

# **Architecture of Life**

Biophilic Urban Acupuncture for Downtown Seattle

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Abstract

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Robert Mugerauer  
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This thesis is an exploration in biophilic design through urban acupuncture. It is an investigation of what is possible at a small scale within the existing dense urban fabric. The intentions are that while we may begin with small experimentations, these ideas and applications of the varied approaches to biophilic design may be scaled up and out and applied throughout our built environment.

The small scale of the designs proposed through this thesis allow a framework for experimentation and the design proposal is purposefully retained to a conceptual idea of nature as it relates to sensory experiences.

## Acknowledgments

Thank you to Judith and Dr. Bob  
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Thank you to my cohort  
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Thank you to my friends and parents  
for your endless love and support.

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Photos of the author at peace in nature at a young age and many years later contemplating life in the city.

(Top photo by parents, bottom by Luca Pellicoro)

## PREFACE

I have always felt a connection to nature and throughout my life have noticed that when I am close to nature I am happiest. I am calm but energized, more clear headed, and generally feel more positive about the world. This love for nature is referred to as biophilia and it is innate in all of us. I realize that my awareness of my own biophilia may be stronger than some people's. I have cultivated it from a young age and have been extremely fortunate to live in some incredibly beautiful places. Living in more dense urban environments for the last ten years (San Francisco and Seattle) has forced me to look for nature in unexpected places and to also reconsider how I define nature.

I am not sure exactly when I came across the term biophilic design, but when I did, I realized that it was what I had been searching for in my decision to return to school to pursue architecture. Therefore, it made perfect sense for me to explore the subject matter more in depth for my thesis.

The following research and project proposal are an effort to further broaden the understanding of nature and the city, how we experience nature in many ways, and how we can translate the experience of nature into a variety of design approaches for urban areas.



# CONTENT

1	Introduction
3	Why This & Why Now
6	Biophilia & Biophilic Design
11	Biophilic Design in Seattle
15	Biophilic Urban Acupuncture
17	Context: Seattle
23	Framework: Bus Stops
26	Fire   Water   Air   Earth
31	Fire
35	Water
39	Air
43	Earth
46	Conclusion
48	References

Note: All photos by author unless otherwise noted.

# INTRODUCTION

This thesis is a process of examining the world through the lens of biophilic design, looking for possibilities, and identifying an area of need within a scale suitable to the time frame of a thesis. It is an exploration of a topic that does not end with the design proposal, but rather hopes to provoke a conversation and further fuel ideas of biophilic design through the ideas presented.

First we must acknowledge that how nature is defined is quite broad and the relationships to nature vary from person to person. Second, designing to connect to, or include, nature may be achieved through a variety of methods, which will be covered in the chapter on biophilic design. While the sites that have been chosen for this thesis are in Seattle, the design concepts may be adapted to any location or scale. And finally, the design proposals of this thesis are purposefully restrained to an abstraction of nature.



Rapid growth in downtown Seattle.  
(Image via Seattle Times)

## WHY THIS & WHY NOW

As the world continues the trend of rapid urbanization, it becomes increasingly important to provide space for nature within cities for both the benefit of humans as well as for the environment. According to a 2014 report from the United Nations, 54% of the world's population is already living in urbanized areas, and by 2050 that number is projected to reach 66%.

Along with the global trend of urbanization and the increase of technology in our lives, there has been an increasing disconnect from nature, especially in urban areas. Americans spend an alarming 90% of their time inside of buildings. Daily access to nature has been shown to be beneficial to health and well-being. The connection between the natural world and that of our well-being has been studied for several decades but is finally becoming more widely accepted and better understood by the greater public, thanks in part to several books by well known author Richard Louv as well as the recently published book *The Nature Fix* by Florence Williams.

Seattle has seen its own rapid growth in the last few years. According to census data from 2016, Seattle was the fastest growing big city in the country, with a 3.1% population increase from 2015 to 2016 (Balk, 2017). With Seattle's close proximity to nature, it is all too easy to take nature for granted and thus leave it out of the design of our city.

Retreating to the countryside to spend time in nature is not always an option for people and as urban areas continue to become more dense, as well as expand, this may become even less of an option. Cities must strive for self sufficiency. Including nature in design and tightening awareness of and connection to nature through design is crucial at a point when the world is urbanizing faster than ever before. This thesis looks for ways to connect us to our surroundings in the densest areas of the city using concepts that can be applied to many scales of design and many locations. Using biophilic design to enrich city life is designing for the overall well-being of city inhabitants.

While the green building sector has made great strides, especially with LEED becoming mainstream, there is much more that can be done to make our cities vibrant and healthy places. Imagine what our cities could be like if we embrace biophilic design and green building for ALL future development - reuniting Architecture with nature - today's architectural challenge.

Part of including nature in cities will be reliant on embracing small scale design interventions that incorporate sensory rich experiences. This thesis focuses on this approach through the application of biophilic urban acupuncture, to be discussed in greater detail in the chapter with that title.



Seattle is a city surrounded by natural beauty, but as designers we must remember that the city itself is also nature.

(Google Images)

# BIOPHILIA & BIOPHILIC DESIGN

The literal meaning of biophilia is “love of life”. The theory of biophilia, popularized by E.O. Wilson, states that we as humans have an innate draw and connection to nature and natural processes. As a species that has evolved in nature and only in more recent times become urbanized, our preferences for the sensory rich experiences that nature provides are still very strong.

As humans, we are wired to respond to our environments and biophilic design is designing for the human need to connect with the natural world. Biophilic design is about establishing a design awareness and understanding of the effects that the built environment has on us. It is how spaces may be designed to positively affect their inhabitants, may they be calming, uplifting, or refreshing.

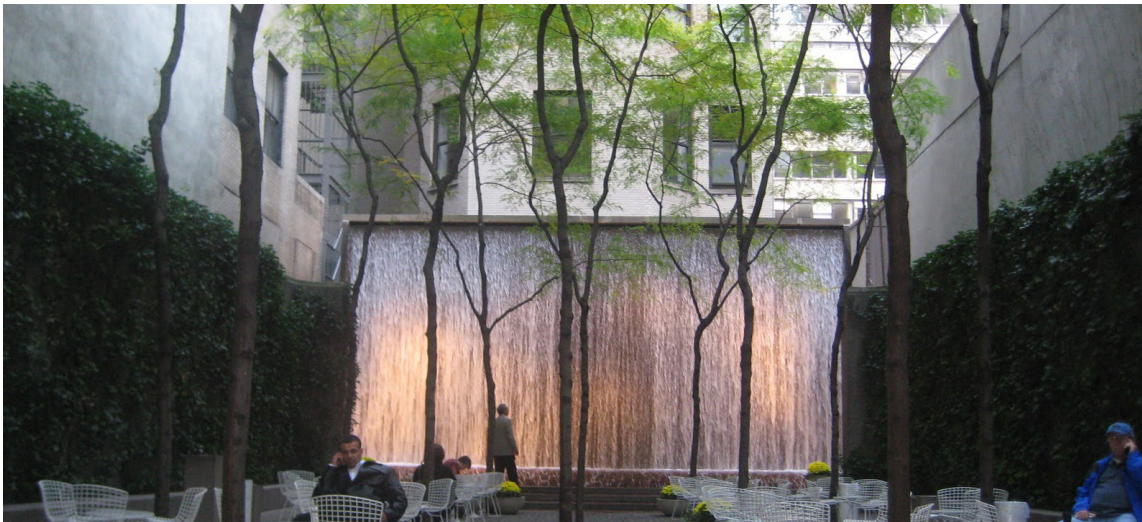
Biophilic design goes far beyond incorporating living greenescapes and fountains into our built environment. The natural world is the most sensory rich environment so what can we learn from it and apply to our built environment? Let us think about the natural world around us and all of the ways in which our senses are stimulated.

Yale Professor Stephen Kellert has been one of the leading voices of biophilic design for several decades. Kellert lists roughly 70 attributes of biophilic design organized into six categories -

environmental features, natural shapes and forms, natural patterns and processes, light and space, place-based relationships, and evolved human-nature relationships.

Another highly regarded source for understanding biophilic design is Terrapin Bright Green, an environmental consulting firm based in New York City. Their list includes fourteen design considerations categorized into three groups- nature in the space, natural analogues, and nature of the space.

The lists by Kellert and Terrapin Bright Green, both found on the following pages, highlight the values of various shapes and forms of nature. While direct contact with real nature is arguably the most beneficial to well being, it is important to recognize that it is not always possible to include in every design. These lists help guide us to thinking about and designing for many different types of nature which have the ability to add delight to our cities.



Paley Park, New York City  
(Sampo Siklo via Flickr)

#### Elements and Attributes of Biophilic Design

- Environmental features  
(Color, water, air, sunlight, plants, natural materials, views, etc)
- Natural shapes and forms  
(Botanical motifs, simulation of natural features, etc.)
- Natural patterns and processes  
(Sensory variability, change & sense of time, fractals, etc.)
- Light and space  
(Filtered & diffuse light, warm light, spatial harmony, etc.)
- Place-based relationships  
(Historic / ecological / geographic connection to place, etc.)
- Evolved human-nature relationships  
(Prospect & refuge, attraction & beauty, etc.)

(Kellert, 15, *Biophilic Design*)



The New York Times Building, New York City  
(Image via Terrapin Bright Green)

#### 14 Patterns of Biophilic Design

- Nature in the Space
  - Visual connection with nature
  - Non-visual connection with nature
  - Non-rhythmic sensory stimuli
  - Thermal & airflow variability
  - Presence of water
  - Dynamic & diffuse light
  - Connection with natural systems
- Natural Analogues
  - Biomorphic forms and patterns
  - Material connection with nature
  - Complexity & order
- Nature of the Space
  - Prospect
  - Refuge
  - Mystery
  - Risk / Peril

(Terrapin Bright Green)



The Amazon Spheres (top) are only accessible to Amazon employees.

Madison Centre lobby in downtown Seattle (bottom) is a private lobby, benefiting only those who have office space in the building.

(Both images via Curbed Seattle)

## BIOPHILIC DESIGN IN SEATTLE

There are some wonderful examples of biophilic design in Seattle, a few of which I will highlight, and in doing so places of need for biophilic design interventions emerge.

First, we look at the private realm. One design that has been receiving a lot of attention recently is the Amazon Spheres. While these are an incredible example of what can be done with biophilic design, the access is limited to employees of Amazon, or prearranged tours led by Amazon. Another excellent example can be found in the design of the lobby at the Madison Centre, downtown on Madison Street at Fifth Avenue. Once again though, this incredible space is only for the people who rent office space in the building. The lobby is not public, isolating the benefits of the design.

These examples are evidence that employers are doing a better job at prioritizing the well being of their employees. Yet, while these are beautiful examples of biophilic spaces, they only benefit those who have access.

Looking to find examples of biophilic design beyond the interiors of private buildings, we discover that there are many privately owned public spaces within the downtown core that demonstrate a variety of approaches to biophilic design. However, these spaces are not always well known. Even when they are at a street accessible

level, not everyone may feel welcome there, as they are technically private property (ie. Waterfall Park, at right).

These existing private spaces, both interior and exterior, are not democratic. It becomes an equity issue within the city. Everyone can benefit from, and should have access to, sensory rich spaces that help to promote a connection to the natural world. Looking at the existing examples of biophilic design within Seattle and identifying areas of need leads to looking for small scale interventions that are democratic - accessible to everyone, with the goal that they can be used both passively and actively by people.

The streets may be the only democratic spaces in the city that benefit everyone. The streets are actively used by people coming and going to the city or going about their business throughout the day. They are the stage for daily interactions between citizens of the city. Also for many people living and working in urban areas, the views from their windows are onto the streets below and what they see and hear from the outside world while they are inside has an affect on them, which is why, as designers, we must take into consideration the fifth facade (the roof) of any structure.



Waterfall Park, a privately owned public space in downtown Seattle, is an incredible example of Biophilic Design. This park is located on private property, gated off from the sidewalk and locked outside of business hours.

(Image by Al Kemp via The Seattle Times)



## BIOPHILIC URBAN ACUPUNCTURE

Urban acupuncture, a term coined by Jaime Lerner, is the idea that small targeted pinpoints of change within the urban environment are enough to have a positive effect. "Good acupuncture is about helping the city become a catalyst of interactions between people... Good urban acupuncture is also the art of stimulating knowledge about the city... since we rarely pay much mind to what we don't know, how can we hope to generate respect for a city we don't understand?" (Lerner, 47, 59).

Applying the concepts of biophilic design to urban acupuncture gives us biophilic urban acupuncture. Through this we connect the importance of place making in urban acupuncture to the importance of connection to place in biophilic design. This allows for the opportunity to enhance the quality of life through sensory rich experiences at a scale that is not only feasible for cities to implement, but at small scale allowing for direct interaction of people at street level.



Google Earth Image of downtown Seattle, 2018.

## CONTEXT: SEATTLE

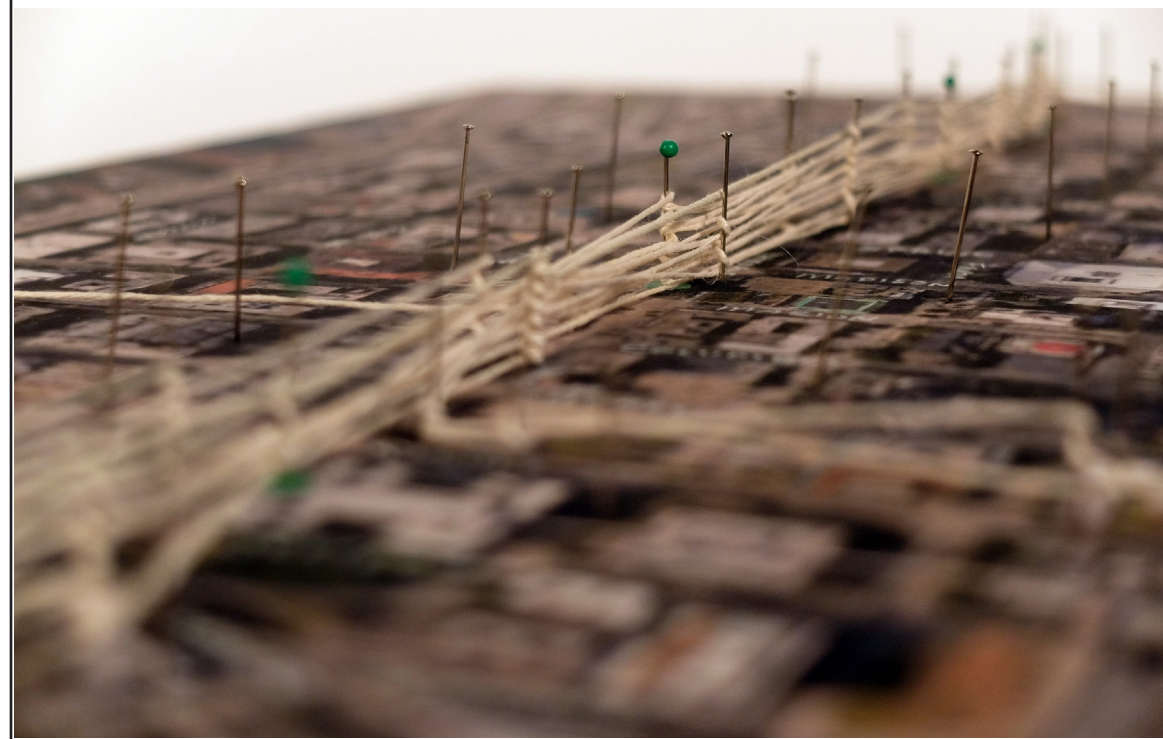
Bounded by the waters of Puget Sound and Lake Washington, Seattle must accept a future of becoming more dense in order to adapt to the influx of people that it has and will continue to receive. Looking at recent census data for the United States via the The Seattle Times, Seattle was the fastest growing large city in the country with a 3.1% population increase from July 2015 to July 2016. The city also now ranks as the 10th most dense city in the country with a 9.8% increase in density since 2010 (Balk, 2016 & 2017). The increase in population has highlighted the importance of the public transit network.

One in five Seattleites takes the bus to work, making Seattle the most bus dependent metropolis after San Francisco. From 2010 to 2014 Seattle had the largest increase in ridership of any major US city (Balk, 2016). Forty seven percent of downtown commuters use public transit. As Seattle's population continues to grow, public transit ridership will continue to grow, placing even more of a demand on the downtown core.

Third Avenue is one of the busiest transit corridors in the city, with upwards of 200 buses per hour during rush hour. This means that Third Avenue is the entry and exit for thousands of people per day. There is great opportunity to improve the public infrastructure along this thoroughfare. With the upcoming closure of the transit tunnel, more bus lines are slated to be rerouted to the surface routes through

the downtown core, further increasing the already existing need for infrastructure and streetscape improvements.

This provides an excellent opportunity to propose a network of biophilic urban acupuncture. The diagram at right visualizes the density of bus routes on Third Avenue, while the pins are a literal representation of the acupuncture metaphor. The following pages are a collection of photographs of Third Avenue during the evening rush hour. While they help to explain the experience of the street, hundreds of people coming and going, bus after bus whooshing by, nothing replaces the experience of actually walking Third Avenue during rush hour. There is no way it is an enjoyable experience for anyone. I feel my stress elevating just thinking about the time I have spent on Third Avenue, I can't even imagine what it would do to me if I had to experience it twice a day, week after week. The goal of biophilic urban acupuncture is to relieve stress points by transforming overlooked everyday spaces into beautiful and engaging places.

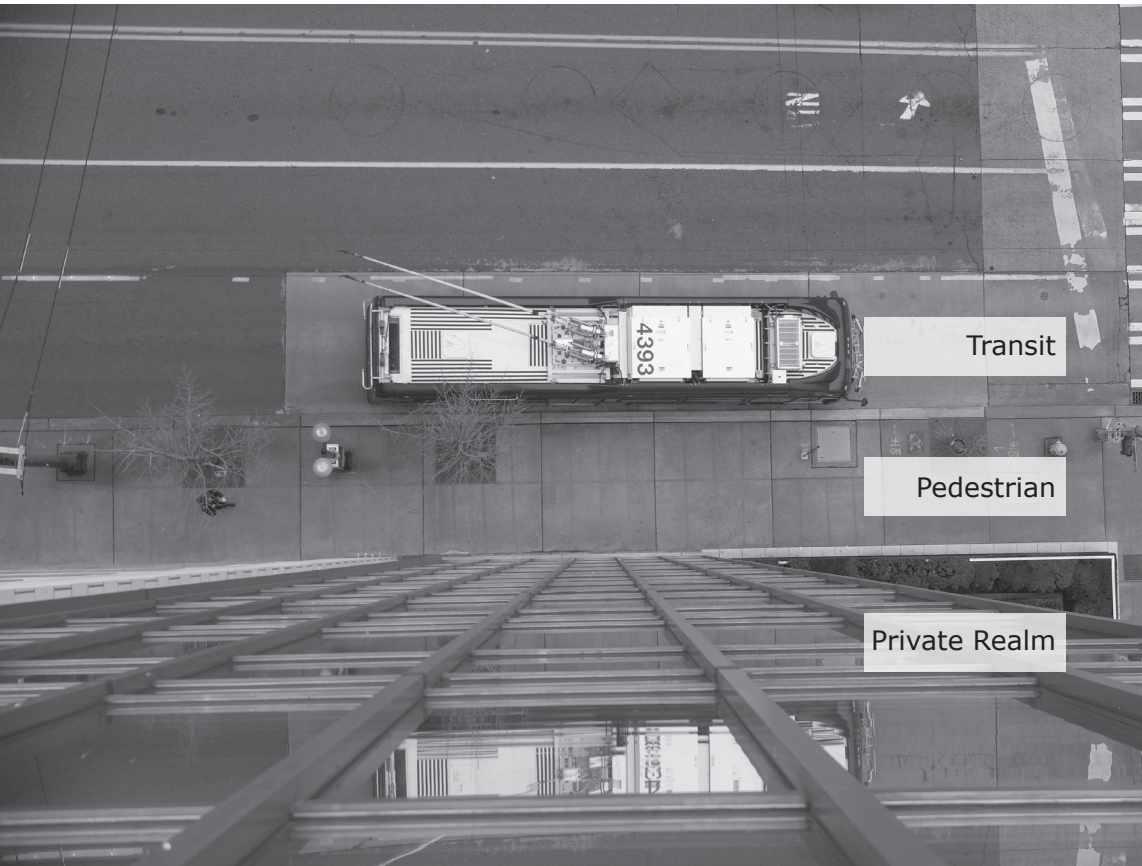


A diagram visualizing the bus traffic along Third Avenue and a possible network of urban acupuncture.



Third Avenue, in downtown Seattle, is the busiest bus corridor in the city with over 200 buses per hour during the evening rush hour. It is the point of arrival to and departure from downtown Seattle for thousands of people each day, yet little attention has been given to the design of the street experience.





## FRAMEWORK: BUS STOPS

In deciding on a design intervention, I wanted to explore ways in which to make biophilic design highly accessible to all urbanites. Many buildings may only benefit those with direct access to the building, therefore limiting the reach of the effects of biophilic design. I also was not interested in designing a park-like space, as they rely on users intentionally seeking them out for their known benefits, or in the case of parklets, taking away valuable parking spaces or reducing the traffic lanes. This led me to look at leftover, underutilized, or in-between spaces and ask what is not a park and what is not a building and can be both actively and passively used?

As a frequent user of public transportation, I began to turn my attention towards thinking about the potential for better bus stops. These lackluster, yet approachable pieces of civic infrastructure provide the perfect human-scale canvas for integrating biophilic design into the city on a very public level. Looking around at existing bus stops, there is much room for improvement. If five minutes of exposure to nature or nature inspired design can have even the slightest beneficial impact on someone's day, then multiplying that by the amount of people who not only use bus stops, but just pass by them while walking or driving down the street makes the impact of the biophilic bus stop all that much greater. Having a network of biophilic bus stops throughout the urban downtown provides 'pin pricks' of sensory delight, which is the

concept and goal of biophilic urban acupuncture.

The mundane bus stop will serve as a framework and design opportunity to improve the experience of the streetscape through biophilic urban acupuncture. Bus stops have been chosen as a framework because of their ubiquity and necessity in the city. While their main purpose is to serve passengers awaiting the arrival of a bus, they often serve as information points for pedestrians. They have the potential to become points of visual interest within the grayness of our urban corridors. This thesis imagines the bus stop as a lively, welcoming point of public infrastructure by exploring the principles of biophilic design at a small public scale.

The majority of bus stops along Third Avenue have existing shelters. They are a common design found throughout Seattle - a steel frame with a "wood" panel at the bottom and glass on the top two thirds capped off with a plexiglass roof. While there is nothing arguably wrong with these shelters, they have the ability to provide the framework to host the biophilic design interventions. The initial design proposals explored in this thesis reuse this framework.

When designing a bus stop, considerations must be taken to ensure that the space is user friendly, safe, and convenient. To use the street level transit stop as a prototype for biophilic urban acupuncture brings the principles of biophilic design to a scale that people can directly relate to and engage with. Also, this is the most publicly accessible design in the most democratic space of the city: the sidewalk.



A dull bus stop on Third Avenue.

# SITE + CONCEPT: THE ELEMENTS

Four sites have been chosen on Third Avenue and an element has been assigned to each site as a concept or design. The elements of fire, water, air, and earth are the building blocks of our world. They are nature at its core, fundamental things everyone can relate to. The ways in which fire, water, air, and earth may be experienced are scalable, approachable, and universal.

When translating the experiences of the elements into design inspiration we are presented with a wide range of opportunity. While the most direct relation to the elements would be to very literally incorporate them, for the purpose of this thesis I have chosen to abstract them in the interest of broadening how we may interpret the sensory experience of the nature through design.

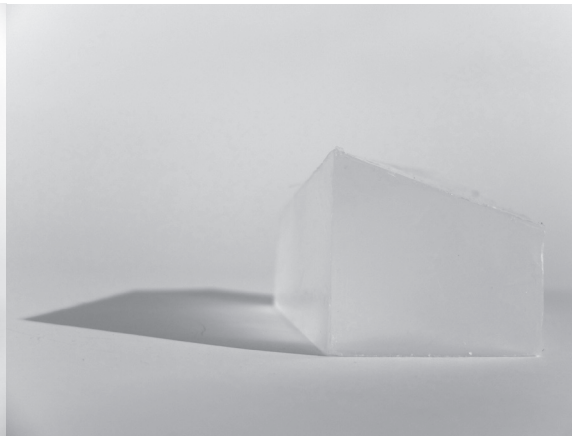
The map image on the bottom of the following pages shows Third Avenue through the downtown core - from Yesler Way in the Pioneer Square area at the left, north 13 blocks to Virginia Street. The four selected sites are marked in green, but keep in mind that the design applications to these sites are meant to be scaled and adjusted to fit anywhere. Although as a key point of biophilic design, I did note important historical and ecological connections to place where applicable in explaining each design.



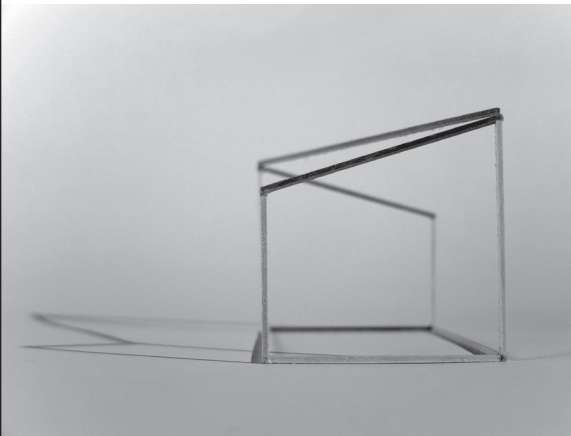
How can we as designers interpret the sensory rich experiences of nature in ways that will enrich the built environment for everyone?



FIRE



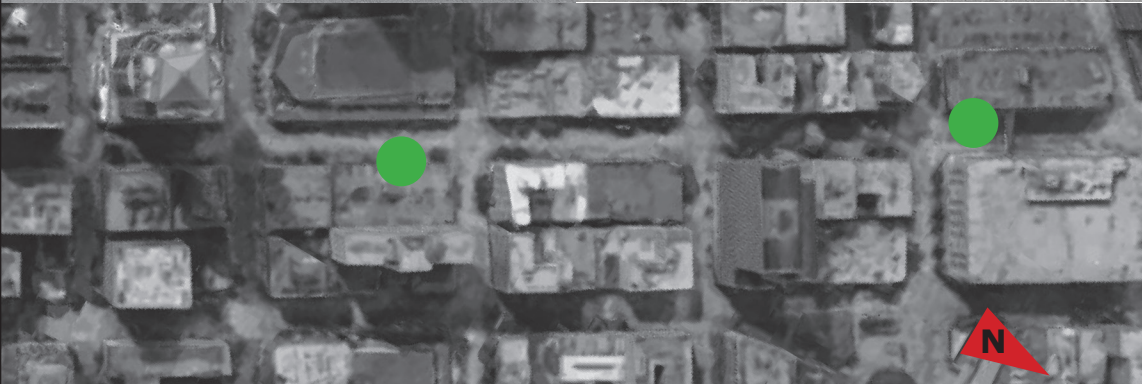
WATER



AIR



EARTH



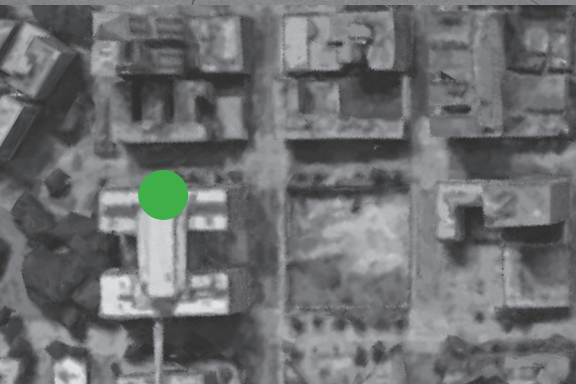
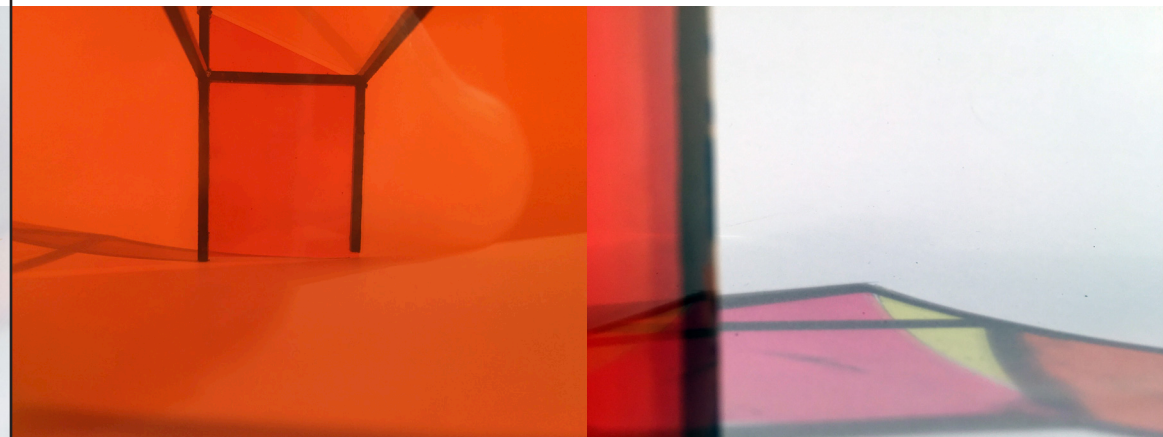
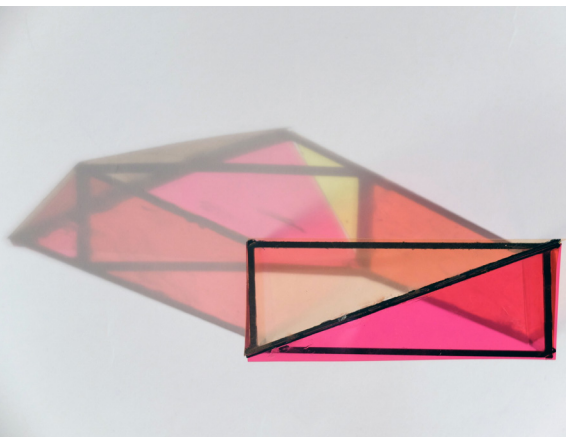


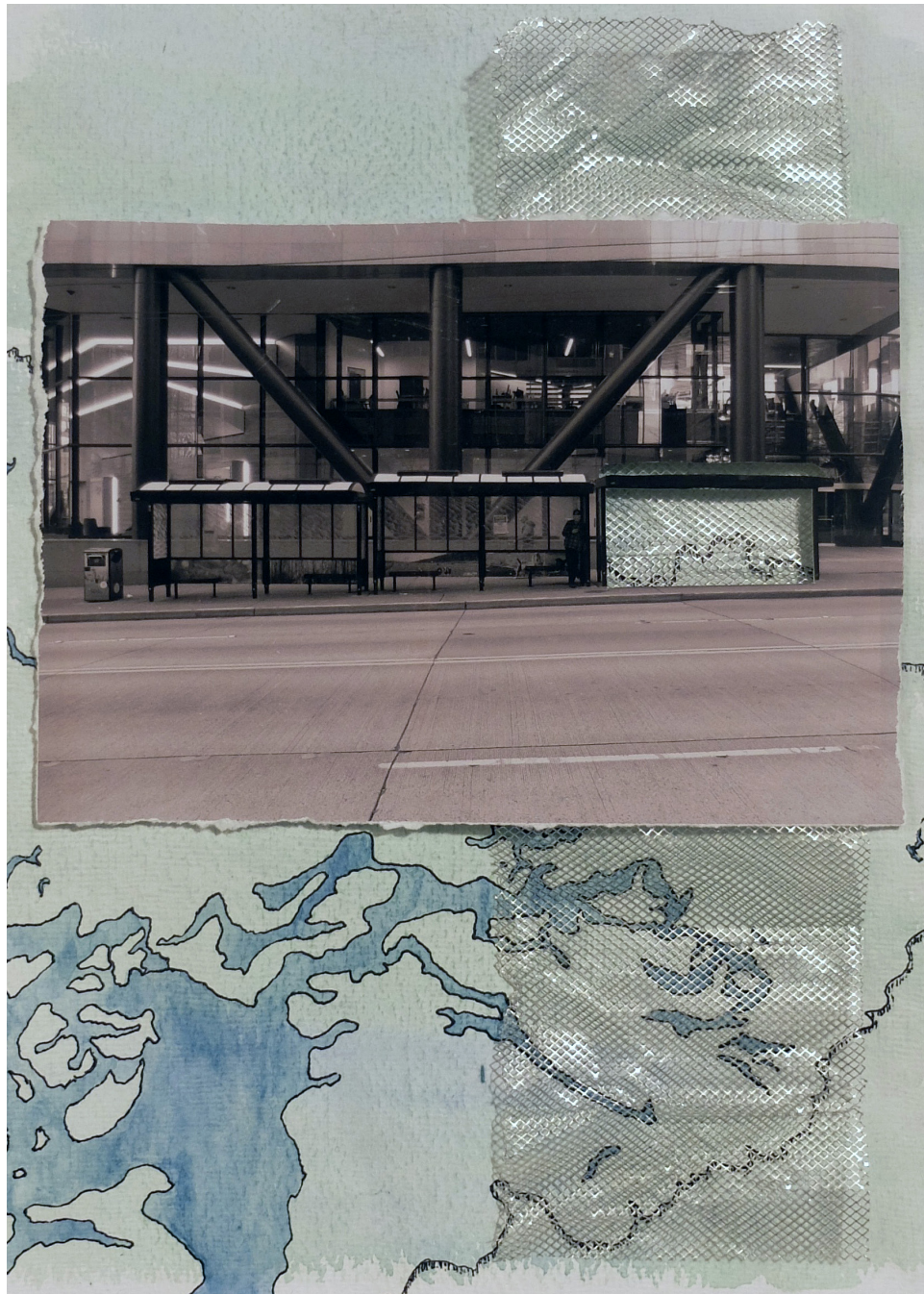
# FIRE

The great Seattle fire of 1889 changed the course of the city through destruction. The site for the element of fire is located on the border of what was once demolished by fire. While fire in a historical sense for Seattle may be associated with destruction and change, it is also the element of warmth, energy, and light. These are qualities especially important to integrate during the long, dark, rainy, winters, but also ones that can really shine when the summer sun does finally arrive. The design uses dichroic glass to make a dynamic, colorful space, changing with the changing conditions of light.



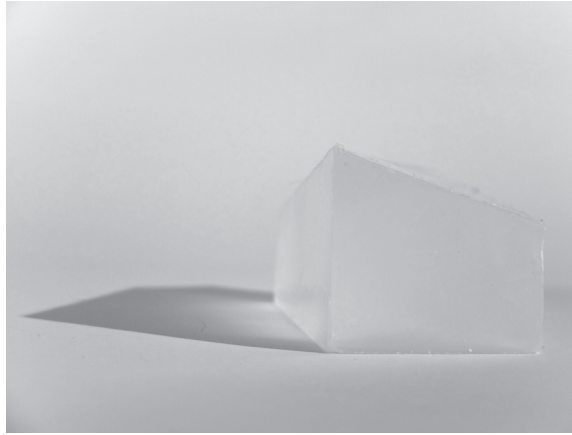
FIRE



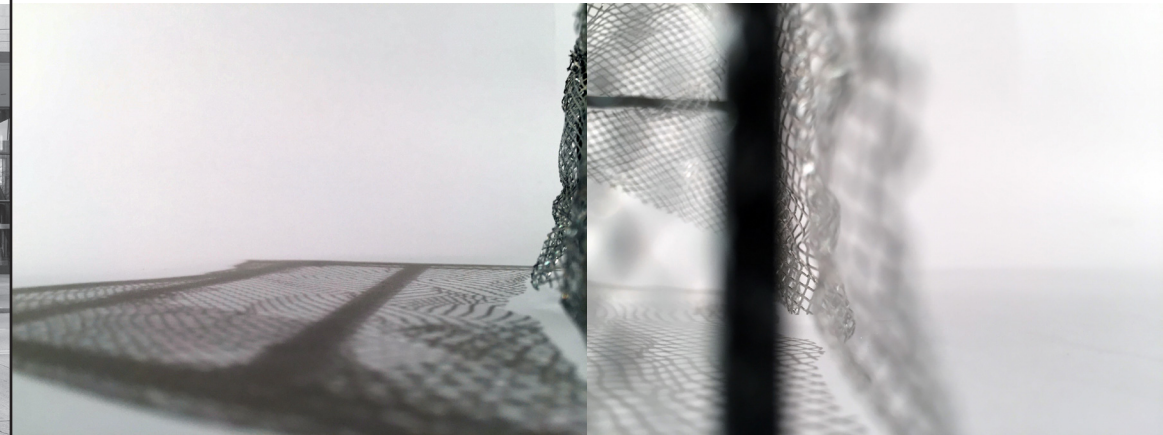


# WATER

Seattle is a city with a close connection to water. It is surrounded by water and has 150 rainy days in an average year. This design is inspired by water but does not use actual water. Instead, a kinetic screen of metal is used to mimic the movement and appearance of water. As the numerous buses whoosh by, the metal screen swooshes in the gusts of air and shimmers in the light. The dynamic metal screens cascade down the slight slope from shelter to shelter ending at the sidewalk just as we expect the flow of rain to cascade as it makes its way to the waterways surrounding our city. While we may feel subjected to the endless winter rains, may we also remember the ways in which the development of Seattle and the surrounding urban area has permanently transformed the waters around us.



# WATER



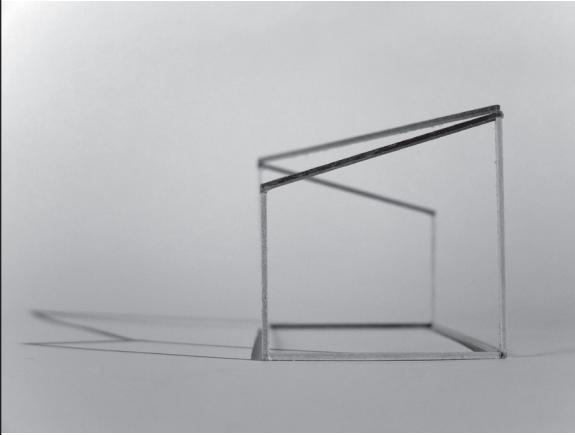


## AIR

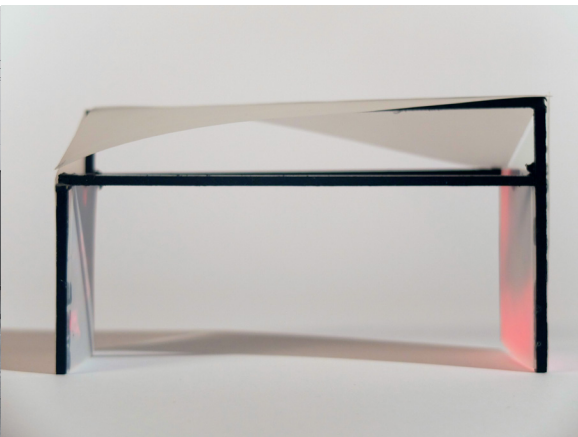
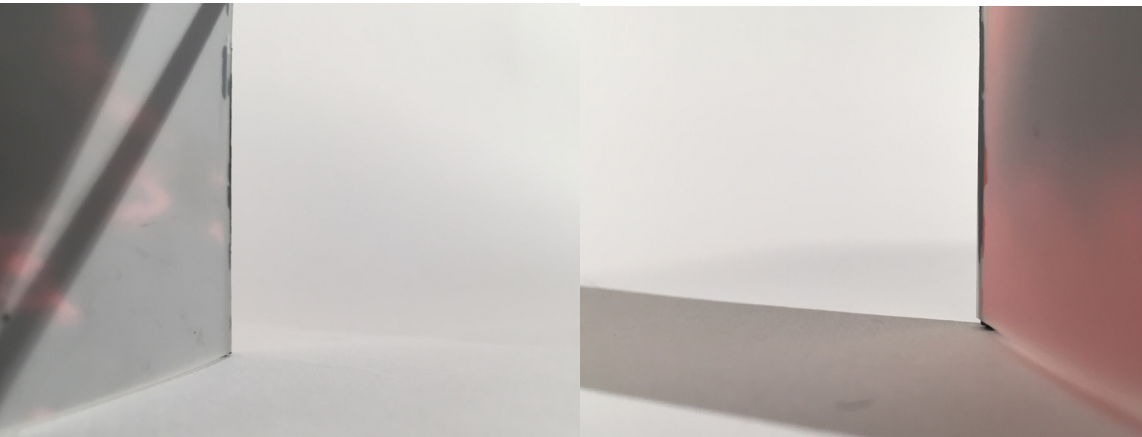
The site for the design inspired by the element of air is located on a block of Third Avenue that has several lower rise buildings, therefore allowing an open view to the sky. The design proposes the use of LCD screens that change to reflect current atmospheric conditions, essentially bringing the sky to the ground. Downtown Seattle is directly under the flight path of incoming air traffic to SeaTac and there is history of a strong connection to the airline industry here. When an airplane flies overhead, the shape would also appear on the screen, heightening the awareness of the highway in the sky.

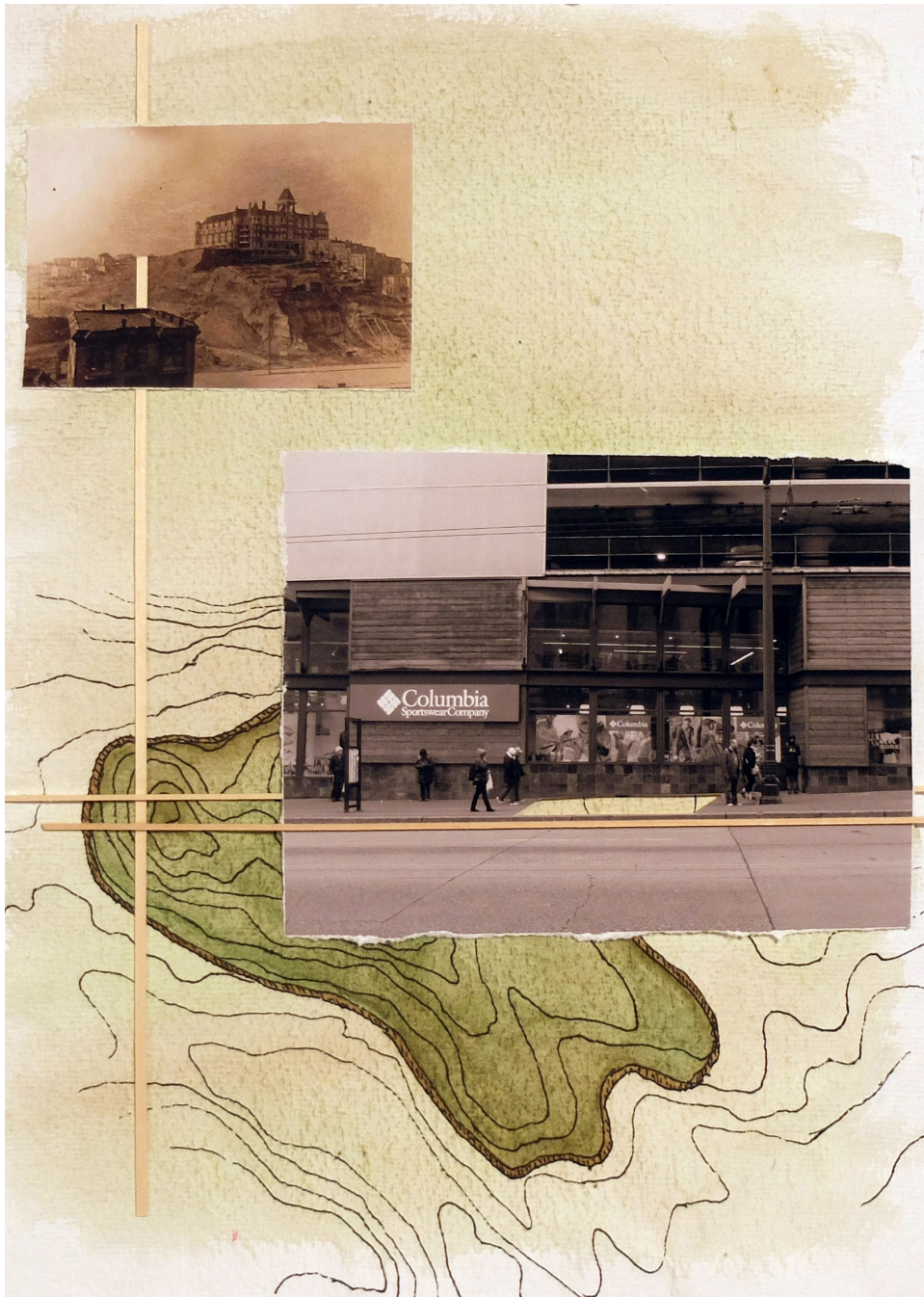
What is the atmosphere of Seattle? While Seattle has its reputation for being gray and dreary all winter, which at times it is, what is striking is the vibrancy of living plant matter. When the sky hangs low, the grasses and mosses seem to glow in the diffused light. It isn't just me that is captivated by the light here- the painter Gertrude Pacific, who once lived in downtown Seattle, noted in a 1987 story that was re-published in the Seattle Weekly in March of 2017:

"Light was one of the only moving, 'living' things you saw—it was one of the few things that lived and moved and changed. I kept seeing these subtle changes—from off-white to gray to pearly-white to lavender-white—and I decided to try to capture them" she said referring to her series of paintings titled "Oyster Light" (Moody).



AIR

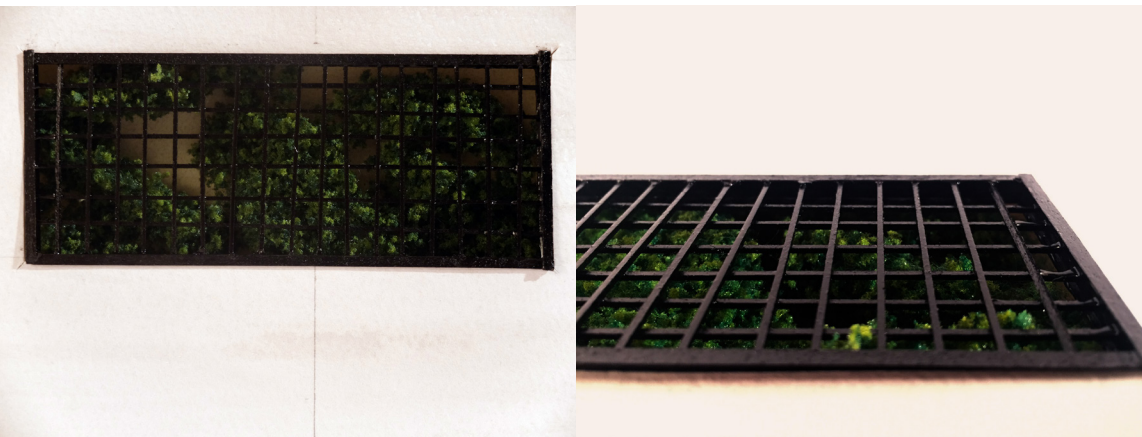




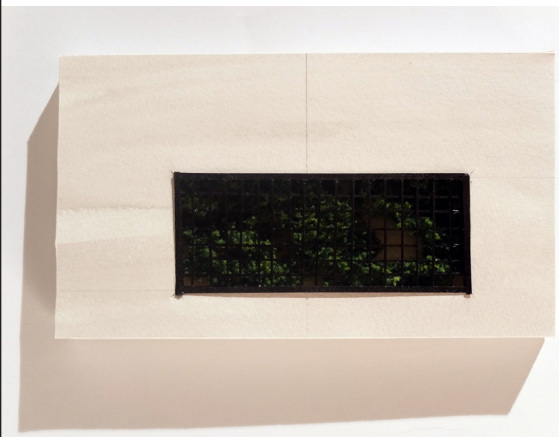
# EARTH

Seattle was once a city of seven hills. The movement of earth was a large part of how the city was shaped. The highest point of Denny Hill was 240 feet above sea level in the approximate location that the design intervention for the element earth has been located. Denny Hill was literally washed away into Elliott Bay in the early 1900's. This area has essentially been 'flattened out' in order for the city to grow.

This is also the only site of the four that has no preexisting shelter. Here, the focus is on the absence of earth. Rather than propose the construction of a shelter, the footprint of a shelter will be integrated into the sidewalk. An amount of earth may be removed from the area under the footprint of the bus stop, and a grate placed above. Through changing the feeling of the earth underfoot the attention of the pedestrian is drawn to the ground. This not only highlights the mass removal of earth from this site in the regrade but also breaks the plane of the concrete to reconnect us to the earth, as we look down, through the grate to the dirt (and possible plant life) below.



# EARTH



# CONCLUSION

The initial ideas based on indirect connections to nature as inspired by the elements have possibilities far beyond the four proposals I have presented. The concepts can be expanded further and additional layers of complexity added. The initial designs should be studied for their usage before implementing any further designs. What works and what doesn't? How do people engage with the spaces? Are there possibilities to introduce more complex spaces or spaces that will require upkeep?

While the four designs presented maintain a conceptual approach to nature through sensory experience of the environment further designs should not only strive to include aspects of living nature, but to also combine multiple approaches to sensory design. Also, while this project focused on small scale design interventions, the concepts of biophilic design can and should be applied at any scale.

In the end, this project is obviously not really about bus stops. It is about the importance of leaving and making space for abundant nature and sensory rich experiences because we depend on them to maintain happy and healthy cities. May the streetscapes and buildings morph into a framework for supporting all types of life, both inside and out. We must learn through practice and time to design self sustaining nature cities.



*"Designing a dream city is easy;  
rebuilding a living one takes imagination."*

- Jane Jacobs

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