NATURE IN INTERIORS

Supporting Ecological Connection, Respect & Behaviors

THESIS 2018 | NATALA COVERT
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PREFACE

I grew up outside, spending most afternoons in the backyard, digging in soil looking for worms, finding bones and other animal remnants, watching spiders build their webs, and tracing ants back to their nests. I was lucky to have these experiences which directly impacted the way I understand the world. I learned that we are built from the same ingredients as those worms and bones, connected the growth of plants to the cycles of the sun and moon, and developed a sense of responsibility for this place we inhabit.

Many children grow up without a place like this to explore, be curious, and potentially break an arm. But more importantly without a connection to nature they lack the desire to protect what little nature we have left.

We are living in a "post future" world where technology provides countless alterations to our daily lives, becoming a ubiquitous aspect of everyday experiences. All of this tech-based living is producing a counter culture with a desire to return home, to a more simple, quiet, and calm life. This theme has been developing since the beginning of the industrial revolution, the catalyst that spurred the first seed of this culture with the Romantic movement and later evolving into the Ruskin and Morris Arts and Crafts era. The contemporary equivalent of the Arts and Crafts movement has combined the beauty and simplicity of tech-based solutions with a desire to remain connected to the preciousness of resources, material and objects. My interest in nature and the hand-made are linked and developed as a response to my experiences exploring and experimenting as a child.

This thesis began with research into how our brains and bodies are positively affected by a connection to nature. I was inspired and informed by leading research in the mental, physical and emotional benefit of human contact with nature and Biophilic Design. I began to think about how I could effect positive change on a large population of people. I thought about the places where we keep people inside for most of the day, otherwise known as our schools and prisons. I decided to focus on designing a school in an urban area to help connect children and their community to the urban wildlife that exists all around our built environments. And perhaps with a little intention and attention, this wild-life can exist inside our built environments as well.

My aim is to help encourage a sense of curiosity and appreciation for the natural world, to continue to further our connection to our natural environment.

EXECUTIVE SUMMARY

This thesis explores the ways that designers can break the division between interior and exterior spaces to help promote a sense of curiosity between humans and the natural world.

The confluence of nature in interior spaces allows people to develop a connection to nature which not only supports humans physical, mental and emotional health, but also promotes ecologically respectful behaviors.

Many studies indicate that a deeper connection to nature can lead to myriad health improvements, including better pain management, sounder sleep, immunity boost, enhanced creativity, clearer thinking, and a better attention span.

Additionally, In the larger cultural and ecological context being connected to the natural world fosters a connection to our environment or "place" which leads to more empathetic experiences towards other people. This connection to place also fosters a desire to preserve the environment so we can continue to support these vital connections to other people and environments. Research supported the theory that healthy and fulfilling exposure to the natural world at an early age is an important aspect in the development of ecologically and socially minded adults.

For precedent studies I began looking at places where we experience a connection to nature in our built environments. From there I focused in on places where a large population of people might be able to experience a connection to nature on a daily basis. Through an examination of small design probes thinking about nature in interiors in terms of scale, experience, and materiality, an idea began to crystallize.

I wanted to explore bringing these themes of curiosity towards nature to an urban area, where access to green space is limited. I also wanted to find ways to engage the larger community through food and education.

LITERATURE REVIEW

People and Nature: Attitudes, Experiences and Connections

Having a connection to nature promotes health and wellbeing across generations and cultures. This relationship also encourages our desire to act as responsible environmental agents. However, our current built environments do not foster this connection. Our urban environments are becoming more and more void of the possibility for a connection to nature. How can we design interior environments that foster a sense of curiosity in the natural world in children and adults?

The Depletion of Natural Environments and our health

We evolved from being dependent on and a part of the natural world, to dwelling inside manufactured interior environments in a fairly short amount of time on the cosmic scale. The beginning of our major disconnect with nature emerged during the industrial revolution in Europe.[1] The desire for progress, in the modern sense, is the source of destruction and depletion of many of the world's natural resources, a depletion which continues to occur at a rapidly increasing pace.[2]

Our built environments continue to expand. The average size of a single-family home increased from approximately 1,625 square feet in 1973 to almost 2,600 square feet in 2008.[3]Also increasing is our energy use in both residential and commercial applications from just under 6,000 trillion BTUs in 1949 to over 18,000 Trillion BTUs in 2010.[4] The construction industry is a major contributing factor to the world's pollution, overflowing landfills, and deforestation. In a briefing note released in 2010 by British construction company Willmott Dixon, the estimate of global pollution that can be attributed to building construction clocks in at 50% of the climate change

1 Hiss, Tony. 1990. The Experience of Place. New York: Knopf.
2 Kellert, Stephen R. 2012. Birthright: People & Nature in the Modern World. Yale University Press
3 Kramer, Melissa G. Ph.D. July 24, 2013, Our Built and Natural Environments: A Technical Review of the Interactions Among Land Use, Transportation, and Environmental Quality. Powerpoint.
4 Melissa G. Kramer, Ph.D. July 24, 2013, Our Built and Natural Environments: A Technical Review of the Interactions Among Land Use, Transportation, and Environmental Quality. Powerpoint.

gases released into the atmosphere, 40% of the drinking water pollution, 50% of the landfill waste, and comprises 25% (indirectly) of the total rainforest destruction.[5]

Aside from the effects on the natural environment, the built environments we inhabit influence our mental, emotional, psychological, and daily experiences in ways that are becoming more scientifically and culturally understood. According to a 2001 study funded by the U.S. Environmental Protection Agency (EPA) Americans spend 87% of their time indoors and an additional 6% in an enclosed vehicle (on average).[6] This study was conducted to help the EPA better understand how humans might be impacted by pollutants. It found that the health effects associated with indoor air pollutants include irritation of the eyes, nose, and throat, headaches, dizziness, fatigue, respiratory diseases, heart disease, and cancer.[7]

Further contributing to the depletion and disconnection with the natural world, is a pervasive attitude that nature can not exist in its 'pure' or 'natural' state alongside our human desires for comfort.[8] During the industrial revolution the debate about how to manage America's natural resources was split between Conservationist vs. Preservationist ideas.[9]

The two sides were led by John Muir encouraging Preservation and Gifford Pinchot who argued for Conservation. Muir was a strong advocate for allowing little to no industry profit on public lands, while Pinchot argued strongly that the land should be used - responsibly- by industry for logging, mining, and other profits.[10] Pinchot became America's first chief of the US Forest Service that now manages the use or protection of 193 million acres of forests and grasslands.

5 The Impacts of Construction and the Built Environment Effective Date: 21/09/2010
6 Klepeis et. al. J Expo Anal Environ Epidemiol. 2001 May-Jun; The National Human Activity Pattern Survey (NHAPS): a resource for assessing exposure to environmental pollutants. www.ncbi.nlm.nih.gov/pubmed/11477521
7 EPA's Report on the Environment (ROE) https://cfpub.epa.gov/roe/chapter/air/indoorair.cfm
8 Saunders, William S. Nature, landscape, and building for sustainability a Harvard design magazine reader. Minneapolis: University of Minnesota Press, 2008. Beyond Wilderness and Lawn, Michael Pollan.
9 Saunders, William S. Nature, landscape, and building for sustainability a Harvard design magazine reader. Minneapolis: University of Minnesota Press, 2008. Nature Used and Abused, Rossana Vaccarino.
10 Westover, Robert Hudson. USDA, Conservation versus Preservation? Mar 22, 2016 <www.usda.gov/media/blog/2016/03/22/conservation-versus-preservation>

The depate over conservation vs. preservation has evolved from its original form, and now includes a right wing Conservative view that aims to utilize any public land for industry. The current administration and is actively diminishing the size of many of the country's natural monuments, with a recent decision to shrink the size of Bears Ears Monument which was dedicated protected land by President Obama. "The decision to reduce Bears Ears is expected to set off a legal battle that could alter the course of American land conservation, putting dozens of other monuments at risk and possibly opening millions of preserved public acres to oil and gas extraction, mining, logging and other commercial activities."[1] These political decisions to decrease protected land limits access to wilderness in both rural and urban areas.

Many of our urban environments lack access to natural landscapes and therefore, many people grow up without a sense of connection to the larger ecological habitat that they exist in. There are very few walk-able neighborhoods where outdoor air pollutants are not a cause for concern and "neighborhoods that exhibit low pollution and high walk-ability are rare and tend to be high income and located near to but not at the city center. [While] neighborhoods with high pollution and low walk-ability are far from the city center."[2]

Our Nature Needs: how nature improves our lives

The list of positive impacts to our health encouraged and restored by a connection to nature is striking. In Why Is Nature Beneficial? The Role of Connectedness to Nature, three studies found that walking in nature promoted clearer thinking, better attention span, positive emotions, and ability to reflect on a life problem.[3] In a recent study conducted in Japan participants who walked in forests had significantly lower heart rates and reported better

1 Turkewitzdec, Julie. NYTime, Trump Slashes Size of Bears Ears and Grand Staircase Monuments 4, 2017. < https://www.nytimes.com/2017/12/04/us/trump-bears-ears.html>

2 Marshall, Julian D. Brauer, Michael. Frank, Lawrence D. Healthy Neighborhoods: Walk-ability and Air Pollution

3 Mayer, F, Cynthia Frantz, Emma Bruehlman-Senecal, and Kyffin Dolliver. 2009. "Why Is Nature Beneficial? The Role of Connectedness to Nature." Environment and Behavior - ENVIRON BEHAV 41 (September): 607–43. doi:10.1177/0013916508319745.

moods and less anxiety, than those who walked in urban settings.[4] In Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life Kellert states that a connection to nature helps to reduce blood pressure, decrease muscle tension, creates a boosted immune system, and helps with better pain management.[5] Another study conducted in 2012 found that hiking in a Natural environment relieved attention fatigue and increased creativity in participants.[6] Studies have found that images or scenes that are easy to take in, typically soothing natural environments, stimulate the release of natural opiates in the brain, which is directly related to our happiness.[7] Research also supports that feeling a sense of connection to the natural world enables and encourages larger cultural improvements, such as more pro-environmental behaviors, and more empathetic experiences toward our neighbors or strangers.[8]

The term "Biophilia" was initially used in the early 1900's medical dictionaries to describe the instinct for self-preservation.[9] Harvard biologist Edward O. Wilson proposed in his Biophilia hypothesis that our innate affinity for the natural world and the human tendency to focus on life and lifelike processes might be a biologically based need, essential to our growth as individuals and as a species.[10] Wilson's insight further supports the initial definition of the term, because our desire to remain in contact with the natural world "draws us close to adequate water, nutrition, and shelter..."[11]. However, since the Industrial Revolution the developed world has become increasingly disconnected from the natural world.

4 Juyoung Lee et al. 2014 Influence of Forest Therapy on Cardiovascular Relaxation in Young Adults
5 Kellert, Stephen R., Judith Heerwagen, Martin Mador, eds. 2008. Biophilic Design: The Theory, Science, & Practice of Bringing Buildings to Life. Hoboken, N.J: Wiley.
6 Atchley, Ruth Ann et al. 2012. Creativity in the Wild: Improving Creative Reasoning through Immersion in Natural Settings.
7 Williams, Florence. 2017. The Nature Fix: Why Nature Makes Us Happier, Healthier, & More Creative. New York: W.W. Norton & Company
8 Geng, Liuna, Jingke Xu, Lijuan Ye, Wenjun Zhou, & Kexin Zhou. 2015. Connections with Nature & Environmental Behaviors.
9 Logan, Alan C. Sclhum, Eva M. 2012, Your Brain on Nature. Page 8
10 Kellert, Stephen R; Wilson, Edward O. 1986. Biophilia
11 Logan, Alan C. Sclhum, Eva M. 2012, Your Brain on Nature. Page 9

In 1903 George Simmel wrote The Metropolis & Mental Life, a critique on the negative effects of capitalist culture on social interactions, and therefore, our mental health.[1] This critique remains pertinent when reviewing the impacts of our ever decreasing contact with the natural world and our ever increasing dependence on technology and its effects on our social experiences and physical health.

For example, in Last Child In the Woods, Saving Our Children from Nature-Deficit Disorder, Richard Louv claims that our current ability to connect to nature is being diminished, by “helicopter parenting”, “stranger danger” and a diminishing lack of curiosity to the natural world, due in part to fewer educational programs focused on promoting the exploration, appreciation, and love for nature.[2]

Maybe, Nature needs us too?

The relationship between our experiences in nature as children and our tendencies toward environmental stewardship in adulthood has been studied and is well documented.[3] Using some of these studies as a basis for his book, Louv is arguing for a cultural shift to encourage more of a connection to nature in order to benefit not only the physical and mental health of children, but to advance a desire for preserving the natural environment as well. In another study conducted in 2006 - a year after Louv released his book detailing Nature Deficit Disorder - scientists Nancy Wells and Kristi Lekies found that “when children become truly engaged with the natural world at a young age, the experience is likely to stay with them in a powerful way - shaping their subsequent environmental path.”[4]

These studies echo the writings of American novelist, poet, and environmental activist Wendell Berry who stated, “without a complex knowledge

1 Simmel The Metropolis and Mental Life 1903 <http://www.blackwellpublishing.com/content/bpl_images/content_store/sample_chapter/0631225137/bridge.pdf

2 Louv, Richard. Last Child in the Woods, Saving Our Children From Nature-Deficit Disorder.

3 Chawla, Louise. The Journal of Environmental Education, 1999,Vol. 3 1, No. 1, 15-26 Life Paths Into Effective Environmental Action.

4 Wells, Nancy M. and Kristi S. Lekies. (2006). “Nature and the Life Course: Pathways from Childhood Nature Experiences to Adult Environmentalism.” Children, Youth and Environments

of one's place and without the faithfulness to one's place on which such knowledge depends, it is inevitable that the place will be used carelessly and eventually destroyed." Without a strong understanding or attachment to nature people are less likely to act as responsible agents of the environment.[5]

Back To Nature: The Romantics were on to something

The intellectual, artistic, and literary Romantic movement developed as a reaction to the demand for progress at the cost of natural resources, and urged for a more emotional and spiritual connection to nature. The Romantics advocated for a connection to nature in response to the Age of Enlightenment - an age predicated on 'knowing all things', championing the scientific method and - above all - mastering nature.[6] In Nature's Economy, A History of Ecological Ideas, Donald Worster states, "at the very core of a romantic view of nature was what later generations would come to call an ecological perspective: that is, a search for holistic or integrated perception, an emphasis on interdependence and relatedness in nature, and an intense desire to restore man to a place of intimate intercourse with the vast organism that constitutes the earth"[7].

Proponents of the Enlightenment believed that man has the power to stand apart from nature and to manipulate it according to his desires, interests, and needs.[8] The Romantics believed the growing divide between man and nature via the industrial revolution was going to cause major harm to our spiritual selves. It was not until recently, with academics and scientists such as E. O. Wilson, Stephen R. Kellert and Judith Heerwagen and their research into biophilia and biophilic design, that Romantic ideals have found the scientific basis for their arguments. Research into Wilson's biophilia hypothesis has generated myriad reasons to support the idea that without a deep connection to nature in our lives, humans suffer.

5 Kellert, Stephen R. 2012. Birthright: People and Nature in the Modern World. Yale University Press
6 Hay, Peter. 2002. Main Currents in Western Environmental Thought. UNSW Press. Page 4
7 Worster, Donald, 1985. Nature's Economy, A History of Ecological Ideas. Cambridge University Press. page 82
8 Hay, Peter. 2002. Main Currents in Western Environmental Thought. UNSW Press. Page 5

A Design Challenge: How to connect the natural world with our built environments

We are beginning to identify just how important the built environment is in regard to its influences on our health and well-being. Architects and designers have the position and the power to advance a variety of design solutions to this complex problem. As Kellert, Heerwagen, and Mador put it, "We designed ourselves into this predicament and theoretically can design ourselves out of it...."[1] In the 19th century there was a major effort with public planning to address the growing issue of public health in our urban environment as crowded cities led to massive health issues. This prompted dramatic public planning improvements such as sewage systems, zoning regulations, and more access to light and fresh air.[2] However, since that point the vast majority of design decisions have been made based on aesthetic or economic decisions, and not on health.[3] Howard Frumkin writes in Urban Sprawl and Public Health about how our communities affect the amount of time we spend in cars, and the growing necessity of physical activity due to sedentary lifestyles, which increases the risk of cardiovascular disease, stroke, diabetes, and obesity, brought on by the suburban method of city planning.[4]

With the growing body of research affirming our inherent need for a connection to the natural world, there is an increasing number of architects and designers working to find "an approach that aims at both a low environment impact strategy that minimizes and mitigates adverse impacts on the natural environment, and a positive environmental impact or biophilic design approach that fosters beneficial contact between people and nature in both modern buildings and Landscapes." [5]

1 Kellert, Stephen R., Judith Heerwagen, and Martin Mador, eds. 2008. Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life. Hoboken, N.J: Wiley.
2 Perdue, Wendy Collins, Stone, Lesley A., Gostin, Lawrence O. 2003 The Built Environment and Its Relationship to the Public's Health: The Legal Framework
3 Perdue, Wendy Collins, Stone, Lesley A., Gostin, Lawrence O. 2003 The Built Environment and Its Relationship to the Public's Health: The Legal Framework
4 Frumpkin, Howard. 2004. Urban Sprawl and Public Health, Designing, Planning, and Building for Healthy Communities
5 Kellert, Stephen R., Judith Heerwagen, and Martin Mador, eds. 2008. Biophilic Design: The Theory, Science, and Practice of Bringing Buildings to Life. Hoboken, N.J: Wiley.

Frank Lloyd Wright, Falling Water

Antoni Gaudi, Casa Mila

Rogner Bad Blumau, Friedrich Hundertwasser

There are many examples of architecture and design that attempt to correct or encourage a sense of connection to the natural world. Architects such as Frank Lloyd Wright, Antoni Gaudi, and Friedrich Hundertwasser spent their careers developing solutions that enhanced our experience of nature in our built environments.

Modern projects like the Fuji kindergarten near Tokyo Japan a 2007 project by Tezuka Architects, brings the excitement and experience of natural play space for children to an urban area.

The ACROS building by Emilio Ambasz in Fukuoka Japan, is another example of bringing green space to built urban environments. This ambitious project contains over one million square feet of multipurpose space. Built on what was the last remaining green space in the city, Ambasz used this project to help redefine what we mean by "man-made nature".[1] This fifteen story commercial center provides a terraced garden landscape encouraging a variety of activities for its users. However, the terraces are only accessible from the outside park area, missing out on an opportunity to break down the barrier between our interior and exterior environments. Bringing it all together

Being connected to nature promotes health and wellbeing across generations and cultures and our sense of connection to the natural world is a major factor in our desire to act as responsible environmental agents. However, our built environments do not easily facilitate this connection. Our urban environments are becoming more and more void of the possibility for connection to nature, and we need to be spending more time connected to nature for the benefit of our mental and physical health. How can we design interior environments that foster a sense of curiosity in the natural world in children and adults?

1 Wines, James. 2000 *Green Architecture* Taschen

"The danger now is too much reliance on those illusory visions of a technological salvation in the face of a vastly more complex problem of psychological distress caused by an alienation from nature and the lack of an earth-centered philosophy"[2] -James Wines

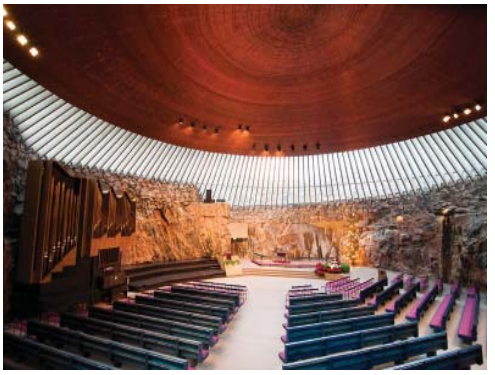
2 Wines, James. 2000 Green Architecture Taschen. Page 227

PRECEDENT STUDIES

JAMES TURRELL: Sky Space

PETER ZUMTHOR: Bruder Klaus Chapel

TIMO & TUOMO SUOMALAINEN: Rockchurch



MASS DESIGN GROUP: Butaro Hospital

HUNDERTWASSER : Bad Blumau

FRANK LLOYD WRIGHT : Falling Water

I began looking at places where we experience a connection to nature in our built environments. Churches, Chapels and Meeting houses are some places that I've personally felt the same sense of connection to nature as I would overlooking a cascading mountain view. Other places where we may have this experience is in our urban gardens, where we get to experience the joy of producing our own food. I also looked into architects who design with vernacular nature in mind, such as Frank Lloyd Wright, Huntervasser, & Mass design group.

From there I focused in on places where a large population of people are able to experience a connection to nature on a daily basis: the following two Kindergartens are great examples of developing a connection to nature and learning directly from our experiences with the natural world.

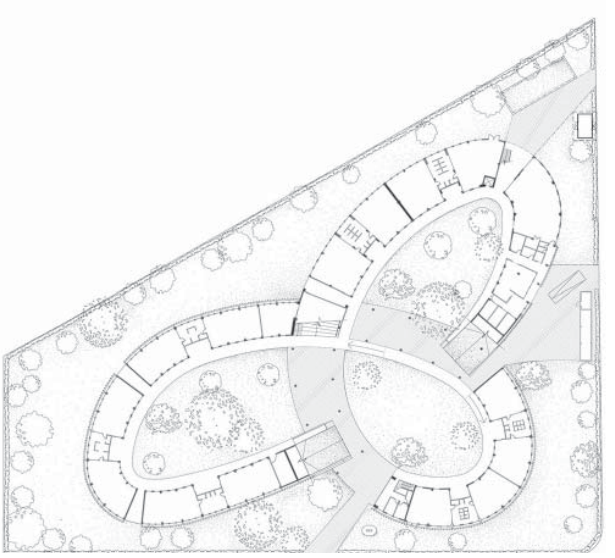
FARMING KINDERGARTEN
VO TRONG NGHIA ARCHITECTS
Vietnam, 2013

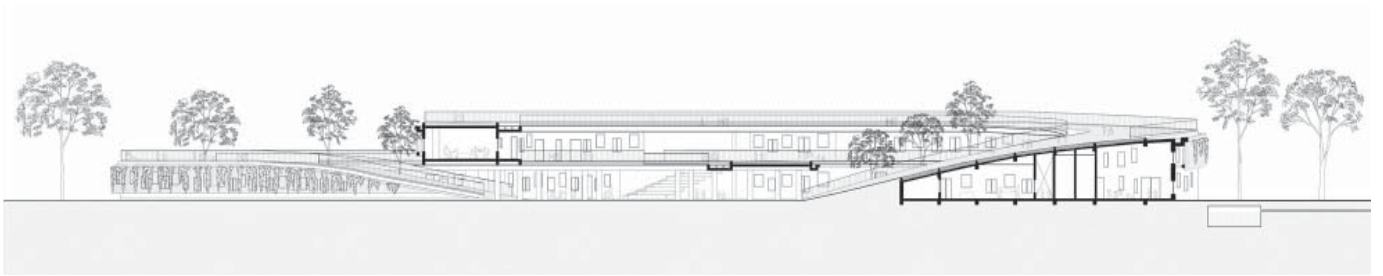
Designed for 500 children of nearby factory's workers. This kindergarten includes a continuous green roof, providing food and agriculture experience to children, as well as an extensive playground to the sky.

A three-pronged loop shape across two floors, with the rooftops spiraling down to ground level.

The building is made of a continuous narrow strip with two side operable windows which maximize the cross ventilation and natural lighting.

Three interior courtyards act as safe playgrounds.





FUJI KINDERGARTEN
TEZUKA ARCHITECTS
Tachikawa near Tokyo, Japan. 2007

The school follows the Montessori Method, an educational approach where children are given freedom to roam around the classroom and learn via discovery.

Rather than impose physical boundaries on the children, Tokyo-based architect Takaharu Tezuka designed the kindergarten as a continuous space that allows for unfettered learning and play.

He calls his concept the “nostalgic future”, where he looks at the way children would naturally choose to play without gadgets and screens, then facilitates it with future-forward designs.

PROGRAM

For my program I began thinking about where people spend the most time inside, and where exposure to the natural world could really make a difference in people's lives and their experience. One answer is our large institutions such as schools and prisons. Unfortunately the growing trend is there are more and more prisons and fewer and fewer schools.

I decided a place to being tackling this issue would be a school for 5th - 8th grade students. The school would focus on firsthand learning experiences, especially outside in an urban garden. It would include a 'Teaching Kitchen' for students and the community, and also a rent-able commercial kitchen to generate revenue and provide needed space for local businesses. In addition the program would create an alliance with other local companies and businesses to provide exposure to local natural landscapes and experiences.

In urban areas access to green space is so rare, and connecting to what little there is around us is incredibly important. Healthy and fulfilling exposure to the natural world at an early age is such an important aspect in the development of ecologically and socially minded adults. Children in late childhood and early adolescent ages are beginning to define and understand their role in the world, outside of their immediate families and they begin to develop an overwhelming social interest. In Montessori teaching philosophy children in 7th and 8th grade work on a farm to gather the vital experience and understanding of their impact on the earth. I wanted to explore bringing these themes to an urban area, and also find ways to engage the larger community through food and education.

PROGRAM REQUIREMENTS

Administrative		
work area	600	600
waiting area	200 - 400	300
principals office	250	250
mail, copy, processing	600 - 800	700
assistant office	150	150
guidance councelor	150 per counselor plus waiting area if clustered	300
faculty workroom	400 - 650 (one per 125 students)	800
adult toilet	200 (varies) one per 125 students	400
teacher/student conference	500 - 750 one per 125 students	1200
teachers Resource Area	600	600
Auditorium **	school capacity x %50 x 7 sq ft	875
Art facility	1,000 - 1,200 (one per 125 students)	2000
Cafeteria **	School capacity x %50 x 12 sq ft	1500
Classrooms	770 - 1,000 each	9625
Common areas /courtyards	20 sq ft per student	5000
Greenhouse	1,000 - 2,000 sq ft	2000
Gymnasium	3,500 sq ft per 250 students	3500
Health Services	min 800 sq ft per 200 students	
waiting area	200 - 400	200
office	100	100
exam area	80 per station, 1 station for 150 students	160
rest area	80	80
toilet	450	450
Kitchen	1/3 size of dining area	500
Library	10 sq ft per student	2500
Lobbies	200 sq ft each for 100 students	
450		
Multipurpose Rooms	dependent on population and use	
Music Education	850 - 1,200 sq ft per 250 students	1200
Restrooms	1 toilet - 20 girls, 1 toilet & 2 urinals - 40 boys	
Science Facility	1,000 - 1,200 per 125 students	2400
Teaching Kitchen **	1,000 - 2,000 sq ft	2000
Tech and Media Areas	850 - 1,200 on per 250 students	1200

** NEEDS SERVICE ENTRANCE

NET TOTAL	=	41,040 sq ft
+ 30 % CIRCULATION	=	12,312
GROSS TOTAL	=	53,352 sq ft

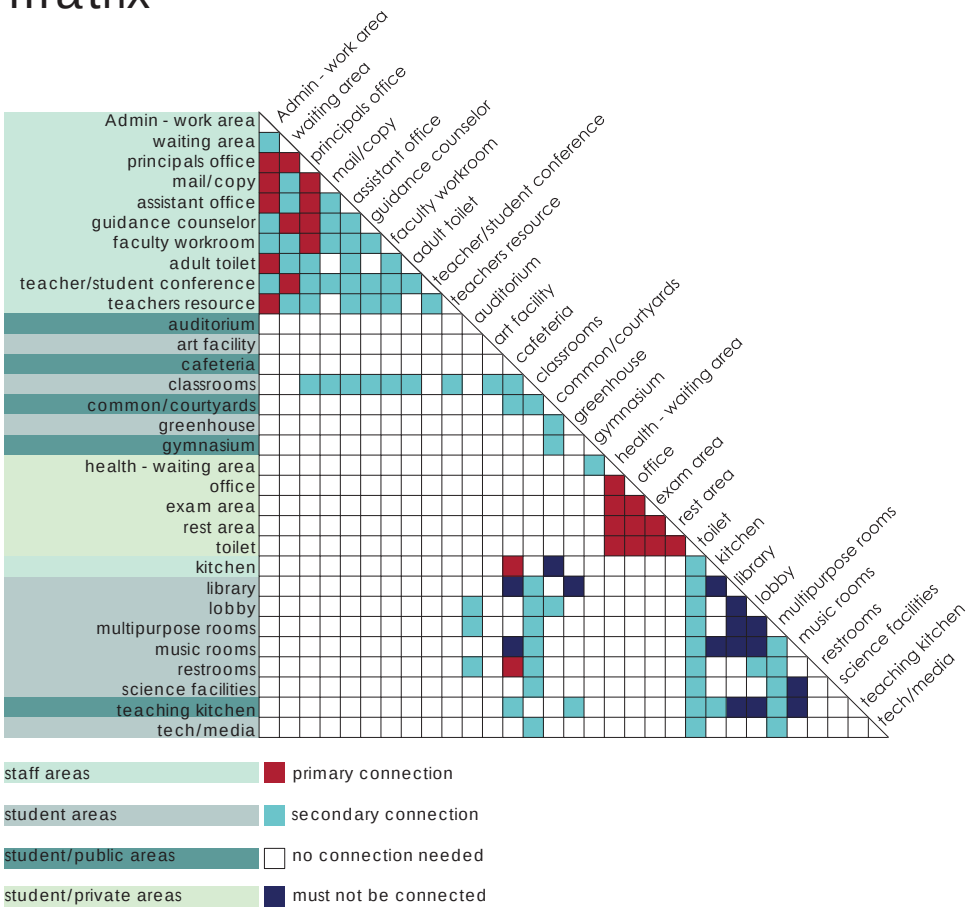
305.1 Educational Group E - sprinklered

area	sq ft	floor area/ occupant	persons
first floor			
offices	3800	100 gross	38
multi/auditorium	3600	15 net	240
health offices	1149	100 gross	11
atrium space	3000	50 net	60
		total	349
second floor			
kitchen	988	200 gross	5
cafeteria	2400	15 net	160
art & music classrooms	2804	50 net	56
		total	221
third floor			
library	3110	100 gross	31
study hall	960	15 net	19
open computer lab	1980	50 net	39
science classrooms	1550	50 net	31
		total	120
fourth floor			
classrooms	3600	20 net	180
		total	180
fifth floor			
classrooms	3600	20 net	180
		total	180

restroom requirements : single sex with pans and urinals for males plus accessible unisex

females		
	pans	11
	basins	4
males		
	pans	9
	urinals	2
	basins	4
unisex/accessible		2

matrix



PROGRAM

CASE STUDIES

THE WILLOW SCHOOL
Gladstone, NJ

Founded in 2000
Independent, Co-educational Pre-K - 8th
Campus: 4 buildings on 34 acres
Enrollment: 124 students
Average Class Size: 12-17
Faculty members: 23
Administration/Staff: 11
School Hours: 8:00am-3:00pm

The Willow School has a deeply intertwined virtues program connecting respect for other people with respect to the environment. In both their educational model and their architecture and connection to place, the Willow School's mission of educating and encouraging socially conscious lives is evident throughout the campus. The buildings consist of some original structures, including the farm house and barn that date back to the 1800's, to one of the nations only certified educational "living buildings", built in 2015. This Health and Wellness building is at the forefront of what net zero architecture can provide in our built environments, both in terms of its impact on the earth and also on our experience in interior environments.

DC CENTRAL KITCHEN
Washington, DC

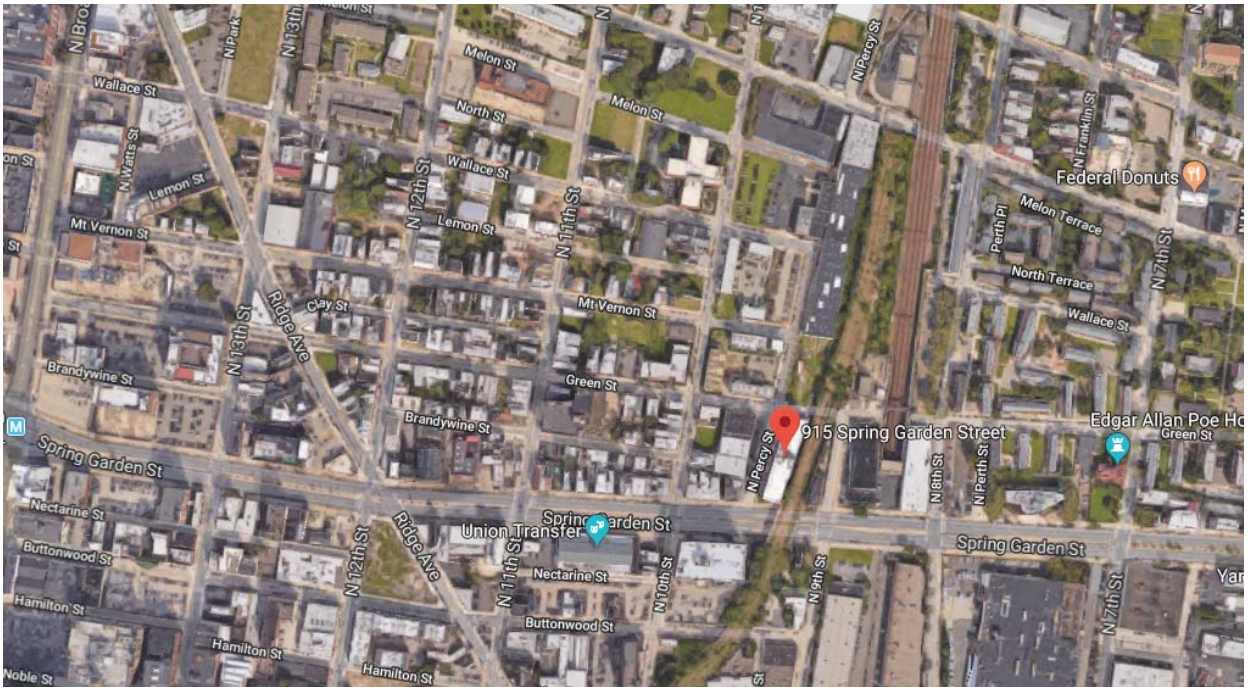
Founded in 1989
Preparing 1.8 million meals each year
Culinary job training: 88% job placement rate
Distributing 5000 meals each day

Through their Culinary Job Training, Community Meals, Healthy School Food, Healthy Corners, and The Campus Kitchens Project, DC Central Kitchen has various programs to fulfill its mission of battling hunger, homelessness and access to healthy food for everyone. Housed in the basement of a homeless shelter, DC Central kitchen prepares around 5000 meals everyday with the help of volunteers and their culinary program. Meals are delivered to schools, halfway houses, and other non profits. Most of the food prepared has been donated by local restaurants & food retailers that would otherwise be thrown away.

With the help of annual fund-raising events like the Capital Food Fight, DC Central Kitchen is able to run many of its non-profit programs. These events also engage the wider community in its mission by providing an entertaining event appealing to food lovers of all levels. In 2017 Capital Food Fight raised over $638,000 For DC Central Kitchen.

CASE STUDY

SITE DOCUMENTATION

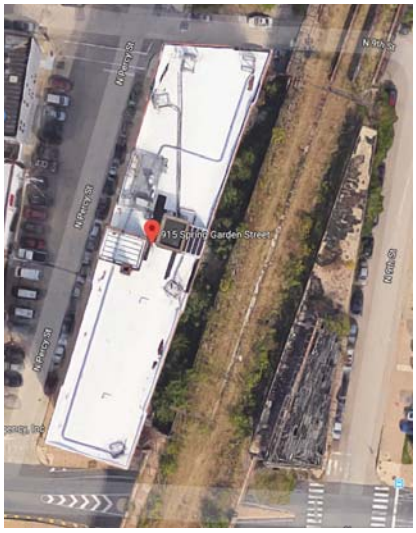


915 SPRING GARDEN

Built in 1909, 915 Spring Garden was originally used for the offices and overnight quarters for employees of the Reading Railroad. During the era of heavy industry when trains were the primary means of long distance travel and commerce, 915 Spring Garden Street was a focal point of industry for Philadelphia. Since its beginning, 915 Spring Garden has been a textile factory, printer, warehouse and artist studios.

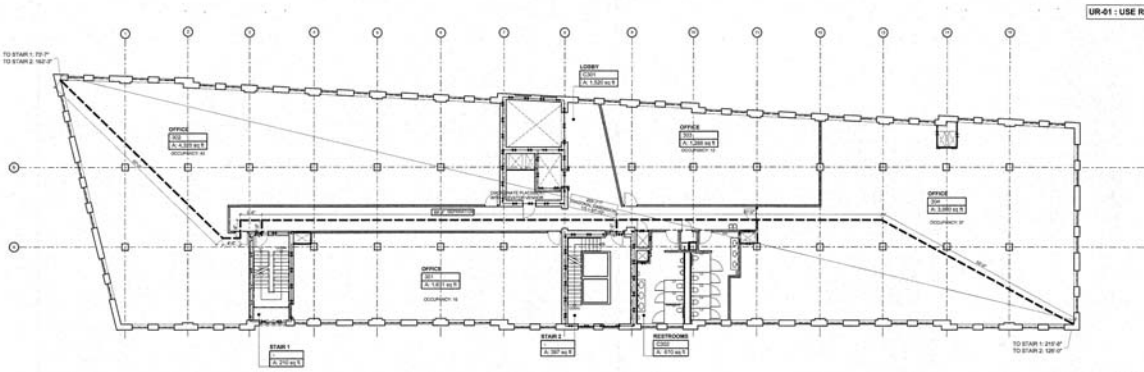
In 2015 a small fire on the 4th floor led to code inspections and infractions which put the inhabitants at risk and the Artist Studios that had inhabited the space for three decades had to move out. After a few years of vandalism and neglect the building is currently undergoing major renovations and will be turned into commercial use.

The site location is very urban, with direct connections to major throughway's such as the vine street express way, SEPTA train lines, and bus routes.



In addition, the old Reading Railroad tracks that run adjacent to the structure provide the opportunity for access to green space. The photo to the right is a view of what those tracks look like today, overgrown with various species of plants, and home to many urbanized wild animals.

UR-01 : USE REGISTRATION 8/21/2017



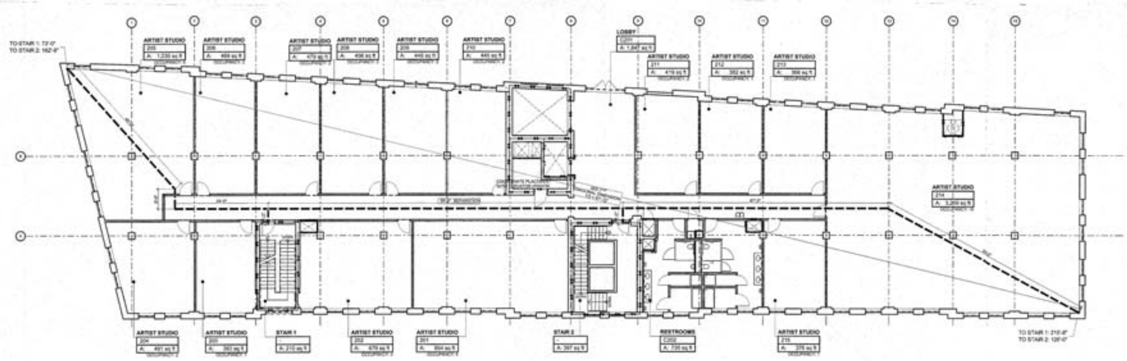
2 A-2 3RD-5TH FLOOR USE REGISTRATION

SCALE: 3/32" = 1'-0"

Pg 2 of 3

811871

REFERENCE ONLY



1 A-2 2ND FLOOR USE REGISTRATION

SCALE: 3/32" = 1'-0"

[BOX]WOOD ARCHITECTS LLC
THE PHILADELPHIA BUILDING
1315 WALNUT STREET
SUITE 1614 . PHILADELPHIA, PA
19107 . TEL: 215.845.2215

JOHN WECKERLY, RA
PARTNER

JOB #:

915 SPRING GARDEN

915 SPRING GARDEN STREET PHILADELPHIA PA 19123

SCALE: AS NOTED

19-003

DRAWN BY: BG / PB

APPROVED: JW

Issue	Description	Date
UR-01	USE REGISTRATION	8/21/17

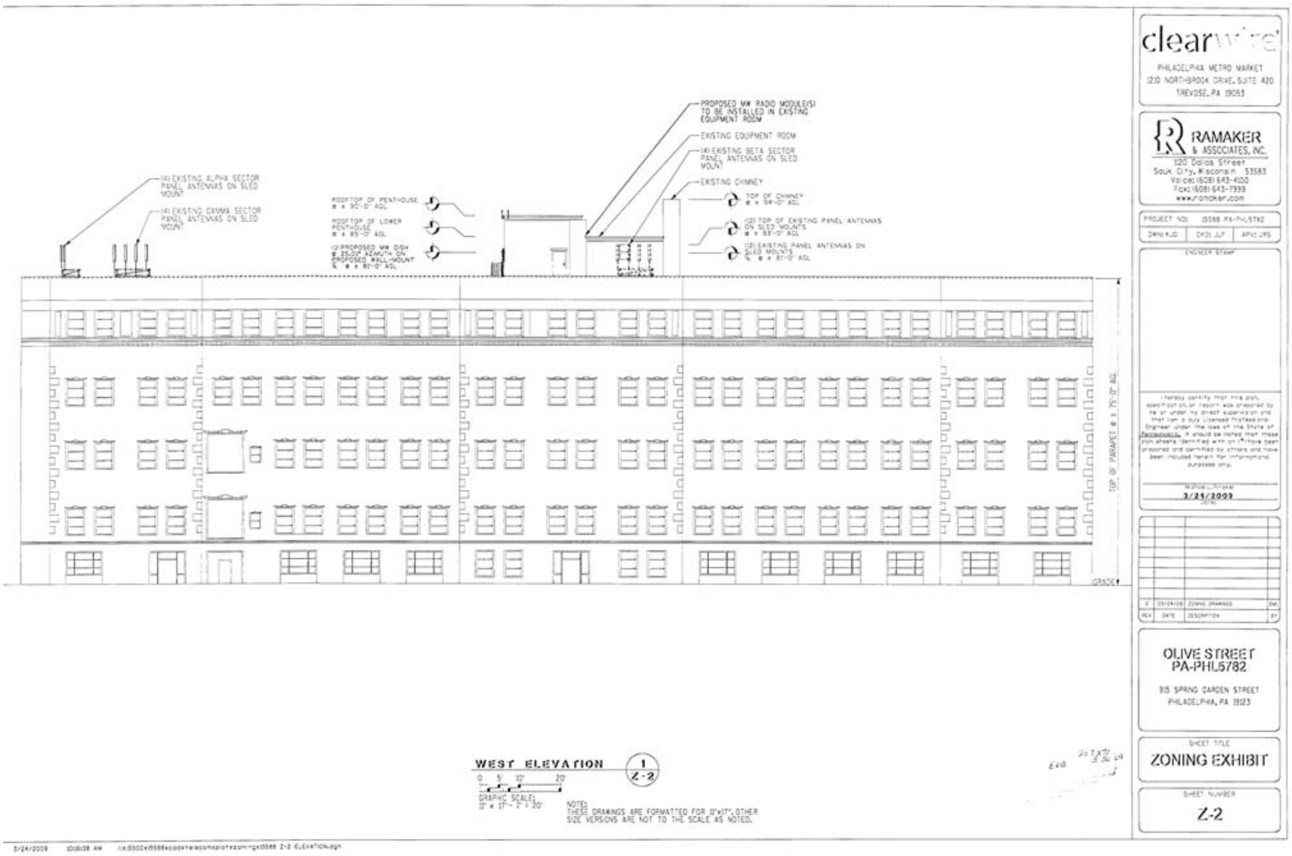
ORIENTATION:

TITLE:

USE REGISTRATION

DWG. NO.:

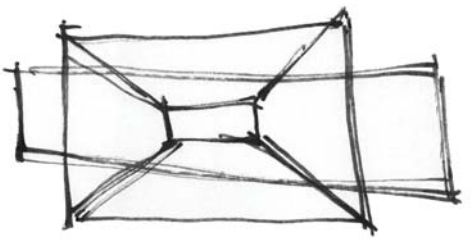
A-2

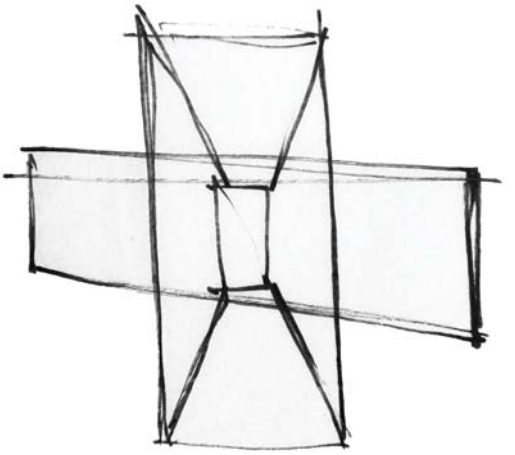


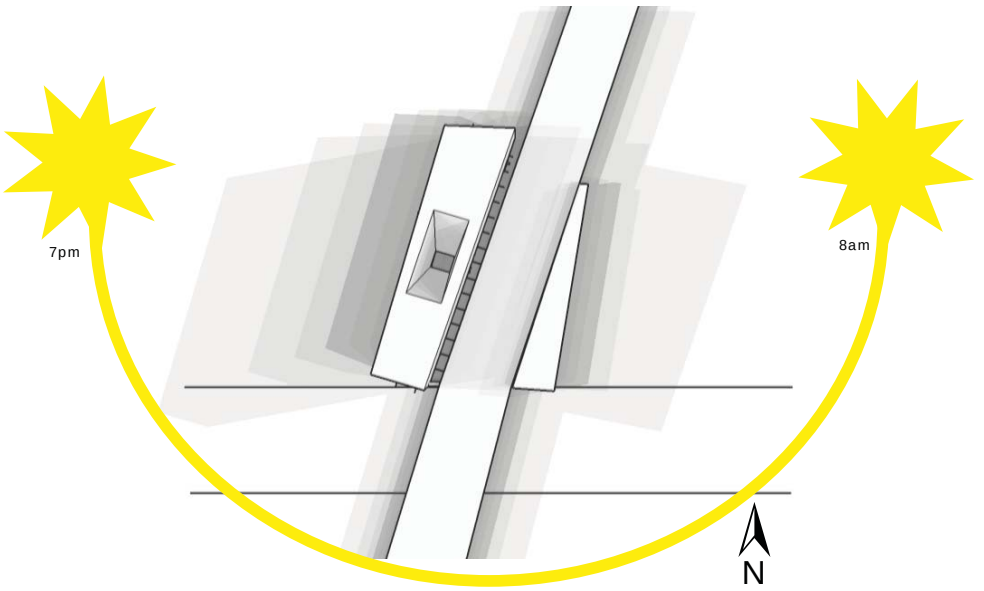
SITE DOCUMENTATION

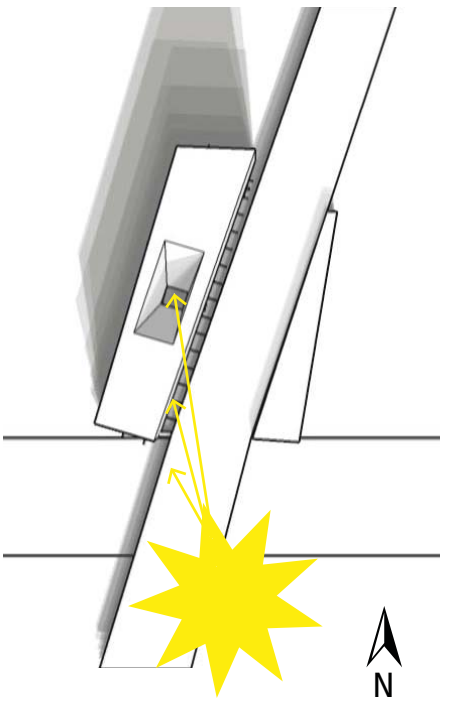
SITE ANALYSIS

SUN STUDIES & PARTI



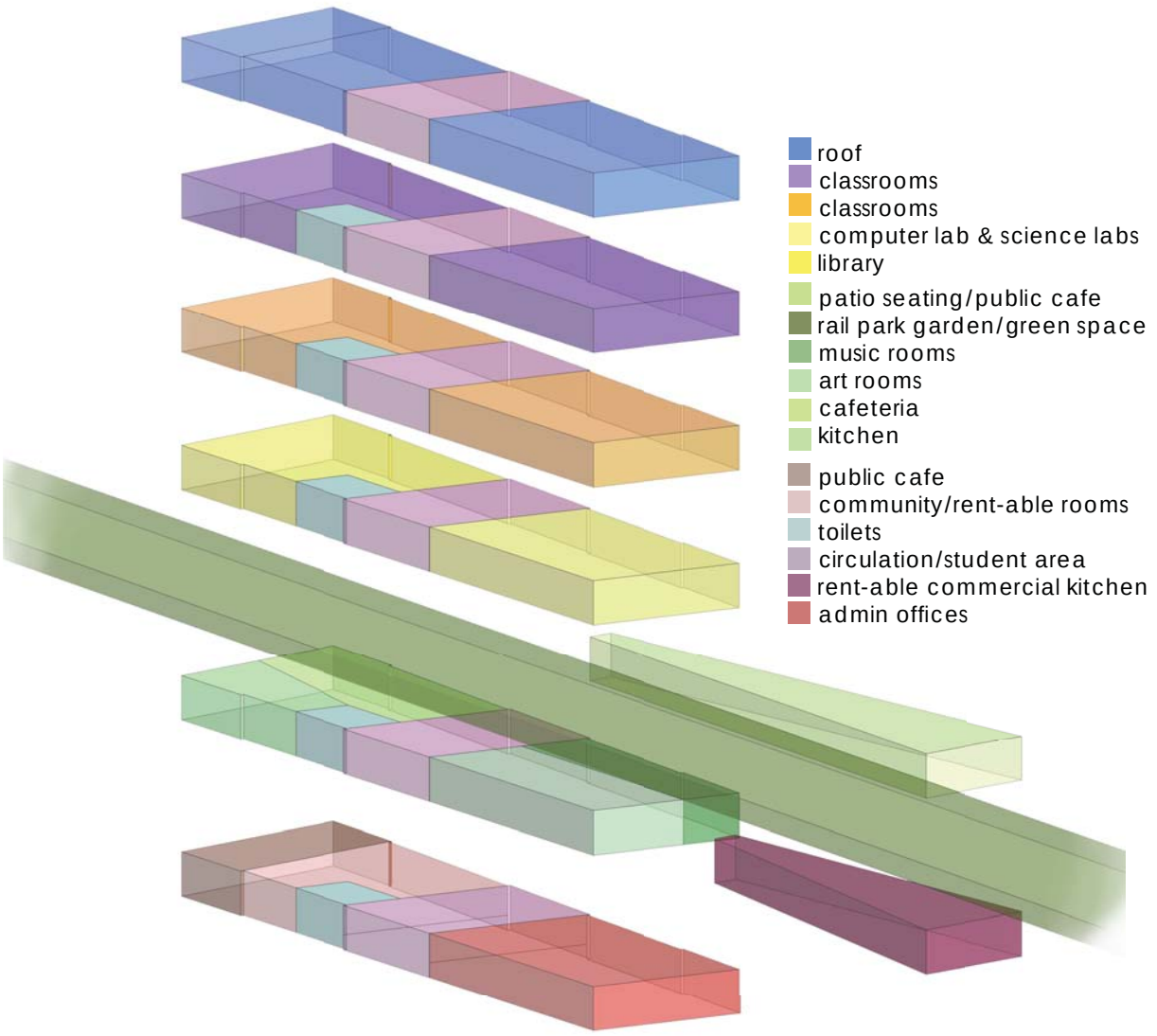






Various sun studies (many not shown) and this parti generated the basis for the shape of the atrium. The goal was to allow the maximum amount of sun light to down to the first floor without diminishing too much of the usable floor area on each story. This 3D trapezoid wedge shape provided the solution.

STACKING DIAGRAM



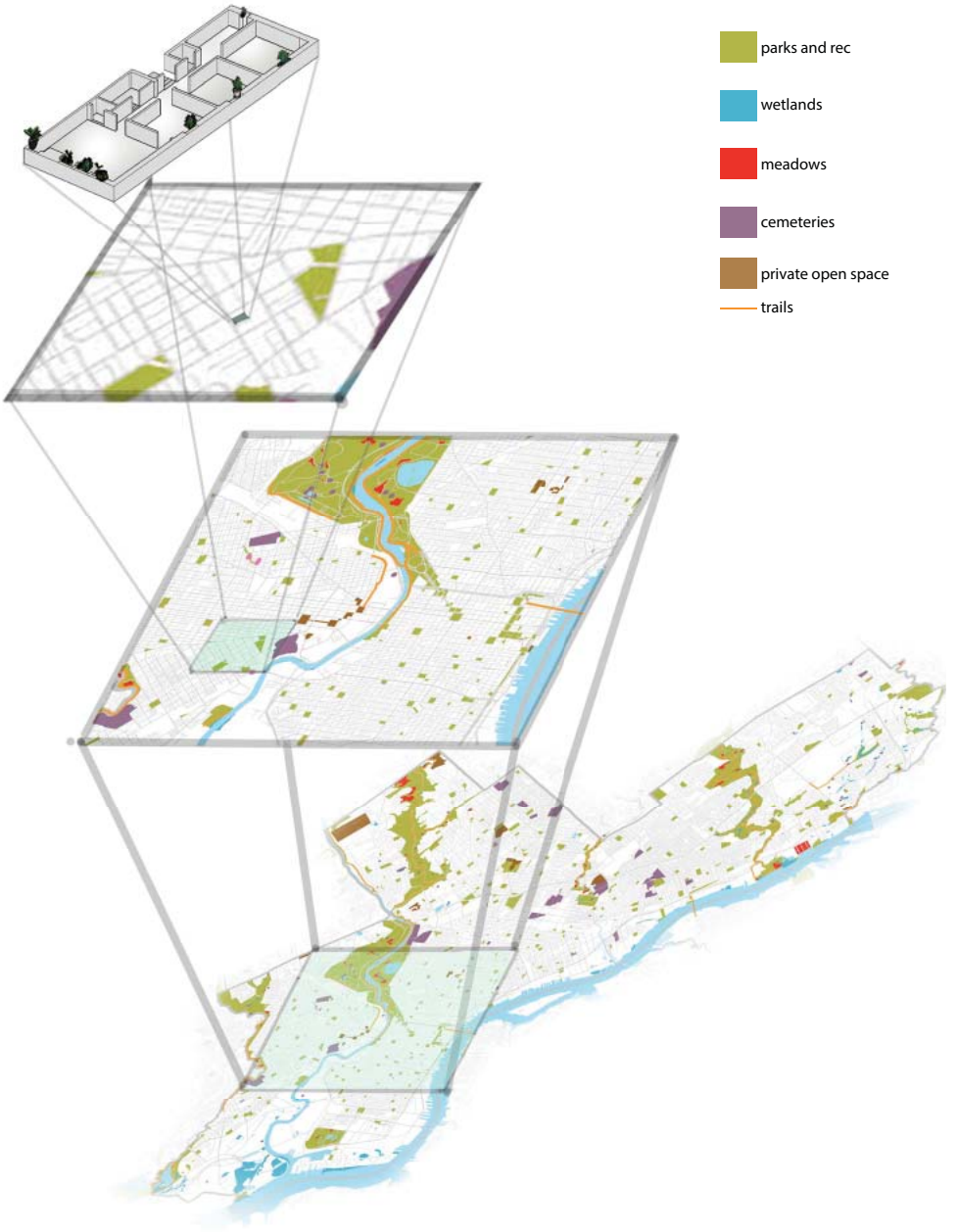
The first three floors of the site are more open/ public access, while the classrooms on the 4th and 5th floor become more private and secure. Encouraging community involvement and participation in the site outside of regular school hours is a huge component of the program, therefore an open and inviting main circulation system was critical, as well as access to the public cafe, computer labs, library, etc.

DESIGN STRATEGY & PROCESS

The following design probes were the beginning of the exploration into what kind of project to focus on. Through thinking about Nature in Interiors in terms of scale, experience, and materiality, an idea began to crystallize.

Process work includes a conceptual collage and a sketchbook to document the evolution of ideas.

SCALE



Scaling my own connection to green space, access and experience in the city of Philadelphia. Noticing the areas with very little nature nearby and how I personally find ways to have nature be a normal part of everyday experiences.

Rotating green walls allow plants to spend most of the year soaking up the sun on the outside of the home, and can easily rotate indoors during the colder months, or whenever one needs a little more green in their view.

BRING IN GREEN

Rotating green windows allow for the same flexibility as the walls; perfect for the urban homeowner who only has smaller window openings available.

EXPERIENCE

INTERVIEW WITH XIAO LONG:

Q: what was your experience with nature as a child?
A: Grew up in a mostly urban area.
Avoided nature: very cold in the winter months. In the summer stayed inside to avoid the bugs.
Was very afraid of bugs as a kid, and it has developed into a serious phobia as an adult. Grandmother told her not to let caterpillars get on her cause they were “poisonous”, which instilled a fear that has grown with age. Hates ALL bugs. Didn’t want to work in the garden with her father when in high school because there were too many bugs.

Grew up in a house full of plants, grandma and dad both gardened. Thinks plants are “cute” and “aesthetically pleasing”.

Went hiking in the mountains in college to “get away. It was good exercise. Provided better air. Felt different from everyday life. Good reason to hang out with friends. Went to go see animals in the zoo in the mountains, fun to look at, “good distraction”.

Q: Where do you experience Nature in Philadelphia?
A: Fairmount Park, Schuylkill River side. Some of the “fake” Natural Environments do not give a sense of relaxation.

Nature is an ‘Environment’, not an ‘Element’

Need to feel like a tiny piece of it all, reminded of our scale in reference to the world.

Q. Do you think your Cat is a piece of the Natural World?
A: Cats are a reminder that there is a larger world outside, but they themselves are not “nature”. They are a good “distraction” fun to look at.

EXPERIENCE:

1 - Exposure Therapy Room --

A series of enclosed spaces where different kinds of insects are able to be see first, but with a barrier between, moving into a different room without a barrier between the insects and the user.

2 - Apartment redo --

A wall for the Cat to climb on, a balcony full of small trees and shrubs and plants, a built in fire place, a murphy bed that converts into a sofa easily. Room to hang with friends and watch the animals play!

MATERIALITY

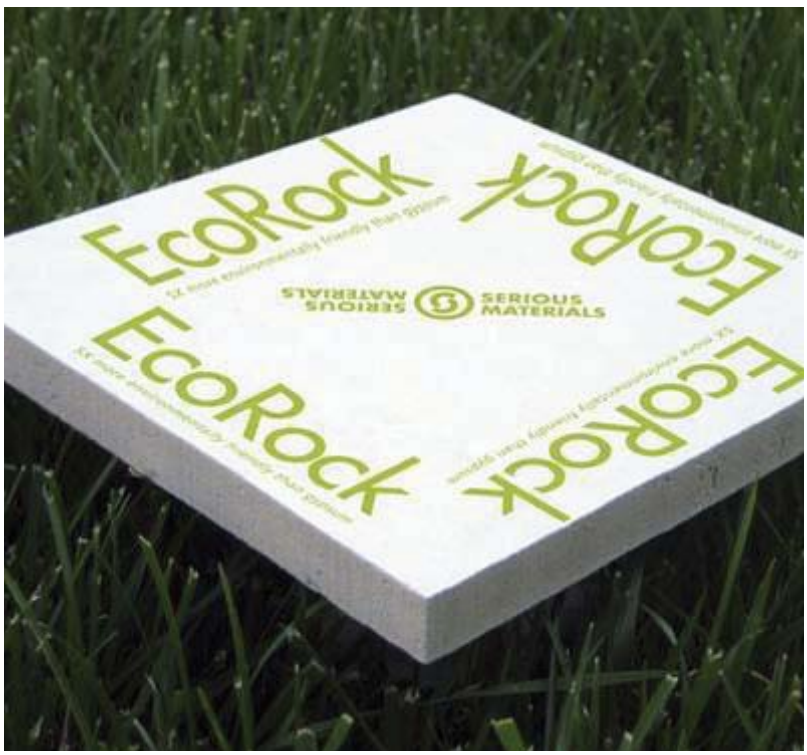
Glass roof tiles, allowing light into interior spaces in a unique way.

Moss Bath Matts, for adventurous people who are not afraid of a little dirt.

Slate - ish Tiles made from recycled counter-tops look like stone.

3D printed algae.
Eric Klarenbeek &
Maartje Dros

Bio-glass -
post consumer
recycled glass
counters,



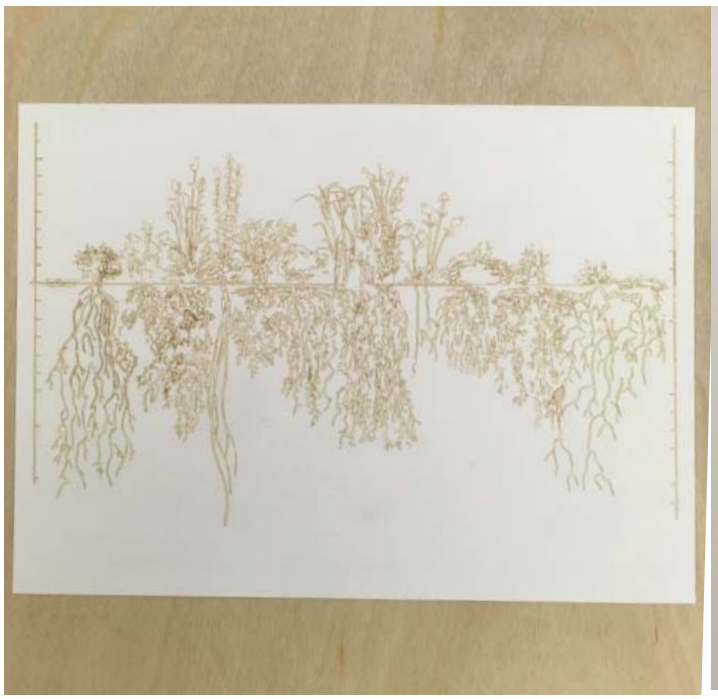
EcoRock is made of
80% post-industrial
recycled materials
and requires 80%
less energy to
produce than
regular drywall. It
can also be used
as a pH additive
for soil and is safe
to dispose of in
landfills.

CONCEPTUAL COLLAGE

An exercise in the exploration of space, atmosphere & materials. This space evokes the feeling of a walk in the woods. Access to interior and exterior spaces is blurred, with no clear distinction between the two.

PROCESS - SKETCHBOOK

This sketch book came into being after many discussions about how to clearly articulate the entire journey of this thesis. I felt there was more to the story that needed to be shared: trips to influential sites, half finished ideas about outdoor seating, research experiences from before this thesis even began, and more. All of these items played a role in the culmination of this project and were important aspects of my thought process to share.



"the future will belong to the nature-smart - those individuals, families, business, and political leaders who develop a deeper understanding of the transformative power of the natural world and who balance the virtual with the real. The more high-tech we become, the more nature we need."

-richard louv

"without a complex knowledge of one's place and without the faithfulness to one's place on which such knowledge depends, it is inevitable that the place will be used carelessly, and eventually destroyed."

-wendell berry

:HOME:

Keeping as much plant life as possible alive in a small apartment, with very few windows....

"DESIGN KIND" LECTURE

cultural shifts:

- FUTURE FOLK
- MATERIAL CHOICE
- FREE STYLE
- RETURN HOME

QUESTIONS?

Where do we keep a large populations indoors for a majority of their day?

- schools
- prisons

There are more & more prisons & fewer & fewer schools

INTEREST: community engagement:

- FARMERS MARKETS
- CAFE's
- COMPUTER LAB - ACCESS
- HEALTH - FOOD & EDUCATION

- GREEN SPACE IN URBAN AREAS
  - Utilize what we have
  - EXPAND

Louisana Museum, Denmark.

CASE STUDY: ethical relationship with nature

THE WILLOW SCHOOL

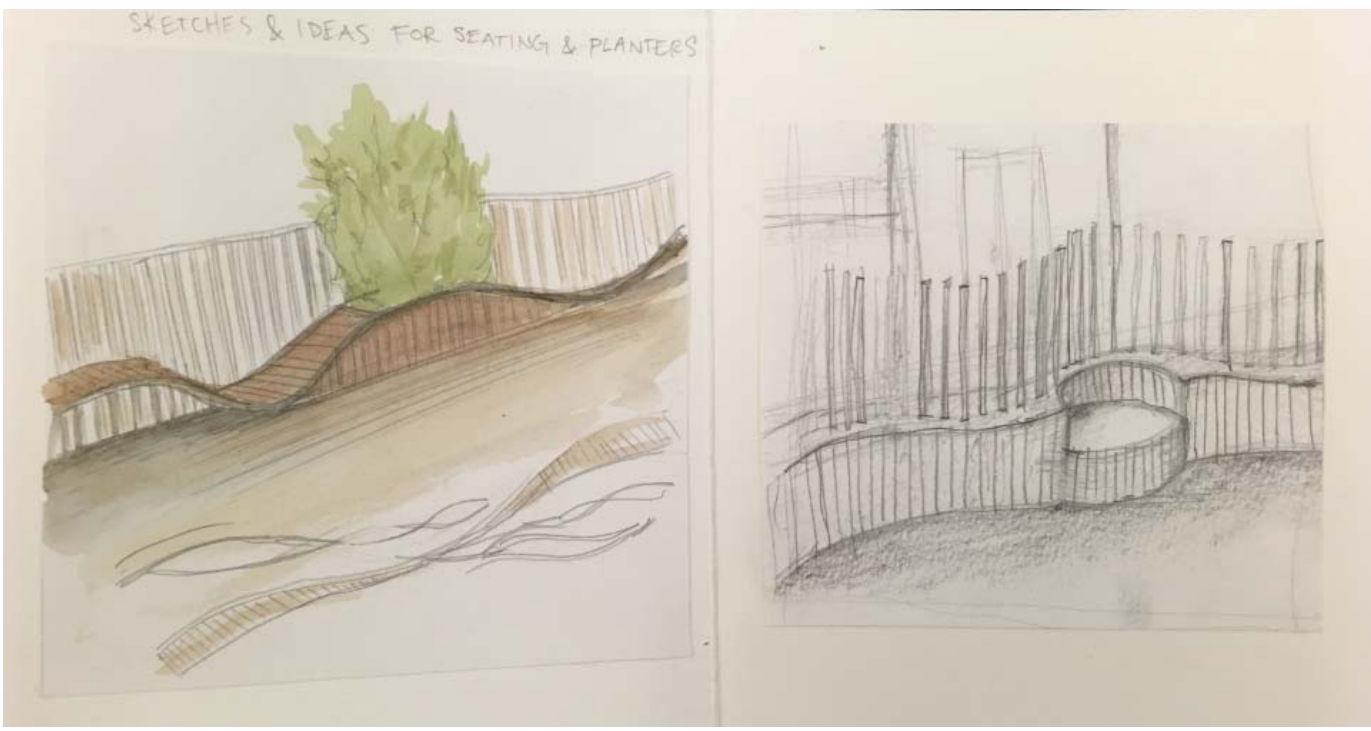
Health, wellness & nutrition center: First Living Building, Educational, in the U.S.

WORK WITH THE SCATTERGOOD FOUNDATION.

RESEARCH: SOCARP. studying playgrounds at:

A school should: help children develop a sense of PRIDE, RESPONSIBILITY, OWNERSHIP, & ADD VALUE to the community.


Falling Water


SKETCHES & IDEAS FOR SEATING & PLANTERS

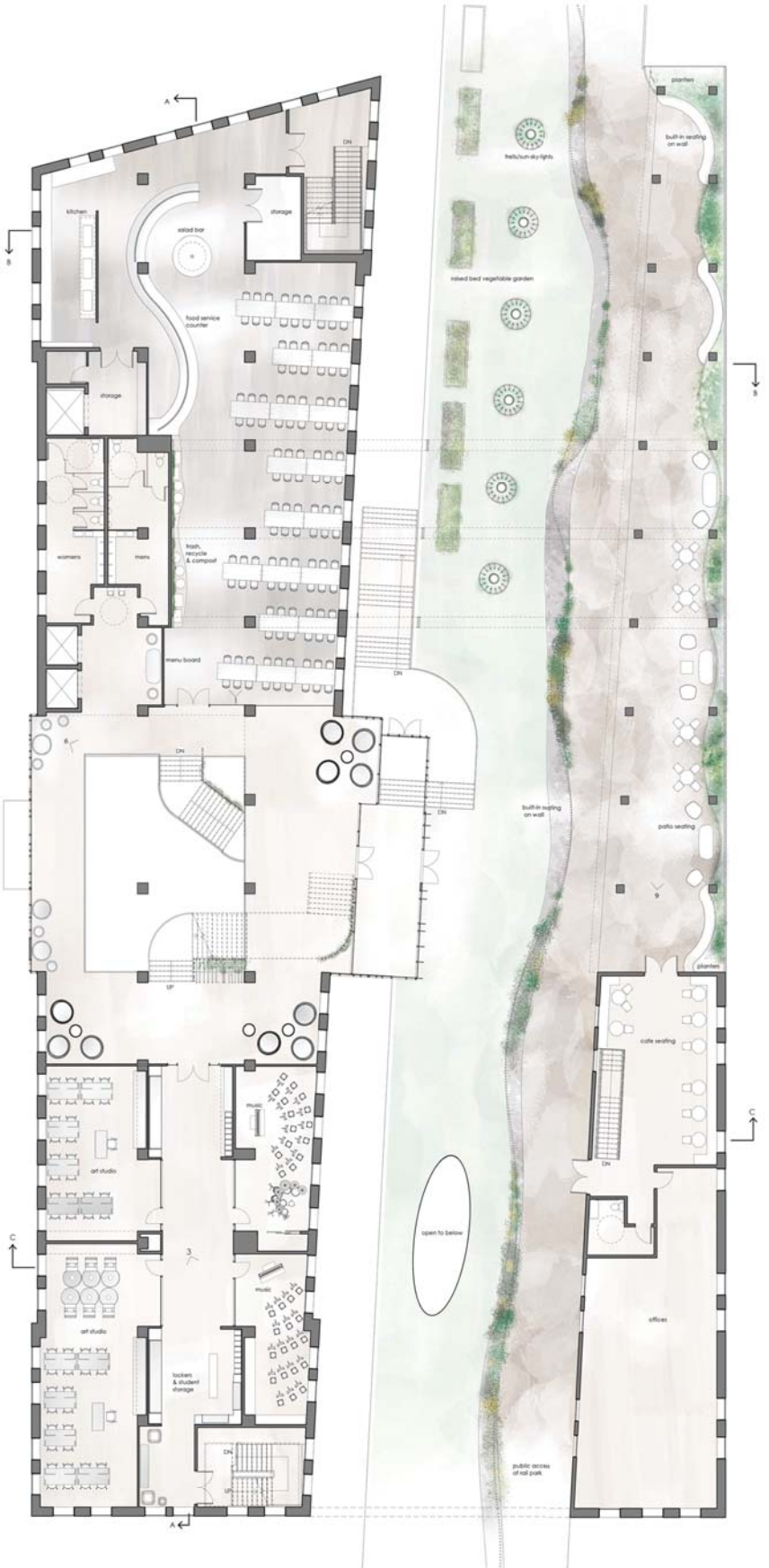
FINAL DESIGN

URBAN WILDERNESS SCHOOL:

Supporting Ecological Connection, Respect & Behaviors

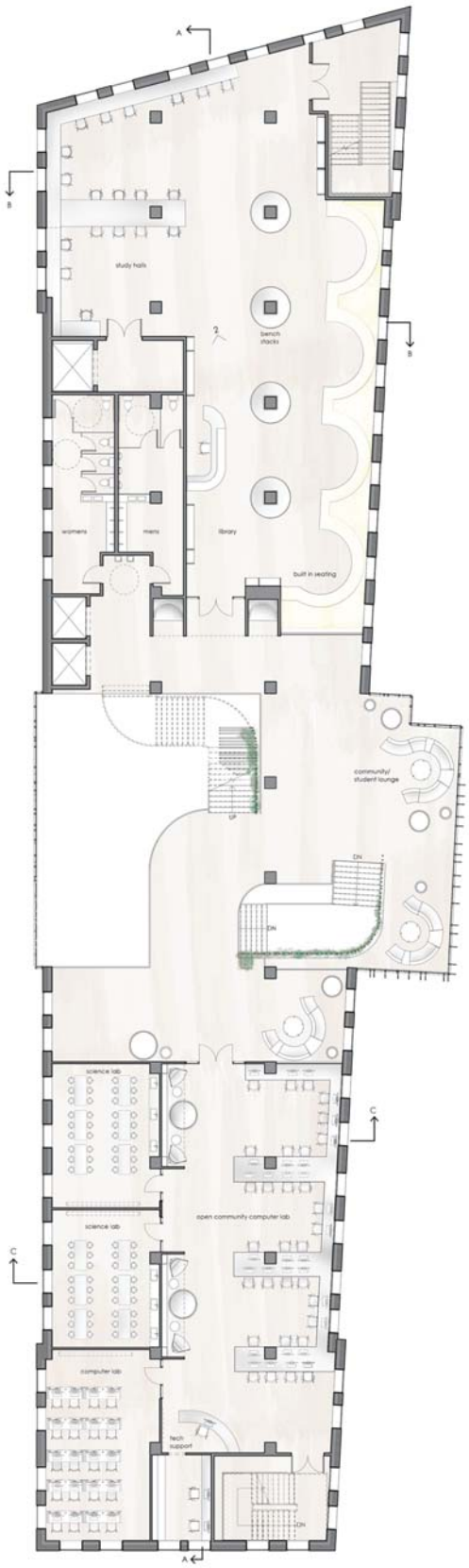
The following pages include plans, sections, axonometric, & perspective renderings of the final design.

FIRST FLOOR PLAN

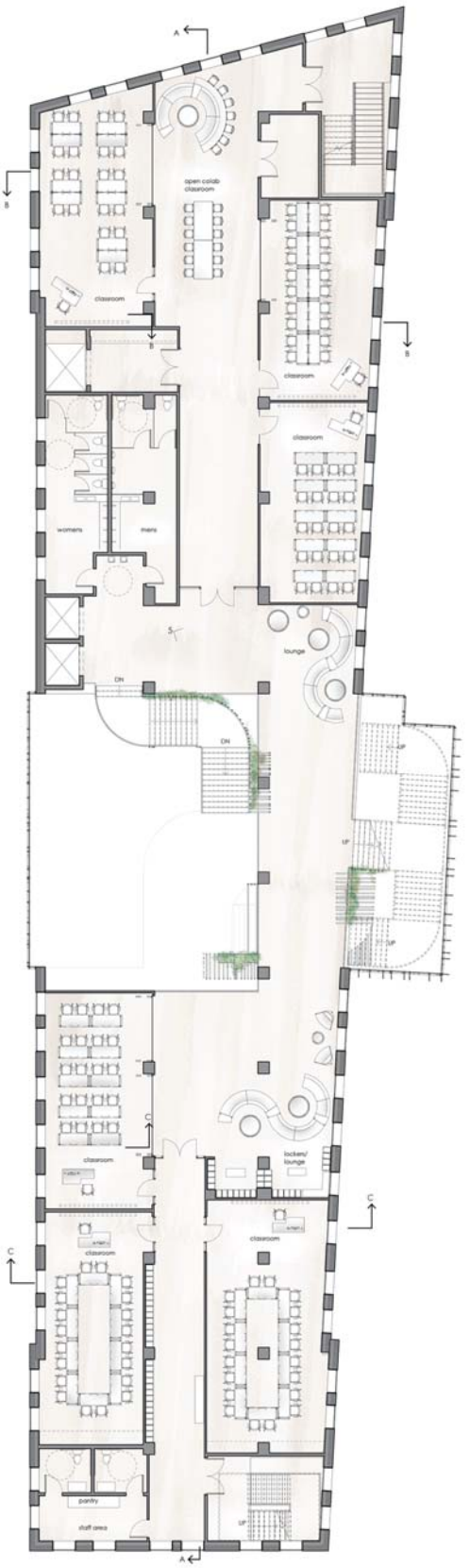


SECOND FLOOR PLAN

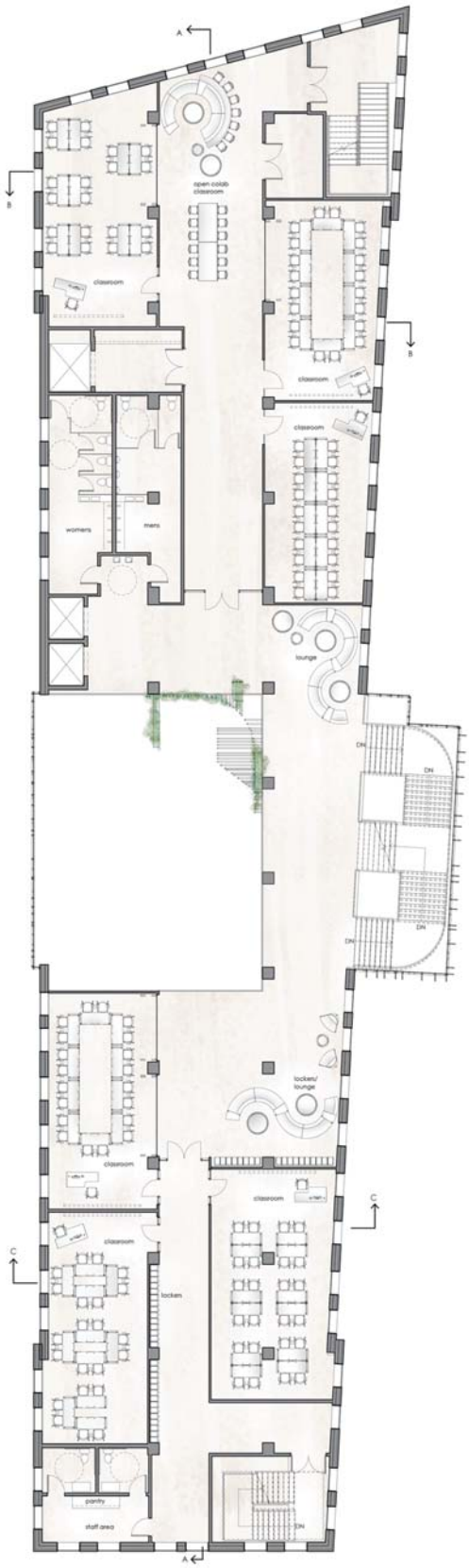
10
0 5 20



THIRD FLOOR PLAN



FOURTH FLOOR PLAN



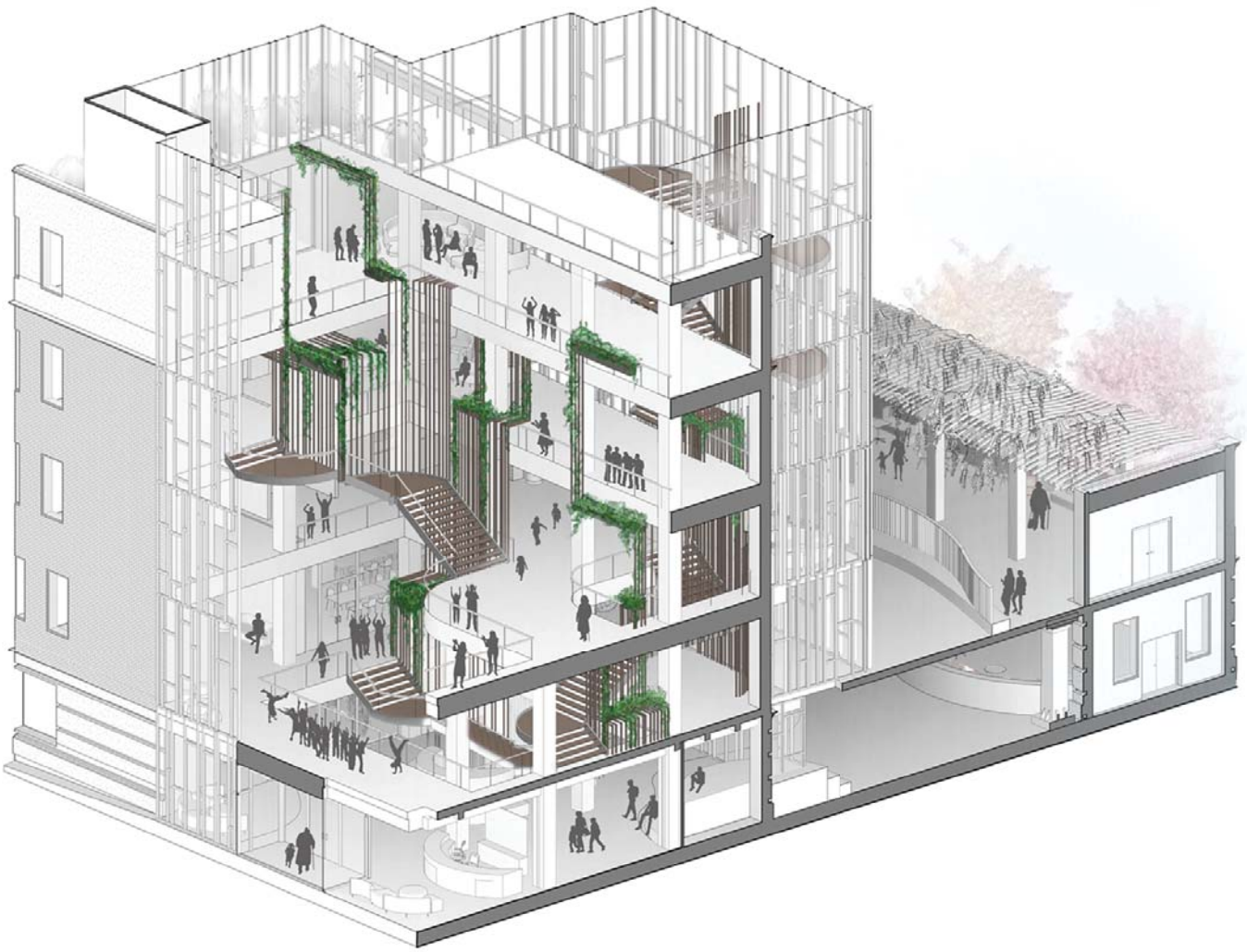
FIFTH FLOOR PLAN

ROOF PLAN

0 5 10 20

SECTION A - A

ATRIUM FROM SECOND FLOOR



AXONOMETRIC - ATRIUM

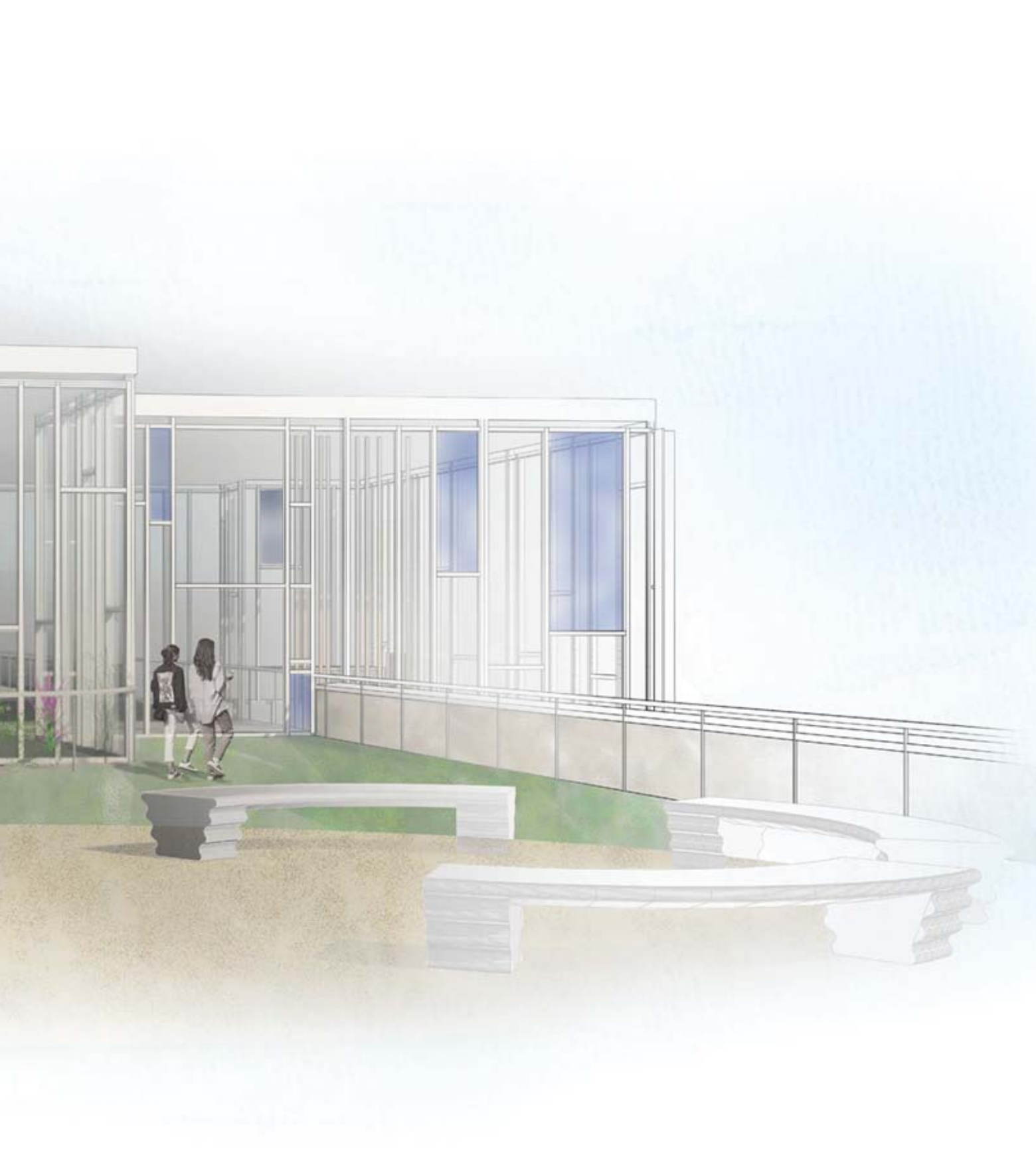
SECTION C - C

SECTION B - B

CAFETERIA

LIBRARY

GREEN ROOF



OPEN COURTYARDS UNDER RAIL PARK

RAIL PARK PUBLIC SEATING

STUDENT LOUNGE & ATRIUM

WAYFINDING STRATEGY

The transition between elementary school and middle school can cause a lot of anxiety for some students, especially due to the drastic change in the size of the facilities and the need to navigate through a larger space on ones own, since middle school kids must move from classroom to classroom throughout the day. This prompted the design of the colorful glass in the atrium acting as an indicator for floor level.

Each level's color embodies the floors activities:

BLUE - connection to nature & the sky : roof garden

PURPLE - thoughtful and focused : classrooms

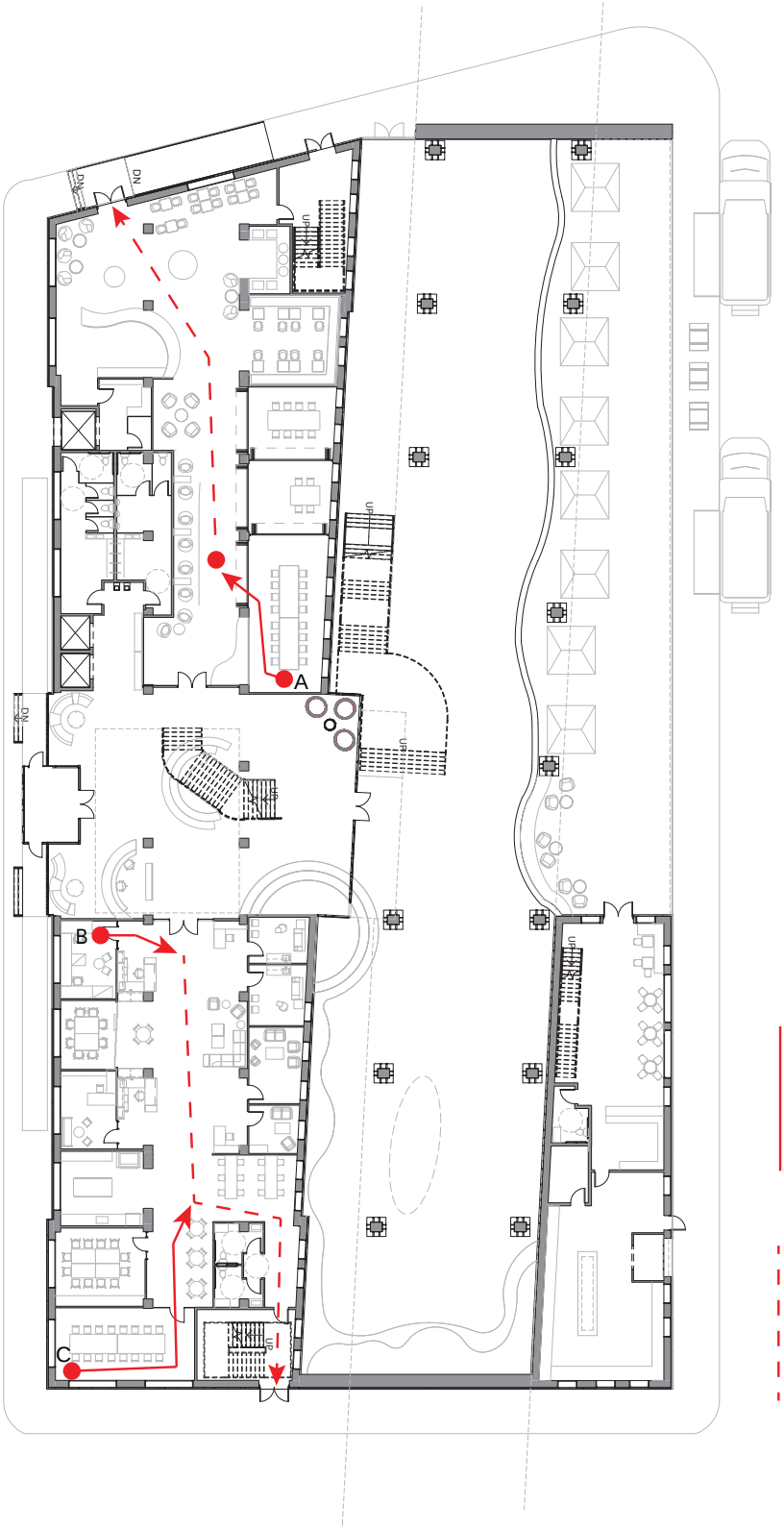
ORANGE - bright and energetic: classrooms

YELLOW - calm and focused : library and tech rooms

GREEN - connection to plants and nature : cafeteria and rail park gardens

RED - public, active & vibrant : first floor cafe and main offices.

EGRESS CALCULATIONS



OCCUPANCY E : SPRINKLERED

EXIT ACCESS TRAVEL DISTANCE = 250’

MINIMUM # EXITS
OCCUPANT LOAD PER STORY : 1- 500 persons = 2

TOTAL TRAVEL DISTANCE:

A - 117’
B - 120’
C - 114’

MINIMUM EXIT TRAVEL DISTANCE:

A - 42’
B - 17’
C - 62’

COMMON PATH OF TRAVEL DISTANCE:

A - 75’
B - 103’
C - 52’

SUSTAINABILITY

Sustainability was a huge motivator for this project, both in terms of the programming of the school in the educational methods researched and explored, and also in terms of the space planing/ overall design, down to the materials.

This project explores ways to break the division between interior and exterior space to seamlessly connect users to the natural world. In doing so this school aims to deepen our connection to the natural world, fostering a desire to preserve the environment.

Listed below are a few key features of sustainable design incorporated into the project.

- **Vegetable Garden** - Encouraging sustainable thought processes through education and direct gardening, composting, and harvesting experience at the school.
- **Trash, recycle & compost collection** - Reminding users to be contentious about how and what we consume on a daily basis. Teaching ecologically sustainable habits.
- **Operable windows** - Allowing users more control of air temperature and reducing the need for constant year round HVAC.
- **Indoor plants** - Trough our daily interactions with other living beings we develop a sense of pride, ownership and responsibility for their wellbeing.

MATERIALS

SELECT MATERIAL PROFILES

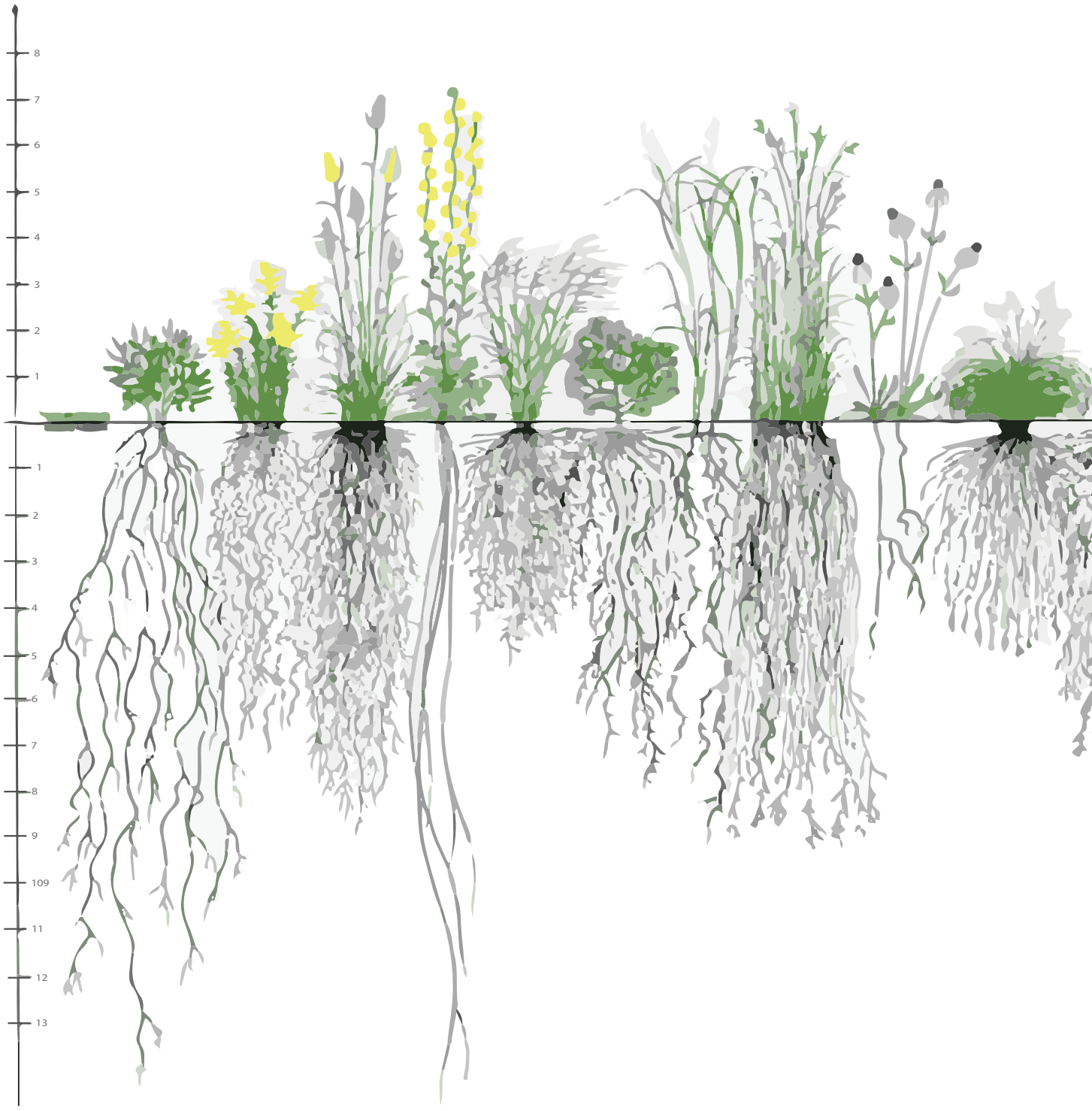
1 - TorZo - Sustainable surfaces. Orient, color: Natural
75% pre-consumer recycled SFI® Certified wood
Contains no added urea formaldehyde
Made in USA in Woodburn, OR
LEED CREDITS
EQ 4.4: Low Emitting Materials
MR 4: Recycled Content
MR 7: Certified Wood

2 - FilsFelt - Akustika 25 Suspended - color: 150
Acoustic panel system with 100% Wool Design Felt Noise Reduction Coefficient (NRC) rating of 0.90.
100% Wool Design Felt + Acoustic Substrate Acoustic Substrate contains minimum 60% recycled content and is 100% recyclable
100% biodegradable, contains no formaldehyde, 100% VOC free, no chemical irritants, free of harmful substances, Oeko-Tex© Standard 100 Certified Product Class II
LEED CREDITS
MR Credit 6: Rapidly Renewable Materials – One year harvest cycle

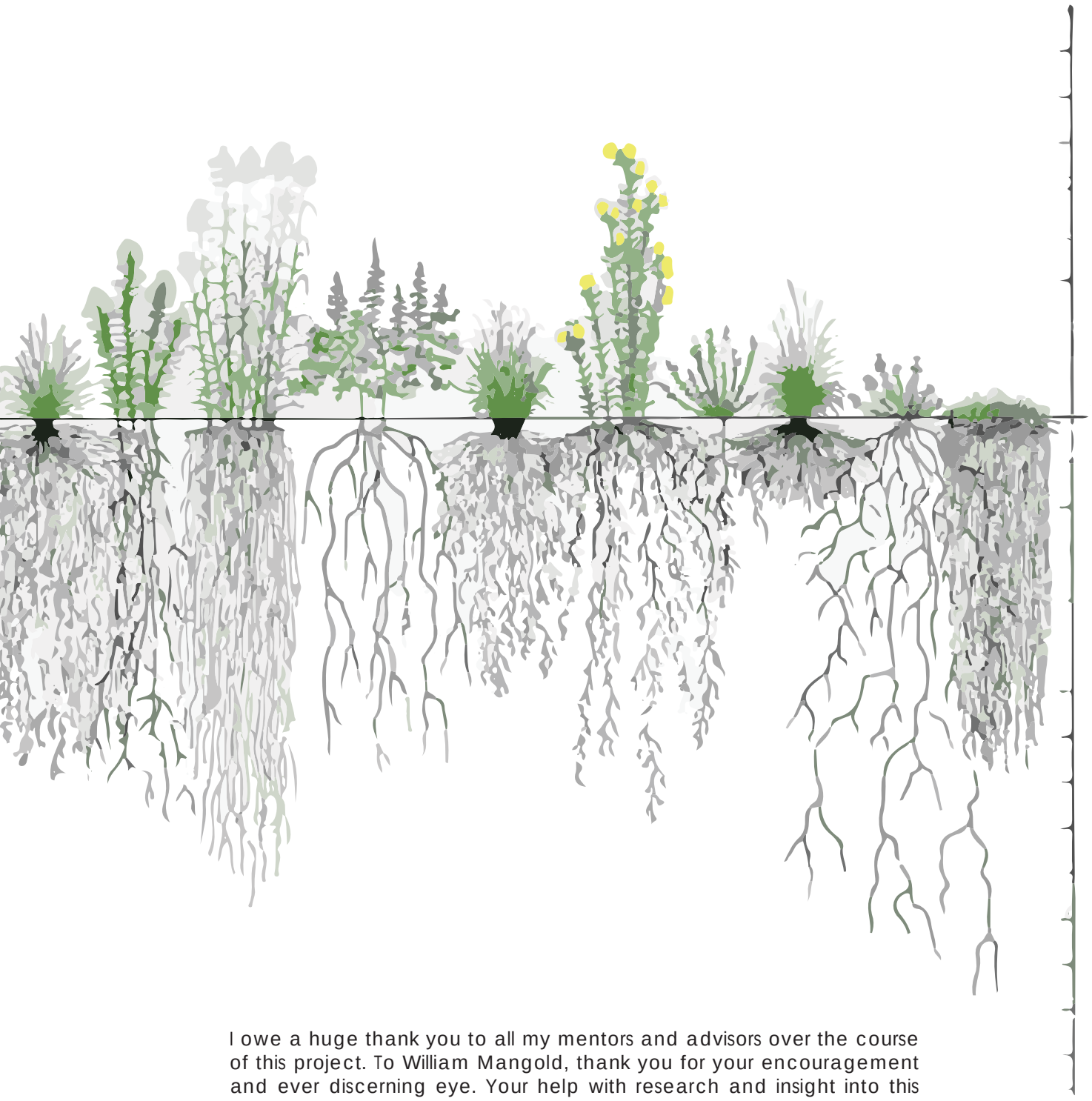
3 - Armstrong - Tectum lay in ceiling panels. Color: Natural
Sound Absorption (NRC) 0.40
Fire Performance - Class A
Cementitious Wood Fiber; FSC®-certified
HumiGuard® Plus panels - Humidity/Sag Resistance
Mold/Mildew Protection, Ceiling panels with BioBlock® performance
Low VOC Emissions

4- ReSAWN Timber reclaimed wood flooring - Harbor: Black Walnut
FSC ® wood
Local Source company in PA

5- US Floors - Cork Flooring - color/style: Marmol
GREENGUARD GOLD Certified for Indoor Air Quality
Endura AR UV-Cured Finish
Moisture resistant HDF



ACKNOWLEDGEMENTS



I owe a huge thank you to all my mentors and advisors over the course of this project. To William Mangold, thank you for your encouragement and ever discerning eye. Your help with research and insight into this topic was invaluable. To Helen Joo, I am so grateful for your confidence and ability to keep me on track. This project benefitted immensely from your talent and care. Thank you. And to the entire Drexel Department of Architecture, Design and Urbanism, without your training, attention, critique, and faith in me this project would not exist.

THANK YOU

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