COLUMBIA GSAPP

PORTFOLIO

2019-2020

LUYI HUANG

LIVE BOUNDARY

Project: Mixed-Used& Public Stairs

Location: Washington, D.C

Professor: Nerea Calvillo Gonzalez

Year: SUMMER 2019

Team: Luyi Huang and Xinglu Zhu

EAST RIVER PARKS

Growth of Manhattan Isaland

The city extension lines evoking the flooding line.

Growth of Manhattan Island 1650-1980 Source: Rebuilt by Design

Manhattan Extension 1660 & 1880

Manhattan 1660

The original shoreline

The Land of East River Park Exited in 1660 yet!

1660 Mahattan Map Source: Rebuilt by Design

Manhattan 1880

First Landfill with ***Garbage***

The Land of East River Park Exited in 1880 yet!

1880 Prespetive Mahattan Source: Rebuilt by Design

Manhattan 1930

Second Landfill with ***Toxic British Rubble (From WWII)***

Constructing East River Park

1930 Prespetive Mahattan Source: Rebuilt by Design

The Construction's History & Future

1939- The construction of East River Drive had been strated.

1939 FDR DR- Recording the construction. Source: New York Times

Construction Processs Record

1940 **2010**

1939- The construction of East River Drive had been strated.

East River Park Source: WXY Studio

History Extension Direction (Horizontal)

VS.

Future Extension Deirection (Vertical)

Future Plan - *Bury the Park!*

The Shoreline of East River Park

The latest plan calls for burying the park under landfill to act as a bulwark against flooding Source: New York Times

The city's latest plan to protect from future flooding called for burying the park under eight to 10 feet of landfill, and starting over. This was not the original plan, and that's what had locals upset.

The new plan will also create a temporary ecological desert for hundreds of species migrating the Atlantic Flyway. Buried, too, will be the running track field house with its sea monster tiles and the track itself (just refurbished for nearly $3 million).

Future Proposal

East River Park's resiliency project at East Houston Street. Source: New York Times

1. Hanania, Joseph. "To Save East River Park, the City Intends to Bury It." The New York Times. The New York Times, January 18, 2019. https://www.nytimes.com/2019/01/18/nyregion/to-save-east-river-park-the-city-intends-to-bury-it.html.

EAST RIVER PARKS

Soil PH

7 8

Extreme acidity | Strong acidity | Acidity | Neutral | Alkaline | Strong Alkaline | Extreme Alkaline

PH Range

4.5 5.5 6.5 7.0 7.5 8.5 9.5

PH Range of Soil (Before)

5.5 7.5

PH Range of Soil (After)

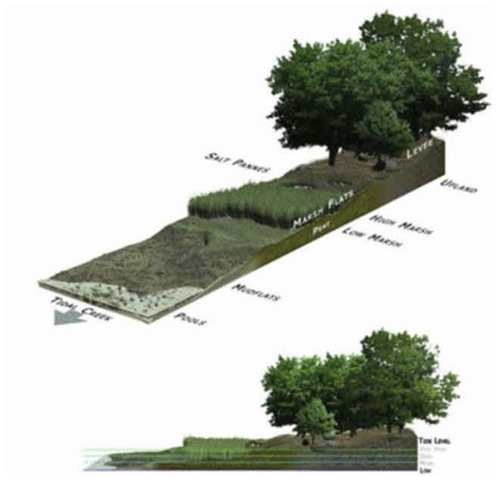
6.5 8.5

	Azalea	Crocus	Flowering dogwood	Hawthorn	Marsh Margold	Pansy	Hydrangea	Grape hyacinth	Butterfly bush	Sage	Rose	Hollyhock
PH	4.5-6.0	5.5-6.5	6.0-7.0	6.0-7.0	6.5-7.5	6.5-7.0	5.5-8.0	6.5-7.5	6.5-7.5	7.0-7.5	6.5-8.0	6.5-8.0
Sunlight	·Live under shadow	·Live in sunny position	·Good morning sun&afternoon shadow ·Mild sunlight, not too strong	·Be fond of cool condition	·Prefer mild sunlight	·Prefer mild sunlight ·No shadaw, no strong sunlight (10-20°C)	·Short daylight period ·18-28°C & 60%-70% shadow	·Short daylight period ·18-28°C & 60%-70% shadow	·Like sunny or half-shadow environment ·15-30°C	·Like sunny and warm and well-ventilated sunny and warm environment	·Like sunny and warm and well-ventilated sunny environment	·Like sunny or half-shadowed environment
Soil Humidity	Well-drained	Well-drained	Moist Acidic	Moist Well-drained	Marshes Woodland Not brackish	Well-drained Oxygen-rich	Well-drained Sandy soil	Well-drained Sandy soil	Dry soil No flooding	Dry soil Well-drained	Low humidity Well-drained	Well-drained Sandy soil

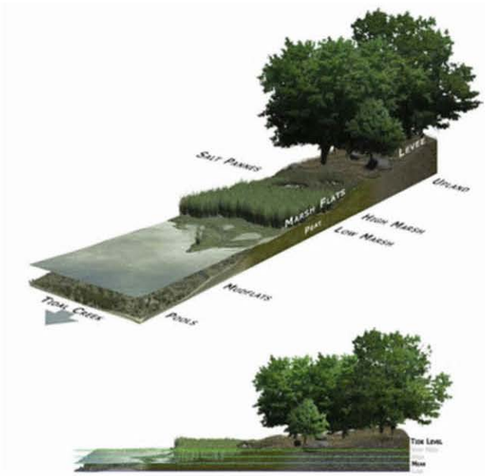
EAST RIVER PARKS

EAST RIVER PARKS

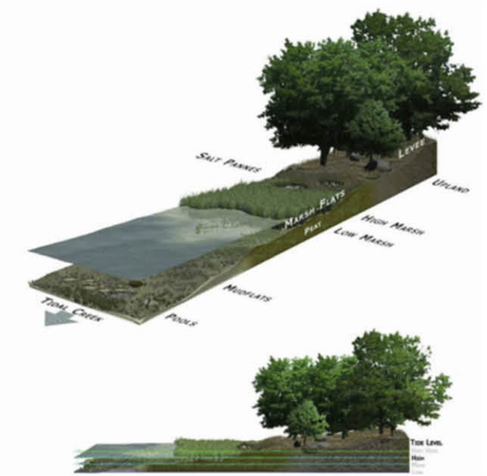
Marshes - *Species*



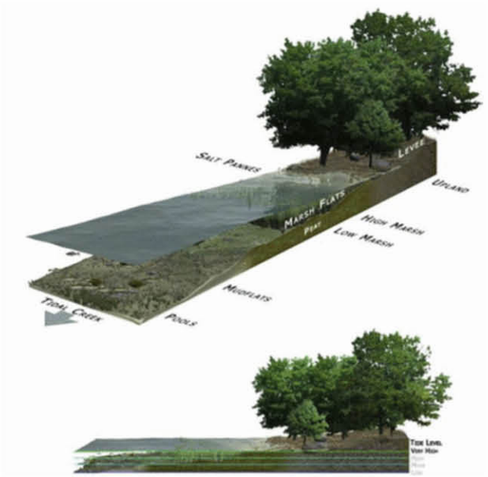
Low tide



Mean tide



High tide



Very high tide






Trees	Oak	Maple	Ginkgo Tree	Elm	Pine	Beech
PH	6.0-8.0	5.5-7.0	4.5-8.0	Wide range	5.0-8.0	Wide range
Sunlight	·Strong sunlight adaptability	·Like sunlight	·Like sunlight	·Like sunlight	·Like sunlight ·low tolerance of shadaw	·Like sunlight
Soil Humidity	·Can tolerant flooding	·Well-drained ·Fertile Soil	·Well-drained ·No brackish soil	·Well-drained ·No flooding situation	·Well-drained & fertile soil ·No brackish soil	





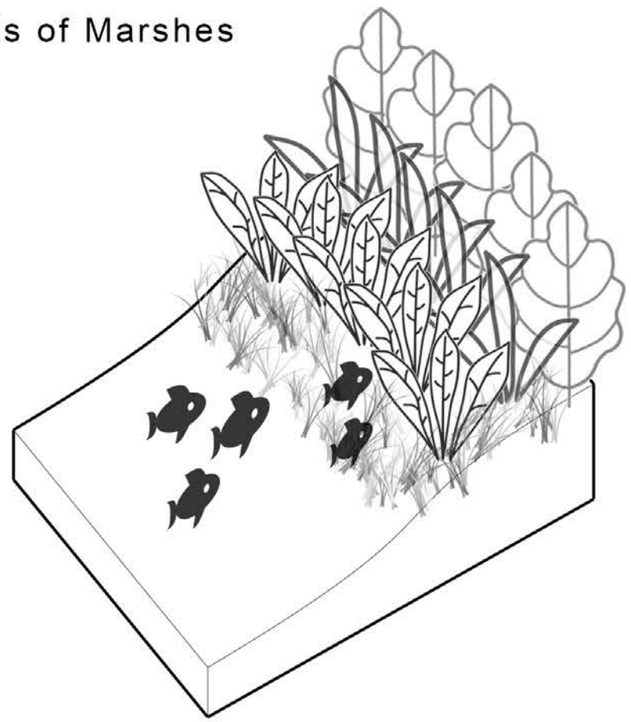
Halophyte	Juncus	Salicornia	Rhizophora	Toxicodendron	Tamarix
PH	Marsh shrubs	Marsh shrubs	Marsh shrubs	Marsh trees	Marsh trees
Sunlight	·Strong sunlight adaptability	·Strong sunlight adaptability	·Strong sunlight adaptability	·Strong sunlight adaptability	·Strong sunlight adaptability
Soil	· grow on saline soil	· grow on saline soil	· grow on saline soil	· grow on saline soil	· grow on saline soil

Marsh - *The Practice of Artificial Marshes*

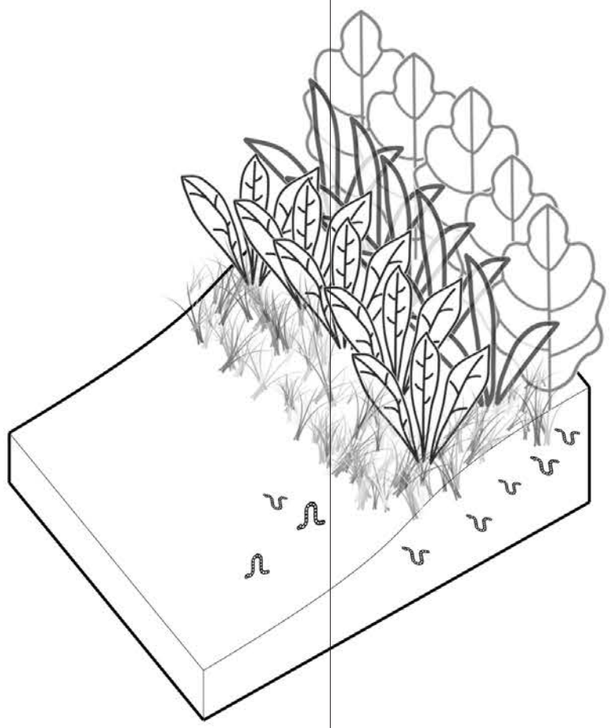
EAST RIVER PARKS

Plants Selection for Marshes based on pollutant-removing capacity

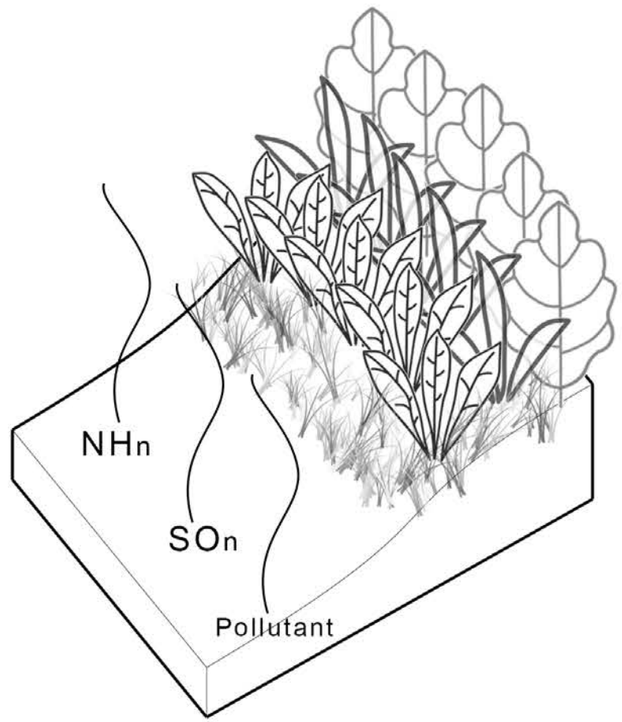
Effects of Marshes



Accomodate Fish



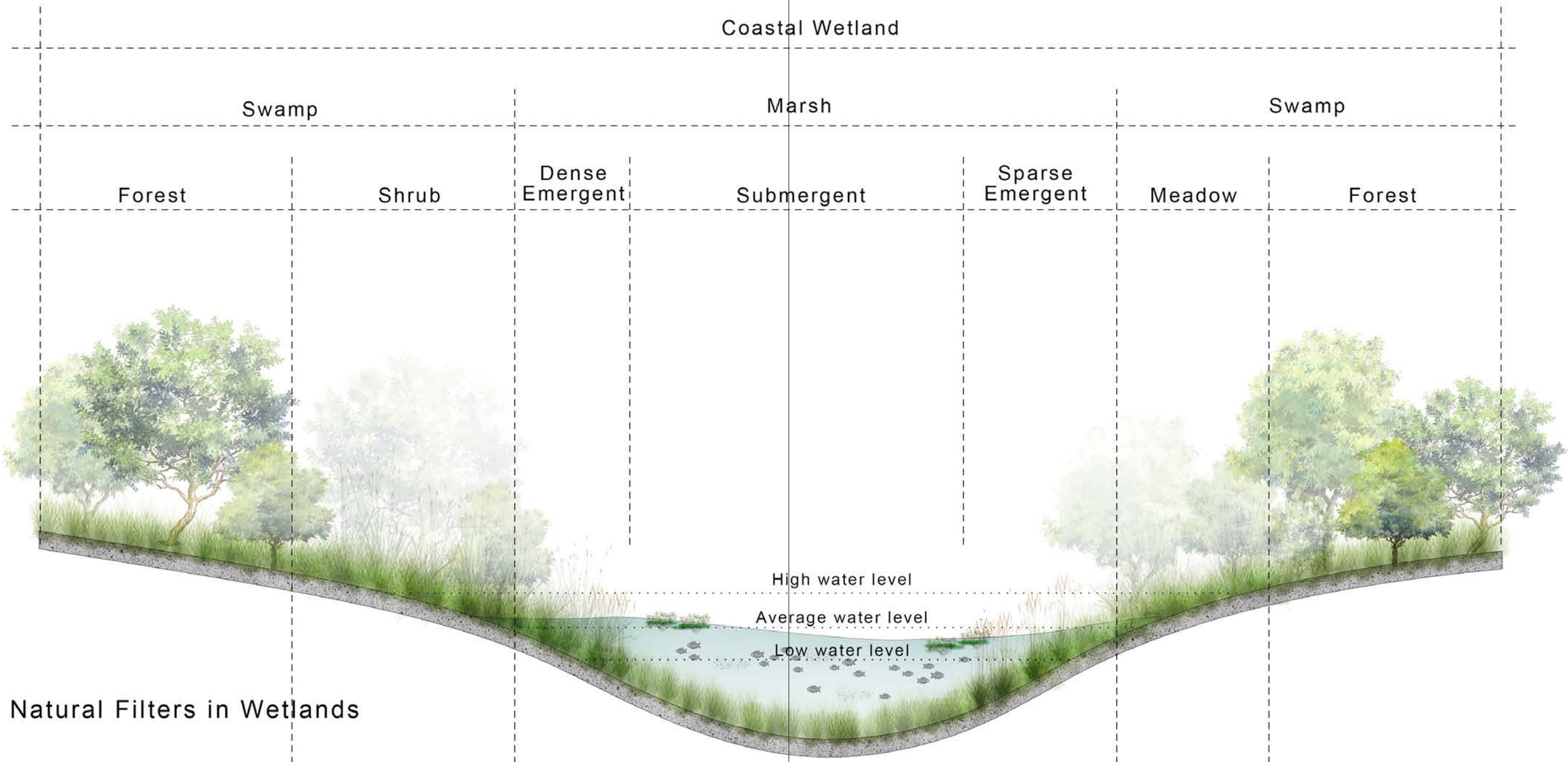
Privide Nutrition for microorganism



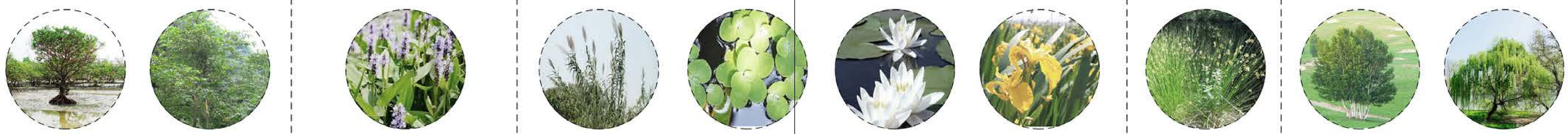
Improve soil Quality

Marsh - *Species*

Wetland Components



Natural Filters in Wetlands

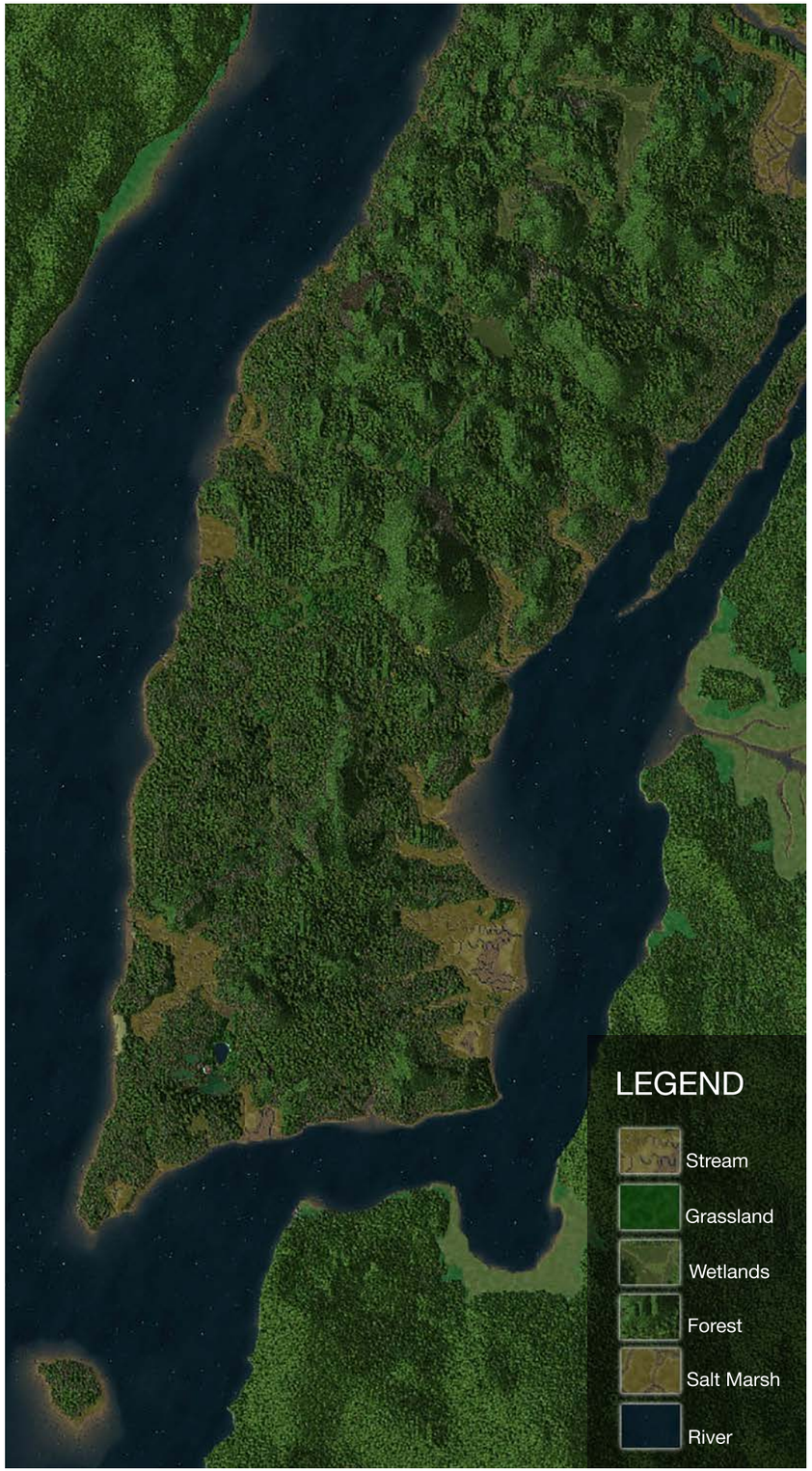


EAST RIVER PARKS

1600

Back to long time ago, in 1600, before the Europeans came to the land, Manhattan was surrounded by stream, grassland, wetlands, forest, salt marshland and fresh marshlands.

As history moved forward, British built up New York city. The natural environment disappeared grandly.



2019

New York has architecturally significant buildings in a wide range of styles spanning distinct historical and cultural periods. However, during the development proccess, New York the natural connetion with the ground and soil.

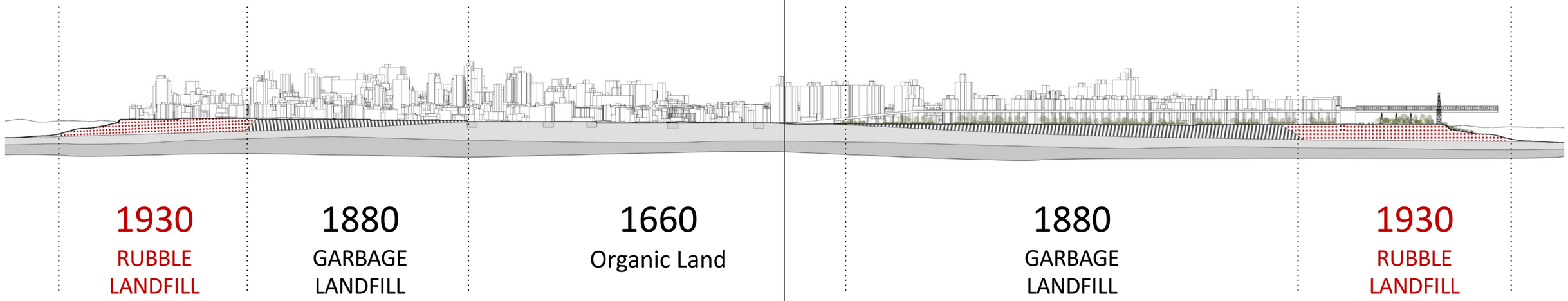
Manhattan Extension with Landfill

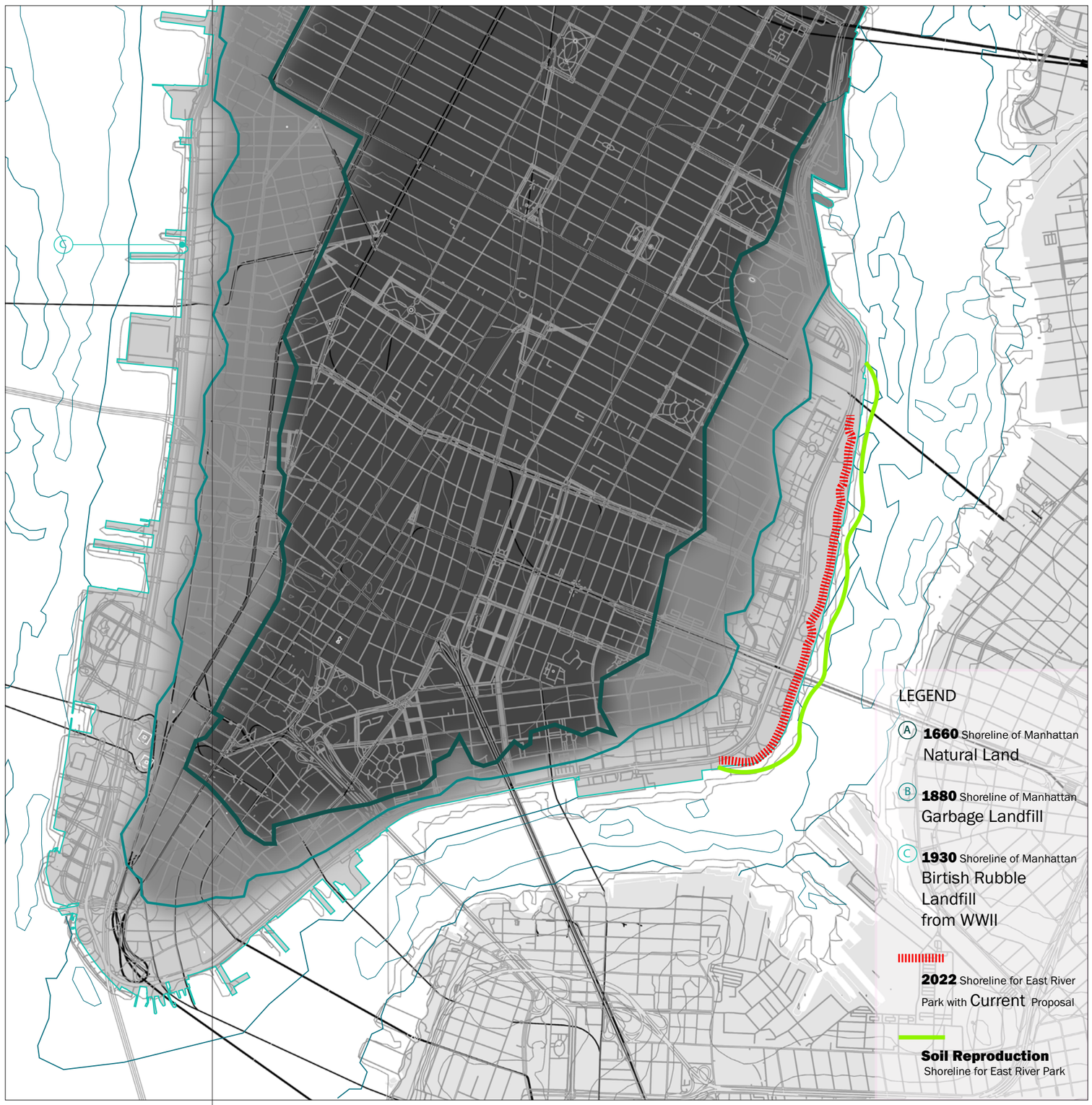
In 1600, before the Europeans came to the land, Manhattan was surrounded by marshlands. As history moved forward, British built up New York city.

1880
In the history, New York City has extended several time for urban development. The first time landfill has happened in 1880, and the material was garbage.

1930
Part of FDR Drive, which snakes up Manhattan's eastern profile, was actually built over rubble shipped over from wartime England—a fact first brought to our attention in 2007 by BLDGBLOG's Geoff Manaugh, who explained that rubble from bombed English cities were used as ballast for ships coming to America. As it turns out, most of the rubble actually came from Bristol, upon which German planes dropped thousands of bombs during World War II.

EAST RIVER PARKS





EAST RIVER PARKS

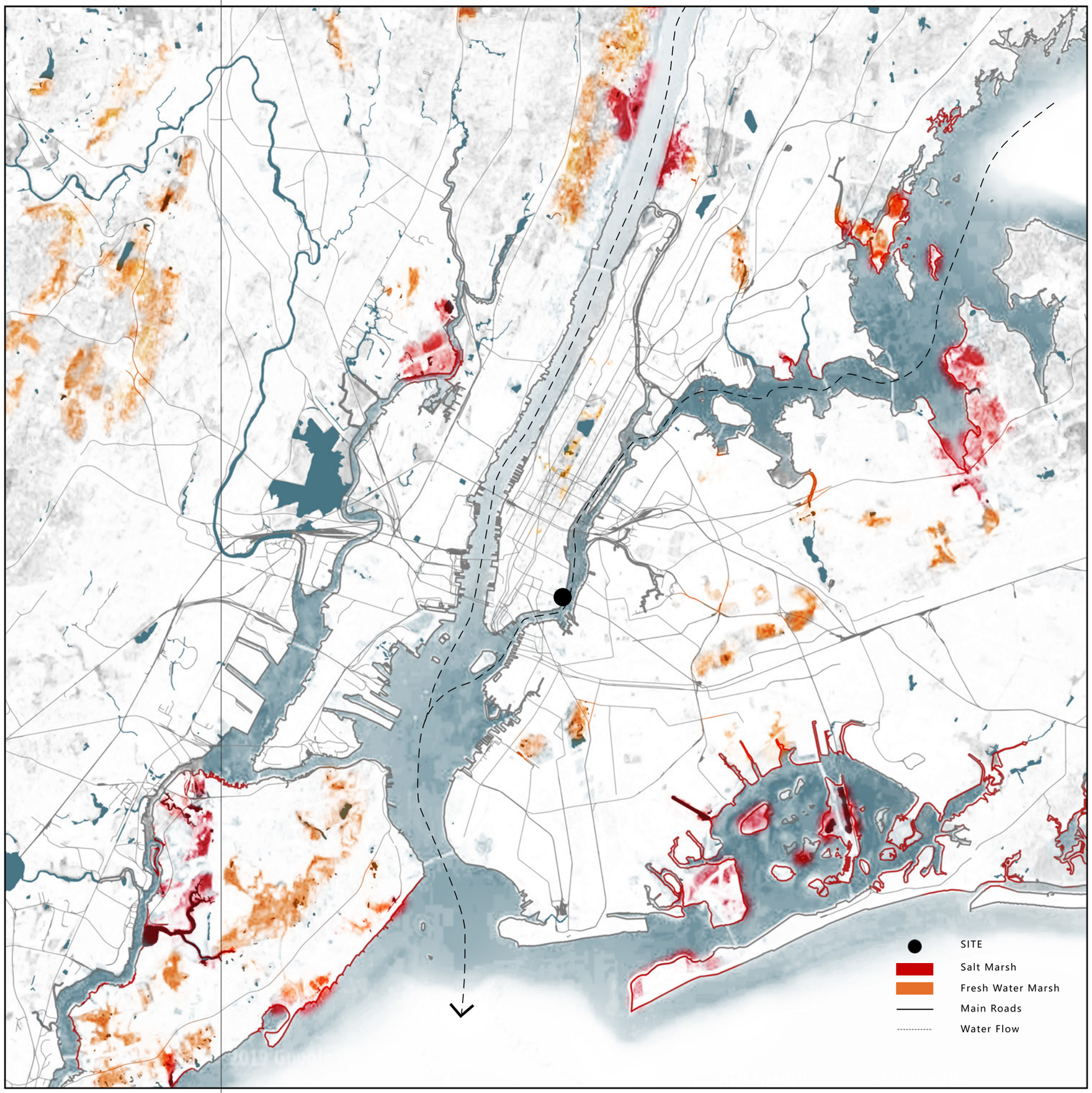
Trace back to the history, the whole Manhattan has kept being landfilled in the past 400 years, as you can see in this map. The material used for landfill under our site is the ruins from WWII Europe, so it has been polluted.

Due to sea level rising, the soil is gradually submerged by sea water. In that case, the soil can't drain well and the soil PH will go up because too much salt in the water will come into the soil and salinize the soil. Based on our research of the existing plants in our site, as a result, most of them are not gonna survive in this kind of situation, so as many animals such as squirrels, worms and microorganisms. After research, we found that marshland might be a fine opportunity to be developed here, because plants living in marshes can sustain high humidity and high salinity and marshes can help forming a healthy eco-system in this area as well

Due to sea level rising, the soil is gradually submerged by sea water. In that case, the soil can't drain well and the soil PH will go up because too much salt in the water will salinize the soil. Most of the existing plants in the East River park, as a result, will not survive, so as many animals such as squirrels, worms and microorganisms.

- Should we just let them die?
No.....we found that plants living in marshes can sustain high humidity and high salinity and marshes can also provide benefits such as improving soil and cleaning pollutants.

There are a still serveral marshlands around NYC, many of them along the coastline and defined as salt marshes. Which give us sound foundation of developing marshes here.



EAST RIVER PARKS

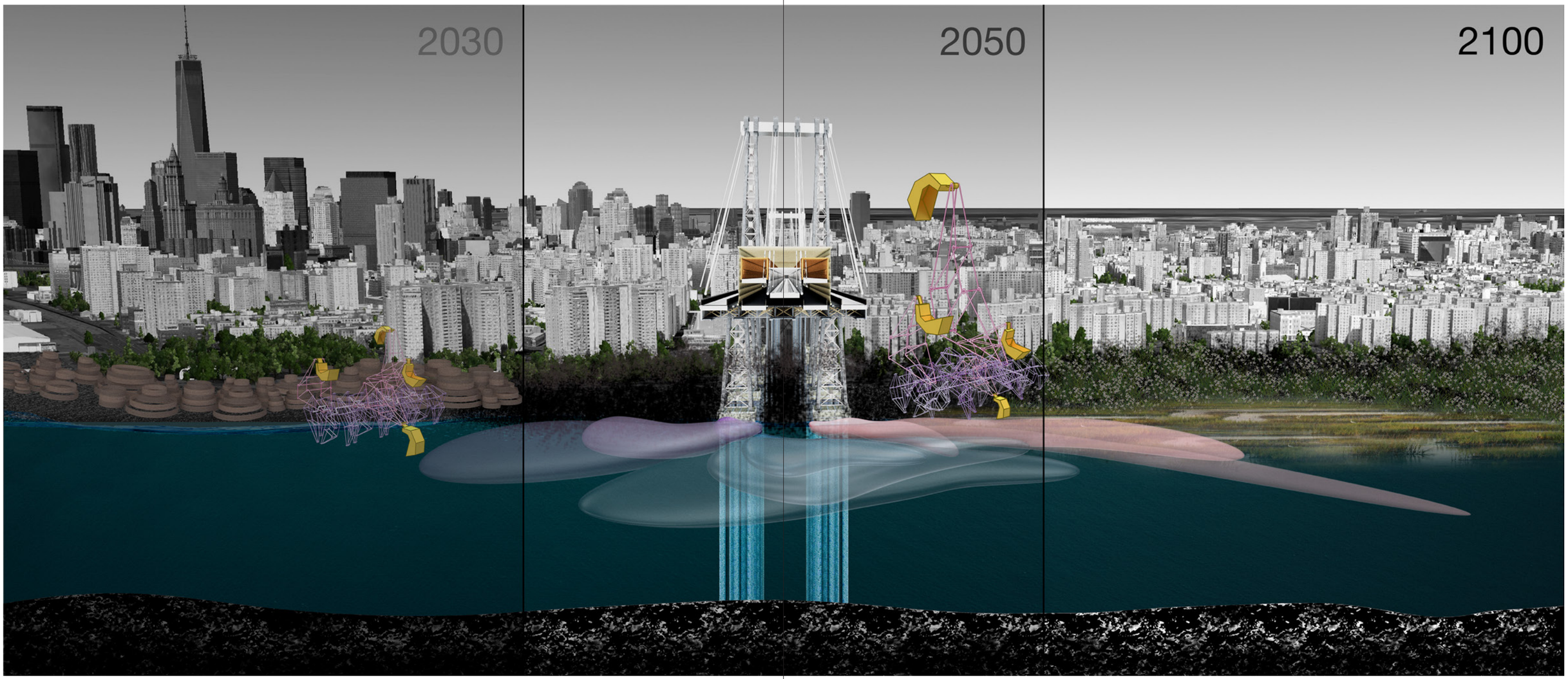
PROGRASS

- An inflatable infrastructure will be installed on the bridge's foundation, to reduce the river currents' speed and direct soil sedimentation. These inflatable devices are cheap compared to other infrastructures, because they are made of 1 % fabric and 99% air. And the assembly process could be finished within a couple hours. So compared to what has been proposed for the East River Park, which requires to close the park for 3 years, Our proposal will be much more beneficial to the neighborhood.

- "Collection device" is a moving infrastructure that transfers the sediments from river to the land. It performs like a crab, with big thongs and linear moving. And the foot of this shipping machine are very flexible, which permits to adapt to different topographic conditions.

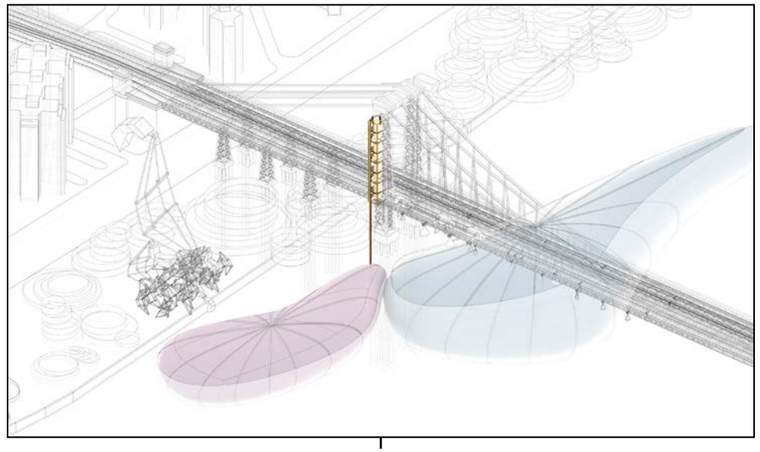
- The sediments are contained in wood rings, where they dry and reproduce as rich organic matter. The idea of the wowod rings comes from the surrounding community gardens. We would invite the East river park neighbors to join us in this project by constructing the rings and maintaining the soil. They could continue their community garden practices here, and get more gardening space once the mountains are created.

- A computer operated system, built under the bridge, will release different types of seeds according to the data from the sensors and environmental conditions.

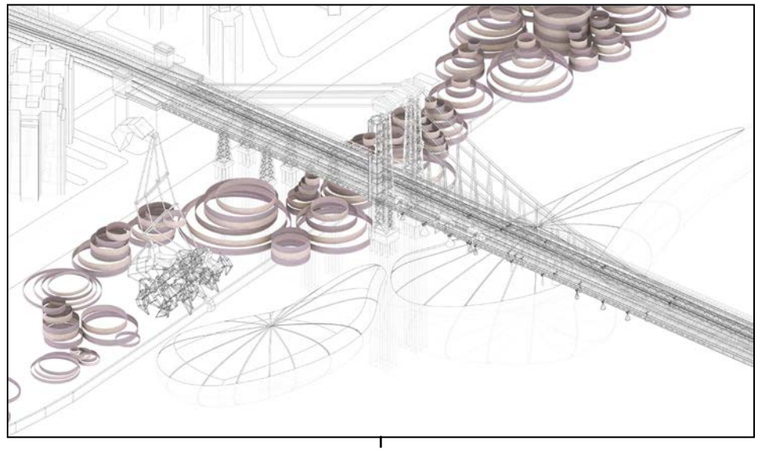


EAST RIVER PARKS

Inflatable Infrastructure



Wood Ring Container



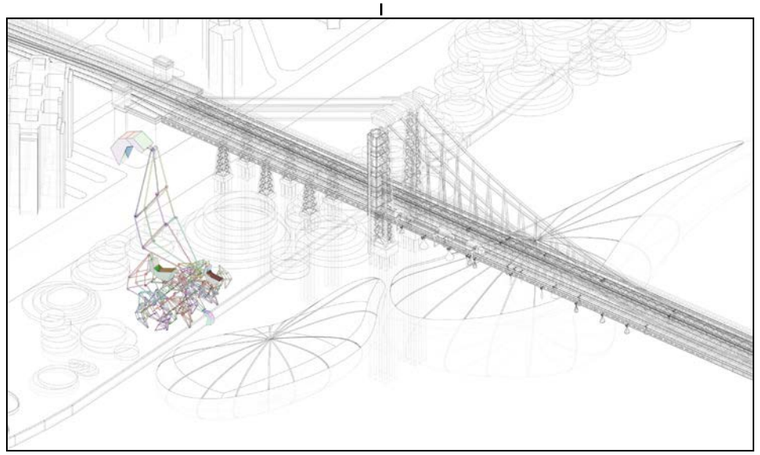
EAST RIVER PARKS

02

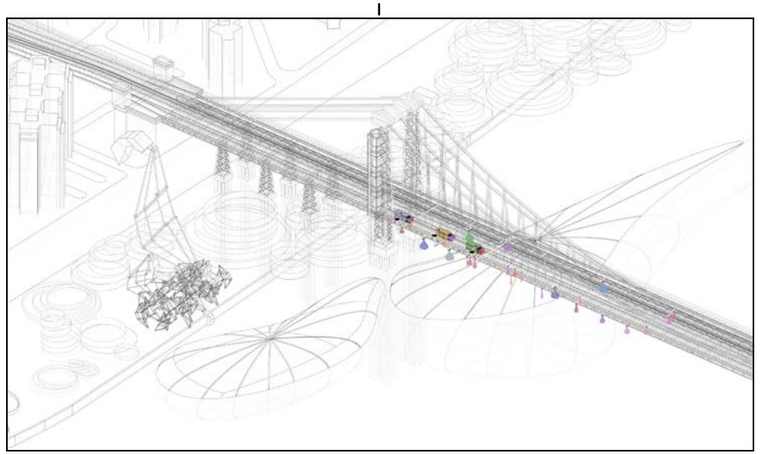
01

03

04

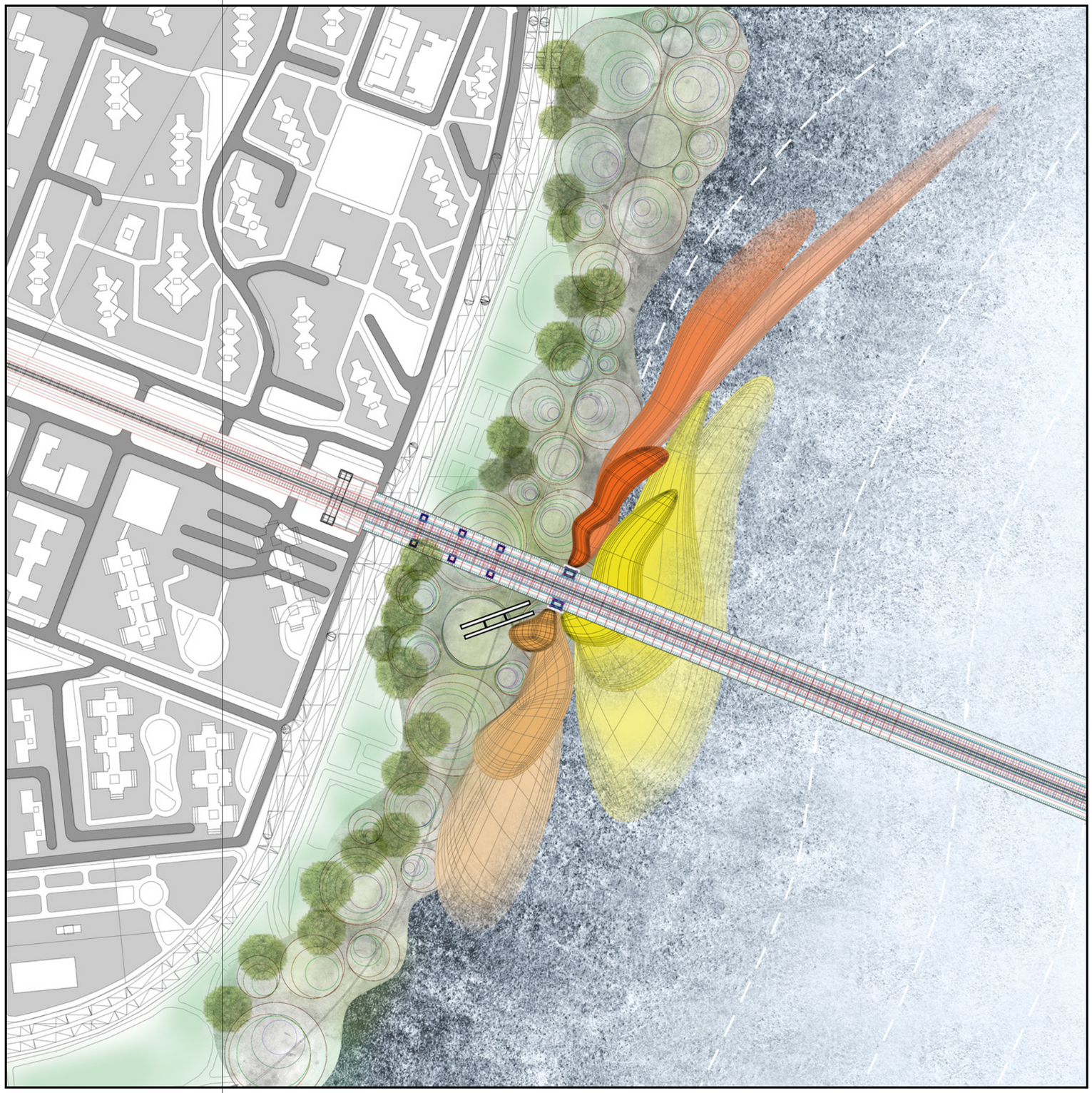


Collector Device



Seed Spread System

EAST RIVER PARKS



EAST RIVER PARKS

SITE PLAN

You might got a question that if we develop the site into a marshland, what about the plants and all living things that is now existing in our site? Should they just go away? Well we know that marshland is not a long term solution cuz sea level rising will not end up here. And we are not gonna always construct this kind of natural infrastructure to try to hold the city inside.

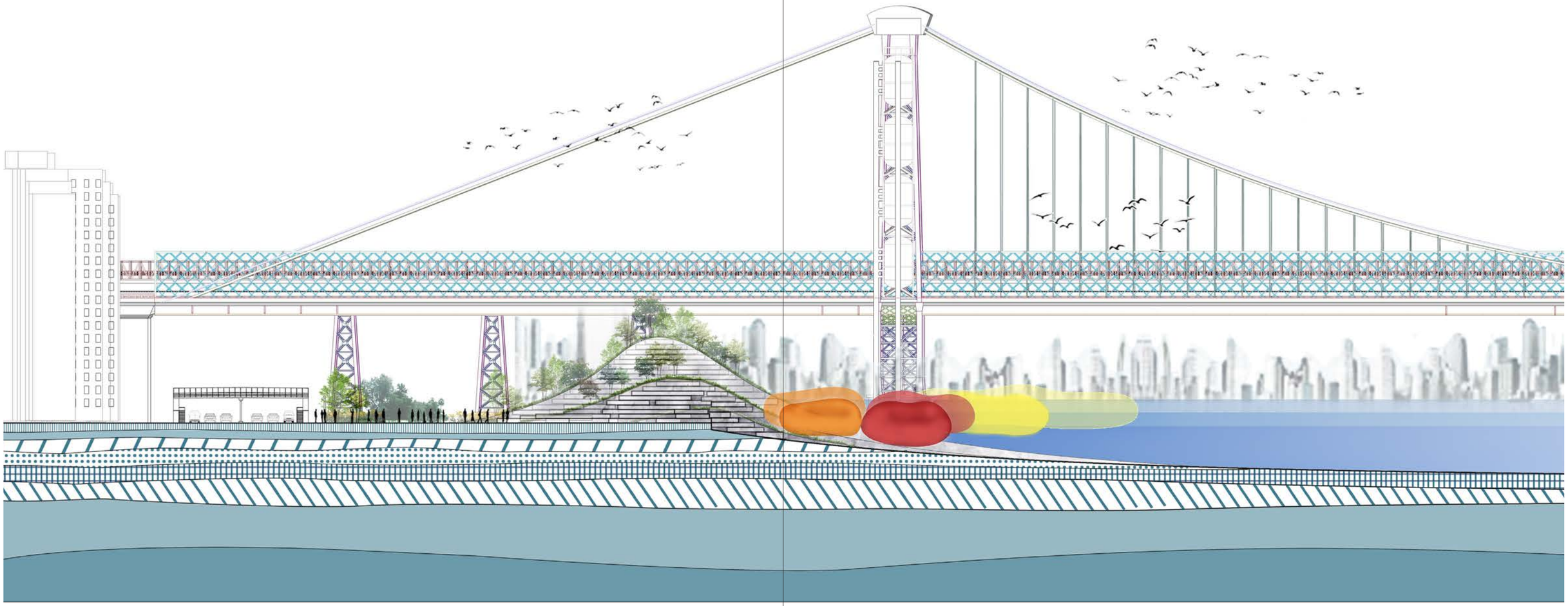
When the whole Manhattan is submerged by sea water, where can all living species that depend on soil go? So we are thinking why not see the process of sea level rising as a merging between the land and sea. Can we make a switch of the land being flashed by water to the land being surrounded by water? In this process, we construct a shelter for soil before it's submerged as well as creating the space for living plants, which is our third bubble system, moving them into the sea, kind of creating an underwater inland community, to shape an interaction between the sea and the land.

SITE SECTION

So, What to do with the East River Park? How to deal with a site made of overlayered toxic soil and sea level rise?
We started to wonder: what is the land? what is the soil? what could be a better connection between land and water?

-Instead of building the wall, we are continuing the history of site.

This project is about continuing adding layers of soil, collected as sediment from the river, until a marshland is created, hacking Williamsburg bridge in order to operate the shoreline.



EAST RIVER PARKS

COMMUNITY GARDEN

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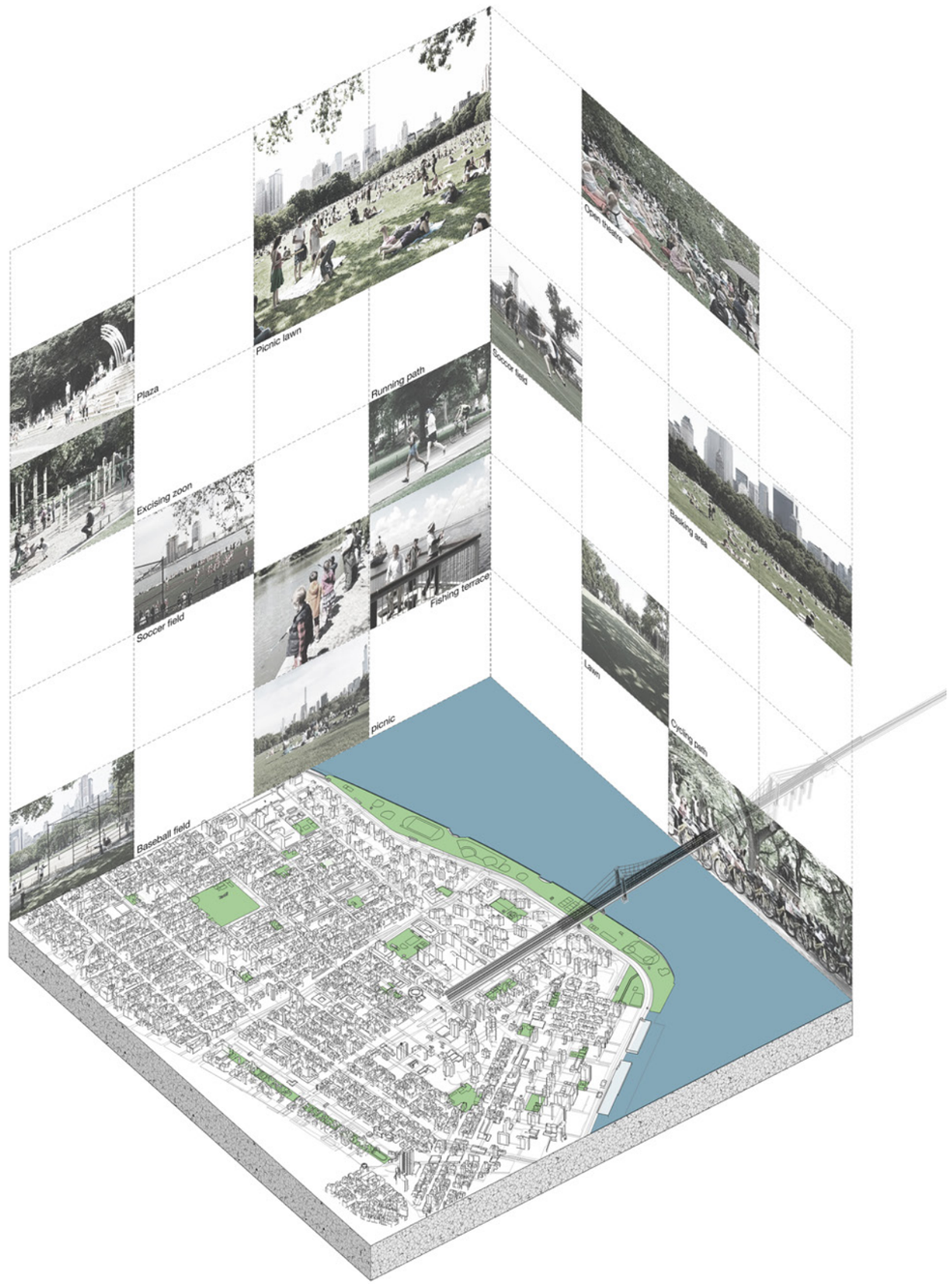

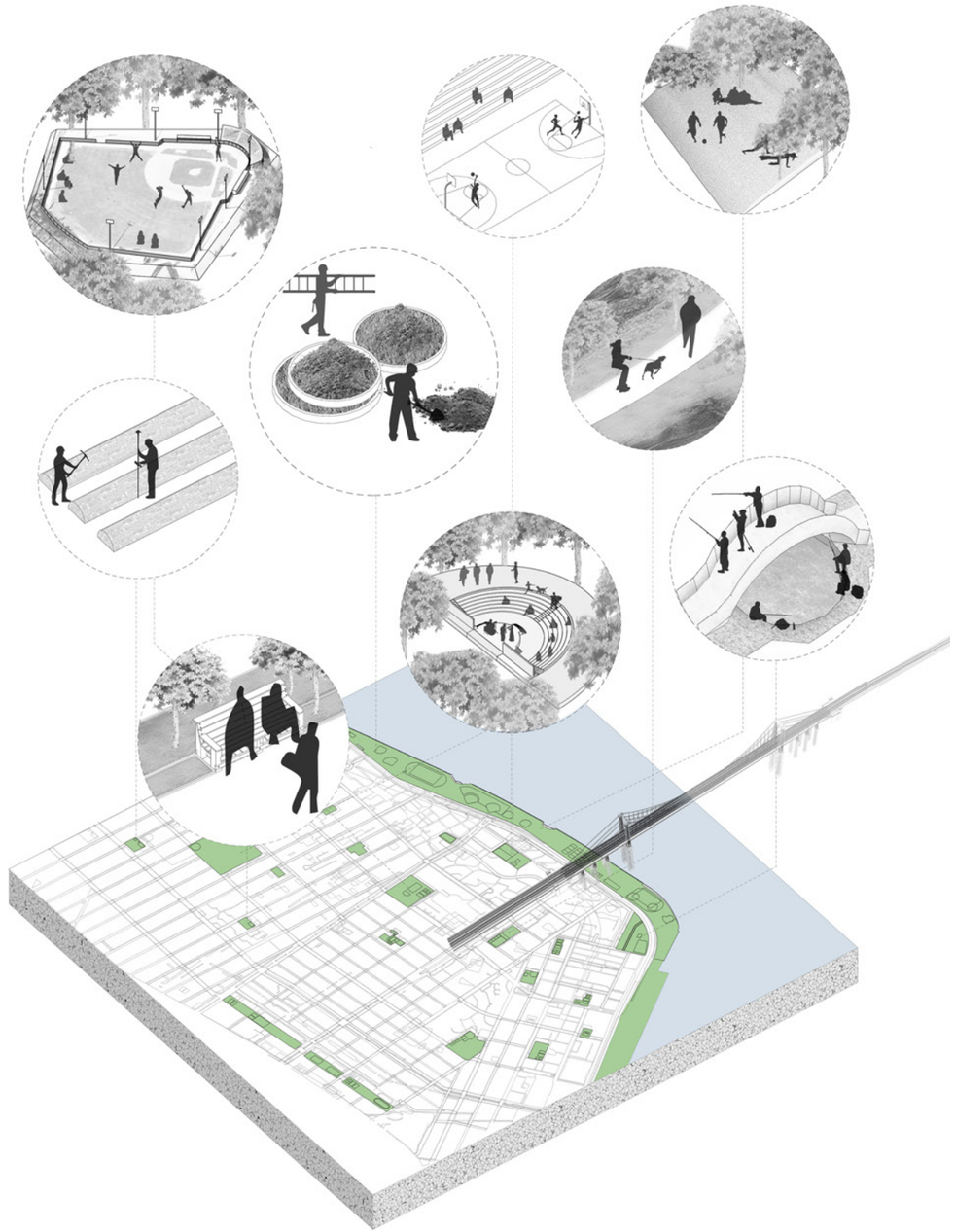

HUMAN ACTIVITY

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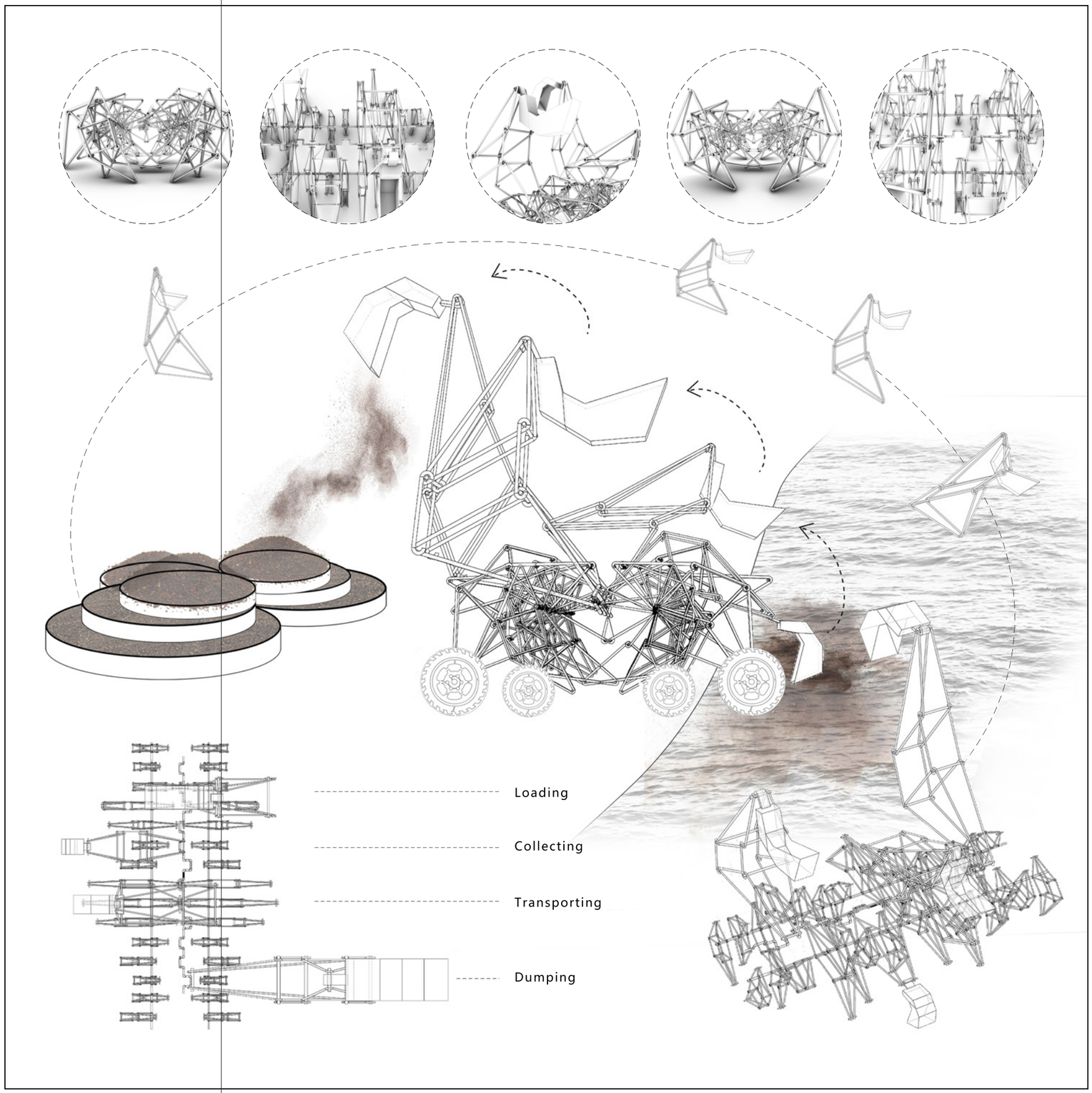
COLLECTOR DEVICE

Ir is a moving infrastructure that transfers the sediments from river to the land. It performs like a crab, with big thongs and linear moving. And the foot of this shipping machine are very flexible, which permits to adapt to different topographic conditions.

The duty of collector device is about shippint the sediment next to those inflatable instrusture to the land. And since the wet senser has been installed on the feet of the collector device, therefore the machine will return back to the ground once the water getting over the machine more than 50% which could protected the collector device from damaging inside the water. The machine is designed with different working zone in the feet area, such as the function of loading, collecting, transporting, dumping.



The East River Park, in lower Manhattan, is the lowest elevation in the island, and has flooded many times in the past decades. Currently, New York City government has decided to close the park in December 2019 for the next 3 years. They are going to bury the entire park to lift it up as one sea wall. Which might not be the best solution for the city and the East Village neighborhood.

An inflatable infrastructure will be installed on the bridge's foundation, to reduce the river currents' speed and direct soil sedimentation. These inflatable devices are cheap compared to other infrastructures, because they are made of 1 % fabric and 99% air. And the assembly process could be finished within a couple hours. So compared to what has been proposed for the East River Park, which requires to close the park for 3 years, Our proposal will be much more beneficial to the neighborhood.

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A computer operated system, built under the bridge, will release different types of seeds according to the data from the sensors and environmental conditions.

HALF FOOTFPRINT

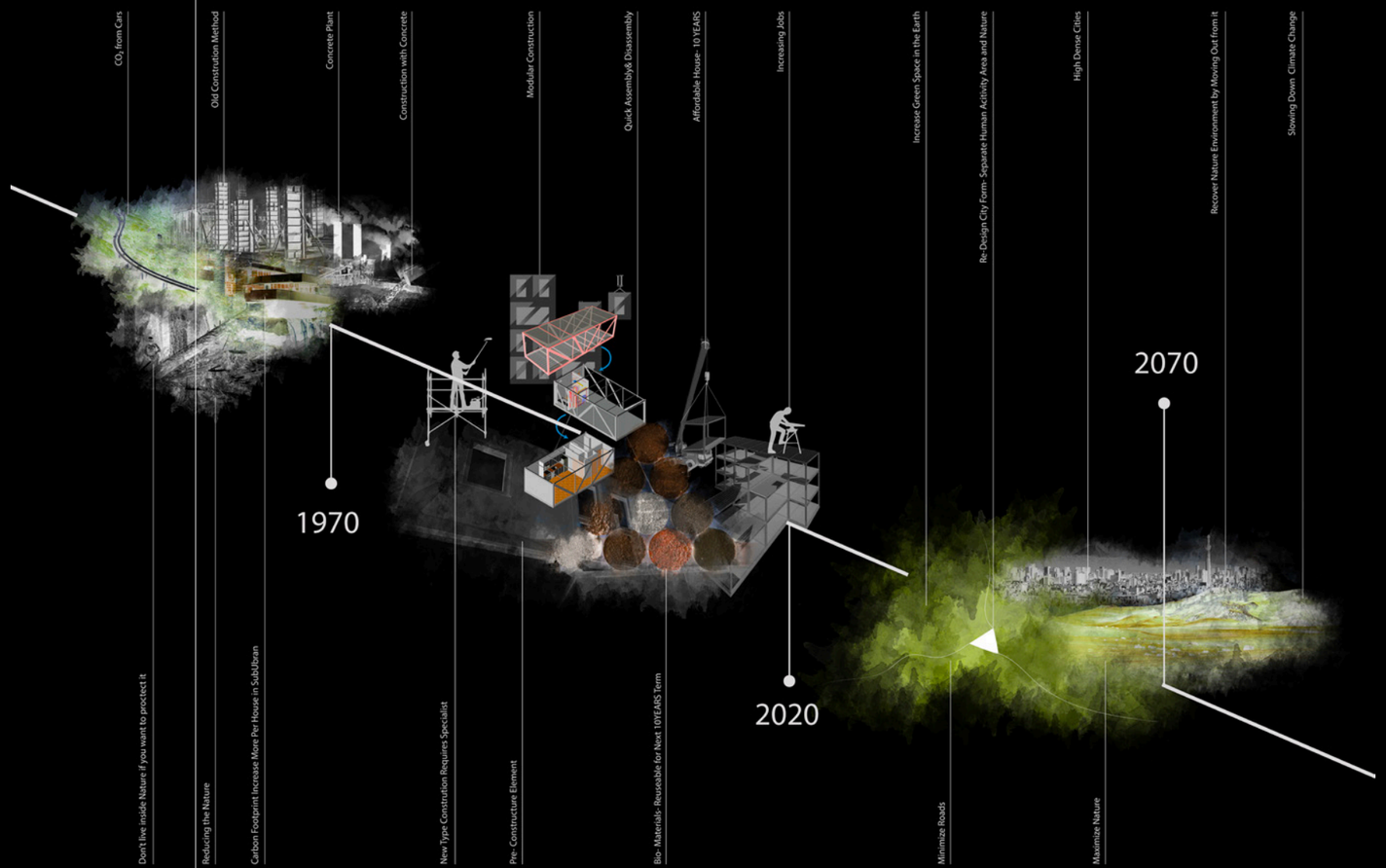
Project: Mixed-Used&Residencal

Location: Los Angeles

Professor: David Benjamin

Year: FALL 2019

Designer: Luyi Huang



HALF FOOTPRINT

Centralized City ----------> Half Land Occupation

Veritial Block ----------> Community & Soical

Robotic Unit ----------> Half sqft Unit Size

HALF FOOTPRINT

HALF FOOTPRINT

HALF FOOTPRINT

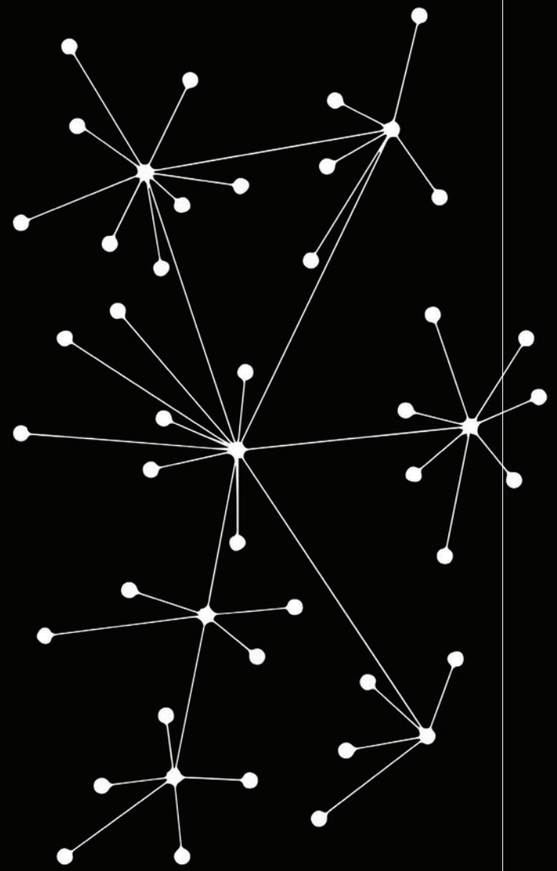
HALF FOOTPRINT

HALF FOOTPRINT

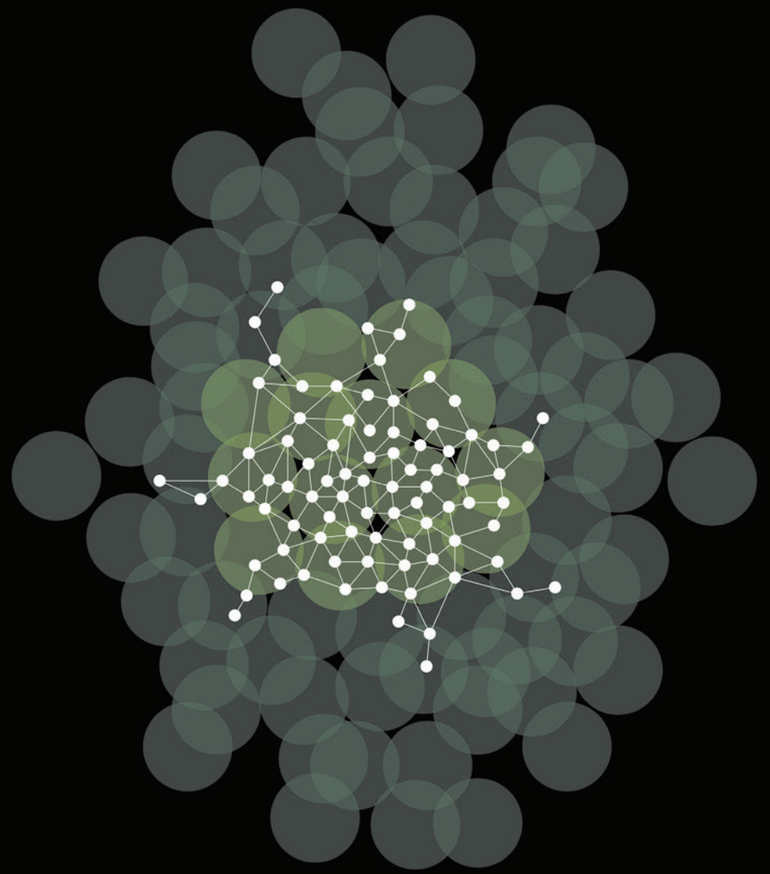
HALF FOOTPRINT

FUTURE CITY FORM

HALF FOOTPRINT



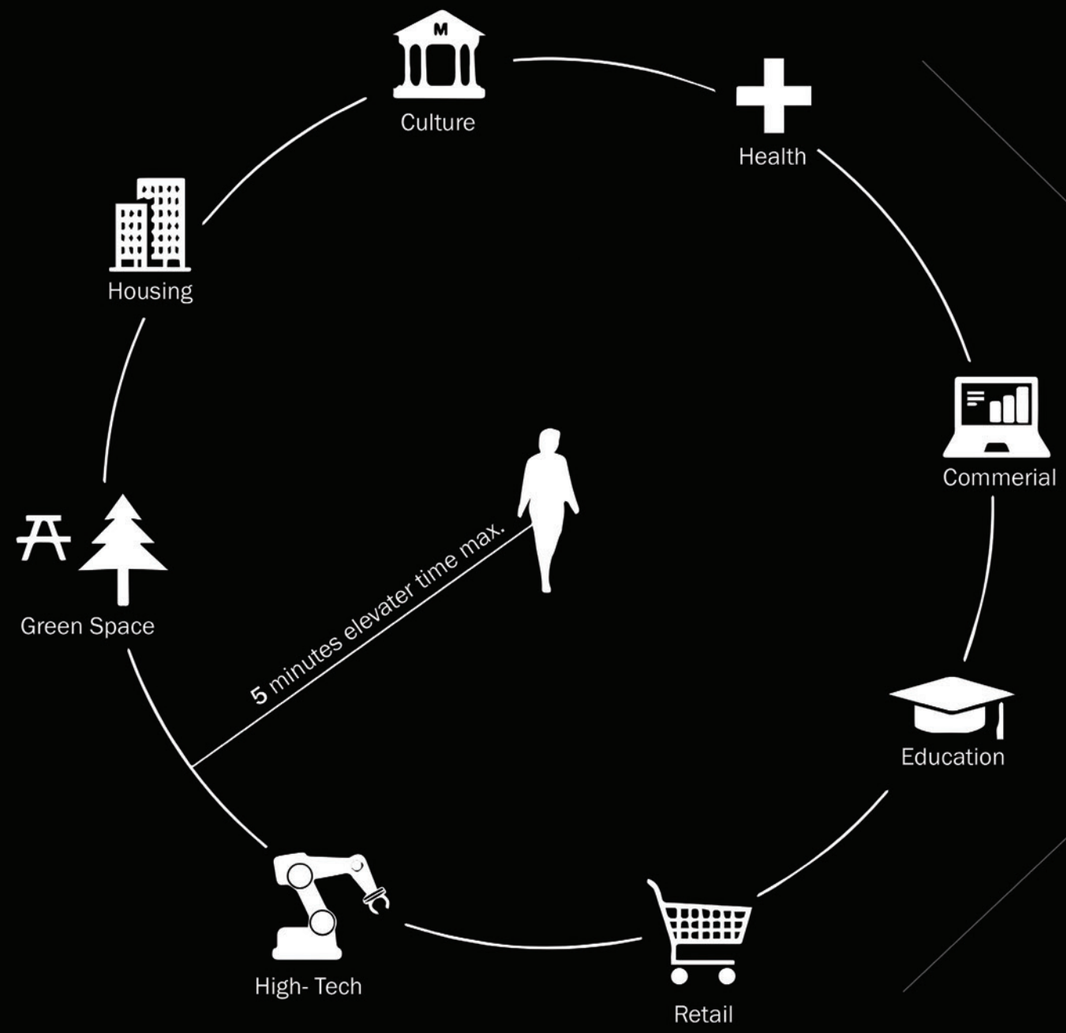
L.A. Present

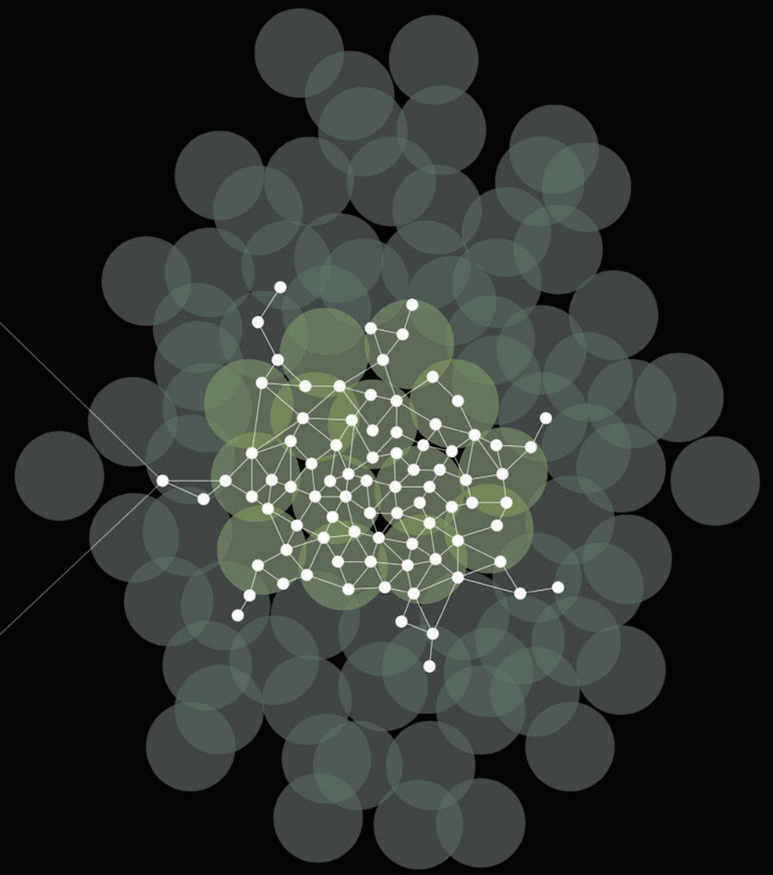


L.A. in 50 years

HALF FOOTPRINT

FUTURE URBAN COMMUNITY





L.A. in 50 years

HALF FOOTPRINT

Residental Unit

Green Space

Food

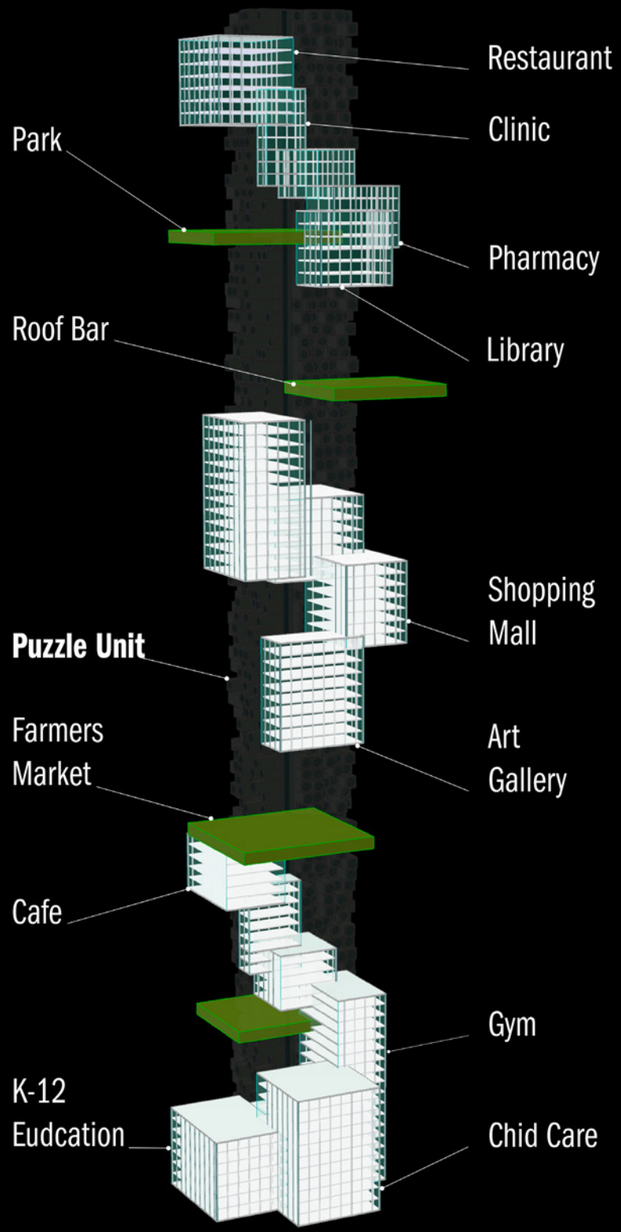
Healthcare

Education

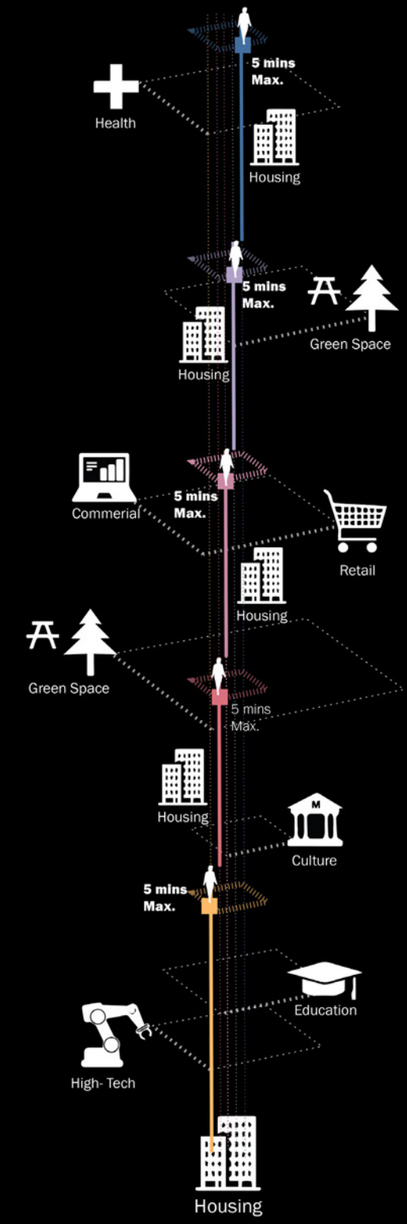
Art

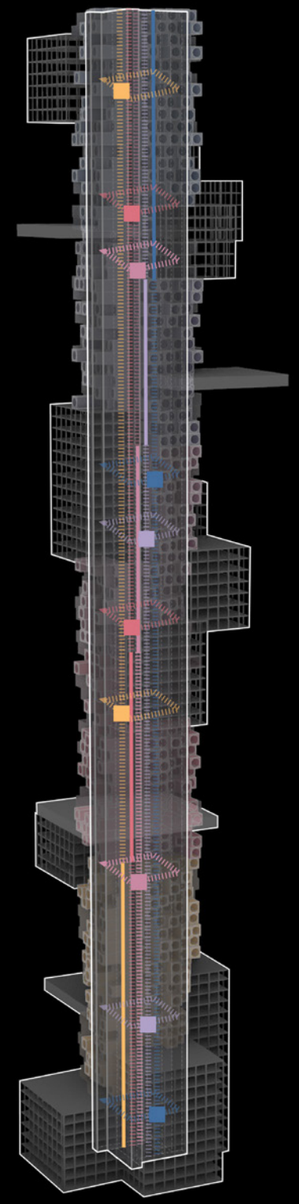
Wellness

Commerical

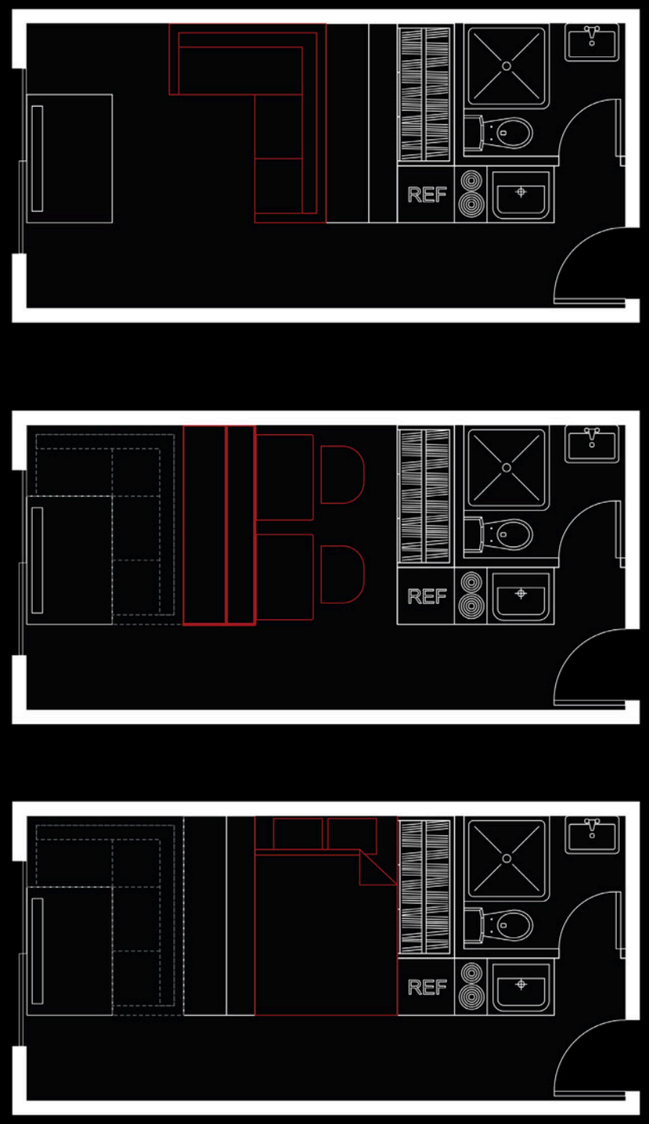


Programming

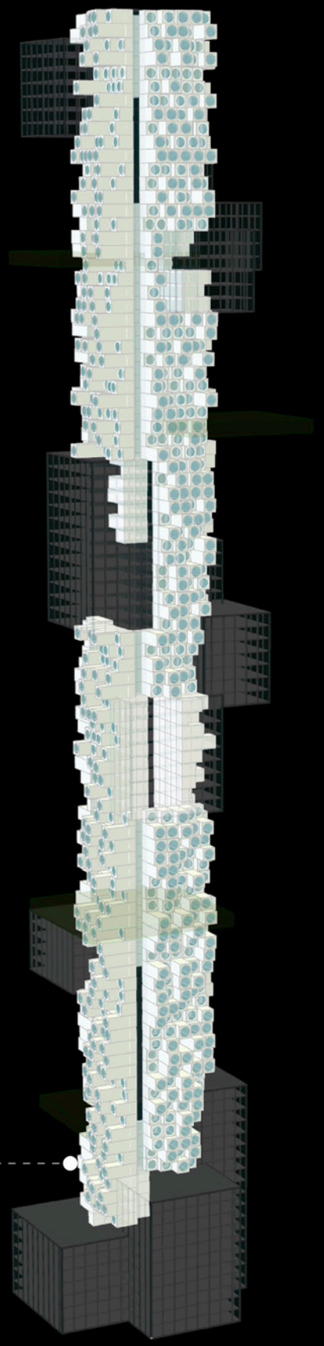




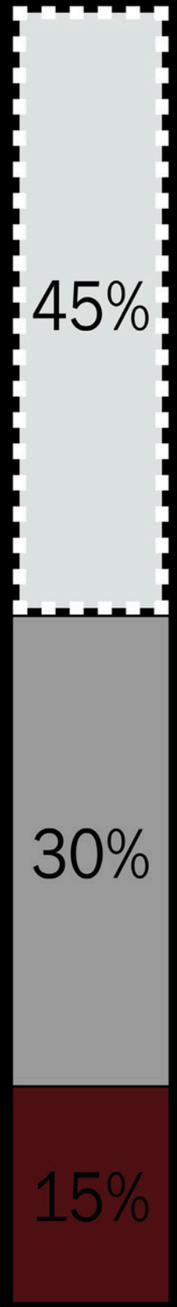
Circulation



1 BED 1 BATH (210 sqft = 516sqft)



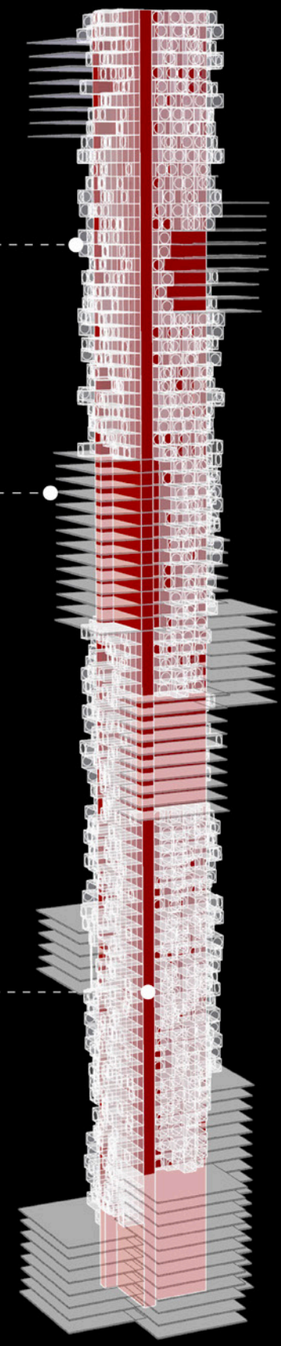
Robotic Units



Residents
- Units

Government
- Retail

Government
- Core



Ownership

HALF FOOTPRINT

HALF FOOTPRINT

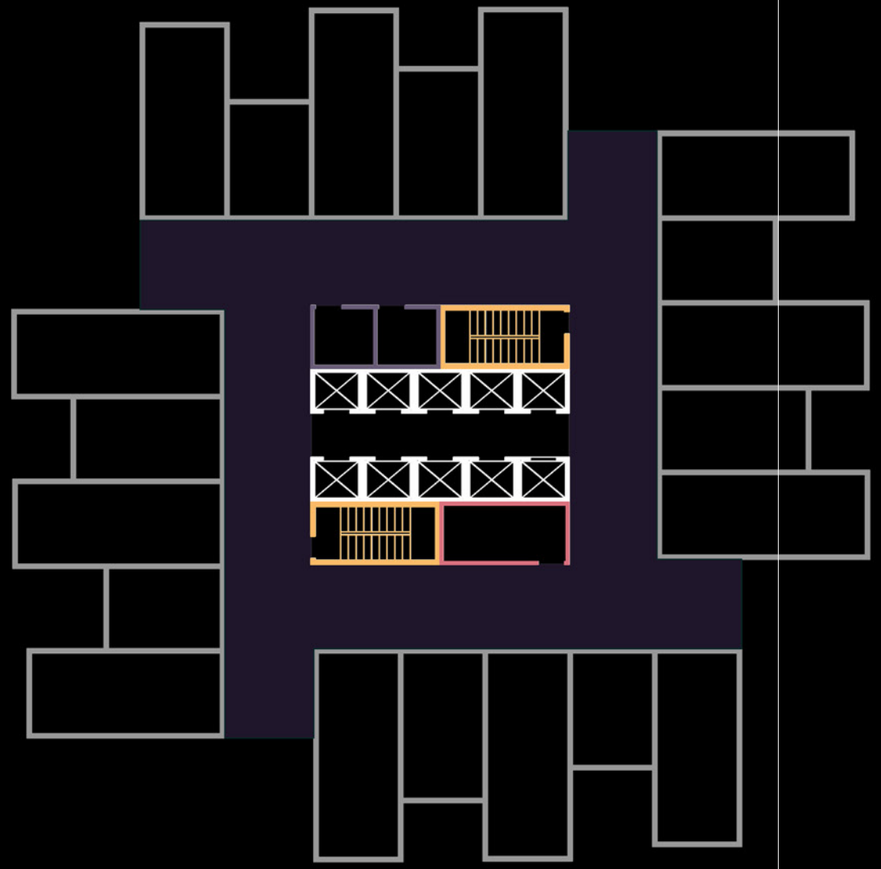
2560 units

80 floors

800ft

HALF FOOTPRINT

Service Core



Egrees

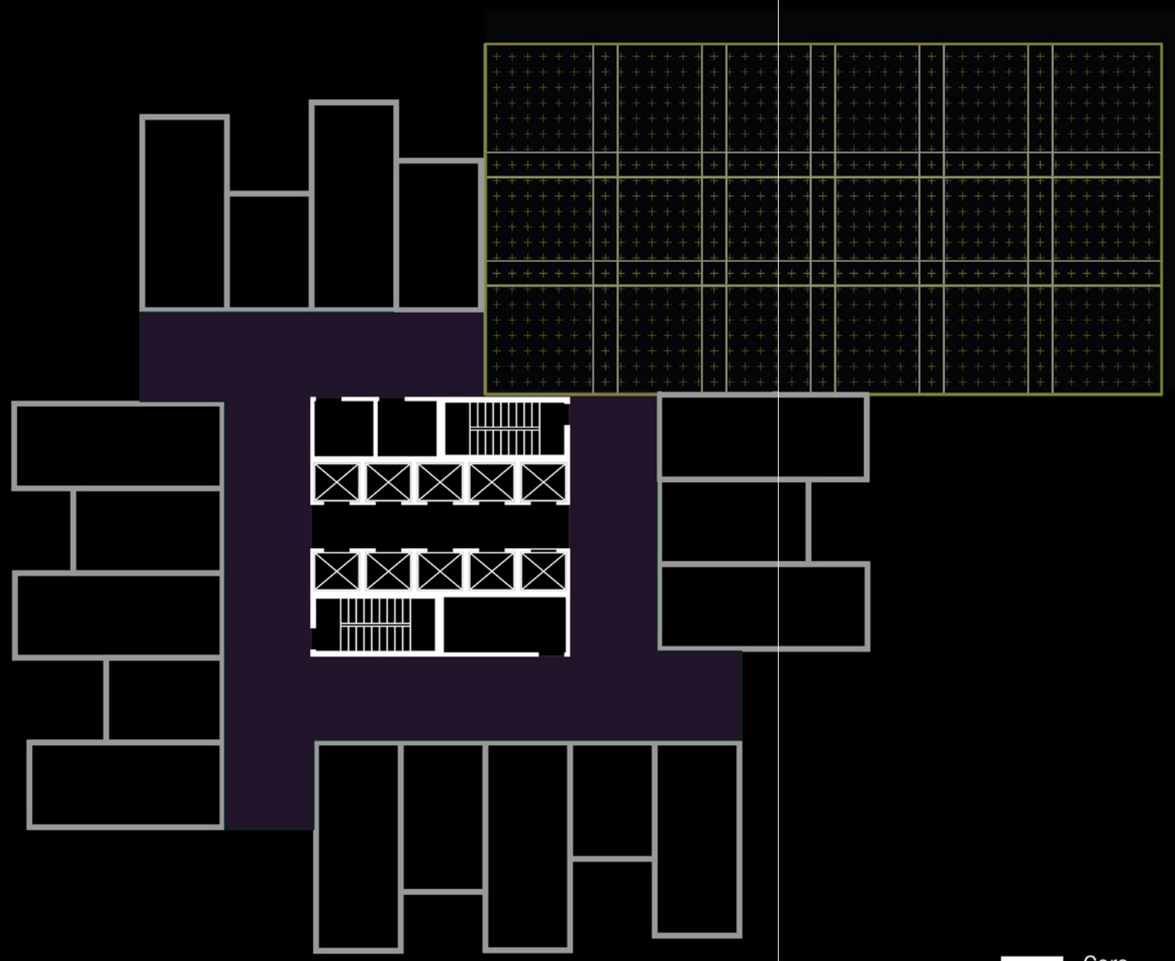
Electrics& Data

Mechanical Room

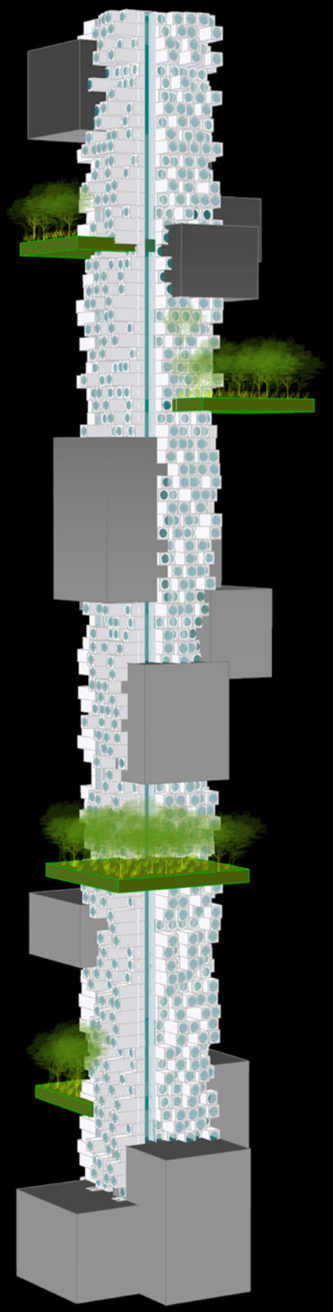
HALF FOOTPRINT

HALF FOOTPRINT

Green Space Floor Plan



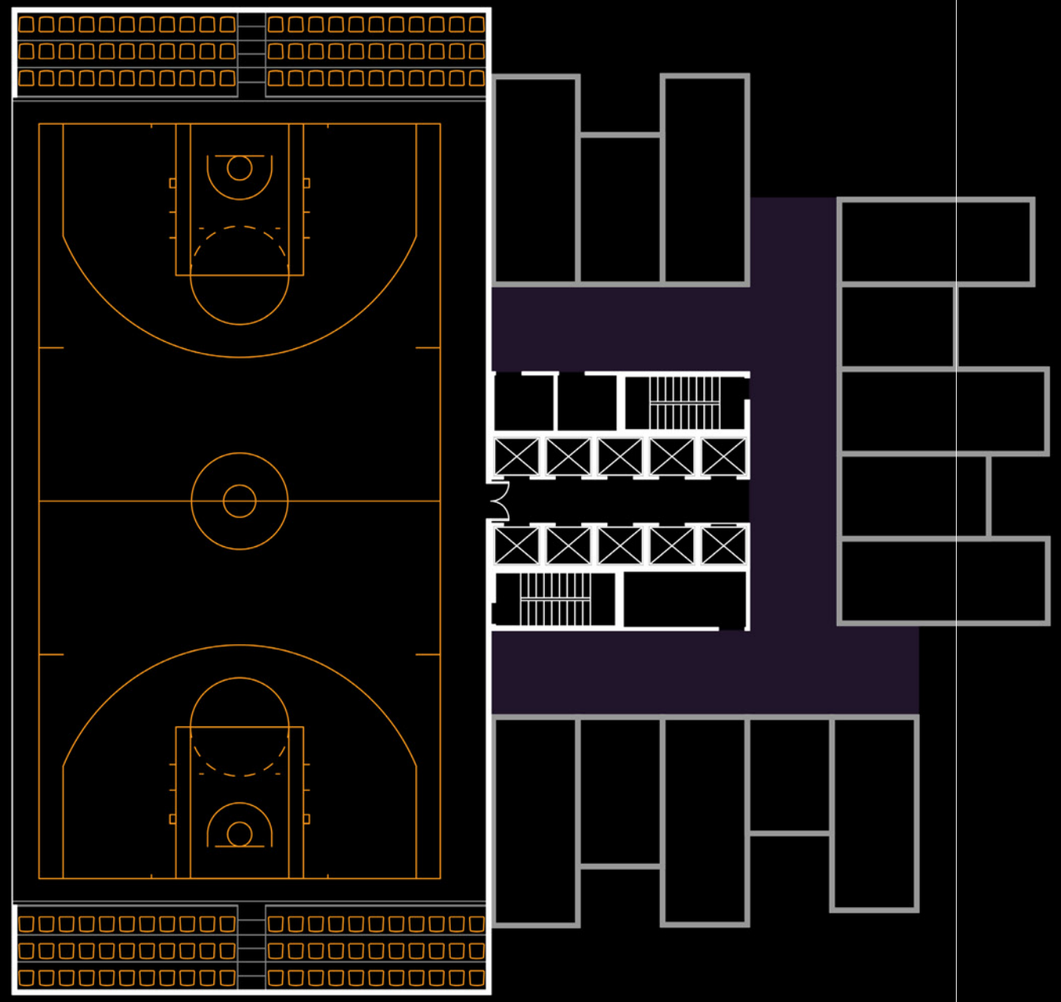
HALF FOOTPRINT



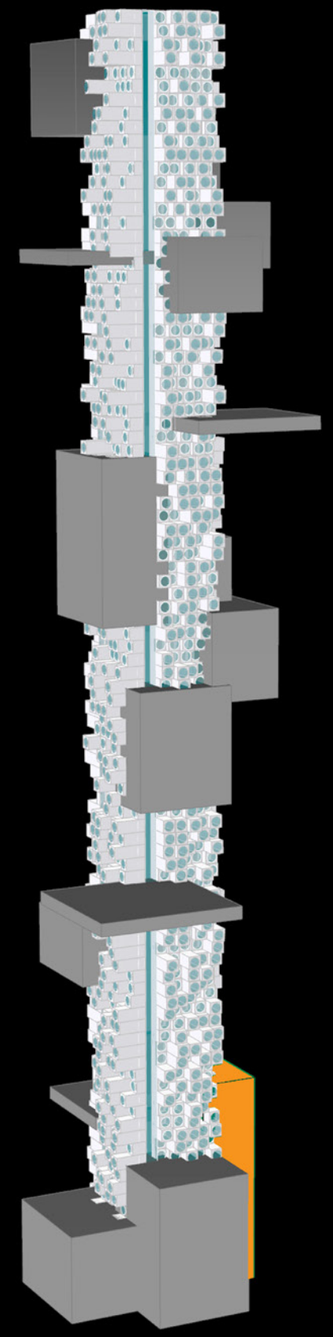
HALF FOOTPRINT

- Core
- Units
- Circulation
- Green Space

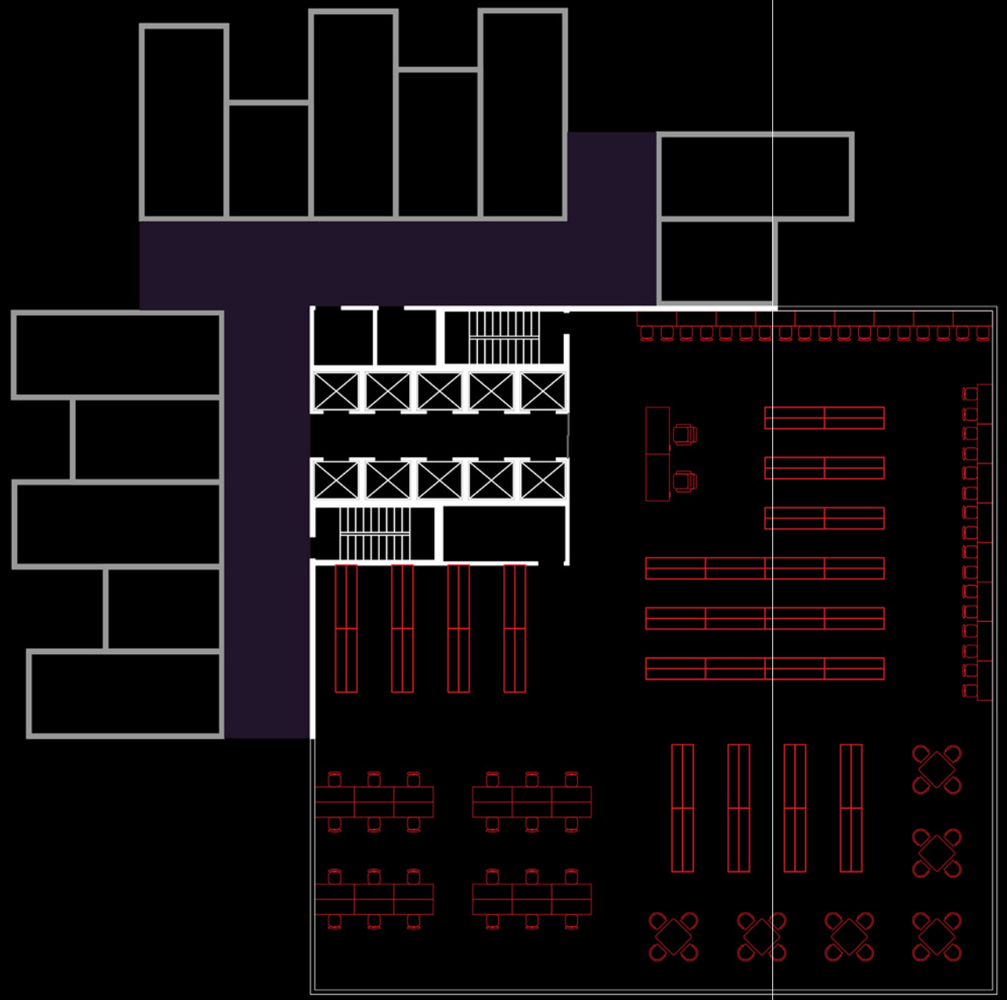
Gym Floor Plan



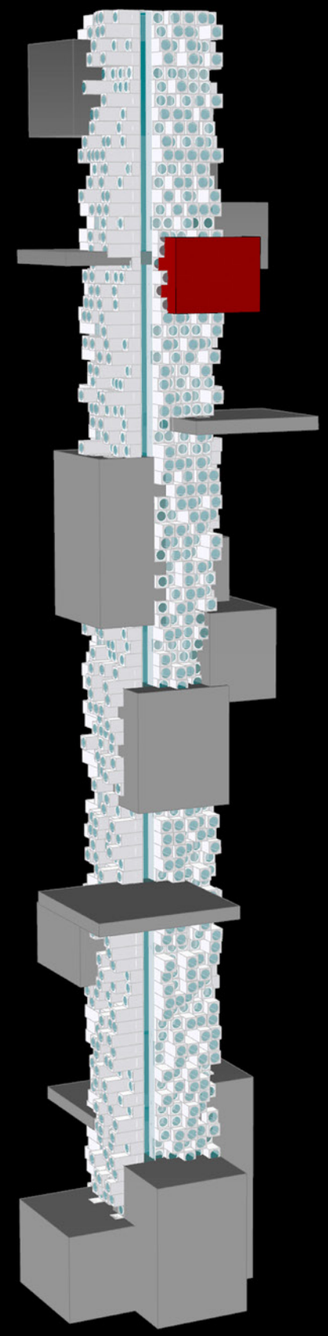
Core
Units
Circulation
Basketball Court



Library Floor Plan



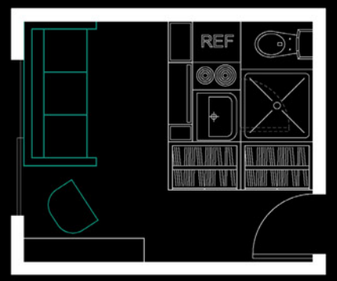
Core
Units
Circulation
Basketball Court

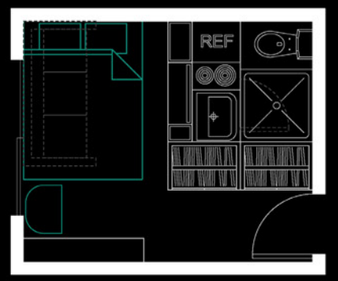


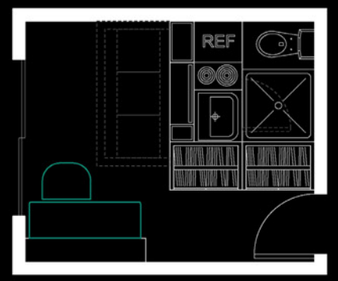
HALF FOOTPRINT

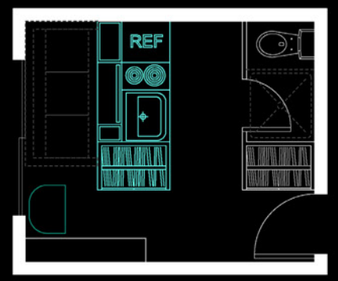
HALF FOOTPRINT

STUDIO (120 sqft = 352sqft)

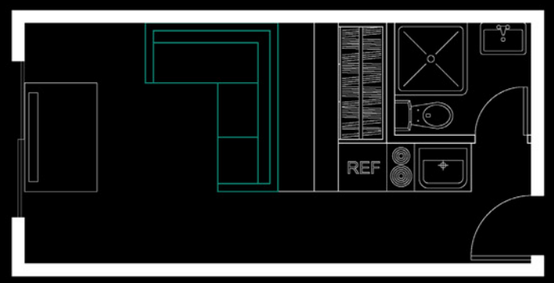


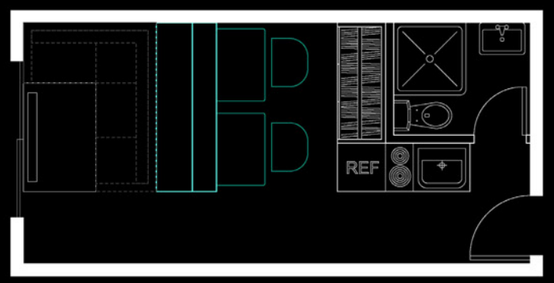


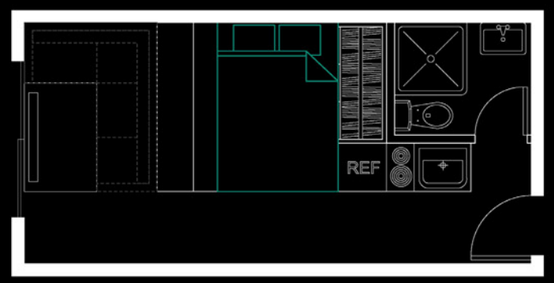




1 BED 1 BATH (210 sqft = 516sqft)

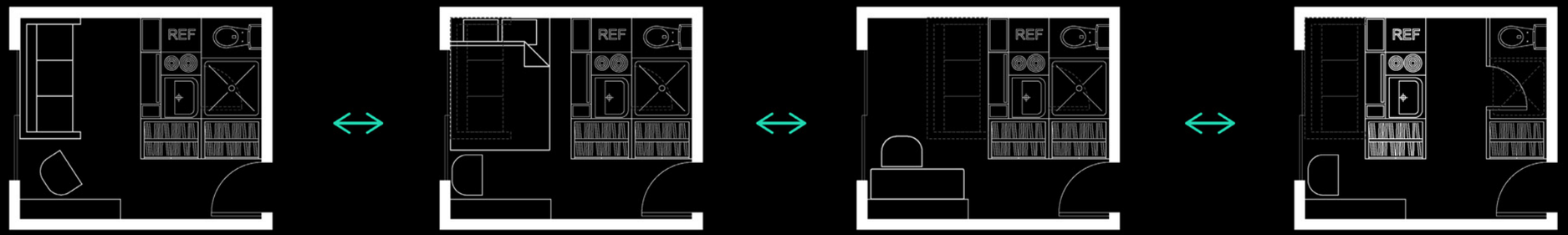




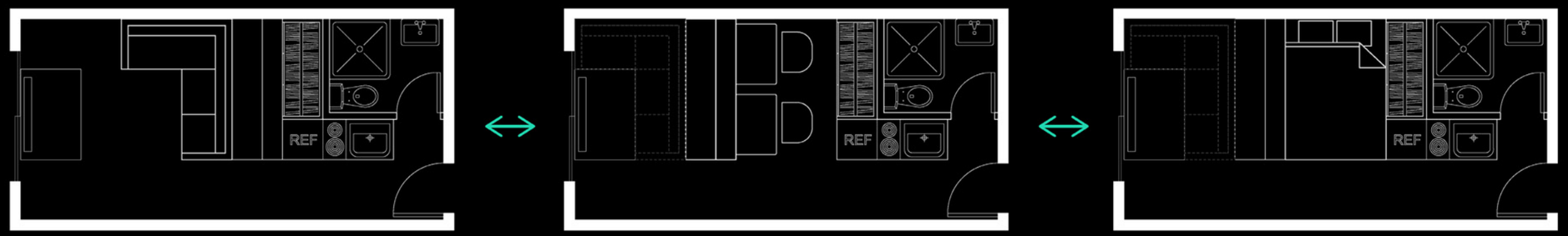


HALF FOOTPRINT

STUDIO (120 sqft)



1 BED 1 BATH (210 sqft)



HALF FOOTPRINT

HALF FOOTPRINT

HALF FOOTPRINT

CULTURAL NEST

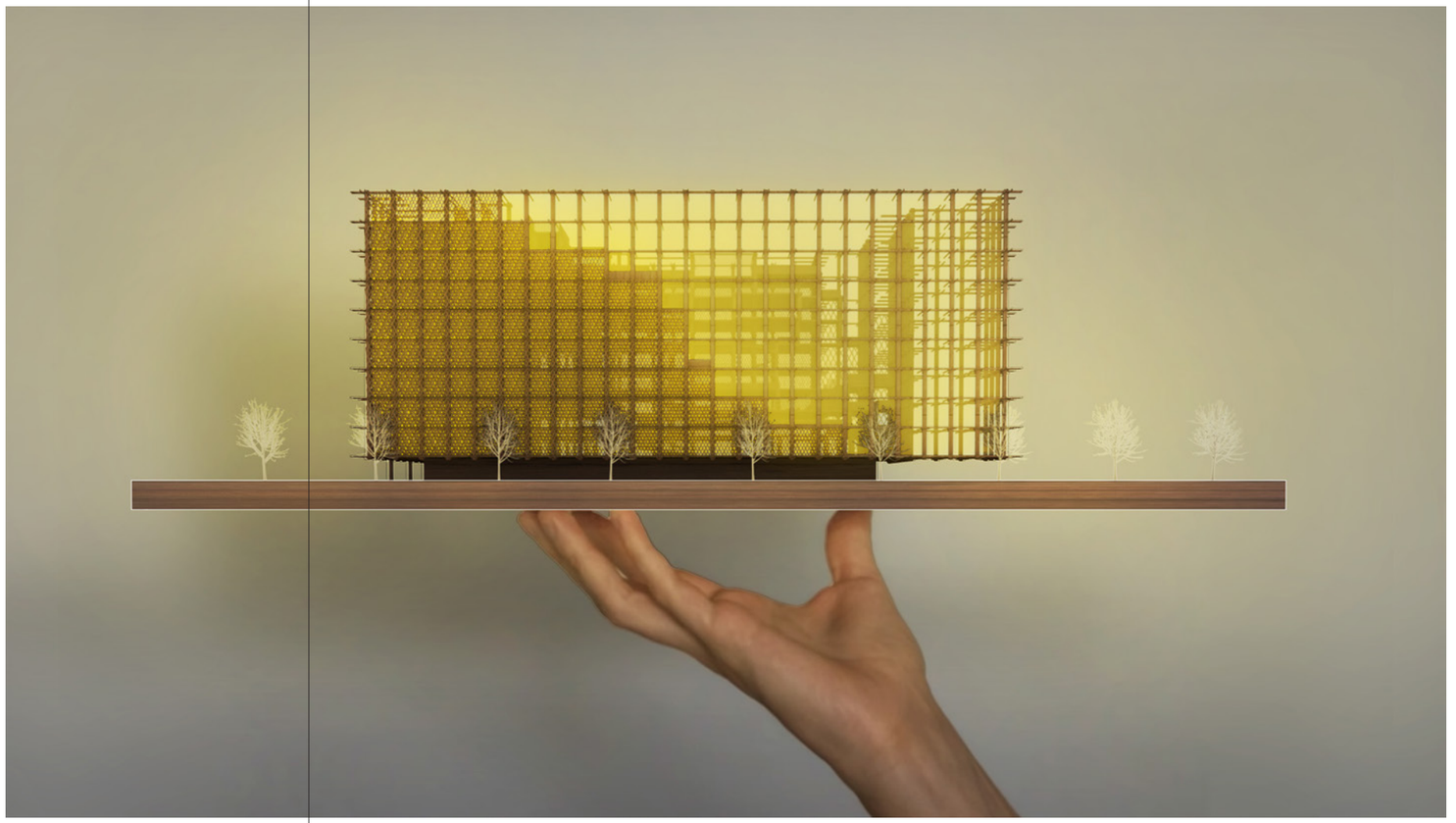
Project: Mixed-Used& Public Stairs

Location: Washington, D.C

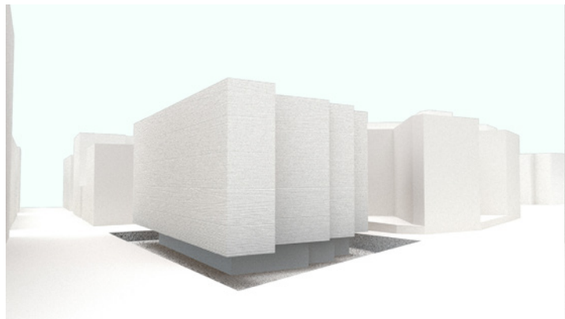
Professor: Hilary Mary Sample-Meredith

Year: Spring 2020

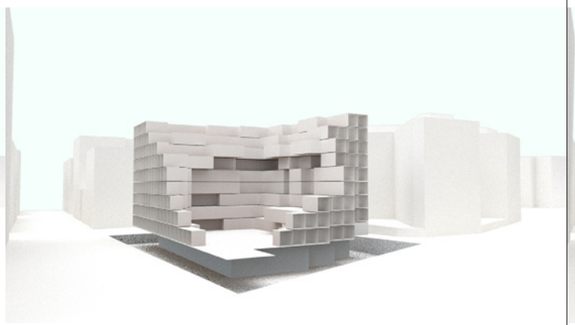
Team: Luyi Huang and Yanan Cheng



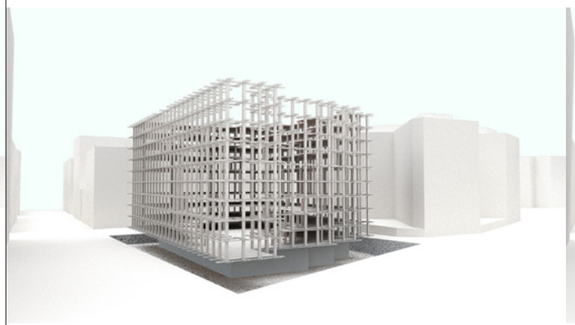
CONCEPT DIAGRAM



Lifting the volume for the space use. And separate the building from the city by isolate the from the side walk.



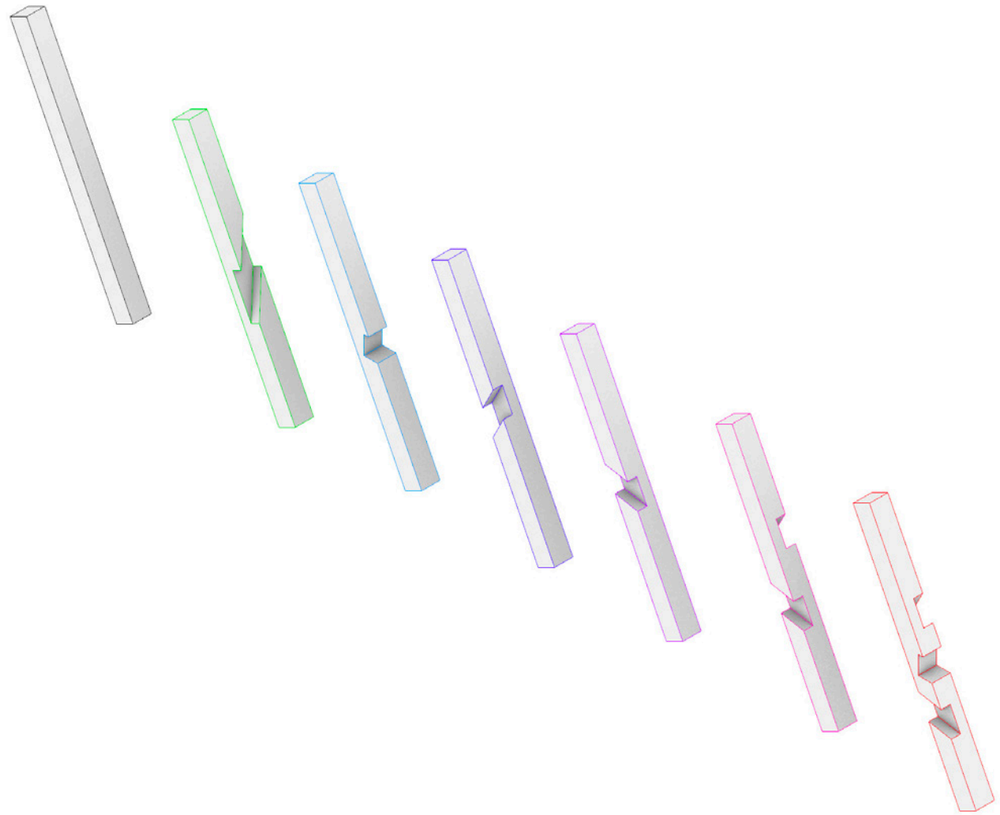
Opening the half of volume space for the interior garden gathering and multiple program .



30’ x 30’ Structure gird to building up the structure of nest and divide the space in the module way.

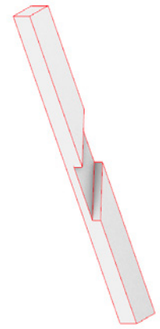
The timber face is installed the different face depends ont the light control needs. And the moat protected the buildings.

JOINTS CONNECTION OF FACADE

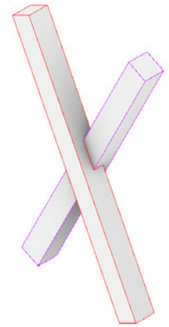


1.Variation of Wood Joints

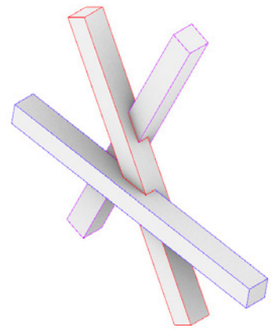
2. Modules



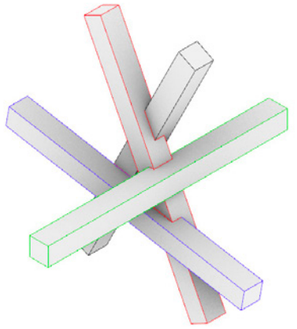
Modules- 1 piece



Modules- 2 pieces



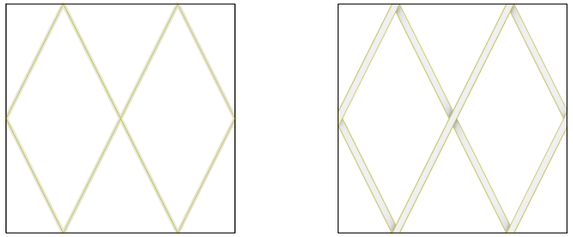
Modules- 3 piece



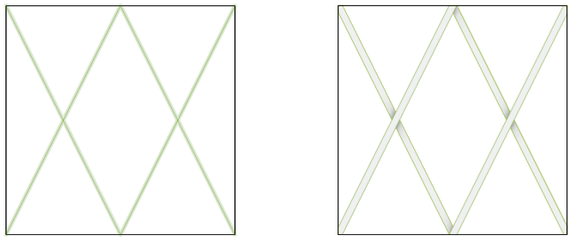
Modules- 4 pieces

FACADE PATTERN

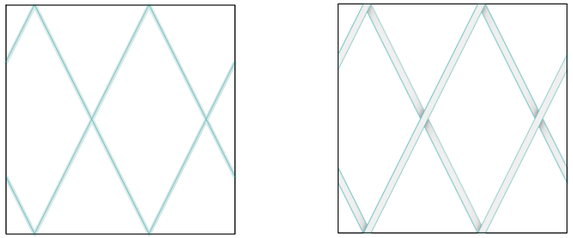
Panel A



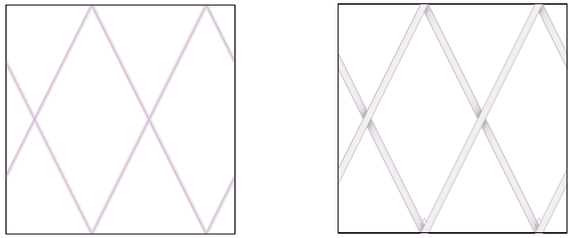
Panel B



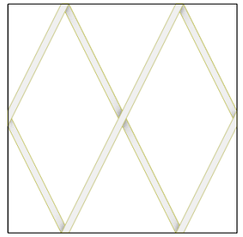
Panel C

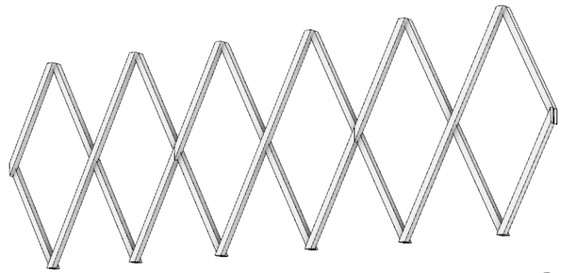


Panel D

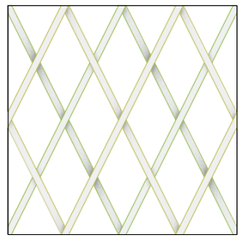


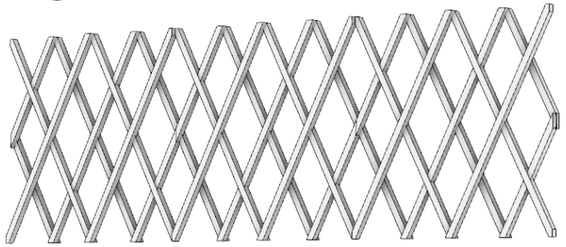
Screen A
with 1 layer



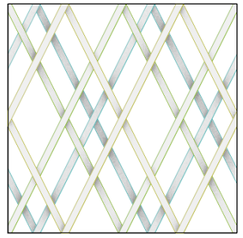


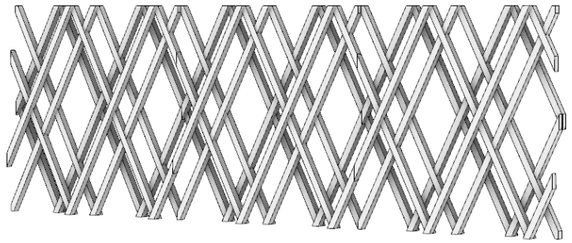
Screen B
with 2 layers



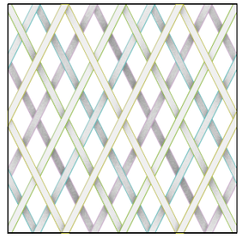


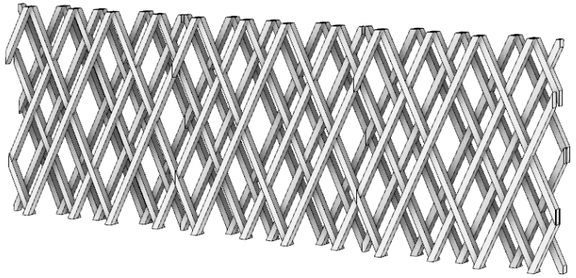
Screen C
with 3 layers





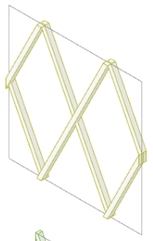
Screen D
with 4 layers



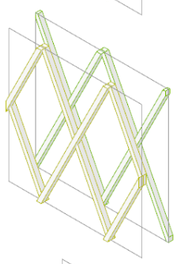


SUNLIGHT CONTROLING

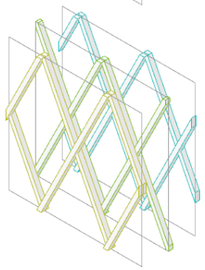
Screen A
with 1 layer



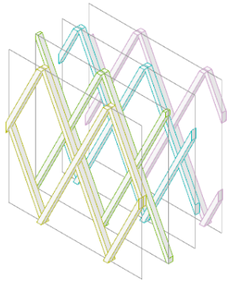
Screen B
with 2 layers

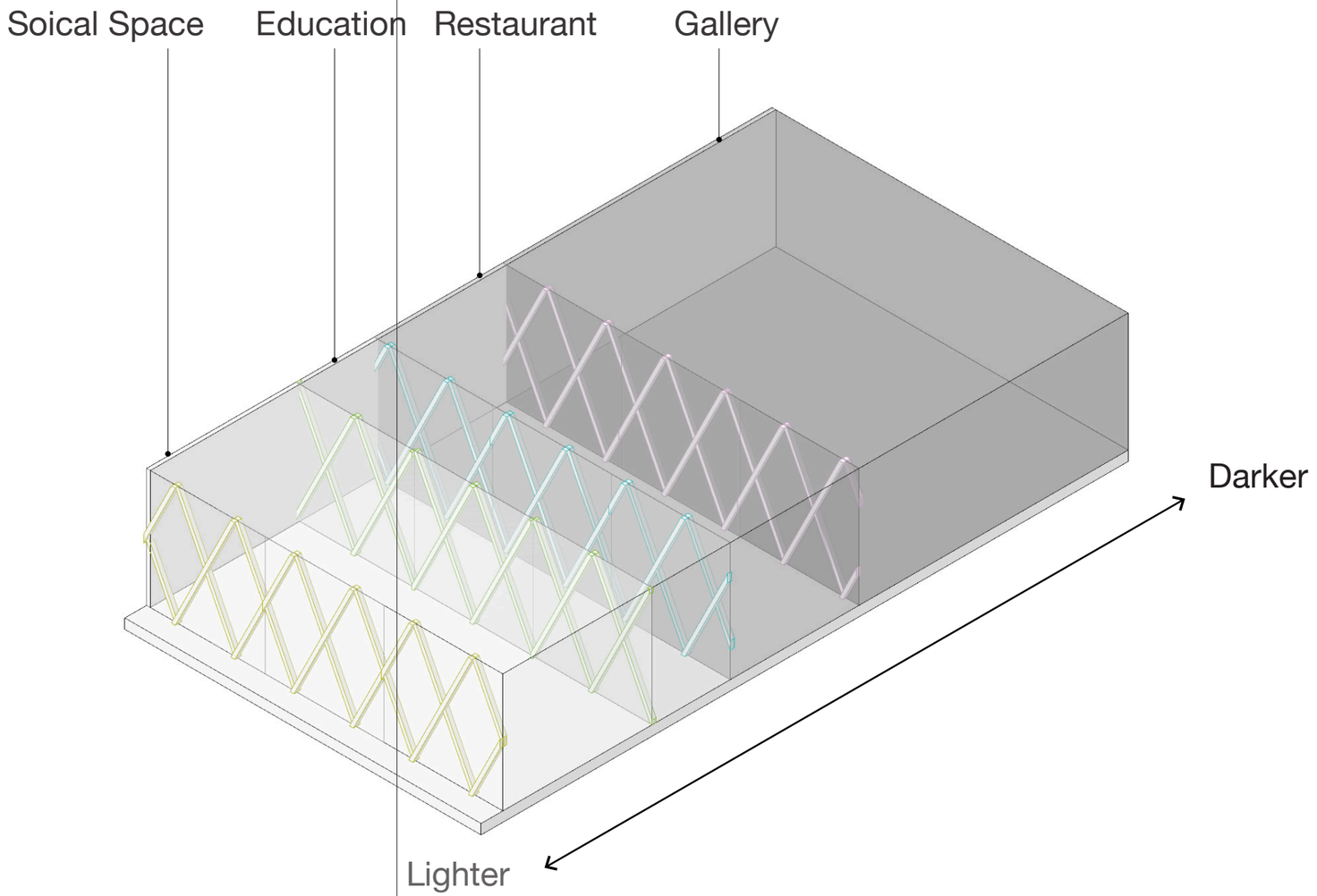


Screen C
with 3 layers

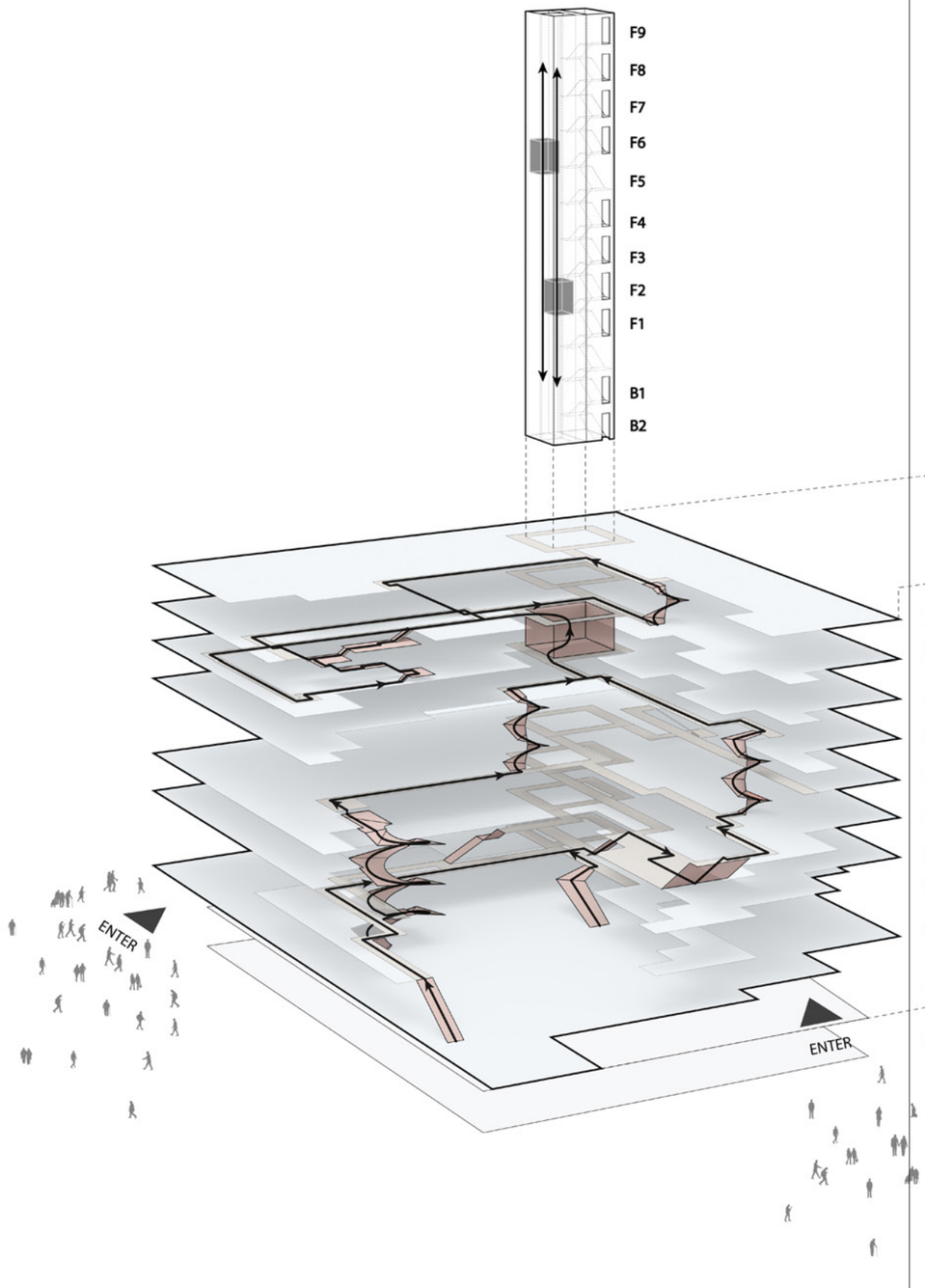


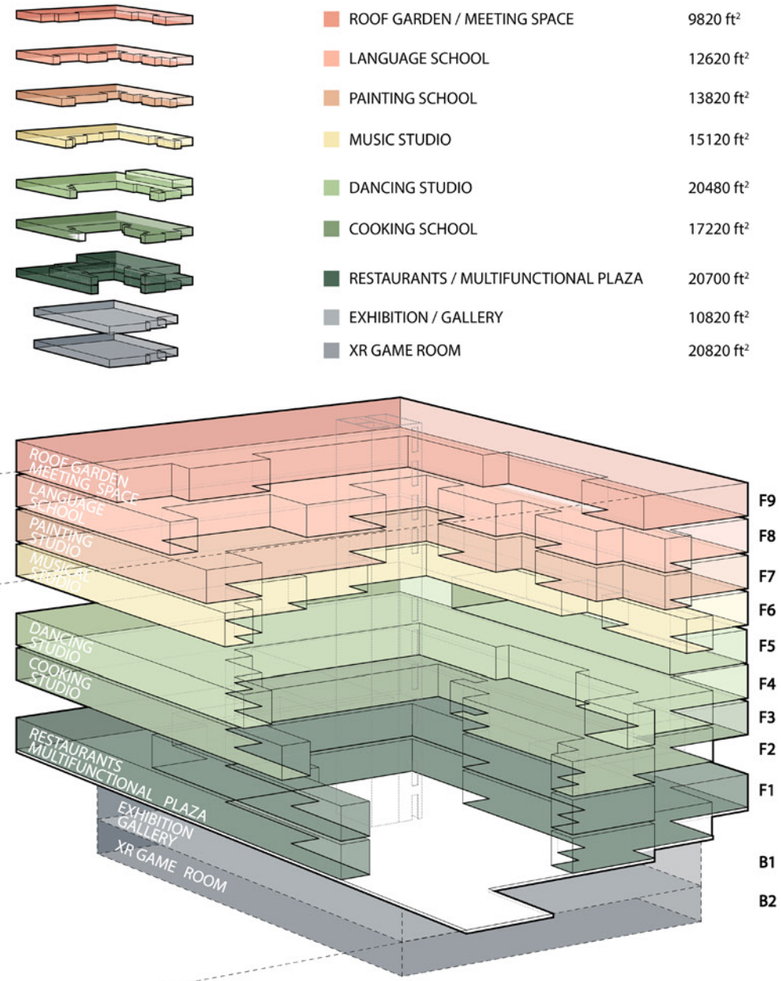
Screen D
with 4 layers



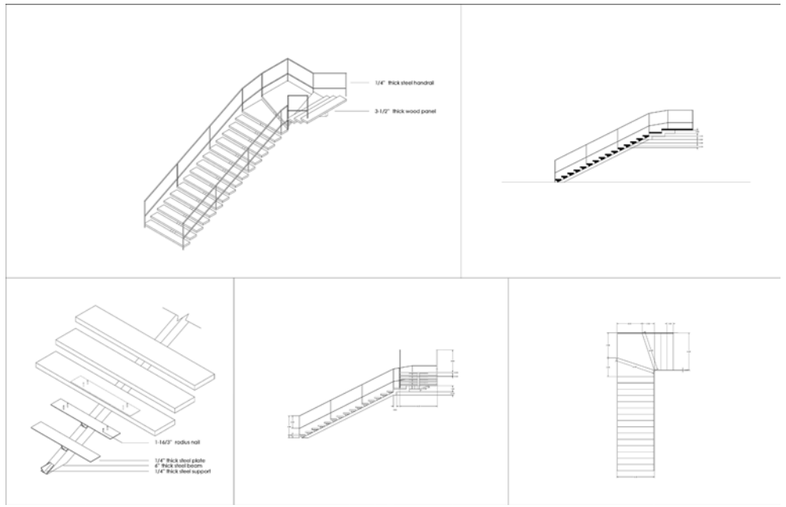


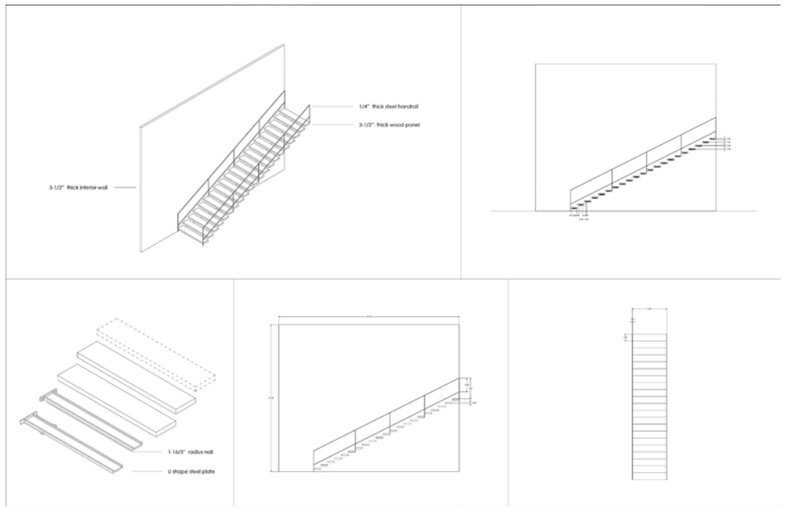
CIRCUATION / PROGRAM DIAGRAM

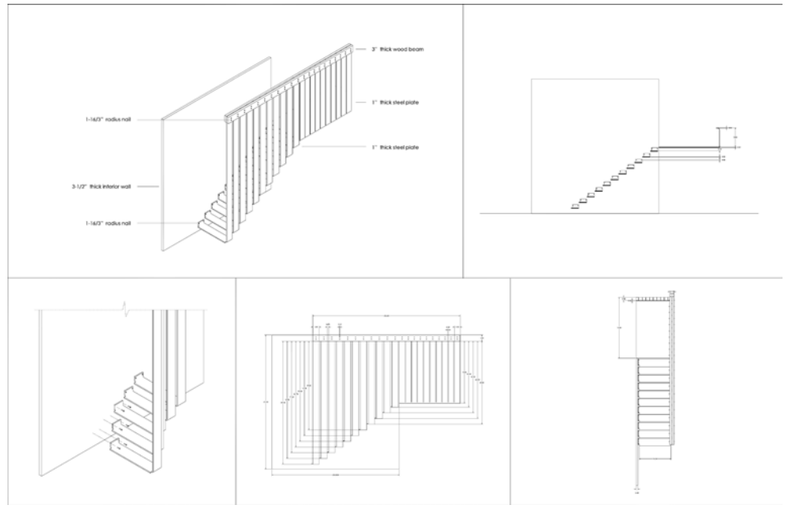


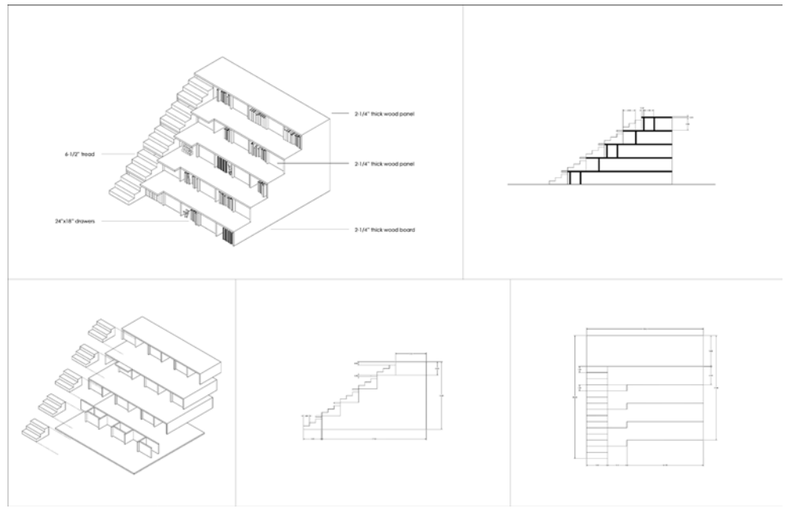


STAIR DRAWINGS

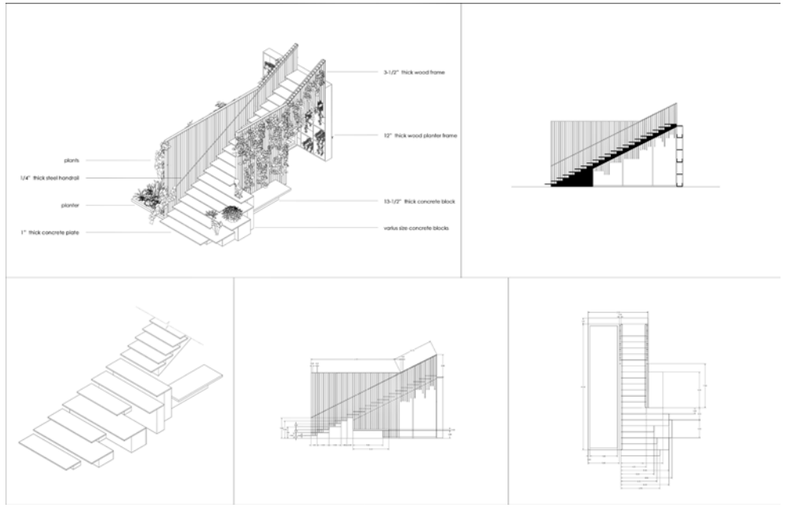


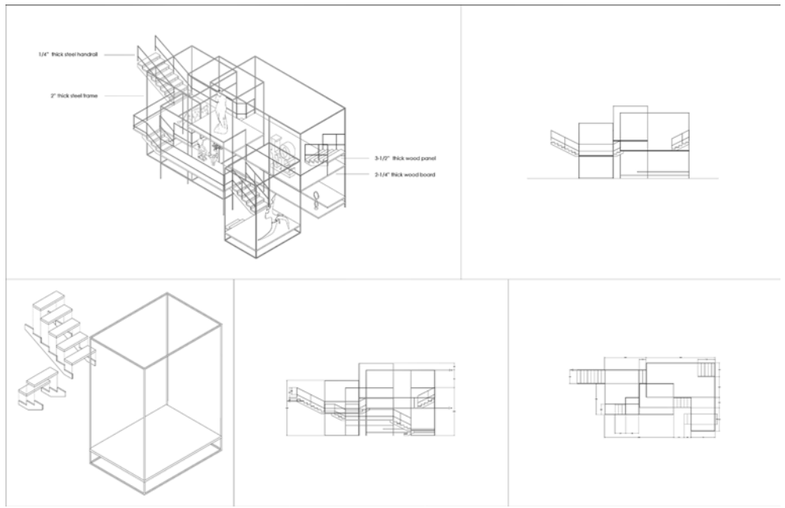




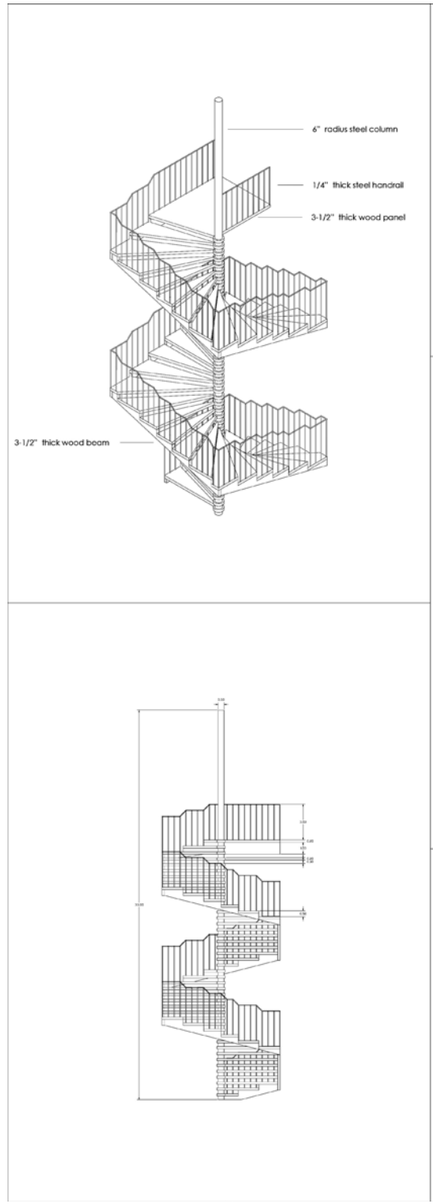


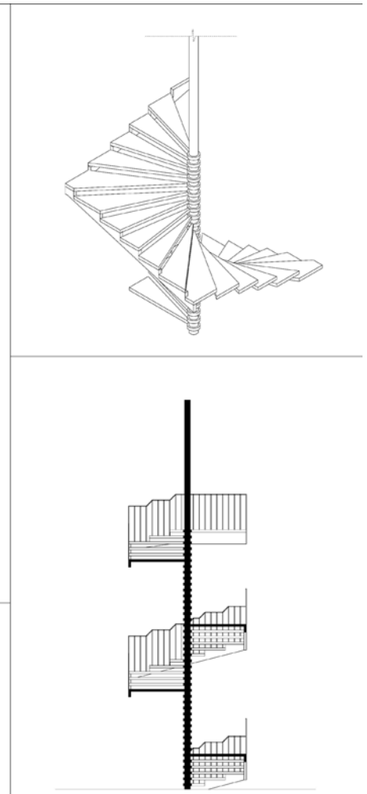
STAIR DRAWINGS

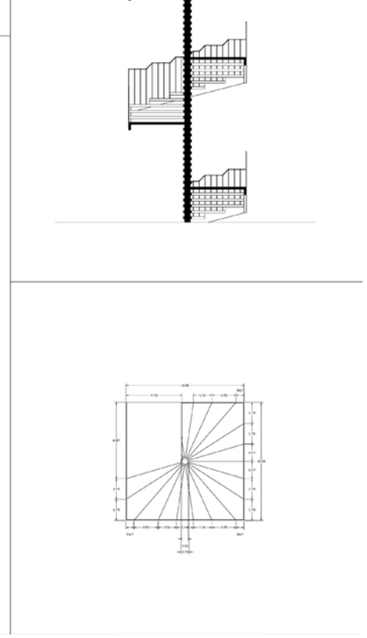




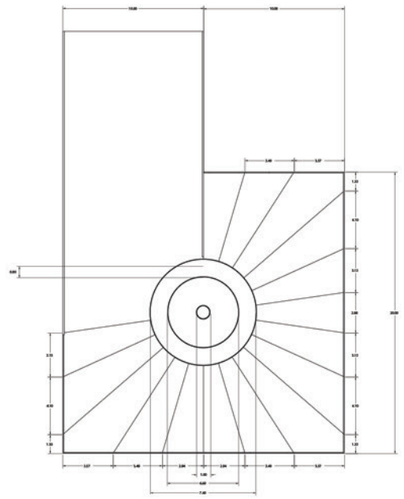
CULTURE COMMUNITY CENTER

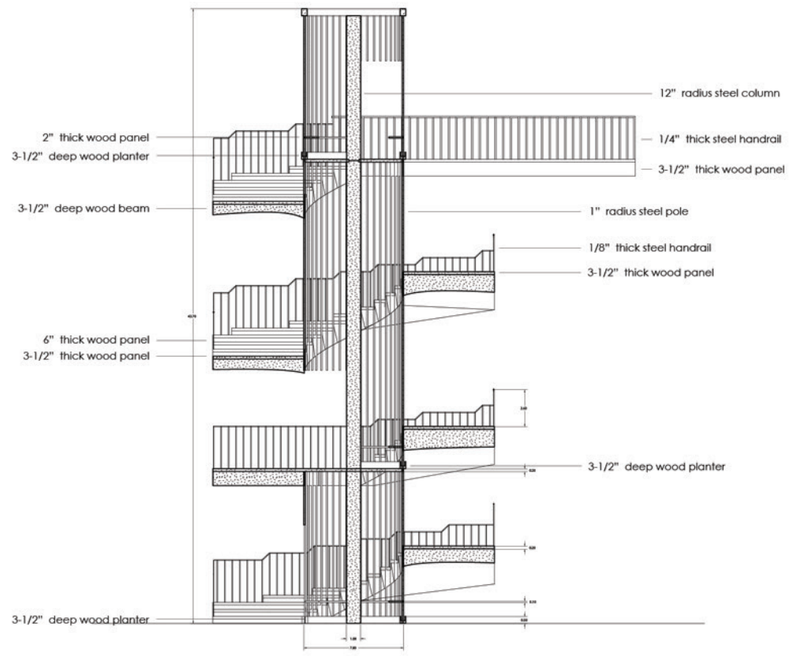


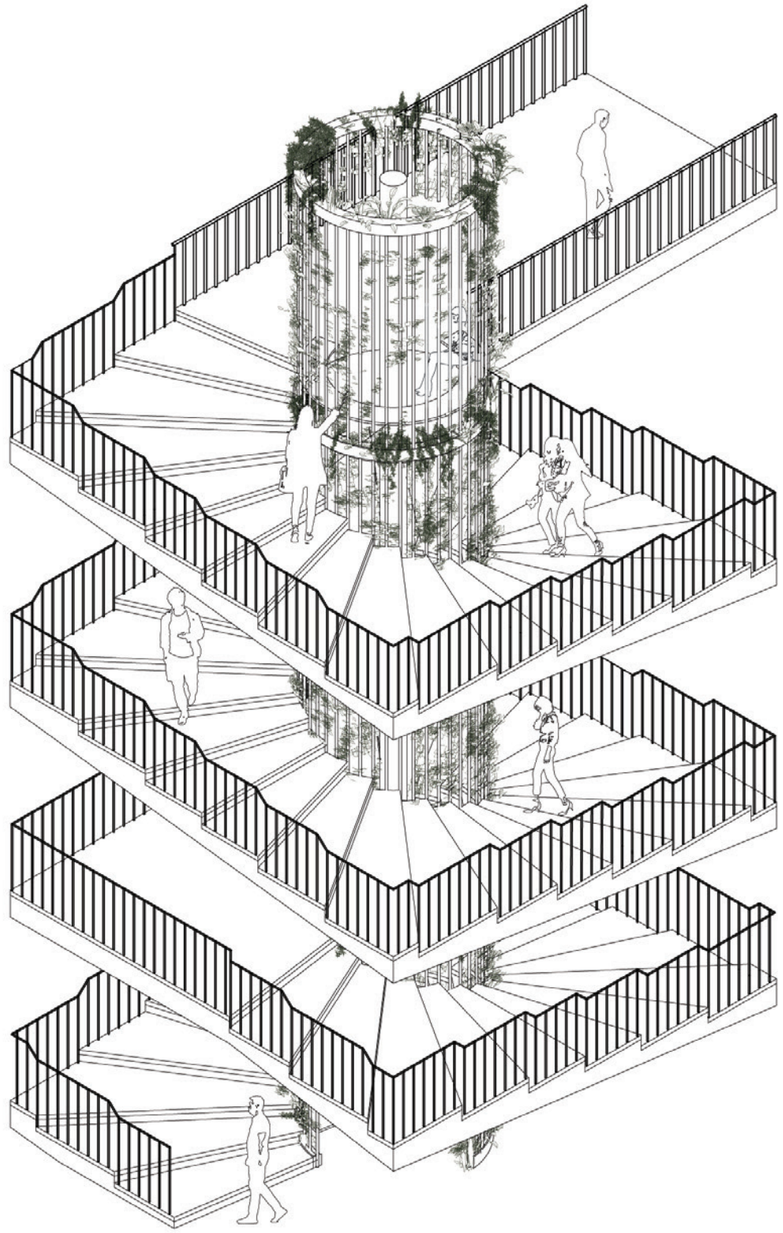




STAIR DETAIL







FLOOR PLAN

CULTURE COMMUNITY CENTER

Ground Floor (loft)
RESTAURANT + MULTIFUNCTIONAL PLAZA

CITY VIEW

DOWNTOWN WASHINGTON D.C.

FLOOR PLAN

Third Floor
COOKING SCHOOL

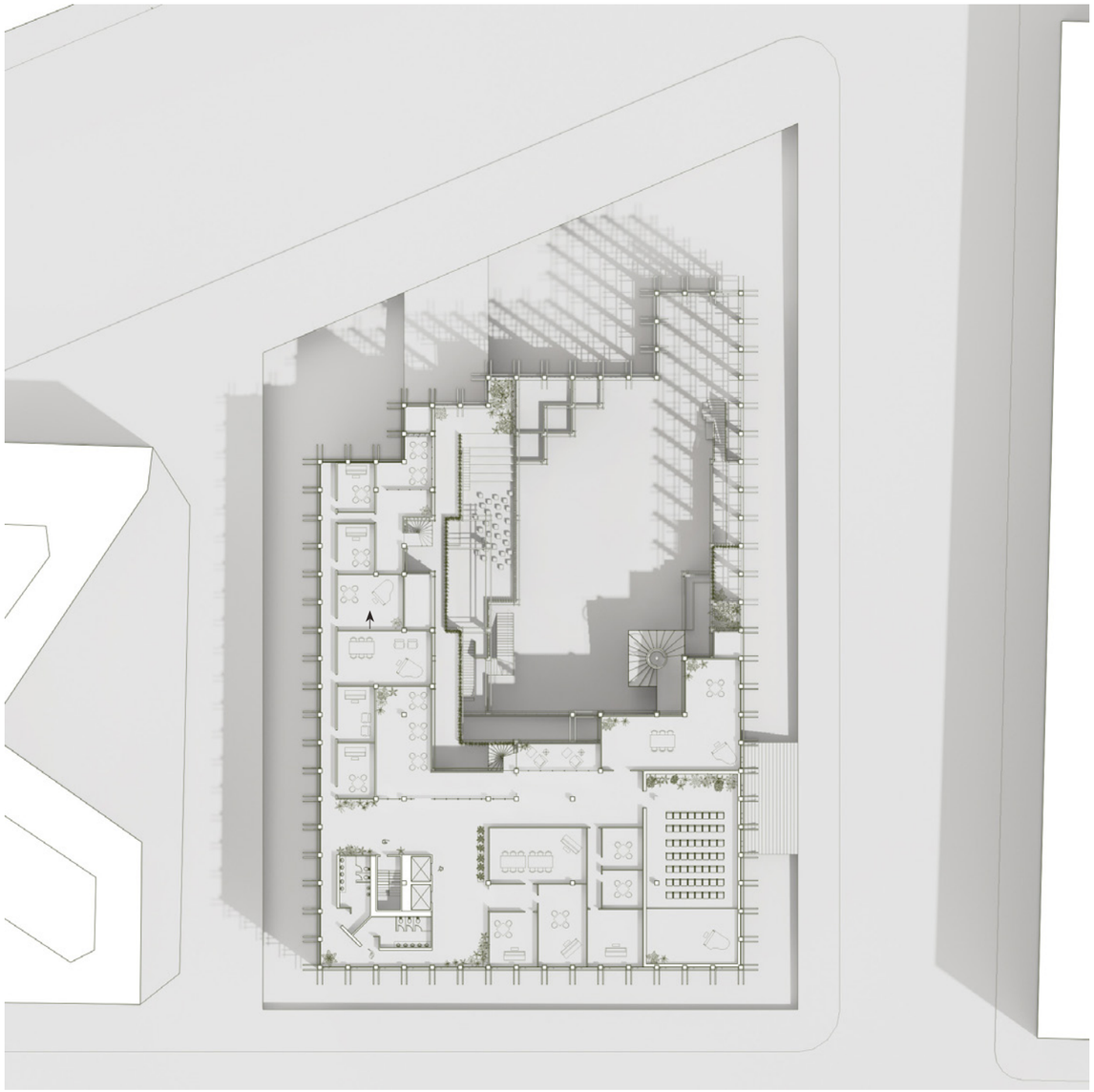
INTERIOR VIEW

FLOOR PLAN

Fifth Floor (loft)
DANCING SCHOOL

INTERIOR VIEW

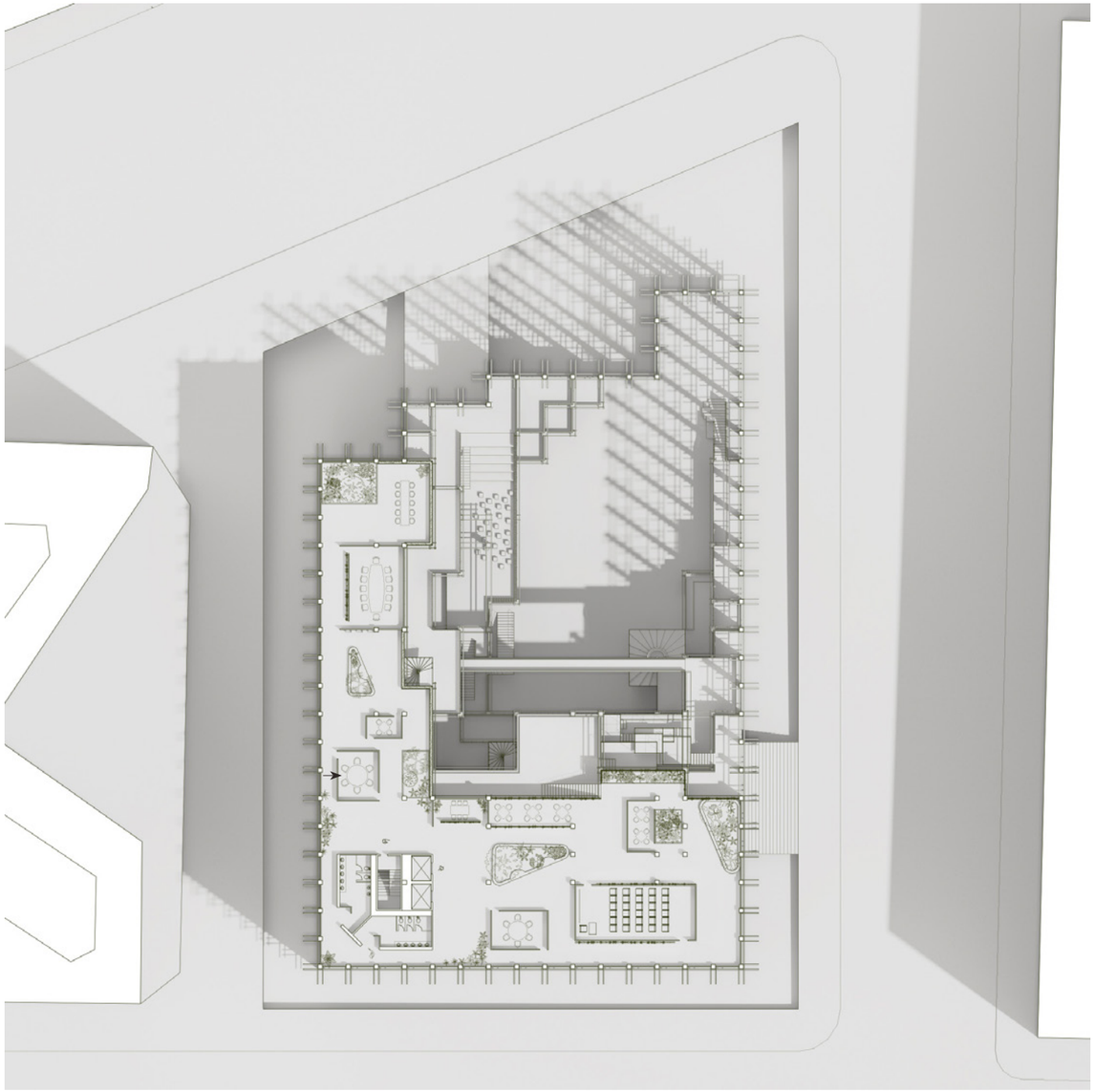
FLOOR PLAN



Seventh Floor
MUSICAL STUDIO

INTERIOR VIEW

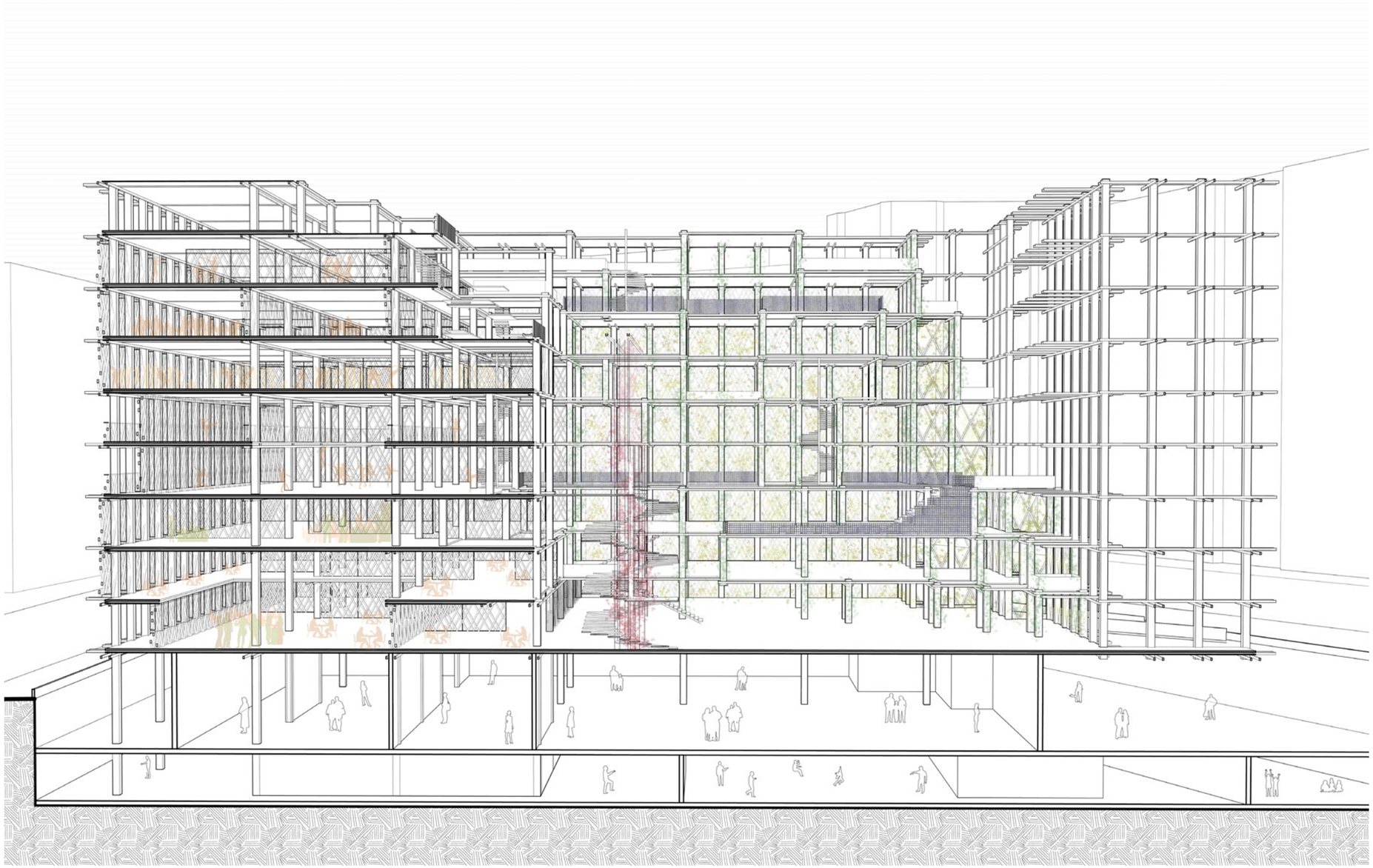
FLOOR PLAN

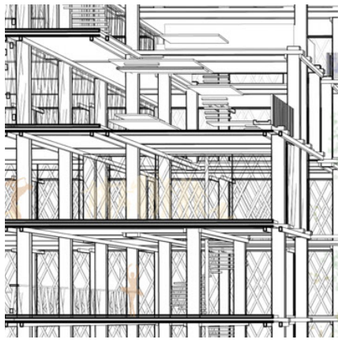


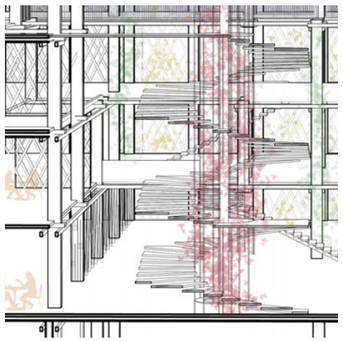
Ninth Floor
ROOF GARDEN + MEETING SPACE

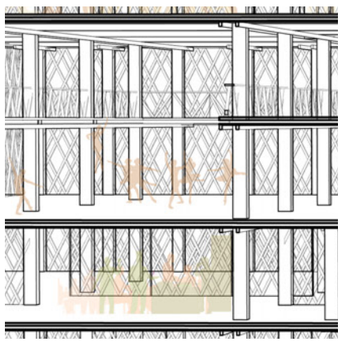
INTERIOR VIEW

LONG SECTION







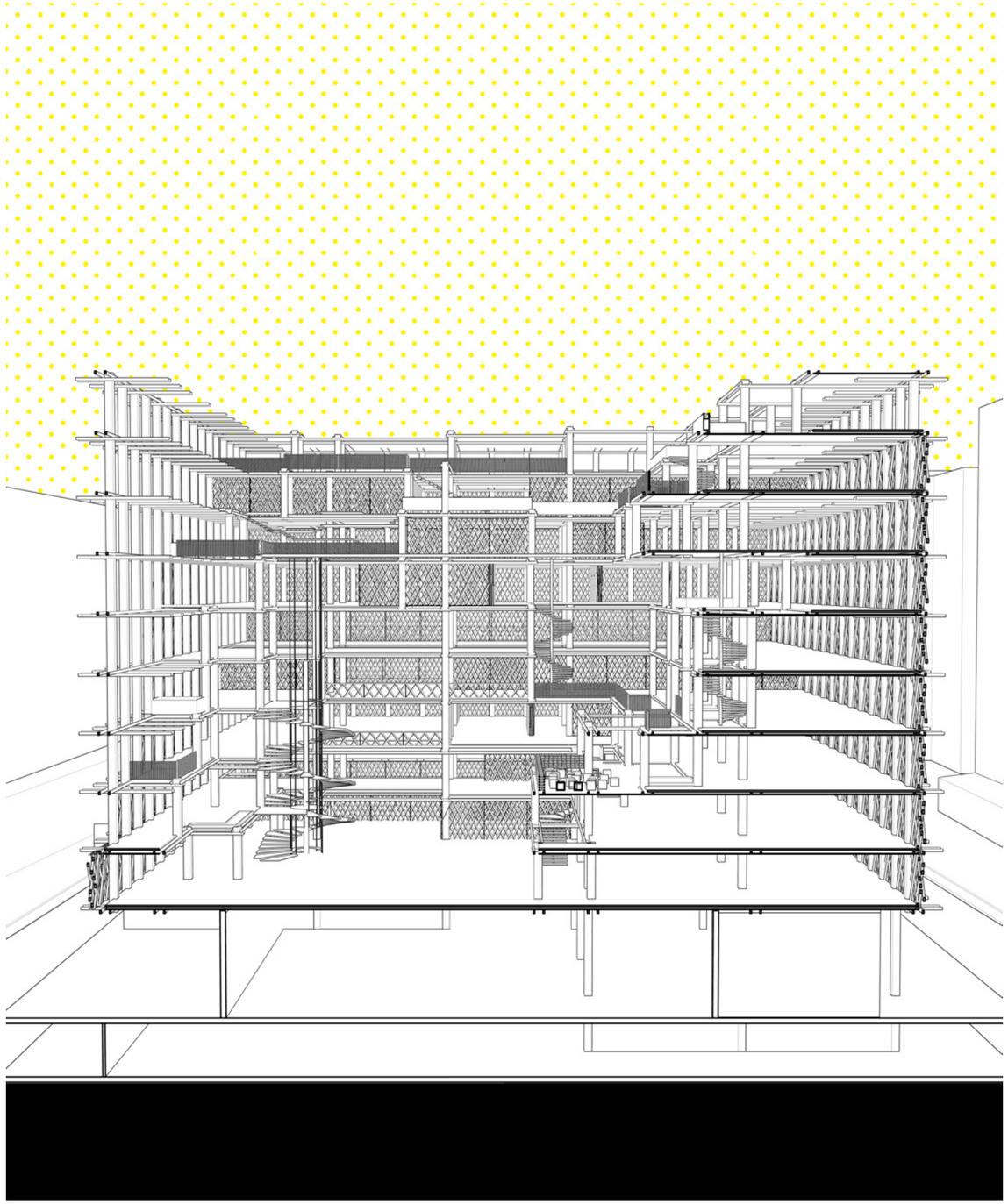


CULTURE COMMUNITY CENTER

DOWNTOWN WASHINGTON D.C.

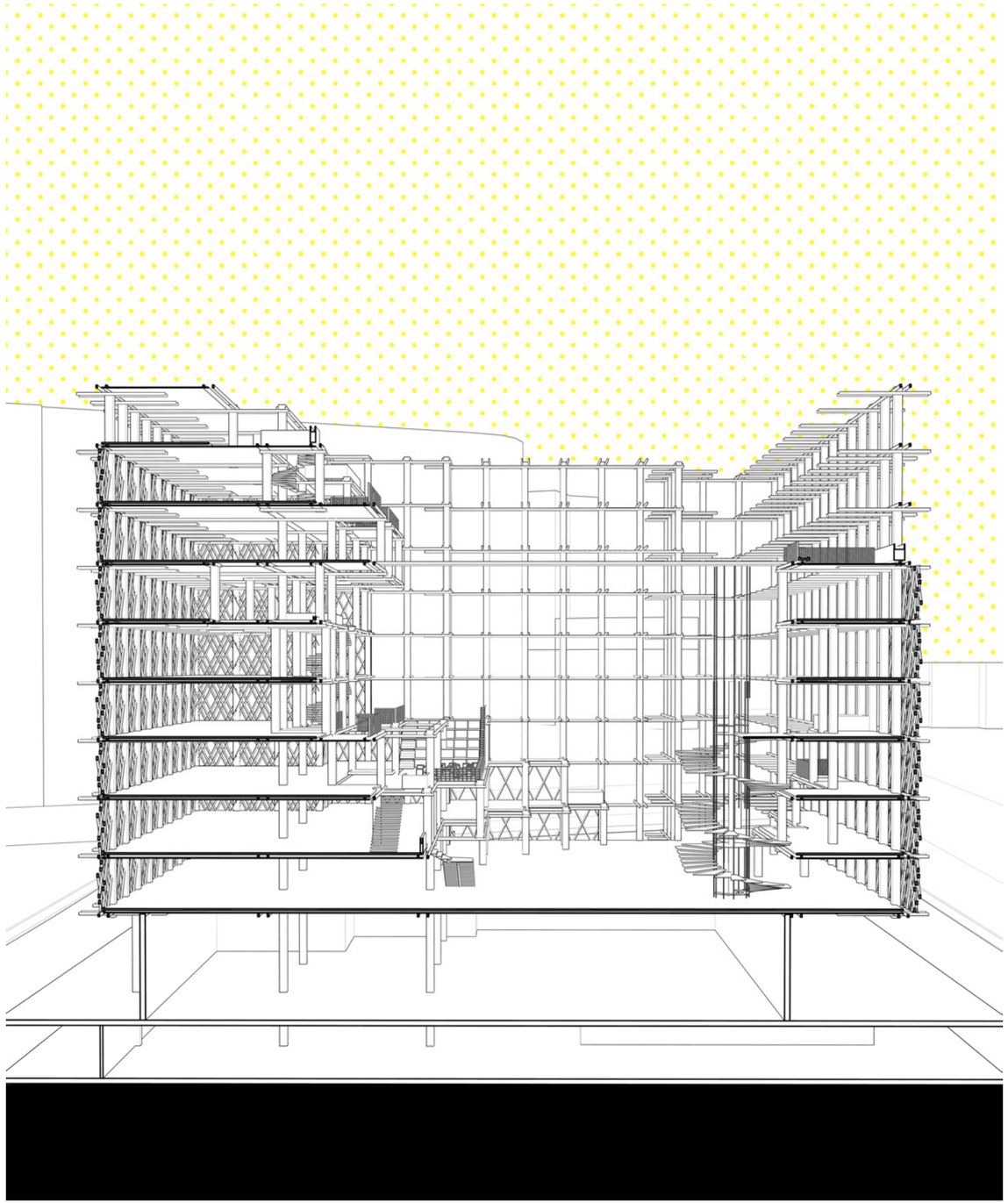
The space looking towards to the interior side of building. And veritcal cirulation guided people going throuth building. Espiecally, provied the great expeience in the graden. And the stairs connecting the interior and exterior space.

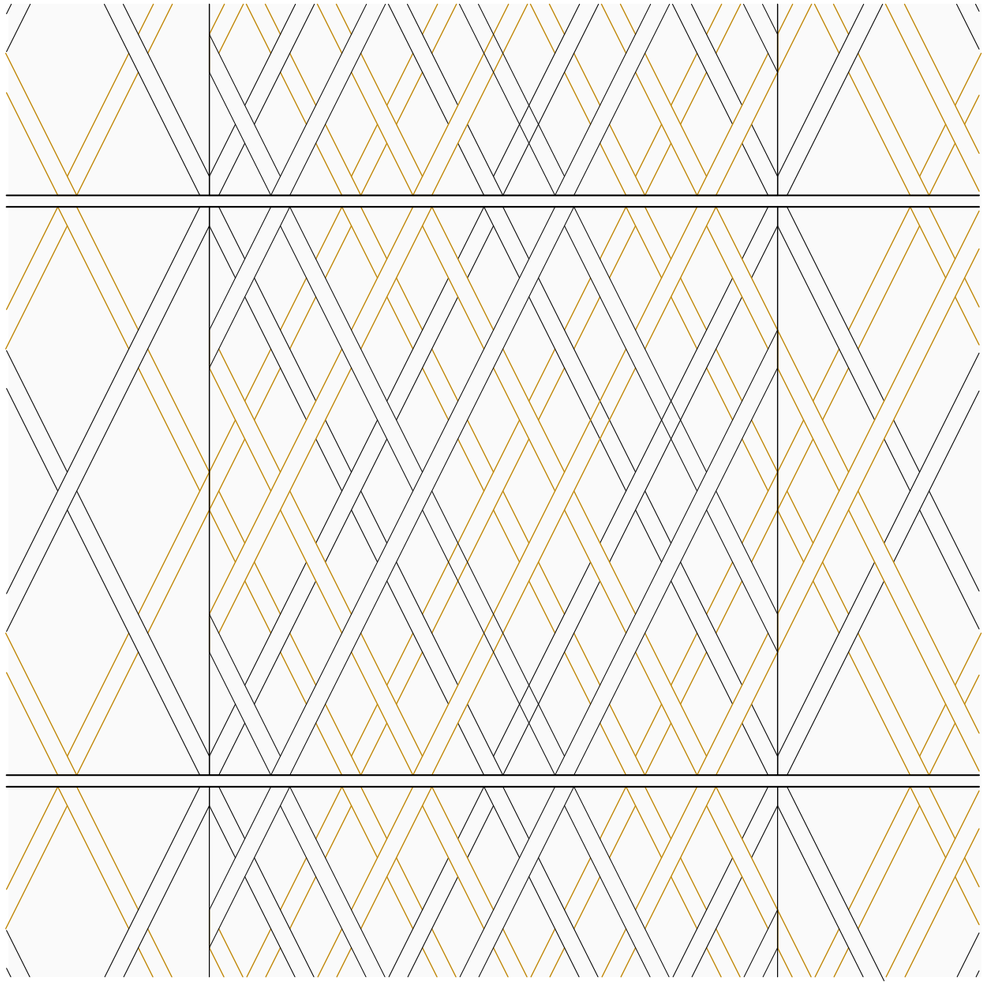
CROSS SECTION



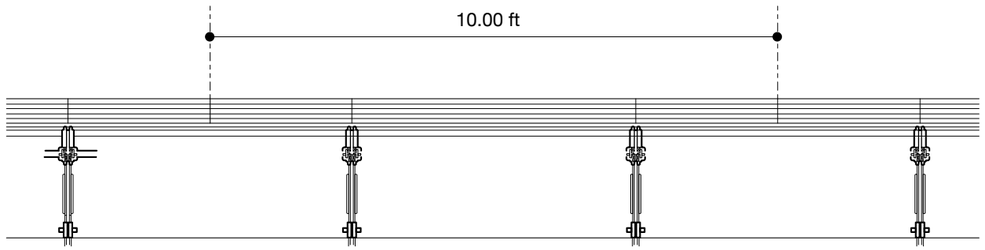
The view towards to the New York Ave which is one open conern allow people seeing the city view throuth garden .

CROSS SECTION

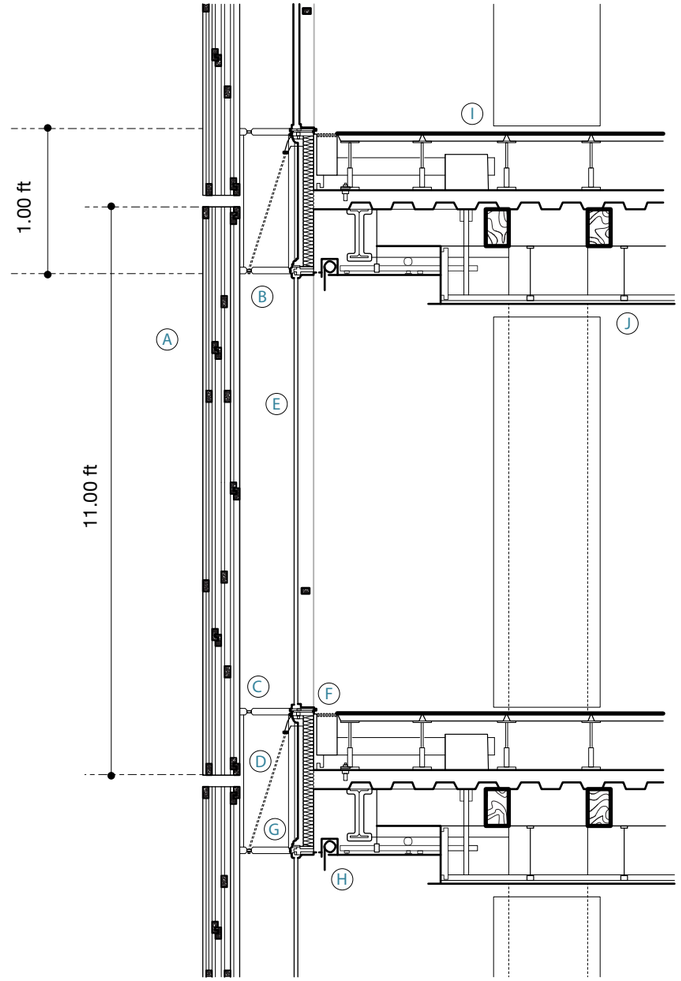




Partial Elevation

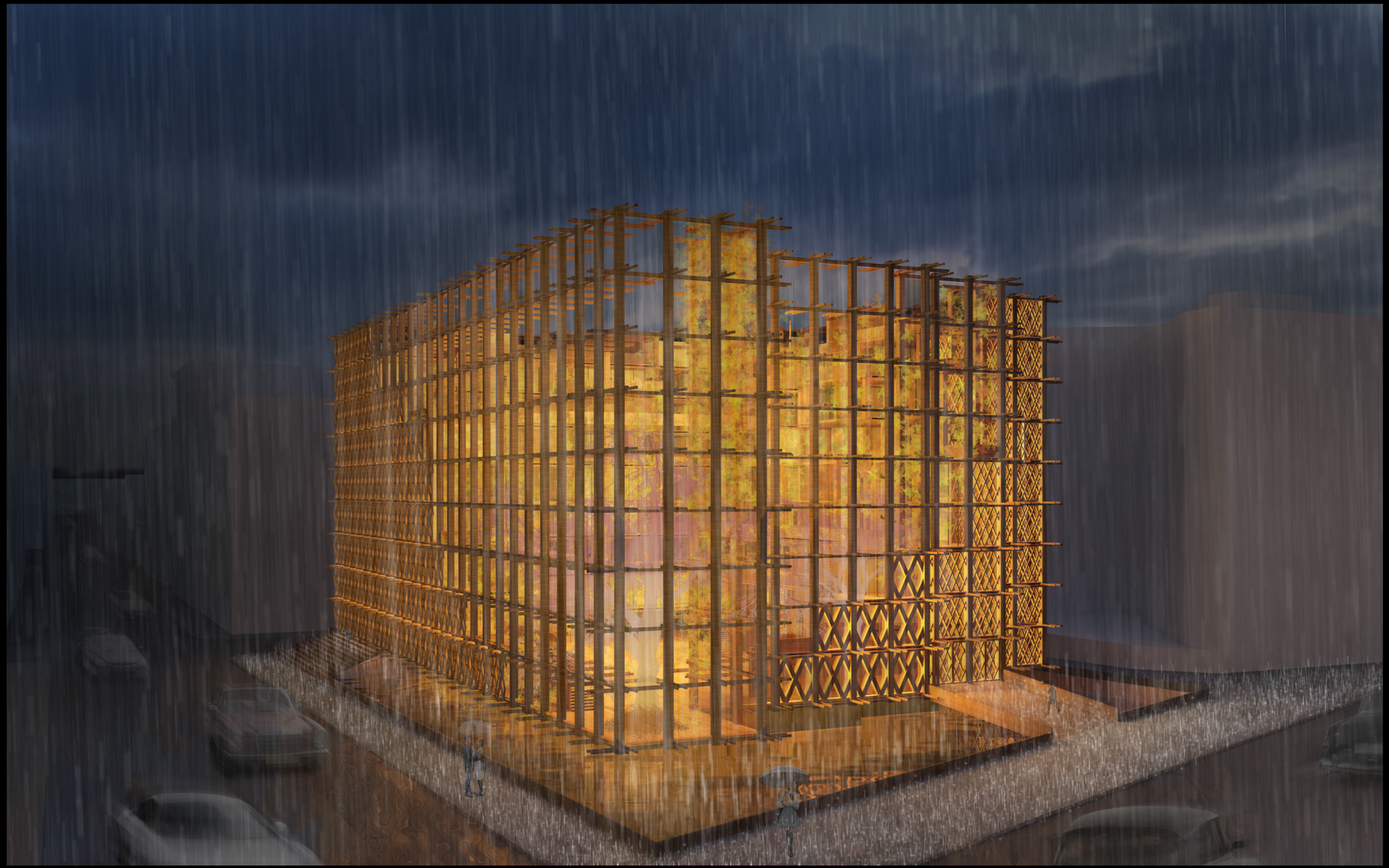


Partial Plan



Wall Section

- (A) Timever tubes facade with internal aluminum
- (B) Painted timber vertical strut
- (C) Painted timber horizontal strut
- (D) Wood suspension rod
- (E) Low-iron insulating glass with low- E coating
- (F) Painted extruded-wood unit frame
- (G) Painted timber spandrel panel
- (H) Automated internal shade
- (I) Raised floor over timber slab on deck
- (J) Suspended ceiling



CULTURE COMMUNITY CENTER

DOWNTOWN WASHINGTON D.C.

HALF FOOTFPRINT

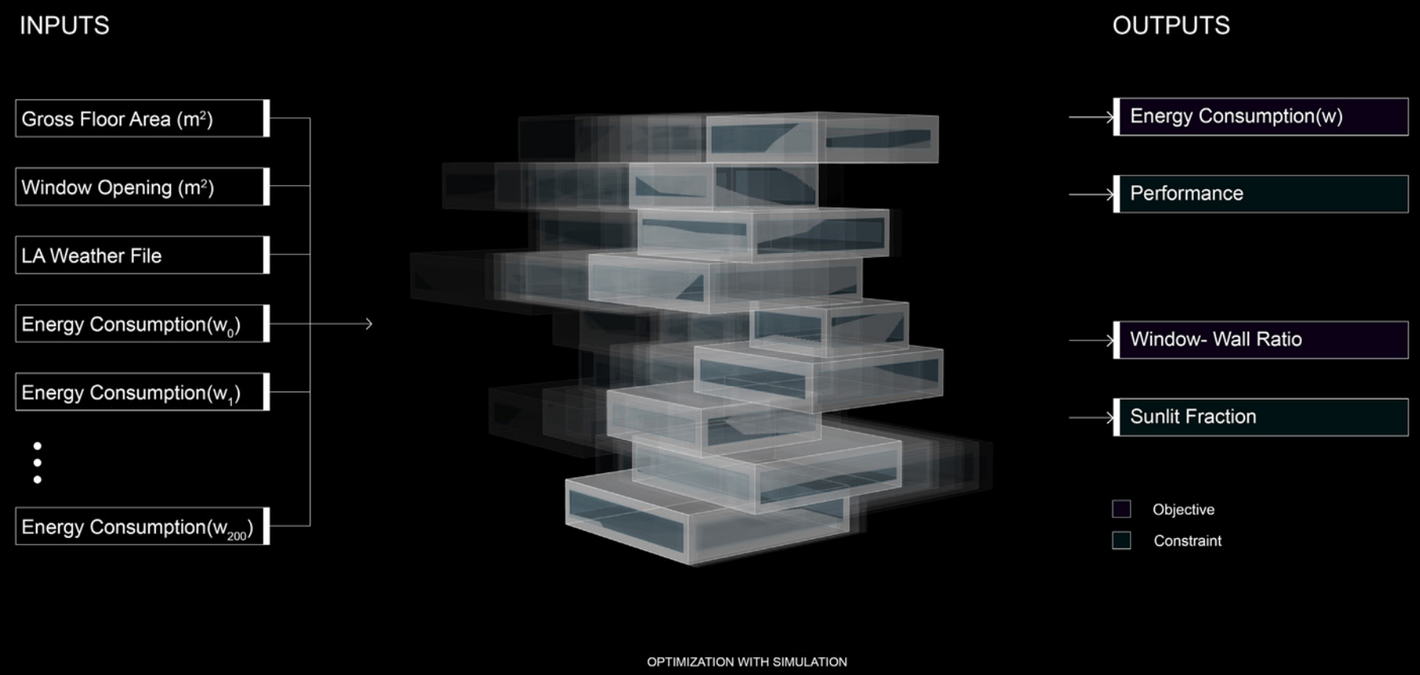
Project: Optimization & Simulation Research

Location: Building Energy Consumption

Professor: Danil Nagy

Year: SPRING 2020

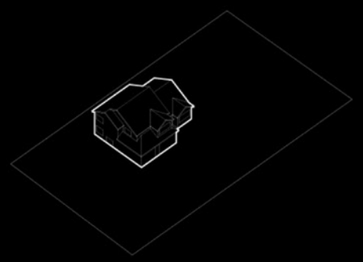
Designer: Luyi Huang, Xinglu Zhu, Shaolin Feng



HALF FOOTFPRINT

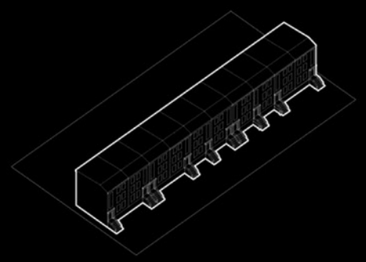
Annual Carbon Emissions per Household

Suburban



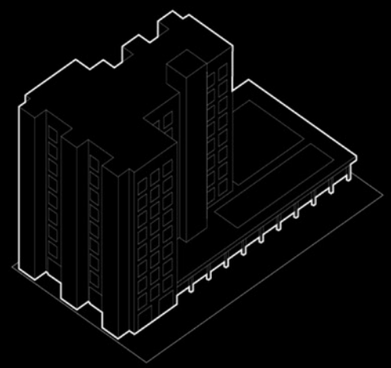
8.47 tons

Urban

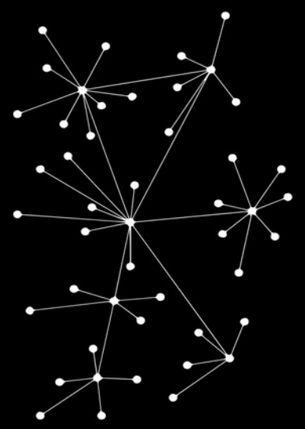


4.21 tons

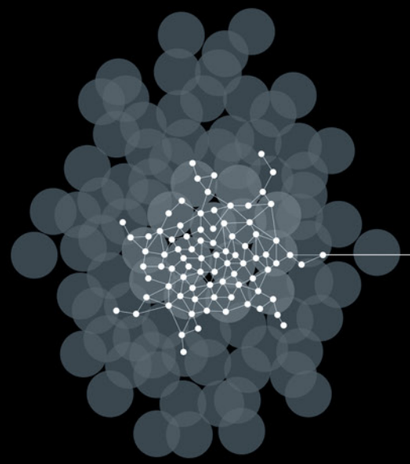
Carless Urban



1.29 tons

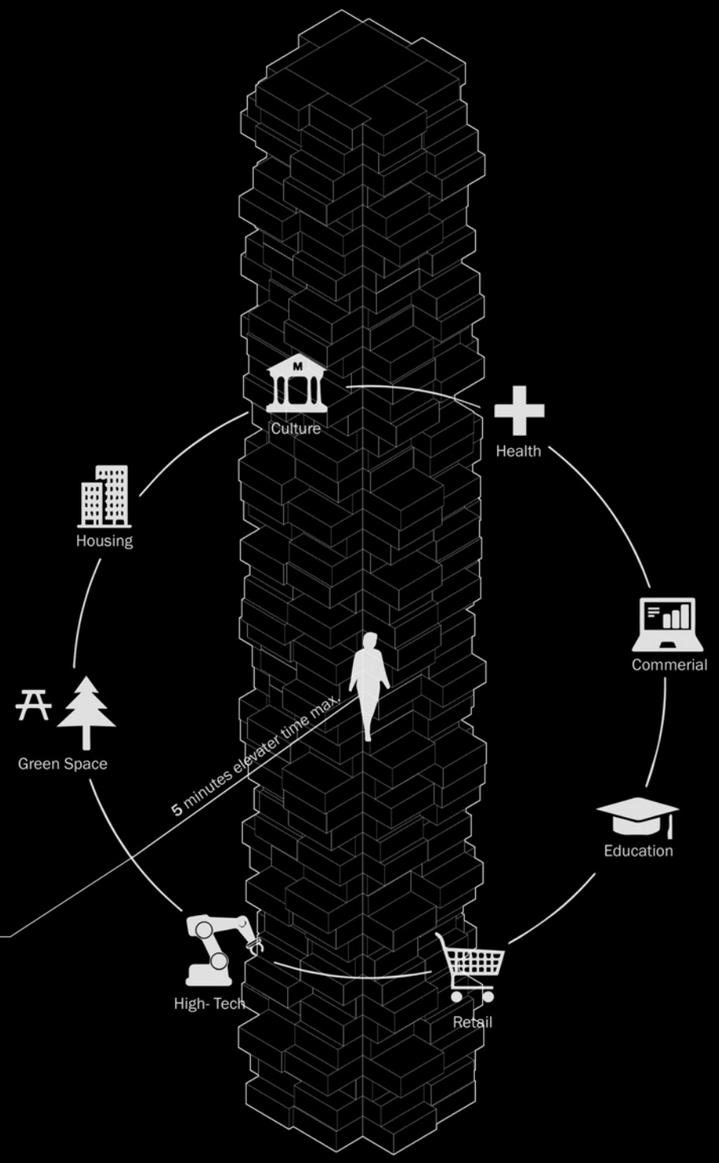


High Carbon Emission Urban Form



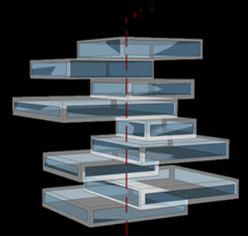
Low Carbon Emission Urban Form

Combined Urban Community



HALF FOOTPRINT

Generative Design for Architecture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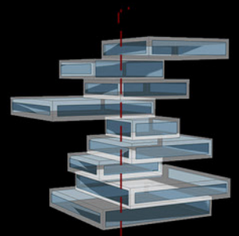
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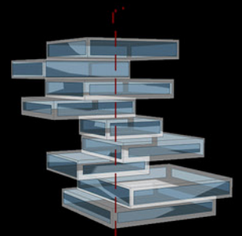
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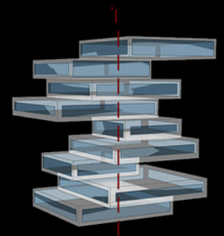
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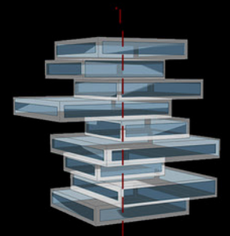
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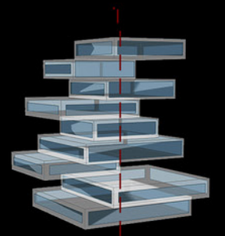
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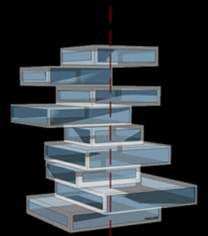
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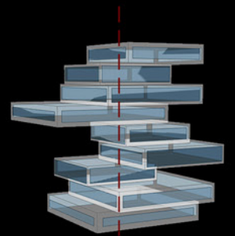
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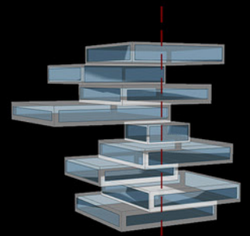
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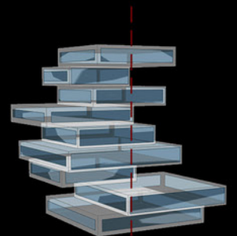
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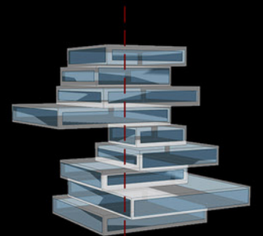
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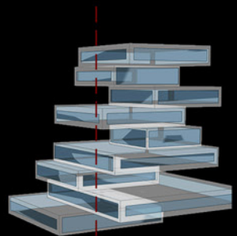
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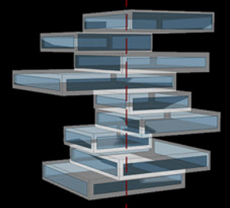
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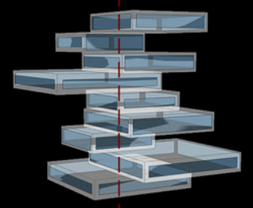
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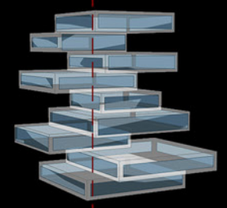
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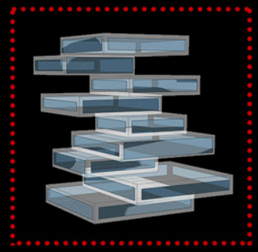
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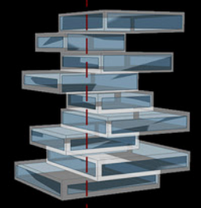
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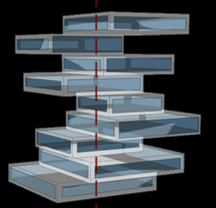
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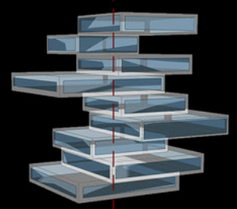
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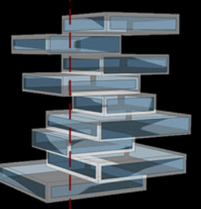
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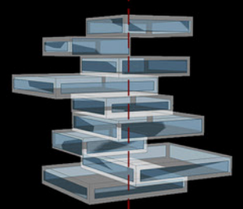
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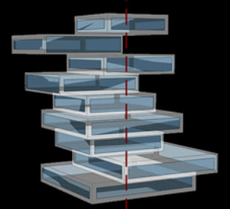
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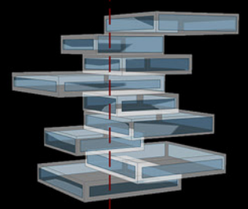
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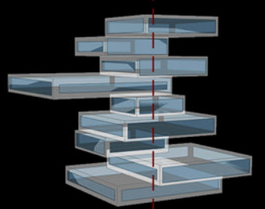
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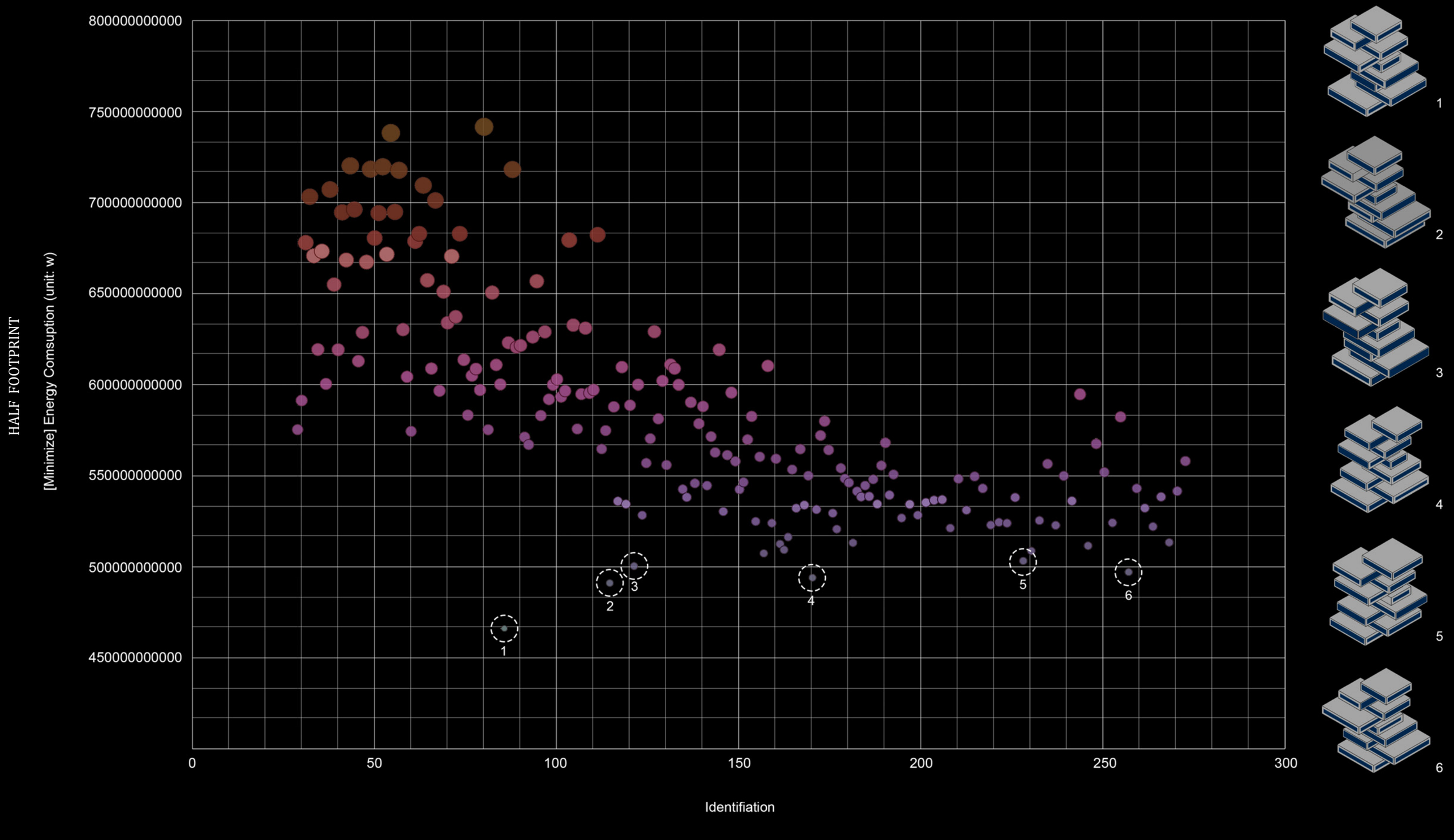
HALF FOOTPRINT

HALF FOOTPRINT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Identifiation
[Minimize] Energy Comsuption (unit: w)
HALF FOOTPRINT
1
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HALF FOOTPRINT