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# Living Lightly on Earth: The Urban Eco Village

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# Living Lightly on Earth: The Urban EcoVillage

A Design Thesis Submitted to the Department of  
Architecture at:  
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By:  
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In Partial Fulfillment of the Requirements for the Degree of  
Master of Architecture

North Dakota State University Libraries Addendum

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October 2021  
Fargo, North Dakota





Figure 3



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THE PROPOSAL.

# Thesis Abstract.

Imaging living a low-impact lifestyle surrounded by nature, food, freshwater and air, wildlife, and a community with a common desire. An eco village is a community with shared land that promotes positive values including ecology, solidarity, quality, tolerance, generosity, diversity, hospitality, respect, and collaboration all while being self-sufficient. These communities are more commonly found in rural and off-grid locations and have numerous benefits that should be shared on a larger scale.

Although living off grid is a desirable lifestyle for some, a large amount of the population strive to live in urban settings. With sustainable living becoming a growing desire, a redesign of an urban eco village would not only satisfy multiple needs of the common individual, but will create numerous environmental benefits as well. The vertical densification of sustainable living and nature will combine the benefits of the common Eco Village with the benefits of an urban typology to attract and encourage a sustainable lifestyle and personal growth.





# Thesis Narrative.

Sustainable living has become a very popular concept in architecture due to a large portion of the population becoming educated on humanity's impact on the environment. The more recent environmental devastations have become evident to many people, including myself, thus increasing an interest in the many tactics to protect the earth. This includes recycling, volunteering, education, water conservation, and of course, choosing sustainability.

The concept of sustainability first became popular in the 1980s but has increasingly become more popular within the last decade. In addition to the protection of our ecosystem and preservation of natural resources, an Eco Village has social, culture, and economic benefits that the average sustainable community lacks. The development of the Eco Village has introduced a way to live sustainable as a community with a larger focus on these benefits to form the strongest built community. Today, there are nearly 10,000 of these intentional communities around the world and based on the beneficial features an Eco Village provides to people and the environment, I hope to see that number increase.

The first Eco Village began its first stages in 1990 with a basic principle: concern for people and the environment. The typical Eco Village hosts 50-250 residents who strive to lead



more sustainable lifestyles. However, the redesign of an Eco Village in an urban setting will allow for larger populations within.

With half of the worlds population living within cities and a prediction of another 2.5 billion joining them within the next 50 years, the appeal for a rural lifestyle is decreasing significantly. An urban lifestyle has benefits such as people, diversity, job opportunities, etc. These benefits have a large percentage of the population's attention therefore, an urban Eco Village can check multiple boxes for people who want to live sustainable as well as people who seek the advantages of living in an urban environment.



Figure 6

# Project Typology.

An eco village is a community with the shared goal of becoming more socially, culturally, economically, and ecologically sustainable. A village is considered to be a cluster of human settlement or community with a population of a couple hundred to a few thousand. Though these villages are often found in off-grid, rural locations, I will be applying the term to an urban setting. The Urban Eco Village project focuses on the combination of the typical eco village, a Manhattan mid-rise structure, and vertical farming practices. Multiple structures will be placed on the site ranging from 5 to 20 floors of residential, wellness, community gathering, retail, and gardening spaces. The purpose of the combination is to regenerate the environment and urban biodiversity without expanding floor square-footage.





Eco-Village



Vertical Farming



Manhattan Mid-Rise

# Major Project Elements.

## Housing

Well planned housing units that have the least possible negative impact on our environment. These energy efficient housing structures will hold residents with various incomes and ethnicities, use responsible material and recourse choices, and have both physical and psychological positive impacts on its inhabitants.

## Community Hub

The community hub is a centralized multi-purpose structure for community use. It is intended to provide gathering spaces that are open and accessible to all residents, create employment opportunities, and provide services that reflect the wants and needs of the community.

## Community Gardens & Vertical Farming

Gardens within the community will be collectively utilized by the residents to promote organic farming practices to limit water contamination, produce harvesting for rainwater, etc. Additionally, these shared plots of land will provide the community with fruits, vegetables, and plants by using healthy soil from organic waste composting. Not only does vegetation play a vital role in habitat protection, but designing with vegetation helps to purify the air thus reducing the effects of pollution. Vertical Farming will also be implemented to maximize green square footage.



### Restaurant / Cafe(s)

Providing more locations for community gathering and health practices for residents will not only benefit user satisfaction but provide employment opportunities as well.

### Wellness & Fitness Spaces

Creating spaces to conveniently improve and maintain fitness and wellness patterns will be essential to a successful, sustainable community.



Figure 10





## User & Client Description.

The Eco Village will host like minded families and people to experience, share, and grow together. The freely arranged community is an experience for people who have an interest in living side-by-side with their neighbors with similar ecological philosophies. The typical Eco Village host residents who enjoy living sustainability however, have a large interest living off grid and within rural settings. A resident within an urban Eco Village would include people with sustainable interest as well as life in an urban setting. The benefits of Urban settings are better education opportunities, healthcare, and employment. Families with these priorities as well as an interest in a better lifestyle and environment advantages, would find an urban Eco Village the perfect place to call home.



# Site Information.

The current status of the site, located on the island of Manhattan in New York City, New York, hosts the Washington Housing Playground. The intention of this thesis is not to replace the current housing units, but to use the site theoretically. Manhattan is the most densely populated borough of New York City. Among the world's major commercial, financial and culture centers, just walking distance from the site sits a masterpiece of landscape architecture - Central Park. A large variety of restaurants, businesses, schools, bodies of water, and transportation opportunities also surround the site, making it the perfect location for an Urban Eco Village.

An aerial photograph of New York City, showing the dense urban landscape of Manhattan in the background and the lush greenery of Central Park in the foreground. The Manhattan Bridge is visible on the left, spanning the East River. The city's skyscrapers and buildings are densely packed, while Central Park features a large body of water (the Reservoir) and numerous trees.

## Additional Site Information:

### Address

---

E 96th St, New York, NY 10029

### Location

---

Manhattan, New York

### Site Typology

---

Urban

### Climate

---

Humid Subtropical

### Size

---

1.7 acres

### Land Use

---

Park

BLOOMINGDALE

MANHATTAN  
VALLEY

9A

UPPER WEST SIDE

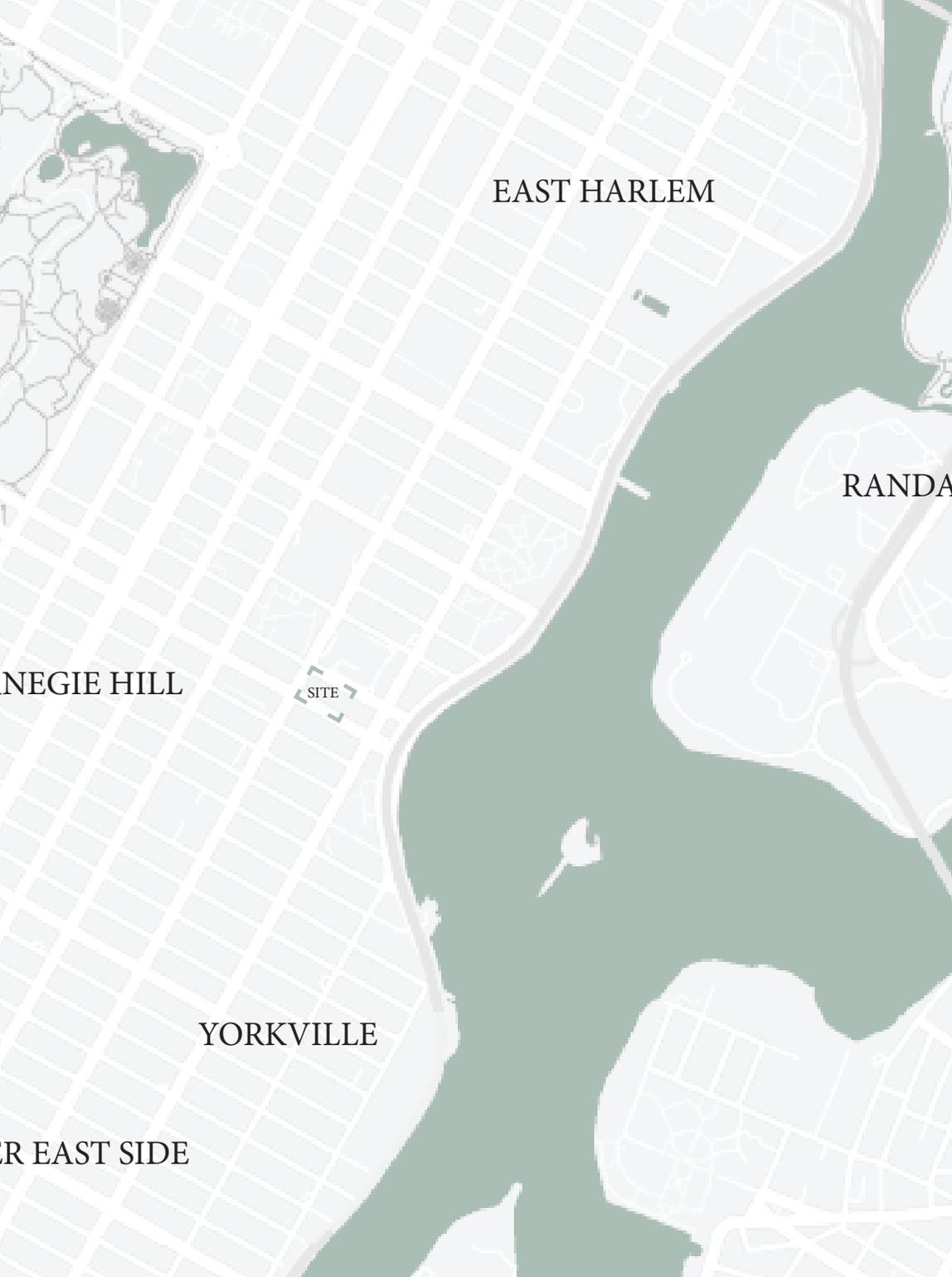
CAR

MANHATTAN

CENTRAL PARK  
WEST HISTORIC  
DISTRCT

LINCOLN  
SQUARE

UPPE



EAST HARLEM

RANDA

NEGIE HILL

SITE

YORKVILLE

R EAST SIDE

# Project Emphasis.

## Ecologically

Produce the least possible negative impact on the natural environment through intentional physical design and resident behavior choices and interactions. Sustainable strategies and techniques will be researched and applied to the design of this thesis to create the most impactful solution to sustainable living.

## Culturally

The development of a safeguarding environment of cultural heritage and nurturing creativity. Culture variation and acceptance promotes economic growth, education, and various perspectives to strengthen the community as a whole.

## Economically

Create a community that properly uses its resources that meet the needs of the residents while ensuring future growth. Energy-saving techniques, design features, materials and appliances choices are essential to ensure running and maintenance costs low.

## Socially

Design an interactive, diverse, community in an urban setting to create a larger desire to live sustainably. Social sustainability can be achieved by using a combination of design strategies to best combine the physical environment with human interaction.

# Project Goals.

Academically, I am very excited to learn more about sustainable strategies and techniques and how to incorporate them into design. I have developed a strong passion for sustainability through my architectural journey, specifically in residential design, which I hope to further expand. Through further research I also hope to achieve a Platinum or Gold LEED rating to ensure the project's sustainable goals were met. Leadership in Energy and Environmental Design (LEED) is a green building certification program used worldwide.

Additionally, I hope to successfully deliver my thesis to not only further my architectural knowledge and capabilities, but educate others on the importance of sustainability as well. With the most recent devastations to the earth's environment due to humanities lack of education and resources, the need for sustainability is at an all-time high. Further examination into the four emphasis topics - social, culture, economics, and environment - will expand my knowledge and understanding to best deliver an educational and interesting presentation.

In addition to furthering my sustainable and design knowledge, I also hope to further enhance my writing, research and communication skills. Pursuing my Master Degree in Architecture has prepared me both intellectually and socially in life. Each aspect of my education has expanded my capabilities as a student and I am excited to develop these crucial skills further in preparation for future careers.

# Plan for Proceeding.

## Research Direction:

---

Research will consist of a further examination of the sites characteristics and demographics as well as the four distinct areas of sustainability: Social, Economic, Environmental, and Culture. To develop a well constructed program, the following page demonstrates a tentative schedule of the semester with a list of deadlines and objectives to reference.

## Design Methodology

---

The design phase will utilize the research to produce the best possible solution to the problem. This phase will broken into four sub-phases:

1. Schematic Design
2. Design Development
3. Technical Drawings and Detailing
4. Presentation and Execution

These sub-phases not only act as a guide for project management, but will contribute to a stronger final product. In correlation to design phases, research techniques, including public interviews, to best develop a solution.



## Documentation of the Design Process

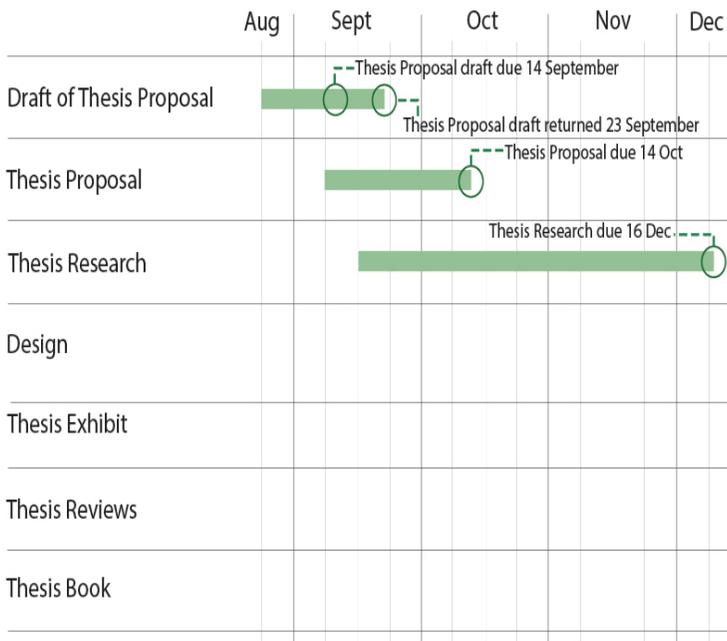
To best present my design thesis, a project book, boards, virtual images and fly-through, and a final presentation will be developed. The project book, containing this thesis proposal, will provide a detailed overview of each phase in the design of the Urban Eco Village. A set of design boards will graphically represent the project during final presentation and display. These graphics will be digitally produced as well as a video to showcase and explain the final design.



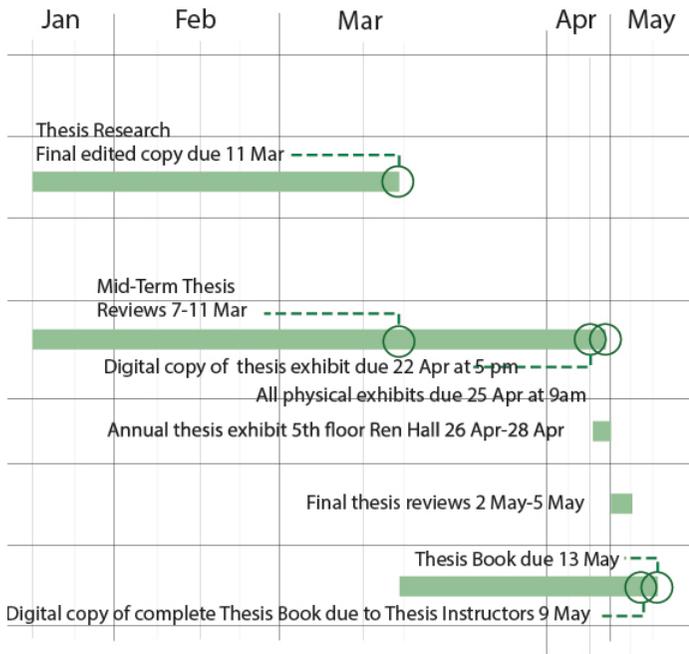
Figure 14 |

# Project Schedule.

Fall Semester 2021



## Spring Semester 2022





# Research



# Literature Review.

The purpose the literature reviews is to collect key sources on ecovillages and urban farming with an overview, a summary, and evaluation of each review. The five objectives I have conducted include:

1. Expanding the social necessity for the thesis design
2. Provide background content
3. Compare and contrast with other research
4. Justify the experimental method
5. Close the knowledge gap

The two reviews conducted examine the importance of urban farming and an insight to life within an ecovillage. The journal articles include:

1. “Modern Pioneers: What it’s like living in an Ecovillage”  
by Brian Ziggy
2. “Urban Farming and its Architecture” by architect Kuber Shrestha

# Dancing Rabbit Ecovillage

Dancing Rabbit Ecovillage is an intentional community in the pioneering stage near Rutledge, Missouri. Brian Ziggy, a curious traveler to Dancing Rabbit with his own quest towards a lower impact lifestyle, was quickly taken by the community environment and goals over his five-year experience in **“Modern Pioneers: What it’s like living in an Ecovillage”**. An exploration of Dancing Rabbit and how his lifestyle goals were met within the Ecovillage are examined within the literature to not only inform but to share his experiences and journey to further attract the interest of others.

## Life at Dancing Rabbit

Dancing Rabbit Ecovillage has been a considerably thriving community for over 20 years. The Ecovillage explores sustainable practices including organic permaculture gardening, alternative energy, inner sustainability, and self-governance. When Ziggy began his journey, the community hosted 50 residents. However, the population today is currently around 60 people with desire to grow to a community of 500-1000 total residents to live within the 280 acres of land. Residents living within the community strive to live sustainable lifestyles by agreeing to abide by ecological covenants and sustainable guidelines. To provide an environment of a shared community, residents elect to participate in services to benefit the community including

transportation, food, health care, showers, phone, and Internet. Residents are also held responsible for their own finances, housing, and other necessities. Some examples of community guidelines include the use of organic farming techniques only, personal vehicles are prohibited, only renewable energy usage within homes, etc. According to Ziggy however, there is still a quite a bit of freedom in how one decides to live their life within Dancing Rabbit.

Although Ziggy has many lifestyle goals, his sustainable goal is to live as mindfully as he can and as low impact as he is able. Within Dancing Rabbit, he lives in a hand-built home without electricity. His cooking revolves around a small, efficient rocket stove, beekeeping and raising chickens, and gardening. During his five-year journey at Dancing Rabbit, his biggest take aways have come from his exploration of natural building, organic gardening techniques, and community living.

### Natural Building

Natural building includes many variations of techniques to create sustainable buildings that minimize their negative ecological impact. These techniques often include non-industrial, minimally processed, locally available, and renewable materials. For Ziggy at Dancing Rabbit, his natural building experience revolved around the construction of his first cob house made from subsoil, water, and fibrous organic



material. His experience was so rewarding, a construction of another, more energy efficient, passive solar home constructed of bales of straw as the structural element was next on his list.



Figure 16 |

## Organic Gardening

Ziggy's passion for food is what kept him grounded. Organic farming is a form of agriculture that makes healthy food, soil, plants, and environments by reducing the use of pesticides, herbicides, and other harmful chemicals. With community and personal gardens at Dancing Rabbit, Ziggy's has cherished his gardening experiences. Gardening has been a platform that has strengthened his relationships with community members, nature, and himself.

## Community Living

Perhaps the most important lesson Ziggy has learning during his experience in an Ecovillage was that living environmentally does not happen in isolation. The collaborative process of living ecologically was quickly learned to be key to creating the sustainable lifestyle many people look for when experiencing an Ecovillage.

Obvious gratitude and love for Dancing Rabbit was clearly shown through the literature. An encouragement to others with passions for a sustainable lifestyle, growing their own food, building their own home, or any environmental interest to look into Dancing Rabbit or other villages is expressed followed by a letter of appreciation from the Dancing Rabbit team.

# Urban Farming and its Architecture

Kuber Shrestha examines the architectural techniques and importance of urban farming in “Urban Farming and its Architecture”. The practice of urban farming includes the practices of growing, processing, and distributing fresh food by people in a city of heavily populated town or municipality. With statistical research and example implementation diagrams and information, Shrestha analyzes different urban regions to further execute the role and benefits of urban farming and the architectural techniques required to environmentally perform.

## Importance of Urban Farming

Studies have shown that an increasing number of the population are going to inhabit urban regions over rural regions. This increasing number continues to advance and encourages urban architecture to follow. With the rise of poverty numbers and food crises due to climate change and global warming, there is a huge conflict between social and economic environments. These challenges put farming in a dangerous position including the effects of natural disasters have on farming. With all these challenges in mind, agriculture and architecture need to take the step into urban farming, rooftop farming, and façade farming techniques. The benefits of urban farming as stated in the literature are of the following:

- Providing a frequent flow of hygienic and healthy foods
- Farming without the use of pesticides and harmful fertilizers
- Waste-to-resource systems
- Water filtration
- Local produce can reduce transportation and storage needs
- Reduction of fossil fuel usage
- Reduction of food costs
- Improving the quality of the urban environment

The difficulties of urban farming as stated in the literature are of the following:

- Initial expenses
- Diseases can be spread to the community without careful treatment
- Arising controversial arguments between agriculture and urbanization
- The requirement of structural sound multi-story structures
- Need for knowledgeable individuals for vertical farming techniques
- The use of artificial lighting would be needed for larger urban farming structures

Within the literature, Shrestha dove into different categories of land used and zoning in urban areas. When it comes to agriculture in urban areas, the zone can be broken into for models: Core zone, Corridor zone, Wedge zone and Periphery zone.

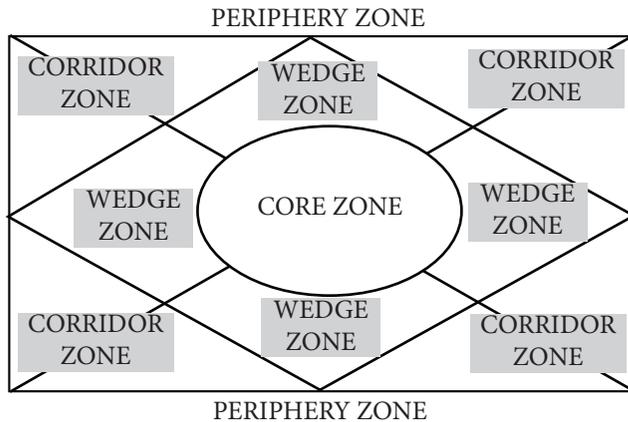


Figure 16

The higher built-up region of an urban area is the core zone. There is a stronger focus on this zone considering the relation to this thesis site. This zone has less opportunities for agriculture thus the implementation of rooftop gardens, balconies, and a few public parks are often showcased in this area. Vertical farming structures would be implemented in the core zone to best increase vegetation square footage to where it's needed most.

The examination of different countries and how they implement urban farming into their dense cities is also reviewed within the literature. Considering locations such as Hong Kong with a population of over 54,000 to 100,000 people/Km<sup>2</sup>, government has stated green zoning in urban areas and rooftop farming and gardens in dwellings, open spaces and more greenery policies. AS for the United States, urban farming spaces is not a new practice. Famous structures including the Brooklyn Grange Farm in Queens, New York City, just miles from this thesis site, and Eagle Street Rooftop Farm in Brooklyn, New York City have proven to be make notable changes in food production and other environmental challenges.



Figure 18

# Literature Review - Overview.

Conducting literature reviews were essential for developing my research idea. My goal was to consolidate what I already know about ecovillages and vertical farming to enable me to note any knowledgeable gaps. The two literature reviews I conducted not only further developed my knowledge but gave concrete evidence of the beneficial aspects of an urban ecovillage with specific statistical data and real-life experiences. “Urban Farming and its Architecture” by Kuber Shrestha gave detailed bullet points of advantages and disadvantages of urban farming and how specific big cities implemented urban farming the proper way. While determining where it is needed most and why, Shrestha tackled the topic with concrete problems and solutions. “Modern Pioneers: What it’s like living in an Ecovillage” by Brian Ziggy gave an educational, insiders perspective of life within the typical ecovillage. Not only are we taught about the life within an ecovillage, but he expressed the sustainable aspects that had the strongest impact on him. This information can be used to further develop a design with special focus on aspects that will make the greatest difference to the residents within.



# Vertical Farming Techniques.

With vertical farming technology, crops are organized in tower-like structures within an indoor, controlled environment. These designs use an artificial control of temperature, light, humidity, and gases for food production. Within these environments, crops are cultivated in stacked planting techniques to produce the most desired microclimate, allow for year-round farming, maximize farming square footage, and give provide easy access to fresh food in urban settings. Some techniques within vertical farming structures include:



Figure 19

## Aeroponics

Aeroponics is another technique to planting without the use of soil. Plants sit with exposed roots and sprayed with a nutrient water mix. Oxygen accelerates the absorption of the nutrients at the root surface. The benefits of using an aeroponics system in vertical farming are to maximize nutrient absorption, increase in plant sizes, higher yields, mobility, and less water





usage. Besides hydroponics, aeroponics systems are the most common soil-free techniques used in vertical farming. Overall, aeroponics provide a clean, efficient, and rapid production of food.



Figure 21

## Hydroponics

The process of growing plants in sand, gravel, or liquid with added nutrients is called hydroponics. Many vertical farms use hydroponics as a method to planting. With this technique, plants are more closely controlled, thus providing a healthier environment to produce greater yields. This systems maximizes space while using nearly 99 percent fewer land than the typical farm. The overall benefits of hydroponic farming are zero soil usage, 2x growth rate, 80% less water usages, now wees, nutrient efficiency, and fewer pesticides. The image to the right showcases how hydroponics would look in a vertical farming environment.



Figure 22

### Aquaponics

Aquaponics is a system that combines aquaculture with a hydroponics as a food production technique. Wastewater is pumped to vegetables in grow beds filled with gravel-like materials. The water-efficient, space-saving farming techniques not only accelerates plant growth, provides organic and nutritional benefits, and provides year-round farming opportunities, but it also allows for fish production and housing as well. The typical fish used within aquaponic systems is a Tilapia, a warm water fish with numerous nutritional benefits.





# Typological Research.

When selecting the primary projects for my typological research, there were multiple factors I kept in consideration to best correlate with my thesis topic including:

## Typology

Existing Eco Villages & Sustainable Communities

## Context

Rural & Urban Settings

## Impact

Projects are successful with both sustainability as well as community growth

## Function

Project uses sustainable strategies to best meet the project emphasis and goals.

Project Selected:

1. SPACE10 + EFFECT envision 'urban village project'
2. RenGen Villages
3. Crystal Waters - Sunshine Coast, Australia
4. Auroville, India - Eco-City

# RenGen Villages

A Danish studio EFFEKT designed their own modernized, tech-integrated and regenerative sustainable village. The founder of RenGen Villages James Ehrlich, describes his brand as “engineering and facilitating the development of off-grid, integrated and resilient neighborhoods that empower and feed self-reliant families around the world.” The village, called RenGen Villages, are home of several buildings with attached greenhouse structures that produce all their own food as well as an integration of sustainable techniques to produce their own energy. This project was developed as a conceptual community to show what can be done with technology that already exists by combining architecture and science. The project then pushed the start of the sustainable community in Almere, the Netherlands. The projects typology will sit in a rural setting in various locations with averaging 100 homes a site.

## Design Implementations

### Energy Power Homes

---

RenGen’s design showcases energy positive homes. Energy power homes are zero energy residential structures that produce more energy than consumed to leave extra





energy to use in other ways. This strategy works well for communities who share energy. An implementation of solar panels throughout the site are used to convert sunlight into electricity. Energy is stored from these panels as well as other energy absorbing techniques to power the individual home as well as leave extra energy for community use. Overall, the community produces more energy then it consumes.

### Waste-to-resource systems

The use of waste as an input material creates usable products as an output material. Composting, a biological process where bacteria and insects break down organic materials, is one technique used in the design as a natural was of returning needed nutrients to the soil.



Figure 25

## Passive Heating and Cooling Systems

Design techniques for passive heating and cooling manage the interior temperature and air quality of each individual home. The design allows for a pressure difference between the indoor and outdoor air to reduce unwanted heat gain during the day.

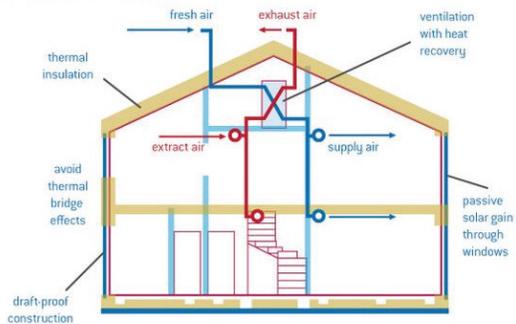


Figure 26

# Crystal Waters.

Set within 640 acres of bushland at the headquarters of the Mary River, Crystal Waters is a fully sustainable community and wildlife sanctuary for nearly 200 people. The purpose of this community aims to create a peaceful shared land between humans and wildlife. The community consists of ecological cabins designed by Max Lidegger and Robert Tapp. These structures within the community are not only built on sustainable land-use principles, but also include the basics to sustainable design including the use of solar energy and composting toilets. 83 freehold residential homes and 2 commercial lots occupy 20 percent of the land while 80 percent of the land is used specifically for regeneration of wildlife, bamboo farms, organic agriculture, and natural playgrounds. The village, being Australia first permaculture village, has an approach to land management. The combination of design principles including regenerative agriculture, rewilding, and community resilience, contribute to the thriving sustainable community.



## Design Implementations

### Regenerative Agriculture

Crystal Waters uses this approach to their food and farming systems. The farming practice uses photosynthesis in plants

Figure 27



to sequester carbon in the soil thus improving the overall soil health, water resilience, and nutrition density.

### Re-wilding

The connection of human to wildlife culture efforts to restoration and protection of natural processes and wilderness areas. Portions of Crystal Waters is left to nature.

### Community Resilience

Facilities including places for healthy and safe recreation, meaningful activities, active social interaction, freedom of spiritual belief, shelter, etc. aim to produce a strong community connection.

# Auroville, India - The Eco-City.

Auroville is currently the largest existing eco-city attempt in the world with a goal to realize human unity. A mission statement from the founder of Auroville describes the universal town as a place where a variety of men and women are able to live in peace and progressive harmony above all creeds, all politics and all nationalities. Auroville has the highest concentration of alternative and appropriate energy systems in India. This includes the strong use of solar, wind and biogas generating systems to create a climate-friendly community.

## Design Implementations

### Art and Culture Facilities

Auroville has developed a remarkable cultural scene that is quite remarkable. With art, music and dance being essential to human survival, development, and happiness, the implementation of theaters, concert venues, and art centers create an individual and collective identity to the residents that strengthen the overall bio-culture.

### Educational Facilities

With a goal to provide continuing education and a strong system to nurture the children's potential to it's highest





possible level, the community uses a “free choice” educational technique and facilities to introduce the concept of a life-long process of development towards a person balanced in body, mind and spirit.

### Environmental Regeneration

A wasteland reclamation and reforestation work has transformed the landscape from a near barren state to a lush green environment.

### Heath and Healing Facilities

Facilities housing health care amenities such as allopathy, homeopathy, acupuncture, chiropractic, massage, etc., has proven to increase residents overall comfort, mood and productivity on any given day. An implementation of many exercise and meditation facilities are also included within the city.

### Innovative Building Technologies

Auroville implements several innovative, appropriate and cost-effective building technologies, especially earth construction and ferro-cement.

### Organic Farming

The development of an ecologically sound agriculture to reverse the previous use of dangerous chemicals and inputs in the form of fertilizers and poisonous pesticides. Further



training programs for the farmers of Auroville are organized regularly to introduce sustainable agriculture practices throughout the bio-region.

### Renewable Energy

The major forms of renewable energy used at Auroville include solar, wind and biomass. Over 1,200 solar photovoltaic panels, 30 windmills, and ferro-cement bio gas systems are implemented within the Eco-City. A research facility is also on-site to further investigate renewable energy strategies and techniques.



Figure 29

# The Farmhouse.

In an attempt to reconnect architecture and agriculture, Precht Architects designed a timber skyscraper containing prefabricated A-Frame housing modules combine living spaces with interior farming to allow residents to grow their own food for their own personal use, or to share as a community. The design concept aims to create a more sustainable way of living as the typical large city loses its touch with nature and the production of organic foods. Each residential module has an open floor plan, some including balconies. The garden portion of the design are arranged in a way that create both private and community based gardens with allowable buffer space between to gain access to natural lighting. The design also includes an indoor food market and composting units to dispose and reuse growing materials. Residents aside, the design has created a brilliant technique to increasing crop yield that comes with a smaller unit area of land requirements. Overall, the design creates a beautifully modern, tranquil environment in connection with nature.

## Design Implementations

### Materials

The Cross-Laminated Timber (CLT) structure is considered to be more sustainable than other low-cost building materials. Living with wood also has ecological benefits such





as manufacturing techniques used to fabricate the material and the carbon absorption levels compared to steel, cement or concrete. CLT also allows for easier on-site delivery, faster installation, cleaner construction sites, waster reduction, and provides a fire-resistant wood construction.

### Modular Building System

The Farmhouse design implements as prefabricated off-site and flat-packed systems deviled by trucks. The advantages of this system include shortened construction time and the



Figure 31

affects the structure has on its surroundings. The systems also allows for a variety of structure shapes and sizes. The systems can be used to develop single family homes (see below) to towering skyscrapers. The connection of these modules use a diagrid systems that runs the loads though the structure. The modules include three wall layers including an inside finished layer with electricity and piping, a structural layer with insulation, and the outermost layer with gardening and water supply elements.



## Interior Garden & Farming

The benefits of interior gardens for residents include the reduction of stress, a boost of creativity, production and focus. Besides the mental health and wellbeing beneficial qualities, an improvement of air quality is also a feature. The interior gardening system allows for larger quantities of vegetation to grow as well due to the stacking strategies instead of the traditional, horizontal rows.



Figure 32 |

# Typological Research Takeaways.

With the many strategies and techniques used within the designs of the previous case studies, there were many that caught interest to this these goal. The design implementation of the modular building system of “The Farmhouse” structure proved to be a beneficial tactic for designing in multiple locations and site variations. With the goal of implementing my design in many location in the future, a modular system would prove beneficial to this thesis design. Each sustainable strategy used in the RenGen gardens also has numerous features that would benefit this thesis. The features include a waste-resource system, especially in this thesis’ vertical farming portion, and passive heating and cooling strategies. The health and healing centers at Auroville would be a strong portion of this thesis design to incorporate as well. The overall emotions and moods of the resident has a high level of priority in the design. Therefore, similar centers will be implemented.

The quotes to the right are directly from residents and staff within these communities. These quotes prove the techniques and strategies used within these projects do have beneficial qualities and can have an impact on peoples life.

“

...a place where the needs of the spirit and the care for progress would get precedence over the satisfaction of desires and passions, the seeking for pleasures and material enjoyments.

”

—Auroville Resident—

“

Hits a very powerful nerve with people who are searching for a better way of life that make them feel secure in all areas of regenerative living and more.

”

—RenGen coordinator—

“

Crystal Waters is full of genuine people and reflects the diverse things we can all offer in community life

”

—Crystal Waters Visitor—





# Project Justification.

The project topic I have decided on is important to me for a couple reasons. First of all I have a passion for green design and building so a topic revolved around sustainability was very important to me. With my recent travel to Green Build, my knowledge and passion grew making it the perfect grounding topic for my overall goal of the project. Secondly, I have a strong passion for residential design as well. Although I am not designing individual homes as I previously thought, my project still revolves around residential design. I believe there will be a lot of educational and person benefits following completion of this project. Not only will I have a stronger knowledge on sustainability, but how architecture effects a person as well. This will also increase my communication and presentation skills as well. This will be great for me while entering the real world. With the growing interest and need for sustainability the funding opportunities and return on investment will be justified. The growing interest and need for sustainability will also contribute the advancement in architecture and provide and new unique take on the combination of residential living, sustainability and community growth and inclusion in design. Residents within the community will have educational and personal benefits as well. With the implementation of cultural inclusion and sustainable practices will further personal health, wellness, and human interaction.





# Site Analysis

# Manhattan's Architecture.

Manhattan is the New York's most densely populated boroughs. Like the Bronx, Brooklyn, Queens and Staten Island, Manhattan is considered a "smaller city" within a massive metropolis and is often described as the cultural, financial, media, and entertainment capital of the world. Although many architectural styles have flourished through Manhattan's structures, classical architecture has been that focal point of design.

Beaux Arts was the prominent architectural style from the late 19th to the early 20th century when New York was at the peak of urban development. The design style is characterized by order, symmetry, formal design grandiosity, and elaborate ornamentation. Characteristics of Beaux Arts in architecture showcase balustrades, balconies, columns, cornices, pilasters, and triangular pediments. The New York Public Library is a famous example of Beaux Arts architecture in Manhattan.

Art Deco is another famous architectural style in Manhattan. Characteristics of Art Deco in architecture include sleek, linear, rectangular geometric forms. These forms are often arranged and broken up by curved ornamental elements to demonstrate a monolithic appearance. Many of Manhattan's famous architectural buildings are represented by an Art Deco design style including the Chrysler Building and the nineteen Rockefeller Center structures.





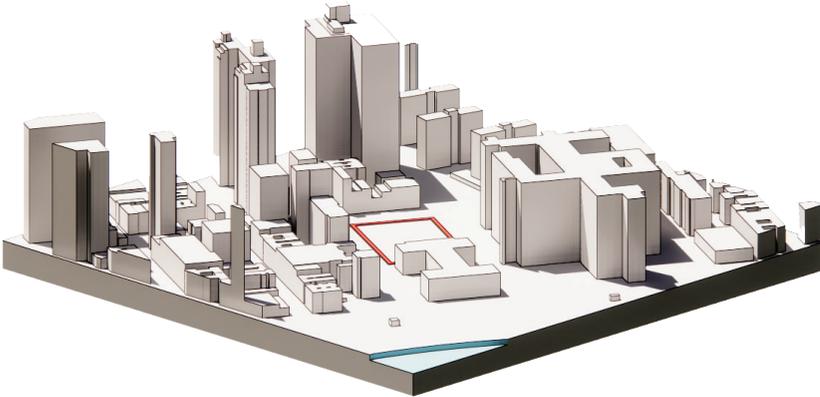
## Site Views.

The North corner of the sites views businesses including Next Evolution Martial Arts Kioto, Edible Arrangements, The Cereza Lodging Center, Ilyusina Hook Up Barber Shop, a pawn shop, and Cherry Tree Park. The East corner of the site sits a health care facility, Genesis Salon, a pharmacy, Early Child Development Center, and deli. The South corner of the site views Marx Brothers Playground, a couple restaurants varying in styles and cost, and Judith South Kaye School. Lastly, the west corner of the site views Specialty Infusion Centers, an apartment complex, an Islamic Culture Center, parking garage, and Baruch College Resident Life facility. The images to the right include photos of each corner view starting with the North (top), East (middle top), South (middle bottom), and West (bottom). The surround context includes a variety of businesses to create the perfect environment for a new development, as well as providing an opportunity to introduce new context to the area.



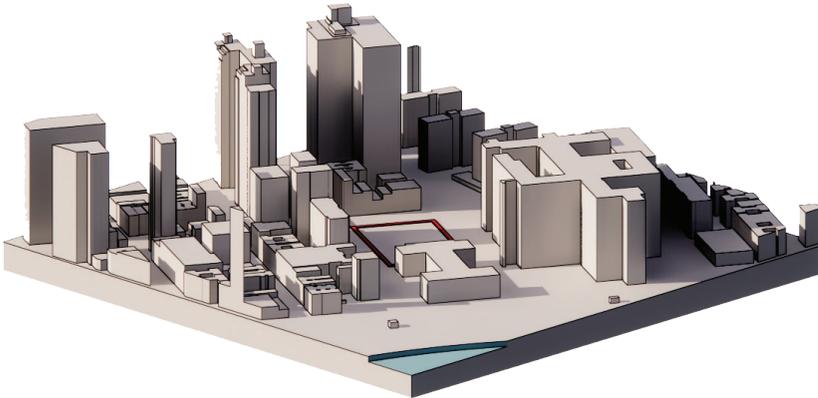
Figure 36-39

# Light & Sun.



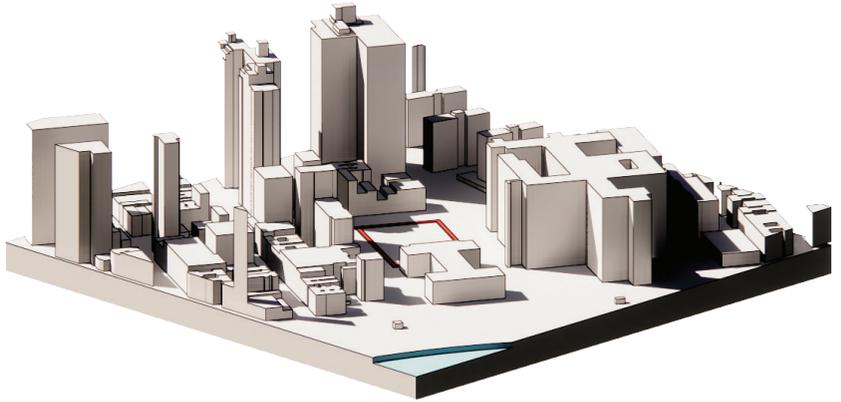
## Summer Solstice

June 20-22



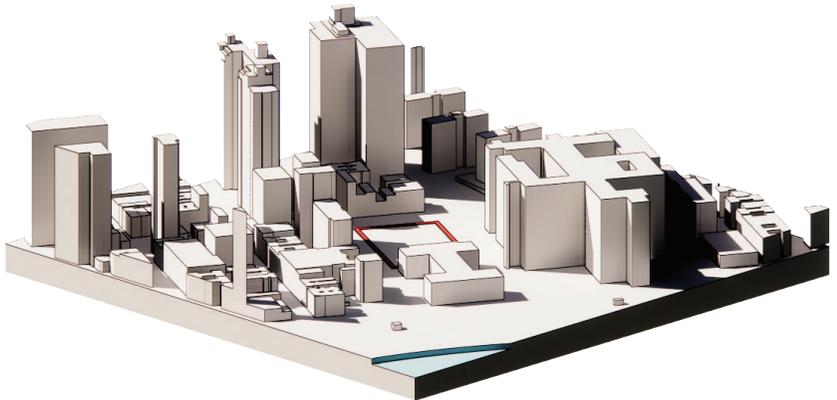
## Winter Solstice

December 21-22



## Autumnal Equinox

September 22-23



## Vernal Equinox

March 20-21

# Wind.

The average hourly Manhattan wind varies significantly throughout the year. From late October to late April, wind speed average wind speed can reach over 8 miles an hour. The calmer months more commonly sit at 6.5 miles an hour. Manhattan is considered a “windy city” due to the air being converged into a small spaces between buildings that lead to stronger winds. Architectural strategies will be considered when designing.



Average wind speed in New York, United States of America Copyright © 2021 weather-and-climate.com

# Soil.

Figure 44

Soil series in Manhattan include Brown soils. These soils are developed in fine-sandy lacustrine deposits. The site sits upon three layers of rock known as Manhattan Schist, Inwood Marble, and Fordham Gneiss. Schist, being the most prominent layer, is an extremely strong and durable rock type. The bedrock is usually suited for the high density of tall buildings, however the heights of the structures are limited.



# Vegetation.

The most common native plants to Manhattan include mosses, ferns, grasses, sedges and rushes, wildflowers, trees, shrubs, and vines. There is a 11% total tree coverage, 5% canopy coverage, and a tree importance value of 7% in Manhattan. 70% of these tree types inculcate just three species: London plane tree, pin oak, and the silver maple. The site i's biome is within the Temperate Deciduous Forest.



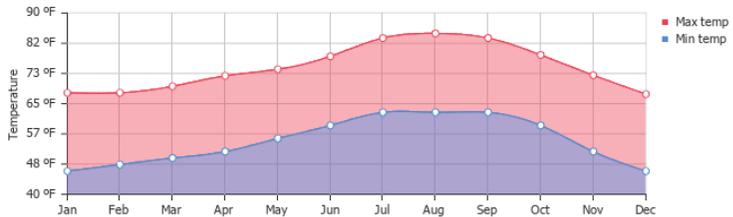
Figure 45





# Climate.

Manhattan's humid subtropical climate has an average of 72 degree days. As for the windier months of the year, temperatures typically stay above 27 degrees Fahrenheit. The best design practices for a humid subtropical climate include proper insulation, usage of lighter colored roofing materials, proper siding materials, use of sun shading, etc. The sun diagram below showcases the typical pattern of the sun for designing for sun exposure, shading placements, green-roof placements, etc.



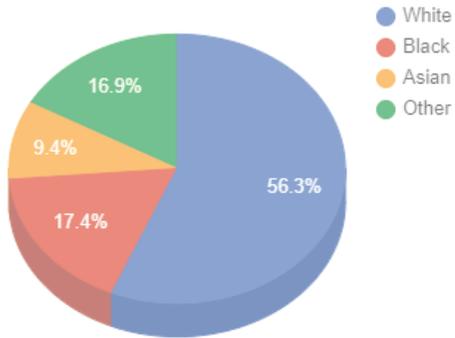
Average min and max temperatures in Los Angeles, United States of America Copyright © 2021 weather-and-climate.com

The objective of this thesis design is to create an infrastructure that can be used during all four seasons. The best materials to considering when designing for an environment with a colder seasons include brick, stone, and concrete. Other design strategies for colder climates include passive heating, airtight construction, covered entrances, slightly east of south orientation, etc.

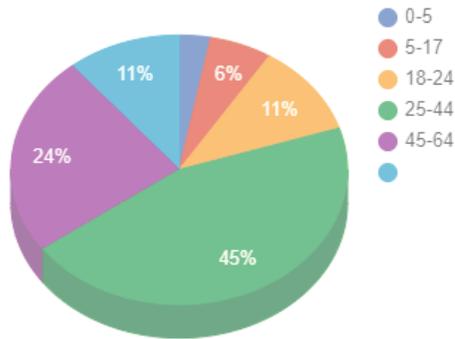
# Human Characteristics.

With New York being the highest populated density of any major city in the United States, diversity and other human characteristics vary dramatically. While Manhattan has an extraordinarily diverse population, the city is home to many distinct communities of Indians, Irish, Italians, Chinese, Koreans, Dominicans, Puerto Ricans, Caribbeans, Hasidic Jews, Latin Americans, Russians and many others. Nearly 70 percent of these individuals living in Manhattan are a United States born citizen while 18 percent are not born in the United States and 12 percent are not a United States citizen. Among all these cultures, the city is often remembered as one of the most eclectic communities. The wide variety of theater, dance, literature, music, art and cuisine traditions create an environment unlike many others. However, when it comes to an overall mood, studies have shown that people living in Manhattan are often in bad moods compared to people in other cities. Unfortunately, New York as a whole was ranked the least happy city in America in several studies. As for political stance of people within Manhattan, the majority of the city's population are on the democratic side of politics. The average income of residents living within Manhattan is around 51 thousand dollars while the average household income is 138 thousand dollars. The majority of these individuals obtain a bachelor's degree education.

### Manhattan Diversity Makeup



### Manhattan Age Makeup



### Manhattan Gender Makeup

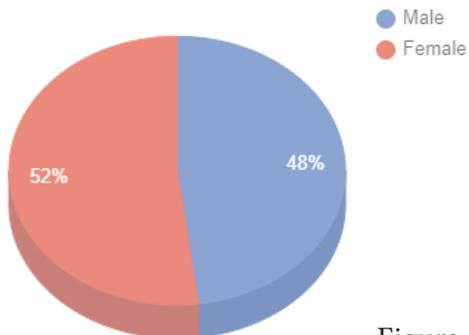


Figure 47-49

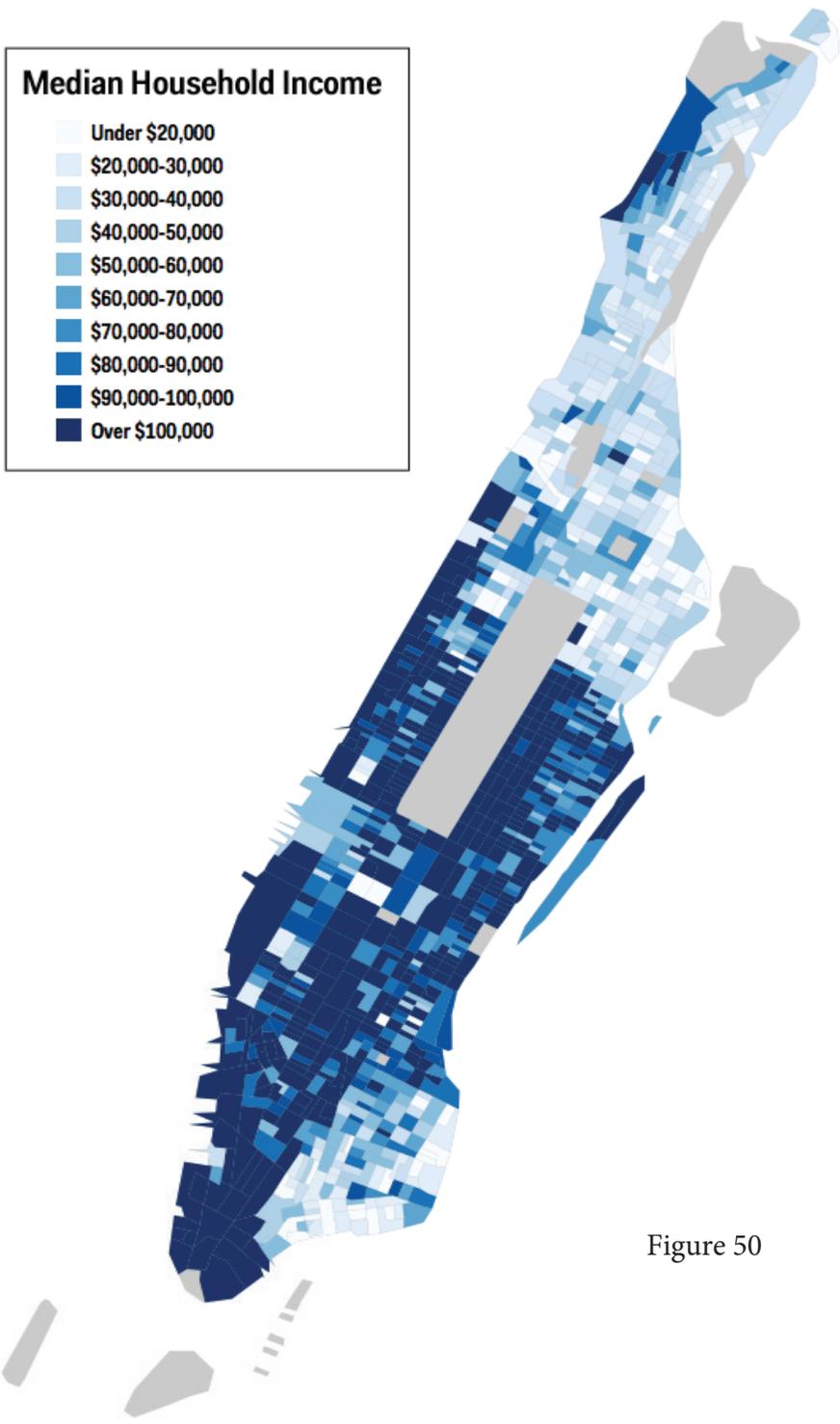
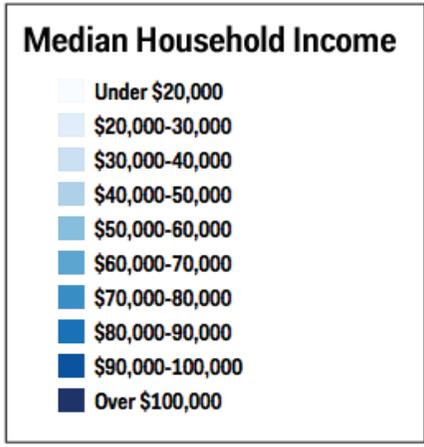
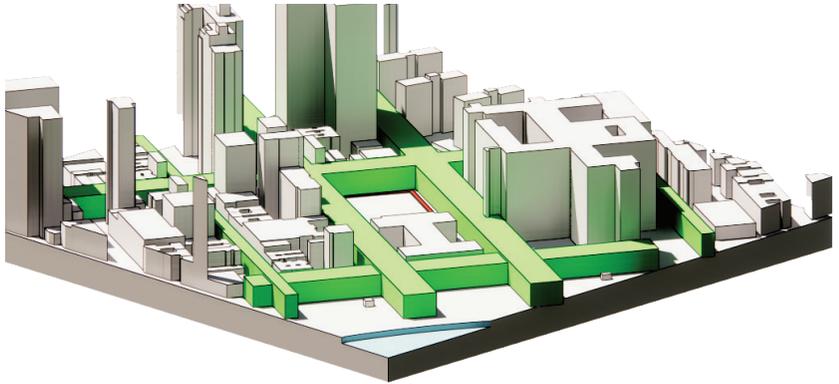


Figure 50

# Pedestrian Traffic.

- Light Traffic
- Light/Medium Traffic



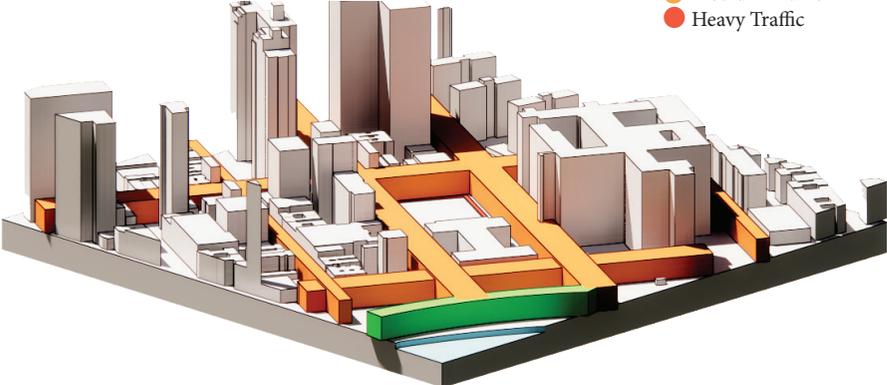
## Foot Traffic



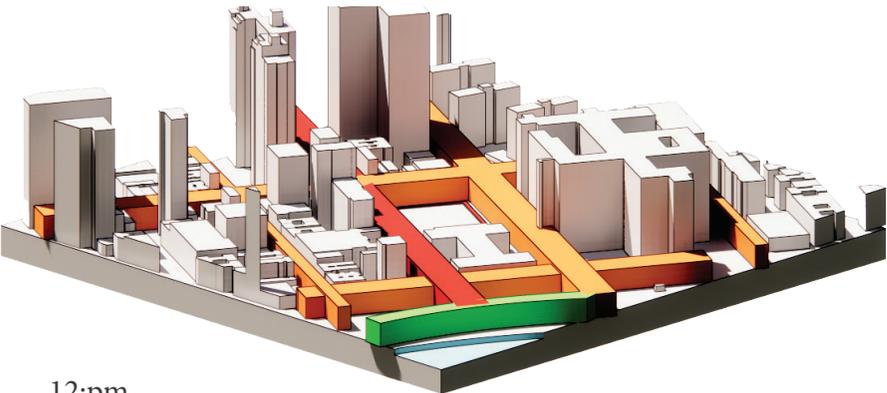
## Bike Traffic

# Vehicular Traffic.

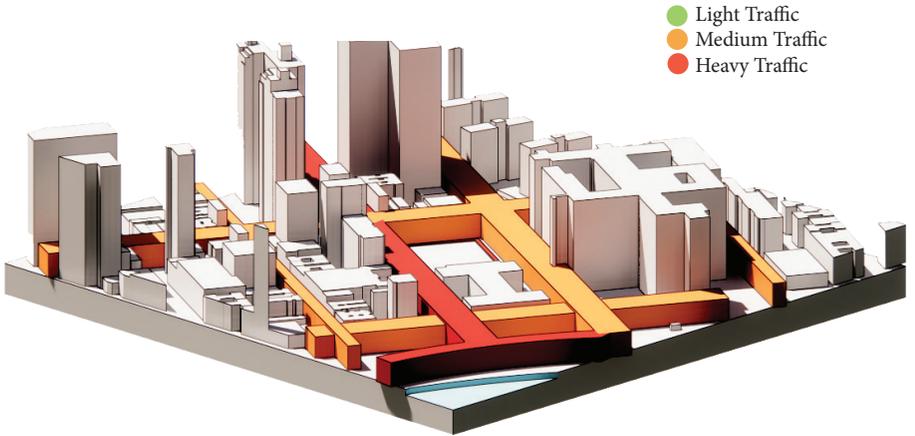
- Light Traffic
- Medium Traffic
- Heavy Traffic



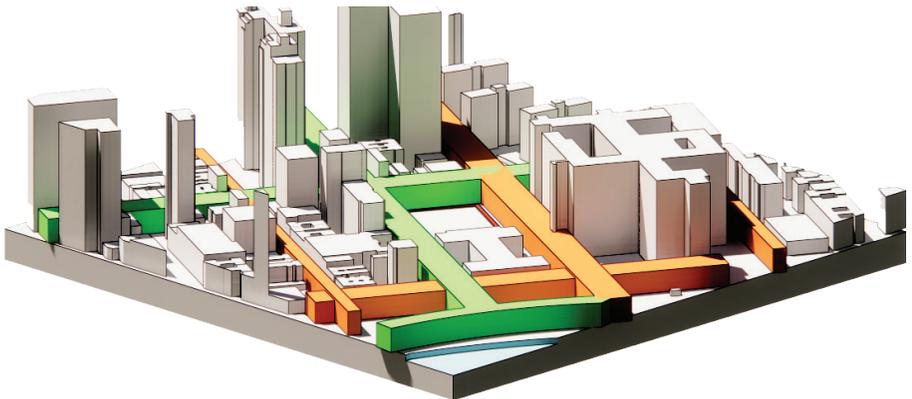
8:00 am



12:pm



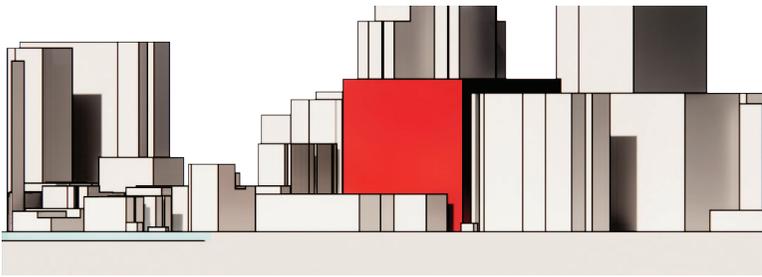
4:00 pm



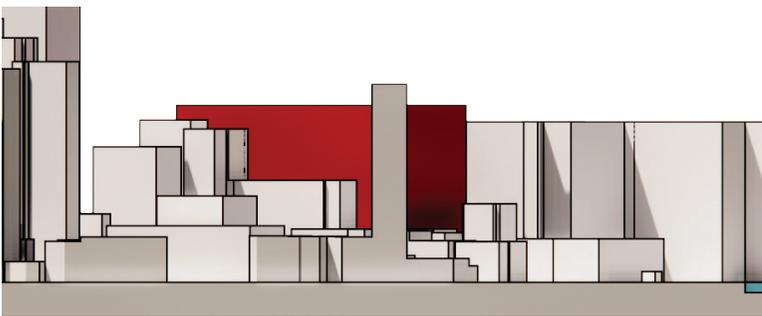
8:00 pm

# Context.

The building heights surrounding the site consists of 1 to 42-story structures. In consideration to the surrounding sites, I plan to create multiple towers ranging from 5-30 stories in high. Below features a SE elevation and a NE elevation to showcase how the building would sit at 20-storys. The diagram to the right features an orthographic view of the site. The diagram pulls notable structures that sit around the site to display the buildings heights and usage.



East Elevation



North Elevation

Figure 54-55

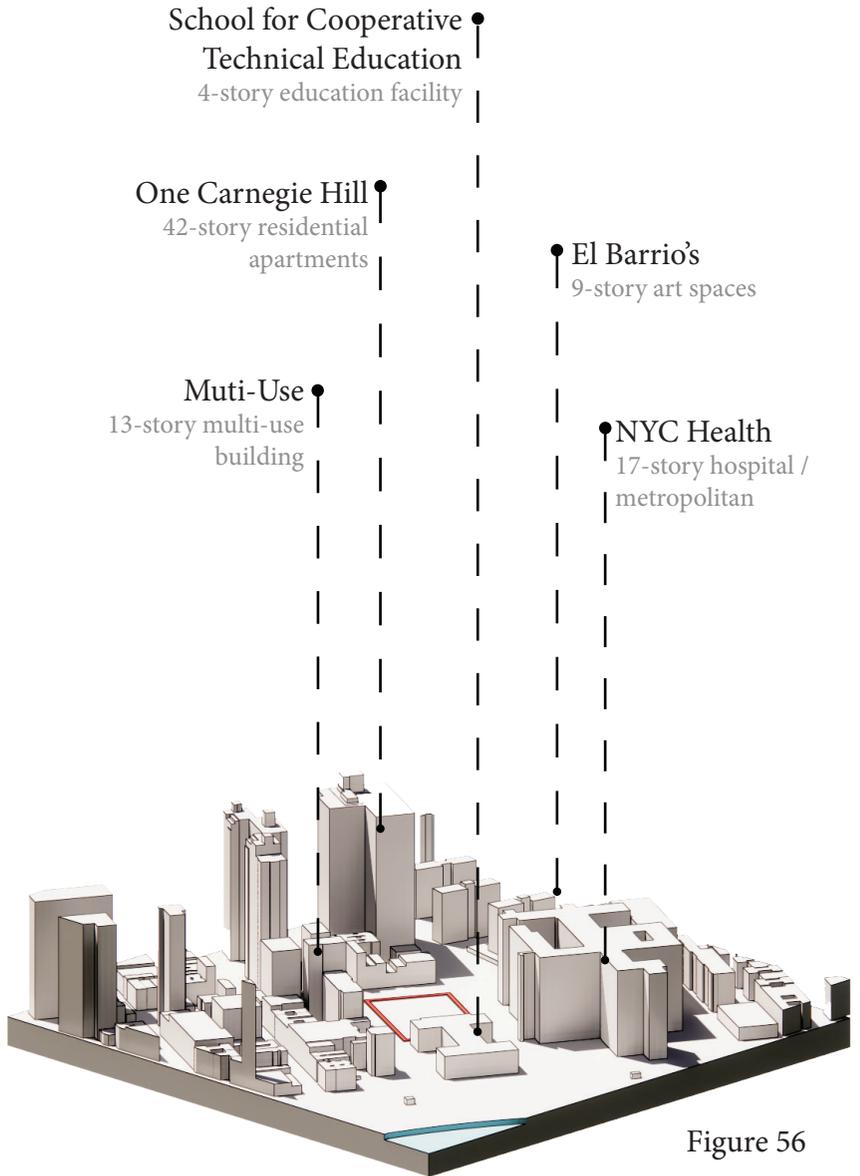


Figure 56

# Historical, Social & Cultural Context.

In the last few decades there has been several projects revolved around sustainability. Today, nearly every new architecture building in some way relates to the practices of sustainability. The history of sustainability revolves around the human-dominated ecological systems dated back to the earliest trace of civilization. Officially, sustainability developed for the first time in 1987 in the Brundtland Report.

The first noted Eco Village in North American began in 1990s. The first officially named Eco Village, Earthaven Eco Village, was design in 1993 using permaculture principles on 368 acres of land in an off-grid location. Today, the village hosts over 70 families.

As for the topic of vertical farming, the term was officially coined in 1915 by American geologist Gilbert Ellis Bailey. However, the modern concept was proposed in 1999 by the professor of public and Environmental Health at Columbia University, Dickson Despommier. The professor challenged his students to examine farming on rooftops of New York. With a an estimated 1,000 people fed per rooftop, Despommier was unsatisfied. Despommier and his students then proposed a design of a 30-story interior farming skyscraper that could

feed up to 50,000 people. Further calculations estimated approximately 100 different kinds of fruits and vegetables as well as housing of chickens and fish subsisting on the plant waste would be included in the design outline. Although the design was never built, the idea was widely recognized thus introducing the world to vertical farming in architecture.



Figure 57-60 |

# Performance Criteria.

With my thesis goals of sustainability, community growth, and personal wellbeing I plan to focus strongly on the LEED AP standards and WELL standards as well. The WELL building standards is a performance-based system of measuring, certifying, and monitoring features of the built environment. I hop to hit many of the points to achieve certification to ensure the most positive personal and emotional occupant health. LEED provides a framework for healthy, highly efficient, and cost-saving green buildings. I will use the point system to ensure my design fits within the requirements to be LEED certified to ensure optimal sustainability performance. Using the systems of both LEED and WELL AP certification, proper calculations can be done to best estimate if the design would fit certification requirements in the real world. Points of measurement will be in all corners of the design and calculated by reviewing requirements and use of insulation calculations, lighting computer simulations, productivity levels from similar projects, etc. I also plan to use a program called In-site imported into Revit to best estimate energy consumption data. Lastly, psychological impact is obviously important and will be calculated with WELL however, the use of proper aesthetics, vegetation, and sensory experiences will be factored into the calculations as well. Obviously, cost will be in consideration. I plan to do research on similar projects and the funding received to move forward with

construction. I believe with the expectancy of LEED and WELL certifications, the plan will not only get funding for the environmental benefits, but will continue to be a low cost environment.

## Space Allocation.

The table below is an example of spaces to be considered in this thesis and the percentage of square footage space that would consume.

<b>Market</b>	<b>5%</b>
<b>Living Spaces</b>	<b>25%</b>
<b>Gym &amp; Wellness Center</b>	<b>3%</b>
<b>Vertical Farming</b>	<b>15%</b>
<b>Parking</b>	<b>8%</b>
<b>Educational Facilities</b>	<b>7%</b>

Figure 61

# Space Interaction.

The Space Interaction Matrix table below and Interaction Network figure to the right illustrate the interrelationships between spaces reference in the Space Allocation Table on page 89.

Space Interaction Matrix

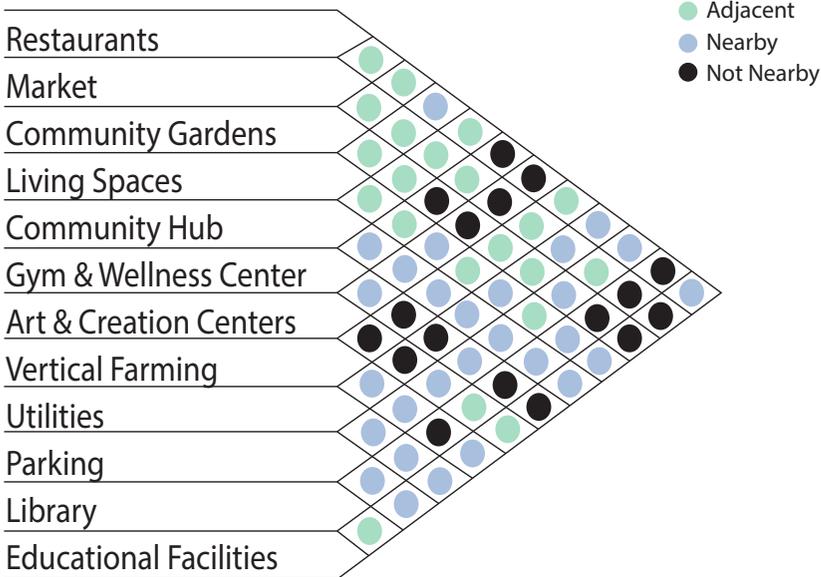


Figure 62

## Interaction Network

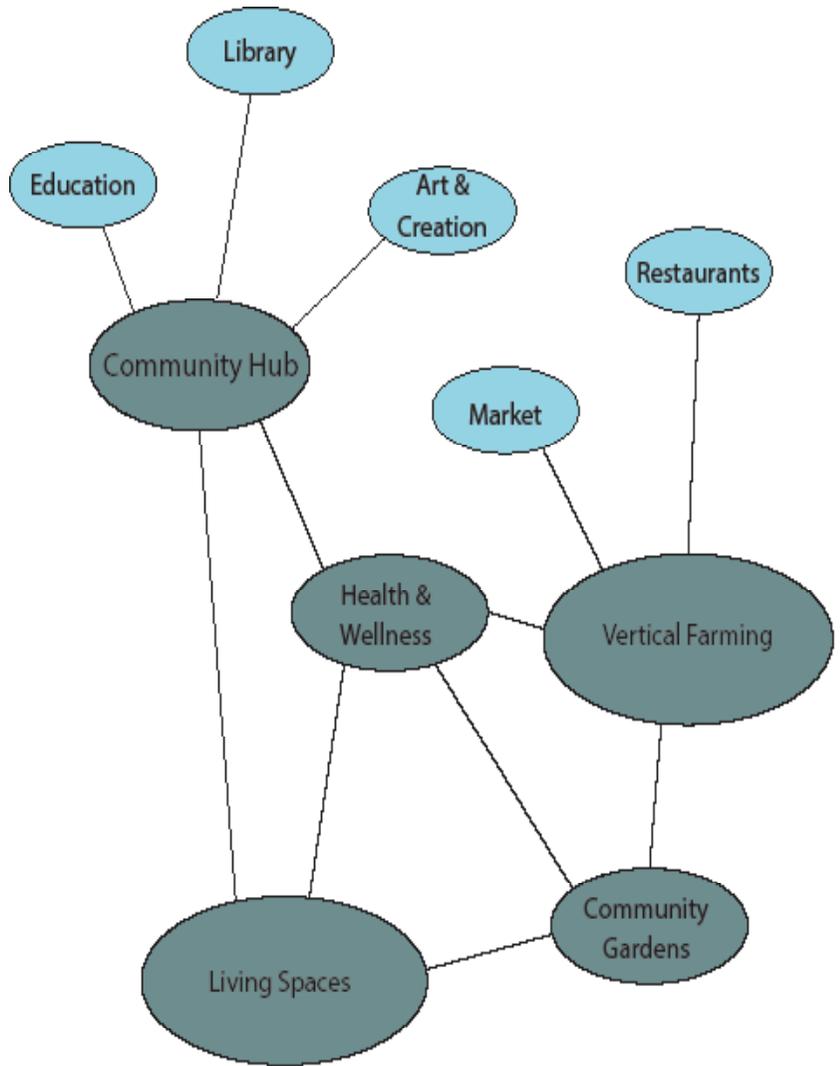


Figure 63





# Design Solution

# Eudaimonia Village.

Imagine living a low-impact lifestyle surrounded by nature, food, fresh water, air, wildlife, and a community with a common desire. An Eco-Village not only demonstrates these positive aspects, but is a community led by influencing values including solidarity, equality, and collaboration, all while being self-sufficient. These communities are often limited to rural and off-grid locations; however, they present great potential to thrive in an urban setting.

Through research, an exploration of the Eco-Village has introduced a way to live sustainably as a community with a larger focus on the social, culture, and economic benefits that the common residential community lacks. However, with the heavy increase in urban populations over the last decade, the appeal to live a rural lifestyle has become less desirable. With benefits such as personal interactions, diversity, job opportunities, and shared experiences, the urban lifestyle proves to be an ideal location to incorporate this type of community. The vertical densification of sustainable living paired with the positive values and aspects of the common Eco-Village will further encourage sustainable and positive lifestyles for the residents within.



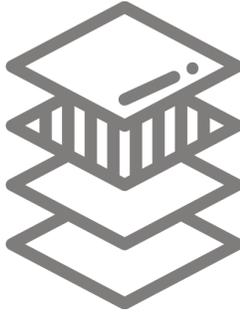




With wood being a natural, renewable, and sustainable material, the majority of the design's structure and form is constructed of White ash. White ash is a harvested material from FSC-certified forests which allow for an increase of absorption of carbon dioxide in the atmosphere thus reducing the structures overall carbon footprint. Other sustainable materials and practices are featured through the design as well.



Eudaimonia Village will host like-minded people to experience, share, and grow together in an urban setting. The freely arranged community is an experience for residents who have interest living side-by-side with neighbors with similar ecological philosophies. As a group, residents will experience a healthier lifestyle with educational, wellness, cultural, and economical benefits on-site. These benefits not only create a healthy environment for the residents, but for the future of Earth's environment as well.



To fully allow residents to collaborate, grow, and have easy access to a healthy lifestyle, a freely arranged program features aspects to meet those goals. These aspects feature spaces to sleep, work, play, shop, create and educate on-site.



Manhattan is the most densely populated borough of New York City. Among the world's major commercial, financial and cultural centers, a variety of restaurants, businesses, schools, bodies of water, and transportation opportunities also surround the site.

# Process Diagrams

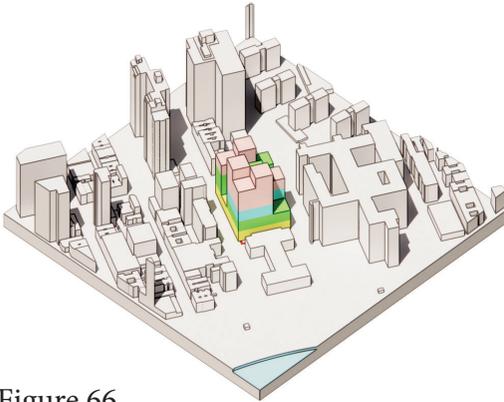


Figure 66

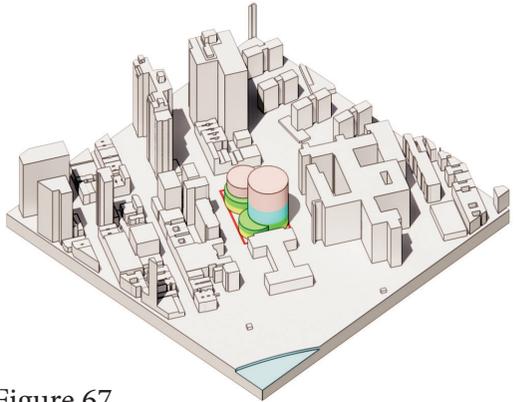


Figure 67

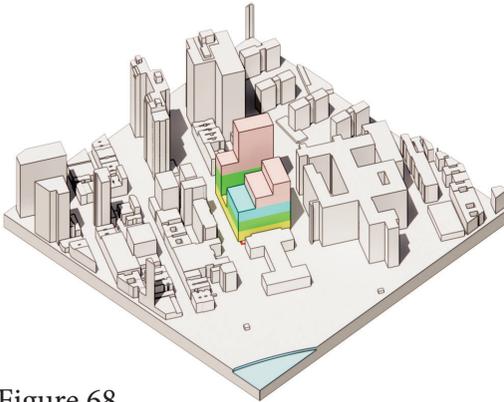


Figure 68

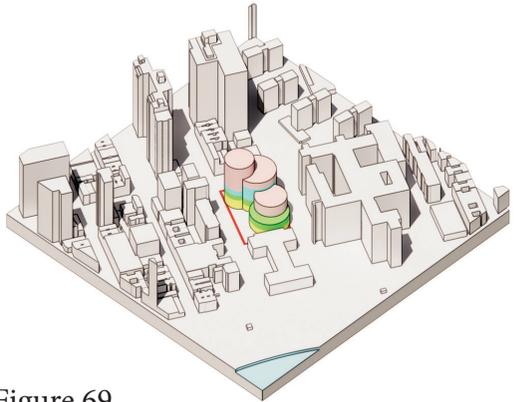
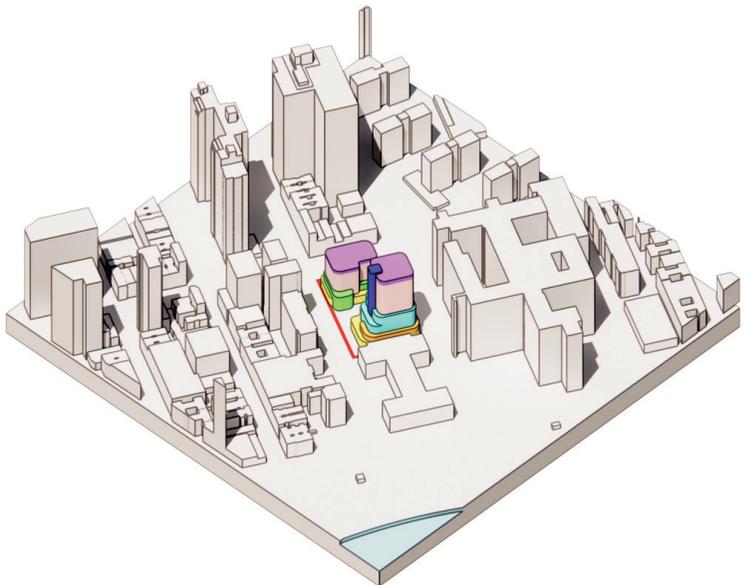
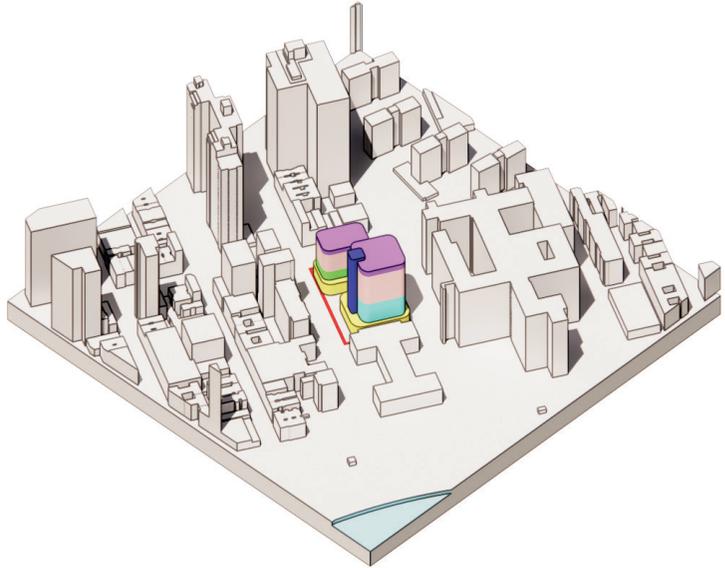


Figure 69



# Materials





Figure 72

● Food & Gathering



Figure 73

● Residential Lofts



Figure 74

● Retail, Market & Lobby



Figure 75

● Wellness



Figure 76

● Vertical Egress



Figure 77

● Vertical Farming & Green Roofs



Figure 78

● Education & Culture



Figure 79

● Parking



Figure 80

Site and Environment | Sustainability

-  **On-Site Renewable Energy**  
Renewable energy is collected from photovoltaic panels on the roof and wind-turbine walls.
-  **Electric Vehicle Charging**  
Electric vehicle charging stations are located on site for resident and visitor use.
-  **Native Planting**  
The abundance of native planting on the site reduces air pollution, provides shelter for wildlife, requires less water and reduces water bills.
-  **Bicycle Racks**  
On-site bike & scooter racks to increase parking capacity and space as well as promote healthier lifestyles.

-  **Renewable Materials**  
White ash is a harvested material from FSC-certified forests which allow for an increase of absorption of carbon dioxide in the atmosphere thus reducing the structure's overall carbon footprint.
-  **Solar Shading**  
Vertical louvers help control resident comfort, solar heat gain, and maintain building heating and cooling needs.
-  **Dog Run**  
On-site dog runs to run freely to increase pet's mental sharpness, decrease anxiety and depression, and increase health strength.



Figure 81

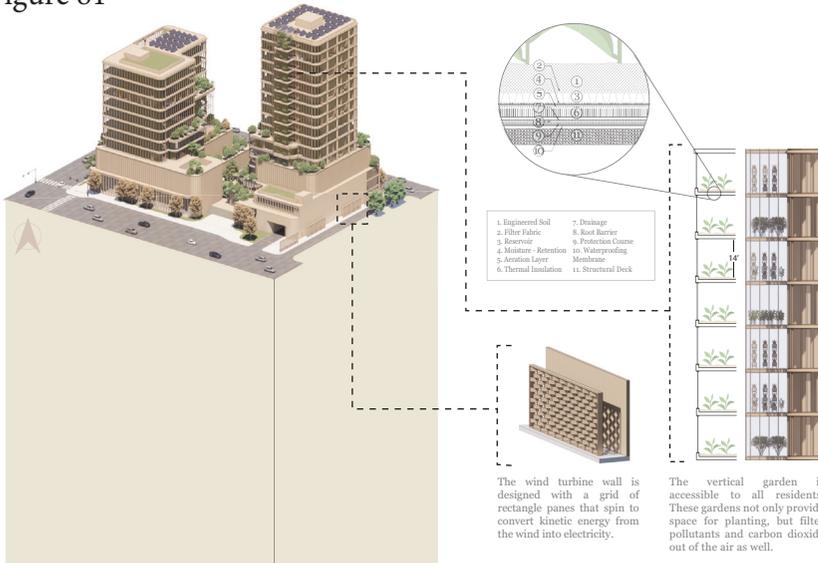


Figure 82

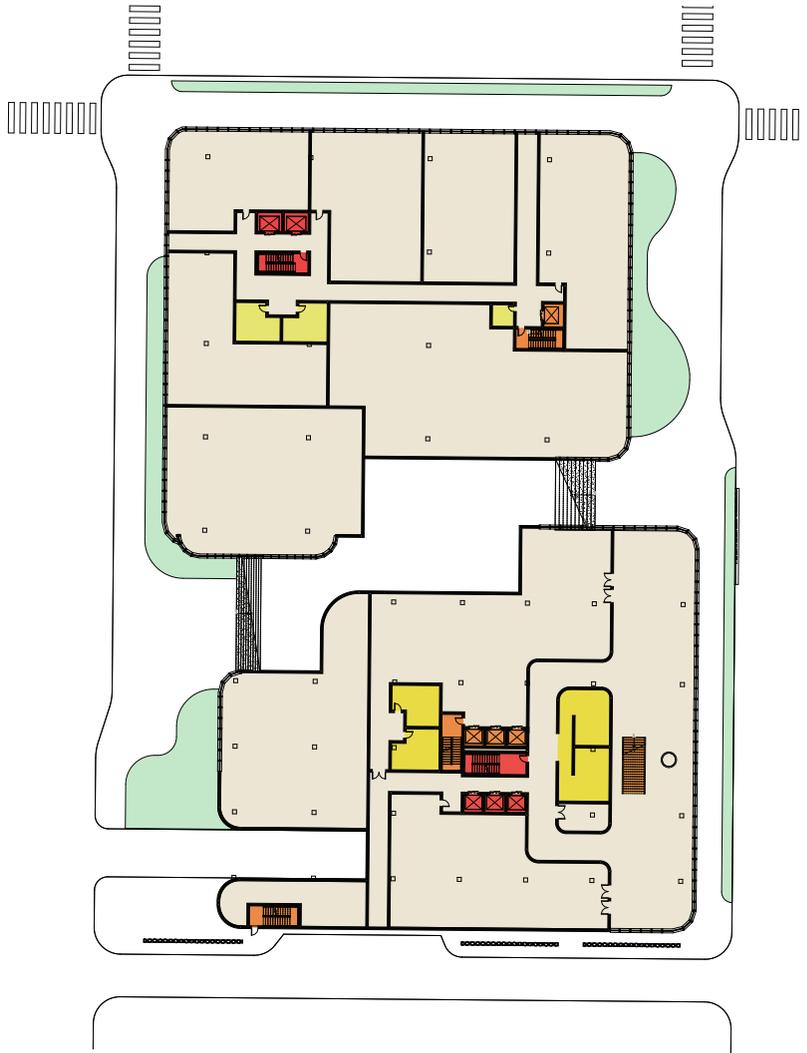


Figure 83

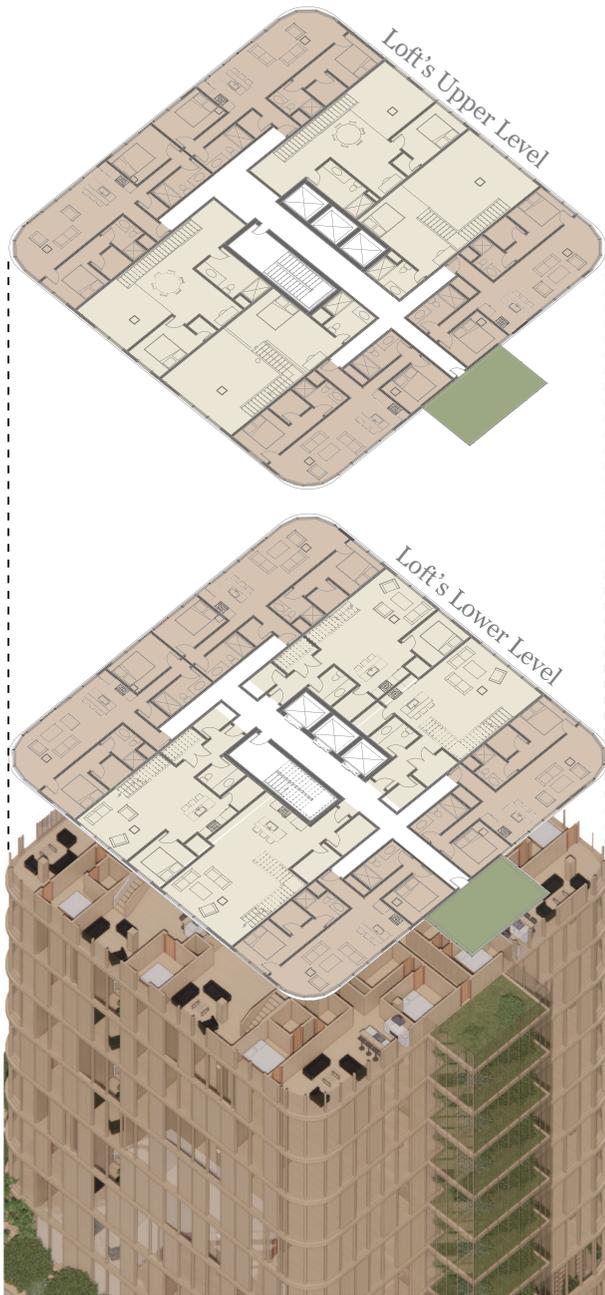
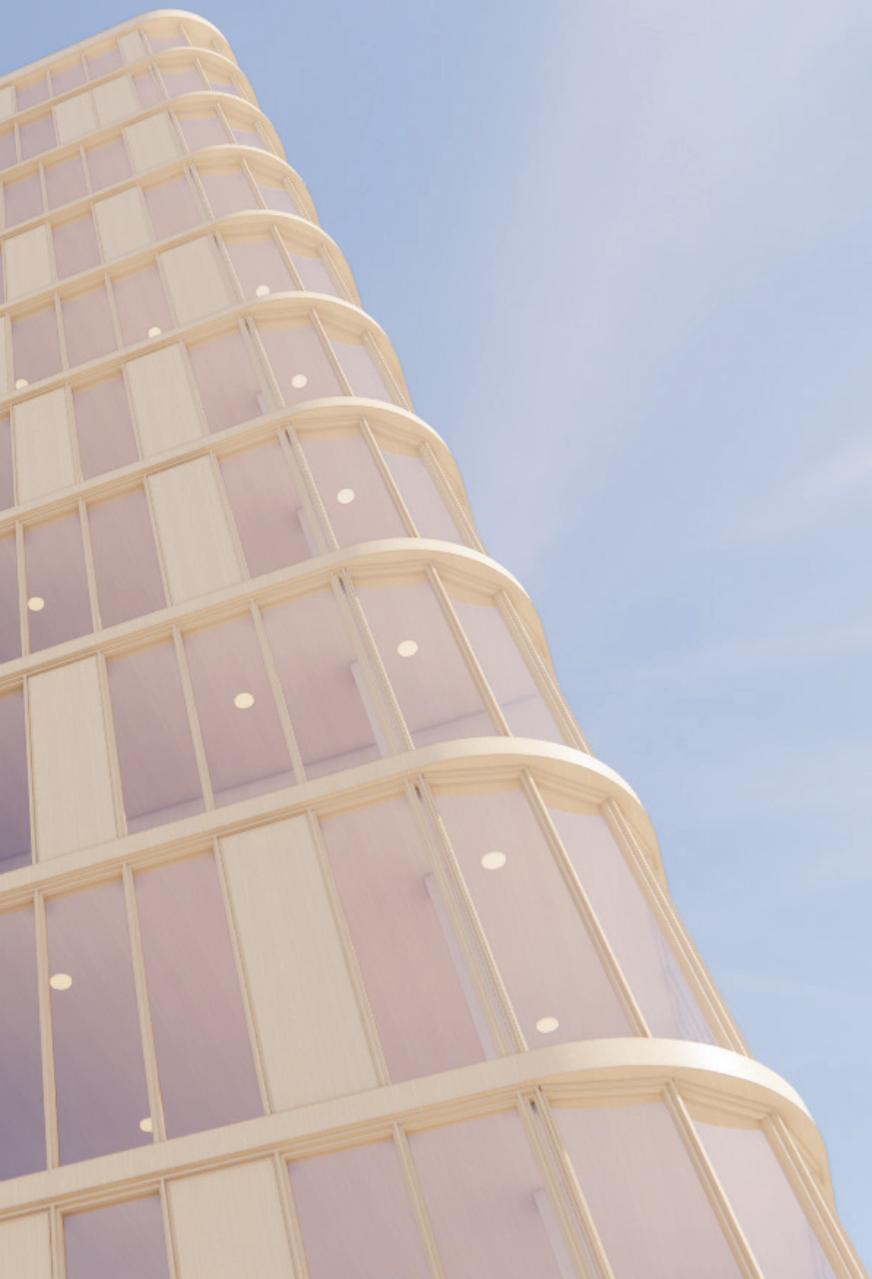


Figure 84



Figure 85





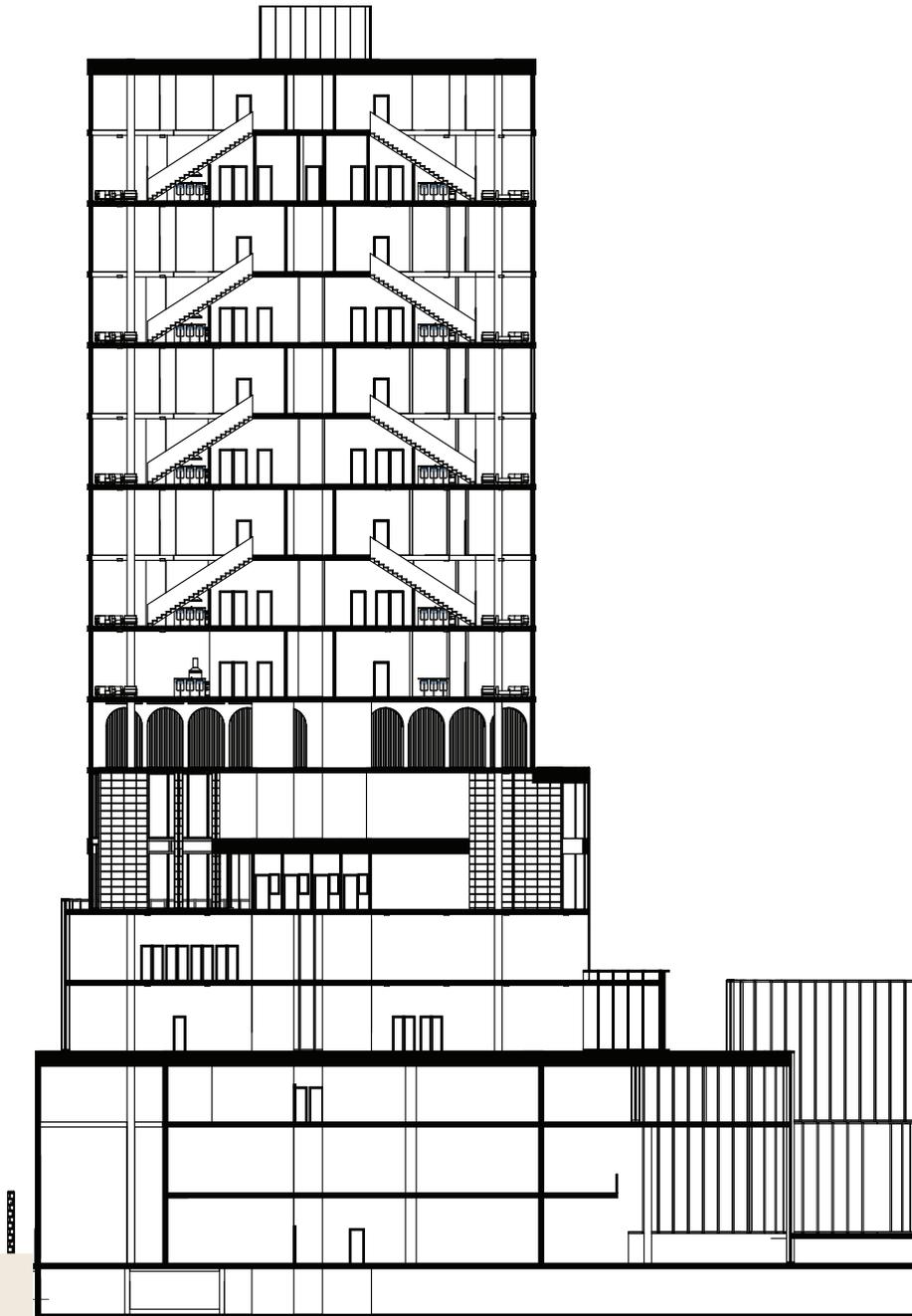
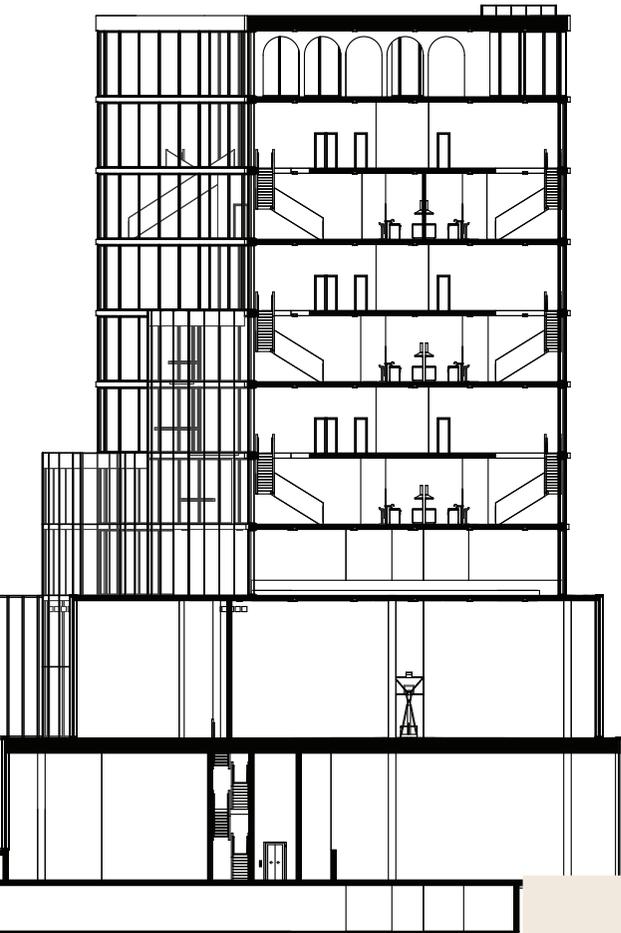
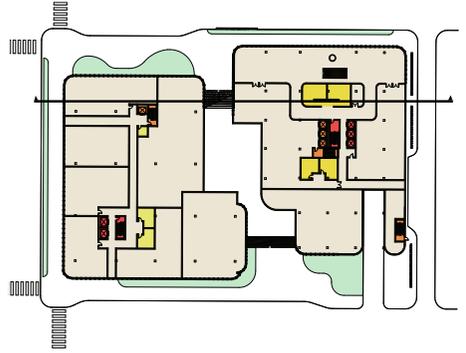


Figure 87





South West Elevation

Figure 88



South East Elevation

Figure 89



North East Elevation

Figure 90



North West Elevation

Figure 91













CON

MINIMALISM V2

MINIMALISM V2

THE WORLD OF ART

STORAGE

MINIMALISM V2

THE WORLD OF ART

MINIMALISM V2

THE WORLD OF ART

STORAGE

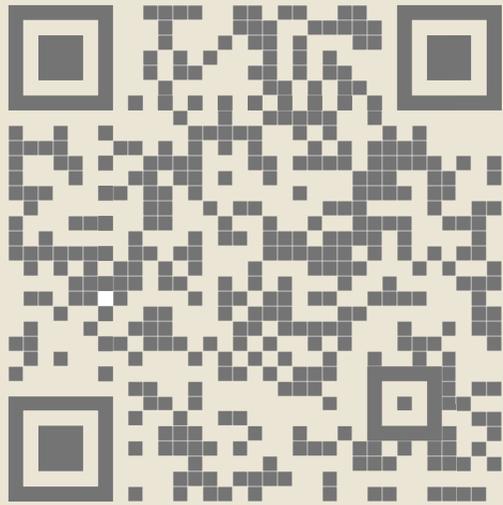
STORAGE



# LIVING LIGHTLY ON EARTH: THE URBAN ECO-VILLAGE







Watch Me!





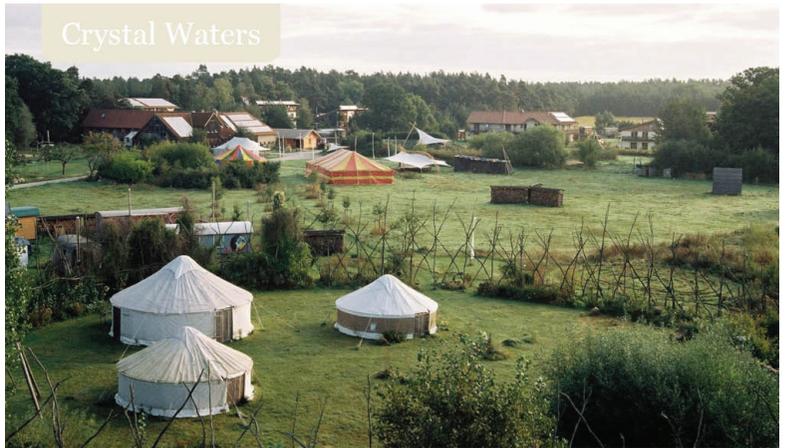
# Presentation Slides



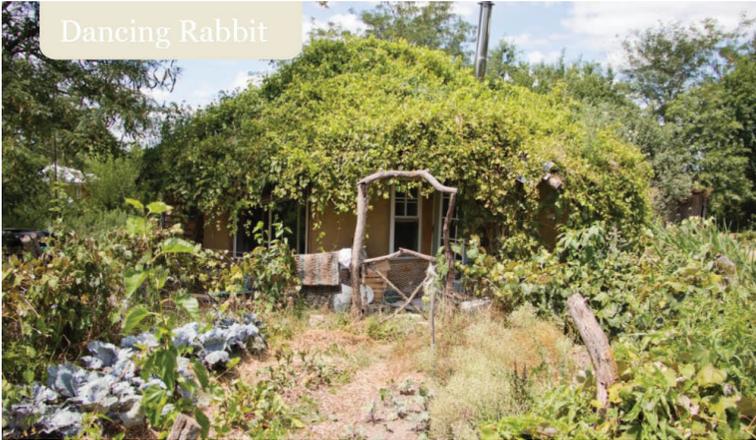
Living Lightly on Earth:  
The Urban Eco-Village



Imagine living a low-impact lifestyle surrounded by nature,  
food, freshwater and air, wildlife, and a community with a  
common desire...



## Dancing Rabbit



Organic Permaculture  
Gardening  
Alternative Energy  
Self Governance  
Guidelines



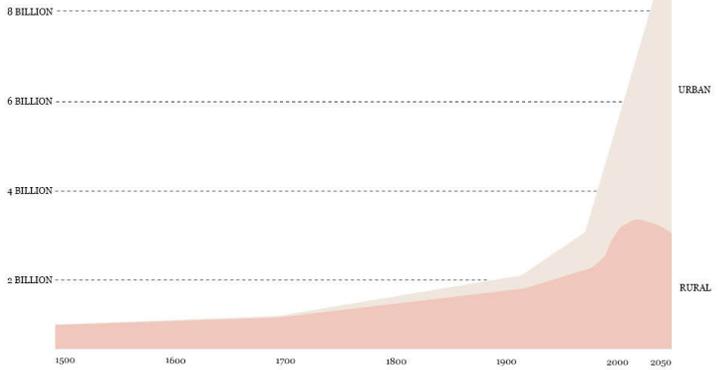
## RenGen Villages



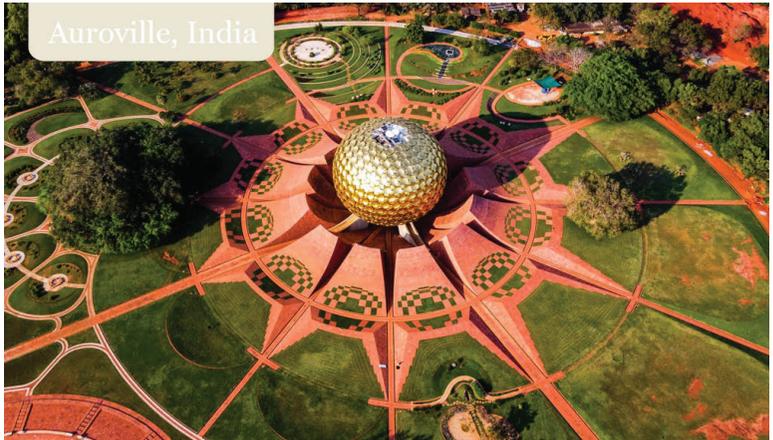
Energy Power Homes  
Waste-to-Resource System  
Passive and Cooling Systems



## URBAN & RURAL POPULATION PROJECTION



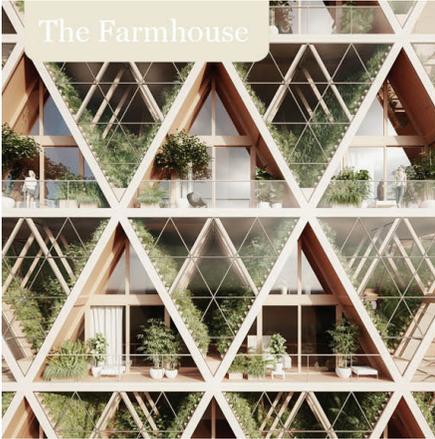
## Auroville, India



Art & Culture Facilities  
Education Facilities  
Environmental Regeneration  
Innovative Building Technologies  
Organic Farming  
Renewable Energy



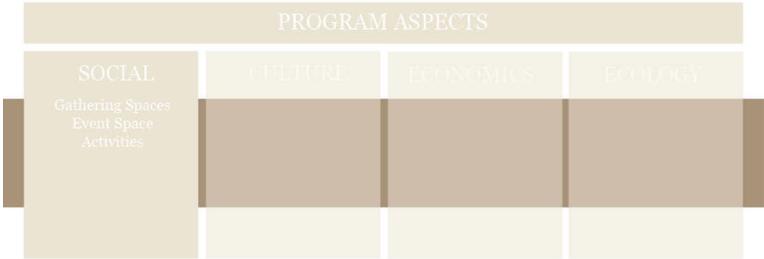
## The Farmhouse



Low-Cost Materials  
Modular Building System  
Interior Gardening & Farming



Overall Goal:  
To promote the social, cultural, economical,  
and ecological values and goals of the  
common Eco-Village in an urban setting to  
expand positive lifestyles.



PROGRAM ASPECTS			
SOCIAL	CULTURE	ECONOMICS	ECOLOGY
Gathering Spaces Event Space Activities	Education Art Music Diversity Food		

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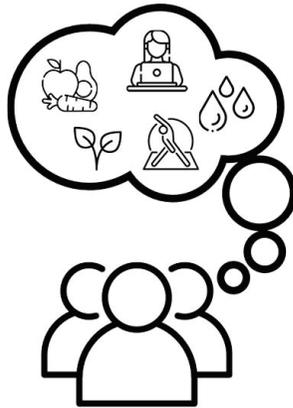
PROGRAM OVERVIEW			
SOCIAL	CULTURE	ECONOMICS	ECOLOGY
Restaurants Ballroom Wellness Center Retail Library Collaboration Spaces			

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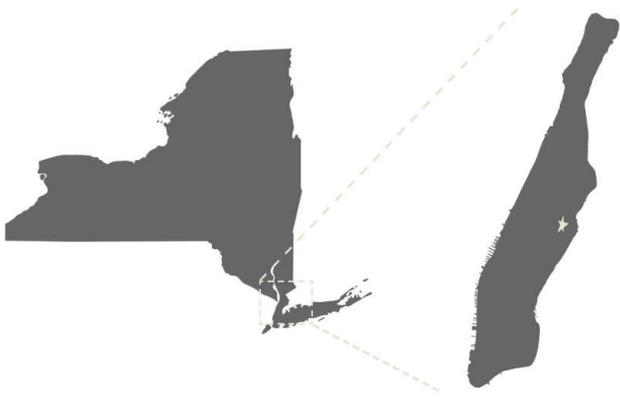
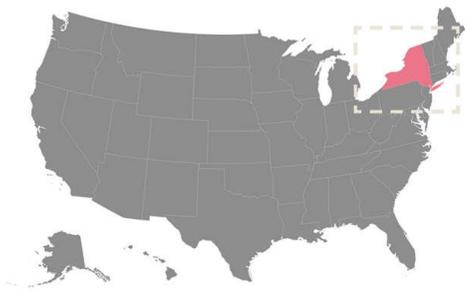
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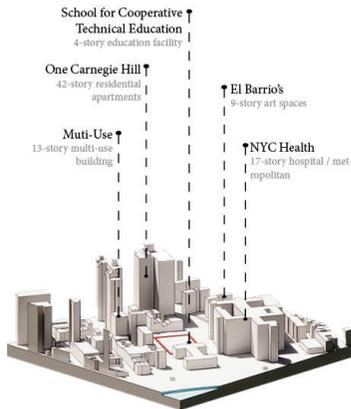


## DESIGN PROCESS

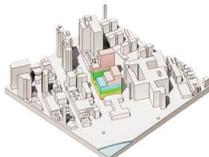


Site





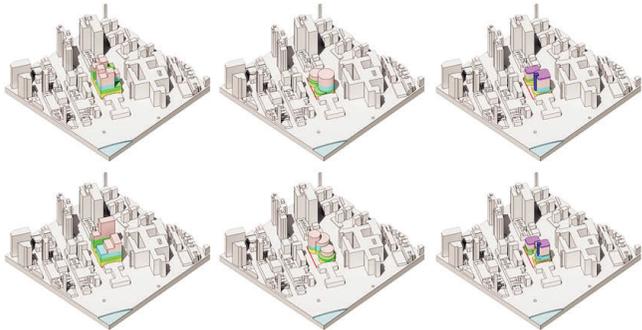
## Process Diagrams



## Process Diagrams



## Process Diagrams



## Materials





# DESIGN SOLUTION

Eudaimonia Village



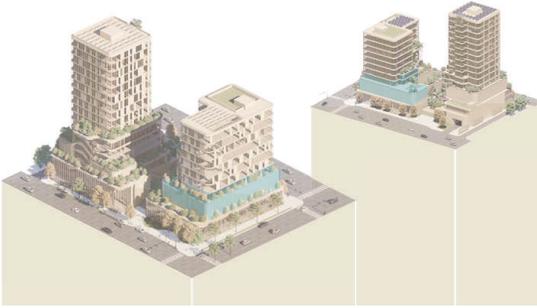
# Program



● Retail, Market & Lobby

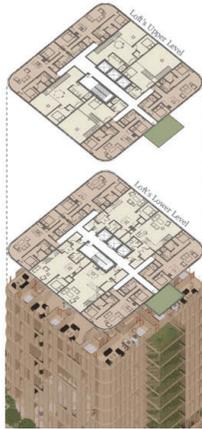


Wellness



Residential Lofts





● Food & Gathering



● Education & Culture



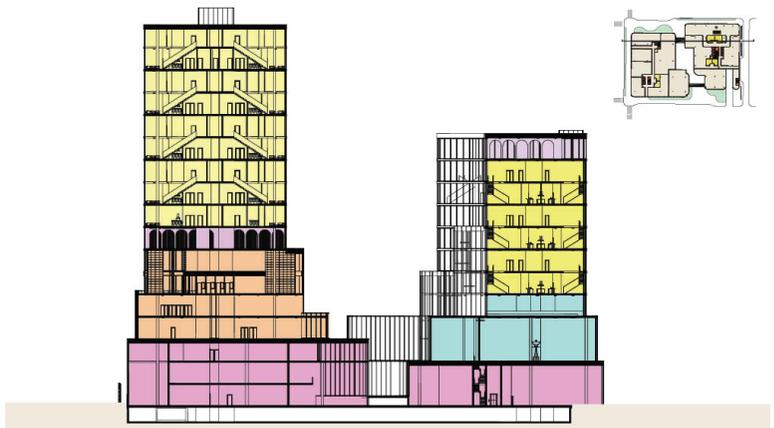
● Parking



Vertical Farming & Green Roofs



Vertical Egress



Site and Environment | Sustainability

On-site Renewable Energy

Renewable energy is captured from photovoltaic panels on the roof and wind turbine walls.

Electric Vehicle Charging

Electric vehicle charging stations are located on site for resident and visitor use.

Nature Planting

The abundance of nature planting on 1 for air filtration is a pollution prevention strategy for visitors, requires less water and reduces water bills.

Bicycle Parks

On-site locker & services racks to increase parking capacity and space as well as promote healthier lifestyles.

Renewable Materials

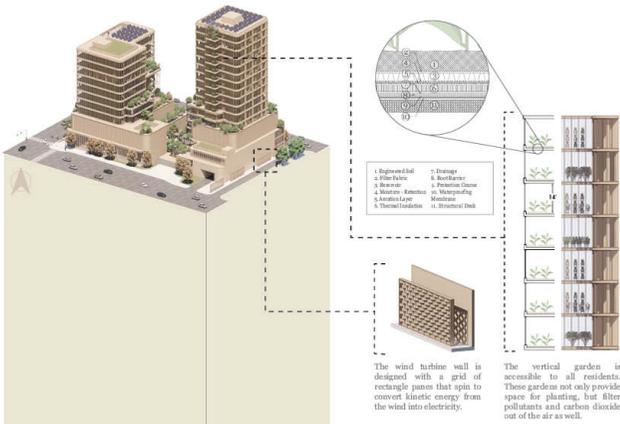
On-site use of a harvested material from FSC-certified forests which allow for an increase in absorption of carbon dioxide in the atmosphere from reducing the structure's overall carbon footprint.

Solar Shading

Vertical louvers help control ambient conditions, reduce heat gain, and maintain heating/cooling and cooling needs.

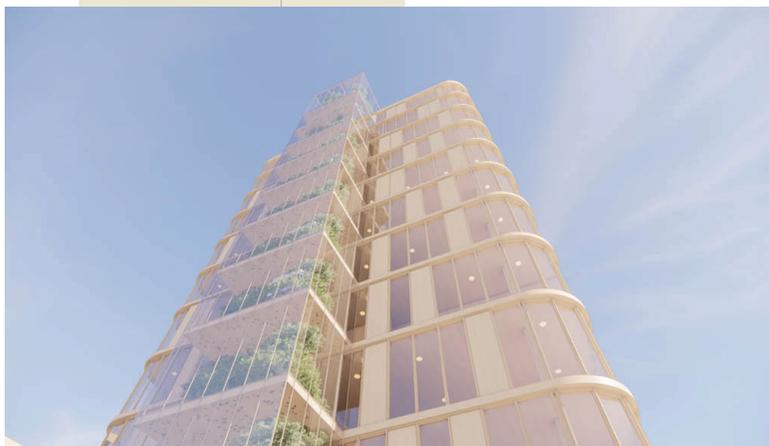
Smart Grid

On-site program to use, track & increase power use related changes, decrease security and downtime, and increase health strength.



The wind turbine wall is designed with a grid of rectangle panels that spin to convert kinetic energy from the wind into electricity.

The vertical garden is accessible to all residents. These gardens not only provide space for planting, but filter pollutants and carbon dioxide out of the air as well.





SUSTAINABLE GOALS



ECOLOGY

SUSTAINABLE GOALS





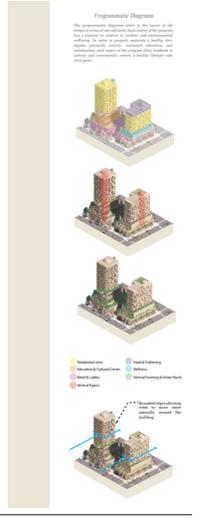
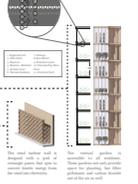
**Endlessville Village**

Endlessville Village is a sustainable, mixed-use development designed to create a vibrant, walkable community. The project features a mix of residential, commercial, and recreational spaces, all integrated into a green, pedestrian-friendly environment. The design emphasizes natural light, fresh air, and a sense of community, with shared spaces and greenery throughout the development.

With smart living, a central amenity space, and a mix of residential options, Endlessville Village offers a modern lifestyle. The development includes a mix of housing types, from studio and one-bedroom units to two and three-bedroom apartments. The design also incorporates a central amenity space with a library, community room, and outdoor lounge area, providing residents with a sense of community and shared living.



- Site and Environment | Sustainability**
- On-Site Renewable Energy:** The development will feature solar panels on the roof and solar water heating systems for hot water and space heating.
  - Electric Vehicle Charging:** The development will include electric vehicle charging stations for residents and visitors.
  - Water Recycling:** The development will feature a water recycling system to reduce water consumption and increase sustainability.
  - Green Roofs:** The development will feature green roofs on several buildings to reduce heat island effect and improve air quality.
  - Energy Efficient Building:** The development will feature energy-efficient building design, including high-performance windows, insulation, and lighting.
  - Water Efficient Building:** The development will feature water-efficient building design, including low-flow faucets, showerheads, and toilets.
  - Green Building:** The development will feature green building design, including a mix of green spaces, trees, and landscaping.
  - Walkability:** The development will feature a walkable design, including sidewalks, crosswalks, and bike lanes.



# Appendix: Reference List.

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