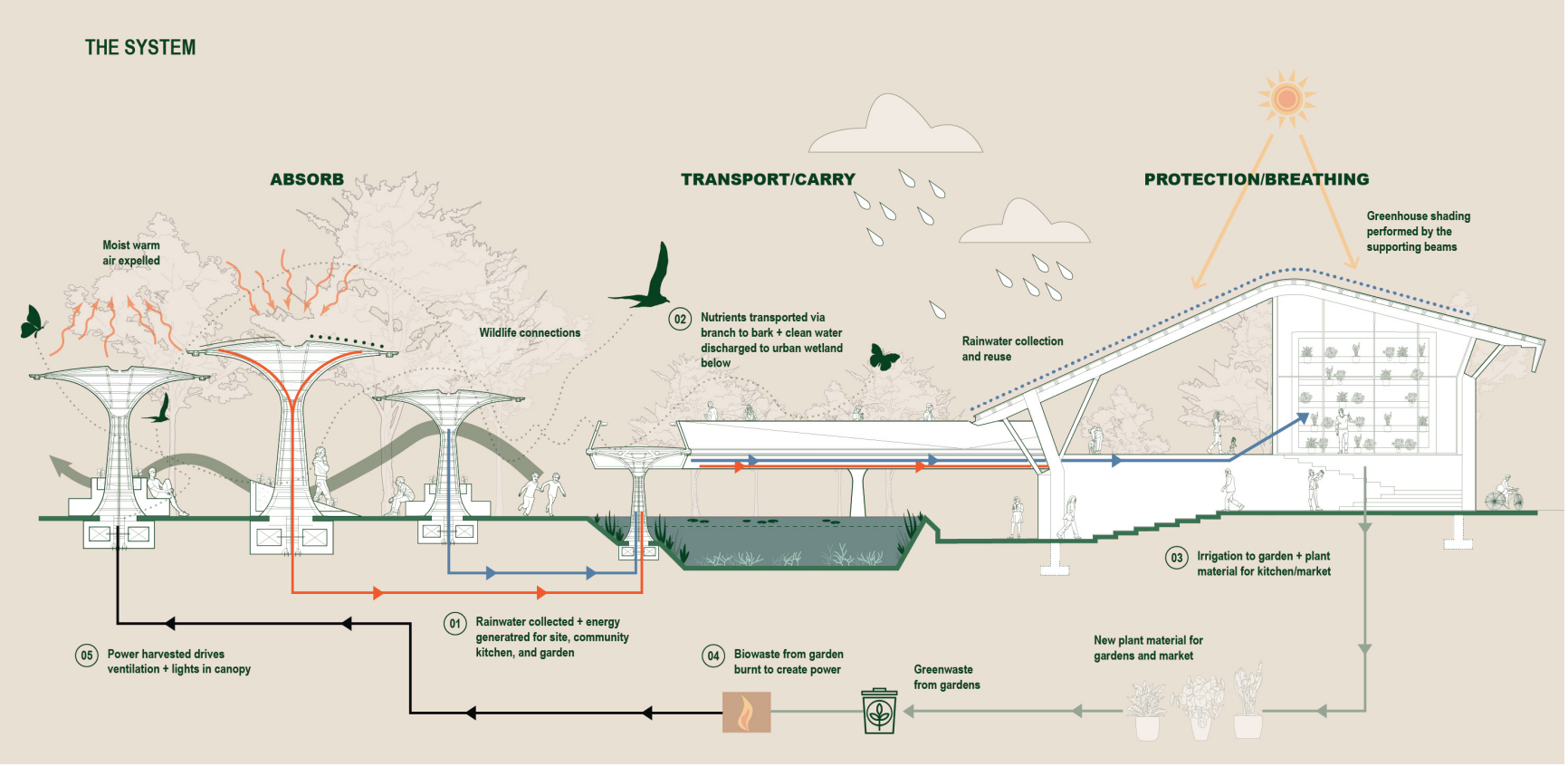


The Bark form and behaviour

The System

To successfully operate the site building in an energy-efficient way, the Canopy, the Branch, and the Bark all play a key role in creating a sustainable cycle similar to the way a tree works.

First, the Canopies harvest and absorb rainwater and solar energy. The water and energy harvested will be transported via the Branch and used for the site's community kitchen, garden, and market. Biowaste is then collected and burnt to produce power for ventilation and systems within the Canopy, thus completing the cycle. This innovative technological circulation system keeps the Stitch green and effective in producing quality public space.

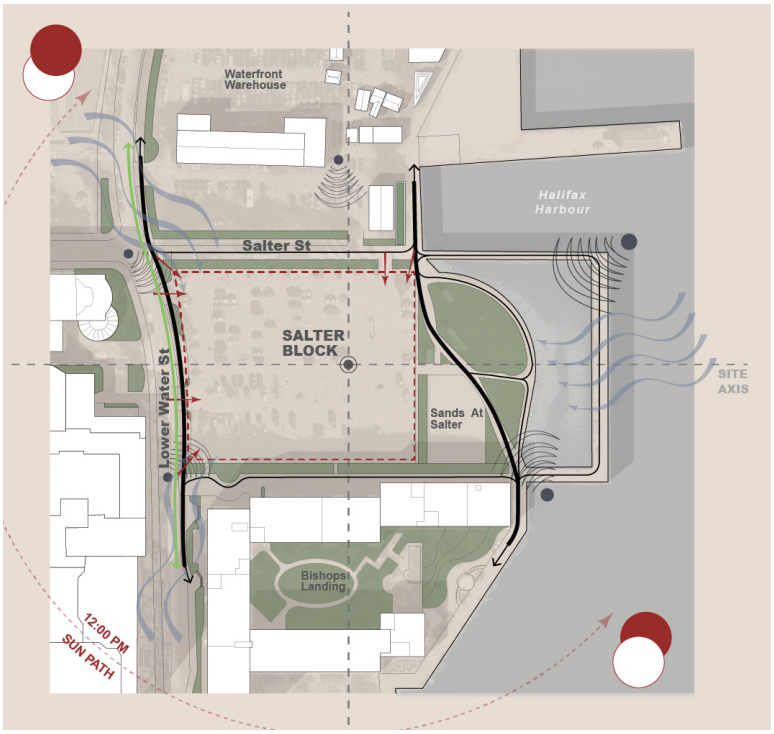


The stitch system

The Stitch on Salter

Site Scale: Salter Park

Located on the corner of Lower Water and Salter Street is Salter Park; a brand new “urban living room” in Halifax’s downtown urban core. The new park will cover what was formerly an urban void and parking lot, and connect to the existing Sands at Salter, turning the area into one of the city’s most important and resilient civic spaces. The end product at a site scale will be a dynamic, behavioural, and systematic concept that will serve both downtown residents and visitors alike, the natural environment, and the urban void it once was.



Salter Park site analysis

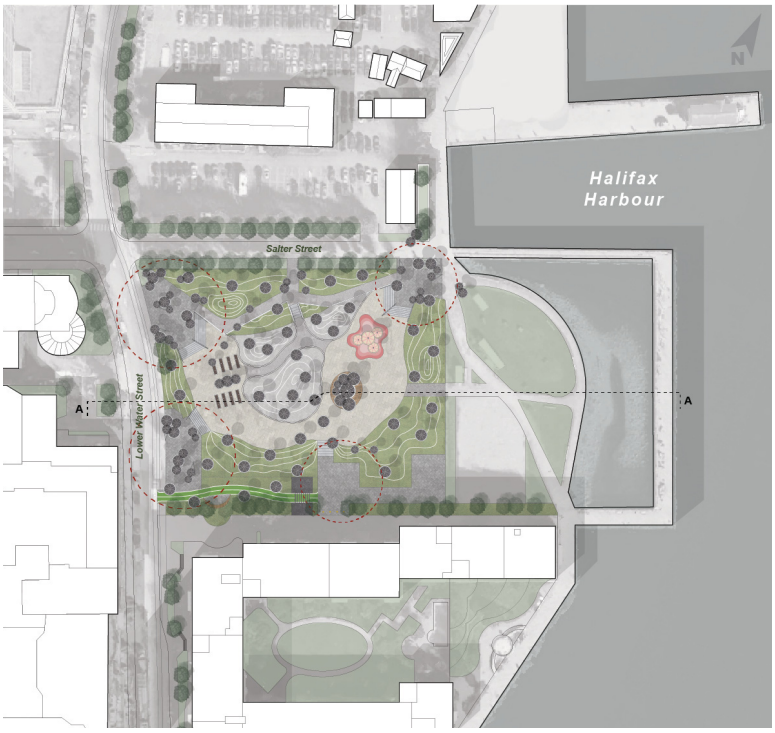
The park, in line with the strategies laid out above, will use the Canopy, the Branch, and the Bark to enhance nature's functions within public spaces. The design will create an attractive and comfortable natural environment, as well as incorporate technology that enables a new atmosphere of interaction between the natural and the artificial.

This new park will not only bring green space to the city center, provide a place to gather and engage in social activities, and take on beautiful surroundings, but also aims to reduce the city's overall footprint. It will prove that ecological urbanism and biomimicry is the method to achieve urban resilience, adapt Halifax and cities alike to the urban climate crisis, and create a harmonious relationship between, the users, the space, and the natural environment.

Salter Park site analysis

The Canopy

Among the Canopy, the void becomes a place of rest, refuge, and community. The structures embrace the void with their scaled stature and outward focus.



Site plan with Canopy

First, a series of ‘Canopy’ structures are built to soften the edge of the void by offering a simple and sculptural destination for temporary use or tactical urbanism. This creates the first incentive for human engagement and allows visitors to spend time within the void.

These installations explore the potential as climatic moderators and highlight these areas as points of activity and interest. The Canopy will explore how humans can live alongside one another in a natural context, where collisions between human activity and natural landscape meet; an alliance between the natural and the artificial.

Beneath the Canopy, shaded outdoor rooms will give park-goers a space for small group gatherings, food fairs, art installations, and other community-oriented events such as a splash pad, theatre stage, and outdoor garden beds. At the park's entrance points, a cluster of canopies will be a place of rest and refuge; a microclimate for the human to relax and break away from the city's concrete jungle.

Over time, what functions can these canopies adapt to?

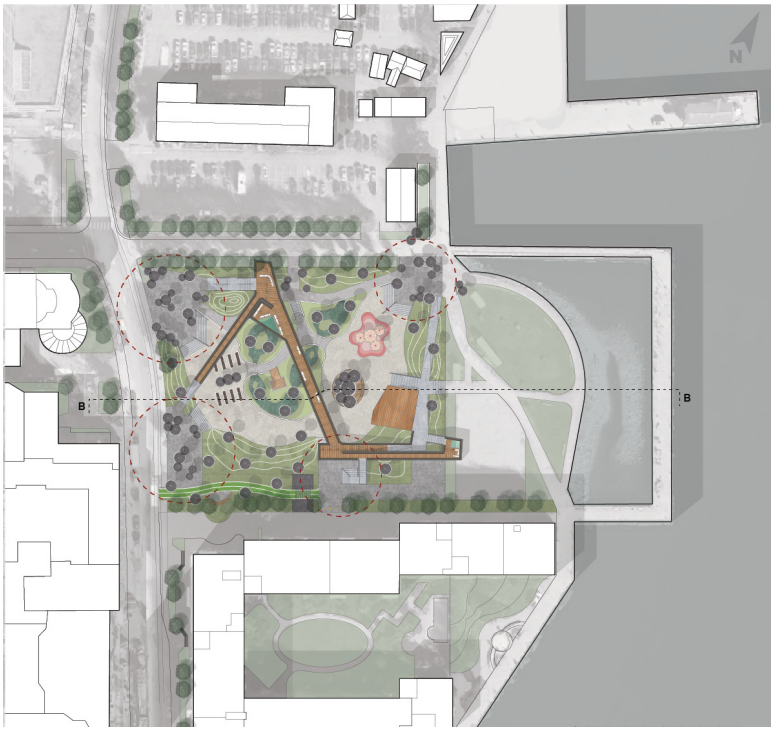
Site section with Canopy

A crossroad between city and void space and a place of rest and refuge.

A space for human engagement and social events such as community garden beds.

The Branch

Peeking over the streetscape of the void, a wooden and metal bridge appears, scaling atop the canopies. The tourist has wandered here and as she walks and gains height, she peers in the spaces below.



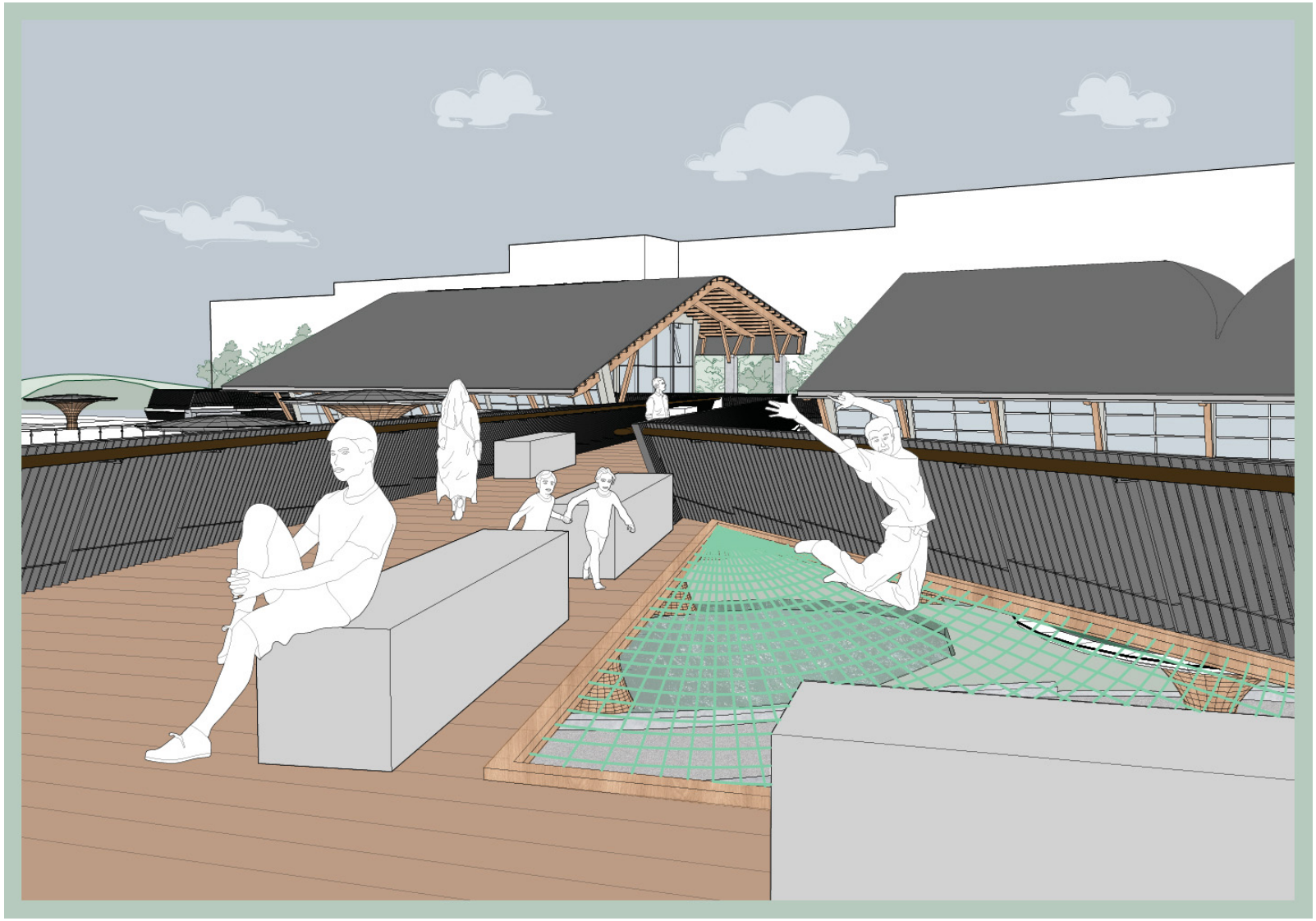
Site plan with Canopy and Branch

Next, the void introduces the Branch, an elevated walkway that provides unique perspectives on the spaces below and beyond. The bridge is intended to leave minimal impact on the environment while still safeguarding nature as the walkway flats above an urban wetland to encourage peaceful cohabitation. The bridge will join two areas of the intact landscape. At grade to the west, the bridge joins a city sidewalk on Lower Water Street. At grade to the east, the bridge joins a walking path on Halifax's busy waterfront.

Raised atop and supported by the canopies, the Branch will host gentle ramp access, observation decks, and a series of green spider web netting built into the deck to encourage climbing, socializing, and lounging above the landscape. The steel walkway is supported by the wooden Canopies and climbs to a height of 12 feet at its highest point, where it opens to two expansive decks looking over the Halifax Harbour and Salter Street.

Site section with Canopy and Branch

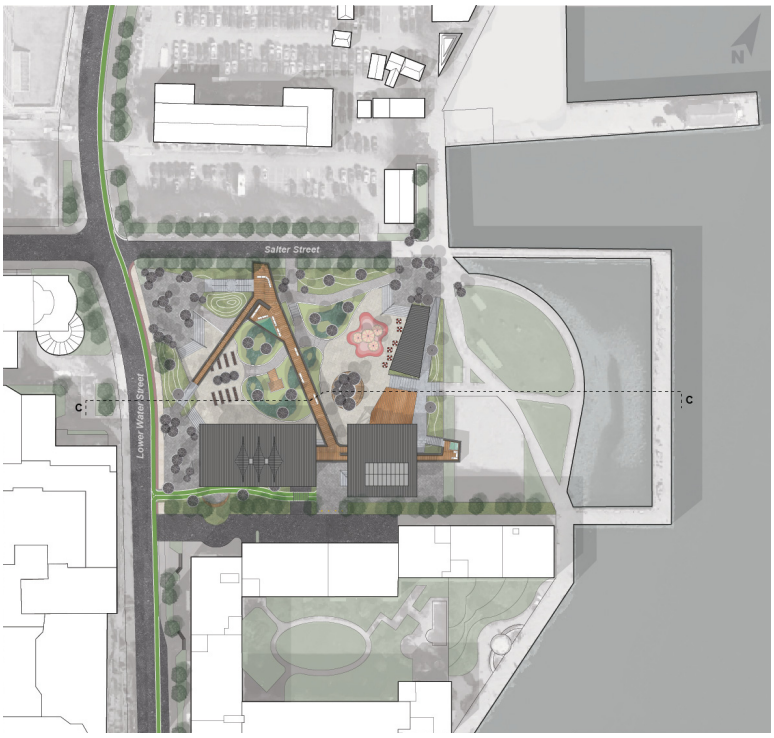
Branch hosts gentle ramp access.



Branch hosts spiderweb netting to lounge above the natural landscape below.

The Bark

At the edge of the void is the Bark, a series of public buildings that will greet curious visitors, tourists, and locals. Weaving the abrupt edge of the void space, three Bark buildings will mediate the sun, wind, and rain of the void space for nature to establish itself within the site.

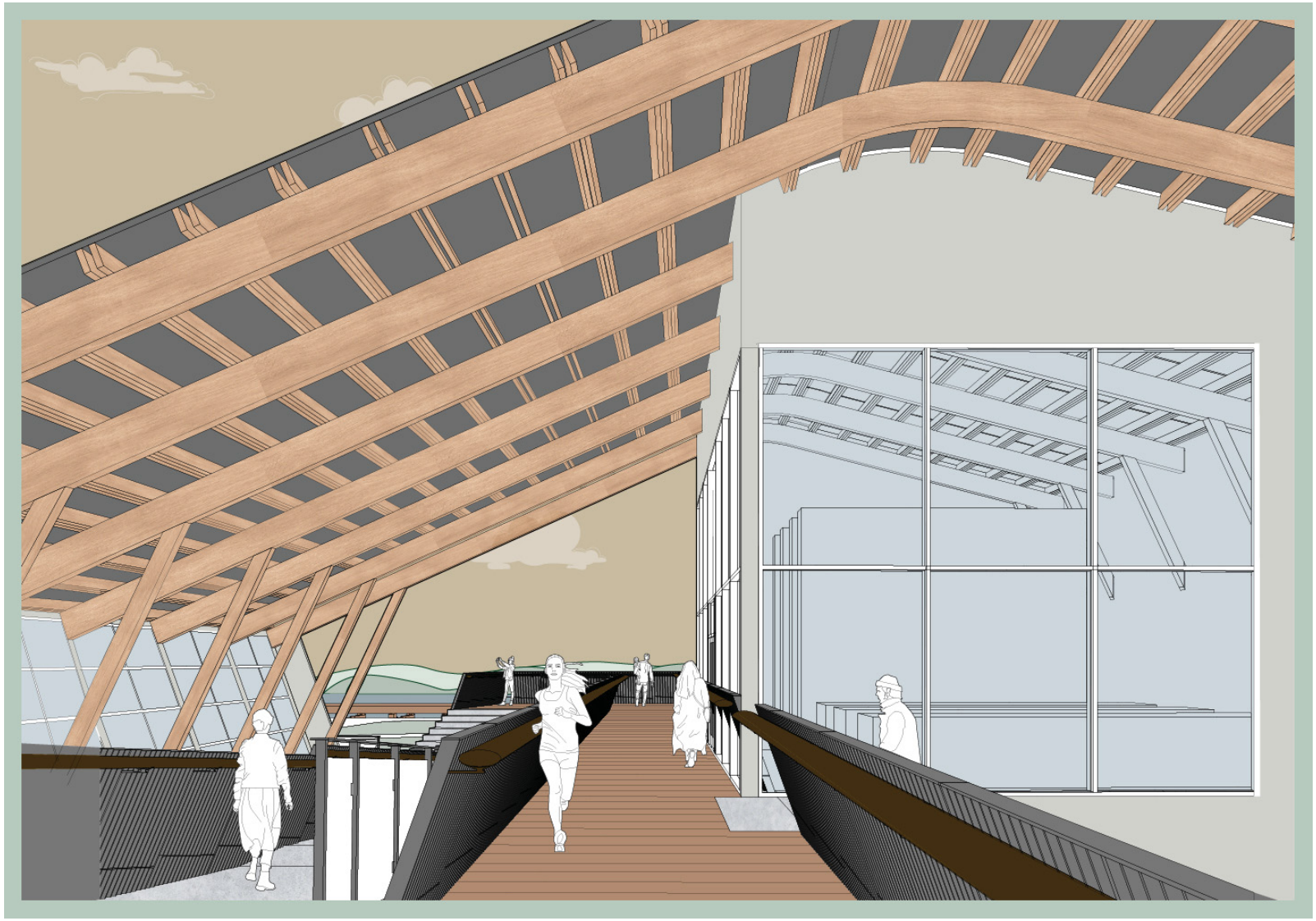


Site plan with Canopy, Branch, and Bark

As the stitch and the urban void gain traction, a permanent home for Halifax's Community Kitchen and Garden known as the 'Bark' addresses the scale condition. These series of buildings will weave together the openness and density of Salter Park - an interim repair to diversify the structure of the void space and the physical condition. Properly scaled forms will be designed and sculpted to create a comfortable 'human scale' experience in the public realm that allows for physical and visual permeability, proper invitation, and reasonable

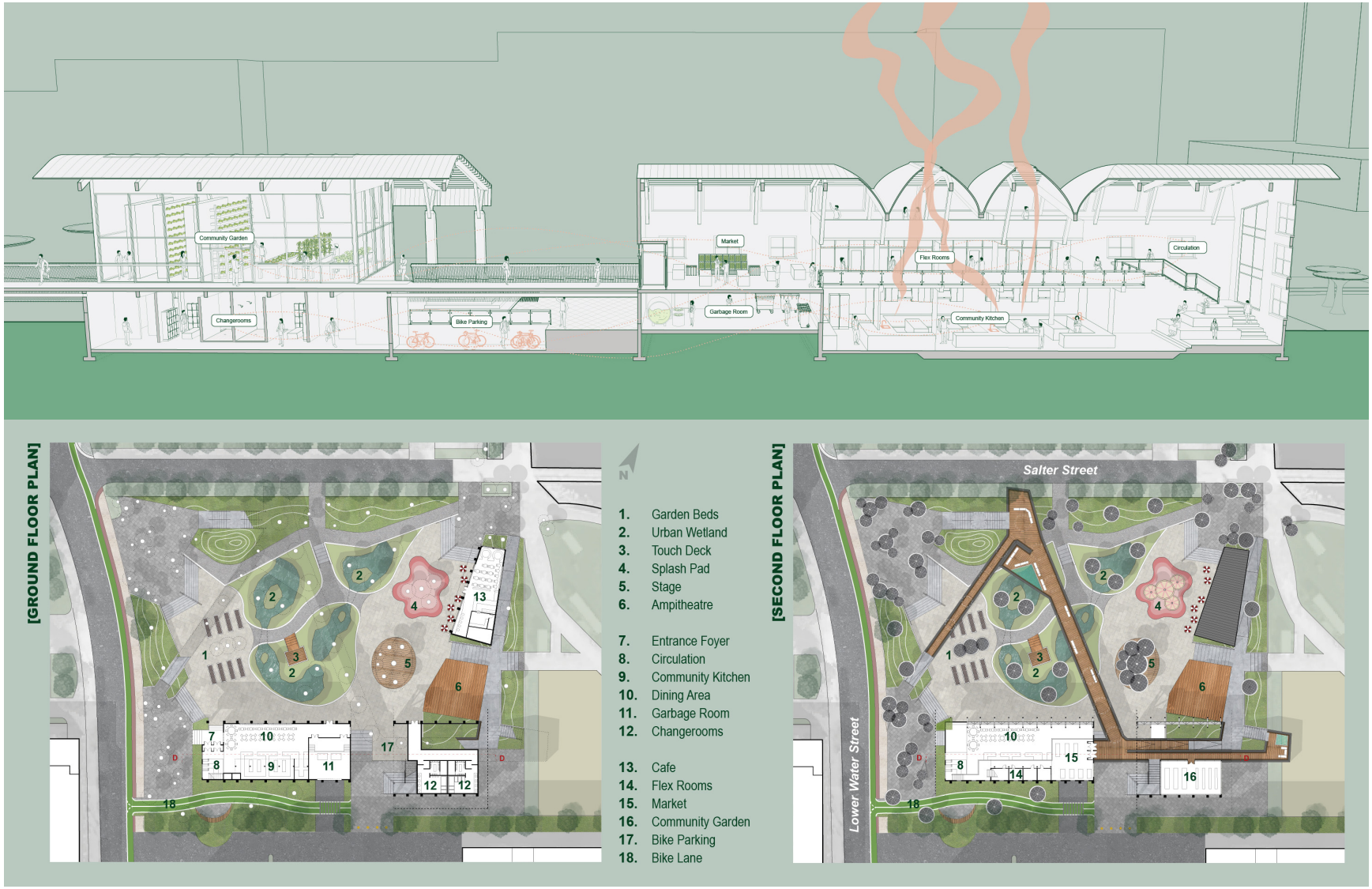
space. These interior spaces will attract considerable foot traffic and promote long-term usage in the void to address the fabric's continuous need for social engagement and human participation. These programs provide the city with a new set of skills, promote a healthy lifestyle and produce productive members within the community. Each building is directed and opened inwards, allowing for activity to take place throughout the void space.

Site section with Canopy, Branch, and Bark



Intersection between the Branch and Bark next to the community garden.

Interior space of the Bark and the community kitchen.



Bark in section and plan

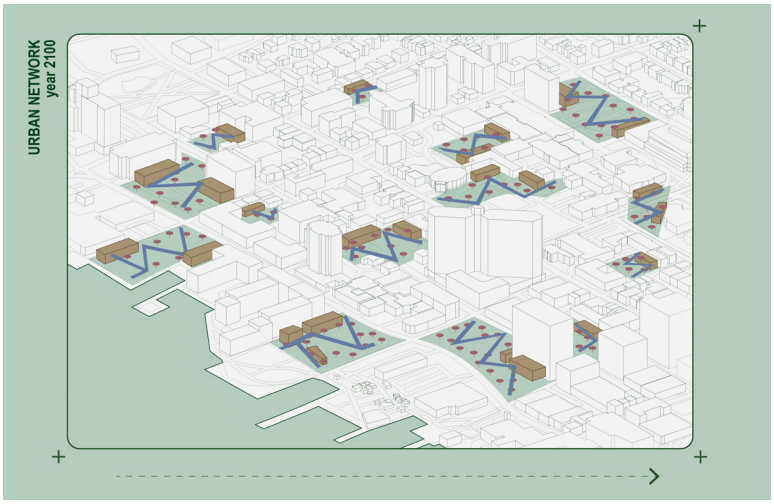
City Scale: Downtown Halifax

Recovery Year 2100

Soon, the ingredients that make Salter Park so successful (the Canopy, Branch, and Bark) will be replicated across the city landscape over time as part of the recovery effort of producing regenerative built environments in urban voids. In the year 2100, the city landscape will change into a network of stitched voids permitting a harmonious relationship between the users, the spaces they inhabit, and the natural environment in which they live, therefore reaching ‘responsible architecture’.

The User, the Environment, and the Space

By creating new landscapes that bring character to the emptiness of the suburban environment, achieving bioclimatic conditioning and quality public space is realized. The Stitch will facilitate the debate around the interdependence between the city and the environment we inhabit. The role of the Canopy, the Branch, and the Bark may change with the city, but this urban void can now be considered a regenerative built environment that stewards quality public space.



Urban void network: Year 2100

Urban fabric is stitched over time with the power of nature

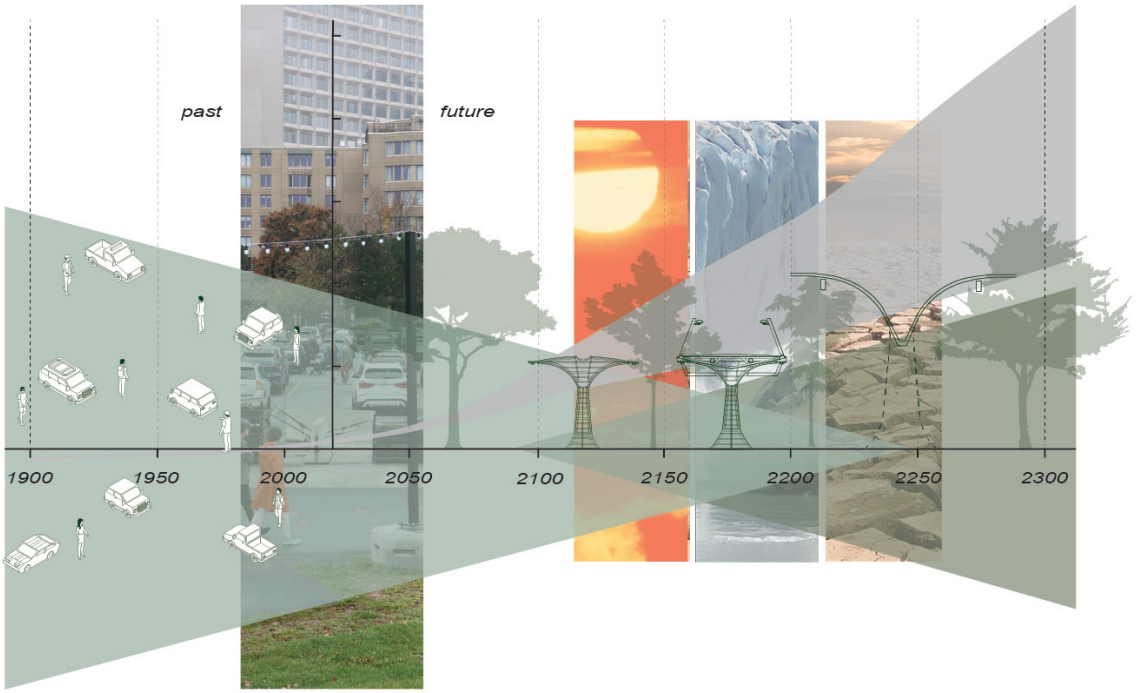
Chapter 7: Conclusion

Beyond the Stitch

Embracing Nature's Imperfections

In nature, nothing is perfect. In this project, the architecture attempts to confront this condition by projecting the ever-changing process of nature, framing a relationship between inhabitants and the slow process of natural conditions. Humans are conservative in the sense that we are most comfortable when our environment is stable. However, nature is not static. It is dynamic, changing over time due to geophysical forces and evolutionary change.

In this sense, the stitch and its architectural elements will change over time testing the capacity of the Canopy, the Branch, and the Bark to produce quality public space.

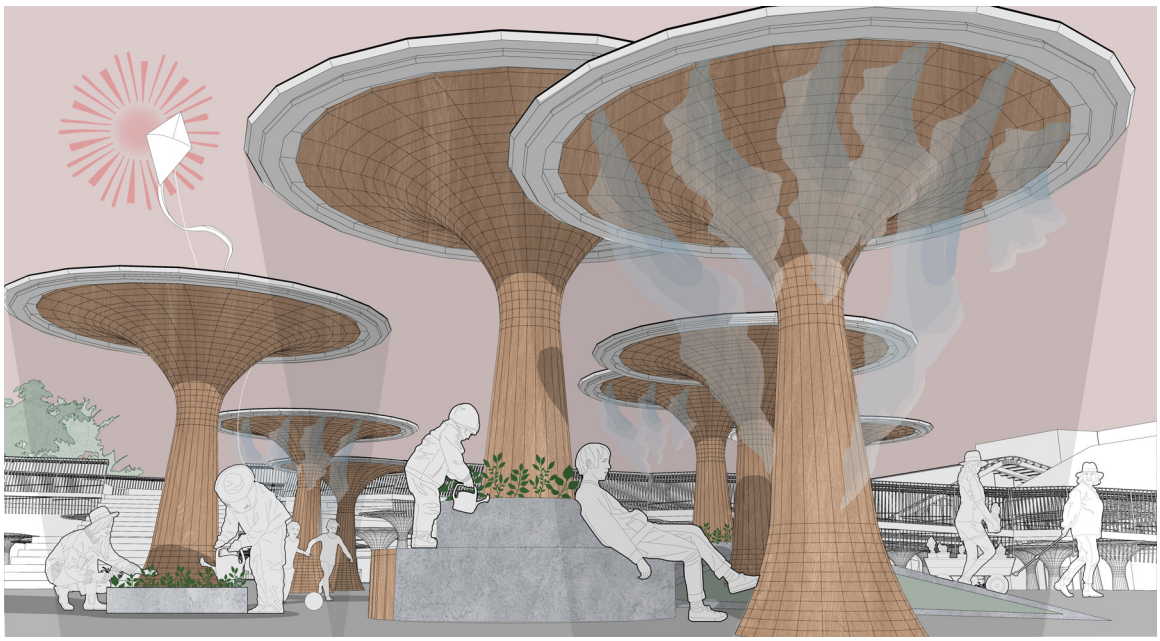


Hybrid drawing portraying the exponential changes of the landscapes: from empty parking lot to the stitch. Our landscapes will never be static, therefore how will the stitch respond to rising temperatures, sea levels, and drought?

The Canopy is designed not only for today but with the future in mind too. Halifax and cities alike will continue to see more hot days and heat waves. As a place of rest, refuge, and recreation, the Canopy has become ideal for the user or passerby who seeks to enjoy outdoor spaces while being protected from the increasing temperatures.

The need for such spaces in Halifax's developing city will protect outdoor lifestyle during the months of the year when heats becomes unbearable. These outdoor microclimate installments will be important to both public and privates spaces that seek to ease the threat and danger of climate change on urban development and residents of Halifax. There can be temporary pop-up stands, cafes, sitting areas, misting stations, nature retreats, and more.

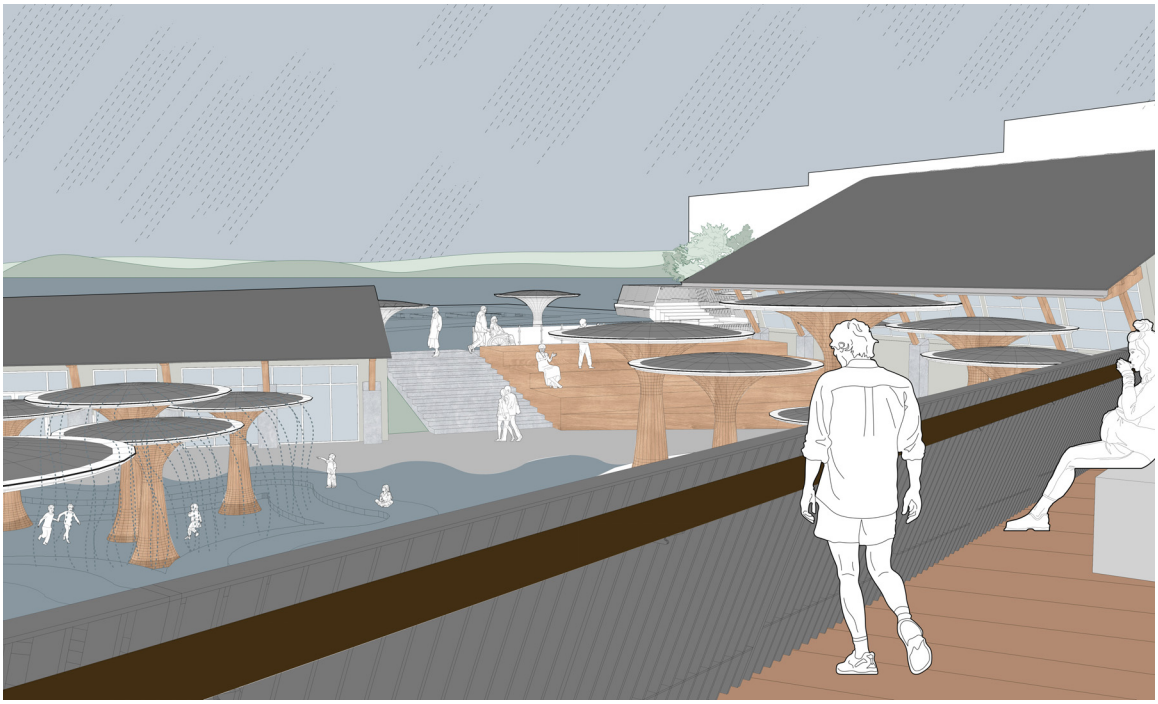
As Halifax seeks to grow and develop its vibrant and diverse city, it is important that these systems exist for the growing industries of tourism, education, and culture.



Perspective under Canopy during rising temperatures as residents come to sit, relax, and enjoy the misting stations.

The threats from the ocean will raise concerns for coastal cities. As a place of peaceful cohabitation with nature, the Branch has been ideal for rising sea levels and the season of coastal flooding. The branch will act as an extension of the sidewalk that takes visitors across the floodplain. During dry times, a ground level plaza provides access to functions below. As water levels begin to rise, the plaza invites water in and the branch becomes the new ‘stepping stone’ that allows visitors to not only cross the stitch but also engage in functions available above the landscape.

By limiting access to certain functions below, the presence of the water is celebrated in a poetic way and educates residents on the true effects of rising sea levels. Although this may seem problematic to the stitch, the urban wetland located in the middle of the plaza will act as a natural sponge that will trap and slowly release surface rainwater, rain, snowmelt, and flood waters, back into the ocean.



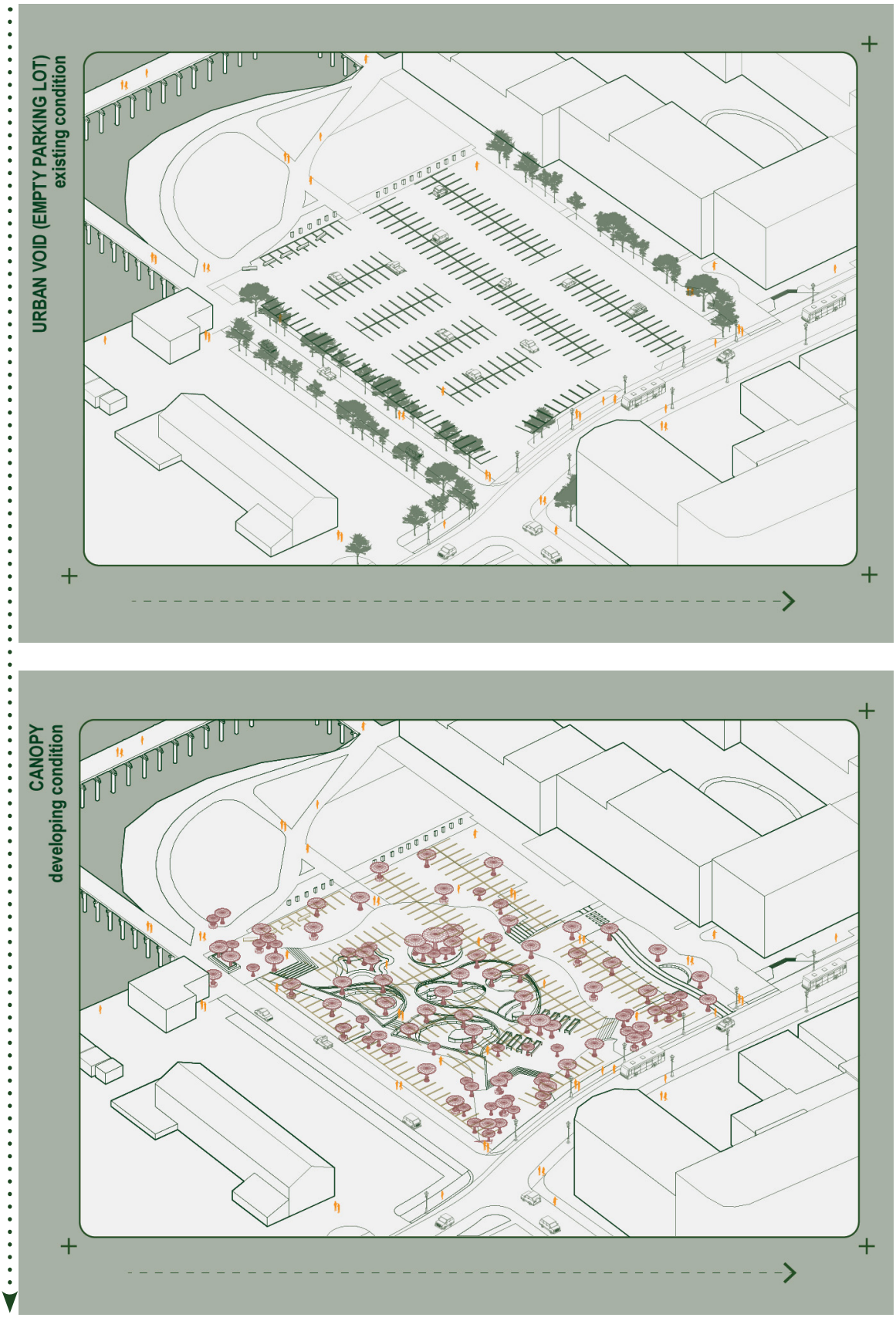
Perspective on Branch during sea level rise as residents continuously inhabit the spaces above the landscape.

Water surge during high tide fosters new engaging space at the edge condition.

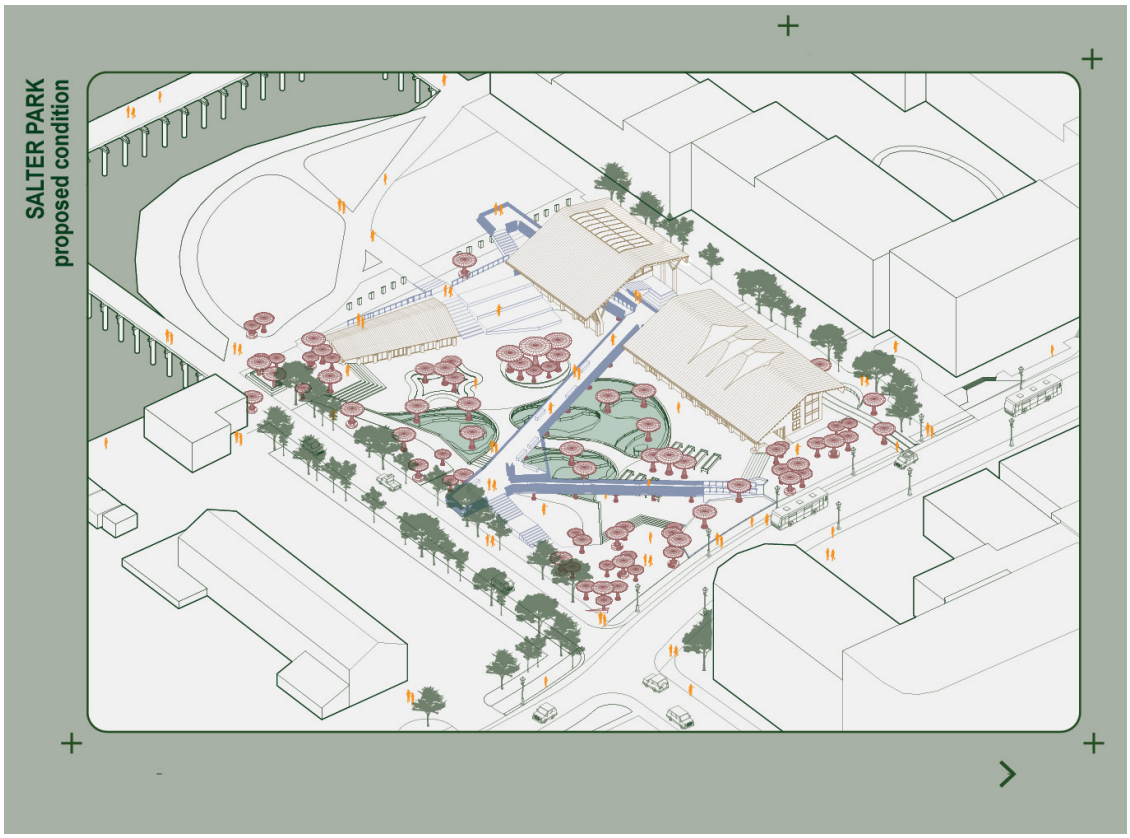
In its first years, many locals and tourists have come to Salter Park to socialize and step away from the busy city. As a retreat and community builder, the Bark has been profitable and has introduced a new landscape on the waterfront of Halifax, Nova Scotia.

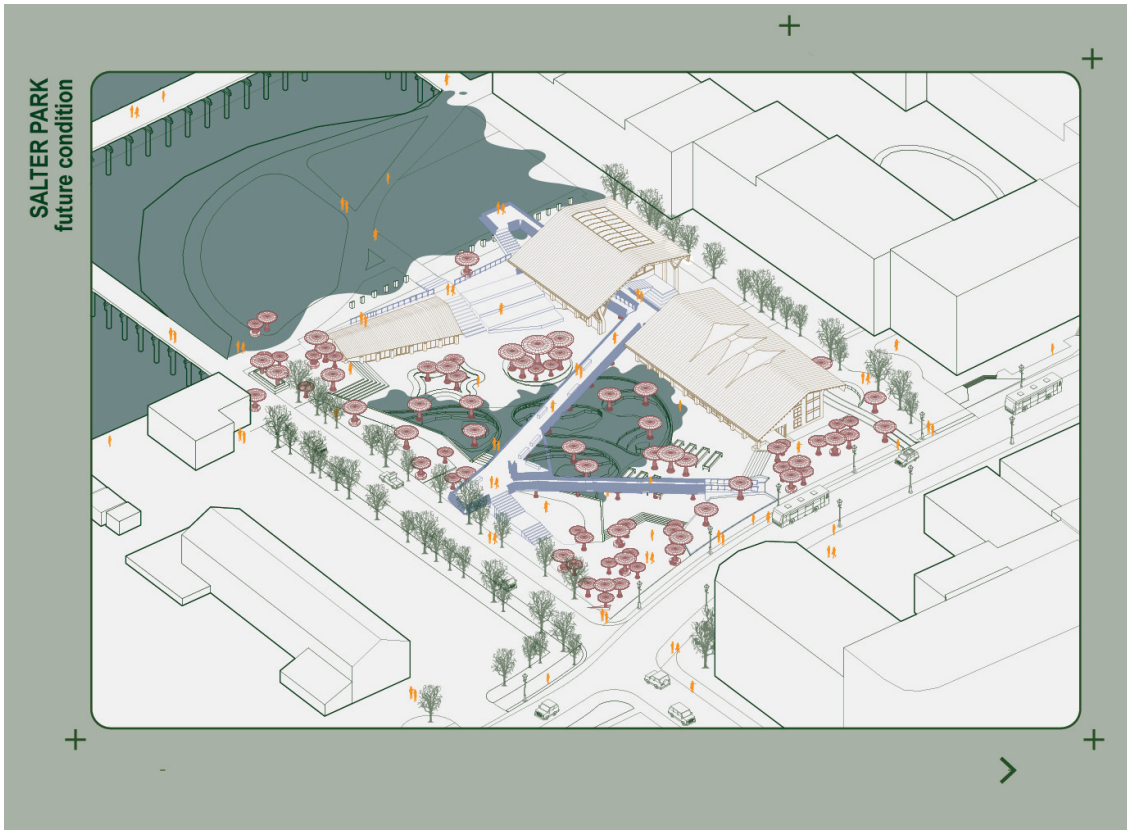
As park use increases and extreme weather becomes more common, how will the stitch flourish despite increased drought? Similar to how a tree responds, the stitch will continue to function while aiming to prevent minimal water loss. The Canopies will continue to harvest rainwater and solar energy as temperatures continue to rise and the Branch will continue to transport what's collected in order to keep the Bark functional through periods of water scarcity.

Therefore, knowing that nature is uncontrollable and produces undesired environmental conditions, the stitch and its architectural interventions are still capable of producing quality space despite nature's imperfections.



Axo-nometric evolution of parking lot over time (from top to bottom)



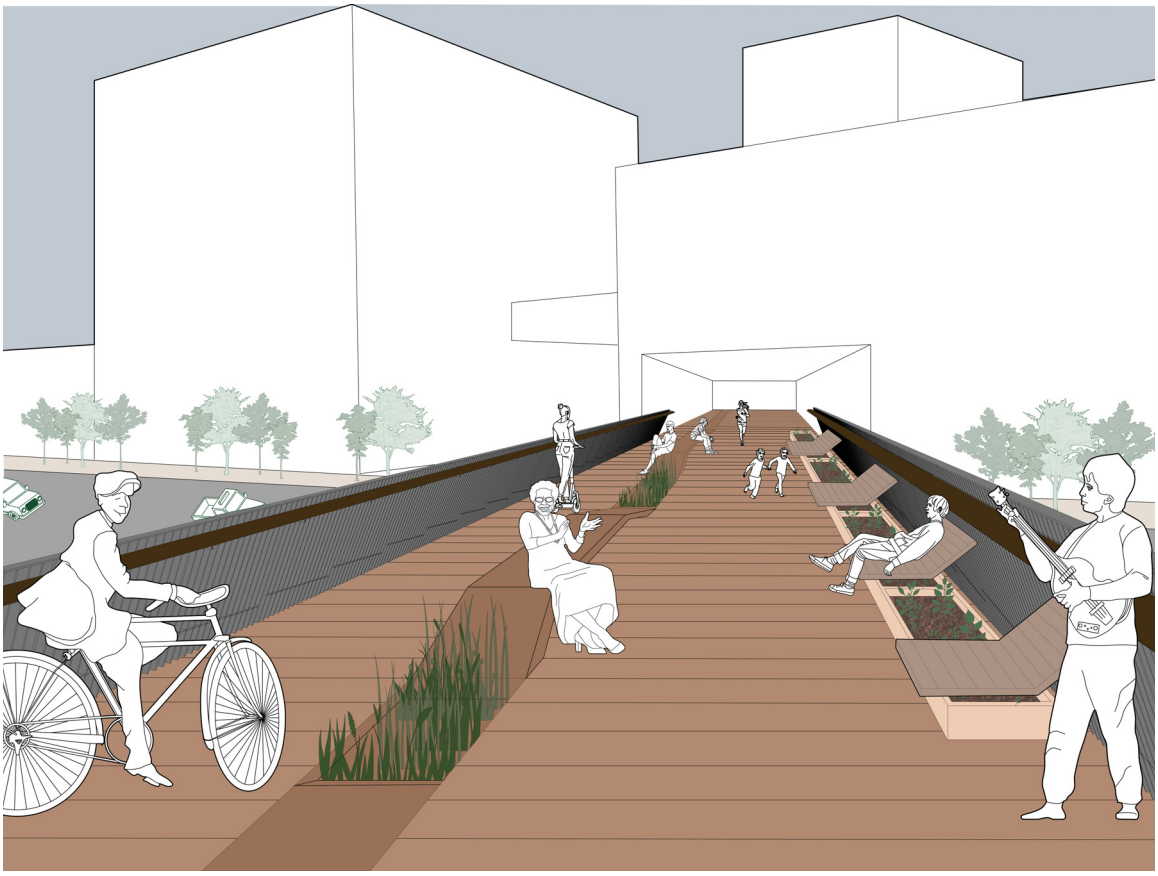


Axo-nometric evolution of parking lot over time (from top to bottom)

Branching the Landscape

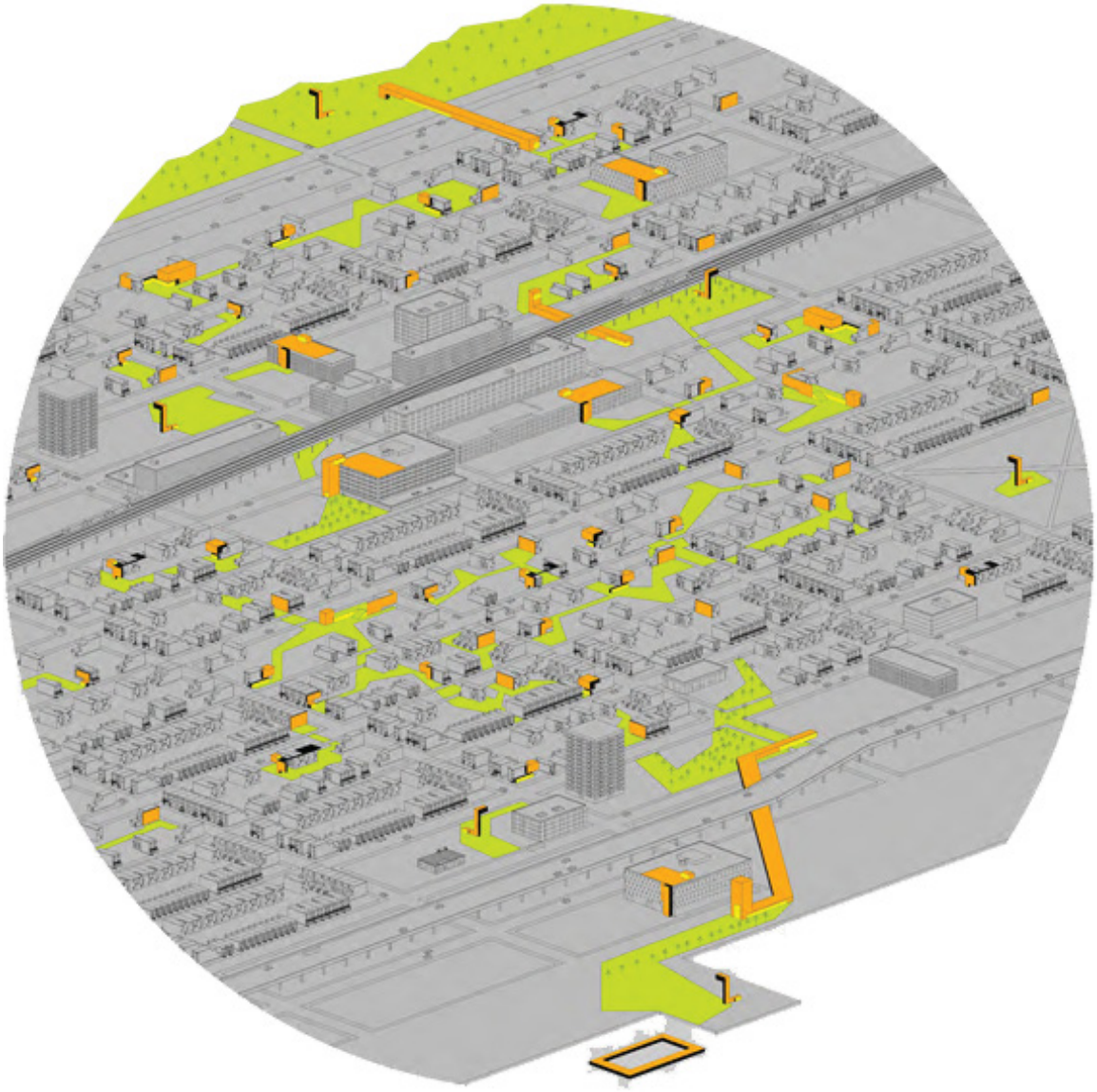
Nature knows no boundaries. With the ever-expanding global population and the stitch spreading across the landscape in the form of urban networks, the stitch looks to extend beyond its border and ‘branch’ the landscape. This notion of branching is to push the limits of the void boundary and bridge city spaces together not only physically, but also socially.

This is successful using the ‘Branch’ intervention; a strong symbol and extension of social activity, new opportunities, and growth across the urban fabric. With this linear site, the stitch now covers a far wider range of community needs including urban regeneration, public participation, green and water resources, and circulation routes for pedestrians and



A crossroad between Branch and city landscape.

bikes. It will become a destination and invitation for users to explore and enjoy quality public spaces through forms of leisure and recreation. By extending and branching the landscape, the use of quality spaces will intensify, therefore promoting a coherent urban network across Halifax's urban fabric.



Coherent urban network (Murphy 2021)

Branching the landscape proposes a bottom-up approach that works with existing urban voids and the proposed kit of parts (Canopy, Branch, and Bark) to form a coherent urban network.

Reflecting On the Process

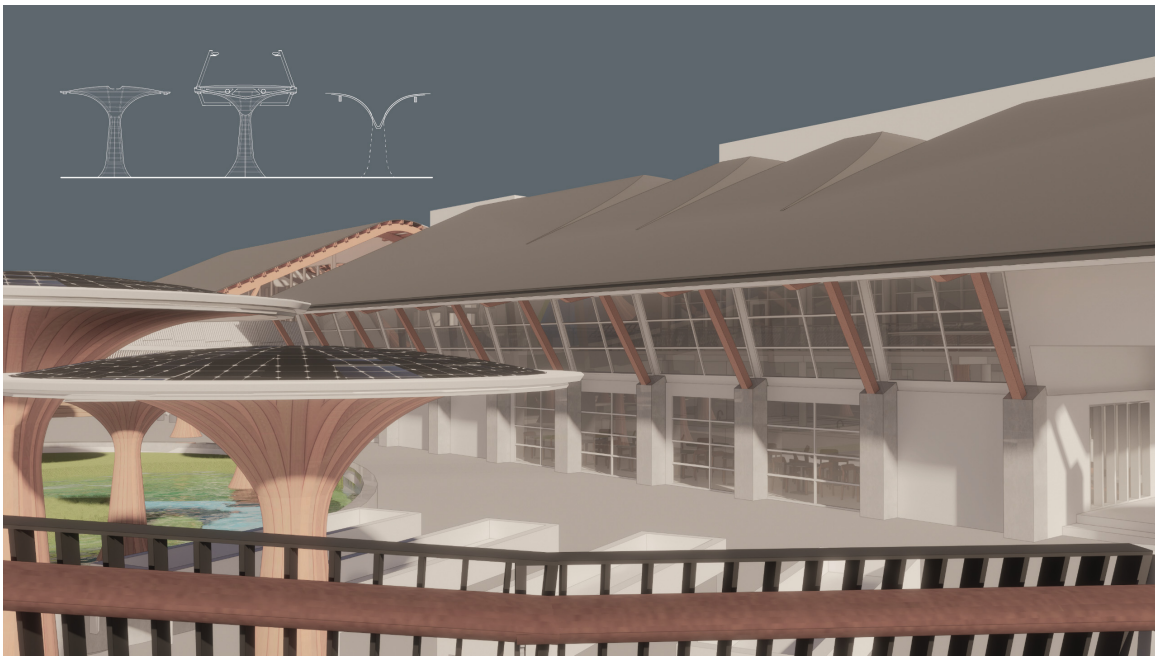
Environmental degradation has sparked a wide range of academic media in response to concerning predictions about the livelihood of the planet and its ecosystems. With that, cities are shifting architectural focus in producing quality public spaces. As cities continue to densify, providing this quality space is getting increasingly difficult to find.

As architects, we are well positioned to confront the intersections between concepts of nature, inhabiting lost space, and the environmental impact of the city's landscape. This thesis has pursued these intersections by seeking architecture's capacity to predict change in void spaces within Halifax's urban landscape and stitching urban voids with nature. Beyond presenting some prototypical possibilities for addressing issues of urban void restoration to create quality public space, this thesis also presents itself as a standard for a network of spaces, which in itself summons a new and liveable future.

Biologist and self-proclaimed "nature nerd" Janine Benyus worked this way, identifying and popularizing the term biomimicry. In her 1997 book *Biomimicry: Innovation Inspired by Nature*, Benyus was dedicated to making biology and ecological urbanism a natural part of the design process. This emerging discipline drove many students and practitioners to emulate nature's designs and processes to create a healthier and more sustainable planet.

As an educator at heart, Benyus believes that the more people learn from nature's mentors, the more they'll want to protect them, reorientating how we discuss and define solutions to ecological problems. In other words, designs that mimic nature should not only be on a material or form

basis but be based on the philosophy and principles that make those solutions successful. With this integrative design approach, architecture has the opportunity to create complete unity between the user, the natural environment, and the landscape itself. Ecological urbanism has proven that designing with nature can produce responsible architecture in a public setting. Therefore, inhabiting lost space with the power of nature is realized.



View of Salter Park from the Branch

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