GSAPP PORTFOLIO

MS. Advanced Architectural Design ‘24
Pavitra Nayak

CONTENTS

1. REDnARCH Studio

CHARAS El Bohio / PS 64 Revival

Spring Semester - Advanced VI Studio
Instructors - Christoph Kumpusch & Patrice Derrington

The proposed project for the adaptive reuse of the CHARAS Community Center in NYC's East Village honors its rich history of community activism and artistic expression. Formerly a school turned into a hub for preserving neighborhood identity and advocating for affordable housing, CHARAS stood as a beacon against gentrification. The project seeks to continue this legacy by transforming CHARAS into a school/factory focused on building homes, particularly Accessory Dwelling Units (ADUs) for affordability and shelters for the homeless. Through comprehensive workshops, residents will receive training in homesteading and repair skills, empowering them to revitalize both buildings and the community. Moreover, the project addresses the prevalent issue of storefront vacancies by incorporating maintenance training to enhance cleanliness and neighborhood aesthetics. By engaging residents in hands-on activities that simultaneously address housing needs and neighborhood upkeep, the project fosters a sense of ownership and pride in the community's future. It embodies the ethos of reclaiming neglected spaces, preserving local identity, and empowering residents to actively participate in shaping their environment while combating the challenges of gentrification and homelessness.

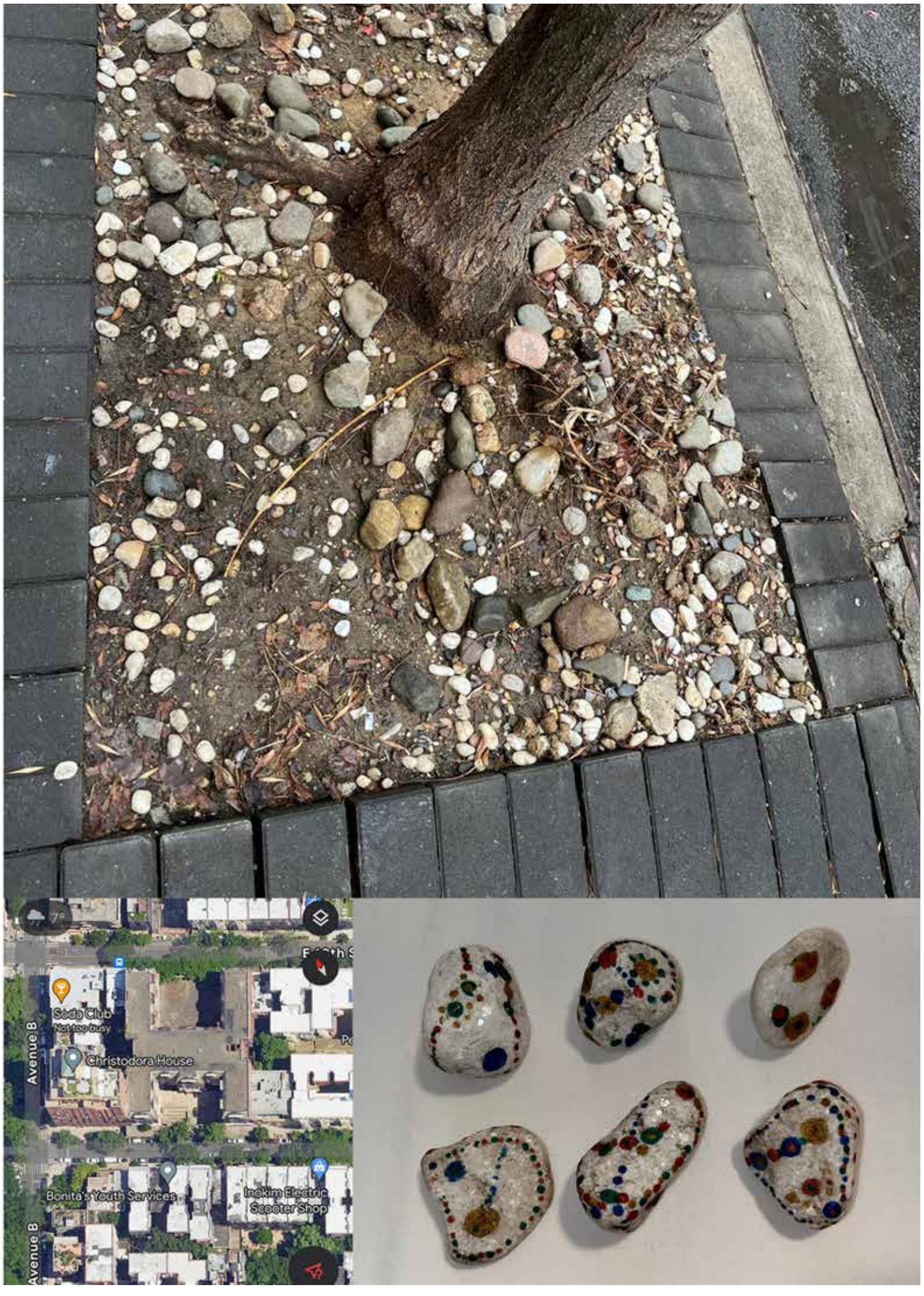

NYC Deli


'El Bohio Mu
CURATED
THRIVE COLL
@NYCTHRIVE
@PROJECTIV
#BRIN
LOISAIDA

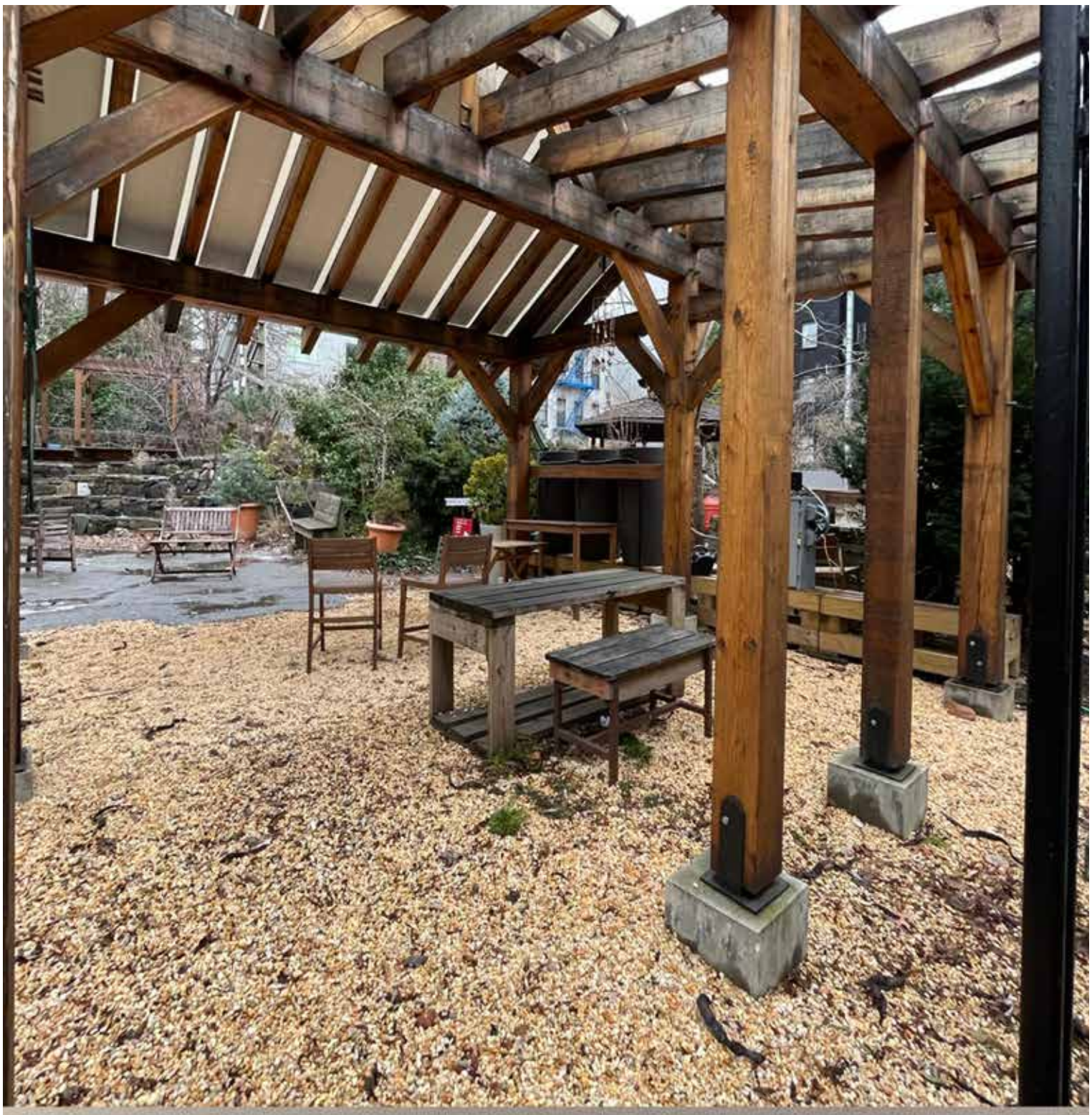

Lante


LIVING PROOF

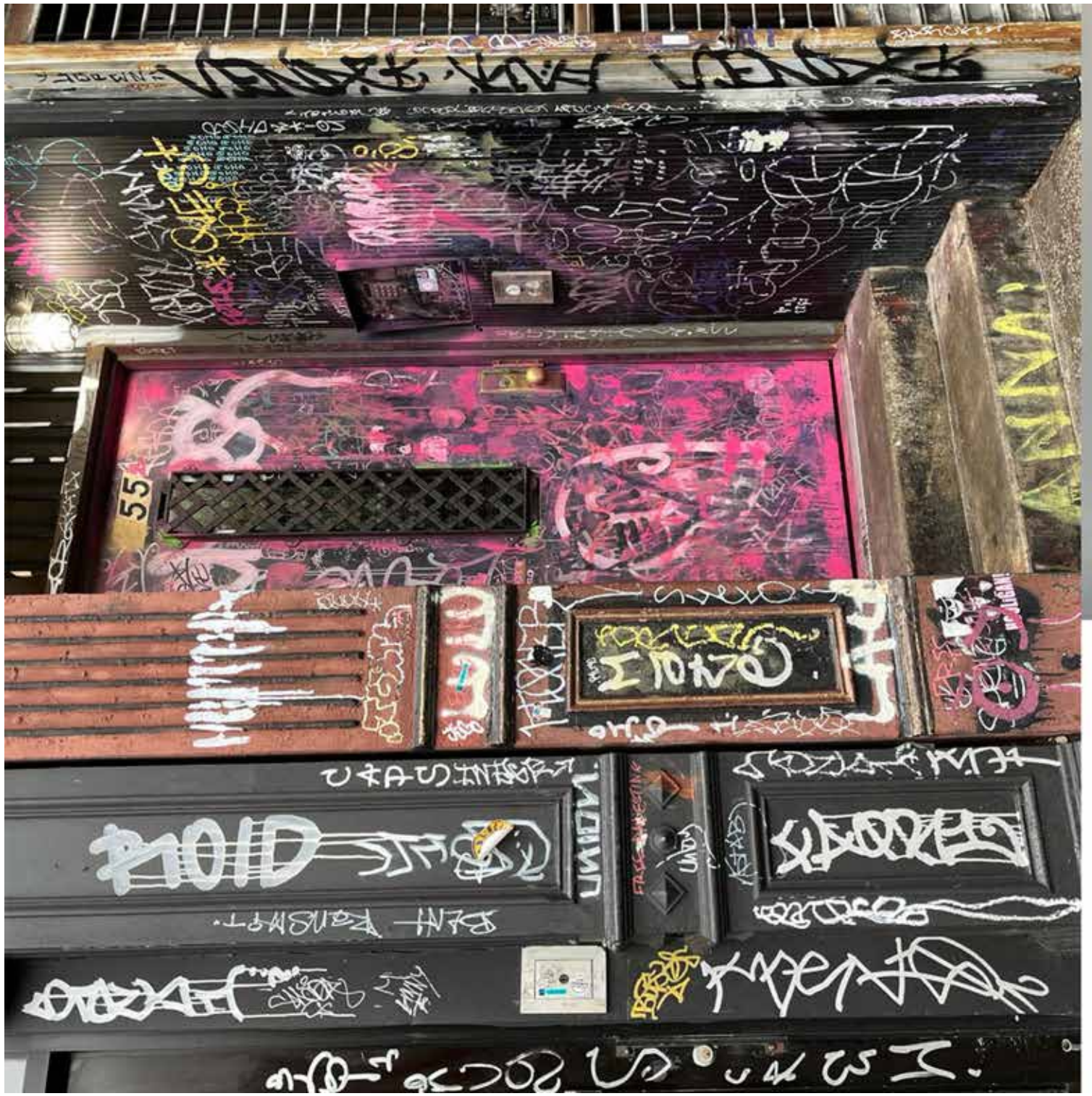

DEDICATED TO THE FOUNDERS
AND ALL THE
OVER THE YEARS
BIG


Soda Club
Christodora House
Bonita's Youth Services
Inokim Electric Scooter Shop
Avenue B
Avenue B


Soda Club
Not too busy
Christodora House
Avenue B
Bonita's Youth Services
Inokim Electric
Scooter Shop




E 10th St
Soda Club
Not too busy
Museum of Reclaimed
Urban Space (MoRUS)
The Cabinet Mezcal Bar
Entrance
Inokim Electric
Scooter Shop
La Casita
De Colores

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Museum of
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Space (MoRU
The Waylan
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E 11th St
E 10th St
The Summit Bar
Not busy
Soda Club
Not too busy
Inokim Electric


Authentic Mexican Cuisine
E 12t
Fiaschetteria
Avenue A
526 E 11th St
E 11th St
E 10th St
E 10th St
E 9th St


UTIO

HOUSING COMMUNITY ENVI

CHARAS

ACTIVISM =

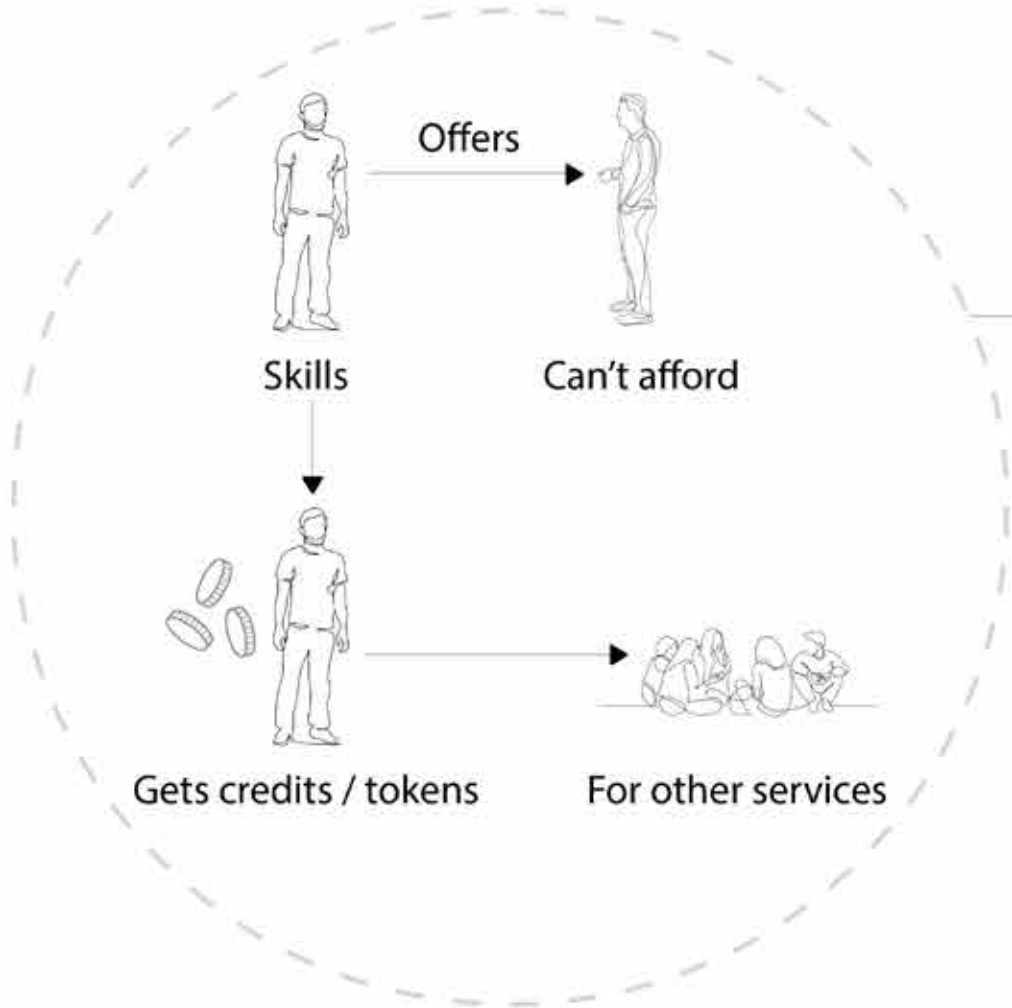
NEIGHBORHOOD PRESERV

ADOPT-A-BUILDI

HOMESTEADING

Platform for **Skills / Knowledg**

Exchange



Constructing Com

COLLABORATION

Trust,
mutual support
networks

SENSE OF **OWNERSHIP**

Hands-on care of public spac

(Peopl

Discourages vandalism and

Basement and Airshaft clean-up

Resource library

Space for
Single Mothers

ISSUE OF **STOREFRONT VACAN**

RONMENT

EDUCATION

WORKSHOPS, SKILL-SHARES

Educational needs of youth, specifically for
immigrants whose first language wasnt English

VATION

Reclaim space

Revitalizing neglected spaces

NG

October 1980, Second Building Project, New Roof

e Sharing

Skills

Expertise

Resources

Electrical and plumbing

mmunity

COMMUNITY

ECONOMIC EMPOWERMENT

SELF-SUFFICIENCY

ces

Sweat equity - reduction of expensive services -
cost saving - resource sharing

Demonstration area
e build their community)

Income generation

neglect

Property Value Enhancement

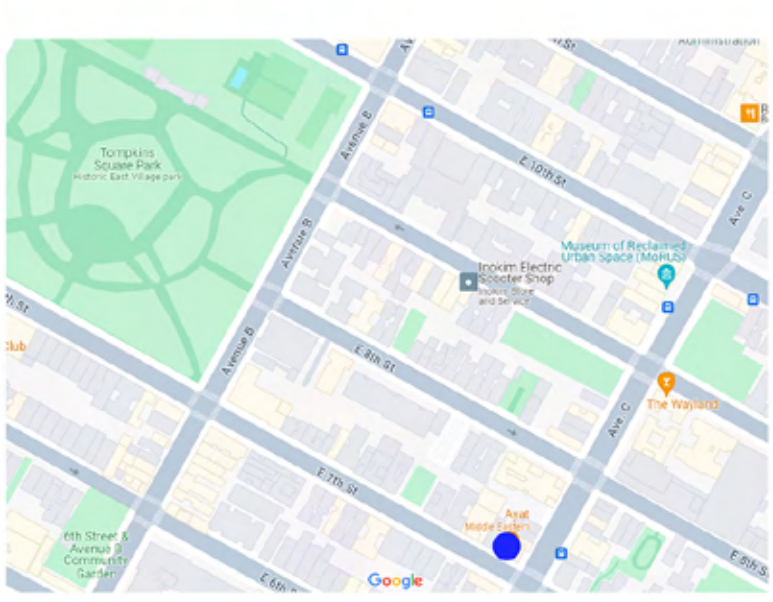
Autonomy -
To change demographics by involving
child-care amenities & building
necessary spaces

ICIES

USER 1 -

Yoonjai Choi
Columbia University Faculty

Lived in East Village since 10 years, two streets away
from the CHARAS building.
Currently lives in Stuy Town.



Reason for Moving -
Having a child. She felt the need for more space to raise a kid.
(Demographics - Does the East Village neighborhood exclude children and multi-family housing?)

Her Observations -
Diverse population - different economic groups living in the neighborhood from celebrities to plumbers
Her neighbors were artists and musicians.
Issues with Cleanliness and Maintenance - City doesn't take care of the neighborhood.
Transientness - Most people coming to the neighborhood are transient and hence, don't care for the spac
they treat it as a "rented-car."
Discrimination - The zoning district includes most of Manhattan as one zone and separates few
neighborhoods by splitting it into two - she feels like it wasn't drawn with good intentions.

What She Wants -
Cleanliness and Maintenance of the neighborhood - Like Chelsea has a Storefront Commission where
store-owners come together and invest into property management, East Village also needs one.
Space to Hang-out / a gathering space / libraries -
She feels like most of the restaurants are crowded and there isn't any space to just hang-out and gather
together. She comes from Korea where spaces like malls are seen as spaces you can go just to hang-out.
Spaces for Child-care for single-mothers who want to get some work done while taking care of their
children.

USER

David Soto
Community Organ

His mother was one of the unlis
Has been going there sinc
Organized the beautification
His Art Studio is right acr

What CHARAS did for him -
It kept him away from gangs and drugs and focused on
"This movement inspires people to stay away from thin
of empowerment through this art, through our culture.

What CHARAS means to him -
"- activating folks to get involved in their community, p

What he did for the community -
The abandoned building attracted neglect and vandalism
organize the beautification of the space along with Lois

2 -

(DASO)
izer and Artist

ted founders of CHARAS,
e he was 6 years old,
of CHARAS (graffiti),
oss from the building

the arts.
gs that can take your life and move you in a direction

olitics, activism through arts and culture."

n, garbage and lack of maintenance. He helped
aida, NYC Thrive and Projectivity.

USER 3 -

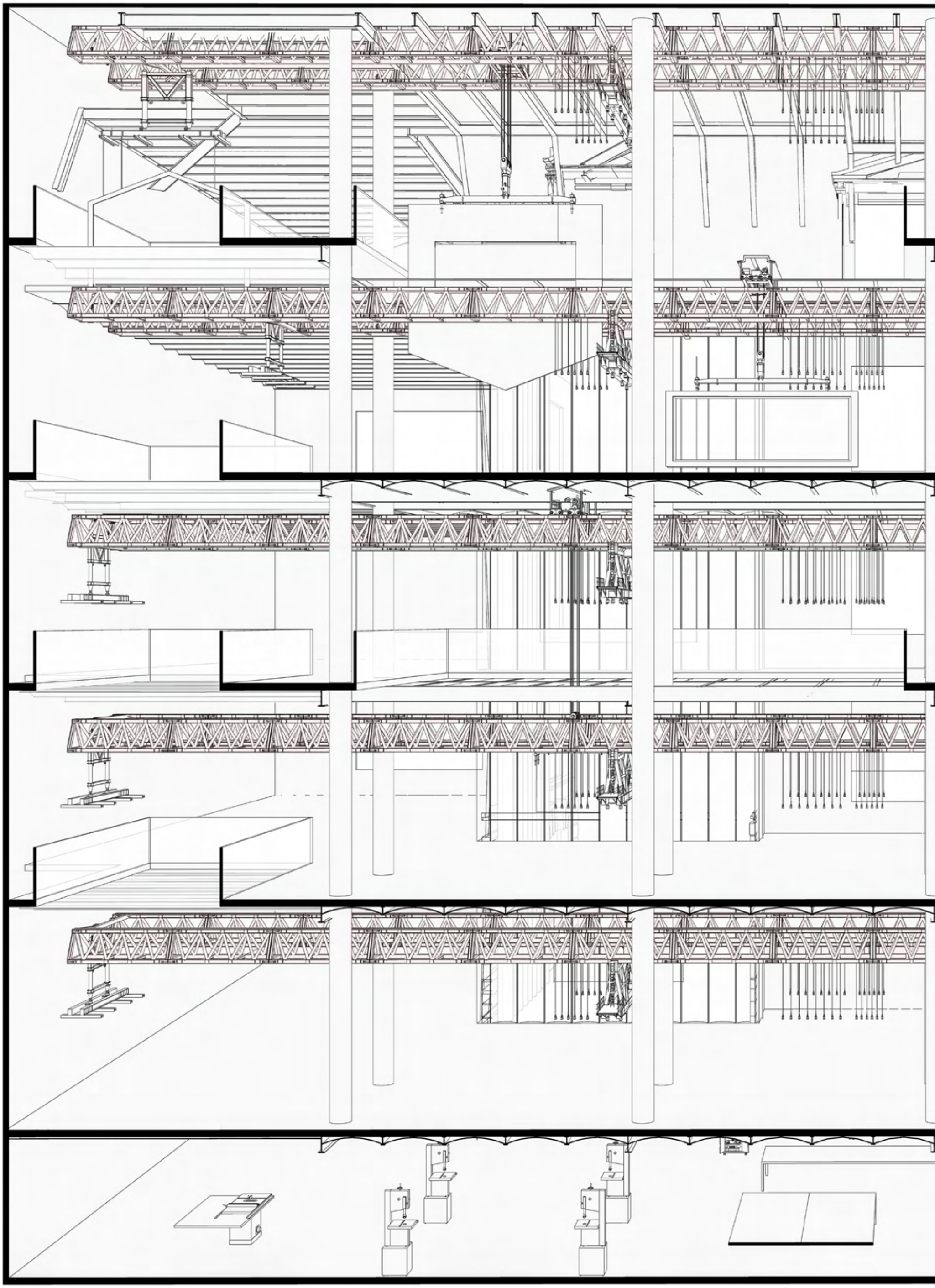
Lisa Ramaci
Antiques Dealer

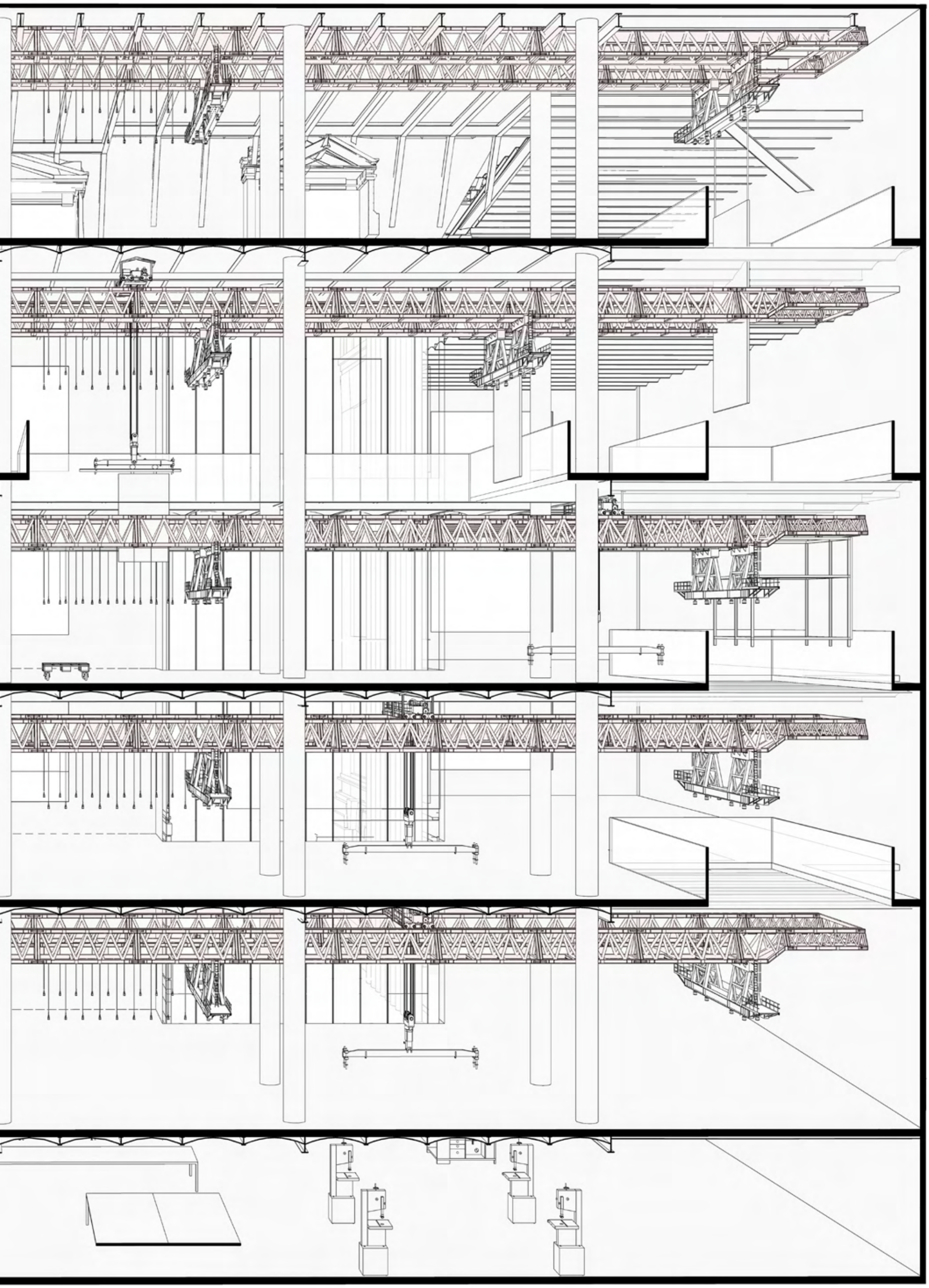
Homesteaded her property in East Village

Homesteading -
She homesteaded her property in East Village, and fixed the abandoned building by self-training with other members.

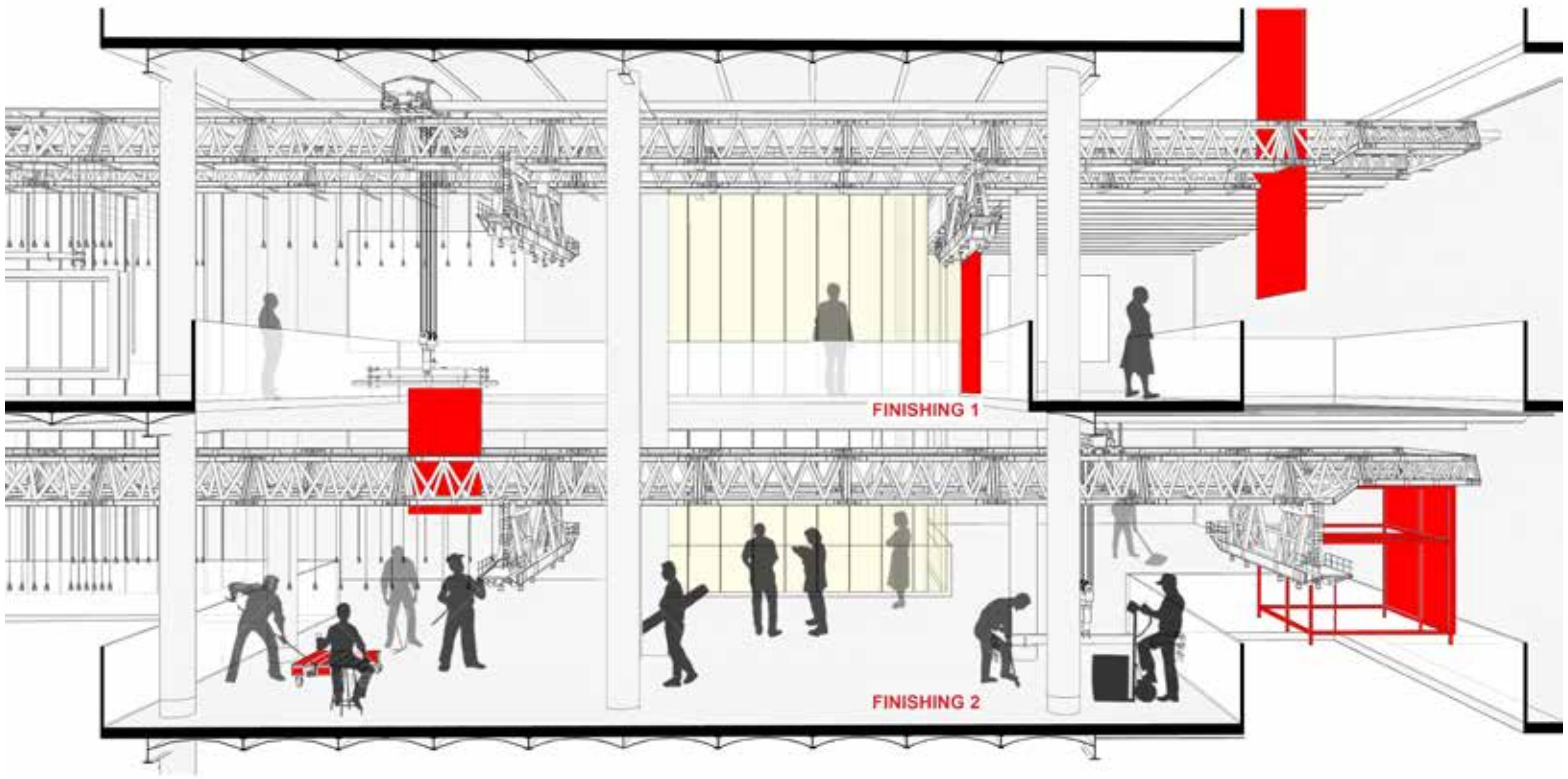
History -
She endured Alphabet City's perilous days and, with her neighbors, turned her apartment into a livable space through sheer determination

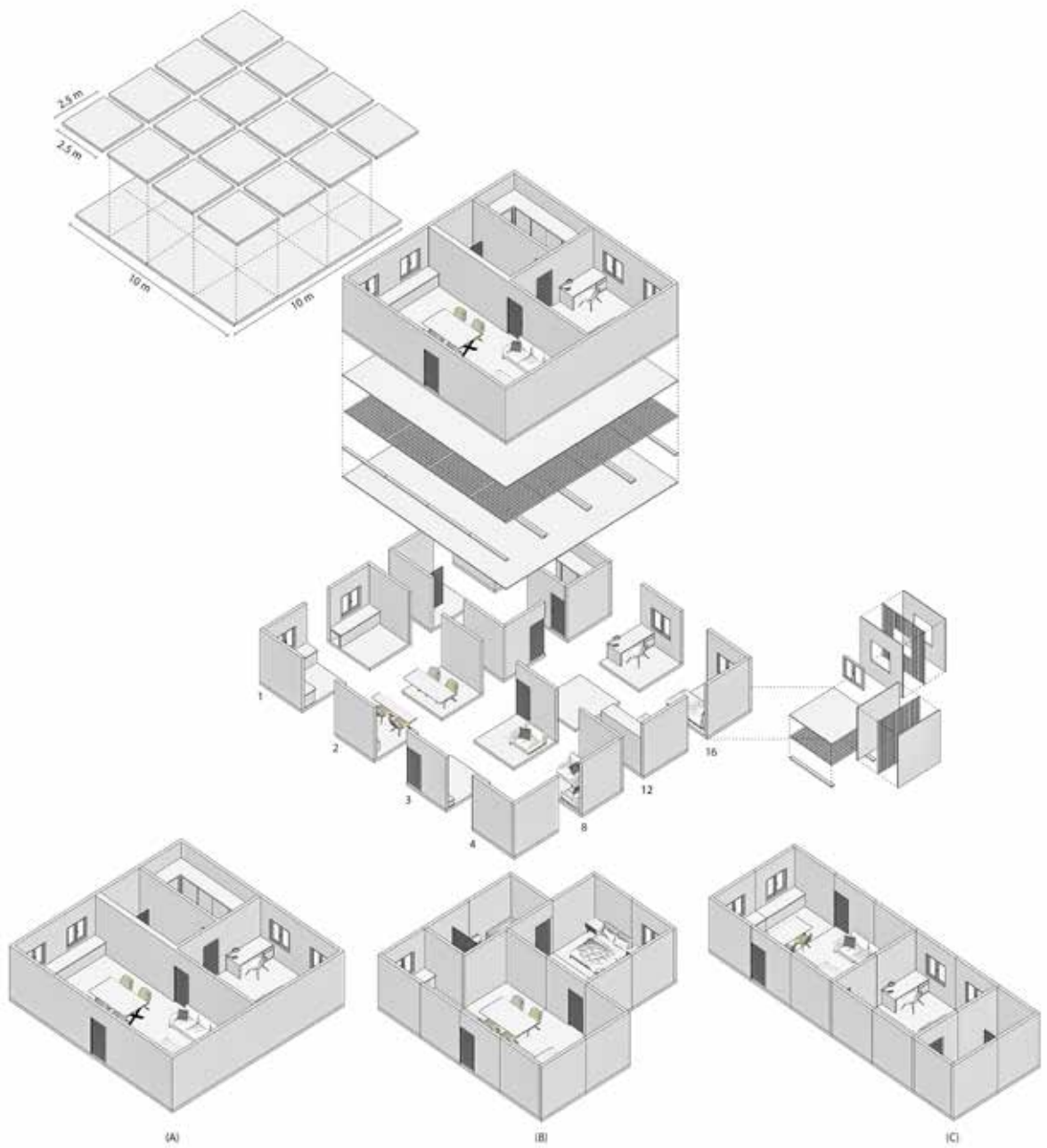
People Constructing their own Community -
Citizens coming together to construct their own community, fostering a sense of belonging and solidarity, taking ownership of a place.

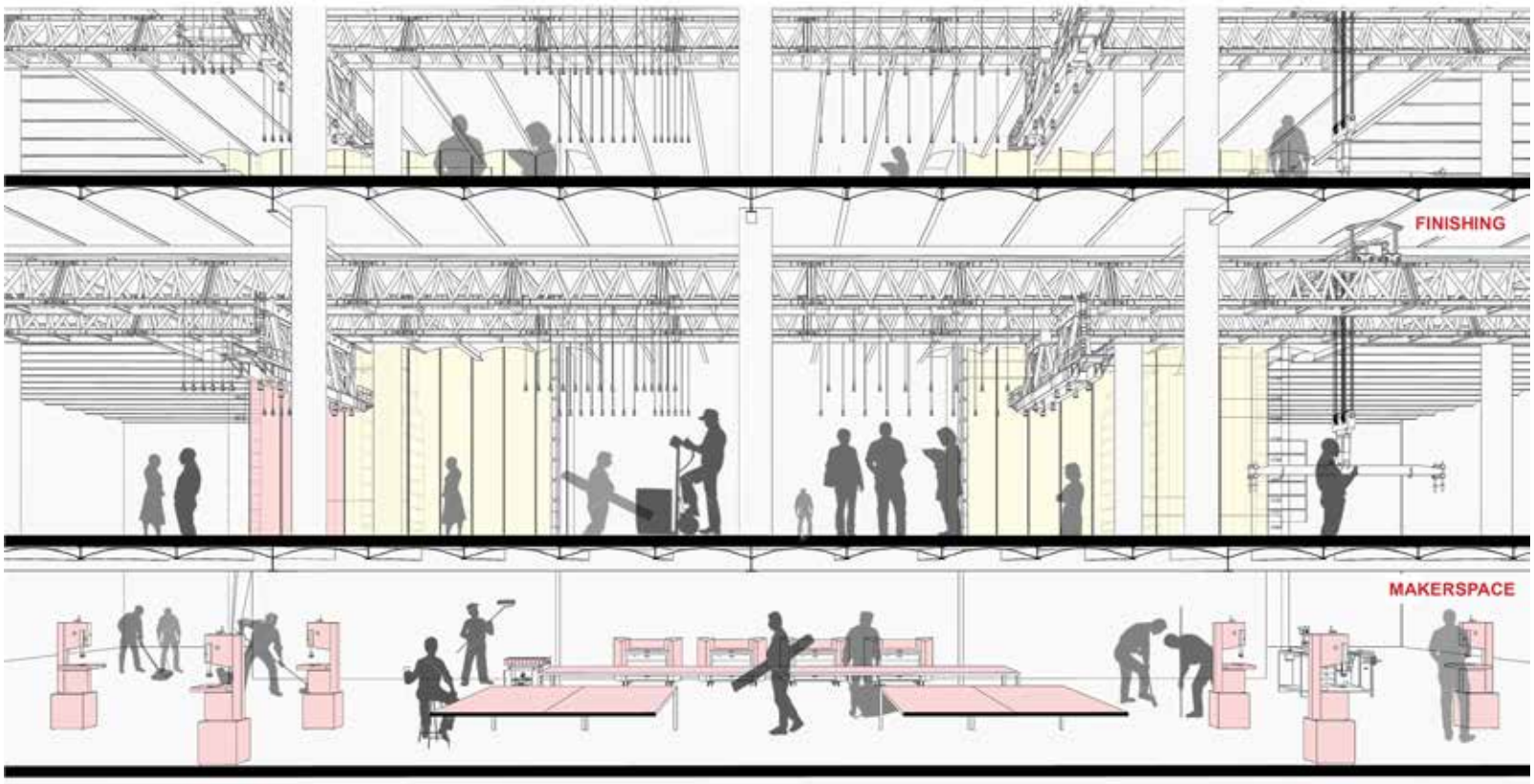


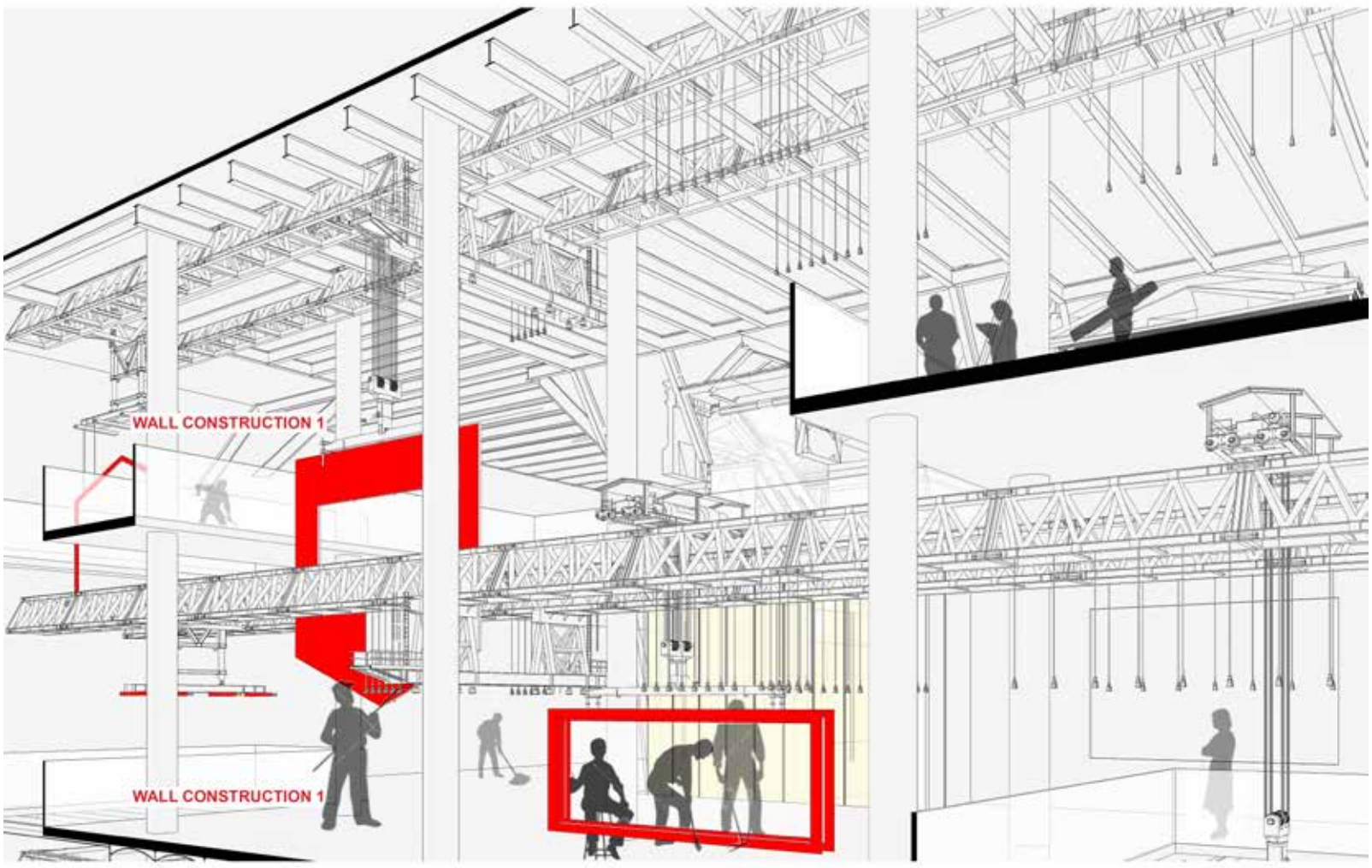


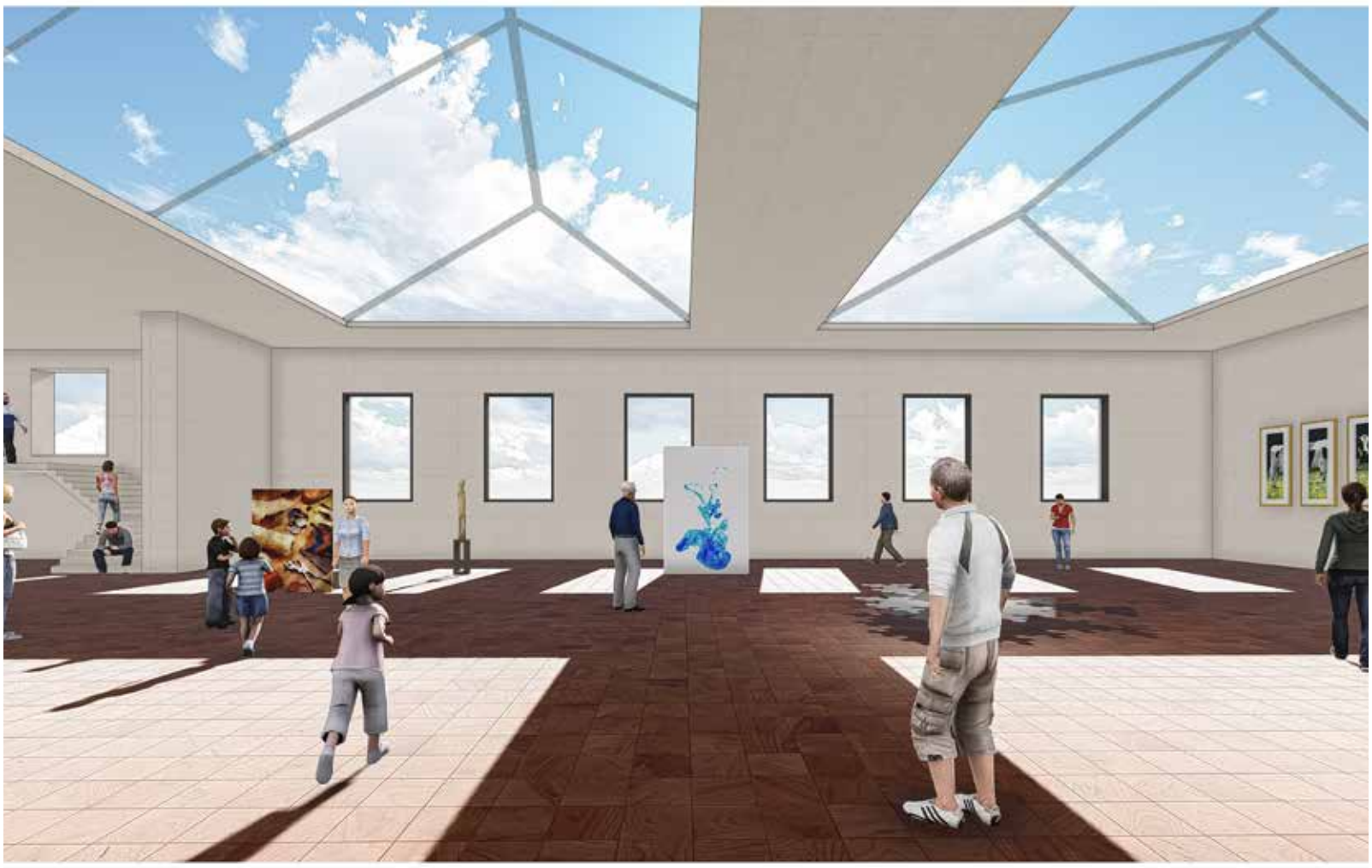

CHARAS
EL
BOHIO

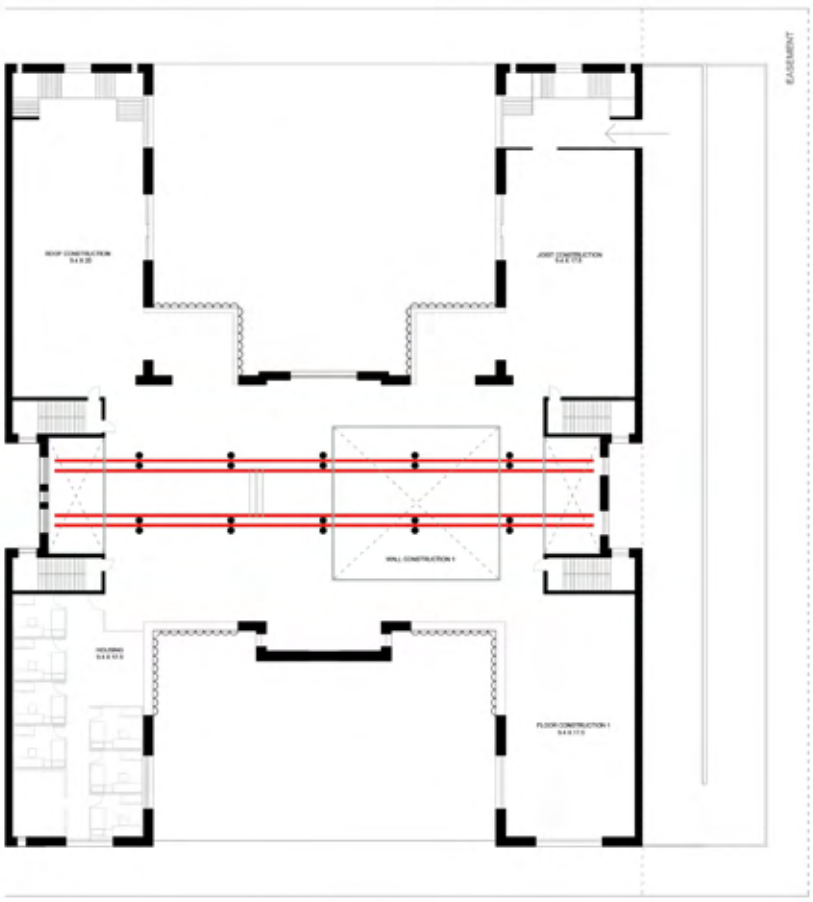

FINISHING 1
FINISHING 2


2.5 m
2.5 m
10 m
10 m
1
2
3
4
8
12
16
(A)
(B)
(C)

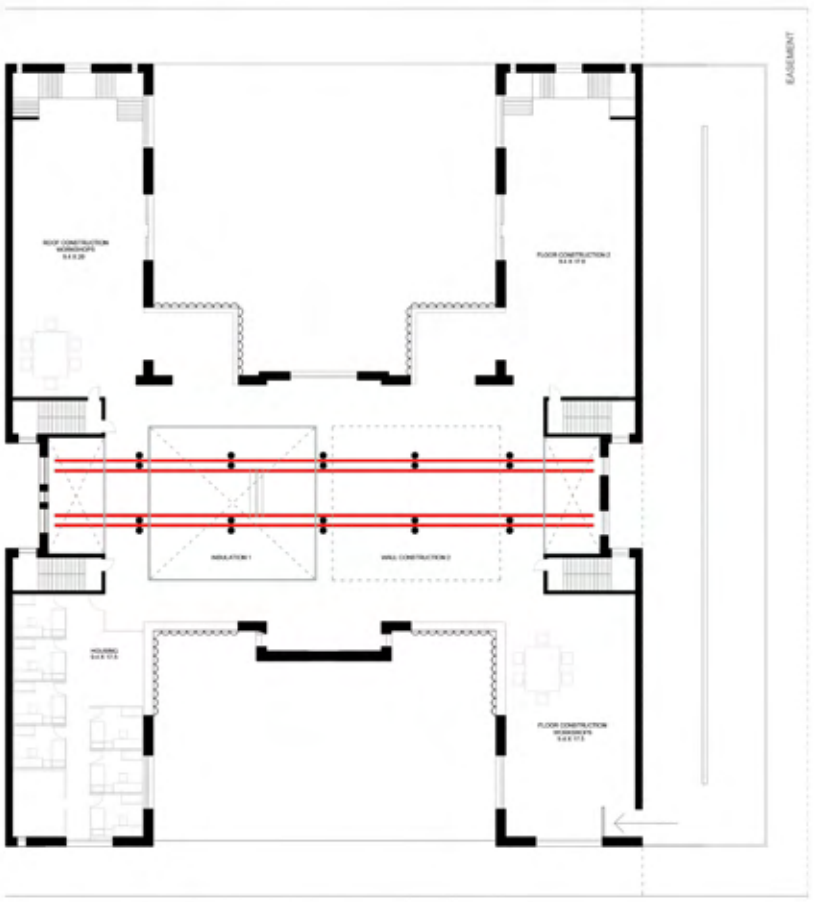

FINISHING
MAKERSPACE


WALL CONSTRUCTION 1
WALL CONSTRUCTION 1

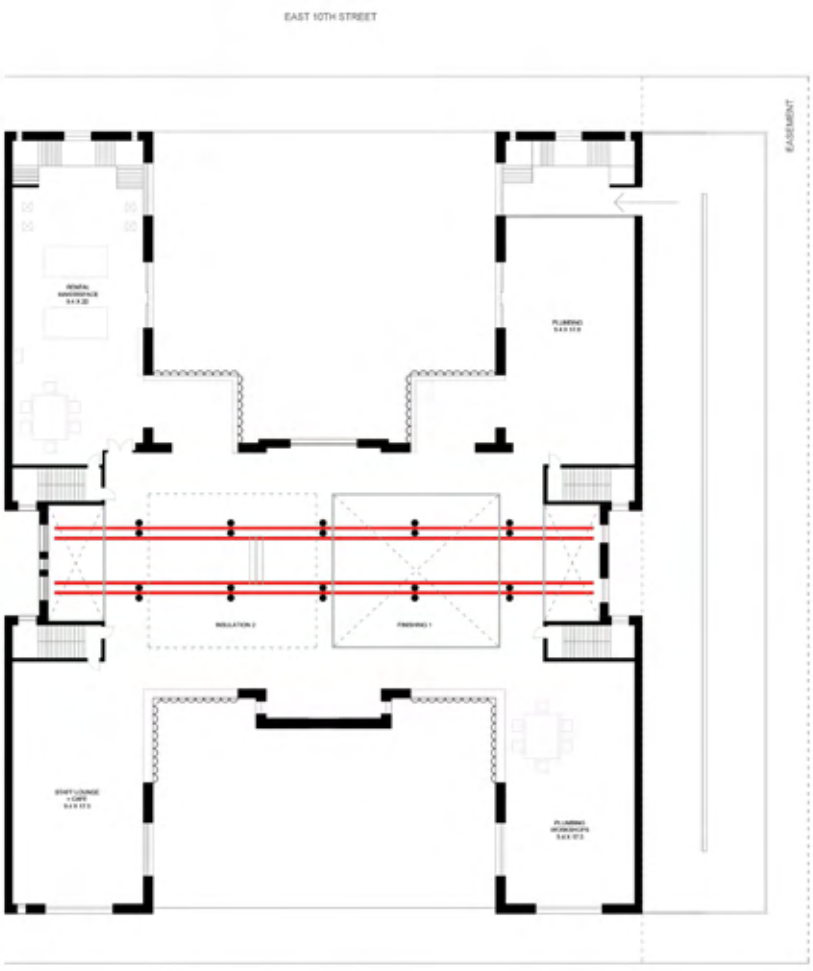




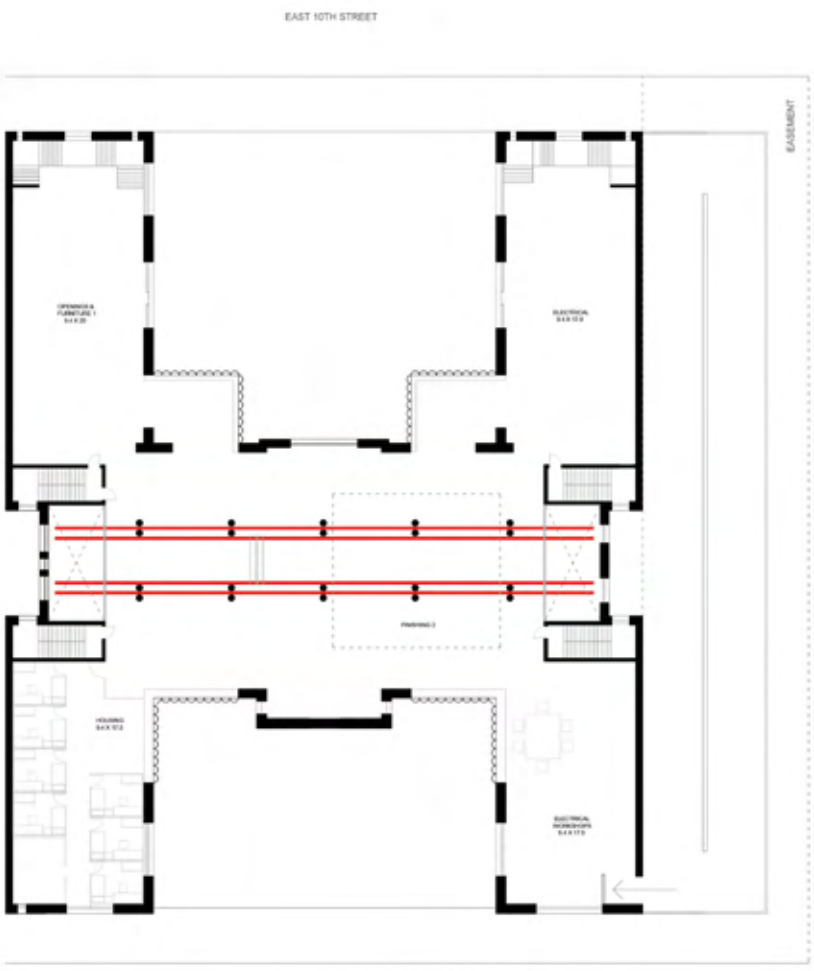
FOURTH FLOOR PLAN



THIRD FLOOR PLAN



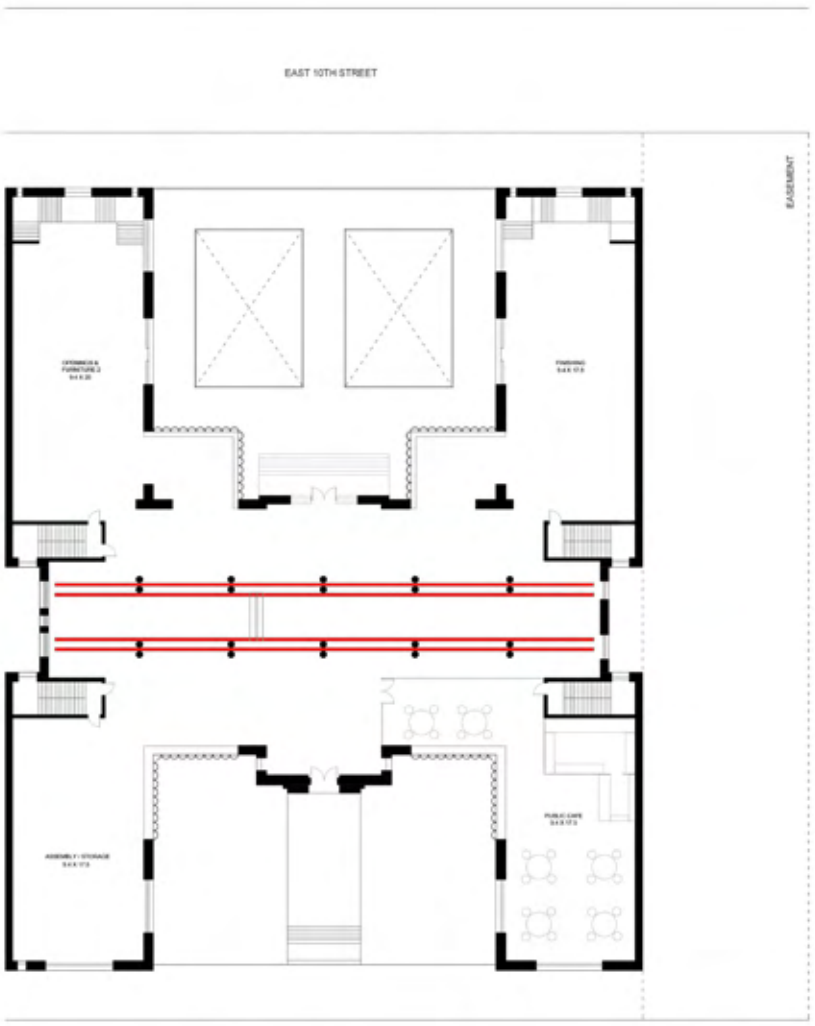
SECOND FLOOR PLAN



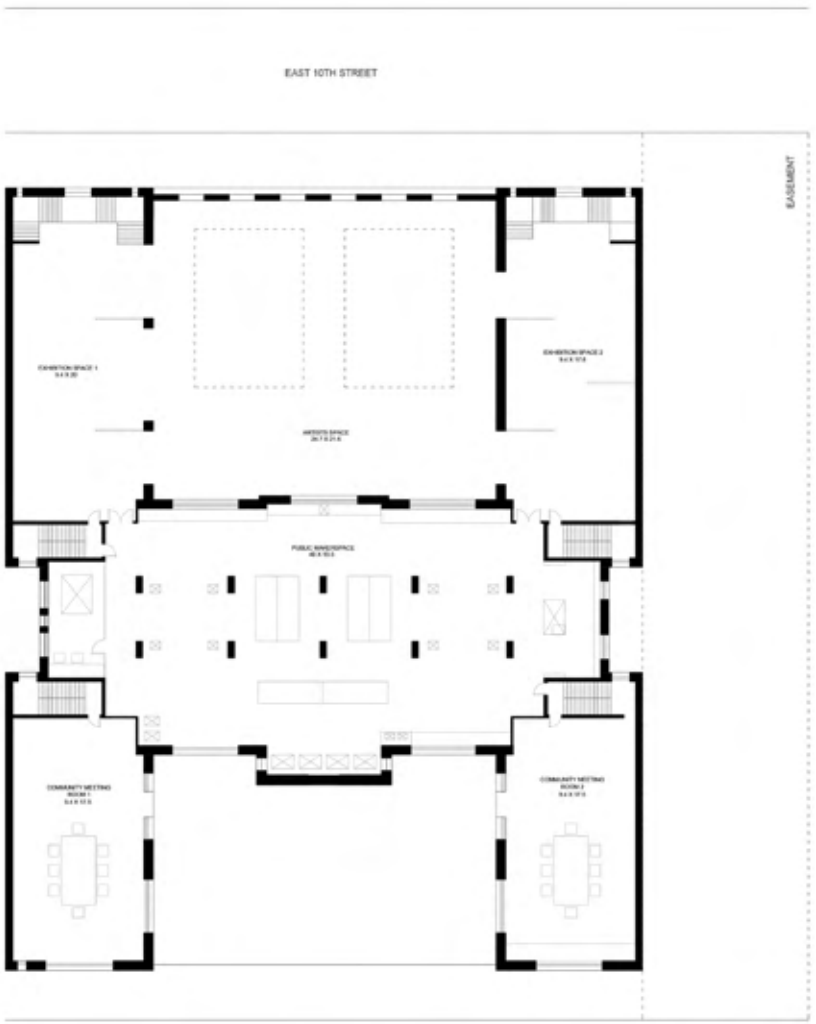
FIRST FLOOR PLAN


WE WILL
RECLAIM
THE
LAND


WE WILL
RECLAIM
THE
LAND

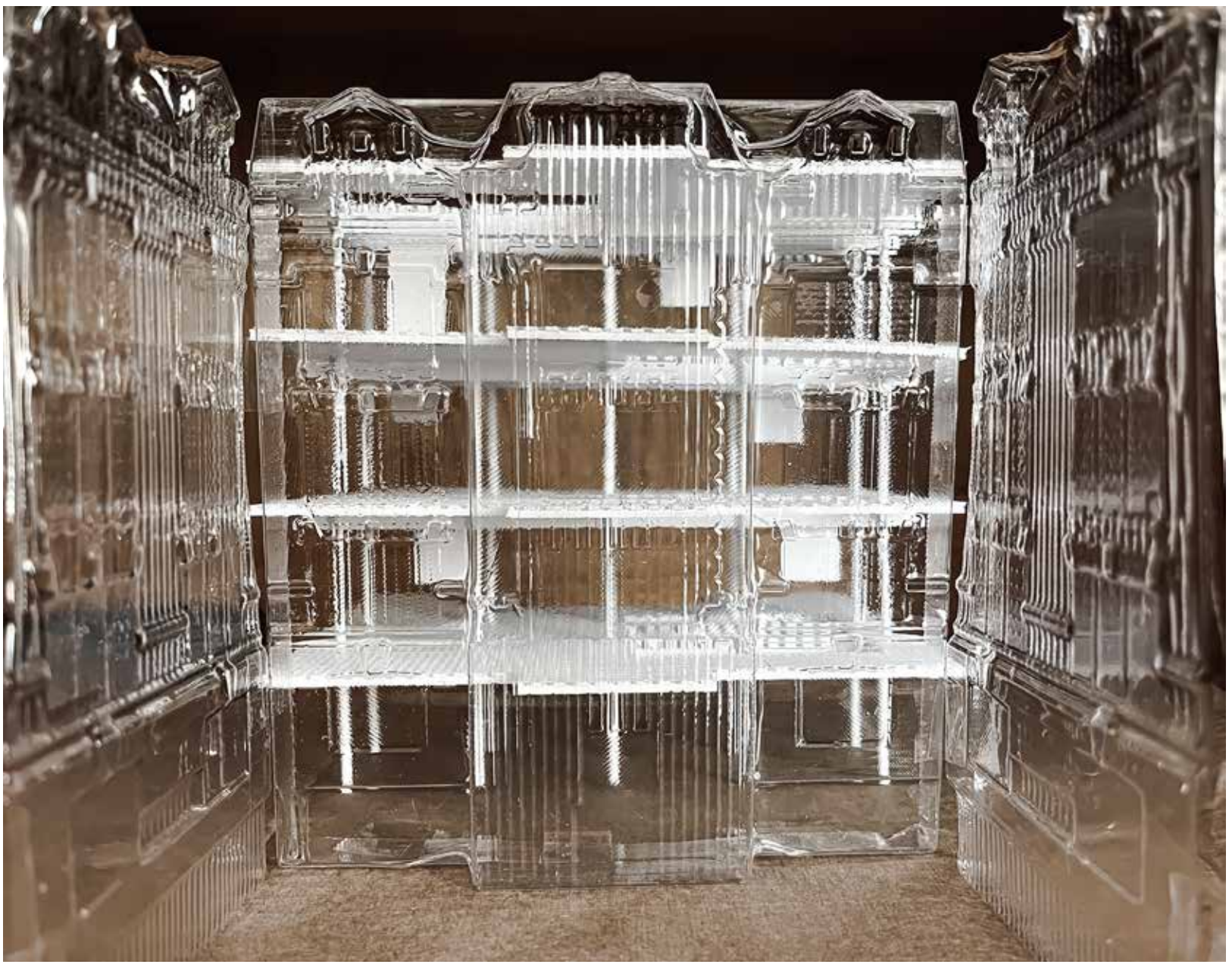


GROUND FLOOR PLAN



BASEMENT FLOOR PLAN


WE WILL RECLAIM THE LAND

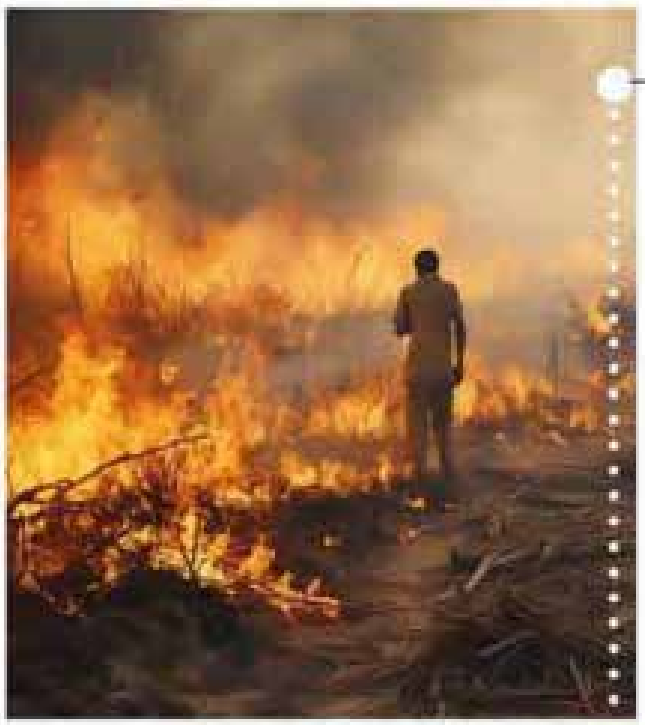


2. RESET Studio

Transforming Agricultural Waste into Sustainable Educational Infrastructure in India

Fall Semester - Advanced V Studio
Instructors - David Benjamin, Maclane Regan

The commitment to limiting temperature rise to 1.5 degrees Celsius is not merely an obligation; it is an irrevocable pledge to preserve ecosystems & mitigate impacts. With the global population set to reach 10 billion by 2050, the monumental task of constructing 13,000 buildings daily for the next 30 years beckons. India, the second largest agriculture-based economy with year-round crop cultivation, generates a large amount of agricultural waste, including crop residues. Although most of it is used as fodder or for energy production, approximately ninety-two million metric tons of crop waste is burned every year. Small-scale farmers facing economic constraints resort to burning as a cost-effective method for field clearance. Burning releases significant quantities of greenhouse gases that trap heat, pollute the air and produce black carbon which is a potent climate forcer. It also makes soil lose its ability to sequester carbon. This aggravates drought conditions and alters climate patterns.
Transforming agricultural waste into sustainable bricks for construction not only upcycles the waste, preventing it from becoming greenhouse emissions but also offers farmers an additional source of income



CROP BURNING

POTENTIAL MATERIAL

EXPERIMENTATION

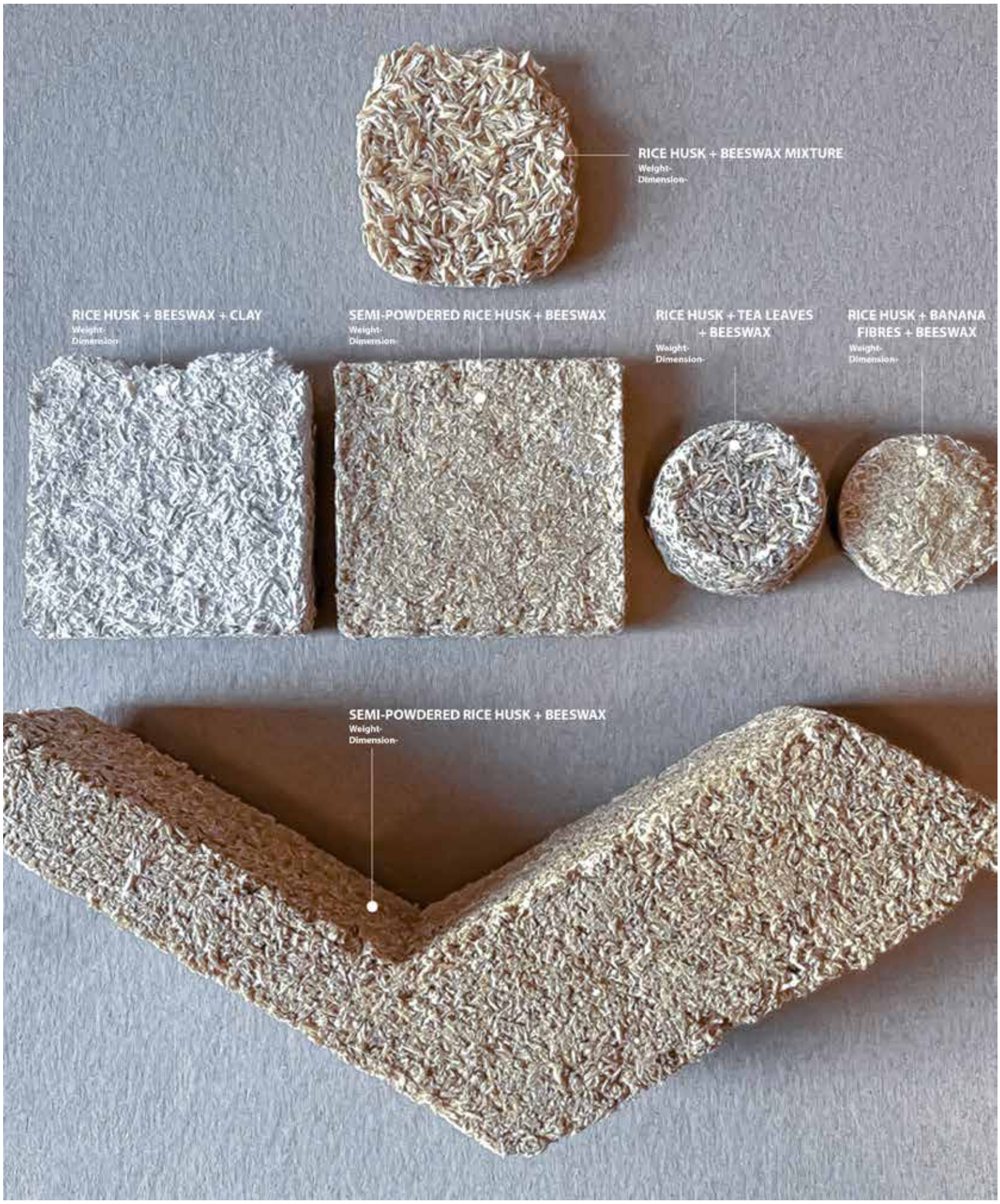
MANIFESTATION

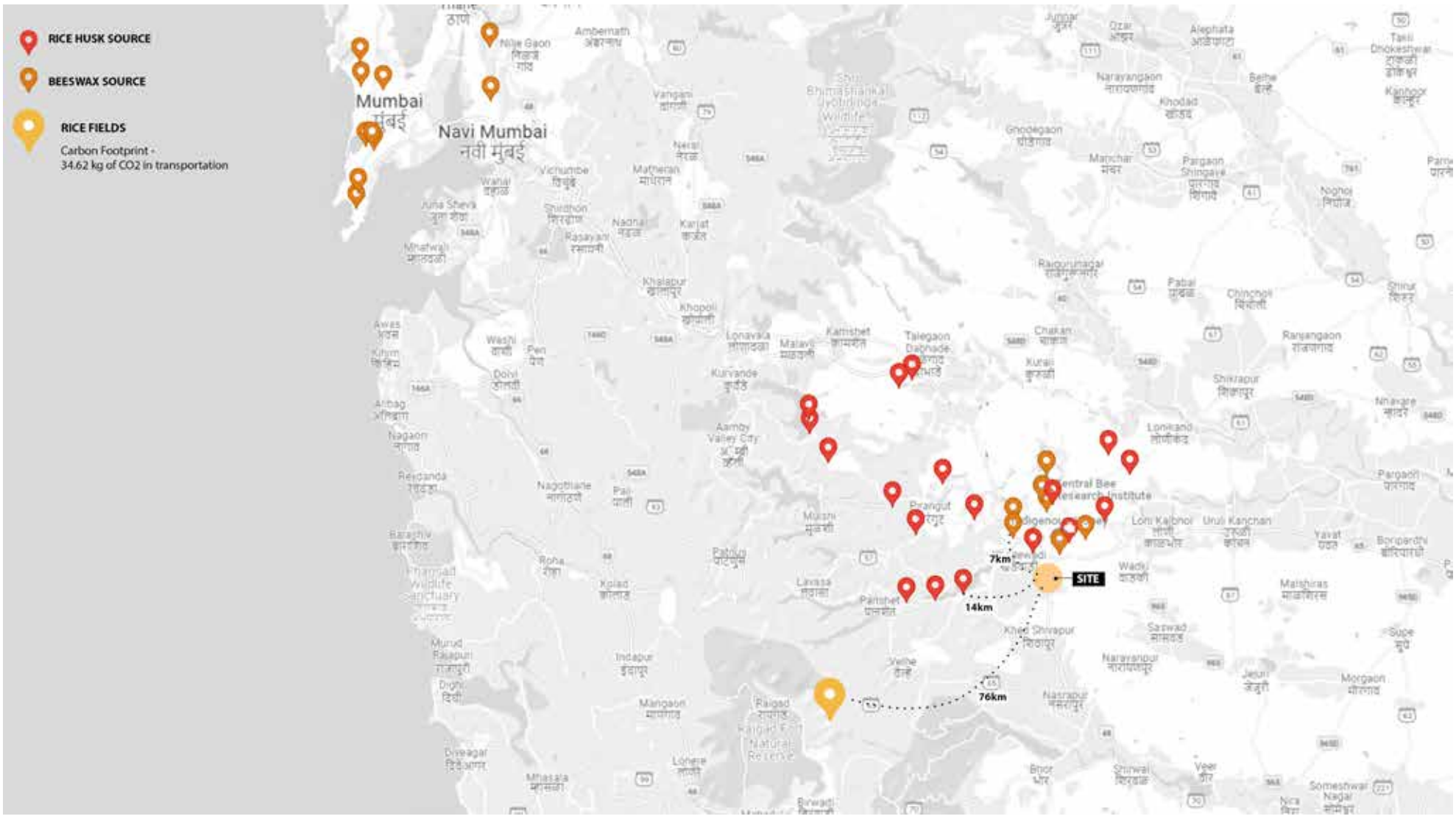

RICE HUSK + BEESWAX
RICE HUSK LAYER EXPOSED
RICE HUSK + BEESWAX
BEESWAX LAYER EXPOSED

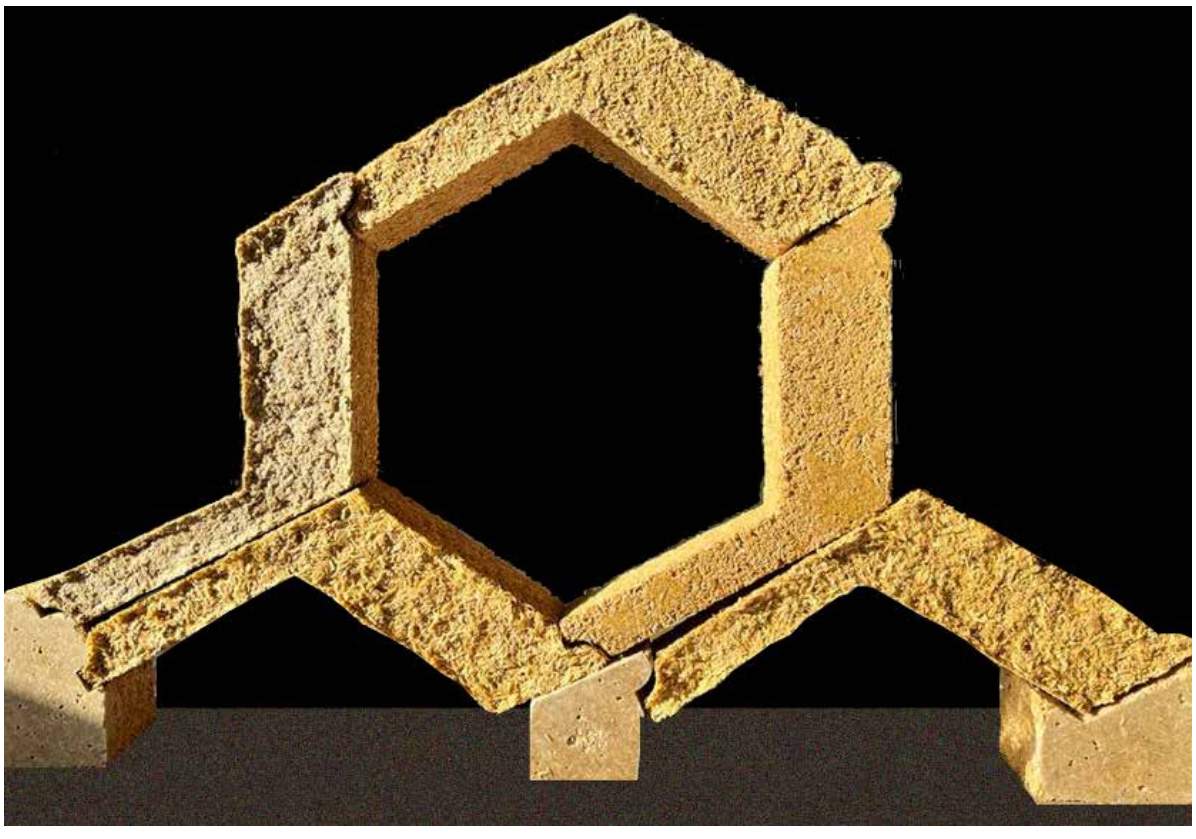

RICE HUSK + BEESWAX + TEA LEAVES
WATER CONTENT MAKES IT WEAKER


FINELY POWDERED RICE HUSK + BEESWAX
+ BANANA FIBRES
INCREASED SURFACE AREA
INCREASED BOND BETWEEN BEESWAX & RICE HUSK
INCREASED STRENGTH

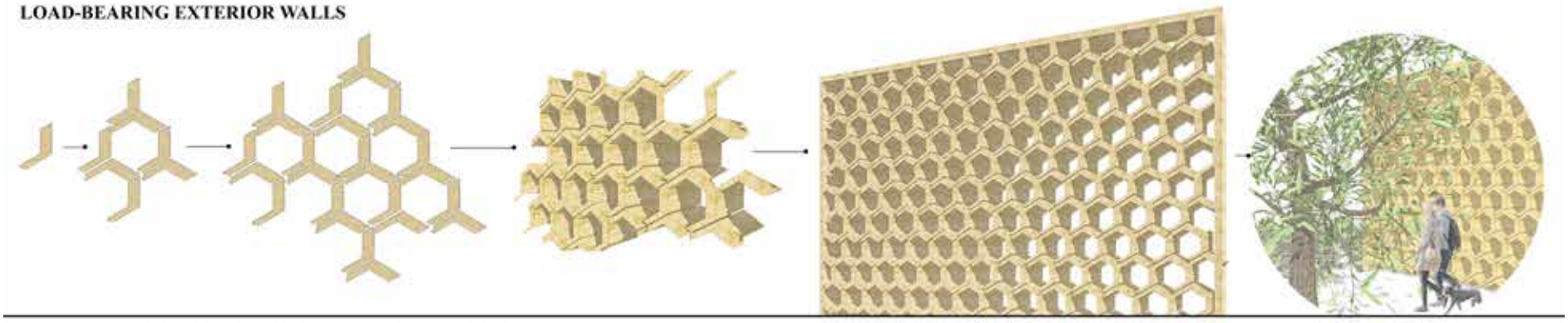

RICE HUSK + BEESWAX + CLAY
WATER CONTENT MAKES IT HARDER TO BIND
SEMI-POWDERED RICE HUSK + BEESWAX
SEMI-POWDERED TO RETAIN COMPRESSIVE STRENGTH


RICE HUSK + BEESWAX MIXTURE
Weight-
Dimension-
RICE HUSK + BEESWAX + CLAY
Weight-
Dimension-
SEMI-POWDERED RICE HUSK + BEESWAX
Weight-
Dimension-
RICE HUSK + TEA LEAVES + BEESWAX
Weight-
Dimension-
RICE HUSK + BANANA FIBRES + BEESWAX
Weight-
Dimension-
SEMI-POWDERED RICE HUSK + BEESWAX
Weight-
Dimension-

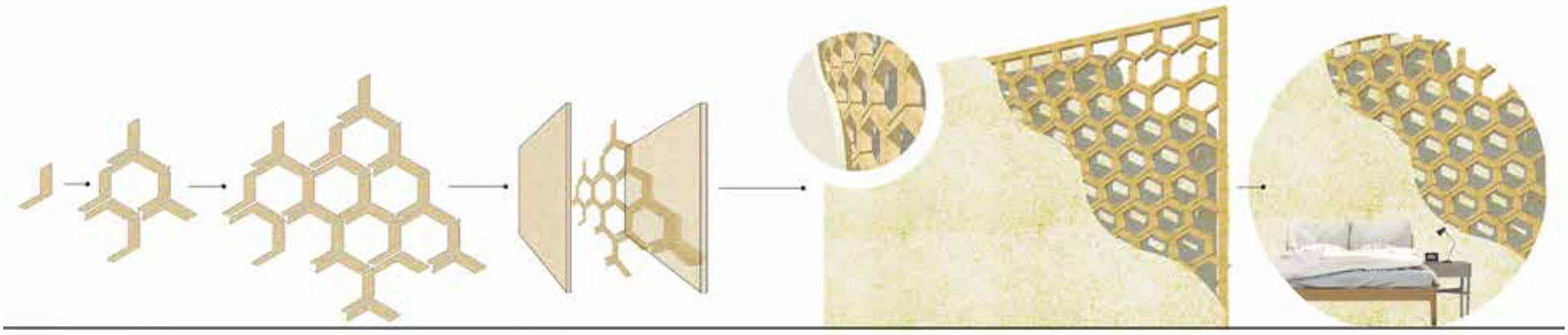

RICE HUSK SOURCE
BEESWAX SOURCE
RICE FIELDS
Carbon Footprint -
34.62 kg of CO2 in transportation
Mumbai
मुंबई
Navi Mumbai
नवी मुंबई
7km
SITE
14km
76km



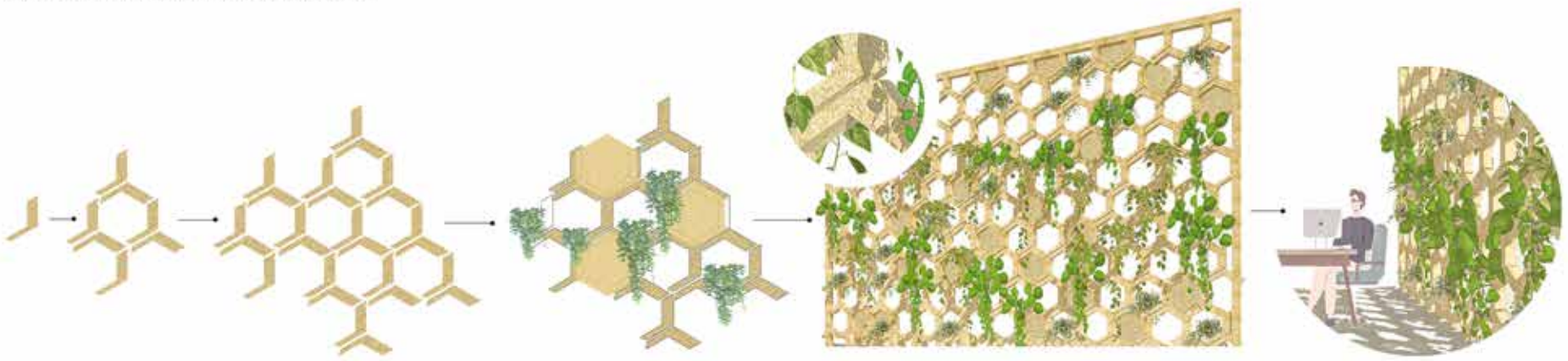
LOAD-BEARING EXTERIOR WALLS



INTERIOR WALLS WITH PANELS - RESIDENTIAL BUILDINGS



LIVING WALL - SEMI-PRIVATE SPACES



SEMI - PRIVATE SPACES

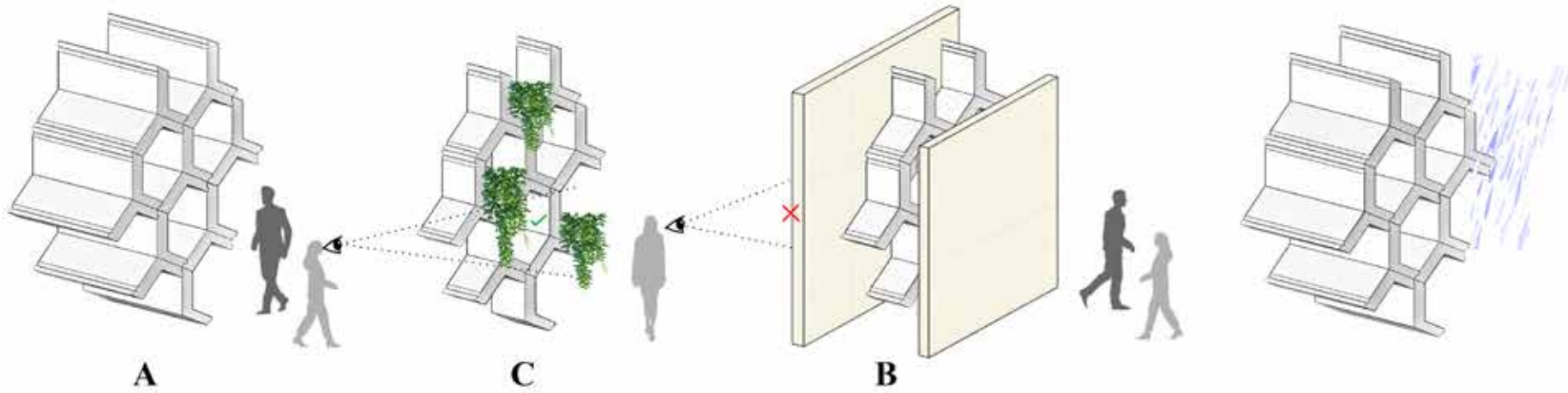
LOAD BEARING WALL

BREATHABLE WALL

PRIVATE SPACES

INTERIOR WALL

LOAD BEARING WALL



A

LOW HEIGHT RESIDENTIAL STRUCTURES & STORAGE FACILITIES

C

COMMERCIAL SPACES / OFFICES

B

HIGH RISE RESIDENTIAL BUILDINGS

CARBON FOORPRINT CALCULATIONS

CONVENTIONAL BUILDING -

.) Embodied carbon (production & transportation) = 1.5 tons of CO2/sqm.

2.) Energy consumption during construction (excavation, concrete pouring, etc.) = 2 tons per floor

3.) Building operations (HVAC) = 2-5 tons per apartment per year
24 apartments = 48-120 tons per year

4.) Transportation = 1 ton CO2 per apartment per year

5.) Total carbon footprint = (1.5 x total floor area (per apt. 150 sqm.)) + (2x12) + (84) =

550.8 metric tons of CO2

RICE HUSK + BRAN + BEESWAX BUILDING -

.) Embodied carbon (production & transportation) = 0.0005 metric tons

2.) Energy consumption during construction (excavation, concrete pouring, etc.) = 0.0095 metric tons per floor

3.) Building operations (HVAC) = 1.4-3.5 tons per apartment per year
24 apartments = 67.2 tons per year

4.) Transportation = 0.80 ton CO2 per apartment per year

5.) Total carbon footprint = (0.0005 x 3600) + (0.0095) + (67.2) =

70 metric tons of CO2

Per ton of bricks ---> 1.5 tons of CO2

Bricks have a **higher footprint** than concrete in construction

POLICIES DRIVING INFLUENCE

1. FASTER APPROVAL PROCESS FOR SUSTAINABLE PROJECTS
2. FAR BONUSES
3. PROPERTY TAX REBATES
4. REDUCED DEVELOPMENT CHARGES
5. SUBSIDIZED LOANS AND FINANCING

12 Storey Residential Building in India with two apartments on a floor -

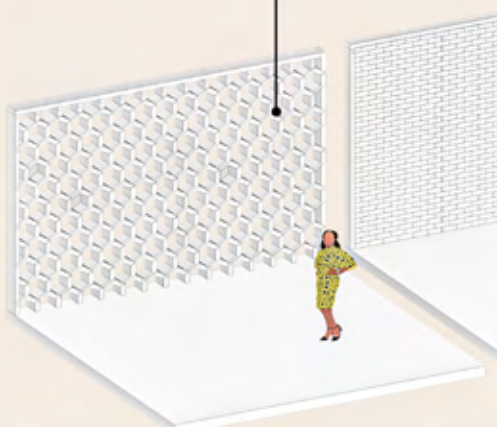
120 interior walls

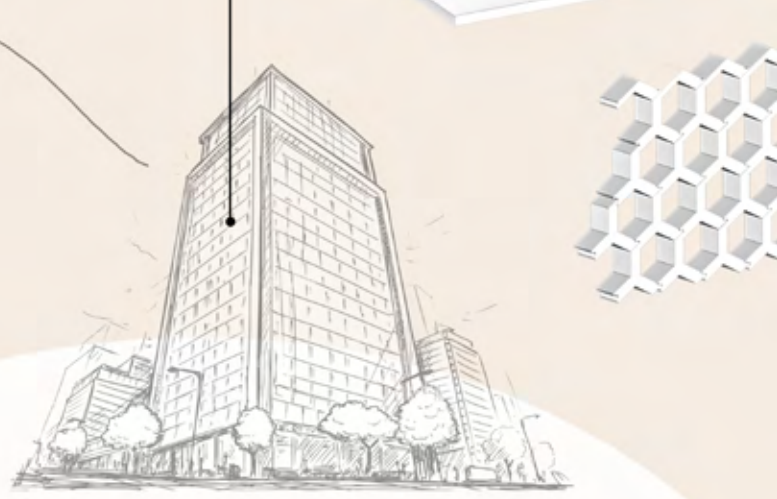
Rice Husk Brick Wall -

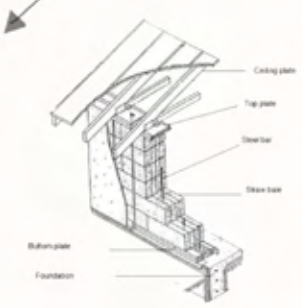
280 bricks
per interior wall
33,600 bricks
per building

Convention Brick Wall -

840 bricks
per interior wall
100,800 bric
per interior wall







INTERIOR WALLS

EXTERIOR WALLS

STORAGE UNITS

RICE HUSKS -

If rice husk constitutes 60% of a brick, 1 brick needs 2kgs of rice husk, i.e. **1.75 billion bricks can be produced with wasted rice husks**.

If one wall needs 280 bricks and one building has 120 interior walls, **52,000 buildings** can be constructed with solely rice husk interior walls.

BEESWAX -

1 healthy beehive can produce **1-2kgs of beeswax per hive per year**.

If beeswax constitutes **15%** of a brick, **75g of beeswax** is required per brick.

1 beehive can make **20 such bricks**.

HARVESTING HONEY

UNCAPPING

HONEY EXTRACTION

HONEY SETTLING

SEPARATION

CLEANING & MELTING

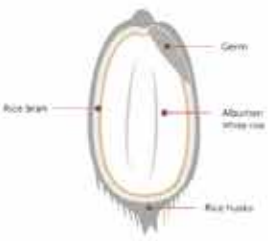
FILTERING BEESWAX

PACKING & STORING

BEESWAX

RICE HUSK

RICE BRAN



FODDER FOR LIVESTOCK

RAW MATERIAL FOR ENERGY PRODUCTION

Rice husk wasted
3.5 billion kgs

Rice husk produced
25 billion kgs

India produces
100 billion kgs of rice

LAND PREPARATION

SEED GERMINATION

TRANSPLANTING

CULTIVATION

HARVESTING

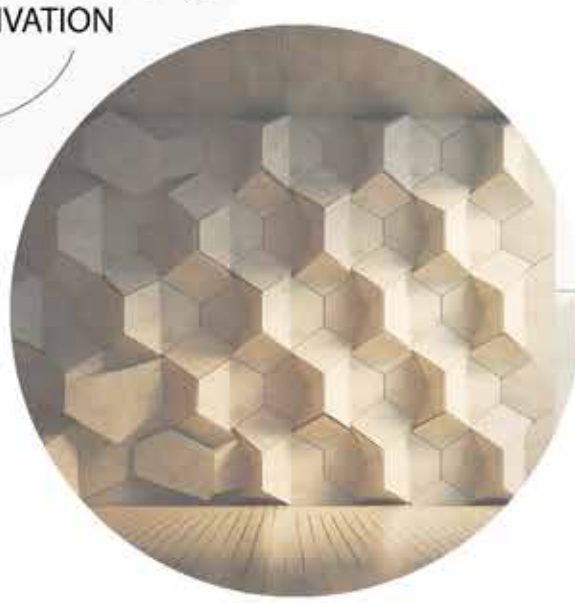
THRESHING

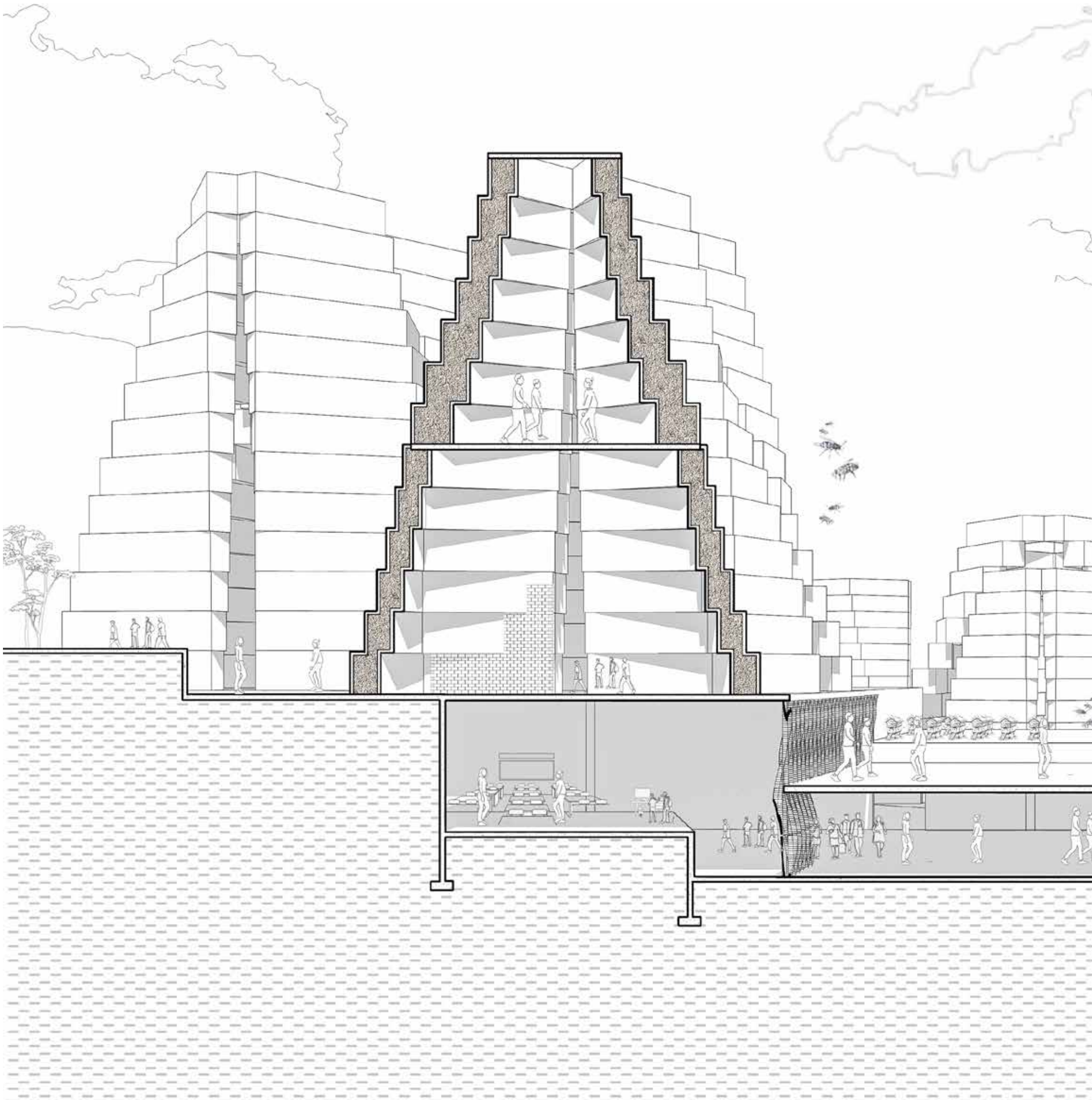
DRYING

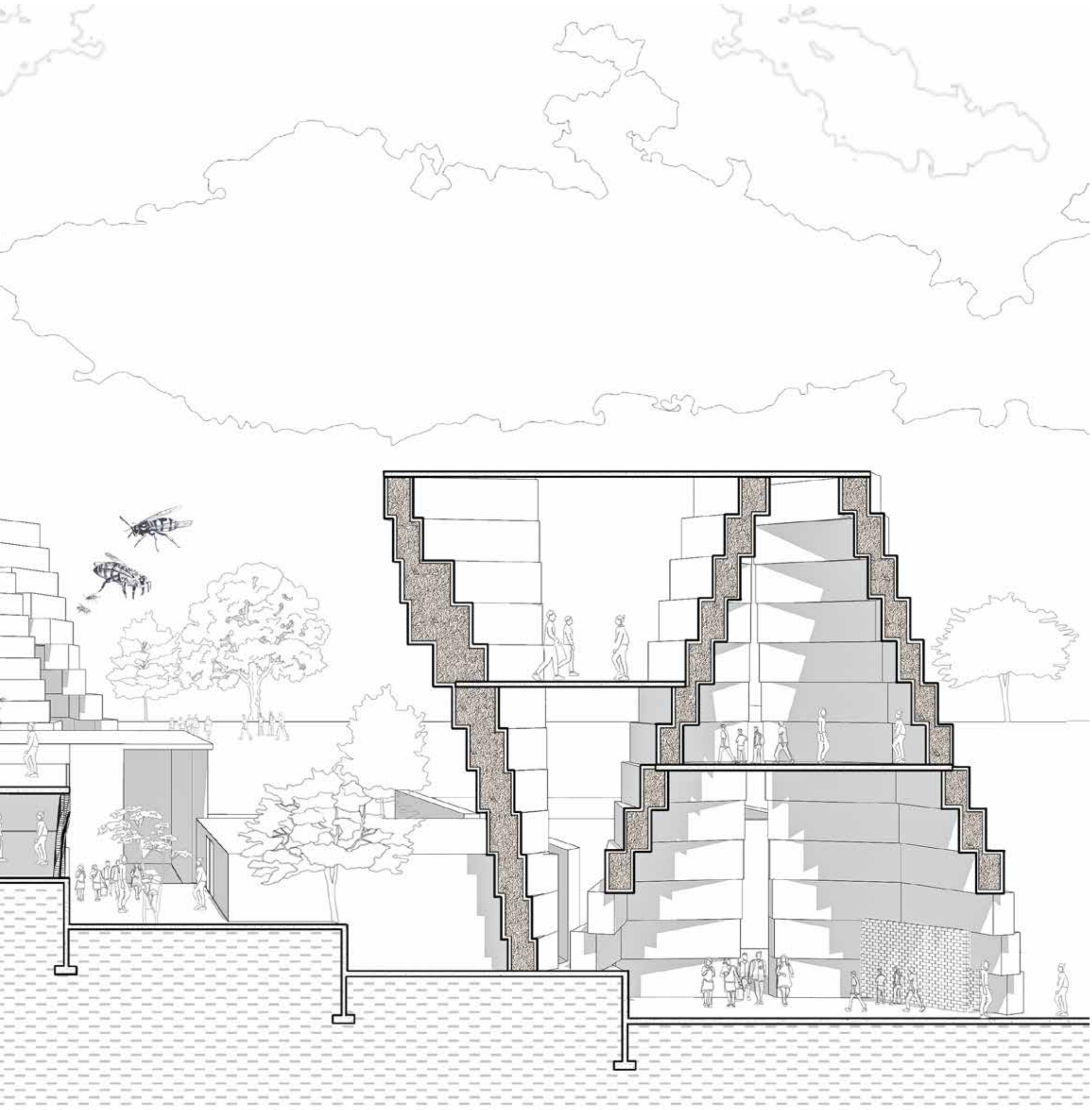
MILLING

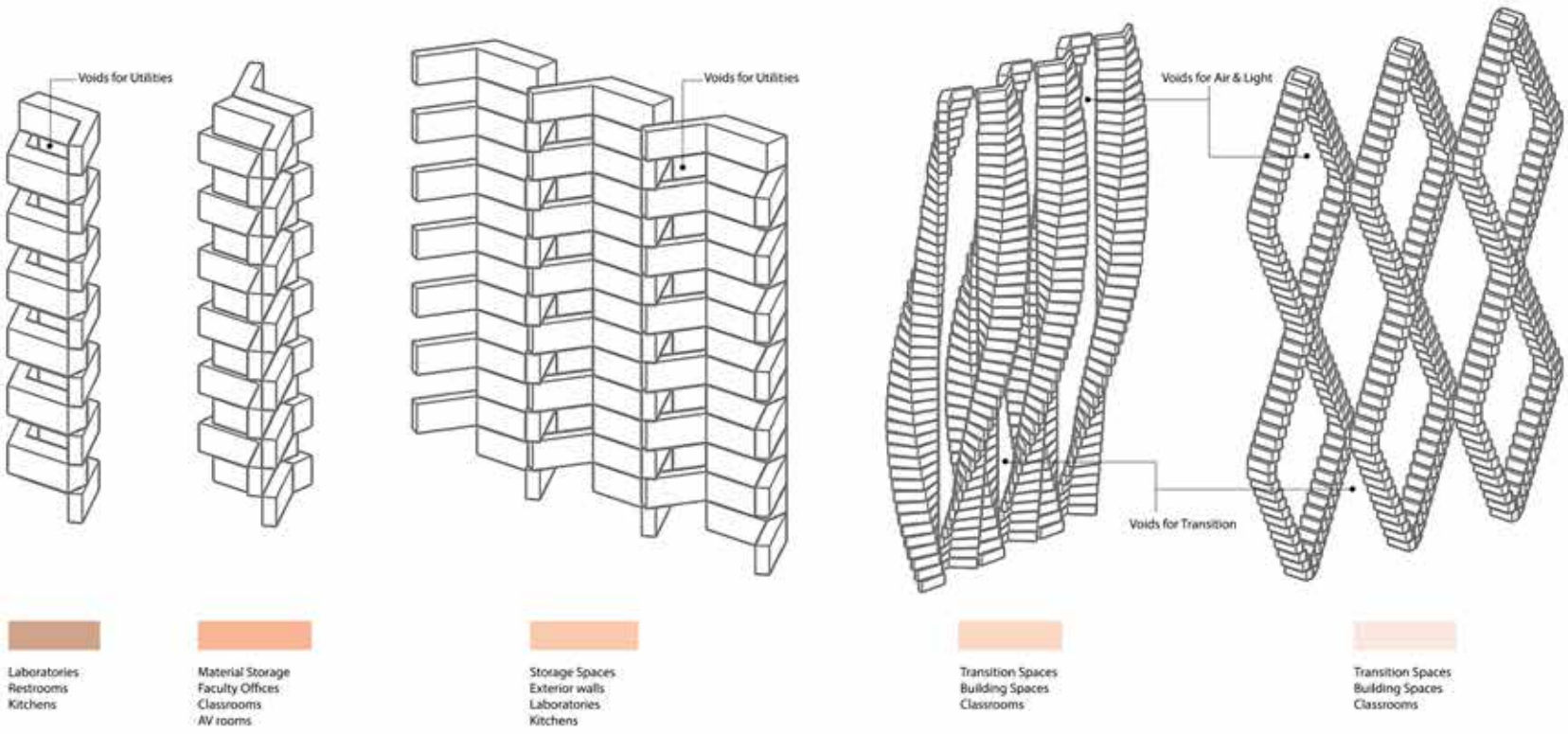
DISTRIBUTION & CONSUMPTION

PACKING & STORING









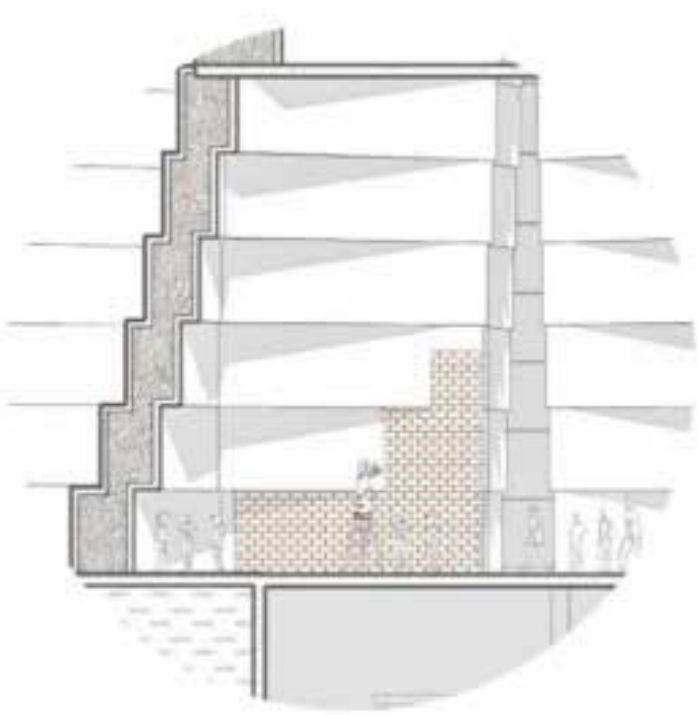
Laboratories
Restrooms
Kitchens

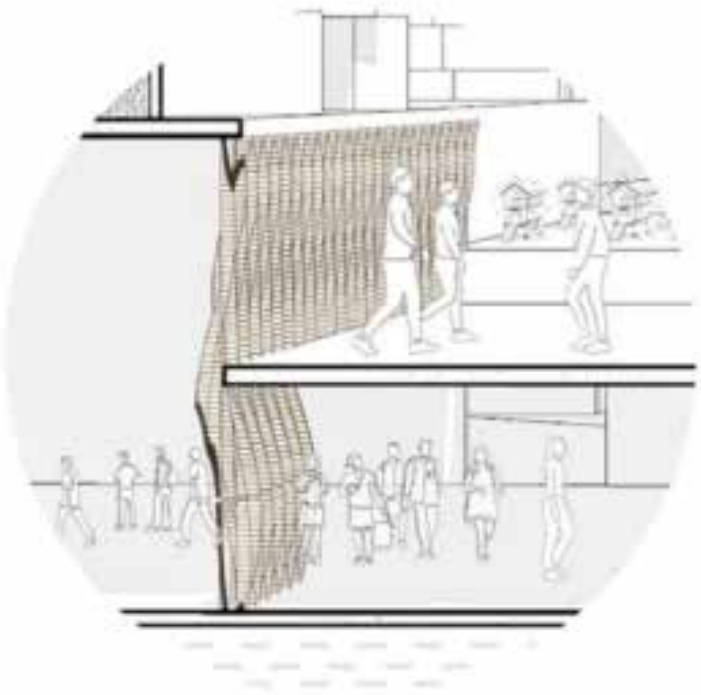
Material Storage
Faculty Offices
Classrooms
AV rooms

Storage Spaces
Exterior walls
Laboratories
Kitchens

Transition Spaces
Building Spaces
Classrooms

Transition Spaces
Building Spaces
Classrooms

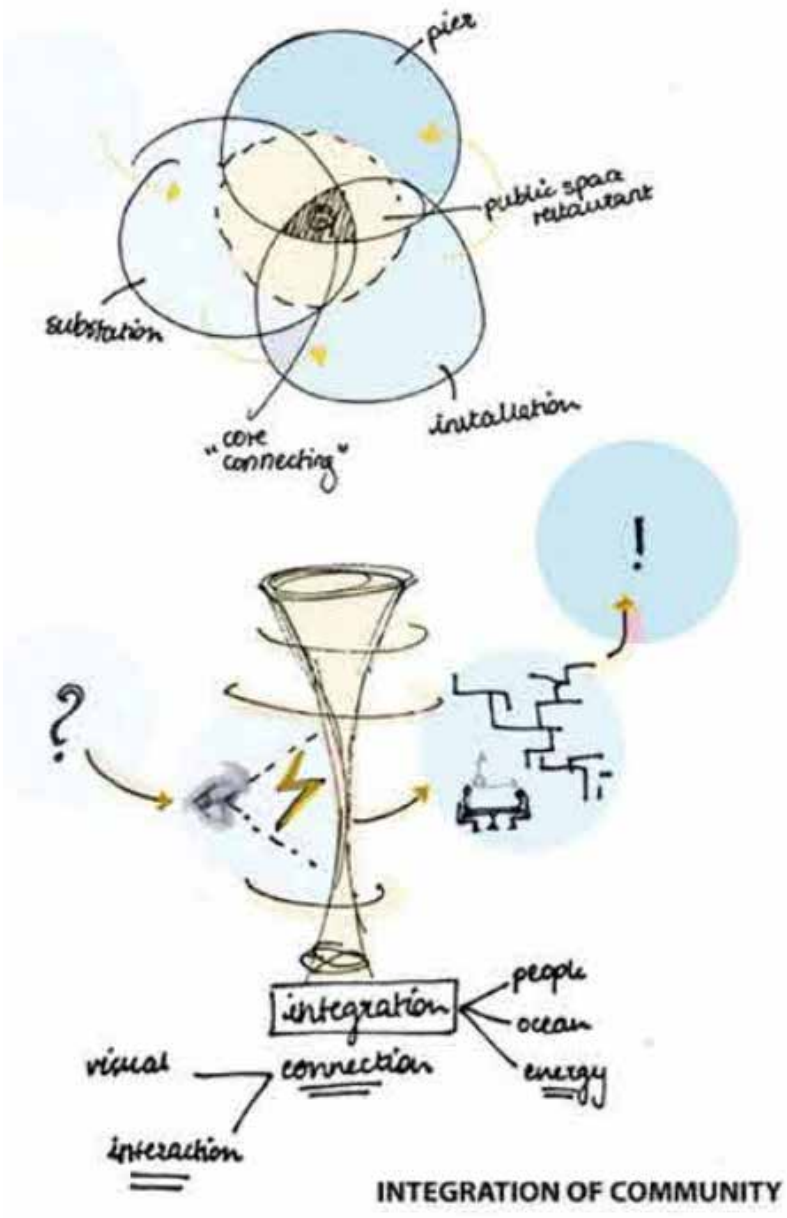




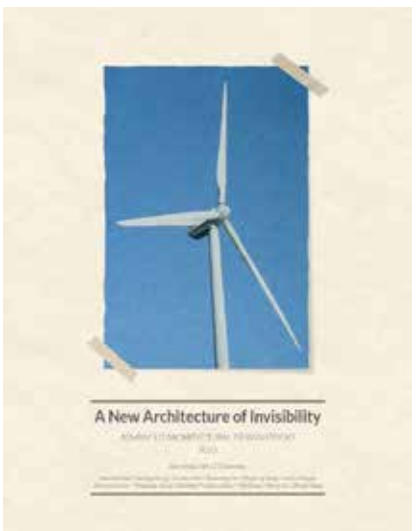
3. The Invisibility of Architecture - Studio

Re-thinking Substations

Summer Semester - Studio
Instructors - Dan Wood, Layna Chen



The design concept for the electrical substation and energy awareness center revolves around making the invisible forces of energy, such as wind and electricity, visible to the public eye. The architectural approach seeks to raise awareness about clean energy sources by incorporating innovative elements that render these intangible forces perceivable. The structure seamlessly integrates into the natural surroundings, utlizing a camouflage design that harmonizes with the environment. By blending into the landscape, the substation not only minimizes its visual impact but also aims to make the integration of cutting-edge technology more acceptable to society. This approach fosters a connection between the community and the often overlooked realm of clean energy infrastructure, sparking curiosity and engagement. The center serves as a hub for research and exploration into offshore wind turbines, providing a platform for the community to understand, appreciate and actively participate in the transition towards a cleaner and more sustainable energy future. Through this harmonious integration of technology and nature, the design strives to make the invisible visible, catalyzing a positive shift in societal attitudes towards embracing transformative changes in energy consumption.



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0.0

Figure 1. The world's first offshore wind farm in Vindeby in Denmark. https://vattenfall.com/

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 1.1.2

1.1.3 HISTORY WIND

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 1.1.4

Source: The Conversation, Tax rates to grid subsidies to be transformed, 2023

GRID

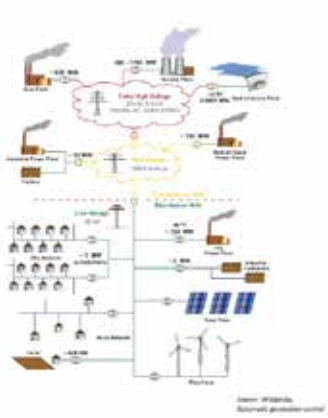
An electrical grid is an interconnected network for electricity delivery from producers to consumers. Electrical grids vary in size and can cover whole countries or continents.

It consists of:

- power stations, often located near a source of energy, that may be fossil-fuel or renewable
- electrical substations to step voltage up or down
- electric power transmission to carry power long distances
- electric power distribution to individual customers, whose voltage is stepped down again to the low voltage needed

The combined transmission and distribution network is known as the "power grid" or simply "the grid"

2.3.1 PRESENT GRID



Source: Wikipedia, Netzstatik gemäßdem vorhd

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 2.3.2

1.2 HISTORY SHORE

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 1.2

GRID

INNOVATION

The power grid is the largest, most complex, and most important machine ever built. With millions of interconnected parts, the electric grid is incredibly complex, and it comes from decades of innovative engineering, hard lessons learned. In the early days of electricity production, the equipment that moved power had to be located up to a few thousand feet from the generators that produced it.

1882

1882

Two electric slums in England pioneered one of the earliest power systems in the entire globe. Their setup, which used a set of two water wheels, could power a dozen light bulbs at the same time.

The first distribution company, and built in Milan's cities are fiber threats. These systems are direct-current over copper wiring.

1.3.1 HISTORY GRID

EXPANSION

1900s

Investors soaked and public utilities acquire rights of way and construct final transmission lines.

1934

By the end of the year, 40 states have regulatory commissions with oversight of electric activities.

1960s

Expansion of scale makes it cheaper to move electricity. The number of miles of high-voltage transmission lines tripled from 32 years earlier to more than

LEGISLATION

1990s

Congress deregulates the wholesale power generation sector, opening up competition among electric producers. Requires transmission owners to allow use of the grid at low prices to the wholesale power producers.

Pearl Street Station was the first commercial central power plant in the United States. By 1884, Pearl Street Station was supplying 10,164 light bulbs from customers. The supply voltage was 110 V DC.

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 1.3.2

There are a total 24 Transmission Substation in NYC. The highest concentration of it is around the Manhattan Area as the energy consumption is high at this area. There are around 50 Area Substation in NYC. Supplying to 13 Networks and 13 (?) primary feeders. The highest concentration of it is around the Queens Area as the there is high concentration of residence blocks in this area. In all, there are 123,835 miles of cables making a total of around feed, enough to reach more than halfway to the moon. The Manhattan cluster has no over-the-ground cables. The Manhattan neighbors in recent years leveraged a requirement for other public electricity infrastructure (we'll let it say) to parts

2.4.2 PRESENT TRANSFORMER & SUBSTATION

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 2.4.3

Substation is a bunch of electrical devices patterned and connected in one place. Substations can be generally divided into three major types (according to voltage levels). Transmission substation is responsible for interconnection into a network with multiple parallel interconnections, so that power can flow freely over long distances from any generator to any consumer. This interconnected site, often called the bulk transmission system. Typically it is a meshed form operate at voltages above 138kV. Transmission substations often include transformation from one transmission voltage level to another. The primary function of transmission is to transmit bulk power from source or all-electric generation to bulk power delivery points. Sub-transmission substations typically operate at 33kV through 138kV voltage levels. This is what substations is to move the high voltage used for efficient long distance transmission through the grid to subtransmission voltage levels. Distribution substations typically operate at 11kV-33 kV and deliver electric power directly to industrial and residential customers.

2.4.4 PRESENT TRANSFORMER & SUBSTATION

The SBMT (Substation and Base Maintenance Terminal) located in Brooklyn has been designated as the point of connection between the offshore and onshore components of the wind farm system (UNPINE 1). In considering the siting of the SBMT, various political, environmental, and social requirements have been taken into account.

Firstly, the SBMT has been planned not only as a space for vessel maintenance and refitment but also as an onshore substation. This multifunctional design demonstrates the high value placed on the SBMT as a multi-capable infrastructure port and substation node.

Waterfront properties in the former Brooklyn context have also been considered, ensuring that the SBMT does not negatively impact the existing landscape and historic sites.

Additionally, the social context of the surrounding area has been taken into account. The facilities around the port have been considered to ensure that the SBMT not only serves as a port but also provides community facilities and services to the local residents.

The evaluation process has leverage toward the inclusion of parks and recreational measures. This indicates that the port, and also its workforce, will have the potential to serve as community spaces for residents by integrating entity for recent functions and open areas. This design idea of the SBMT's potential value and its role in shaping the future of the shore is evident.

SBMT

AAD SUMMER 2023 - EMN WOOD
A NEW ARCHITECTURE OF INVISIBILITY 3.2.2

Source: NYISO/CR

The Grid Modernization program focuses on four specific areas: high performing grid, future-proofing the grid, grid flexibility, and grid resilience. Investment Areas include:

- Grid Enhancing Technologies (GETs)
- Improving situational awareness in the grid
- Energy storage and microgrids at scale
- Grid stability and energy deliverability
- Modernization of the electric grid to enhance resilience to extreme weather and natural disaster

3.3.1 FUTURE GRID

PITCH DRIVE MOTOR

PINION GEAR OF DRIVE MOTOR

PITCH

EXTERNAL LAMINATE LAYER

INTERNAL REINFORCEMENT

LIGHTNING RECEPTORS

BLADE

HUB

NACELLE

MAIN SHAFT

GEARBOX

NACELLE

UP TO
17MW

NACELLE

UPPER TOWER INTERIOR

LANDING

LADDER

SWITCHGEAR

ELECTRIC MOTOR

GEAR

YAW

BRAKE RING & YAW BRAKE

TOWER

INTERMEDIATE PLATFORM

BOAT LANDING POINT
AT SEA LEVEL

60M FROM
SEABED TO SEA LEVEL

J-TUBE

GROUTED FOUNDATION PILE

SHEAR KEY

PILE

GROUT

SLEEVE

30M FROM
SEABED TO SEA LEVEL

EXTERNAL J-TUBE

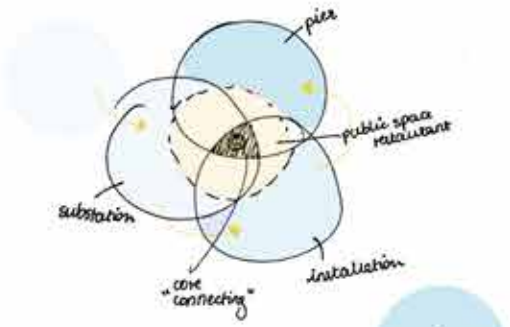
MUDMATS

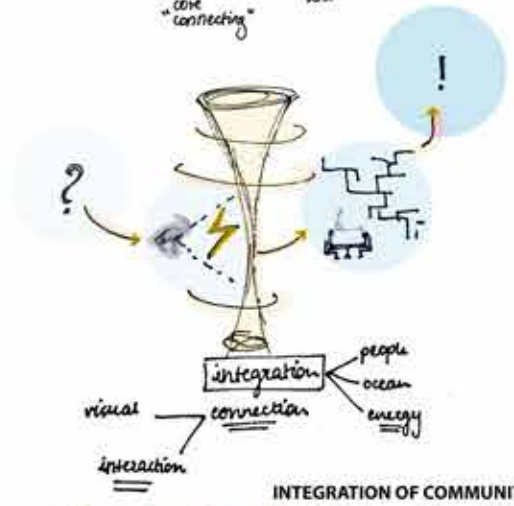
PILE SLEEVE

JACKET
FOUNDATION

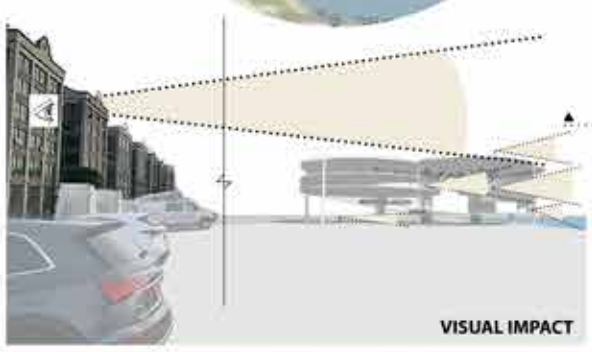
FOUNDATION PILE

OOLING SYSTEM
GENERATOR
HEAT EXCHANGER
FOR OIL COOLING
PLANET CARRIER WITH HUB
PIN (FIXED TO THE ROTATING CARRIER)
RING GEAR (NON-CIRCULATING)
GEARBOX
ROTOR IRON
STATOR COPPER WINDING
STATOR BACK IRON
ROTOR HTS COIL
ROTOR SUPPORT
GENERATOR
O&M ACCESS AT SEA LEVEL
CTV
LEVELING
CYLINDERS
TRANSITION PIECE
GROUTED CONNECTION
SCOUR PROTECTION
FIXATION
CYLINDERS
25M FROM
SEABED TO SEA LEVEL
TRANSITION PIECE
INTERNAL J-TUBE
FOUNDATION BASIS
SCOUR PROTECTION
SKIRT
UNDER-BASE GROUTING
GRAVITY BASED
FOUNDATION
OPILE
DATION
ARRAY CABLE
33kV-66kV
ALTERNATE
CURRENT
WIND





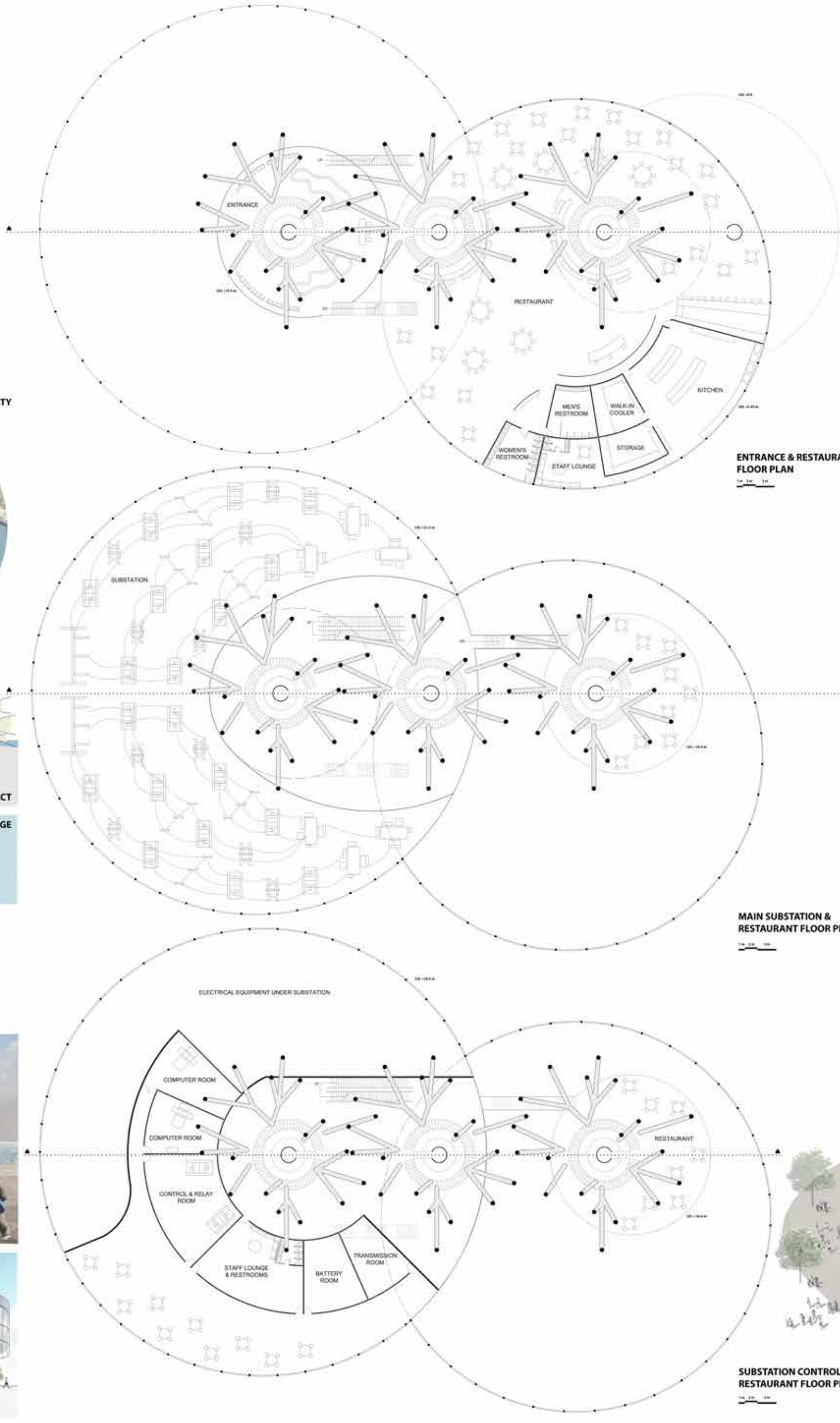
INTEGRATION OF COMMUNITY



VISUAL IMPACT

CAMOUFLAGE

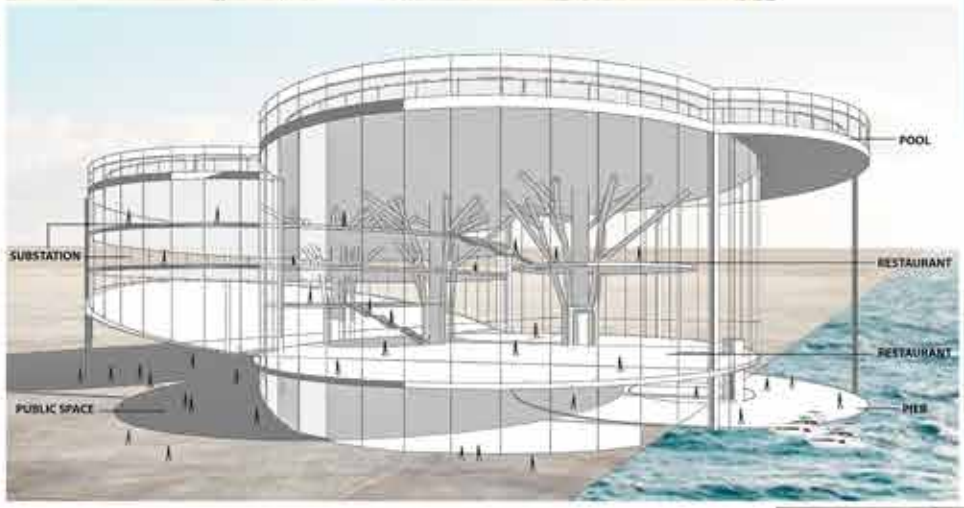
REFLECTIVE SURFACE CREATING INVISIBILITY



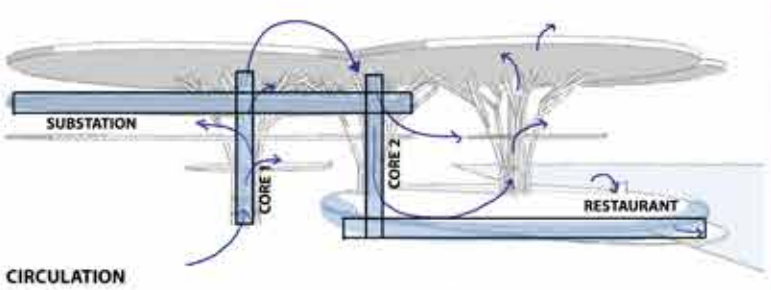
ENTRANCE & RESTAURA FLOOR PLAN

MAIN SUBSTATION & RESTAURANT FLOOR PL

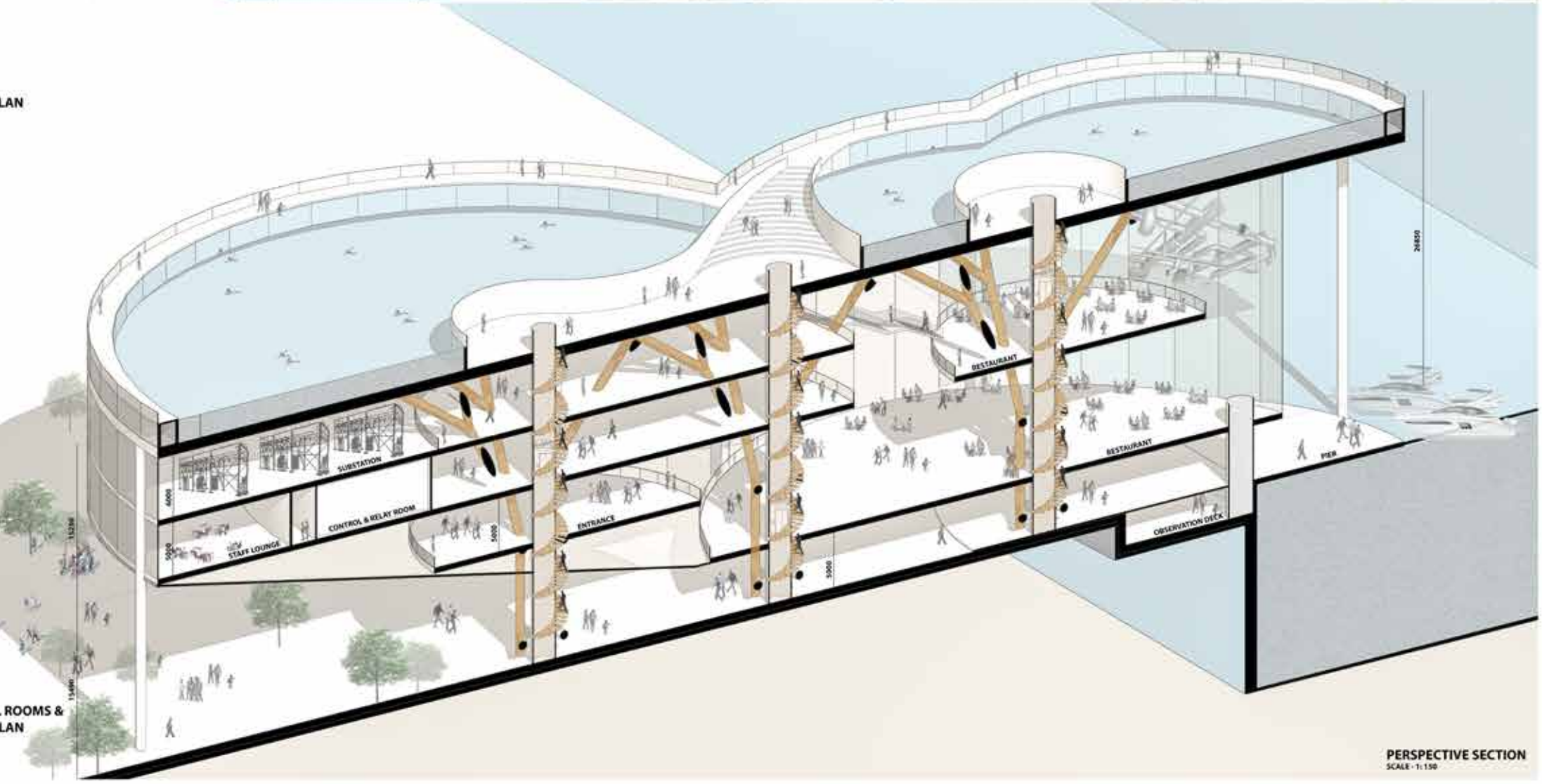
SUBSTATION CONTROL RESTAURANT FLOOR PL



PERSPECTIVE SECTION 2



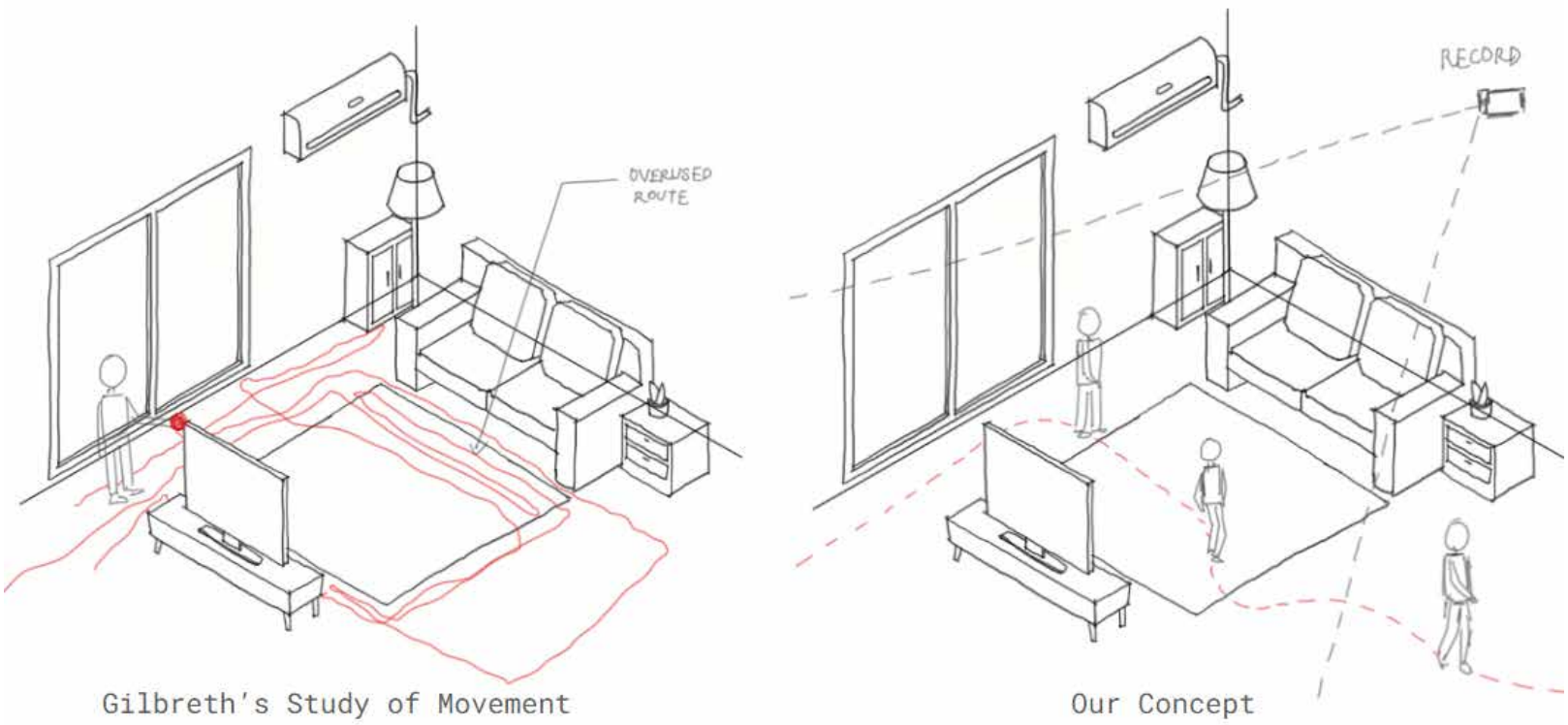
CIRCULATION



PERSPECTIVE SECTION
SCALE - 1: 150

4. Spatial UX - Elective

Designing a Spatial Interface - AutoCAD
Fall Semester - Elective
Instructor - Violet Whitney

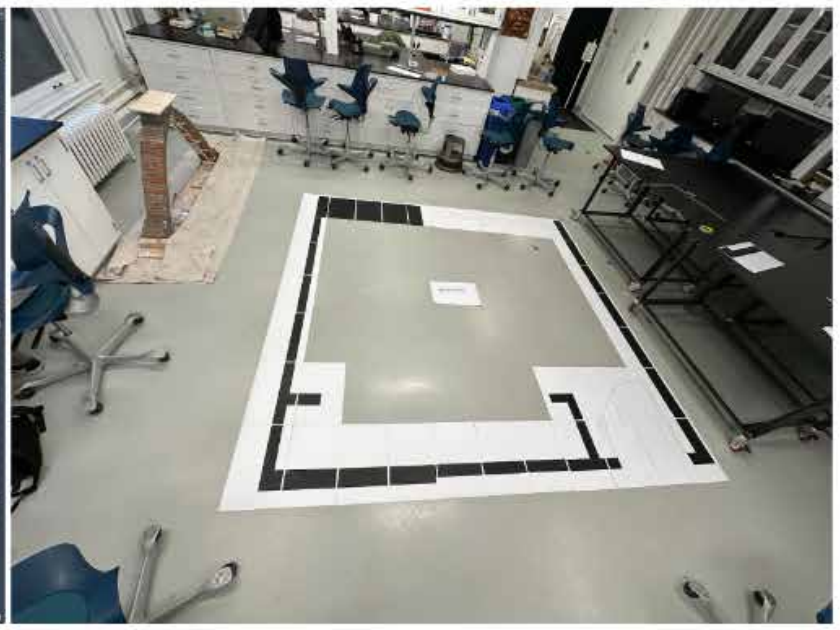


Gilbreth's Study of Movement

Our Concept

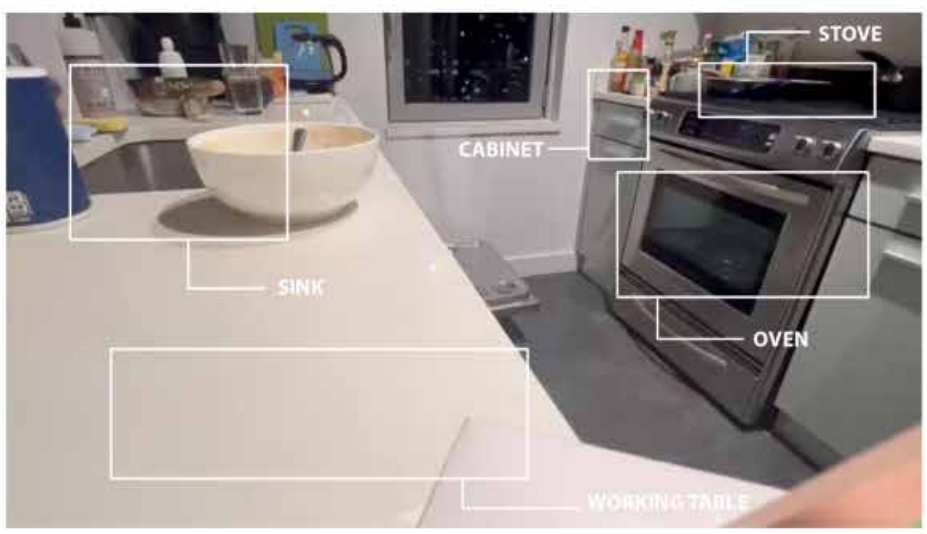
This project pioneers a paradigm shift in User Experience (UX), focusing on Spatial UX to explore the often overlooked spatial and social dimensions of design. Unlike traditional UX approaches that primarily address digital interfaces, this project delves deeper, acknowledging how designs shape our physical and social realities. By critiquing prevalent UX practices like infinite scrolling, which fosters tech addiction and disconnects users from real-life experiences, the project advocates for a more holistic understanding of design impact. Through interdisciplinary methods merging insights from product design, spatial computing, and emerging technologies like AR/VR/XR, the project aims to redefine UX priorities. It prioritizes "Spatial Interface" and "Social Experience" over conventional UI/UX paradigms, emphasizing the interconnectedness of digital and physical worlds. By interrogating the collective effects of design choices and advocating for mindful tech usage, this project aspires to cultivate a future where users remain attuned to their surroundings, fostering a more balanced relationship between technology and reality.

First Draft in AutoCAD

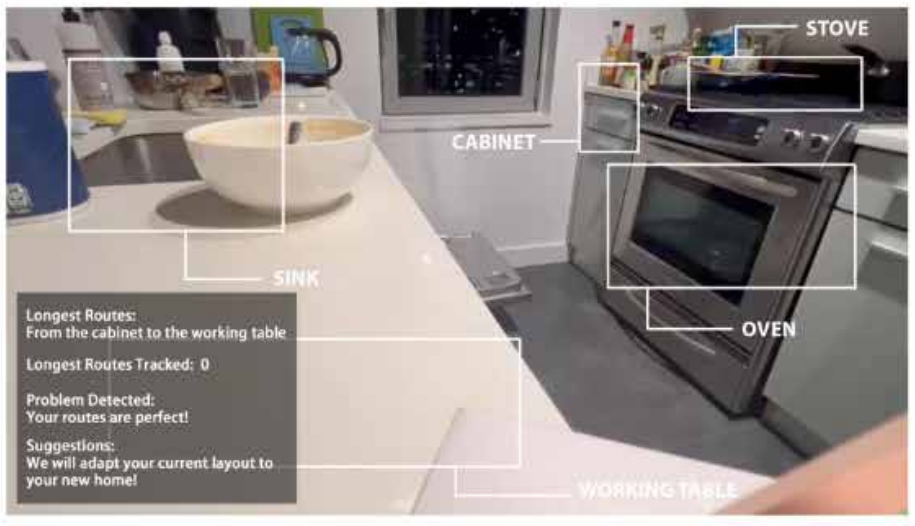


Reflection in the Physical World

SPACE 1



SPACE 2

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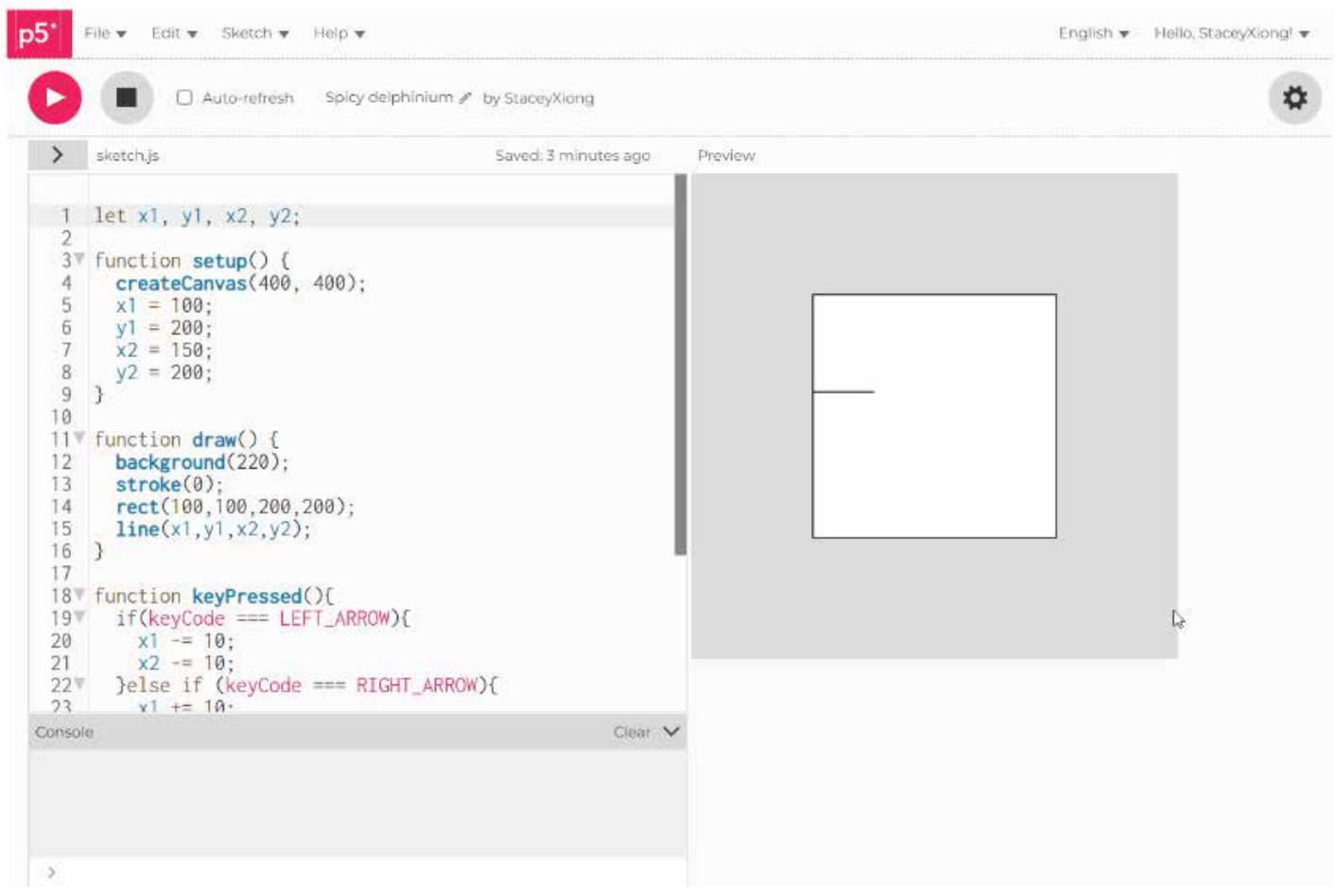
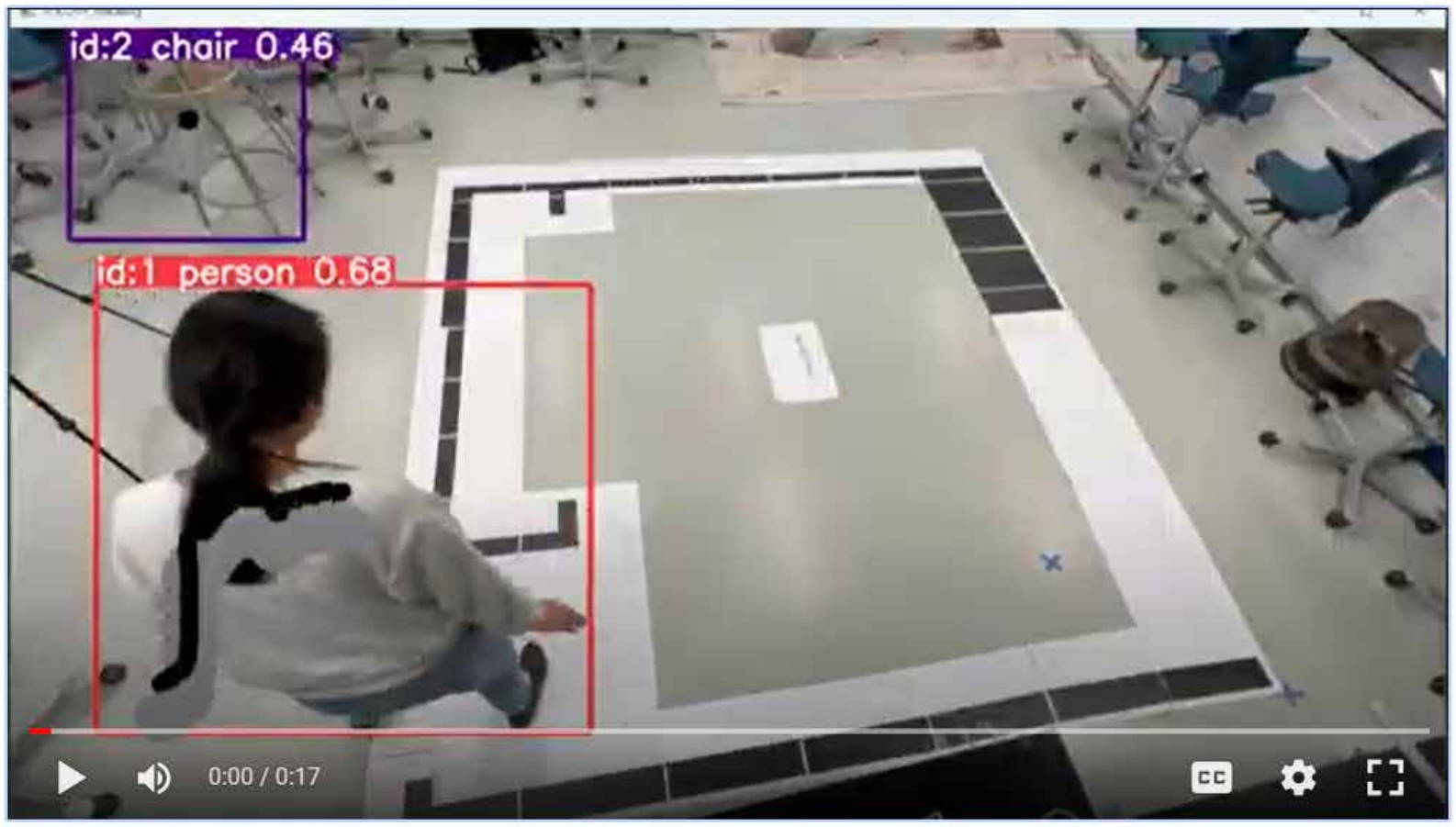

p5*
File
Edit
Sketch
Help
English
Hello, StaceyXiong!
Auto-refresh
Spicy delphinium
by StaceyXiong
sketch.js
Saved: 3 minutes ago
Preview
let x1, y1, x2, y2;
function setup() {
createCanvas(400, 400);
x1 = 100;
y1 = 200;
x2 = 150;
y2 = 200;
}
function draw() {
background(220);
stroke(0);
rect(100,100,200,200);
line(x1,y1,x2,y2);
}
function keyPressed(){
if(keyCode === LEFT_ARROW){
x1 -= 10;
x2 -= 10;
}else if (keyCode === RIGHT_ARROW){
Console
Clear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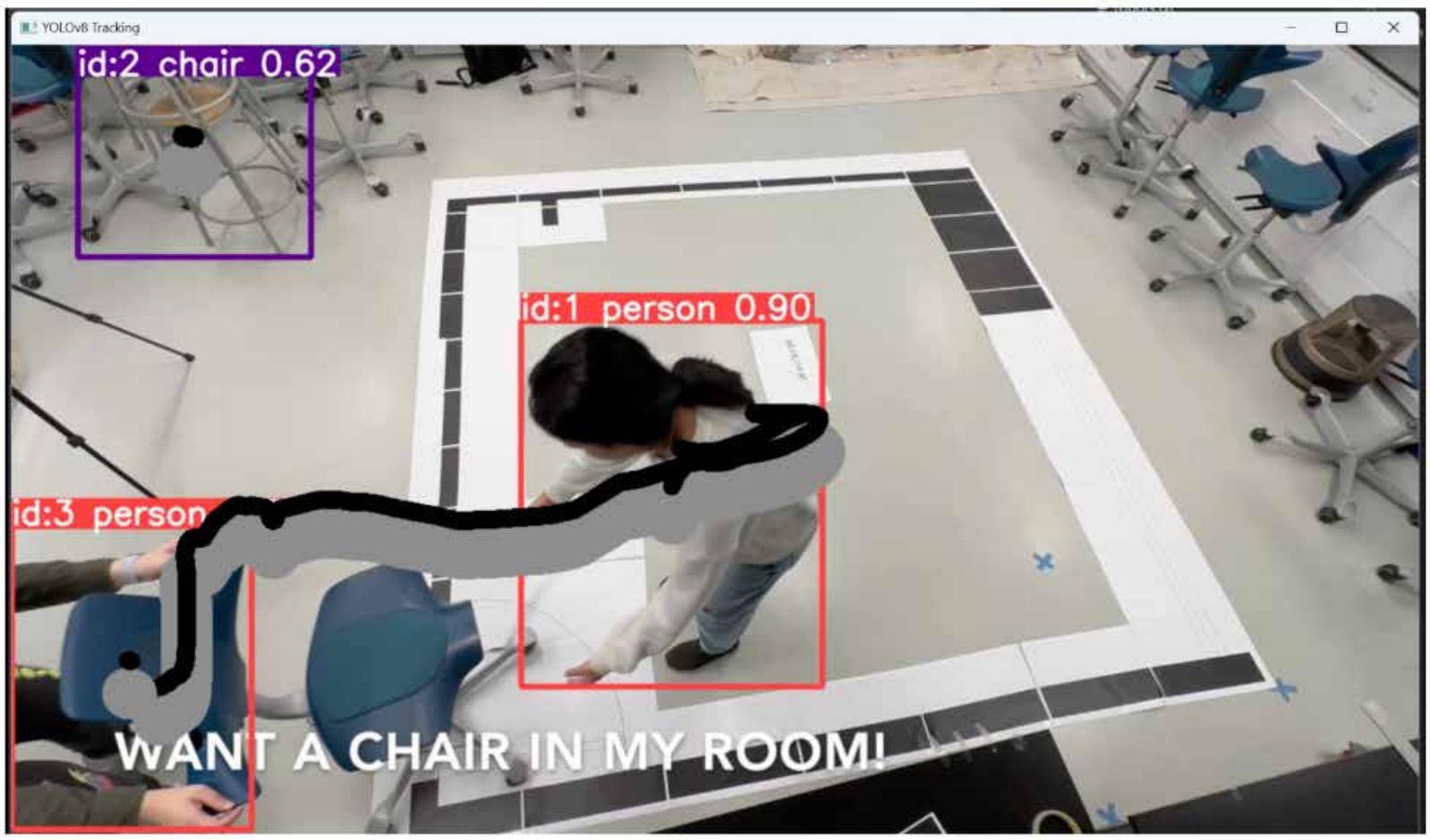
id:1 person 0.68
0:00 / 0:17


YOLOv8 Tracking
id:2 chair 0.62
id:1 person 0.90
id:3 person
WANT A CHAIR IN MY ROOM!

Thank you GSAPP

GSAPP PORTFOLIO

MS. Advanced Architectural Design ‘24

Pavitra Nayak