PLUG INTO NATURE

RESTORING NATURE CONNECTEDNESS THROUGH IMMERSIVE INTERIOR EXPERIENCES

THESIS-SPRING 2021 |JENINE KNIBB| ADVISER- DANIEL NEWMAN

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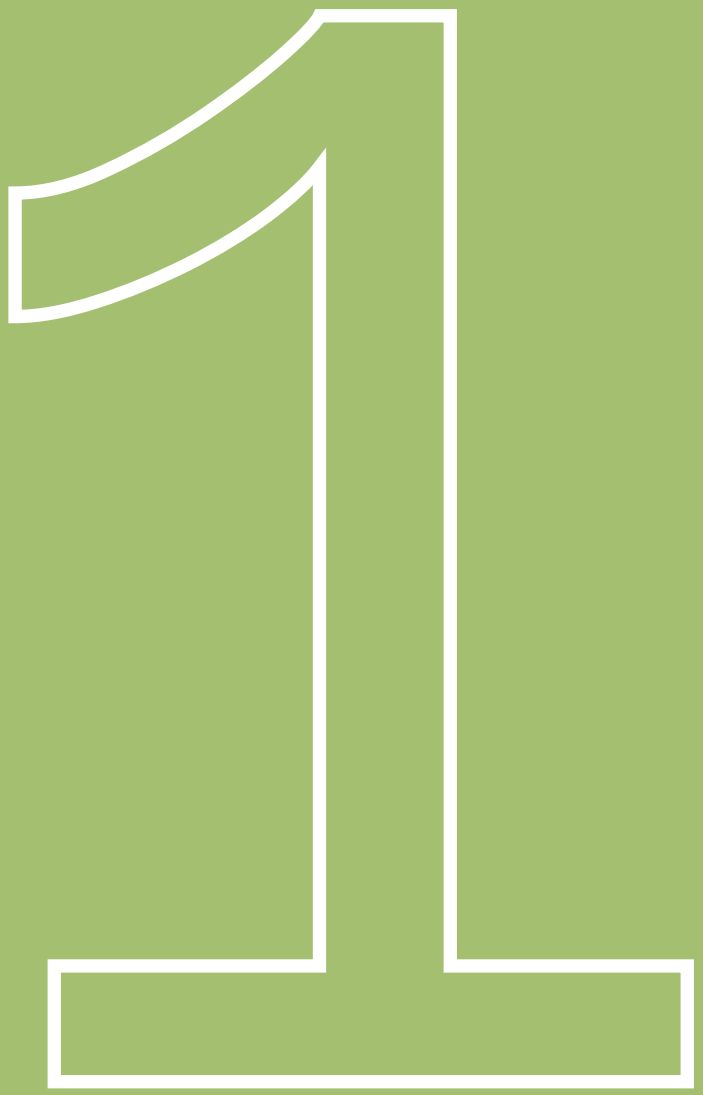
PREFACE

When I say the word nature, what comes to mind for you? Is it a lush forest? An ocean scape? The grass growing in the asphalt crack outside? The truth is that we all have different views of what nature is and our personal experiences of nature have helped to shape our opinion of it. There is a growing trend towards disconnection with nature. It is hard to care about something that you do not interact with. In the digital indoor age, we need to reconstruct the human-nature relationship. The growing divide negatively impacts our health, well-being and the future of the planet. This project seeks to explore the union of biophilic design and technology as a supplemental approach to gaining immersive nature experiences in an urbanized context. Technology can never fully replace nature, but can it be a guiding force back to the outdoors?



S E C T I O N O N E

RESEARCH & PROGRAMMING

1.1 - Literature Review

Introduction

Evidence shows we have entered an indoor digital age, and we are losing our connection with nature. The growing divide negatively impacts our health and well-being. This thesis project, Plug Into Nature: Restoring nature connectedness through immersive interior experiences explores the union of biophilic design and technological nature as a supplemental approach to gaining immersive nature experiences in an urbanized context. The aim of the project is to reconstruct the human-nature relationship.

To further understand the issues, this literature review looks at the connection, and recent disconnection, humans have with nature. It then draws upon the literature to develop a framework for understanding "technological nature" and how human experiences of technology and nature may overlap in interior environments.

An Expansive View of Nature

'Nature is in the eye of the beholder' is a statement posited by environmental psychologists Rachel and Stephen Kaplan. Their extensive research on the nature-human relationship, has found that the variations in the definition of what constitutes nature is a consequence of a person's expertise, activity preferences and familiarity. For instance, one person may view nature as a manicured urban park and another would instead say that nature is a wild untamed forest. Further, their studies have shown that simply viewing photographs of nature can have similar beneficial properties as being in outdoor natural settings. Their studies have concluded that "what qualifies as nature is broadly defined" and though these variations exist, the consensus is that there is a general preference for viewing natural settings to those of the built environment. In addition, the built environment and 'human artifacts' does not necessarily exclude a setting from being thought of as natural. Understanding nature in this way has underscored the work of the Kaplans and their understanding of restorative experiences and the benefits of exposure to nature, in a myriad of forms and settings.

Disconnection with Nature

If a person's expertise, activity preferences and familiarity shape the way in which they view what nature is, then what does that mean for the current state of the human-nature relationship? A 2015 study conducted by The Nature of Americans, led by environmentalist Stephen Kellert and social scientist David Case, found that American adults spend little time outdoors weekly, with more than half of the study participants reporting that they spent less than 5 hours or fewer outside in nature each week (i.e. approximately 3% of their week). The study also found that as children age, their media use increases and time spent outdoors shrinks. With less time in natural settings, a growing divide is being experienced in the human-nature relationship. Richard Louv, has coined the term "nature-deficit disorder"- "the human costs of alienation from nature, among them: diminished use of the senses, attention difficulties and higher rates of physical and emotional illnesses" to explain the phenomenon. This raises concerns centered around the idea of nature connectedness, which is "an individual's feeling of being emotionally connected to the natural world". A person's nature connectedness impacts the value that they place on natural settings, frequency of visiting such sites as well as their approach to environmental sustainability.

The way nature is valued comes into play on a societal level in the growing trend towards urbanization and the "the degradation and destruction of large parts of the natural world". Peter Kahn takes this idea a step further and argues that the disconnection from nature has a compounding effect. He states that "each generation constructs a conception of what is environmentally normal based on the natural world encountered in childhood" and that "with each generation the amount of environmental degradation increases, but each generation tends to take that degraded condition as the nondegraded condition, as the normal experience". This is alarming since it is believed that one needs to feel a connection to nature in order to take steps towards its protection. If the state of environmental degradation is taken as the normal experience and persons continue to be disconnected from the nature, environmental problems will continue to follow the existing trends since persons will feel that things are normal or worse, they may not care at all. Louise Chawla suggests this creates a feedback loop "as people's experience of nature declines, their interest in nature is likely to diminish" this in turn "reduces motivation to seek out natural areas" and parents and caregivers are "likely to pass their disengagement from nature to their children, and over time this can become a generational shift, with the public understanding and valuing the natural world less and feeling less investment in its protection".

Another aspect of nature disconnection exists in the urban context, as not all people have equal access to nature. Urban green spaces and well-maintained large parks are less accessible to ethnic minorities and low-income families. This correlates to an increased likelihood of obesity and higher body mass index scores within these groups that suggests a need for physical activity in accessible green spaces. Chawla goes as far as saying that "equitable access to attractive parks and other green spaces, as well as grounds around schools

and childcare centers that integrate natural elements with play equipment, is an environmental justice issue."

Childhood Connection with Nature

Creating connections with nature is especially beneficial early in a person's development. The experiences of nature that one has a child strongly determines how one views nature as an adult and shapes the frequency of nature interactions. Louv argues that current childhood interactions with nature are different from previous generations and that cumulative laws and regulations are negatively impacting connection with nature. According to Louv "the impact of overdevelopment, multiplying park rules, well-meaning (and usually necessary) environmental regulations, building regulations, community covenants and fear of litigation sends a chilling message to our children that their free-range play is unwelcome, that organized sports on manicured playing fields are the only officially sanctioned forms of outdoor recreation". He states that in addition to decreasing opportunities for outdoor play, it is viewed as being less productive than other organized outdoor recreational activities, there is a greater concern for the safety of children, and there is more emphasis placed on the need for adult supervision. These shifts both negatively impact the development of children, and reduce connection with nature. In contrast, free play in nature offers children "opportunities to engage in creative play alone and with friends, set self-paced challenges, find quiet retreats, learn about the environment from direct experience, and form emotional bonds with places and the natural world." Roger Hart extends the importance of free play to a societal context, stressing its importance for civil society and democracy. He argues that play has an impact on the "physical, intellectual, social and emotional" development of children who need the chance to invent their own activities and to carry them out without constant intervention from adults, who should instead adopt a supportive role.

Taken together, the benefits of childhood connection with nature become clear both for individual and social development, and the literature outlines a number of specific considerations. According to qualitative studies reviewed by Chawla, to encourage connection, experiences for children should include "multisensory immersion in nature play and exploration; caretakers who provide a sense of security and promote interest, attention, empathy and respect for living things and the land; a sense of competence outdoors; a sense of oneness; opportunities to enjoy nature with family and friends; and refuge from stress." Programs for children that seek to establish the human-nature connection should address ideas of "comfort, confidence, enjoyment, exploration, challenge, achievement, freedom to follow interests at one's own pace, overcoming fears outdoors and empathy and care for other living things".

As persons increasingly spend time indoors, the way in which interior spaces are designed is of critical importance. While urban planning largely dictates the quantity and quality of exterior environments, opportunity exists to adapt interior environments to facilitate indoor nature interactions.

Biophilia

The implementation of nature interactions within the built environment can contribute positively to our health and wellbeing. Biophilic design is an approach that designers of interior spaces can implement to increase exposure and connection with nature. Edward Wilson introduced the idea of biophilia to denote an attitude that recognizes our innate need to connect with nature and natural systems. Biophilic design "seeks to connect people with nature in the built environment", offering positive effects on human health and psychological well-being. According to McGee et al, interacting with actual nature is ideal; however, "even viewing features found in nature within the interior built environment, ...containing complex fractal patterns, allows the mind to shift from directed attention to fascination and contributes to mental and physical well-being." They continue, stating, "true biophilic design needs to mimic this natural complexity. As interior spaces are adapted to facilitate these interactions, can technology be used as another dimension?

Technological Nature

As the environment faces increased degradation, another trend is occurring concurrently: technology is taking great strides. According to Kahn, "at the nexus of these two trends lies technological nature". He defines technological nature as "technologies that in various ways mediate, augment, or simulate the natural world." There are numerous scholars and researchers currently engaged in issues surrounding technological nature. This research raises questions surrounding the applications of technological nature and if it can be used to aid in reconnecting people with nature.

There has been increasing interest in technological nature within the research community as numerous studies have been recently conducted especially exploring virtual nature and immersive virtual environment technology that "combines visual and auditory stimuli to create an immersive nature experience". In 2020 Browning et al, did a systematic review that examined 175 experiments in 148 research articles looking at "the methods and findings of experiments that have examined the effects of exposure to simulated natural landscapes on human health and cognitive performance". Some of their findings focused on data that provided insight into whether exposure to

technological nature differs greatly from exposure to actual nature. Their analysis has compiled numerous studies that indicate that interacting with technological nature can have positive effects, and this would be particularly useful in settings where there is greater need for human-nature interactions, though it will not be able to fully replicate the effects of real nature. It is believed that immersive virtual nature is especially promising with situations that would prove unsafe for real nature contact "when the risk of injury outweighs the health-promoting effects such as with pain management, neurological disorders, stroke rehabilitation, distraction and relaxation tools in cancer treatment, cognitive rehabilitation and mental health and well-being, including depression, anxiety, obesity, eating disorders and phobias." As technological nature becomes more immersive, its use to supplement exposure to real nature is an enticing prospect as it has the possibility of providing opportunities to "improve the health and cognitive performance of those who lack access to nature" especially to persons in cities and those with limited access.

Though the potential benefits of technological nature are numerous, caution must still be observed with its use as new problems may arise. According to Browning et al, variations will exist with what each person views as restorative in connection with nature imagery as "not every natural landscape is restorative" and the "image quality, soundscape, presence of human elements, and density of vegetation can impact the extent to which people find landscape simulations to be restorative". Sigbjørn Litleskare expounds that there is a fear that "technological nature will be a replacement, and a downgrade, of authentic nature in a future where nature contact is severely limited" and that "completely replacing authentic nature with virtual nature would have severe consequences, as virtual nature lacks the ability to provide important ecosystem services such as climate regulation and nutrient cycling". According to Kahn technological nature will always "result in a diminished experience compared to its natural counterpart" though if designed well it "will offer substantive nature-like experiences". While some perspectives raise questions and highlight the possibility of undesirable outcomes, Litleskare reiterates that technological nature:

"may (1) enable us to prolong the positive effects of nature-interactions when we have left the outdoor natural setting; (2) provide access to nature for individuals who may not be able to access it directly; (3) increase feelings of connectedness with the natural world and (4) elicit greater awareness of environmental issues and sustainability."

An approach to restoring nature connectedness through immersive experiences, that explores the union of technological nature and biophilic design, will be one that overlays physical manifestations of nature with digital. The concept of exploring the juxtaposition of physical and digital was utilized in the exhibition Pierre Chareau: Modern Architecture and Design at The Jewish Museum in New York City in 2016. The exhibition featured portions of his body of work as a furniture designer and art collector. The exhibition designers, Diller Scofidio + Renfro, used virtual reality, as a means of enhancing the experience. Not only were visitors able to view the physical collection, they were also able to also view the same pieces within the Parisian context of Chareau's design, bringing a new dimension of immersion to the items on display. This typology of juxtaposing physical and digital can also be applied to the context of nature and technology.

Conclusion

As awareness of the importance of the human-nature relationship and our need to connect with nature grows, Kellert proposes we deepen our approach to nature and the environment. He suggests that restorative environmental design could go beyond current efforts of preserving the environment by adopting a "biophilic design approach that fosters beneficial contact between people and nature in modern buildings and landscapes." At the same time evidence suggests that connection with nature can also be taken further through the inclusion of technological nature as a tool towards this goal. As Kahn puts it, "we should employ technological nature as a bonus on actual nature, not as its substitute". Biophilic design in indoor spaces, together with technological nature have the potential to be a valuable union as we respond to the need to reconnect with nature and restore the human-nature relationship.

[1] Kaplan, R. (2001). Nature in the eye of the beholder. Michigan Quarterly Review, 40(1), 207–217.

[2] Ibid

[3] Ibid, 211

[4] Ibid, 210

[5] Nature of Americans National Report. (2017.)

[6] Ibid

[7] Richard Louv. 2008. Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder

[8] Litleskare et al "Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application.

[9] Ibid

[10] Jr., Peter H. Kahn. 2011. Technological Nature: Adaptation and the Future of Human Life. Cambridge, UNITED STATES: MIT Press. http://ebookcentral.proquest.com/lib/drexel-ebooks/detail.action?docID=3339199.

[11] Ibid

[12] Chawla, Louise, and Rachelle Gould. "Childhood Nature Connection and Constructive Hope: A Review of Research on Connecting with Nature and Coping with Environmental Loss." People and nature (Hoboken, N.J.) 2, no. 3 (September 2020): 619–642

[13] Ibid 620

[14] Chawla, Louise. "Benefits of Nature Contact for Children." Journal of

planning literature 30, no. 4 (2015): 433–452.

[15] Ibid

[16] Ibid

[17] Litleskare et al “Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application.

[18] Richard Louv. 2008. Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder

[19] Ibid

[20] Ibid 445

[21] Hart, Roger. 2002. "Containing Children: Some Lessons on Planning for Play from New York City." Environment and Urbanization 14(2

[22] Ibid

[23]Chawla, Louise, and Rachelle Gould. “Childhood Nature Connection and Constructive Hope: A Review of Research on Connecting with Nature and Coping with Environmental Loss.” People and nature (Hoboken, N.J.) 2, no. 3 (September 2020) 622

[24] Ibid 635

[25] Mcsweeney, J., D. Rainham, S. A. Johnson, S. B. Sherry, and J. Singleton. 2015. “Indoor Nature Exposure (INE): A Health-Promotion Framework.” Health Promotion International 30 (1): 126–39.

[26]Ibid

[27] Wilson, Edward O. 2009. Biophilia. Harvard University Press.

[28] McGee et al, 2019. “DIY Biophilia: Development of the Biophilic Interior Design Matrix as a Design Tool.” Journal of Interior Design 44 (4): 201–21.

[29] Ibid

[30] Jr., Peter H. Kahn. 2011. Technological Nature: Adaptation and the Future of Human Life. Cambridge, UNITED STATES: MIT Press.

[31] Ibid

[32] Sigbjørn Litleskare Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application

[33] Browning et al, “The Role of Methodological Choices in the Effects of Experimental Exposure to Simulated Natural Landscapes on Human Health and Cognitive Performance: A Systematic Review.” Environment and Behavior,

[34] Sigbjørn Litleskare Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application

[35] Ibid

[36] Browning et al, “The Role of Methodological Choices in the Effects of Experimental Exposure to Simulated Natural Landscapes on Human Health and Cognitive Performance: A Systematic Review.” Environment and Behavior,

[37]Ibid

[38] Sigbjørn Litleskare Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application

[39] Jr., Peter H. Kahn. 2011. Technological Nature: Adaptation and the Future of Human Life. Cambridge, UNITED STATES: MIT Press.

[40] Sigbjørn Litleskare Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application

[41]“The Jewish Museum.” n.d. Accessed December 13, 2020. https://thejewishmuseum.org/exhibitions/pierre-chareau-modern-architecture-and-design.

[42] Ibid

[43] Scherling, Laura. 2017. “Exhibition Review: Pierre Chareau: Modern Architecture and Design.” Interiors 8 (3): 159–68. https://doi.org/10.1080/20419112.2017.1377419..

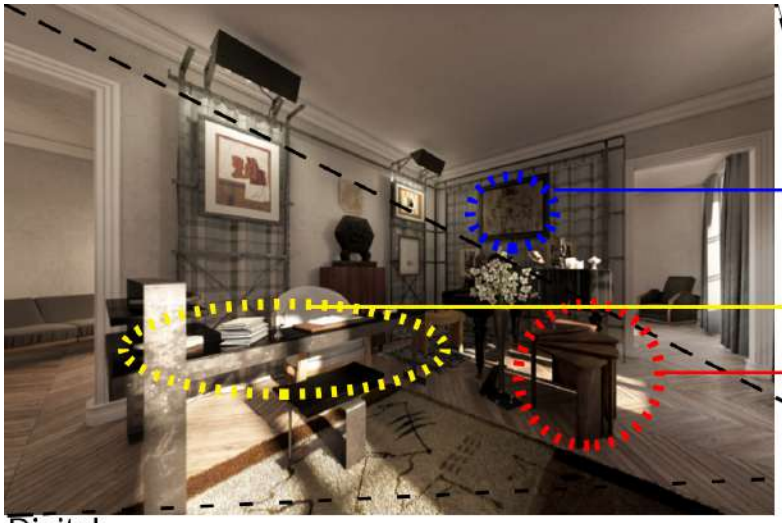
[44] Ibid

[45] Kellert et al 2011. Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life. John Wiley & Sons.

[46] Ibid

[47] Jr., Peter H. Kahn. 2011. Technological Nature: Adaptation and the Future of Human Life. Cambridge, United States: MIT Press.

1.2- Precedent



Digital

Physical Exhibition

Pierre Chareau: Modern Architecture and Design Exhibition at The Jewish Museum in New York City in 2016

Physical Exhibition paired with digital renderings of items as they would have appeared

1.3 - Case Study- Riveredge Nature Center

Address: 4458 County Hwy Y, Saukville, WI 53080
Mission: To support conservation through education that awakens curiosity, engages the body, and explores connections to nature for all generations.
Vision: Healthier human and natural communities
Major Initiatives:

- Bring Nature to Communities
- Empowering Education
- Inspiring Lifestyles
- Rooted in Research

(See Appendix for interview documentation.)

1.4 - Case Study- Schuylkill Center for Environmental Education

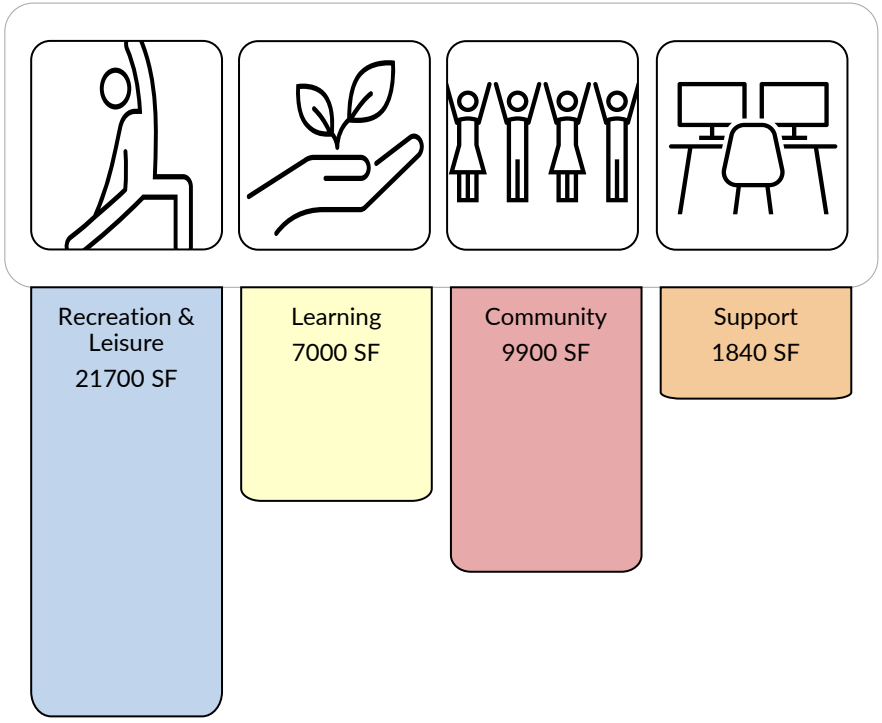
Address: 8480 Hagy's Mill Road Philadelphia, PA 19128
Mission: The Schuylkill Center for Environmental Education inspires meaningful connections between people and nature. We use our forests and fields as a living laboratory to foster appreciation, deepen understanding, and encourage stewardship of the environment.
Vision: As a leader in the next generation of environmental education, the Schuylkill Center will create a world where all people play, learn, and grow with nature as part of their everyday lives.
(See Appendix for interview documentation.)

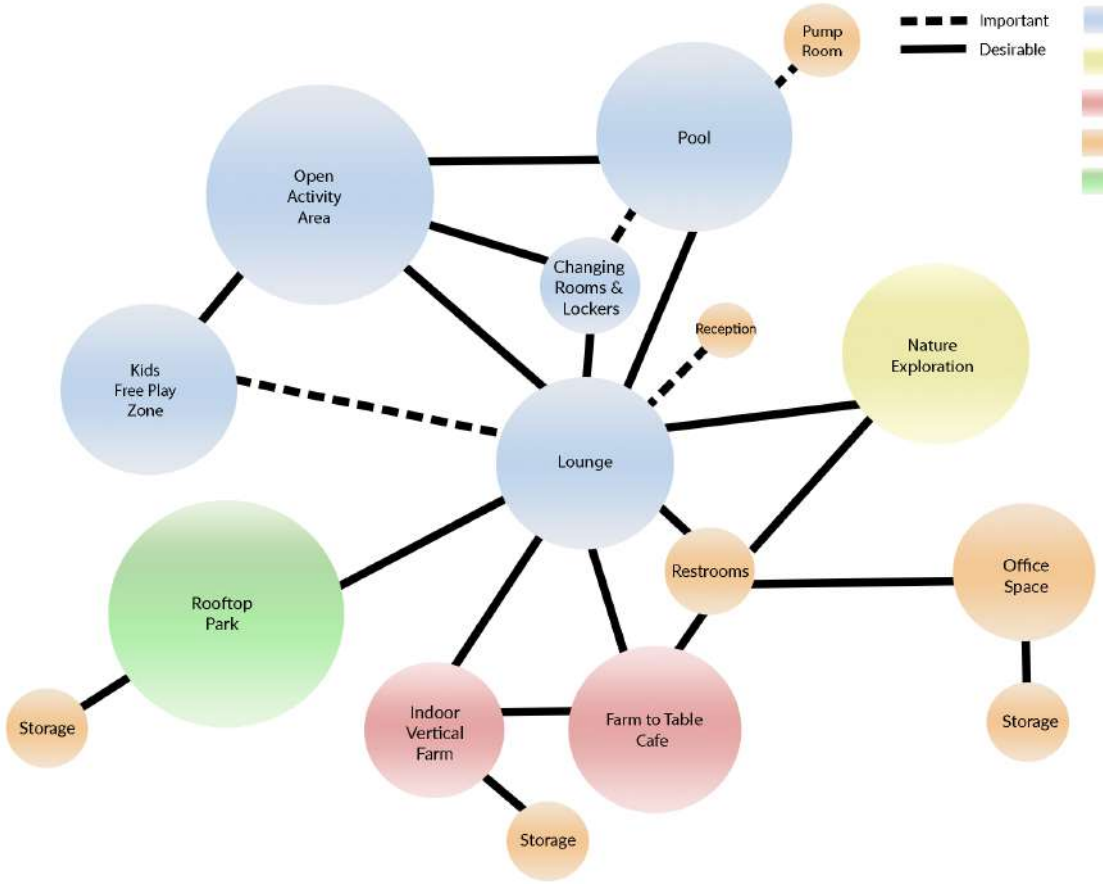
1.5 - Program

The program was developed from an analysis of community need, research on the perceptions of nature and access to green space in Philadelphia as well as my own personal observations of people in green space. Areas of focus for this project include recreation and leisure, community and learning with some overlap between the categories. With the concept words, embedded, rooted linked I developed a parti surrounding these ideas as well as sought to explore a form language that could be used throughout the space.

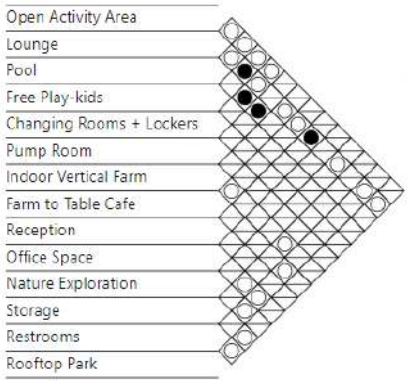
1.5a- Master List of Spaces

	SF
Pool	2100
Kids Free Play Zone	3700
Lounge (Social+Solitude+Flex)	8700
Open Activity Area	6000
Changing Rooms + Lockers	1200
Nature Exploration	7000
Indoor Vertical Farm	6900
Farm to Table Cafe	3000
Reception	240
Office Space	1000
Pump Room	100
Storage	500
Rooftop Park	
Restrooms	
	40440

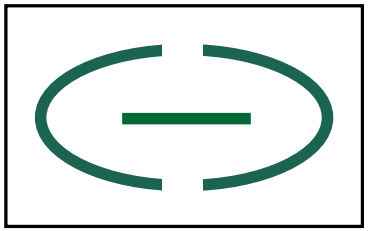




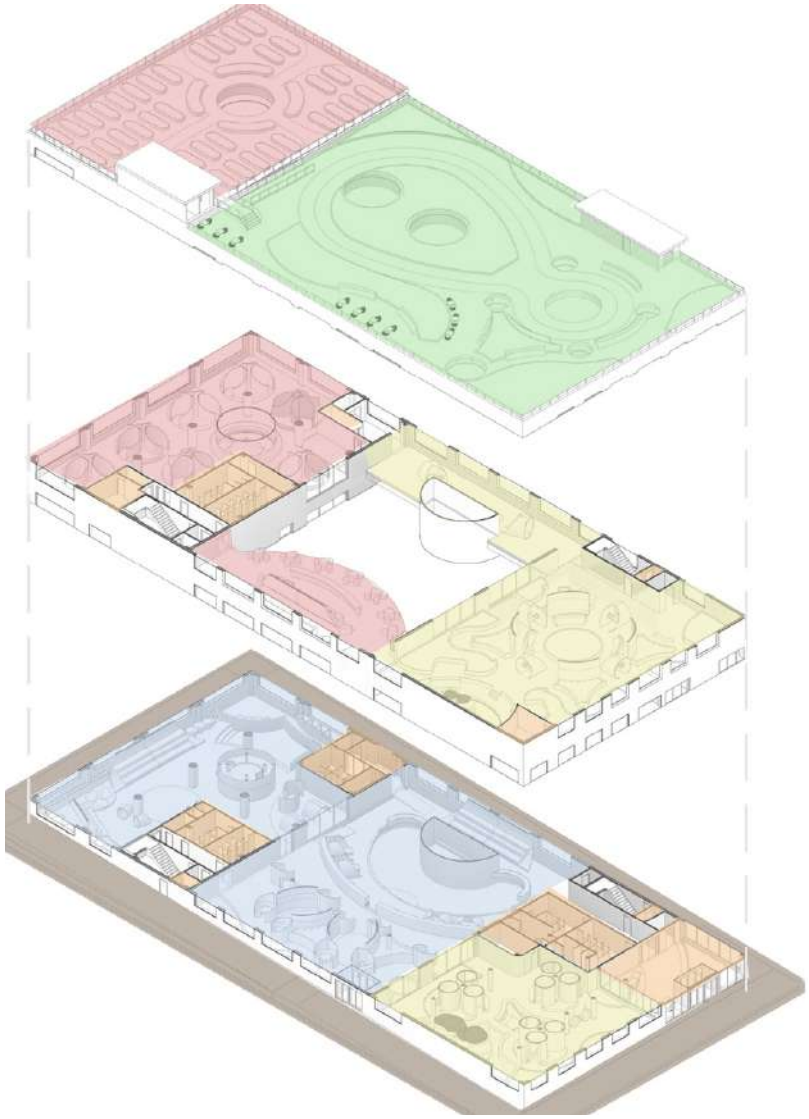
BUBBLE DIAGRAM



ADJACENCY MATIX

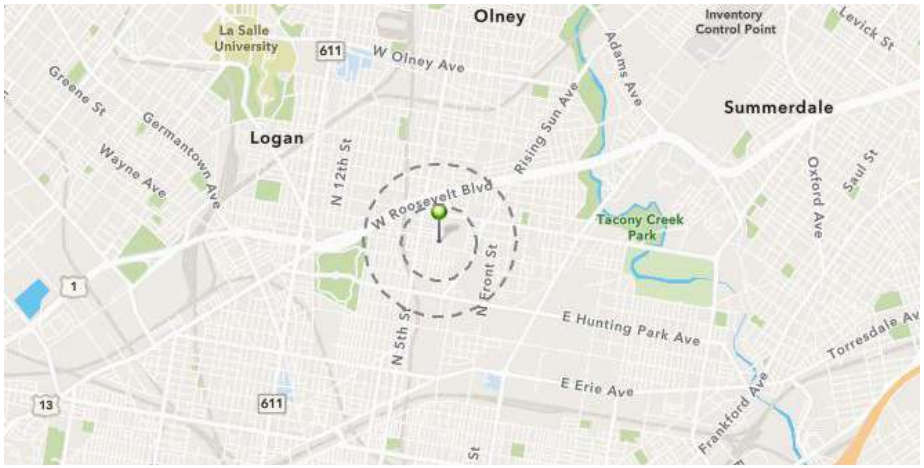


PARTI

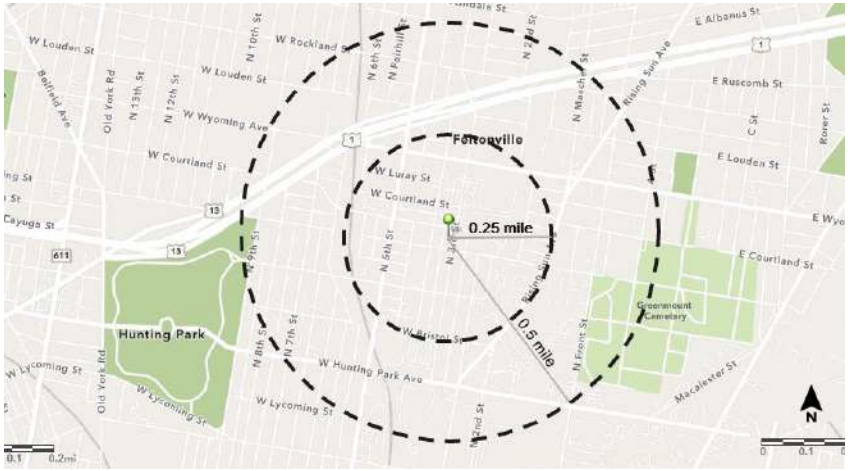


1.6 – Site Analysis, Documentation & Maps

In order to effectively address the issues highlighted in the literature review, the suitable site for this project would have characteristics such that it is an urban location in Philadelphia, some distance away from large parks, in a residential community with possible adjacencies to a school and an empty lot or space for the creation of an outdoor greenscape. In addition, the architecture of the building itself needed to possess a large open volume and facilitate possible modifications to the envelop for natural light. The site also needed to be easily accessible to community members with good walk and transit scores. With these factors in mind, the selected site at 4500 N 3rd St, Philadelphia PA 19140 meets many of these requirements.



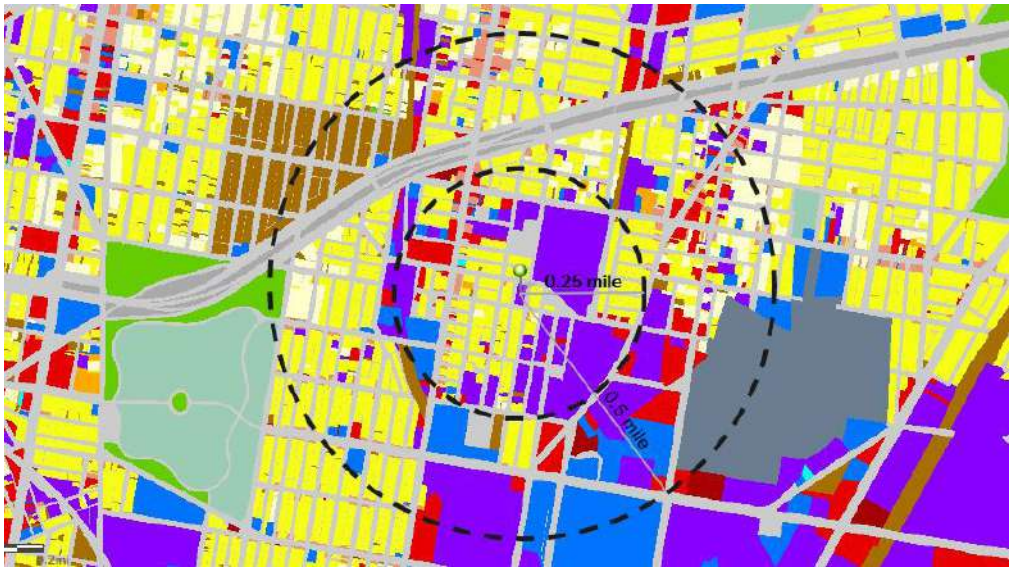
Property Information	
Address	4500 N 3rd St, Philadelphia PA 19140
Neighborhood	Lower North Philadelphia
Property Type	Industrial, Warehouse
Building Area	42680 SF
No. Stories	2
Clear Ceiling Height	16 ft
Year Built	1946
Lot Size	0.48 AC
Zoning	ICMX



0.25 mile = 5 minute walk
0.5 mile = 10 minute walk

Park with Public Access
Park Need: High
Park Need: Moderate to High
Park Need: Moderate

Park Need

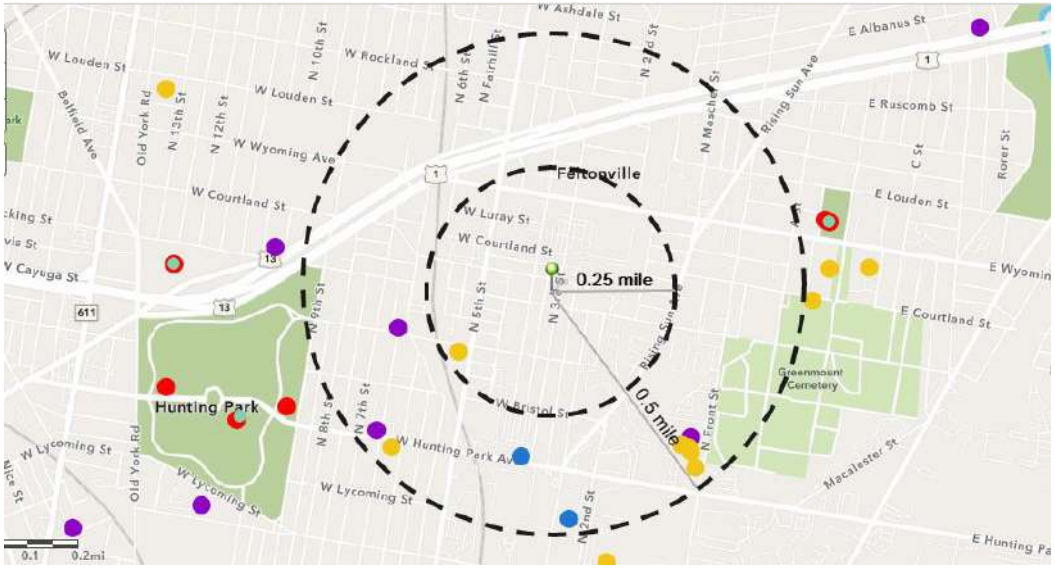


- Residential Low
- Residential Medium
- Residential High
- Commercial Consumer
- Commercial Business/Professional
- Mixed Commercial/Residential
- Industrial
- Civic/Institution
- Transportation
- Culture/Recreation
- Active Recreation
- Park/Open Space
- Cemetery
- Water
- Vacant
- Other/Unknown

Land Use

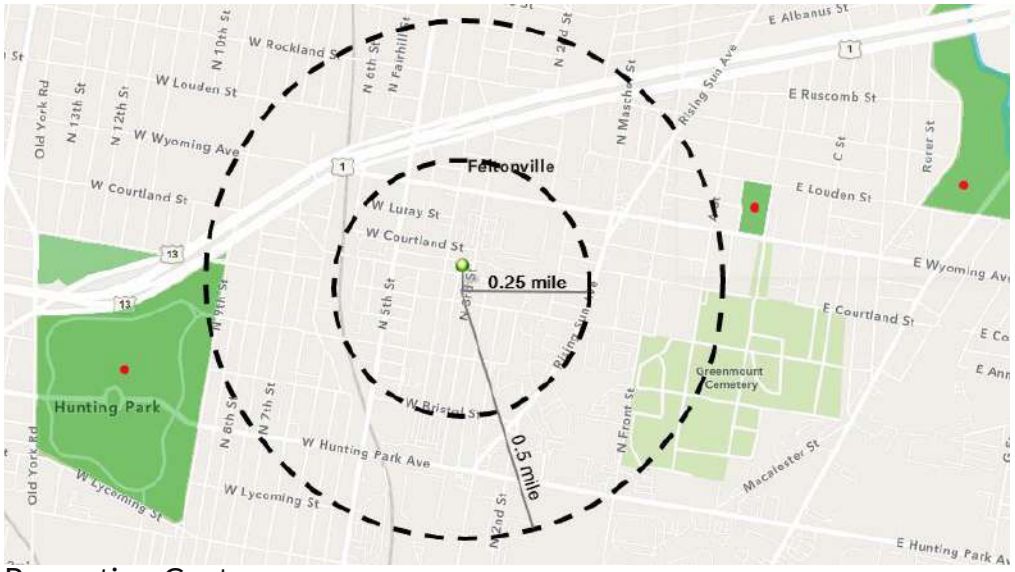
- Street Trees
- Park with Public Access

Street Trees

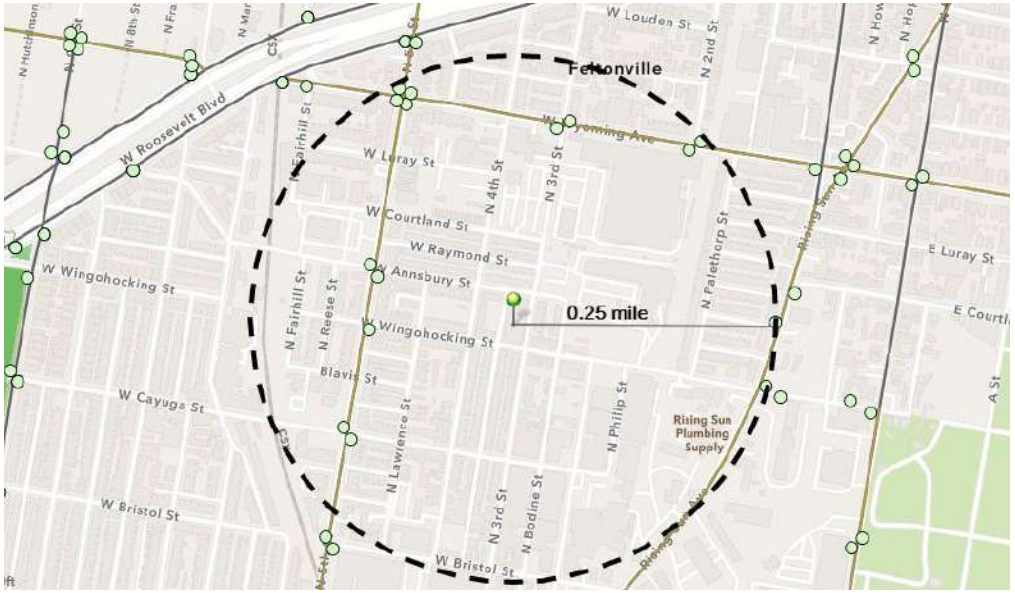


Schools & Playgrounds

Walkable Acces to Healthy Food & Farmers Markets

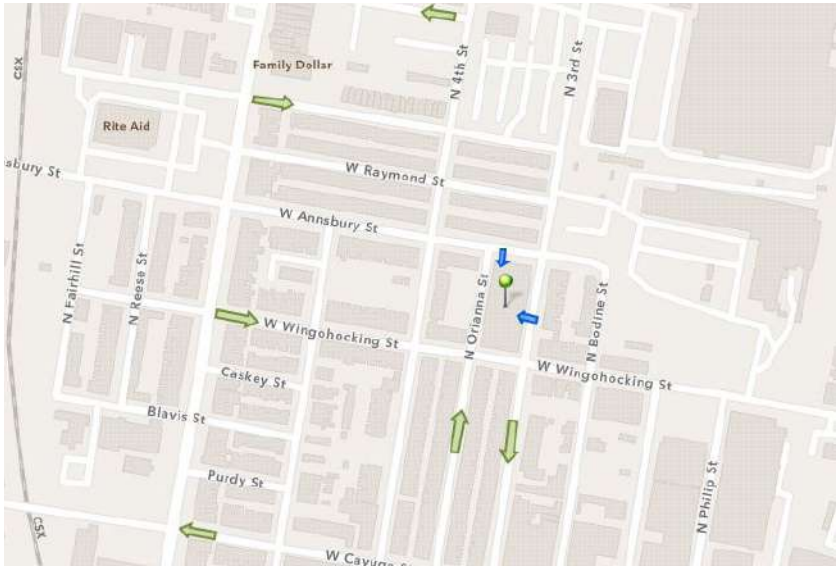


Recreation Centers



- Buffered
- Buffered w Conventional
- Controlflow w Convetional same
- Conventional
- Conventional w Sharrows
- Sharrow
- Streets Arterials
- SEPTA Bus Stops

Bus Stops, Bike Network & Arterial Streets



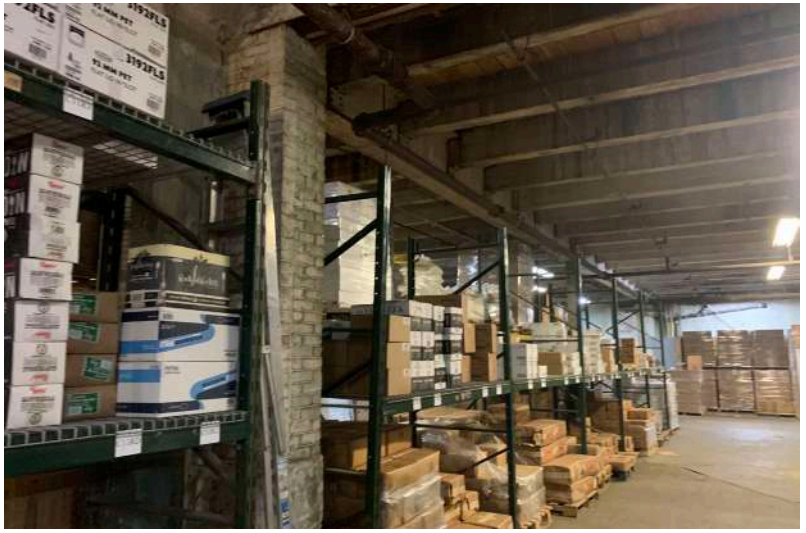
Vehicle Circulation

Oneway Streets

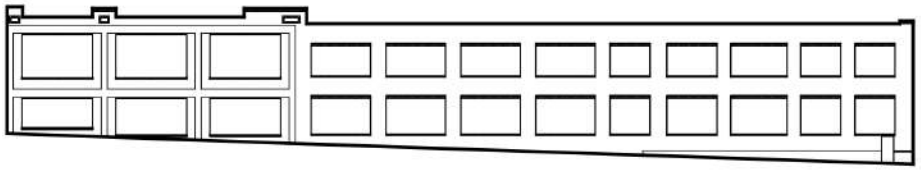
Site Entrance

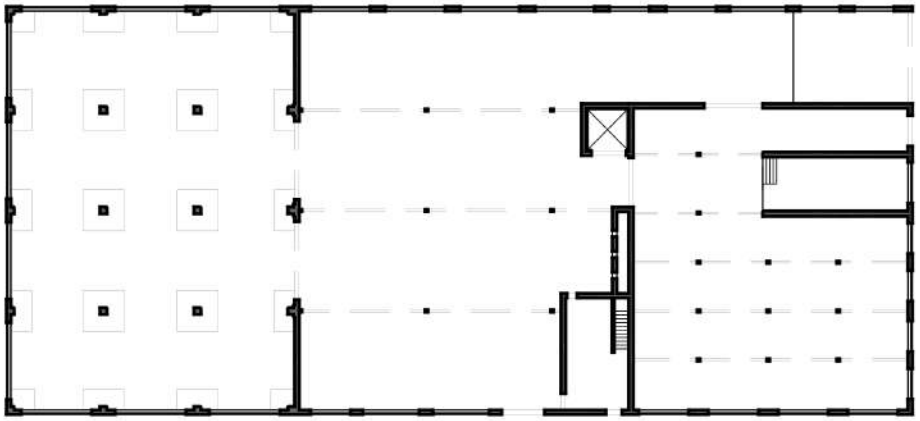
1.7 – Exterior Images

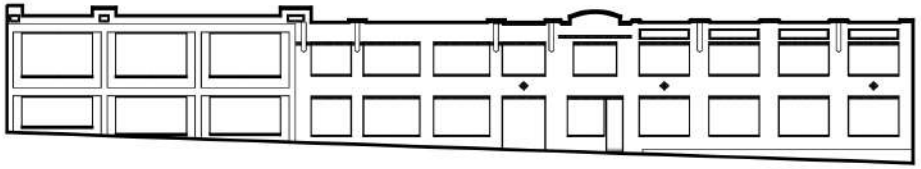
1.8– Interior Images

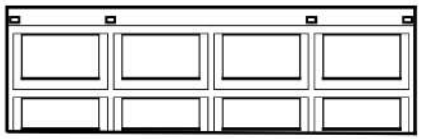


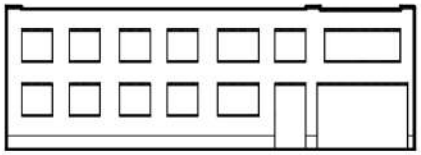
1.9 – Plan & Exterior Elevation Drawings











1.10 -Building Characteritics

First Floor (Concrete floors throughout):

- Segment 1: 30' x 22' 9" column grid, 12'1" ceiling height.
- Segment 2: 12' x 16' column grid, 12' 1" ceiling height.

Second Floor (Wooden and concrete floors):

- Segment 1: 24'2" x 30'6" column grid, 10'6" ceiling height.
- Segment 2: 12' x 16'3" column grid, 10'2" ceiling height.
- Segment 3: 22'6" x 21'3" column grid, 14'7" ceiling height.

Basement:
1,500 SF basement with 9' ceilings (not included in total SF calculation)

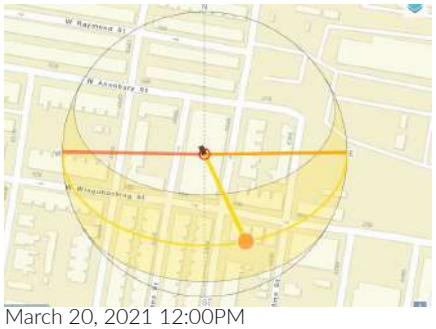
Loading:

- One (1) 10' x 12' drive-in door,
- One (1) interior loading dock 22'7"w x 13'9"h x 27'd.

- Electrical service: 600 amp, 3-phase, 4-wire.
- Dry sprinkler system and smoke detectors throughout.
- Office: 978 SF.
- 6,000 lb freight elevator.
- Video surveillance system.
- Box conveyor belt from second floor to loading dock area on first floor.
- Natural lighting throughout second floor.
- 4 stairways throughout building.

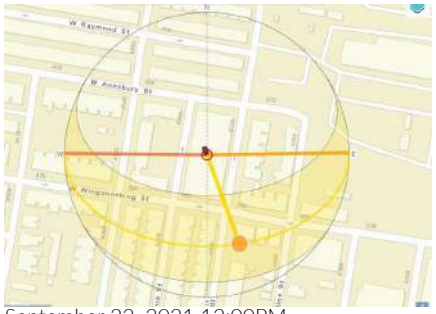
See Appendix for Community Profile

1.11 Solar Study

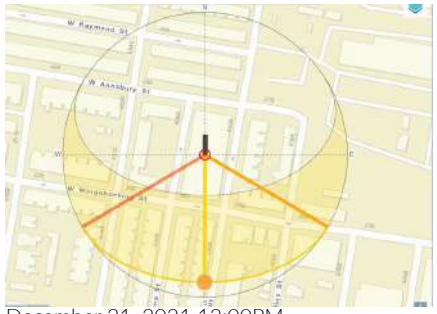


March 20, 2021 12:00PM

June 20, 2021 12:00PM



September 22, 2021 12:00PM

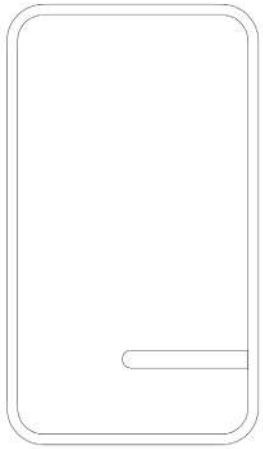


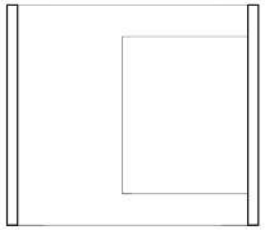
December 21, 2021 12:00PM

	Dawn	Sunrise	Sun peak level	Sunset	Dusk	Duration	Altitude	Azimuth	Shadow length
March 20, 2021, 12:00PM	6:36:30 AM	7:03:11 AM	1:07:51 PM	7:13:12 PM	7:39:56 PM	12h 10m 1s	47.21°	154.56°	24ft at an object level: 26ft
June 20, 2021, 12:00PM	4:58:45 AM	5:31:16 AM	1:02:12 PM	8:33:09 PM	9:05:41 PM	15h 1m 53s	68.86°	137.00°	10ft at an object level: 26ft
September 22, 2021, 12:00PM	6:21:19 AM	6:48:03 AM	12:53:05 PM	6:57:28 PM	7:24:08 PM	12h 9m 25s	48.25°	159.83°	23ft at an object level: 26ft
December 21, 2021, 12:00PM	6:48:25 AM	7:18:40 AM	11:58:48 AM	4:38:56 PM	5:09:11 PM	9h 20m 16s	26.57°	180.30°	52ft at an object level: 26ft

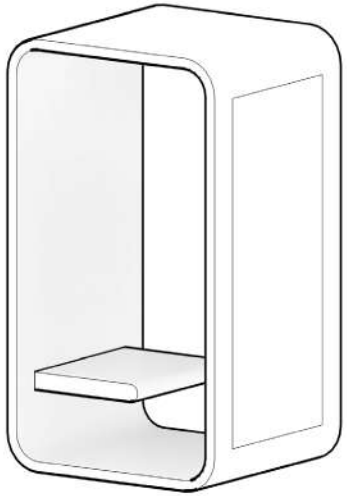
1.12 Design Probes

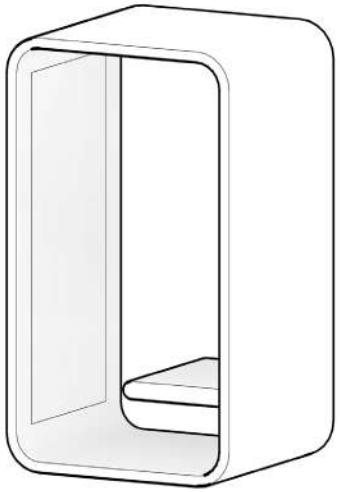
1.12a-Scale

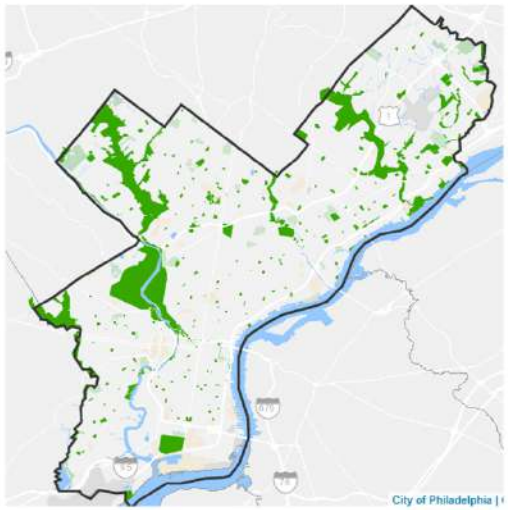




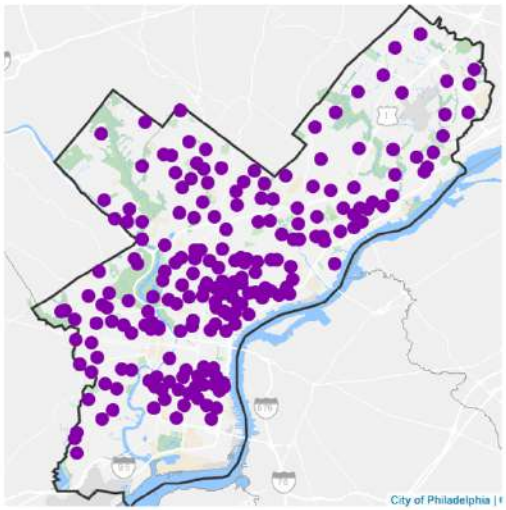
Nature Booth object with added immersive nature experiences including vegetation, integrated monitor,and ability to simulate mist, breeze and sounds.



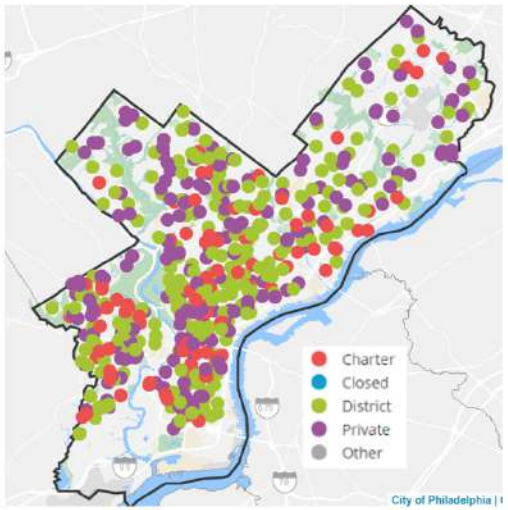




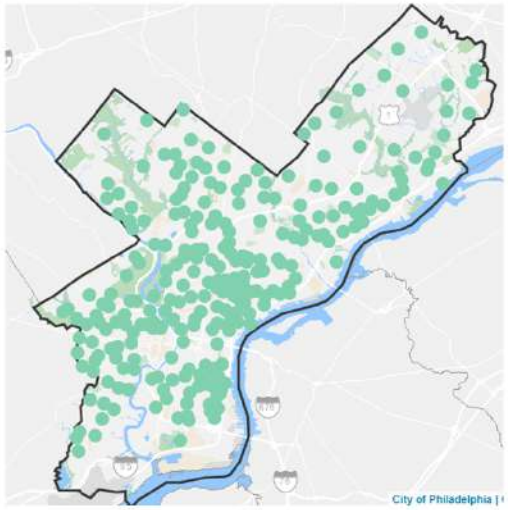
PARKS & RECREATION SITES



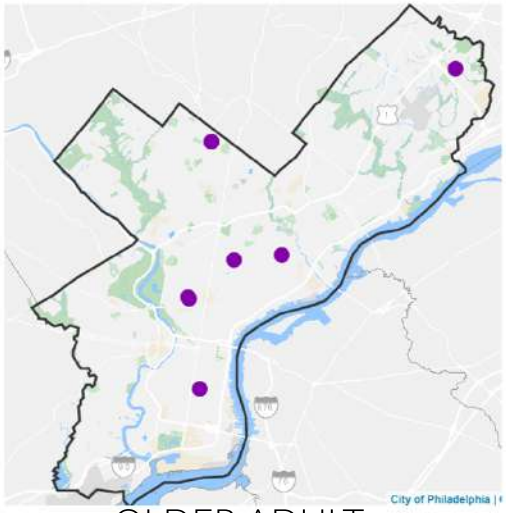
RECREATION CENTERS



SCHOOLS



PUBLIC PLAYGROUNDS



OLDER ADULT COMMUNITY CENTERS

CITY OF PHILADELPHIA

1.12c-Experience

See Appendix for Interview

1.13 Research to Design Statement

This thesis project seeks to explore the way in which an interior environment can be used as a tool to connect persons to nature through a material, experiential and cognitive approach with the hopes of impacting the emotional and philosophical connections that persons have with nature.

Architecture will serve as a medium to create a public interior nature destination for the surrounding urban community. Spaces will be designed with physical manifestations of nature and natural processes, with technology in key spaces to enhance the experience, creating a backdrop that supports recreation, leisure, learning and community.

The Biophilic Interior Design Matrix will be used as the criterion to support the design and incorporation of nature-based features in the interior environment. The six elements include actual natural features, natural shapes and forms, natural patterns and processes, color and light, establishing place-based relationships and human-nature relationships. Nature, natural processes and digital technologies such as plants, auditory stimuli, haptic feedback and other simulations will be embedded into the physical space to aid in the establishment of the first four features of the matrix. Site programming will help to establish place-based relationships with attention being given to the local cultural, geographical and ecological heritage of the Philadelphia neighborhood in determining the approach to relevant nature connection features. The human-nature relationships criteria will be established with an experiential approach to the spatial planning and circulation.

S E C T I O N T W O

DESIGN DEVELOPMENT

2

2.1 Code Compliance

See Appendix for Process work.

USE/FUNCTION OF SPACE	OCCUPANCY CLASSIFICATION	FLOOR AREA	LOAD FACTOR	OCCUPANT LOAD
PODS	A-3	4150	30	138
POOL AREA	A-3	1637	50	33
LOUNGE	A-3	4931	15	329
KIDS PLAY	A-3	6161	50	123
CAFE	A-2	2353	15	157
NATIVE GARDEN	A-3	5724	50	114
OFFICE	B	565	150	4
FARM	A-3	6726	300	22
LOCKER ROOM	A-3	332	50	7
			TOTAL	927

WATER CLOSETS		
	MALE	FEMALE
CODE REQUIREMENT	1 PER 125	1 PER 65
ACTUAL	7	14

LAVATORIES		
	MALE	FEMALE
CODE REQUIREMENT	1 PER 200	1 PER 200
ACTUAL	5	5

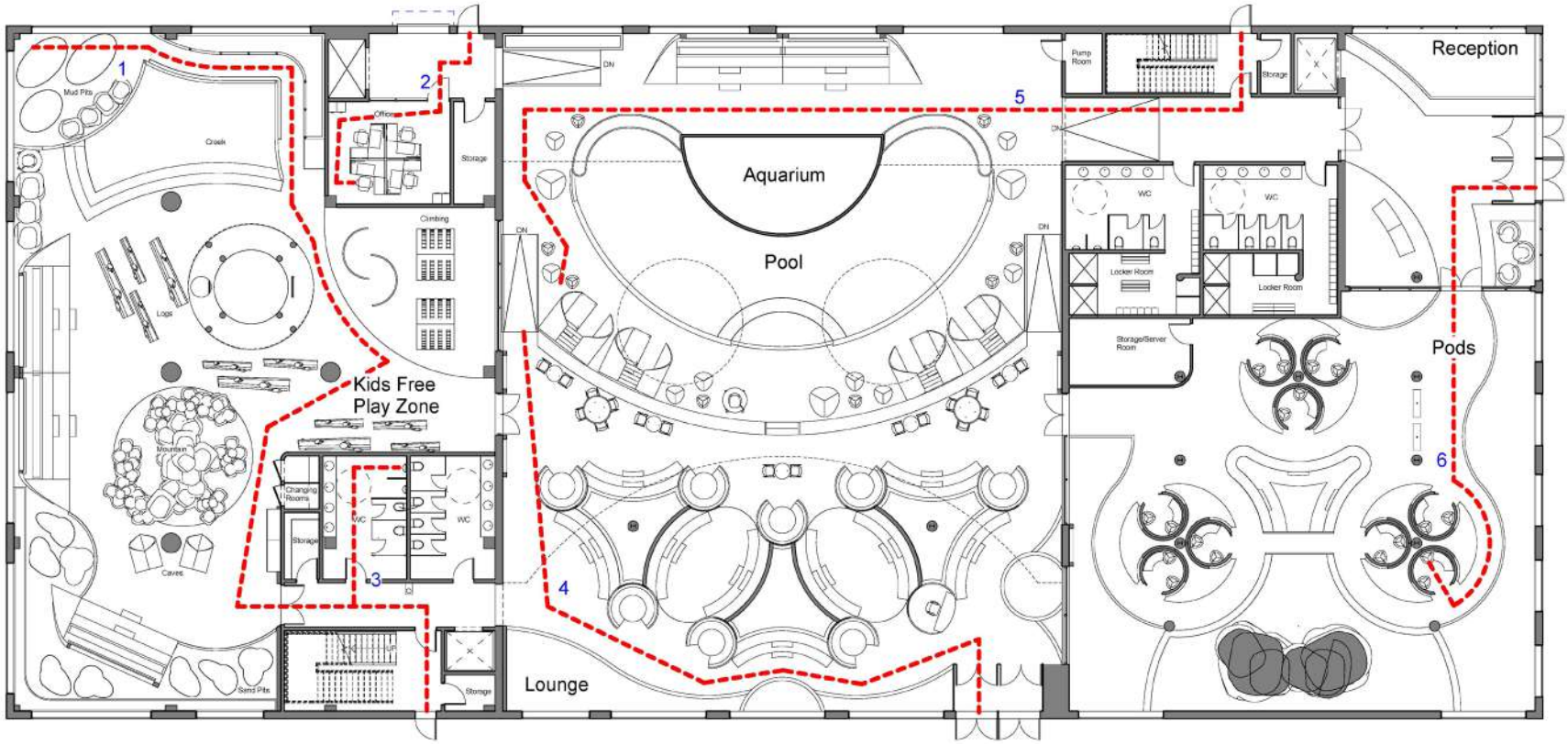
URINALS	
CODE REQUIREMENT	67% OF WATER CLOSETS
ACTUAL	5

DRINKING FOUNTAIN	
CODE REQUIREMENT	1 PER 500
ACTUAL	3

APPLICABLE CODES
2018 INTERNATIONAL BUILDING CODE
2018 INTERNATIONAL MECHANICAL CODE
2018 INTERNATIONAL EXISTING BUILDING CODE
2017 NATIONAL ELECTRIC CODE
2018 INTERNATIONAL PERFORMANCE BUILDING CODE
2018 INTERNATIONAL ENERGY CONSERVATION CODE
2018 PHILADELPHIA FIRE CODE
2018 INTERNATIONAL FUEL GAS CODE
2018 INTERNATIONAL PLUMBING CODE
2018 INTERNATIONAL SWIMMING POOL AND SPA CODE

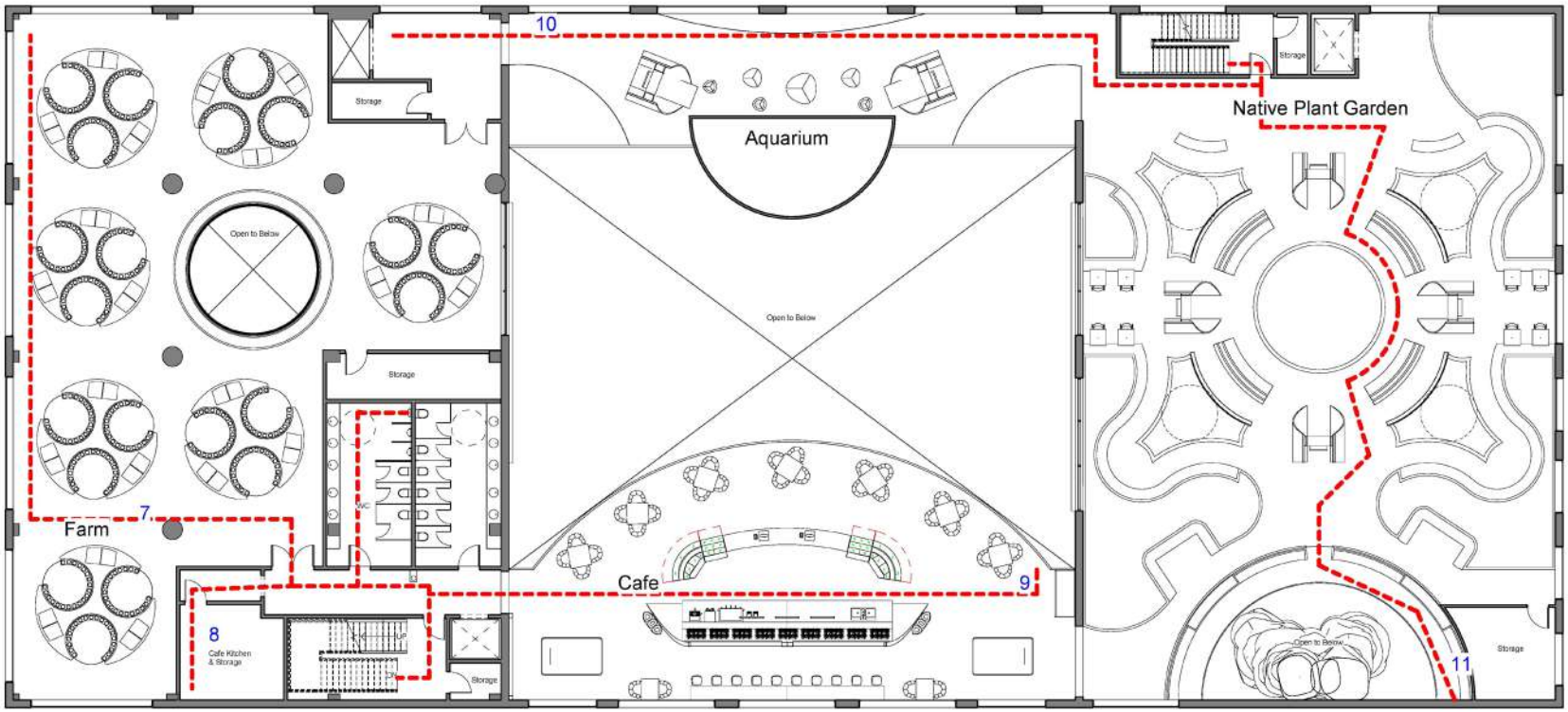
CONSTRUCTION TYPE: IIIA (COMBUSTIBLE (MIXED SYSTEM) / SPRINKLERED)
TOTAL SQUARE FOOTAGE (SF): 42600
MAXIMUM EXIT ACCESS TRAVEL DISTANCE: 250 FT
MAXIMUM COMMON PATH OF TRAVEL: 75 FT
LENGTH OF DEAD-END CORRIDORS: 50'
MINIMUM CORRIDOR WIDTH: 44"
NUMBER OF EXITS REQUIRED: 3

2.1a-Path of Egress



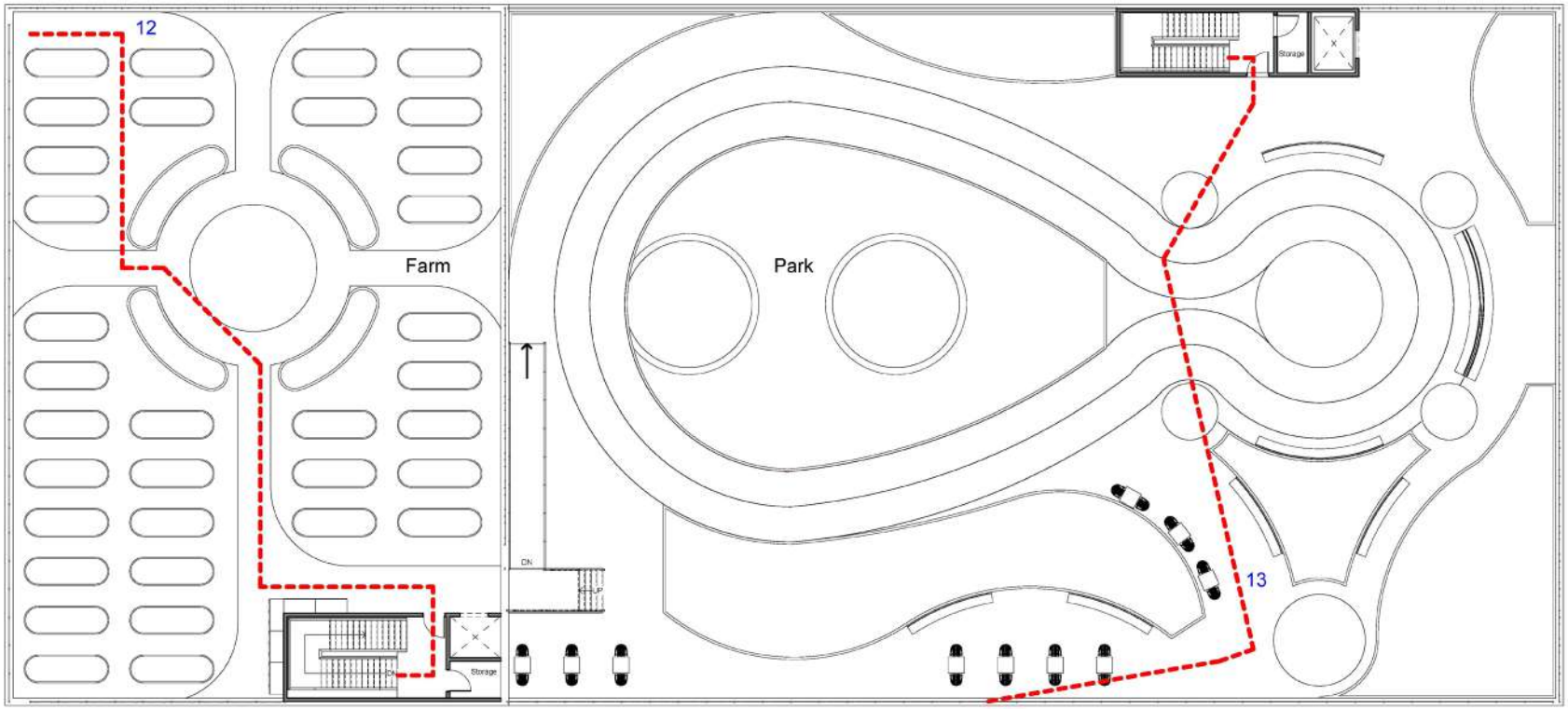
LEVEL 1

ROUTE	DISTANCE TO EXIT
1	171.5'
2	41'
3	52'
4	116'
5	140.5'
6	82'



LEVEL 2

ROUTE	DISTANCE TO EXIT
7	152'
8	65'
9	107'
10	137.5'
11	132.5'



ROOF

ROUTE	DISTANCE TO EXIT
12	145'
13	129.5'

2.2 Sustainability Features

GREEN ROOF

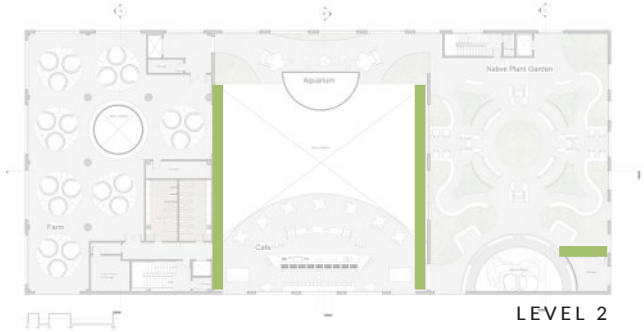
The roof will function as a green roof. A portion will be allocated as a place for the community to grow food for personal use and for the cafe. Addtional recreational green space will also be used. The green roof will also help to regulate the internal temperature of the building.

GREEN WALLS

Green walls will be added to the space to provide a biophilic experience to the users. A green wall is a strategic way to include greenery when ground-level landscape space is in short supply.

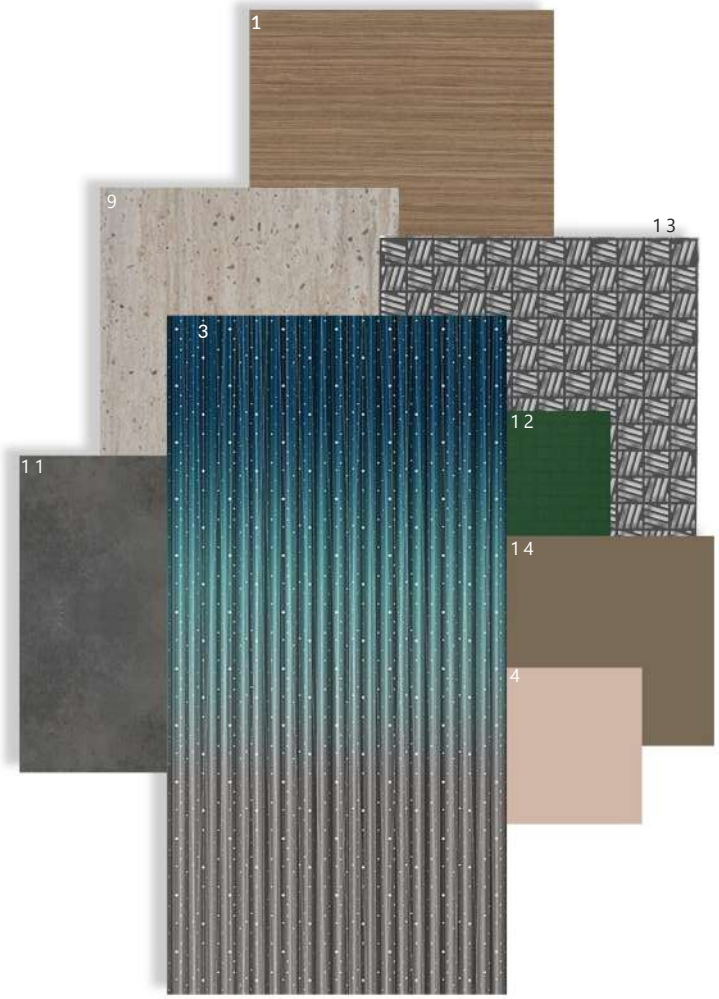
SKYLIGHTS

Skylights within the space will allow for natural light, natural views and solar heating.



2.3Materials

2.3a-Palette



2.3b-Selection Criteria Matrix

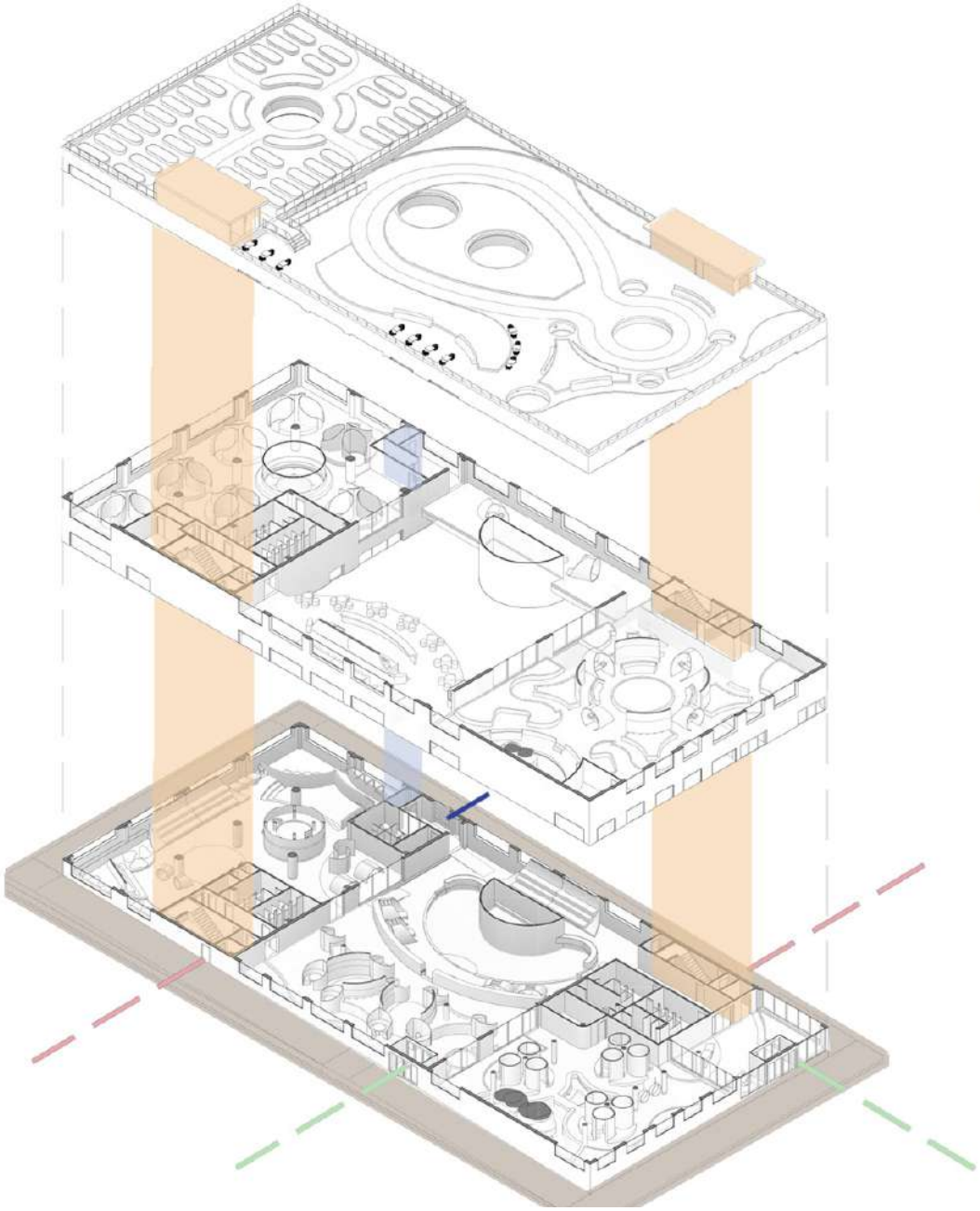
	MATERIAL NAME	LEED POINTS	3RD PARTY CERTIFICATIONS	FIRE OR SAFETY RATING	LOW VOC	ADHESIVES	AIR QUALITY	NATURAL CONTENT	RECYCLED CONTENT	SPECIAL MAINTENCE
1	ALPI BALANCED AMERICAN WALNUT	N	N	Y	Y	Y	N	Y	N	N
2	MOZ DESIGNZ BLENDZ 442 METAL	Y	Y	Y	Y	Y	N	Y	Y	N
3	MOZ DESIGNZ COSMOS LG METAL	Y	Y	Y	Y	Y	N	Y	Y	N
4	SHERWIN WILLIAMS PAINT SW6058	Y	Y	Y	Y	N	Y	N	N	N
5	SHERWIN WILLIAMS PAINT SW7031	Y	Y	Y	Y	N	Y	N	N	N
6	CITY LIGHTS PTS CERAMIC TILE DATILE	N	Y	Y	Y	N	N	Y	N	N
7	TOWNSEND LEATHER SECLUDED CREEK	N	Y	Y	Y	N	N	Y	N	N
8	HI-MACS RED QUINOA W010	N	Y	Y	N	N	N	N	N	N
9	DURASEIN NATURALE SOLID SURFACE	Y	Y	Y	Y	N	Y	N	N	N
10	ARMSTRONG MALLEE WHEAT 5A291	Y	Y	Y	Y	Y	Y	Y	Y	N
11	ASPECTA FIVE CONCRETE WASHED	N	Y	Y	Y	Y	N	N	N	N
12	FOREST GREEN 70 DENIER NYLON	N	N	Y	Y	N	N	N	N	N
13	BERGO BRIQ	N	Y	Y	Y	Y	N	N	N	N
14	SHERWIN WILLIAMS PAINT SW6152	Y	Y	Y	Y	N	Y	N	N	N
15	EDELMAN DASHING LEATHER SAHARA DASH04	N	Y	Y	N	N	N	Y	N	N

SECTION THREE

FINAL DESIGN

Nature.base

3.1 Circulation



LEGEND

PUBLIC VERTICAL CIRCULATION

BOH VERTICAL CIRCULATION

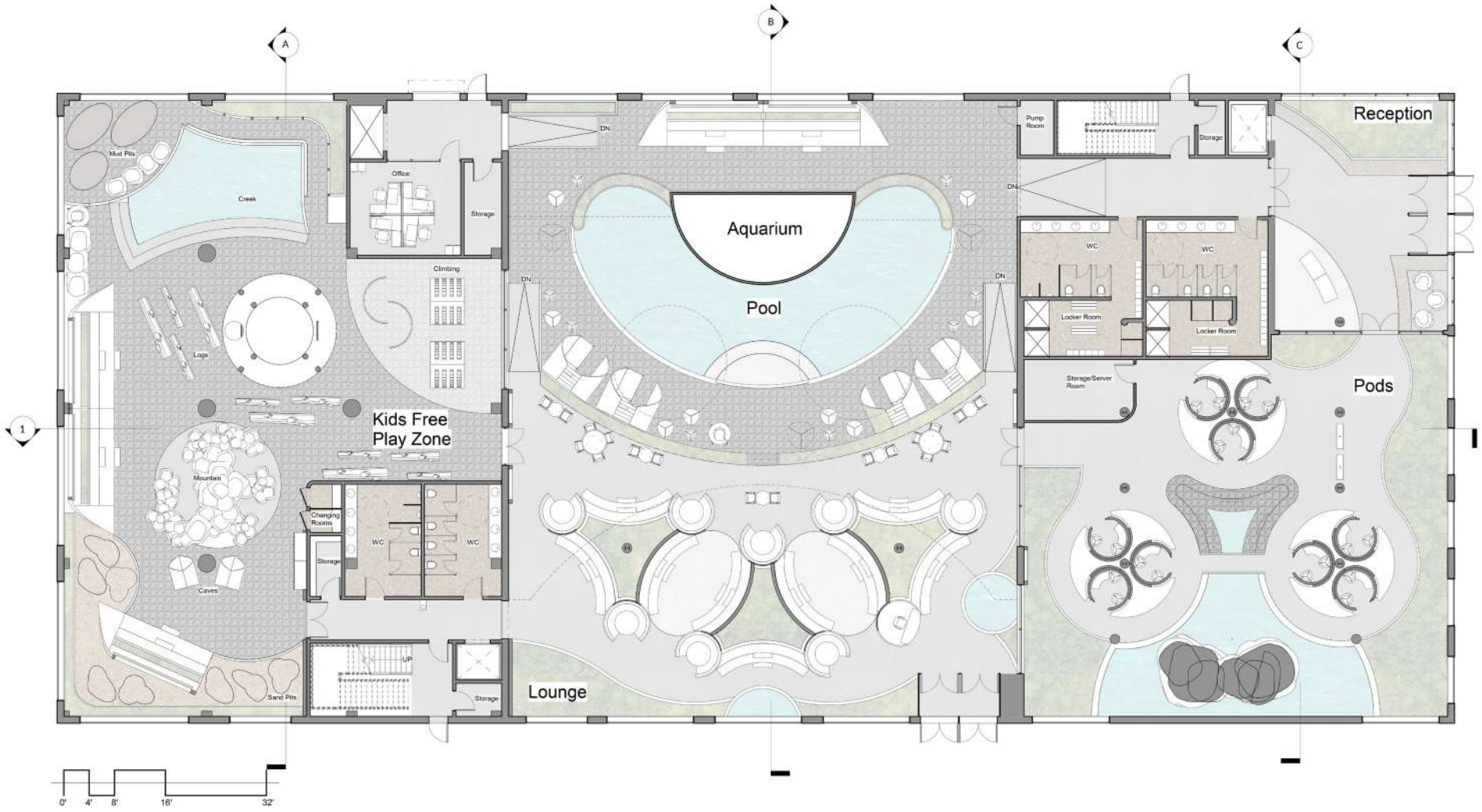
BOH ENTRANCE & EXIT

EXIT

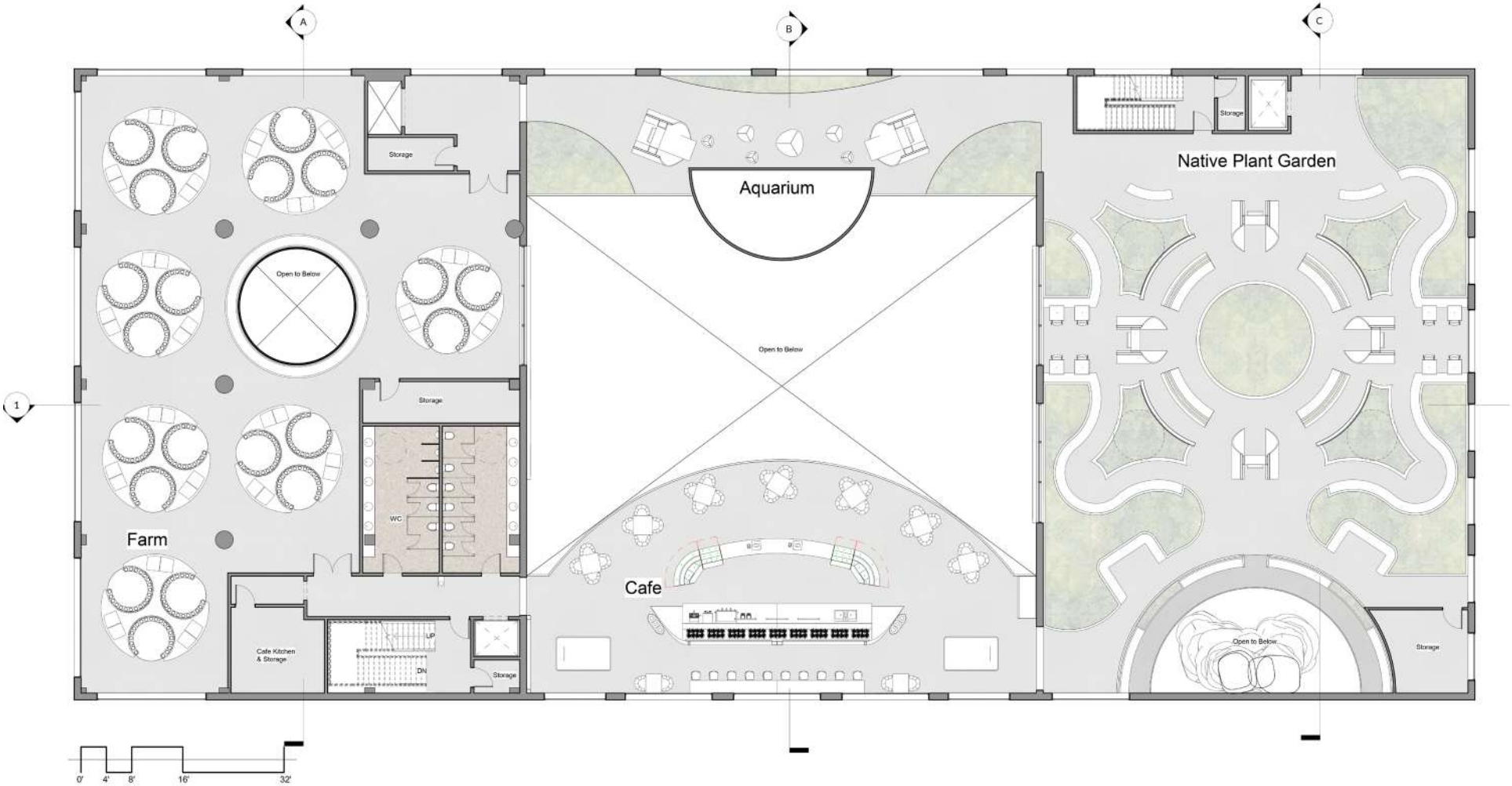
ENTRANCE & EXIT

3.2 Floor Plans

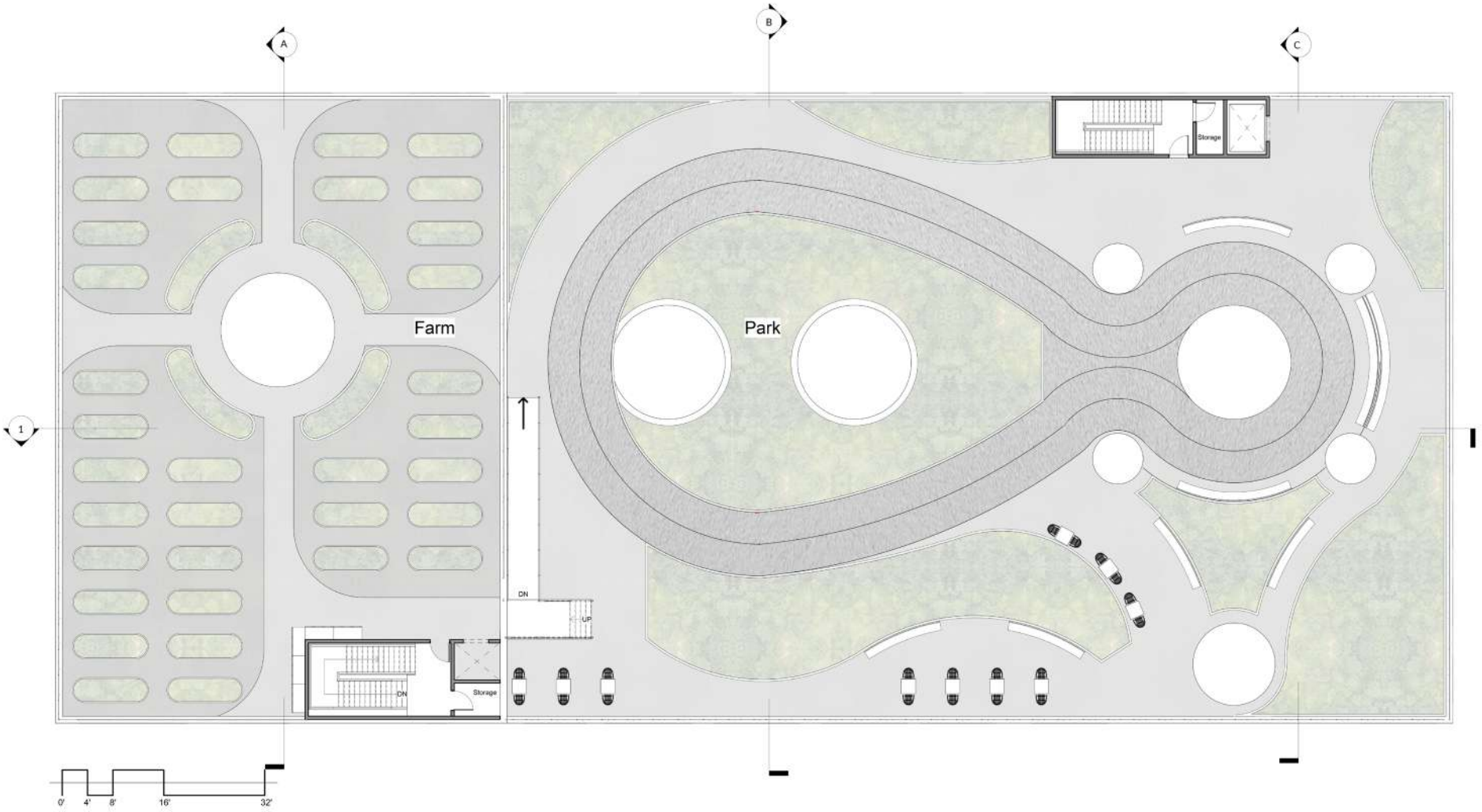
3.2a Level 1



3.2b Level 2


A
B
C
1
Storage
Aquarium
Native Plant Garden
Open to Below
Open to Below
Storage
Storage
WC
Farm
Cafe
Cafe Kitchen & Storage
UP
DN
Storage
Open to Below
Storage
0'
4'
8'
16'
32'
N

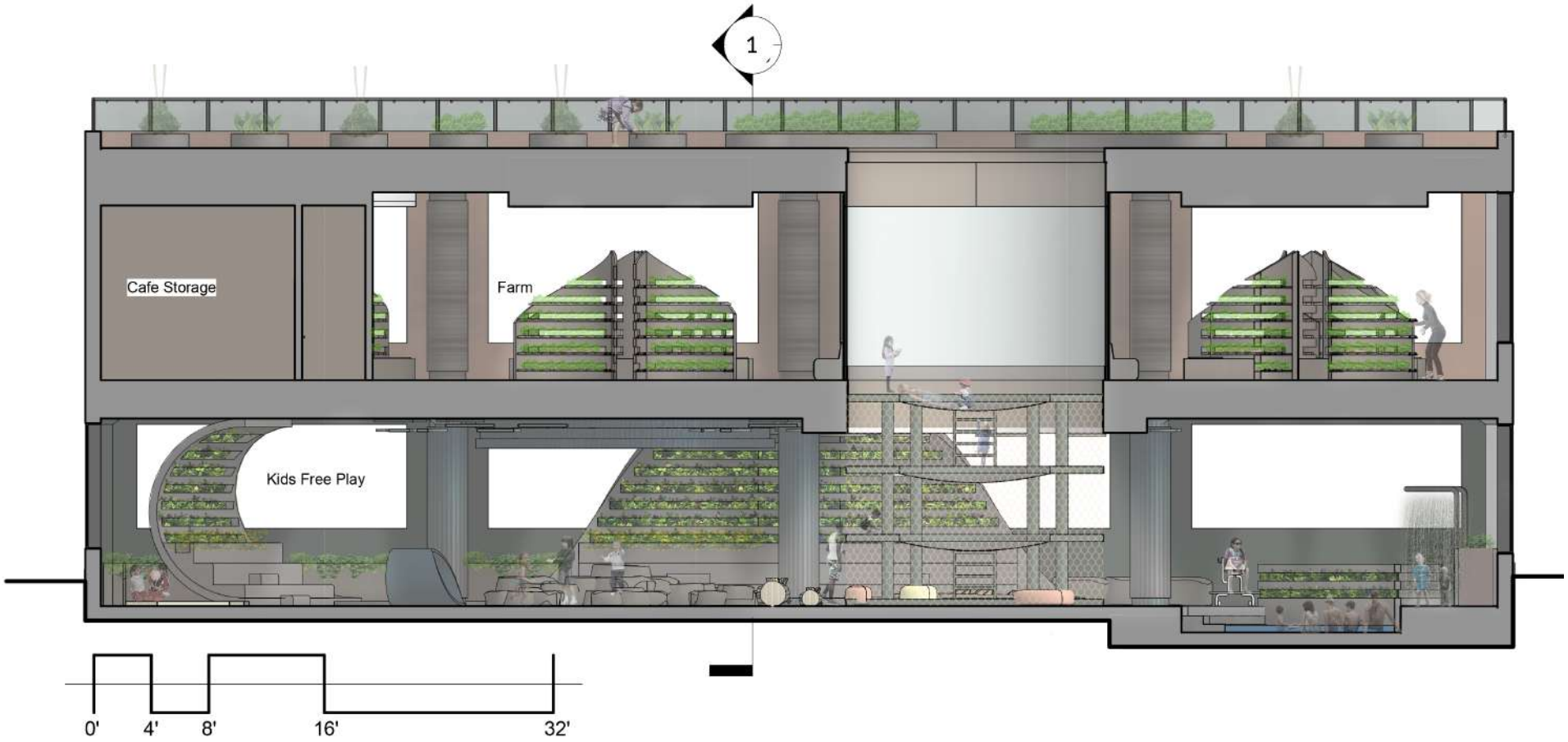
3.2c Roof



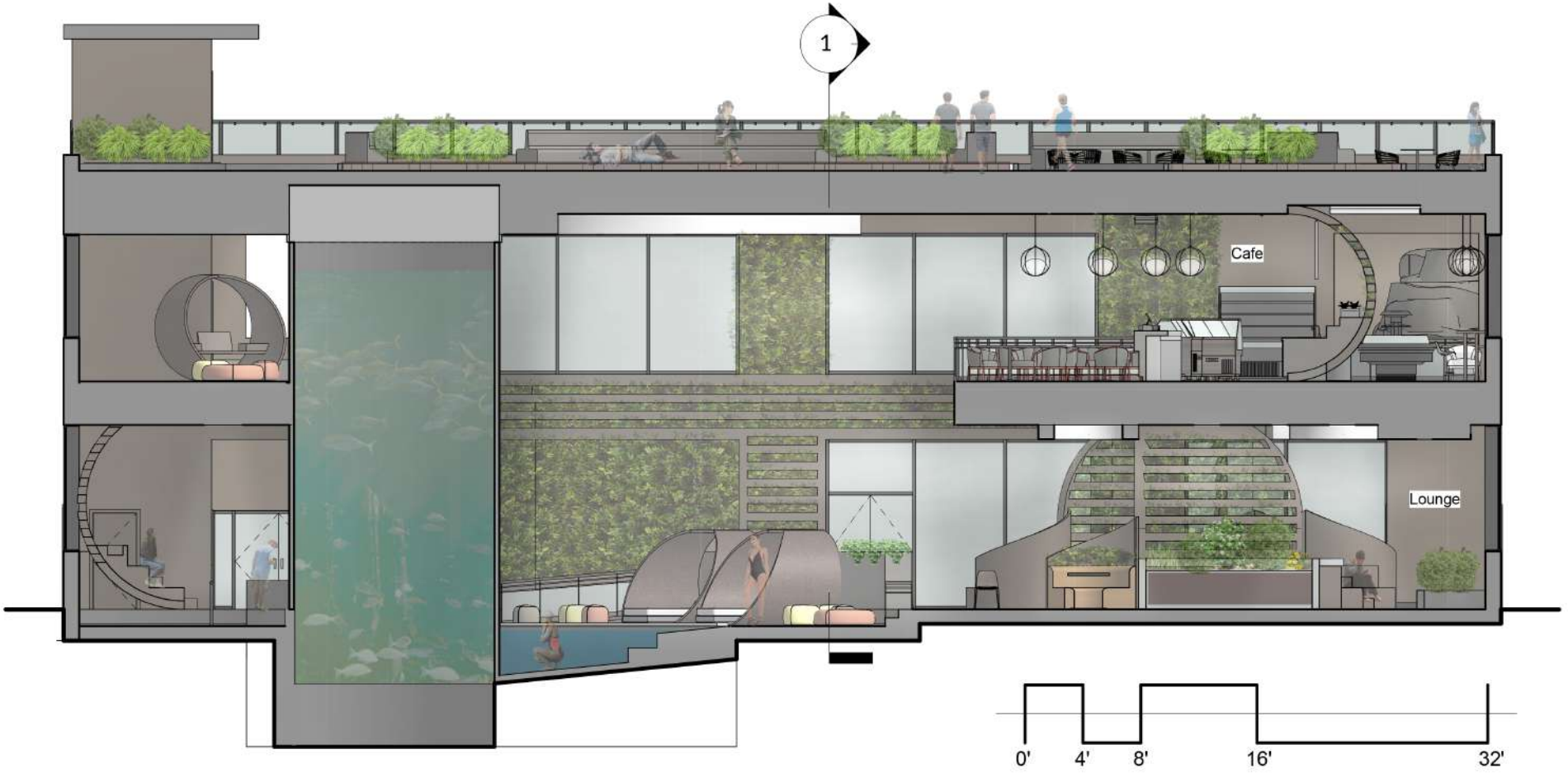
3.3 Sections

3.3a Section 1

3.3b Section A



3.3c Section B



3.3d Section C

RECEPTION

POOL

AQUARIUM

KIDS FREE PLAY

PODS

CAFE

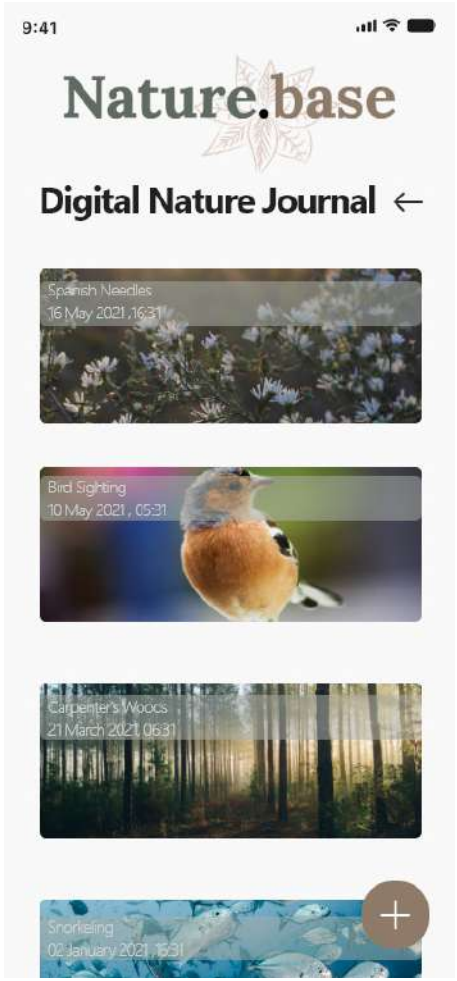
FARM

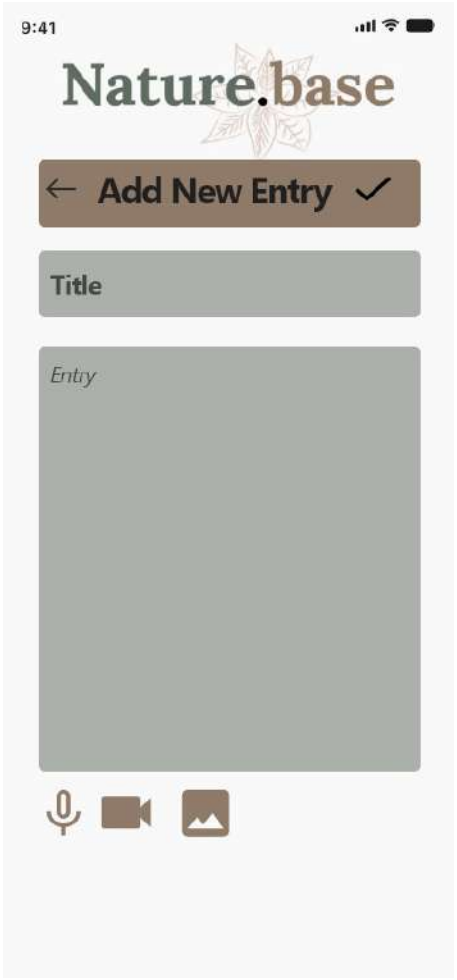
NATIVE GARDEN

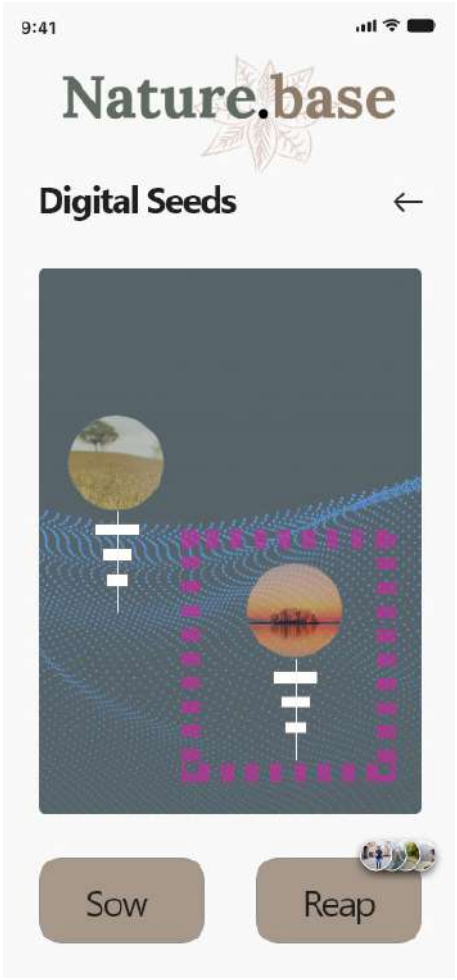
ROOF TOP PARK

3.5 Approach to Technology

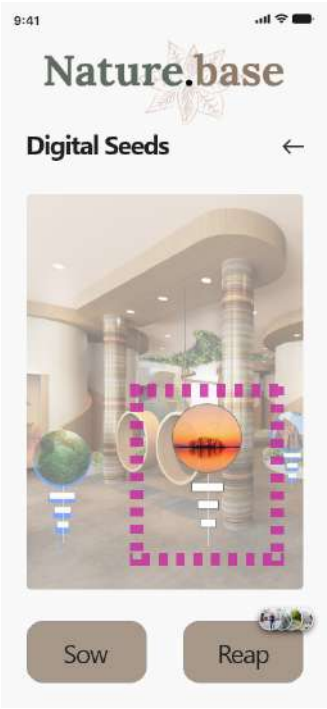
An app with AR technology will be available for persons to use within the space. Technology will be used as a 'sixth sense' that persons can interact with if they so chose. Interactions within the space will include the collection and placement (reaping and sowing) of 'digital seeds' which are digital experiences that can be experienced and optimized within the pods. In addition, the 'grapevine' will serve as a source of information about nature features used within the space that persons can interact with.





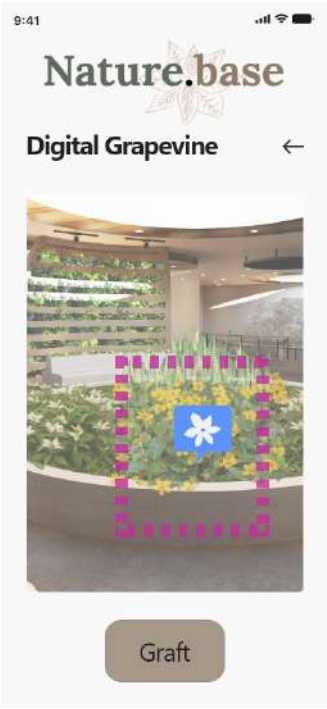


3.5a Digital Seed Simulation



SCAN TO WATCH

3.5b Digital GrapevineSimulation



SCAN TO WATCH

SECTION FOUR

BIBLIOGRAPHY

Bibliography

Browning, Matthew H. E. M, Fatemeh Saeidi-Rizi, Olivia McAnirlin, Hyunseo Yoon, and Yue Pei. 2020. "The Role of Methodological Choices in the Effects of Experimental Exposure to Simulated Natural Landscapes on Human Health and Cognitive Performance: A Systematic Review." ***Environment and Behavior,*** no. Journal Article: 1391652090648. https://doi.org/10.1177/0013916520906481.

Chawla, Louise. "Benefits of Nature Contact for Children." Journal of planning literature 30, no. 4 (2015): 433–452.

Chawla, Louise, and Rachelle Gould. "Childhood Nature Connection and Constructive Hope: A Review of Research on Connecting with Nature and Coping with Environmental Loss." People and nature (Hoboken, N.J.) 2, no. 3 (September 2020): 619–642.

Hart, Roger. 2002. "Containing Children: Some Lessons on Planning for Play from New York City." Environment and Urbanization 14(2). Excerpted in The People, Place, and Space Reader.

Jr., Peter H. Kahn. 2011. ***Technological Nature: Adaptation and the Future of Human Life.*** Cambridge, UNITED STATES: MIT Press. http://ebookcentral.proquest.com/lib/drexel-ebooks/detail.action?docID=3339199.

Kaplan, Rachel. 2001. "Nature in the Eye of the Beholder." ***Michigan Quarterly Review*** 40 (1): 207–17. http://ezproxy2.library.drexel.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=aft&AN=504992843&site=ehost-live.

Kellert, Stephen R., Judith Heerwagen, and Martin Mador. 2011. ***Biophilic Design: The Theory, Science and Practice of Bringing Buildings to Life.*** John Wiley & Sons.

Litleskare, Sigbjørn, Tadhg E. MacIntyre, and Giovanna Calogiuri. 2020. "Enable, Reconnect and Augment: A New ERA of Virtual Nature Research and Application." ***International Journal of Environmental Research and Public Health*** 17 (5): 1738. https://doi.org/10.3390/ijerph17051738.

Louv, Richard. 2008. ***Last Child in the Woods: Saving Our Children From Nature-Deficit Disorder.*** Algonquin Books.

McGee, Beth, Nam-Kyu Park, Margaret Portillo, Sheila Bosch, and Mickie Swisher. 2019. "Diy Biophilia: Development of the Biophilic Interior Design Matrix as a Design Tool." ***Journal of Interior Design*** 44 (4): 201–21. https://doi.org/10.1111/joid.12159.

Mcsweeney, J., D. Rainham, S. A. Johnson, S. B. Sherry, and J. Singleton. 2015. "Indoor Nature Exposure (INE): A Health-Promotion Framework." ***Health Promotion International*** 30 (1): 126–39. https://doi.org/10.1093/heapro/dau081.

Nature-of-Americans_National_Report_1.3_4-26-17.pdf. (n.d.). Retrieved October 8, 2020, from https://natureofamericans.org/sites/default/files/reports/Nature-of-Americans_National_Report_1.3_4-26-17.pdf

Scherling, Laura. 2017. "Exhibition Review: Pierre Chareau: Modern Architecture and Design." ***Interiors*** 8 (3): 159–68. https://doi.org/10.1080/20419112.2017.1377419.

"The Jewish Museum." n.d. Accessed December 13, 2020. https://thejewishmuseum.org/exhibitions/pierre-chareau-modern-architecture-and-design.

Wilson, Edward O. 2009. ***Biophilia.*** Harvard University Press.

SECTION FIVE

APPENDIX

Design Probe: Experience

Interview with Nick Jushchyshyn, Program Director, Virtual Reality & Immersive Media, Drexel University
December 28, 2020

1. Can you share a little bit with me about your background with VR, AR, Immersive Media & Immersive Environments.
a. How did you get interested in this field?
b. What type of work have you done?
c. Early experiences/exposure to the tech?

When it comes to VR AR immersive. I've done a number of projects, while here at Drexel, both in VR video recording creating VR experiences and
Other types of immersive media formats including virtual production projection displays interactive museum displays. You know my area of focus has kind of landed in where immersive media is applied for education and are learning. I think there's a lot of potential right there. And so I've been really focusing a lot of my work in that space while drawing from Entertainment arts because of entertainment level of detail when it comes to graphics interaction and quality. A lot of what's done in digital visual effects digital animation. Is really the pinnacle of computer graphics and visualization and so I try to draw from those industries and bring that level of authenticity that level of detail into creating immersive education experiences.

2. How often do you interact with such technologies/ How often would you say that you are in a digitally immersive space?

These days, almost daily. Right now we're in the middle of a holiday break. So maybe not entirely daily during the holiday break but generally during a work week I'll be using virtual production in particular, every single day. I use it in most of my zoom meetings always creating content and preparing content. Of course, the courses that I teach are in this area. So naturally, I'm using it there. But I'm also working on applying these technologies in other spaces. Including you're teaching other schools, how to use it like the engineering college for example or institutions like Academy natural sciences, etc. So it's a daily thing for me.

3. What type of spaces would you say you have been immersed in recently?
a. Types of spaces
b. Activity being conducted in the space
c. In one sitting, how much time do you spend?
d. What type of technology do you use to access these spaces

Predominantly I create Virtual Learning Environments right now. I usually use Unreal Engine to create them. They're a bit of a hybrid experience. I tried to draw from design ideas that are in use in actual physical locations and particular ones that are familiar to the students or the instructors that I'm working with. So since I do a lot of my work at Drexel I borrow from a lot of the design elements that you might see on Drexel's campus and then kind of enhance that a little bit and just make it a little bit beyond what might be physically possible beyond what might be physically typical and make it more of an engaging immersive environment. So it might take something like the lobby space outside or within the disown center and engineering building has a very distinctive set of glass walls and interior steel, tubular structure and use that as a theme, but then also add in, maybe the garden wall from a different building and then add a teaching desk and then add a massive, you know projection screen to that space so that I can share my my computer screen if I'm doing a lesson I can have like this really, really huge copy of my screen being shared to students and things like that.So sometimes these things will contain real equipment. So we've scanned real equipment and put that into these environments and sometimes it just, you know, create it's used to, you know, just teach software. So it's all virtual experience in one sitting. Amount of time spent- It could be hours and hours and

hours so, I mean it's throughout the day, generally.

Type of tech Not all of these spaces are strictly virtual reality. So I think, you know, it's really important to distinguish that immersive media is much broader than just virtual reality or augmented reality and where those two technologies involve wearing a headset throughout the experience. Virtual production involves no headset at all. I have worked in VR for hours and hours and hours at a time. But that's not necessarily a daily experience even though immersive media is.

4. Is there a specific type of immersive experience that you frequent the most? How often?

So right now the one that I do frequent the most is known as virtual production. And what this is, is basically creating a completely virtual digital environment and setting in in a tool like a game engine and then integrating that with real world so. I might be at my own desk with my computers in the real world with a green screen behind me and camera facing me and then that the video from that camera can be dropped into the virtual world and copies of my computer screens can be also projected. You know, instead of being just a physical laptop screen or physical computer screen. They could be appearing in the virtual space as a holographic display floating in front of me semi-transparent, Futuristic and this allows it. To integrate better so that if I turn and in my real world desk and look at my screen. In the virtual space. It looks like. I'm really physically there and I'm turning and I'm looking at a screen and it happens to be holographic. And so, you know, students that I'm interacting with can see what I'm interacting with and I could share my screen independent of that but it creates a more engaging and certainly compelling environment. So that's one version of virtual production. There's a lot of different variants of it, but that in particulars, is what I'm working with the most on a day to day basis at this particular moment. I would say that a close second would be 360 degree stereoscopic virtual reality video so. This could be a recording you know it's done with a special camera that has many lenses, all the way around it so that it's recording video from every single direction around it and it's doing so stereoscopicly, so there's a separate video for the left and the right eye. So the viewer watches the video they could watch it in YouTube where they could watch it on their phone. And they could use in YouTube on a computer, their mouse could let them look left and right throughout the video and they could look anywhere they want it up and down. With a cell phone, you could just move the cell phone around you and it's kind of like a magic window looking into that world. But one of the most compelling ways to actually view the video would be using a VR headset and that way. Each I gets a separate video signal. And so the viewer sees everything stereoscopic Lee with depth. And again, you know, they just turn their head naturally can look around the environment and it to the viewer seems like they're right there. And in the video. It could be recorded or it could be streamed. So I'm right now preparing to teach my motion capture spatial capture class in the winter. And due to, you know, coven distancing requirements. I, you know, intend to use 360 video to teach that class from the motion capture stage and so that the students will be able to have that experience of, you know, experiencing the idea of standing in the physical stage and looking around and and getting to see it all happen as if they were right there. So those are two main areas, that I would say that I use.

5. Is there an immersive experience that you would want to interact with daily?

a. What would you be doing?

b. How would others interact as well?

I think there's a variety of experiences that that I would want to do daily, but I think that, you know, being able to bring students who are learning remotely into highly specialized facilities like the motion capture stage. That's, that's what I'm really looking forward to doing this winter. I will be doing it and I'll be teaching from there.

And how would others interact as well. Now that's going to be the interesting bit here. Because that hasn't really fully matured. The back and forth communication in this space. So if a student is wearing a VR headset and they're not really well positioned to type a question and the technology for viewing a live stream 360 video. A lot of it doesn't

readily lend itself to saying raising your hand and asking a question. And so these are some of the things that I'm looking into exploring and solving and experimenting with over the winter.

What is being in the immersive experience like for you. Does it feel realistic.

6. What is being in the immersive experience like for you?
a. Does it feel realistic?
b. Is it an activity that you enjoy?
c. What helps to increase your experience of "presence" and being there?/What heightens sense of reality for you?

I'll stay for starters that realistic is a is kind of a difficult word to apply to this. Because it can be realistic. But, you know, it could be realistic. If I'm filming a video from the viewpoint of sitting in a chair in a theater and watching something happening on stage or around me knowing that I'm sitting in a chair right because I'm sitting in a chair in my office wearing a VR headset and so you know, I could have a realistic experience of almost anything that involves sitting in a chair.
But if I'm supposed to be navigating or moving around. Somewhere well that experience isn't entirely realistic. Because I don't have the space to walk around a large museum while sitting in a chair, in my office so
though there's a bit of realism last there now. On the flip side, I could create a virtual museum that would be physically impossible to have
In the real world, or I could create a museum that's exhibiting objects that physical museum could never show because those objects need to be kept in a sealed vaults for protection because they will degrade in air, and in light and things like that. So sometimes realistic isn't actually the goal. Sometimes, the goal is what is beyond real. So I think that's an important note about all of this. But generally, I think, for myself, I do have two functioning eyes, so I do feel that stereoscopic virtual reality experiences are far more engaging than monosyllabic where you don't have that sense of stereo depth and certainly experiences, where you can use your hands and your voice. To interact with the experience are going to be far more engaging and realistic than ones that that are more passive where you just kind of sit and watch them happen. I do enjoy all kinds of experiences like one of the things that I really am looking forward to trying at some point I just haven't had time to sit down with it is, you know, something like Star Wars squadrons or flight simulator with VR, you know, fly either a real or a fictional craft you know and have that experience of Sitting in that cockpit and looking around and having that control over the vehicle. I think would be a lot of fun. And I just haven't had a chance to try either those particular experiences I've tried other ones. But I tried to I try to avoid video games because I enjoy them so much that I use a lot of time if I started to play with them.

7. What are the down sides of being immersed in a digital environment? Has cyber sickness been of issue to you?
I am a little bit prone to nausea, in general, and I am not good on roller coasters anymore with something. I loved when I was young, but somehow, as I've aged my body doesn't really enjoy that so much anymore so car sickness reading in a car reading on a train, roller coasters, those kinds of things will also give me a bit of motion sickness. So I think that, you know, the disconnect. I don't know if cyber sickness. You know that that's a host of things because that has, in part, that could be motion sickness disconnect between what the eyes and ears are perceiving in terms of motion versus what the actual inner ear and your essentially your internal gravitational sense of acceleration and a disconnect between that can cause uneasiness, but also some other things that can cause it. Inaccurate or misaligned stereoscopy where maybe the cameras that filmed an experience have that left and the right. Eyes further apart are closer together than the than the viewer and that can
cause an adverse effect. You know, bright lights all the time, loud noise and then even just the, the idea of, you know, really having to focus your mind on interacting because you've only got two hand controllers in your hands that have buttons that you know, you would naturally speak to someone, or you would listen to them and raise your hand to talk to them, but instead you have to remember which button to push and which set of shortcuts to use on the joystick to do that interaction. So now, your brain is being taxed a bit more to do something that would have come far more naturally in the real world. And so, those kinds of things can factor into things like cyber sickness. So I would say I'm prone to motion sickness. But I think the other aspects of cyber sickness tend to affect me less. I think that the downsides are that it's more difficult to interact with other people unless they are also engaged with that same immersive experience. So if you're in a room and there's only one person one vr headset and you're the one wearing it like no one else is it is really participating in that experience with you. So I think that's one of the downsides.

8. What are your views on daily integrations of this technology into person's everyday routines?
So I think the technology has ways to go before it is a routine everyday consumer product thing like an iPhone or I watch an Android device or tablet device right. Those are great examples

of devices and technologies that have become everyday use, right, and I love the iPad, in particular as an example because the underlying technology when that was released was actually not as powerful as its predecessors in that were delivered and other technologies, you know, other computer companies using other operating systems had created tablet computers and they failed to gain any traction. But with the iPad did was really solve the interaction aspect. So it took things that we were familiar with, like, say, turning the page of a magazine, in the US, we kind of grabbed the right side of the edge of the page and we turn it to our left and then we're looking at the next page. And so the iPad operating system built into it. The idea that this gesture of, you know, taking hold of the right side and sliding to the left. Would you know essentially swipe you to new content. We were very familiar with that gesture and then it took that very familiar gesture and let you do it in any direction and you could do more than simply turn a page, you could switch between apps, you could draw a line, you could you could do anything with that gesture and so it took something we were familiar with from the real world and then made it do more than what we could do with it in the real world and VR is not quite there yet. A lot, you know, if you go into a VR experience in particular, you're going to be holding hand held controllers, you're not actually just using your fingers and hands with nothing in them and you when you're looking at that world. You don't see everyone else in the room with you and interact with them and you don't even have the field of view. Right. So you're, you're much more focused on just what's in front of you and you can't really see side to side. And the equipment's a bit heavy and the you know the graphic fidelity of the most expensive equipment isn't quite there yet. So all of these things will will need to be solved in the coming years to make this something that's more routine, you know, much more like an iPhone or an iPad. An example, you know, a couple of years ago that Oculus development library. Someone forgot to update it in Windows and it expired. This certificate that authenticated it expired and windows and the result, you know, was it was fixed in a day.But for 24 hours, not a single Oculus headset in the world worked, you know, for that day. And of course in VR circles that was huge. It was, it was like, I can't believe this is happening, what's going on, you know, for the truth was, you know, in mainstream media, it was, it was not a news worthy thing. It didn't show up in any local news. It didn't show up in any national news wasn't a big deal. Nobody noticed, but if you know if there was 24 hours when not a single iPhone worked or single Android, you know, every Android device was not working for 24 hours. That would be huge news so VR is not there yet. It's not huge news so it's got its got a way to go.And it has every bit to do with how we interact with it as much as it does that, the technology itself.

9. Along the mixed-reality continuum is there a perfect spot to be?

Nope. I think that each form of immersive media is going to have its own set of strengths and weaknesses in any given situation. And depending on the goals, the outcomes intended Any one of these formats could be more effective than another.

10. When designing an immersive environment that replicates an actual physical environment, what considerations are taken to create a compelling environment?

So if you're for some reason, trying to recreate a genuine physical environment then attention to detail in all aspects of that environment is critical. So, you know, immersion computer based immersion today doesn't really involve smell. So you don't have to worry about the smell so much It involves what you can see and what you can hear, and to some degree, what you can feel. And so those details, need to be really specific, so you know, I know that one of the things that, for example, if you look around the room that you're in right now and you look at where the walls meet the floor, you'll see a little bit of trim. At the bottom of the wall, it kind of covers up the scene between the wall and the floor and that's a common thing for someone who's new to creating immersive content to just forget, you know, the wall just hits the floor and there's nothing else in between. You know the textures, don't look quite right, the reflectivity isn't quite right. The light isn't quite right. The sound. Isn't there like right now there's pets having fun somewhere. And hear your microphone, you know,and so if you have a home. If you have a neighborhood. I mean, it's not uncommon for in my neighborhood for people to be walking their pets by the House and they're having conversations and cars are driving by and all of these sounds I don't normally pay attention to. But if I was creating an immersive environment to replicate my home. I need to pay attention to all of those things and bring them into that virtual environment. So its attention to detail is really the most important part of creating an actual physical environment in immersive spaces.

11. Have you ever been immersed in a setting with virtual nature?

a. What was that like?

b. What do you remember from that experience

Virtual nature. Yep, absolutely. In fact, I've created quite a bit. Whenever you know pre covid, I often visited national parks with my family and I have when I'm doing that. I always want to

bring a VR video camera and record some of those experiences. And so, you know, that could be on the top of a mountain or on a shore or in a forest so so yeah it's those are wonderful. I like immersive being immersed in the natural landscapes.And then, you know, I've enhanced and use those later on I was a virtual reality experience video experience that I was creating. A couple years ago and the director wanted that part of this to take place at camp fire in the wilderness, and so I actually just took one of the VR videos that I had already created. You know, recorded at a national park and took that daylight scene and turned it into night with a starry sky, the environment, the ground and the Mountain View over an ocean and it was from Acadia National Park in Maine. You know the ground and then added a fireplace, like, Oh, it was so it was still that park but the daylight, seeing that I had recorded was transformed into a night-time scene and a little campfire was added. And so, yeah, I've done all kinds of things like that.

12. How often do you visit natural settings?

Not often enough. Honestly I'm lucky to live in, you know, part of the country around Philadelphia. There's lots of natural settings in real life. And I like to get into those so I like real life nature. And so since I have such ready access to actual nature. I don't tend to
you know, you use VR or immersive technologies to visit it too often.

13. Do you have any strong positive or negative associations with a natural setting?

Definitely positive associations with natural settings.

14. Would you say that you live in an urban environment?

I just moved so I used to live in a very suburban and I moved into another suburban enclave of a more rural county in, you know, kind of in the outskirts of Philadelphia, so you know, so I work you know my day-to-day office. When we can be in the office is very urban it is West Philadelphia. I've through most of my life, I've lived in the suburbs of Philadelphia. I don't, I don't feel the suburbs are urban per se. I mean, there's certainly more urban than, say, the Midwest where you know the the closest neighbor might be, you know, a half an hour drive away or even further. That's a natural environment right. But so it's certainly urban in that regard that you know there's paved streets and paved sidewalks and buildings and lots of people and shopping centers. And so, yeah, I guess you know it's urban in some ways. But I think when I think of the word urban I think more of densely populated city like Philadelphia Washington DC Balti-more, that sort of thing. And where I live, tends to be more on the outside of those urban centers where there are more parts and open spaces and natural settings.

And just one follow up question on what you had mentioned where you were like going out and recording the natural settings and like what kind of technology used to do that?

I used a Samsung 360 round camera for the most part, I also have an ozone camera and sometimes there's a camera, called a views VU z that I use.
So all of those cameras record video stereoscopically and 360 degrees and they all have built in Mike's or I'll use an external audio recorder to record.

Case Study- Key Informant Interview

Organization: Riveredge Nature Center
Interviewee: Jessica Jens (Executive Director)
Date: January 19th, 2021

Question: What is the main goal or purpose of the Riveredge Nature Center?

Answer: We have three environmental pillars that we work in education- environmental conservation and environmental research. Those are the areas main areas we are working with the overall intent to help develop environmental citizens.

Question: In what ways has the organization sought to explore connections to nature for all generations?

Answer: So, we make sure that we are connecting from early, toddlers all the way up to folks who are retired and in the later years of their life, and we do that through concentrating on programs that engage for each generation. Simple examples are that, for our youngest we do have a nature-based playgroup for parents or caregivers of babies and toddlers. We then work our way up. We have a nature based four-year-old kindergarten program in partnership with a local public school. We also actually have a public elementary nature-based charter school on site.

And then we do adult education classes, as well as our volunteer programs really engage our adults. So, they help go out and take care of the land, take care of the facilities, help in our school programs and our summer camps. For our older generation, they are usually active volunteers as well. We have some people in their 90s, who go up and they collect prairie seed and help get rid of invasive plants. It is impressive, but then we have things like a bird club and a nature photo club to engage them. There is also a partnership with our Aging and Disability Resource Center where they do a Memory Cafe so folks with different kind of cognitive challenges like Alzheimer's dementia along with their caregivers would come out once a month. They meet inside one of our facilities and then depending on the weather and the footing conditions most times they go on a little walk outside too and they learn about different things. There is a topic each time. It is a great way for them to create a community, being around others who are you know struggling with similar things. It is building a community through using nature as a tool.

Lots of people when they first learn about Riveredge or think about the community, they think about all the programs, we have for kids and families with school aged children. We work hard to ensure that all ages feel included and connected and we continue to work in those areas too, and we want to build more partnerships to do that.

Question: How successful has this been so far? How has COVID affected this?

Answer: Riveredge has just been through five years of extreme growth. It has been going really well. During that time, we have doubled, how many people we reach a year from about just under 20,000 a year to about 45,000 a year. So that is wonderful and that is based on those partnerships. We are partnering with more and more organizations which is wonderful. Our membership is growing, and we have really developed over this time a whole section of programming, that we do not have at Riveredge Nature Center but out in the communities to really

start to expand our reach and bring value to our communities as well. It is not just about the Nature Center. With Covid, we are pivoting and during the best we can, and have done a lot of virtual support of our schools and a lot of our programs, especially for the oldest participants. Those programs have all been virtual. We have been very careful about bringing anybody back. We are doing in person things too as well.

Question: What additional programming would you like to include to further this cause? If money were no object, what would this facility be like?

The areas that we want to work more on is actually a food systems, integration and food security. We have an organic farm as a component of our program that we have here in and we have been using it to inspire and teach about sustainability. But we really want to have conversations with some partners in the region and see if there is some way that we can start integrating better community use of that so that is why so that is one of the areas we want to work in. Inclusion as well. So, we have been trying in a variety of ways. We want to work in all those areas. But one of the things we have been working on is, when you talk about all generations, is to adjust the accessibility of the land and the trails and the buildings as well for people of all ages and abilities. We do have a track chair here through a partnership which is super cool, it is like an all-terrain wheelchair. And folks get go in it, and it has these tracks, instead of wheels. And there they go, out in the snow, in the mud. They can even go through water. It is so cool to see their faces light up it is just amazing. A lot of these folks have not been able to get out into nature in a long, long time, and so that track chair has been allowing those types of things. And then, our environmental research, it is something that we have not done as much as we continue to do it, but we would really like to if we have some opportunities to really invest in that area and start to contribute more to the broader academic field. It is funny that you ask that as we are in the middle of a capital campaign for a new education center here that is to support our elementary charter school, as well as all these programs I have been talking about. People get very interested that you are doing this project, because, as we talk to people about raising this money there's a lot of mental models of why would nature-based programming an outdoor nature center like you even need facilities- we don't get it. So there's a lot of conversations about how these facilities really can be welcome entrances to the natural world. How, you know folks need transition areas to feel comfortable going outdoors and then, when there's bad weather and everything else, having a safe place to go and having that support team at the start and end of programs and bathrooms. We are fundraising. So if money were no object we would go all out as far as the sustainability for that building.

Question: How does this facility compare to other similar facilities?

Answer: I would say we're doing pretty good. We aren't the top nature center in the region as far as when you think of big size and things like that. So other ones that we in the Midwest look to are like Kalamazoo Nature Center in Michigan, Cincinnati Nature Center. Of course there are some long time nature centers who have really expanded the work that they've been doing. But through our growth, Riveredge, was the first independent nonprofit nature center in southeastern Wisconsin. So we're 53 years old, so we've been around the longest and we really helped lead the way in a variety of areas and helped other nature centers get started. We feel like we're doing a really good job and we're one of the top nature centers in. in Wisconsin. We're up there in like the top three probably, you know as far as size and scope of the work that we do and reach, those type of things. But I will say that we also have challenges as well too. Our current visitor center is 30 years old, you know some other nature centers have much newer facilities that have that kind of visitor appeal to them. Part of our personality here is feeling very welcoming we say you try to say yes, all the time. We want people to feel comfortable here and bring their authentic selves to Riveredge so we're very unpretentious.

So the nature Center started without buildings at all and over the years over the 53 years it is added land. And this visitor center, the big gray octagon kind of barnish looking thing seen on the website that's 30 years old and so that was the first building. At some point they got a farmhouse and they were like kind of working out of this old farmhouse that's long gone now you know, but this facility is 30 years old. We now have smaller facilities which are beautiful as part of our facility. Our approach here is to spread people out on the land and create educational nodes. We have a new sugarbush house and we have a new river outposts classroom so we are starting to build smaller remote facilities on our land. And there is also the education center that will be built near our visitor center. We do have some new facilities that are much smaller, but the main place that visitors tend to come here, and you know it is showing its age. Still fine, but you know there is like this weird carpet on the walls, the entrance you know and. But it was it was the time that it was built so.

Question: How would you describe the organizational culture?

Answer: This is cliche, but we really talk about ourselves as a family. There is a lot of transparency and honesty and a community built into our culture, both for the visitors, the staff, the volunteers, and the board. Fun is a big part of it. We strive to make sure that everybody is enjoying their job. Obviously, passion for the mission is incredibly high here right so there's a lot of passion as well, so that I, you know the organization culture is very laid back, but at the same time is, we set really big goals for ourselves, and we have accountability too, but in a positive way, because we're trying to make the biggest impact we possibly can. In collaboration with the community around us, there is always this dichotomy. We ask this question to a lot of our staff and our board members as part of a strategic planning process and they all basically said it is super chill and relax and casual and approachable and welcoming. At the same time, we have these huge goals and this drive to never, never accept status quo.

Some of the departments, there is not a lot of people. Our education team is the biggest and then, research and conservation is just a couple, and so research and conservation works on the land, as well as the facilities, but mainly the land and restoring it, preserving it helping others in the region restore areas to their native habitat. The research we do right now is citizen science based so a lot of the population studies and things like that. In addition to our surgeon restoration project, which is restoring a breeding population of lake surgeon, to the Milwaukee river, for the first time in hundred years. There is a lot of different things in development with our fundraising team. We have them so they integrate obviously a lot with our mission-based teams which are the education, research, and conservation. Then administrative is me, it is our marketing and communications manager, it is our business manager. So, we are there to support, but you know help in all those ways, so we have the different departments. We are a medium sized nature Center with 16 full time staff. So, there is still just a lot of organic communication and one on one people are reaching out. There is not like levels of bureaucracy.

Question: Is there an organizational chart?
It is the Board of Directors and me, and then we do have our leadership team, which is our Director of Education. We currently do not have a director of research and conservation, because he ended up resigning and taking a job, closer to home. And it was right before the pandemic hit, so we will be having a director of research and conservation again come this summer. So that is like the leadership team of the of the center and then we do have our full-time management staff that lead different efforts. Our adventure education manager, she leads our summer camps and all our adventure program and our she is in the education department. We have like four managers in the education department, so we do have those levels, but they are not maybe as important. In practice, you just see everybody kind of melding together.

Question: Approximately what percentage of workers are at the facility at a time?

Answer: 100%, I mean we would have some telecommuting. People could always choose to take a day here and there, to tell a community of projects and things like that, but really our work is done here and in the communities.

Question: What are the spaces required to efficiently run this facility?

Answer: We need classrooms, we don't bring on more groups of students are adults here, then we have spaces for them to go to safely with the weather, but then we usually start and end in there. We need offices, because, like I said, our work is here, so we certainly needs this-the normal support. Desks and kitchen, you know, we also need kind of maintenance facilities for both facility management, but then also all that land management work that I talked about, so tractors and combos and you know all those things so like a maintenance shed we have one of those. And then there is some unique facilities that we have right. So, we do maple, we make maple syrup now, we have for five years. March is our maple sugar season. We have a facility, where

we both educate and produce maple syrup. And then we have like a barn we do community events and member events, or we have dinners and things like that, so space for those dinners to occur and kitchen support. Parking lots and lots of parking. We always run out of parking. It is hard to decide how you make more parking lots because you are basically paving prairie you know. So, we are always battling parking balance. And storage, tons of storage. So, for all those education supplies and hip waders that we put the kids in, and they will go to the rocky river and collect aquatic insects and vertebrates and you know all those things. Also, tree climbing equipment, we put arborist ropes up on trees and all ages, kids through old adults, will ascend, well kind of use systems to ascend those ropes so that they are up in a tree 40 to 50 feet. It is pretty cool. We also have kayaks and canoes and life jackets and paddles and all that stuff.

Question: Are there any special safety or security issues?

Answer: Yes, so you know it is always an interesting challenge by us, we do have you know alarm systems on all our buildings. Even though we're so close, like 20-minute drive from the north side of Milwaukee and urban areas, we're still also in this weird like out in the country kind of place. Recently, a couple of months ago, we were having lots of vandalism damage. I think bored teenagers, having campfires and things. We have a road, the public road but a county road that cuts through it. So, there is really no way to have a fence around it. It is too big, nor do we want to, but there is no way to secure like the grounds of Riveredge. Luckily, the vandalism has stopped but you know, we have asked ourselves about putting in some kind of surveillance system in these remote areas because it's dark and no one's out here. So, it's really ripe for places for people to congregate.

Question: Would you be able to provide an estimate of the square footage of the facility and a square footage breakdown of some of the spaces?

Answer: Yes

Case Study- Key Informant Interview

Organization: The Schuylkill Center for Environmental Education
Interviewee: Stephen Goin (Director of Land and Facilities)
Date: January 19th, 2021

Question: What does your role as the Director of Land and Facilities entail?

Answer: I am charged with overseeing the entire property which includes 340 acres of forest, fields, streams, ponds, wetland, meadows. That is about a half a square mile of land, it is considered the largest privately held green space in the city of Philadelphia. We have a nature center on that land, kind of positioned in the center of the property, so, in addition to stewarding the miles of trails, we have the habitat.

I am also charged with overseeing the facility as well, so our nature centers about 18,000 square feet. It has office space for about 35 full time employees, most of which are positioned in one wing of the basement. The nature center- there is kind of like three different areas to it, so we have a nature based preschool and they do have inside classroom space. Although this year, because of Covid, they are spending like 99% of their time outside. So even if it is snowing or cold, even most of the rainy day they are outside. So, we have the preschool wing. And then there is the Discovery Center it is kind of our exhibition space. It is pretty old. It really needs a major upgrade. But it is intended to invite people in and have kind of a little bit of a nature type experience indoors before going out into the larger property. And then the last space is a library, an extra like meeting area little conference room, lab areas that will use this kind of like free space for different styles of programming and such. And I should also add in our art gallery space, which is part of our environmental art program and so you know I oversee all these areas, anything from changing light bulbs to trying to redesign an entire space. I have a small staff that we try to upkeep the place and make sure that it is suitable for everybody.

Question: How long have you been with the center?

Answer: This month I celebrated my six-year anniversary.

Question: How have things been with Covid?

Answer: Fine, you know. It causes us to take a look at our cleaning regiments. It caused us to figure out different ways to interact with the public, you know whether it was going virtual or changing our policies, about being outside as much as possible. We have you know, the preschool we designated one specific bathroom location for the preschool and it is not open to the public. We have posted occupancy limits and front desk staff are in tune with you know, making sure that too many people are not going into each space that are open to the public. Luckily, we have a lot of area outside that we can go out to, and we are operating. For me, it is really hard for me to do my job from home, I mean I really have to have a finger on the pulse of what's going on in the building or on the property. As far as my small department goes, if they are charged with fixing something, they cannot really do that from home. But, wherever possible, our staff are working from home. So, there is a lot less use in the building. And you know we have had to make some adjustments because of that, making amends in terms of the types of activities.

Question: Who are the types of people that come to this facility? /What is the approximate average age/ability range of the visitors?

We try to be open and accessible to as many people as we possibly can. We do a lot of different types of programming everything from preschool. Actually, we have a program that's younger than preschool so like the tiny tots. There is like two-year-olds, parents or you know caregivers and young child that will come, all the way through, visiting school groups, all the way up to college level that will come out and use our lands as almost a living laboratory. And then you know we have a lot of education that is happening more geared towards adults you like brewing beer using invasive plants or baking muffins that are designed like soil profiles, to really serious things that have to do with environmental justice issues or climate change. And so, we really try to offer a broad spectrum of different things that would attract people and, hopefully, in the process, they would feel more connected to nature and inspired by nature.

We had a very old front walkway and when we had the opportunity to redesign that walkway, we of course made it as handicapped accessible as possible. It was still staying true to our rustic nature type of a theme and so, there is two different locations for handicapped access through our walkway and in 1970 we were considered the first handicapped accessible nature trail in the country. So, we have a paved path that goes through our forest system. Now, of course, that was a long time ago that it was designed and implemented, and a lot of things have changed since then, as far as ADA requirements. We have learned a lot, but you know today it is probably not up to the codes that would be required. But it is pretty cool that they were thinking about it back then, like even at the end of that trail, there is a bird blind so that you can sit behind a wall, and you know, see the birds at the bird feeders and interact with nature that way. That was designed with an open back so that you know if you were in a wheelchair, you could get up into it and then it was designed with lower viewpoints, so that you could see out from a wheelchair height, so we try to think about these things you know and provide as much accessibility as possible.

Question: What are the interior spaces required to efficiently run the facility?

Answer: Well, we have, like the nonpublic areas of the facility, our furnace room has a small oil burning furnace that heats mostly just the staff area. At this point we have exchanged to the old hydroponic system for an electronic mini split system throughout maybe call it 75% of the building. But we also have a lot of our like water for purification and just different types of infrastructure in the furnace room. So that is of course, like nonpublic areas. The public spaces, the front desk is kind of the initial hub that you come into. It is where somebody can ask questions and find out where to, whether it is a need for meeting a staff member that they are visiting or they are just trying to get directions, to a certain place on the property or learn something about nature. Everything kind of comes off that hub. The art gallery is positioned next to the front desk, the discovery center which is kind of like an introductory space to nature, off that front desk, so you know they really provide a critical role in our facility running. The preschool wing is kind of you know its own space in that, in order to have a preschool according to state regulations and all at this time, you also need to provide an indoor space. Since Covid, we have been having such a great time outside all the time that we are considering, you know basically doing that going forward, because you know it is even more in line with those European models of forestry schools and offers all the benefits of being in nature. I think that all the children, but also the parents are really responding well to it. There is a bathroom space for these young children. Nap time is a little bit difficult in the cold. But we have been adapting some of our outdoor spaces to include small propane heaters. You know covered areas that if it is raining or snowing there is some shelter available but ventilation, is still really good. It is essentially outdoors. We have put a lot of a small backyard fireplaces into the different outdoor classroom spaces, so that they can warm up. It has been great.

Question: What type of workspaces do the staff require?

Answer: Everybody is a little bit different. The staff area is probably one of the most neglected areas. Because we are small, well I don't know if we're considered a small nonprofit, but we are a nonprofit, that is, you know always operating on the edge of our budget. So, we have a lot of hand me down desks and chairs. Ergonomics is not at the forefront of our office spaces and we also have a really long history. So, the building was built in 1968, I guess it was completed in 1968. It has been packed full and emptied out I do not know how many times, but there is a lot of remnants. Even in my office, remnants of past directors, notes and different surveys and plans, all kinds of things that I do not necessarily know what to do with, but I hang on to them, because they might be helpful at some point. I do not know. And then some of the hand me down stuff that we have had donated has been great. There are a few staff members that really wanted standup desks and it just so happened we are able to find a donation of desks that were a lot nicer than anything we have around here and have the standup component to them.

Question: What are the public areas in the facility? Who uses them? What activities take place in the public areas? What works? What does not?

Answer: Yes, so that is one thing that is pretty nice. We have diversity of different sized spaces, so the largest is our auditorium, and that is I guess rated at 207 people, that is the fire marshal's capacity on that space. Our smallest public space that we would maybe invite like a small meeting to is the library space, and you know you could easily get a meeting of 20 or so people into something like that.

Question: If money were no object, what would this facility be like?

Answer: Yes, so we do have a strategic plan. We have a capital improvement plan or tying towards what we would call our master plan. That is, we just did get a nice grant for the completion of that plan. So, right now, we have like about $5 million in improvements that we would love to institute throughout the facility and property. As the maintenance master plan gets completed that number would probably go up but we have also already been working on that plan for about five years. And so, we have completed a number of projects, including that front walkway that I described. So, we have a lot of plans to you know that we could put into motion and action really quickly.

If we had the money to me, I think, talking about the facility and the space, we just completed the front walkway which was in dire need of replacement due to you know it just degrading over time. I think that the next thing would be inside the building, to create like an airlock section to keep the front air, especially in the cold of the winter or the warm of the summer to keep the air change a little bit more leveled. Then re-imagining the front lobby and bringing that into a more modern aesthetic and redoing the exhibits in our discovery center. They are pretty old and pretty tired. I think that those are you know the big steps for us that we've probably outlined them to be around $200,000 to do that kind of a interaction. The truth is, probably more. I mean if we could spend whatever we wanted boy, it could be an amazing entry way and all.

Community Profile

Source: PolicyMap- www.policymap.com
Area:- 0.5mile radius of 4500 N 3rd St, Philadelphia, PA 19140
Zip Codes touched- 19124, 19120, 19140, 19141

Population Trends

Population	2000	2010	2015-2019	Change 2000 to 2015-2019 (%)
Area	14,835	14,220	12,803	-13.70%
Counties (Philadelphia)	1,517,550	1,526,006	1,579,075	4.05%
State (Pennsylvania)	12,281,054	12,702,379	12,791,530	4.16%

Racial Characteristics

Race	2000	2010	2015-2019	Percent of Total Population in 2015-2019	Percent of State Population in 2015-2019 (Pennsylvania)
White	3,461	3,240	3,114	24.32%	80.53%
African American	5,265	4,759	4,543	35.48%	11.18%
Asian	535	481	479	3.74%	3.41%
Native Hawaiian or Pacific Islander	0	6	34	0.27%	0.03%
American Indian or Alaskan Native	83	165	43	0.34%	0.19%
Some Other Race	4,960	4,780	4,208	32.87%	2.15%
Two or More Races	531	789	382	2.98%	2.5%

Ethnicity	2000	2010	2015-2019	Percent of Total Population in 2015-2019	Percent of State Population in 2015-2019 (Pennsylvania)
Hispanic	8,125	8,688	7,688	60.05%	7.31%

Age Distribution

Age	Number of People in Age Group	Percent of People in Age Group	Percent of People in Age Group (Pennsylvania)
Under 5	853	6.66%	5.52%
Under 18	3,833	29.94%	20.81%
Working Age (18-64)	7,916	61.83%	61.35%
Aging (65+)	1,054	8.23%	17.84%

Incomes

2015-2019 Annual Income Category	Number of Households	Percent of Households
Report Area		
Less than $25,000	1,920	45.13%
$25,000 - $34,999	640	15.04%
$35,000 - $49,999	526	12.36%
$50,000 - $74,999	671	15.77%
$75,000 - $99,999	199	4.68%
$100,000 - $124,999	130	3.06%

$125,000 - $149,999	115	2.70%
$150,000 or more	53	1.25%

Incomes Continued

2015-2019 Annual Income Category	Number of Households	Percent of Households
County (Philadelphia)		
Less than $25,000	182,386	30.33%
$25,000 - $34,999	61,473	10.22%
$35,000 - $49,999	76,463	12.72%
$50,000 - $74,999	95,173	15.83%
$75,000 - $99,999	63,394	10.54%
$100,000 - $124,999	39,921	6.64%
$125,000 - $149,999	25,984	4.32%
$150,000 or more	56,543	9.40%
State (Pennsylvania)		
Less than $25,000	989,421	19.58%
$25,000 - $34,999	464,548	9.19%
$35,000 - $49,999	622,352	12.32%
$50,000 - $74,999	889,087	17.59%

$75,000 - $99,999	662,467	13.11%
$100,000 - $124,999	465,150	9.21%
$125,000 - $149,999	301,776	5.97%
$150,000 or more	658,305	13.03%

Families

2015-2019 Family Composition	Number of Families	Percent of Families
Report Area		
Families	2,925	--
Married with Children	425	14.53%
Single with Children	1,010	34.53%
Single Female with Children	819	28%
Other Families	1,490	50.94%
County (Philadelphia)		
Families	325,916	--
Married with Children	62,237	19.10%
Single with Children	74,313	22.80%
Single Female with Children	60,224	18.48%
Other Families	189,366	58.10%

State (Pennsylvania)		
Families	3,236,352	--
Married with Children	857,475	26.50%
Single with Children	416,960	12.88%
Single Female with Children	307,405	9.50%
Other Families	1,961,917	60.62%

Households

2015-2019 Household Counts	Number of Households
Report Area	
Households	4,254
County (Philadelphia)	
Households	601,337
State (Pennsylvania)	
Households	5,053,106

2015-2019 Housing Stock	Number of Units	Percent of Units
Report Area		
Single family detached homes	303	6.44%
Single family attached homes	3,800	80.75%
2-unit homes and duplexes	416	8.84%
Units in small apartment buildings	118	2.51%
Units in large apartment buildings	0	0%
Mobile homes or manufactured housing	69	1.47%
Other types	0	0%

Housing Stock Continued

2015-2019 Housing Stock	Number of Units	Percent of Units
County (Philadelphia)		
Single family detached homes	55,271	8.06%
Single family attached homes	400,564	58.39%
2-unit homes and duplexes	54,667	7.97%
Units in small apartment buildings	107,730	15.71%
Units in large apartment buildings	65,884	9.60%
Mobile homes or manufactured housing	1,615	0.24%
Other types	225	0.03%

State (Pennsylvania)		
Single family detached homes	3,246,619	57.03%
Single family attached homes	1,057,041	18.57%
2-unit homes and duplexes	248,078	4.36%
Units in small apartment buildings	685,077	12.03%
Units in large apartment buildings	233,113	4.09%
Mobile homes or manufactured housing	221,895	3.90%
Other types	1,491	0.03%

Employment

Unemployment rate	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20
City (Philadelphia)						
Employed	607,231	613,202	617,212	648,384	646,904	647,077
Unemployed	135,357	135,295	115,900	88,315	78,553	66,933
In Labor Force	742,588	748,497	733,112	736,699	725,457	714,010
Unemployment Rate	18.2	18.1	15.8	12	10.8	9.4

County (Philadelphia)						
Employed	607,231	613,202	617,212	648,384	646,904	647,077
Unemployed	135,357	135,295	115,900	88,315	78,553	66,933
In Labor Force	742,588	748,497	733,112	736,699	725,457	714,010
Unemployment Rate	18.2	18.1	15.8	12	10.8	9.4
Metro Area (Philadelphia-Camden-Wilmington, PA-NJ-DE-MD Metro Area)						
Employed	2,675,503	2,738,067	2,767,861	2,827,686	2,843,813	2,850,472
Unemployed	450,816	421,434	345,020	248,952	228,675	217,114
In Labor Force	3,126,319	3,159,501	3,112,881	3,076,638	3,072,488	3,067,586
Unemployment Rate	14.4	13.3	11.1	8.1	7.4	7.1
State (Pennsylvania)						
Employed	5,559,112	5,633,829	5,673,268	5,917,134	5,918,750	5,929,793
Unemployed	855,034	824,771	675,132	502,581	443,538	382,770
In Labor Force	6,414,146	6,458,600	6,348,400	6,419,715	6,362,288	6,312,563
Unemployment Rate	13.3	12.8	10.6	7.8	7	6.1

Employment Continued

Employment by Industry	People Employed	Percent Employed in this Industry	Percent Employed in this Industry in Pennsylvania
Accommodation and Food Services Industry Employment	349	8.13%	6.42%
Administrative and Support and Waste Management Services Industries Employment	189	4.40%	3.76%
Agriculture, Forestry, Fishing and Hunting	0	0%	0.88%
Arts, Entertainment, and Recreation Industries Employment	70	1.63%	1.90%
Educational Service Industry Employment	389	9.06%	9.37%
Finance, Insurance, Real Estate and Rental and Leasing Industries Employment	297	6.92%	6.44%
Health Care and Social Assistance Industry Employment	926	21.58%	16.56%
Information Industry Employment	141	3.29%	1.64%
Manufacturing Industry Employment	337	7.85%	11.79%
Management of Companies and Enterprises Industry Employment	0	0%	0.13%
Other Services Industry Employment	324	7.55%	4.69%
Professional, Scientific, and Technical Services Industry Employment	91	2.12%	6.64%
Public Administration Employment	158	3.68%	3.99%
Retail Trade Industry Employment	390	9.09%	11.15%

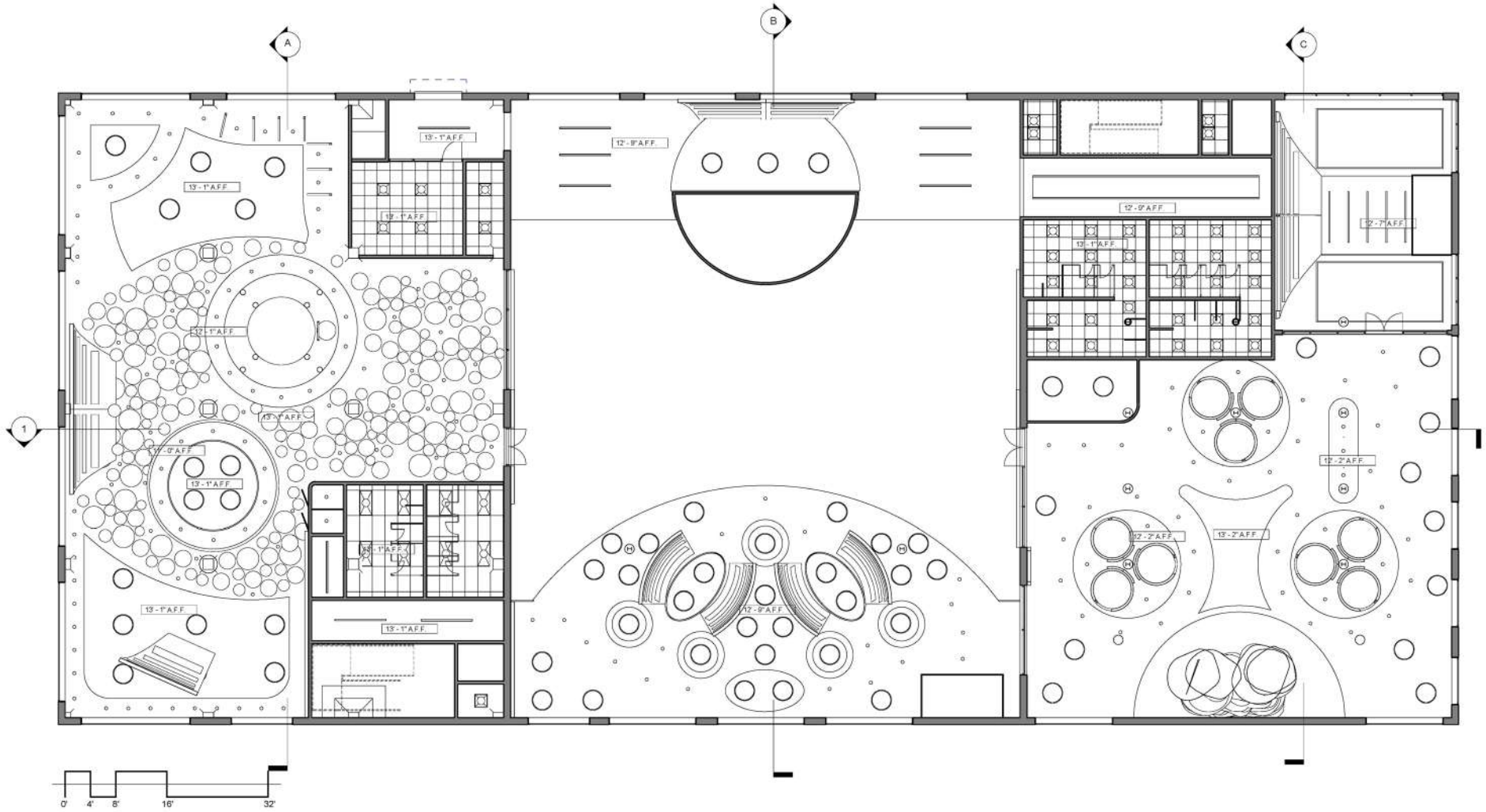
Construction Industry Employment	144	3.36%	5.84%
Transportation and Warehousing, and Utilities Industries Employment	298	6.94%	5.65%
Wholesale Trade Industry Employment	189	4.40%	2.70%
All Other Industries Employment	0	0%	0.45%

Crime

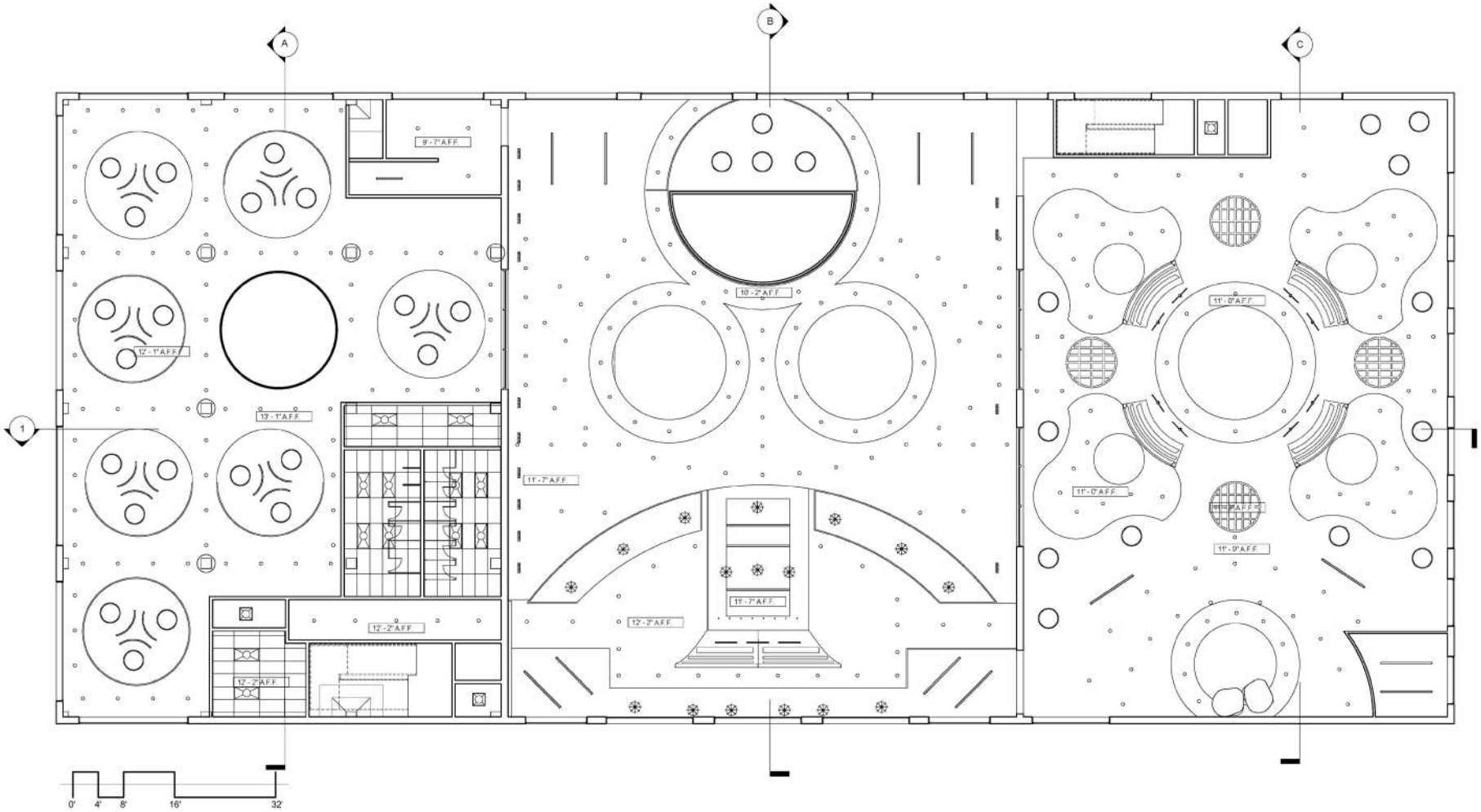
Crime Rates per 100,000 persons	2013	2014	2015	2016	2017
City (Philadelphia)					
Aggravated Assault	514.18	481.06	495.34	487.26	470.04
Burglary or Larceny	3,068.66	3,020.28	2,826.43	2,790.95	2,715.48
Motor Vehicle Thefts	372.85	367.4	324.59	349.69	348
Murder	15.9	15.91	17.86	17.38	20.06
Rape	82.35	77.42	84.32	80.15	75.02
Robbery	486.88	447.06	431.49	394.63	382.46

County (Philadelphia)					
Aggravated Assault	514.95	481.83	496.04	488.66	470.74
Burglary or Larceny	3,069.05	3,020.53	2,826.81	2,791.91	2,715.80
Motor Vehicle Thefts	372.85	367.59	324.66	350.01	348.19
Murder	15.9	15.91	17.86	17.38	20.06
Rape	82.35	77.42	84.32	80.15	75.02
Robbery	487.01	447.13	431.49	394.63	382.59

Reflected Ceiling Plans



LEVEL 1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11' - 0" A.F.F.
12' - 1" A.F.F.
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12' - 2" A.F.F.
12' - 2" A.F.F.
12' - 2" A.F.F.
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4'
8'
16'
32'

LEVEL 2

Native Plant Selection

1

2

3

4

5

6

7

8

9

10

11

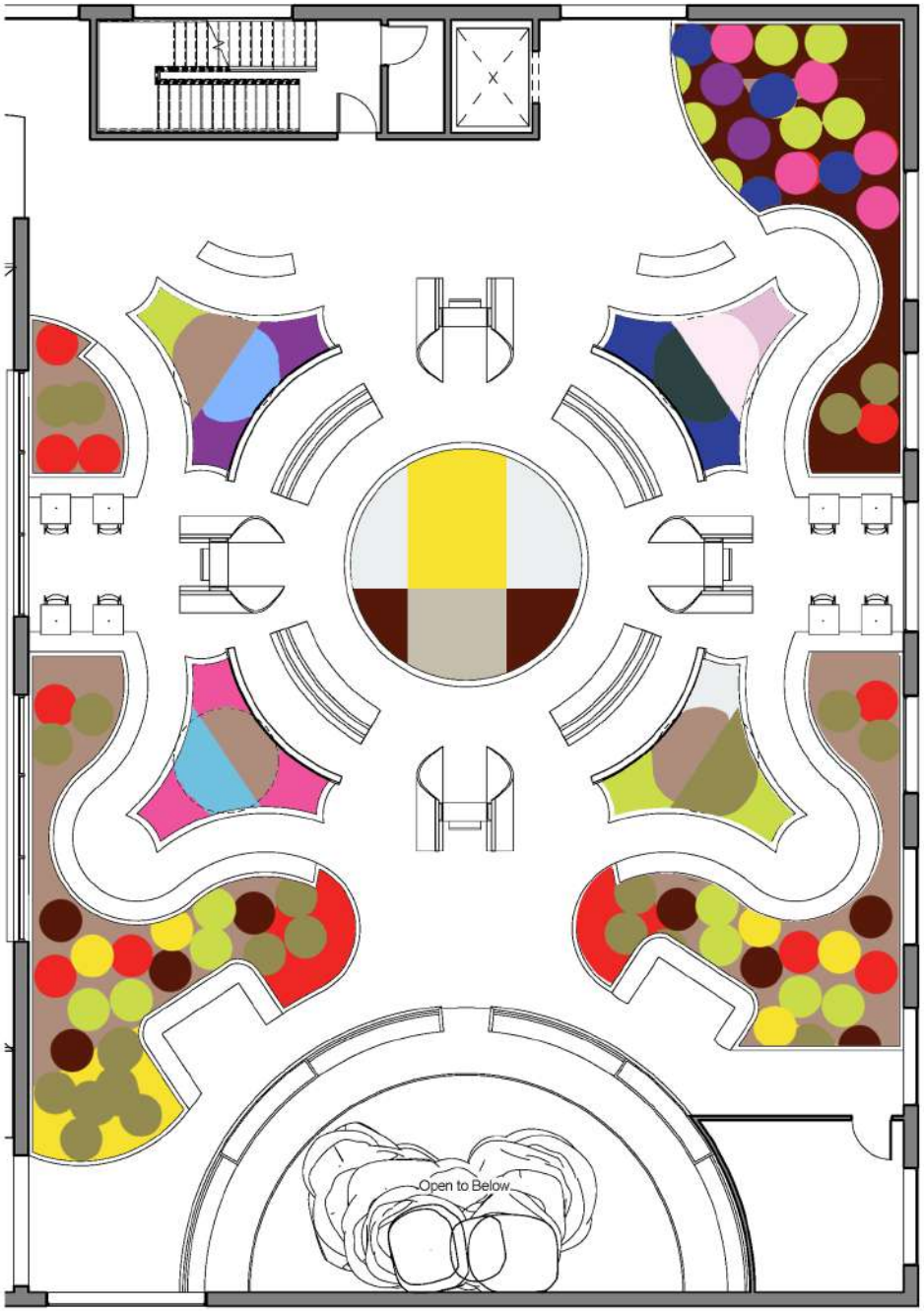
12

13

14

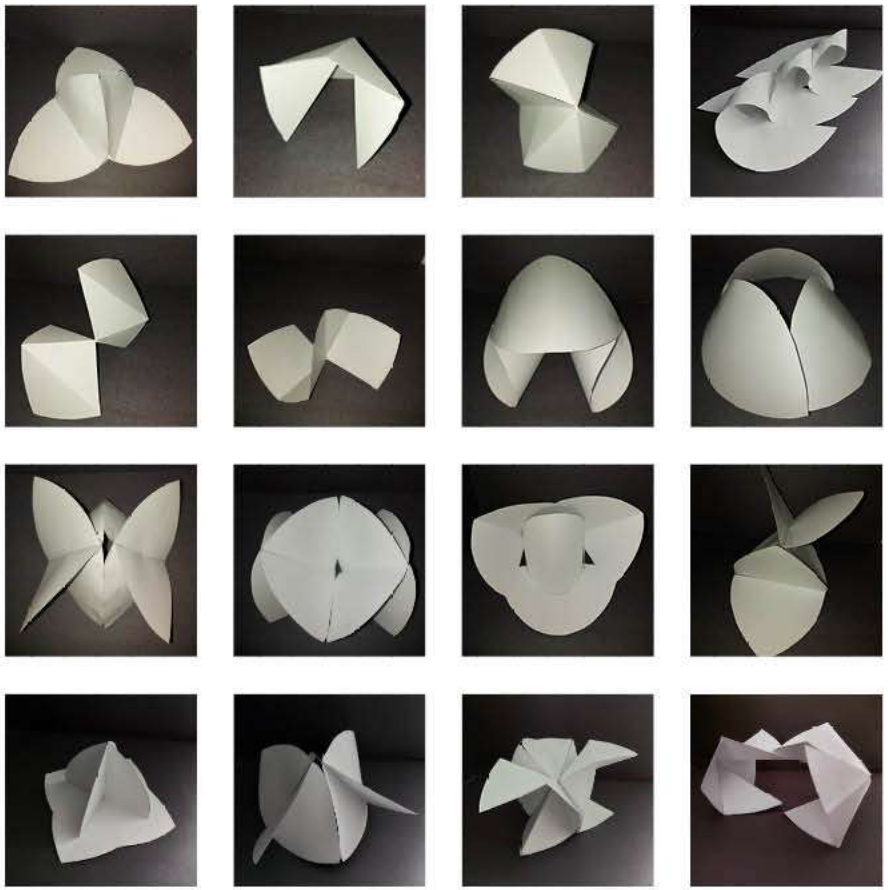
15

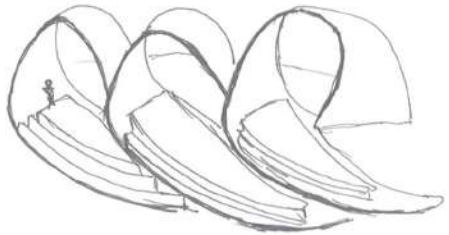
1. Aquilegia canadensis
2. Asarum canadense
3. Aster divaricatus
4. Chelone glabra
5. Polygonatum biflorum
6. Chrysogonum virginianum
7. Cimicifuga racemosa
8. Dicentra eximia
9. Geranium maculatum
10. Tiarella cordifolia
11. Iris cristata
12. Mertensia virginica
13. Monarda didyma
14. Polemonium reptans
15. Lobelia siphilitica

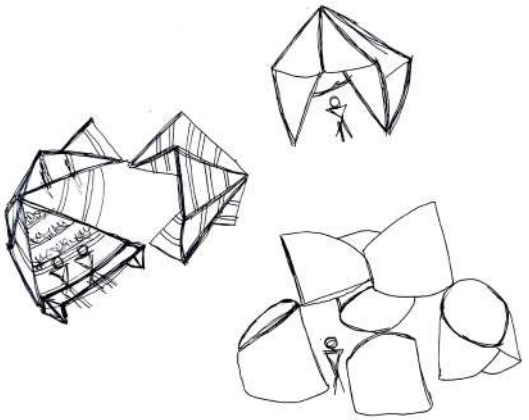


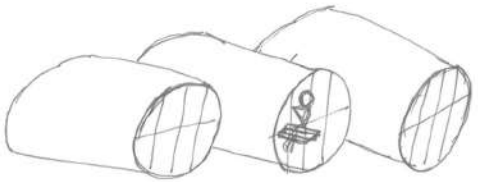
NATIVR PLANT GARDEN PLAN

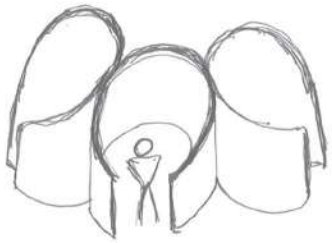
Form Exploration

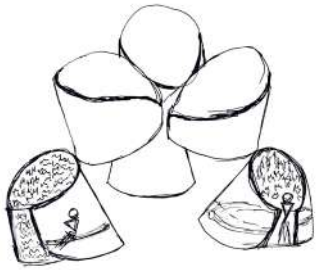


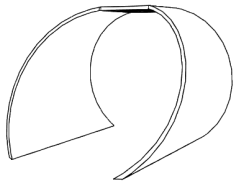


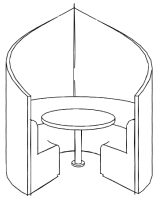


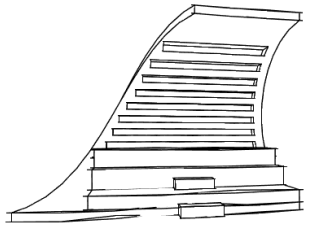


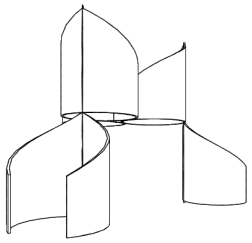


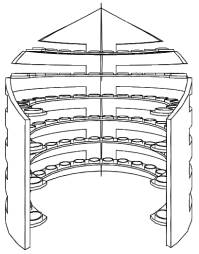


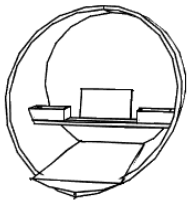


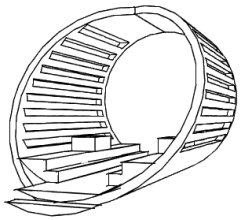


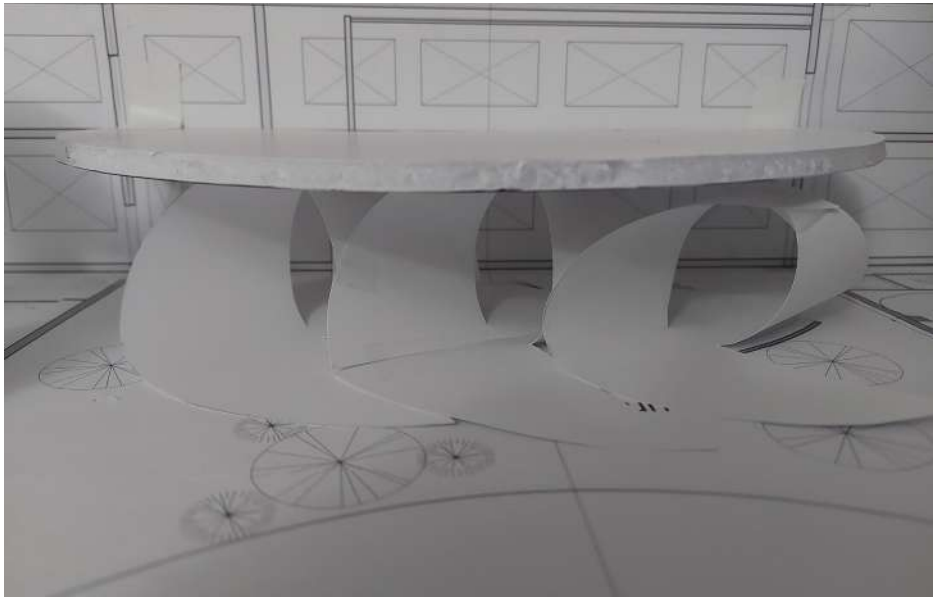


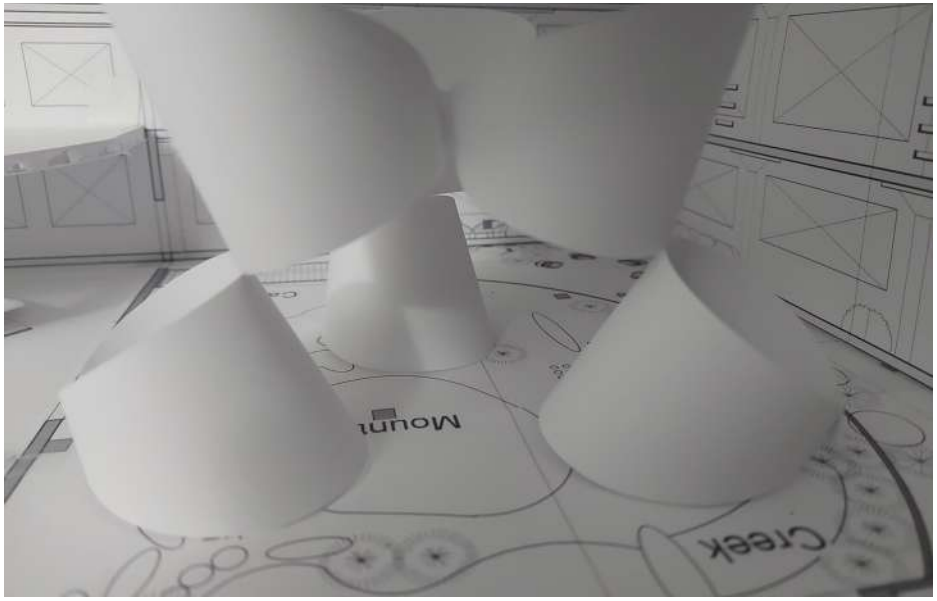


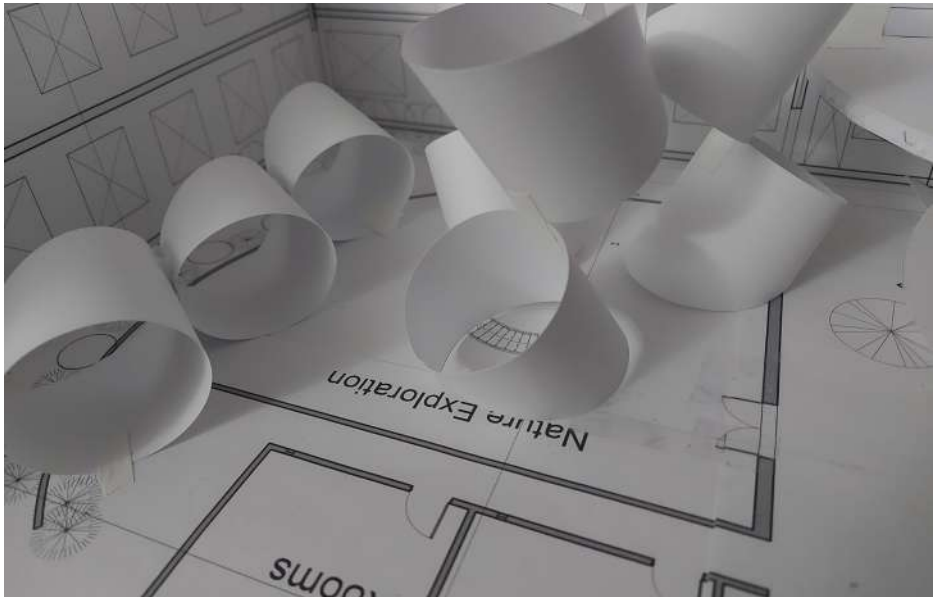











Natura Exploration

Reception
Aquarium
Pool
Lockers
Rooms

Nature Observation

Site Visit: Hope Gardens, Kingston Jamaica
Date: 01/17/21 Partly Cloudy
Time: 2:26pm 26°C / 78.8°F

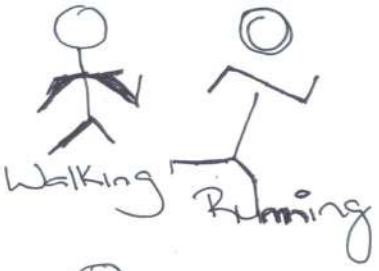
People Range: Babies - Senior
Individuals to Groups

Observed Activities

Bicycle Riding

Picnics

Sitting Lying Down


Walking Running

Parties / Brunch

Gatherings

Reading

Leisure

Plant Observation

Games (football) Catch

Photoshoots

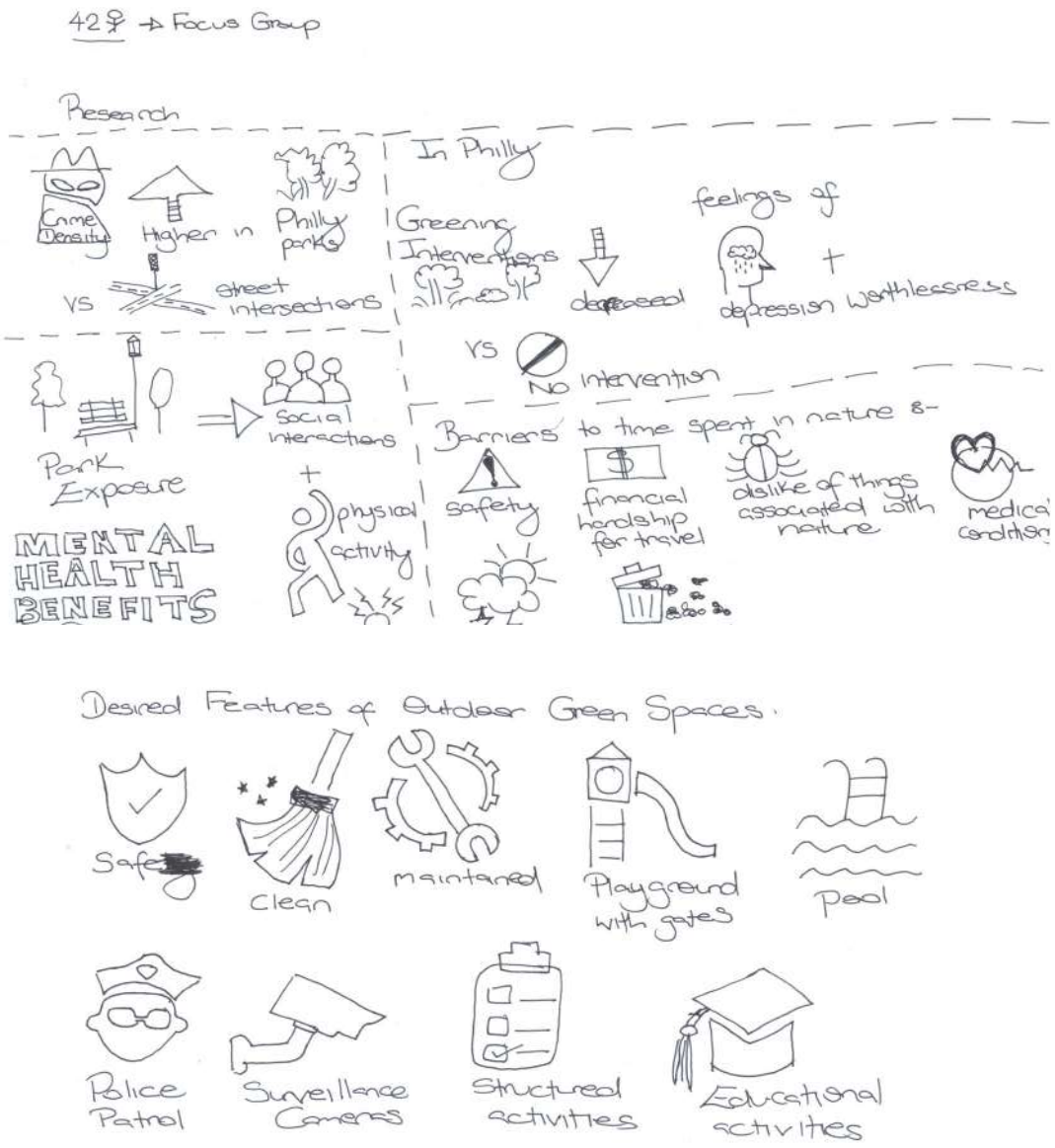
Physical

Maintenance

Exploration

Nature Interactions

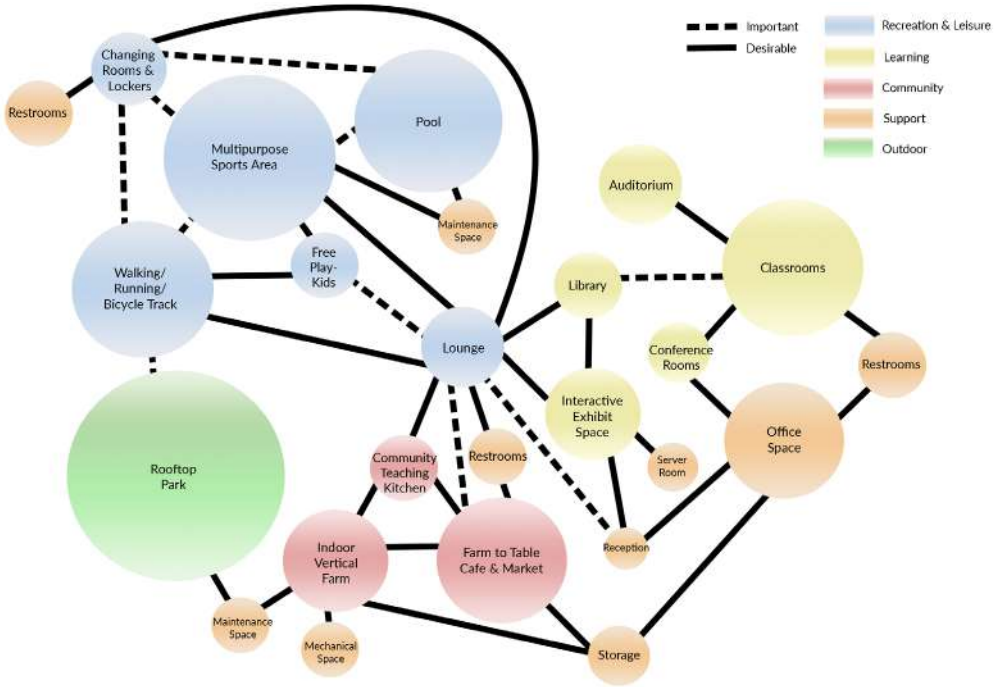
Nature Perception Notes-Philadelphia



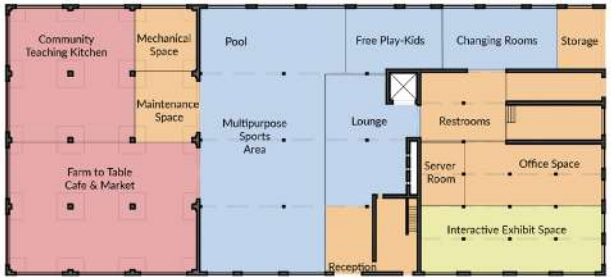
NOTES TAKEN FROM RESEARCH- HTTPS://WWW.NCBI.NLM.NIH.GOV/PMC/ARTICLES/PMC6651051/

Program

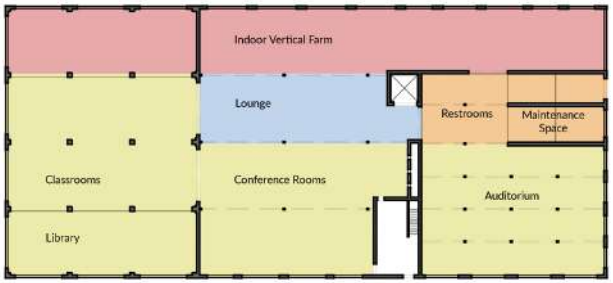
- Multipurpose Sports Area
- Lounge/Leisure
- Walking/Running/Bicycle Track
- Pool
- Free Play-kids
- Changing Rooms + Lockers
- Interactive Exhibit Spaces
- Auditorium
- Classrooms
- Library
- Conference Rooms
- Indoor Vertical Farm
- Farm to Table Cafe & Market
- Community Teaching Kitchen
- Reception
- Office Space
- Server Rooms
- Maintenance Space
- Storage
- Mechanical
- Restrooms
- Rooftop Park



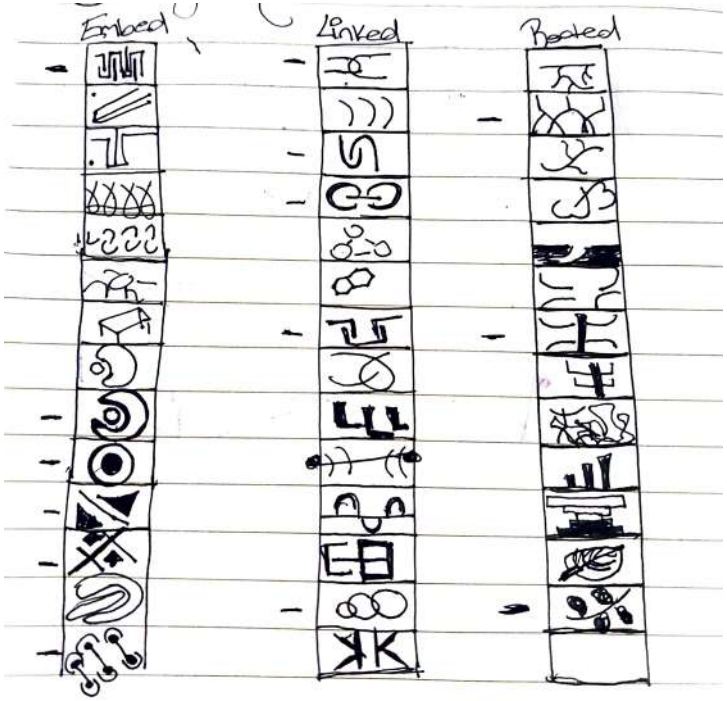
FIRST FLOOR

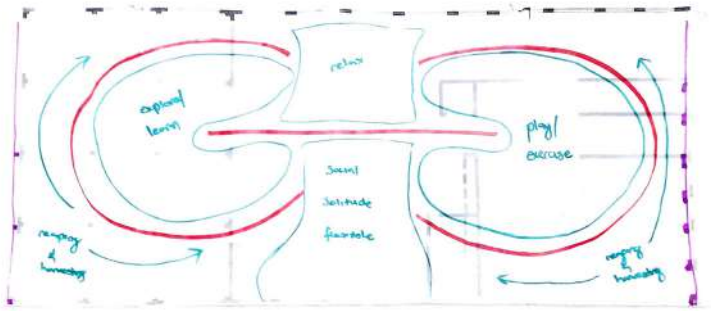


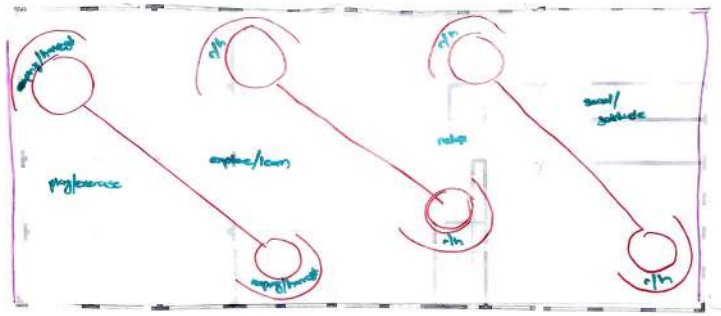
SECOND FLOOR

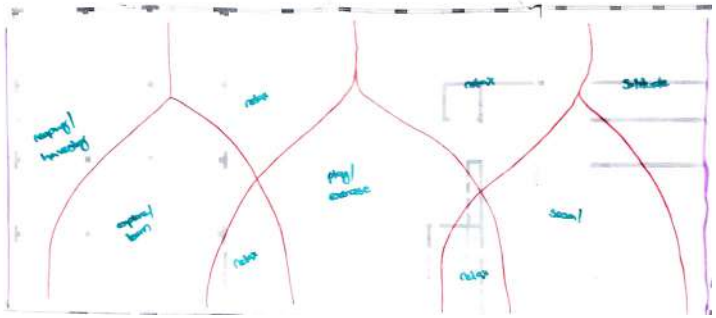


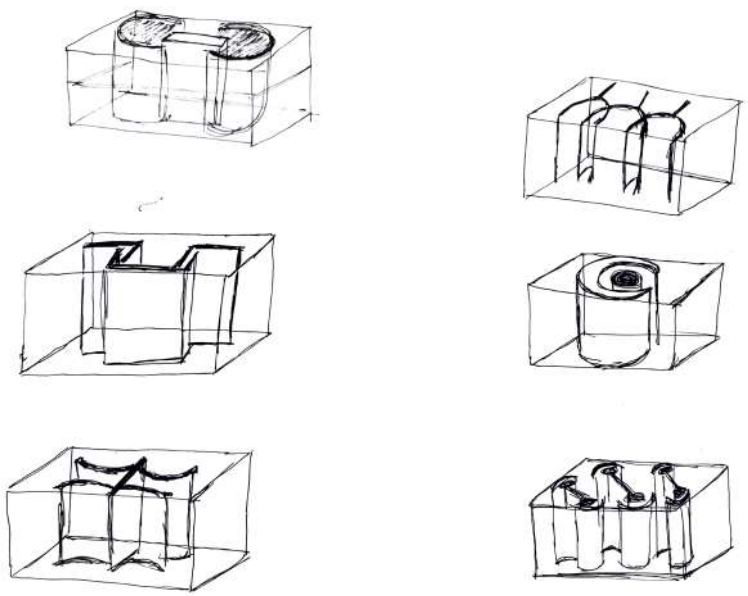
Parti


Embed
Linked
Rooted

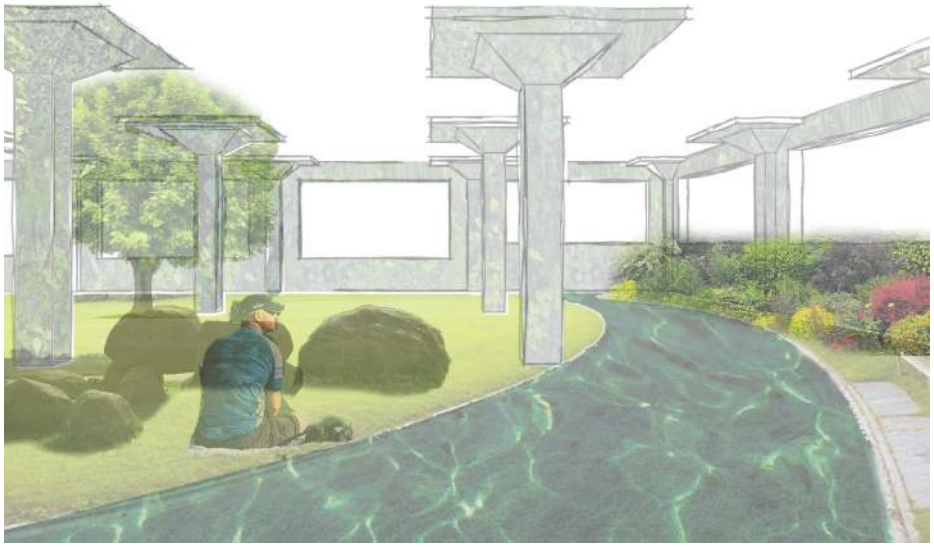

relax
explore/
learn
play/
exercise
social
solitude
favorable


play/exercise
explore/learn
relax
social/
solitude


relax
solitude
play/
exercise
social

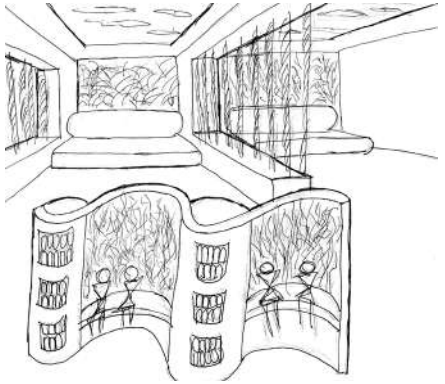


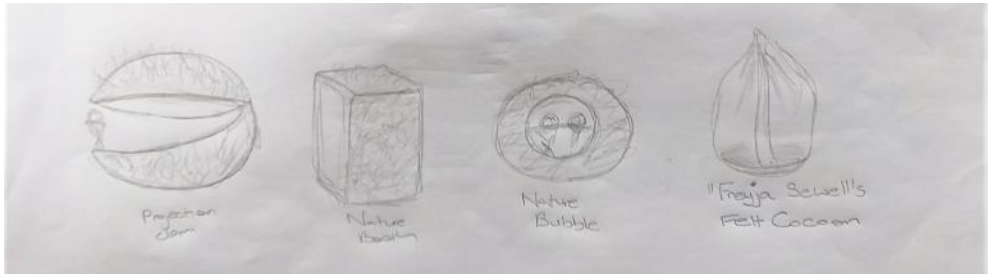
Concepts

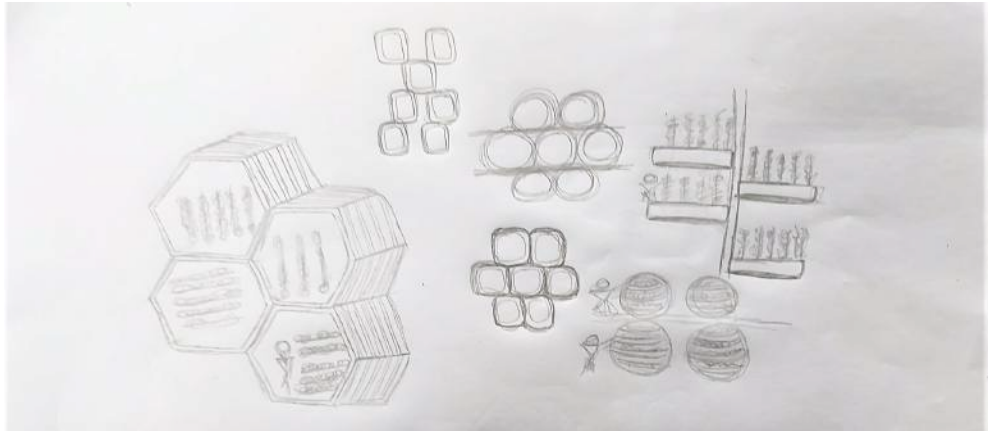


	Sight	Smell	Touch	Sound	Taste
Solitude	Landscapes, plants, water, light, shadow, fauna	Flora, dirt, rain, salt, woods	Flora, dirt, stones	Moving water, fauna, flora + breeze	Not critical
Social	"	"	"	"	-
Relax	Shadow, landscapes, Specific to individual	Varies, Specific to individual			
Play/Exercise	"	"	Smooth, open	Not critical	Not critical
Explore/Learn	As much as possible with variation				
Reaping/Harvesting	Plants	Flora	Flora	Not critical	Variations

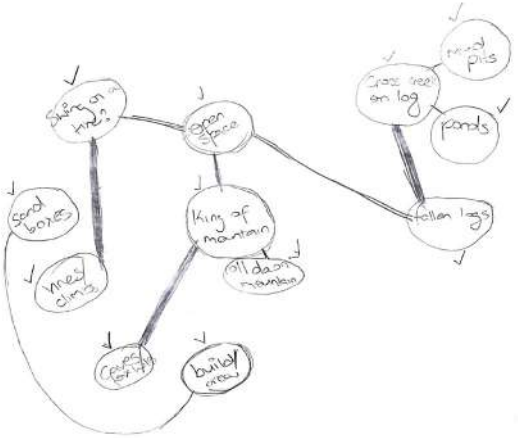
Solitude	sit, recline, walk
Social	sit, recline, walk
Relax	sit, recline, quiet, vistas, soundscapes
Play/Exercise	free, flexible, structured
Explore/Learn	free, flexible, structured
Reaping/Harvesting	planting, picking, consumption, production



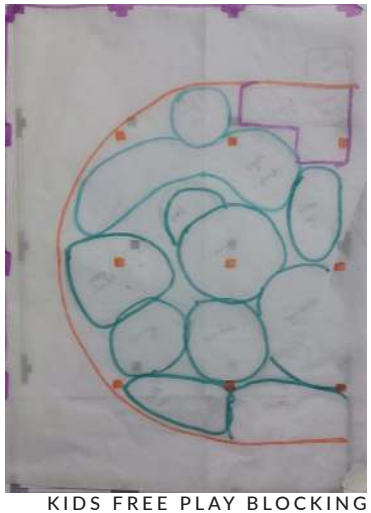




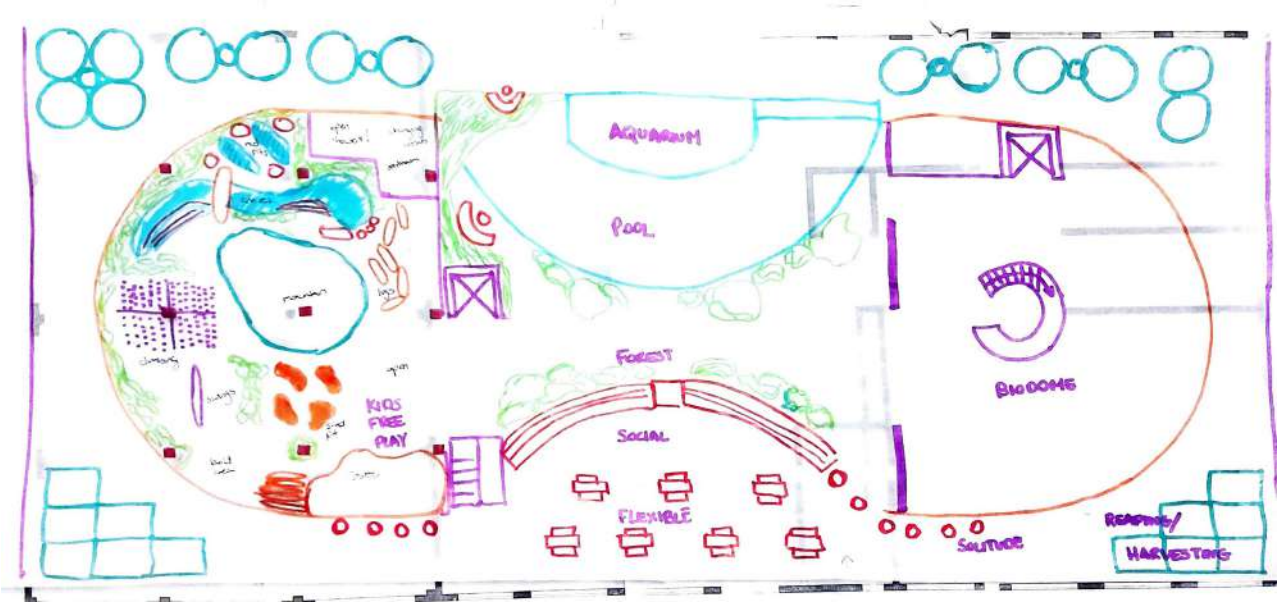
PODS/FARM



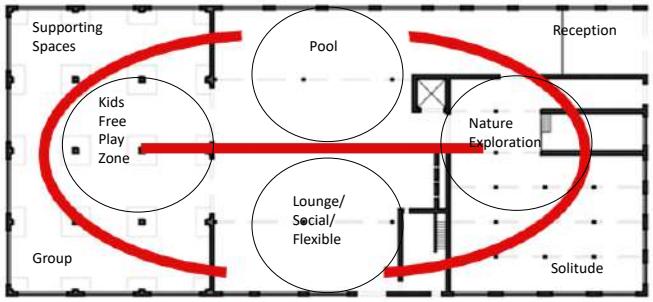
KIDS FREE PLAY BUBBLE DIAGRAM

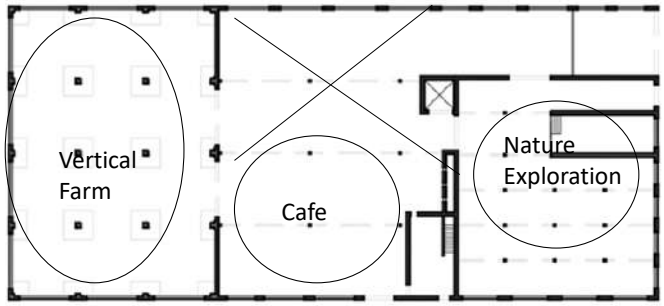


KIDS FREE PLAY BLOCKING

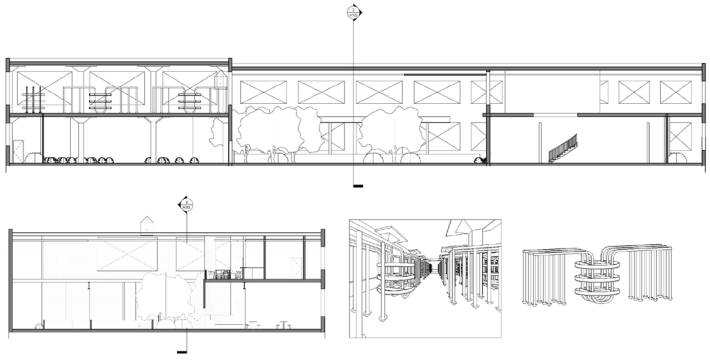


LEVEL 1 FLOOR PLAN

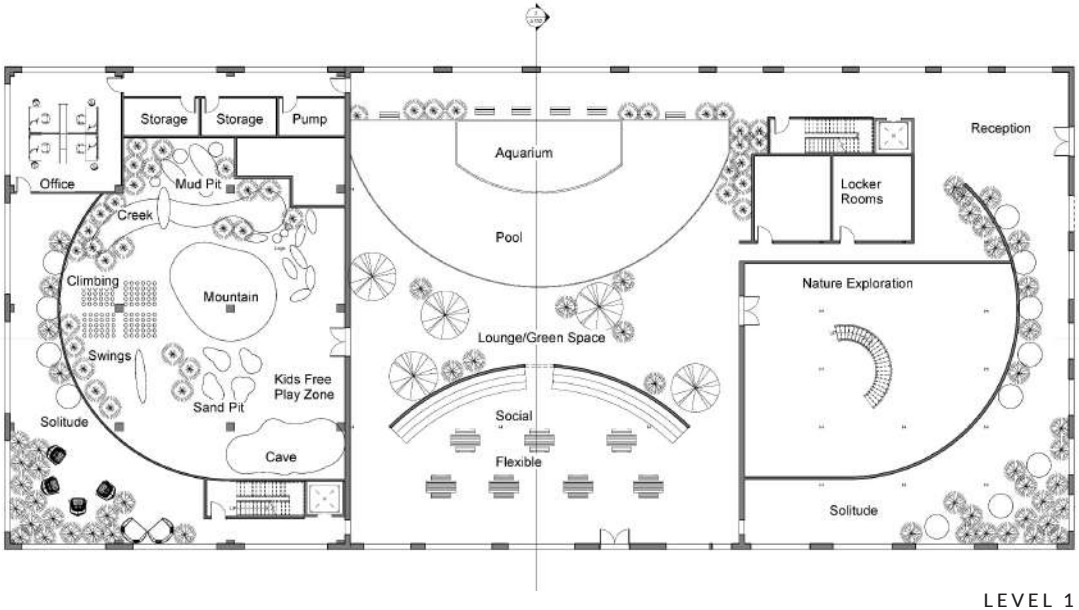




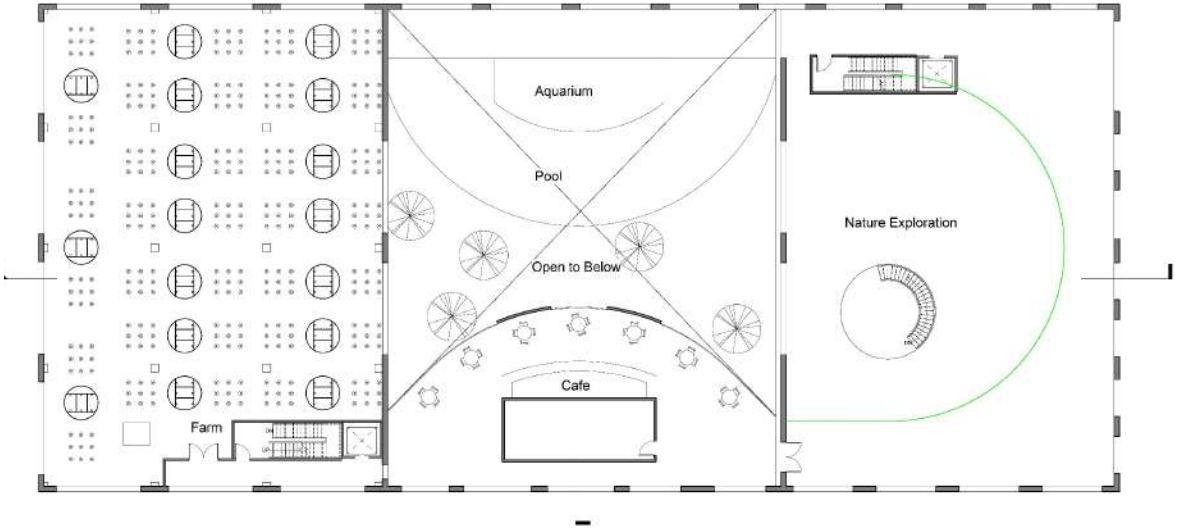
BLOCKING



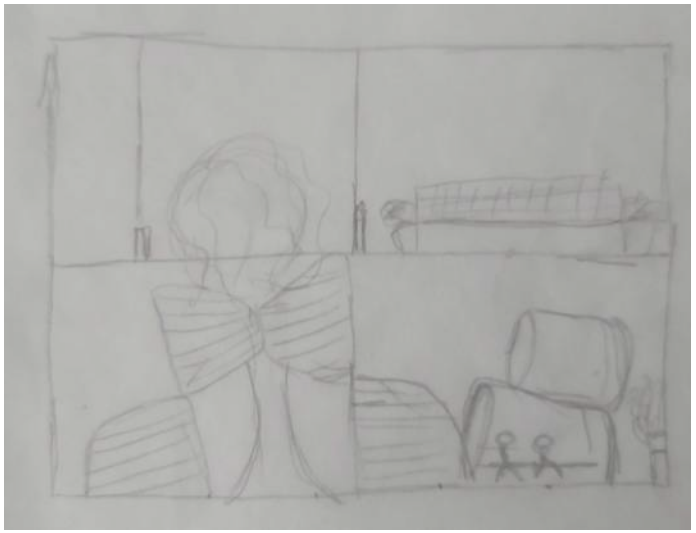
SECTIONS

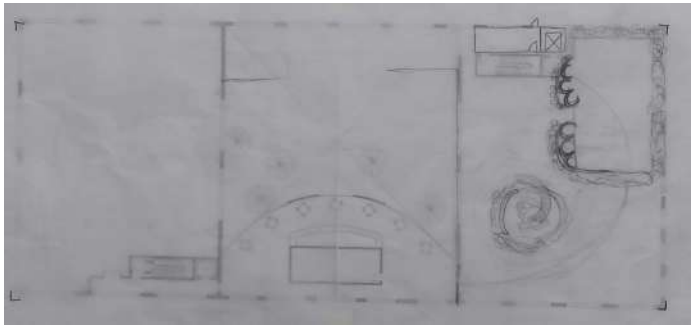


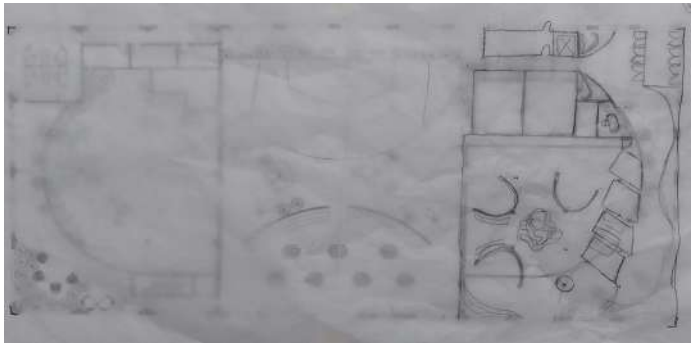
LEVEL 1

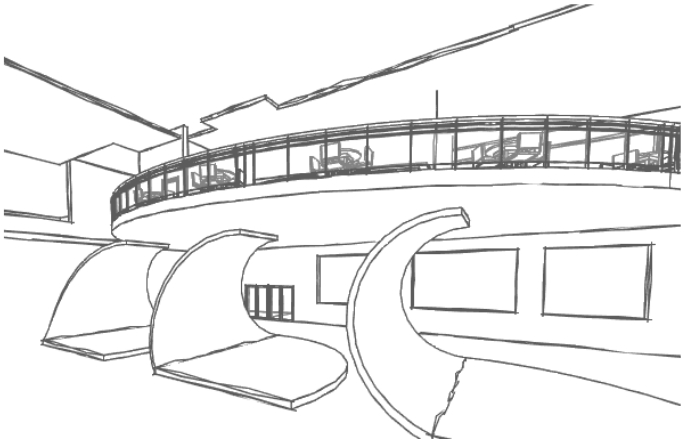


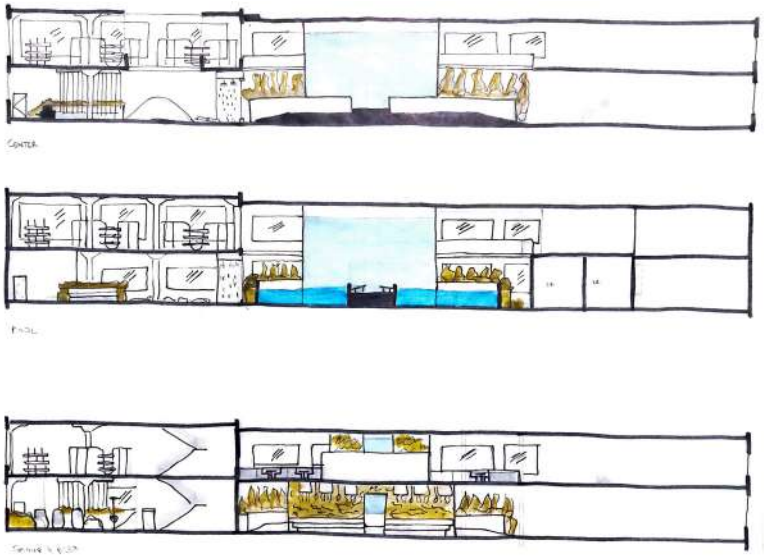
LEVEL 2

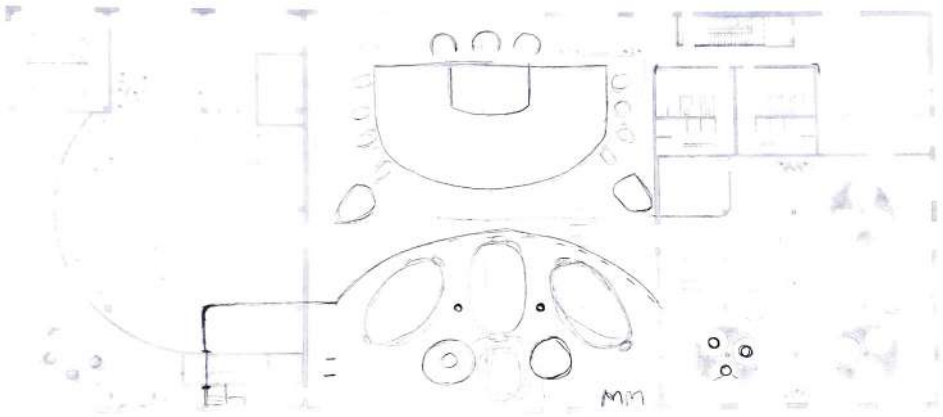


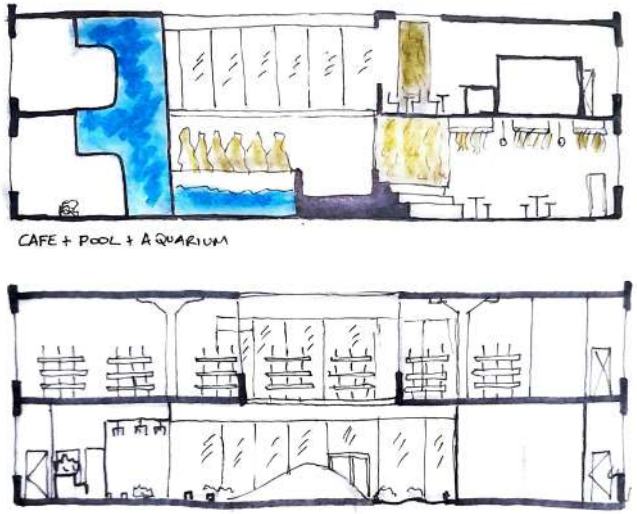


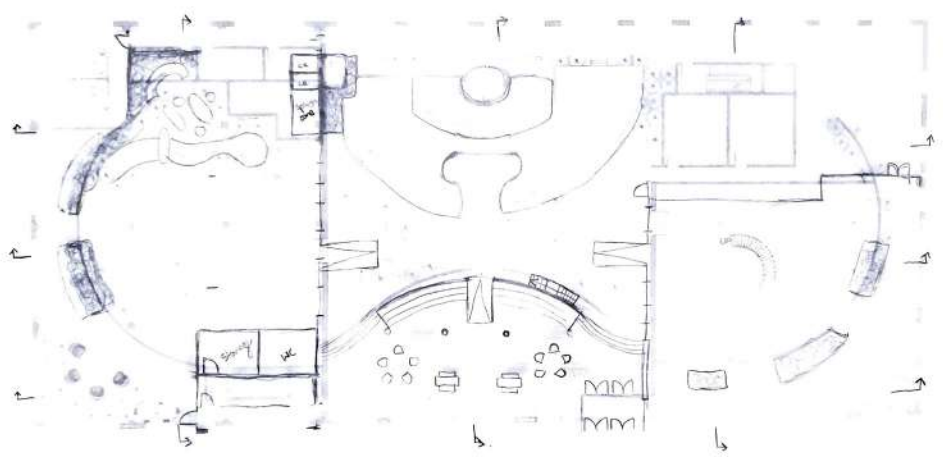


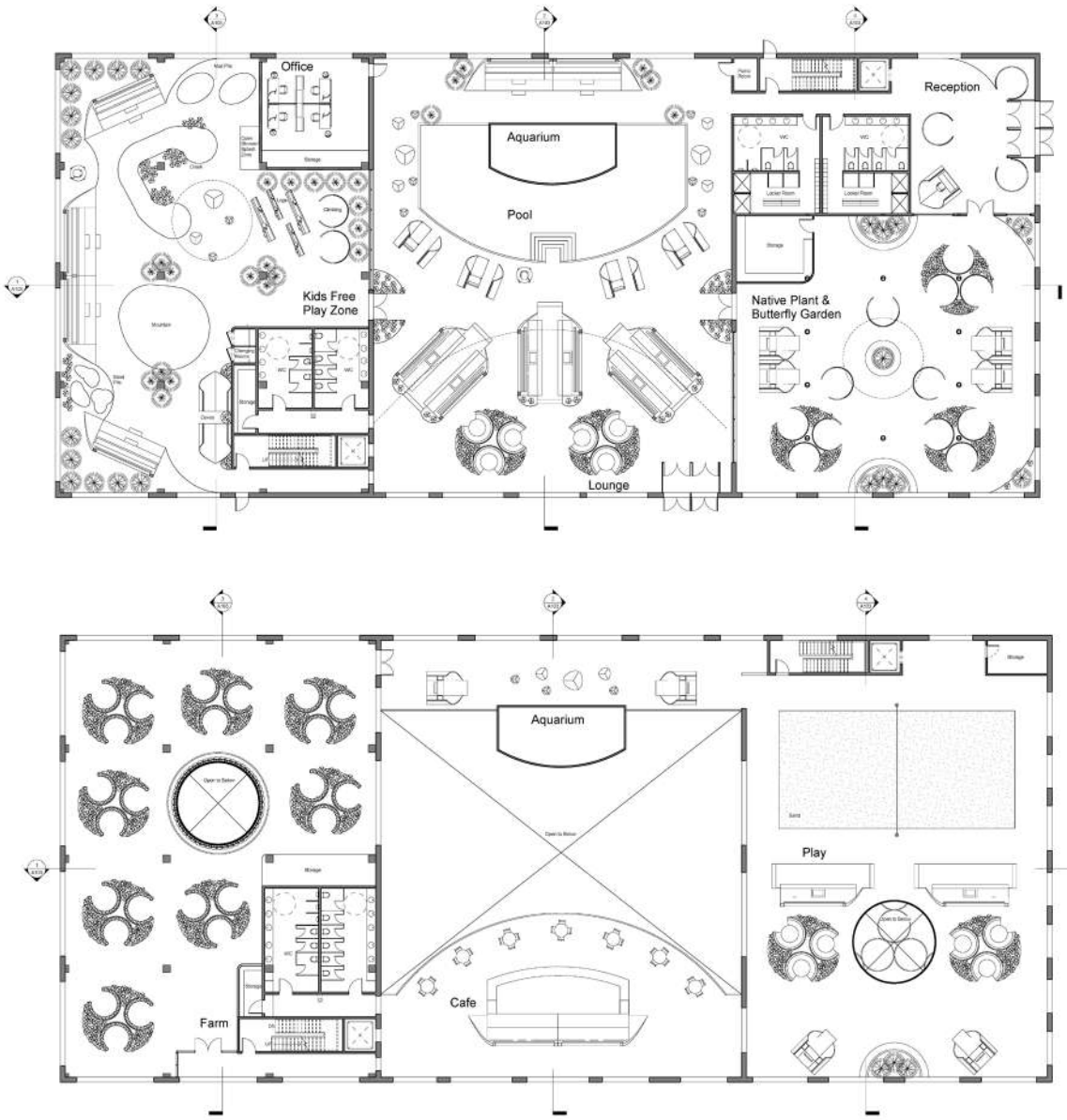


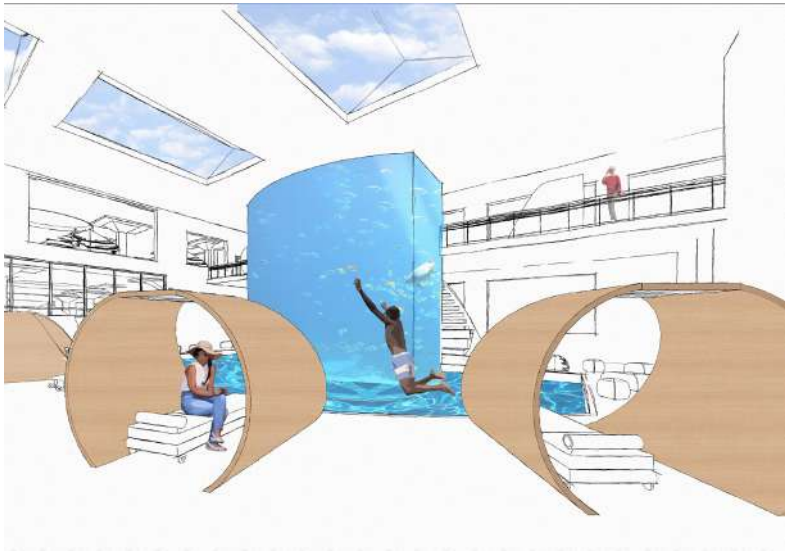


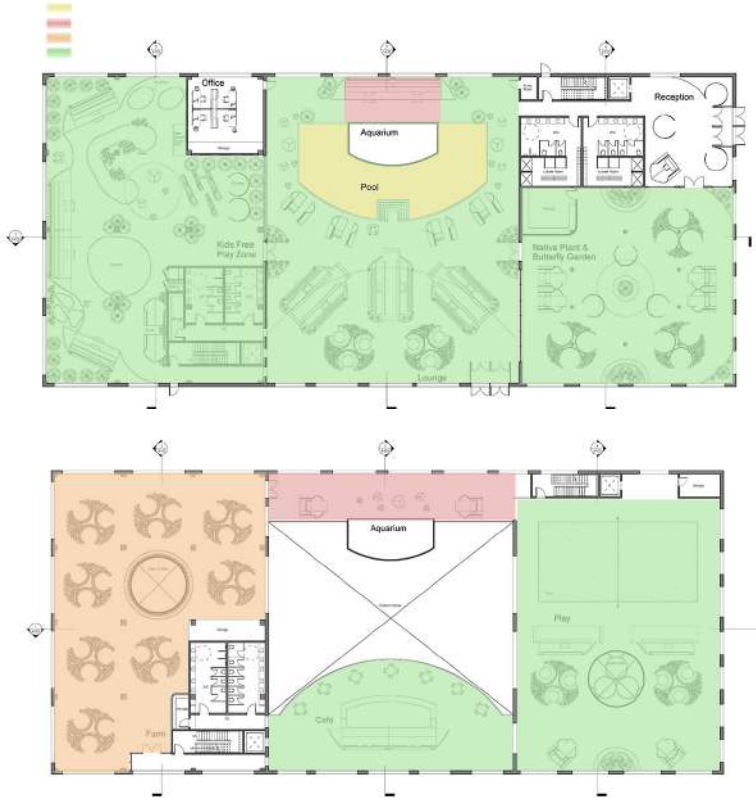



CAFE + POOL + AQUARIUM




Office
Aquarium
Pool
Reception
Kids Free
Play Zone
Native Plant &
Butterfly Garden
Lounge
Aquarium
Play
Cafe
Farm





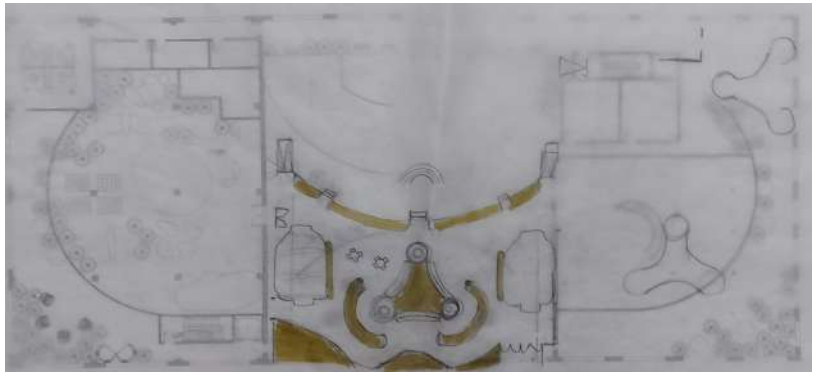
Sofia
- Age: 40
- Gender: Female
- Race: Hispanic
- Occupation: Medical Assistant
- Marital Status: Married
- Interests: Audiobooks- (Suspense/Mysteries, Self-Improvement), Foodie, Dogs
- Sequence: Plant Pod, Relax by the pool/aquarium, Picnic with friends, Walk for fitness
- Time of day: Morning & Evening

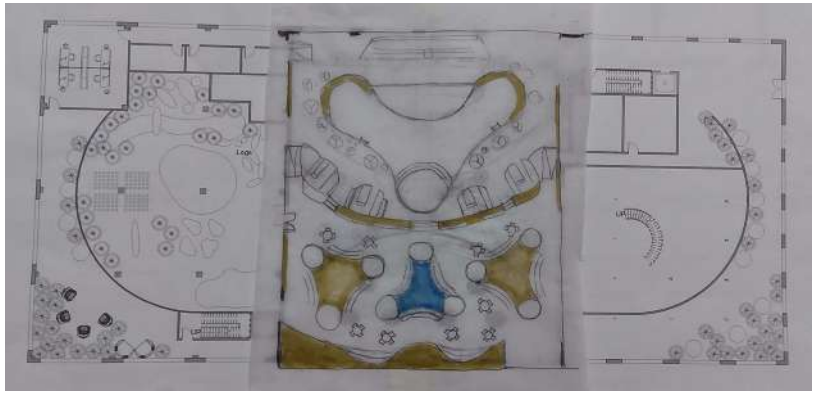
John
- Age: 23
- Gender: Male
- Race: White
- Occupation: Maintenance Technician
- Marital Status: Single
- Interests: Restoring Classic Cars, Football
- Sequence: Garden walk to clear mind, Toss around football with friends, Relax with girlfriend in lounge
- Time of Day: Afternoon & Evening

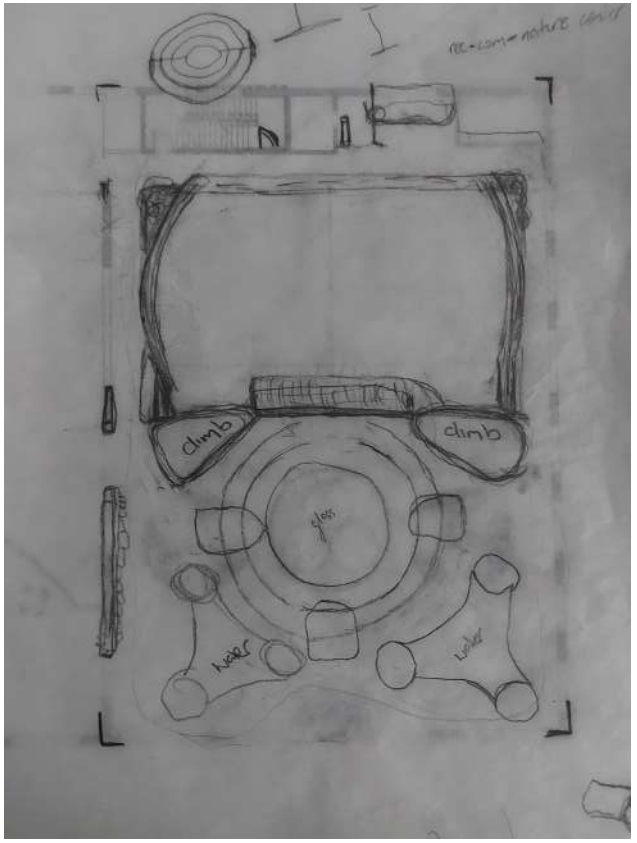
Max
- Age: 7
- Gender: Male
- Race: African American
- Interests: Playing with best friends, Building things/taking this apart, science "experiments"
- Sequence: Garden exploration, pool to see fishes, climbing competition with friends in kids free play zone
- Time of Day: After school

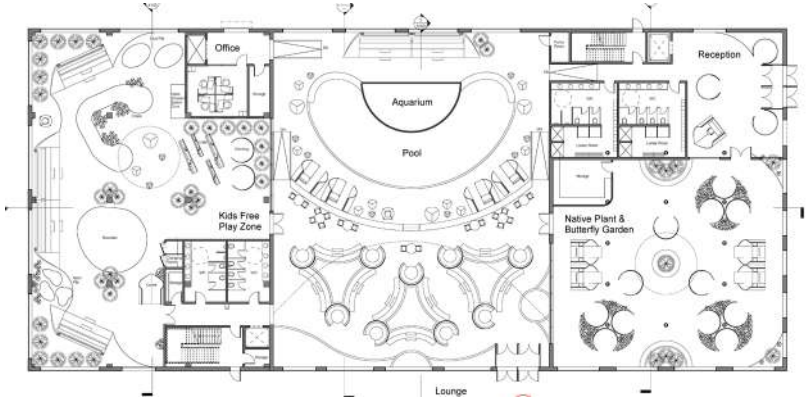
Emmy
- Age: 4
- Gender: Female
- Race: Asian
- Interests: Arts & Crafts, Games on iPad, Shows- Muppet Babies, Abby Hatcher
- Sequence: Free Play Kids- roll down mountain, hop on logs, play in sand, Pool, Look at butterflies in garden
- Time of Day: Weekend with parents

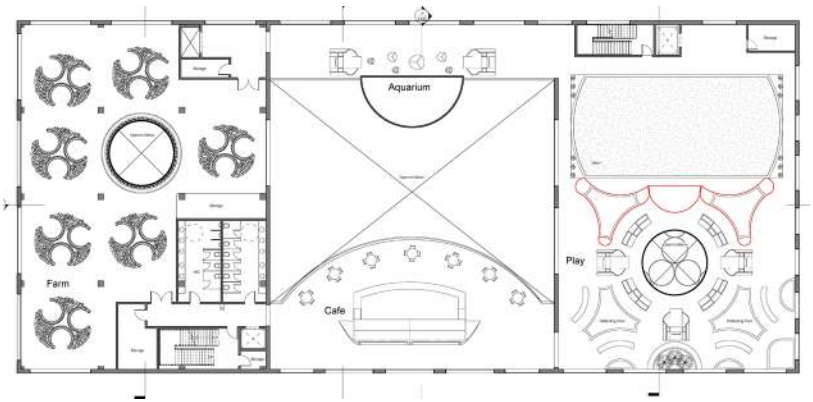
Space	Technology to be used
Kids Free Play	Projections, Audio, Wind, Fog, Scents
Aquarium	Haptics to simulate "the sensation of bubbles popping, the rush of the ocean and the rush of sea creatures swimming by" https://lbpost.com/hi-lo/art/virtual-touch-technology-brings-pacific-visions-to-a-more-diverse-audience
Pool	Underwater Speakers playing aquatic sounds, AquaCAVE- http://yamasy.com/aquacave/ Swimarium https://archello.com/project/swimarium-3d Wind, Fog, Scent
Group Seating	Projections, Audio, Wind, Fog, Scents
Solitude	Projections, Audio, Wind, Fog, Scents
Farm	Necessary automation-water, led lighting
Mutipurpose Play	-
Group Flex	Projections, Audio, Wind, Fog, Scents
Cafe	-
Nature Exploration	Projections, Audio, Wind, Fog, Scents
Roof	-

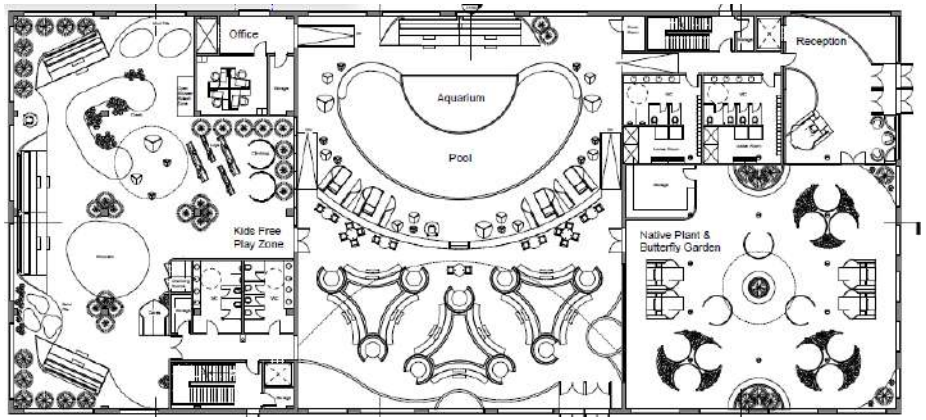


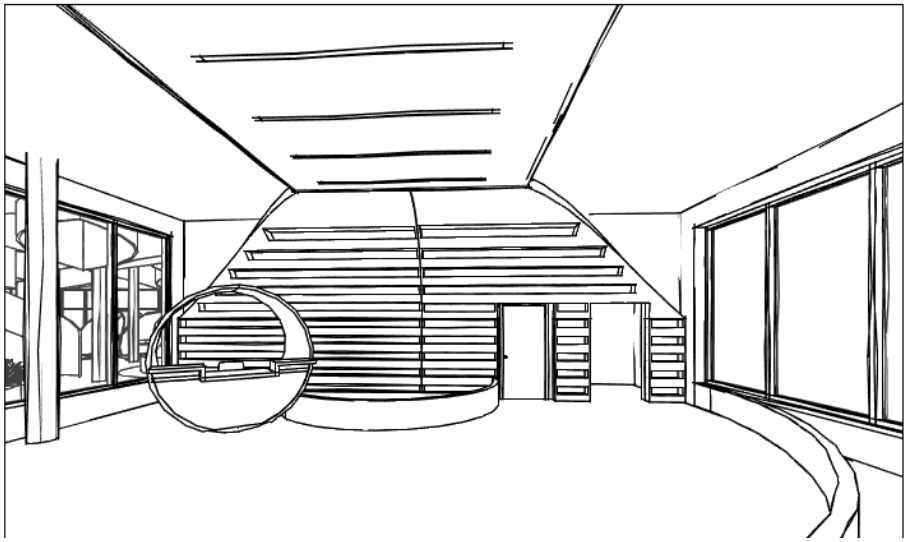


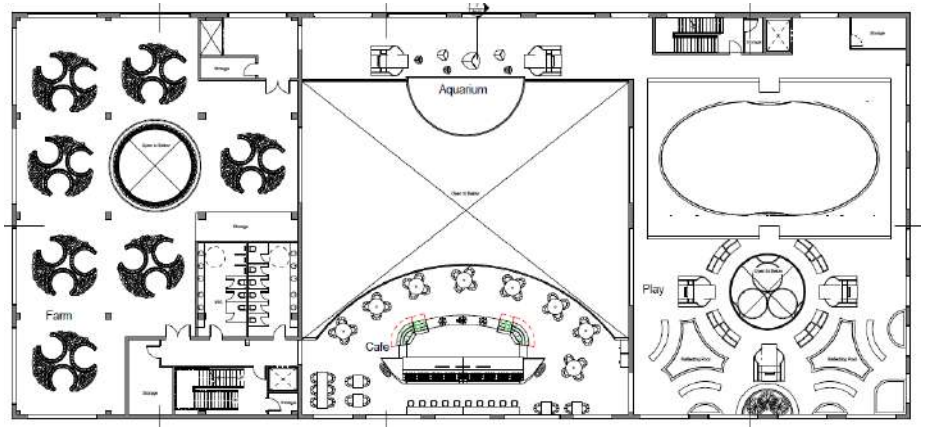

climb
climb

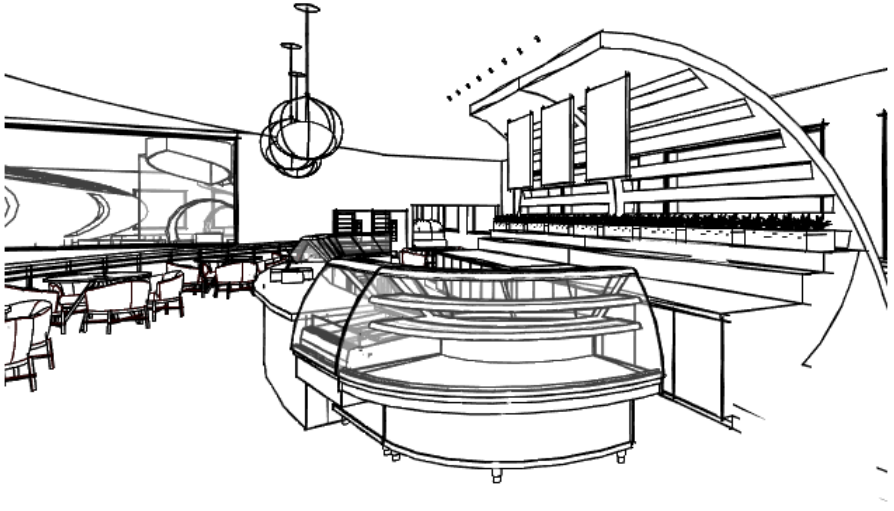
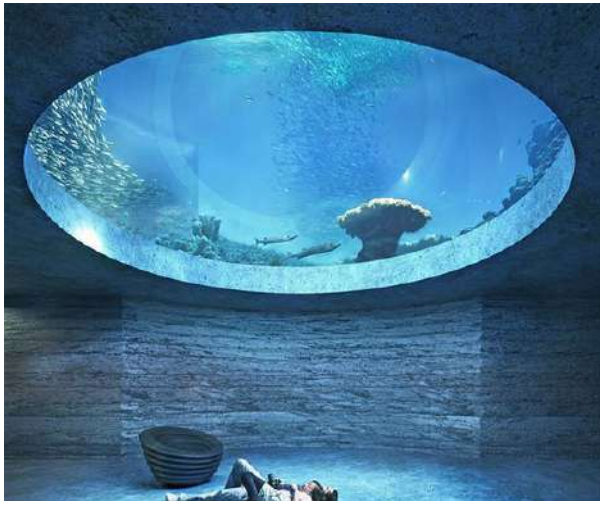

Office
Aquarium
Pool
Reception
Kids Free
Play Zone
Native Plant &
Butterfly Garden
Lounge


Aquarium
Farm
Cafe
Play


Office
Aquarium
Pool
Reception
Kids Free
Play Zone
Native Plant &
Butterfly Garden




Aquarium
Farm
Cafe
Play



Inspiration Images