ZE MENG

COLUMBIA UNIVERSITY GSAPP MSAAD

2022 - 2023
SELECTED WORKS

“LIFE IS ARCHITECTURE AND ARCHITECTURE IS THE MIRROR OF LIFE.”

I.M. PEI

01

AAD STUDIO VI | 2023

INSTRUCTOR: MICHAEL BELL

STOP. TO HEAL

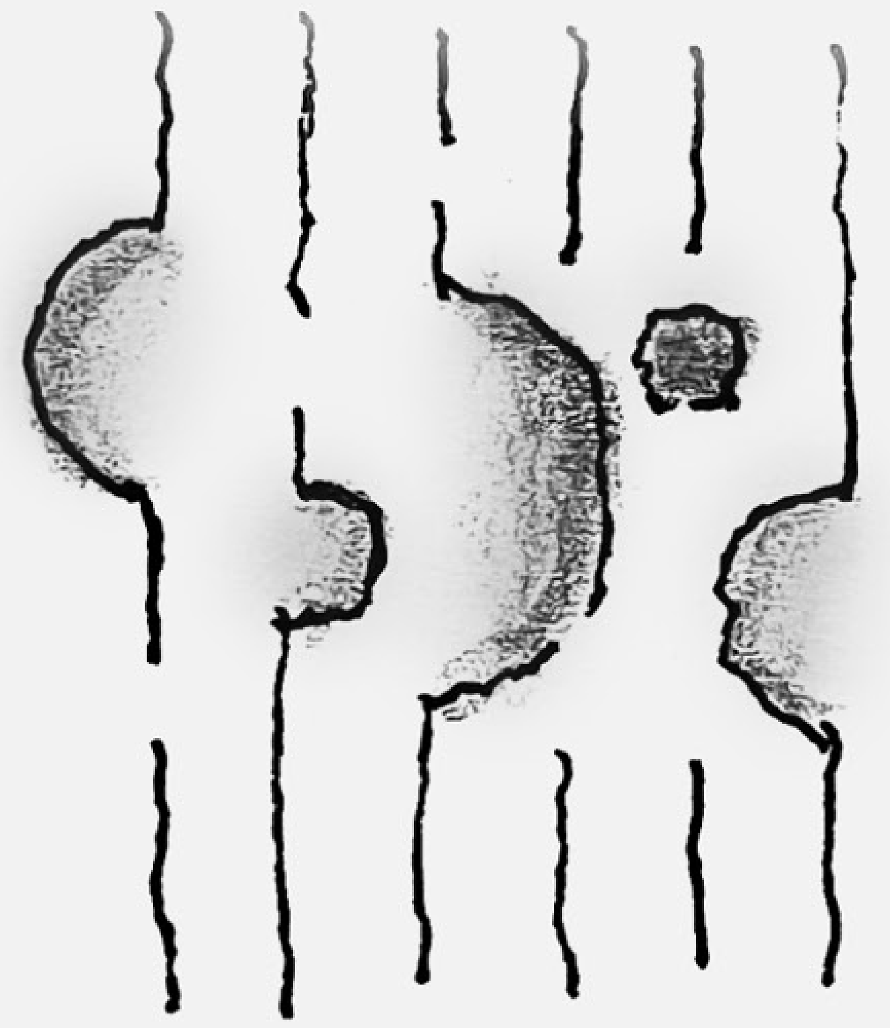
TAHOE-RENO INDUSTRIAL CENTER | RENO, NV
TRUCK STOP | EMOTIONAL SPACE | PROTOTYPE

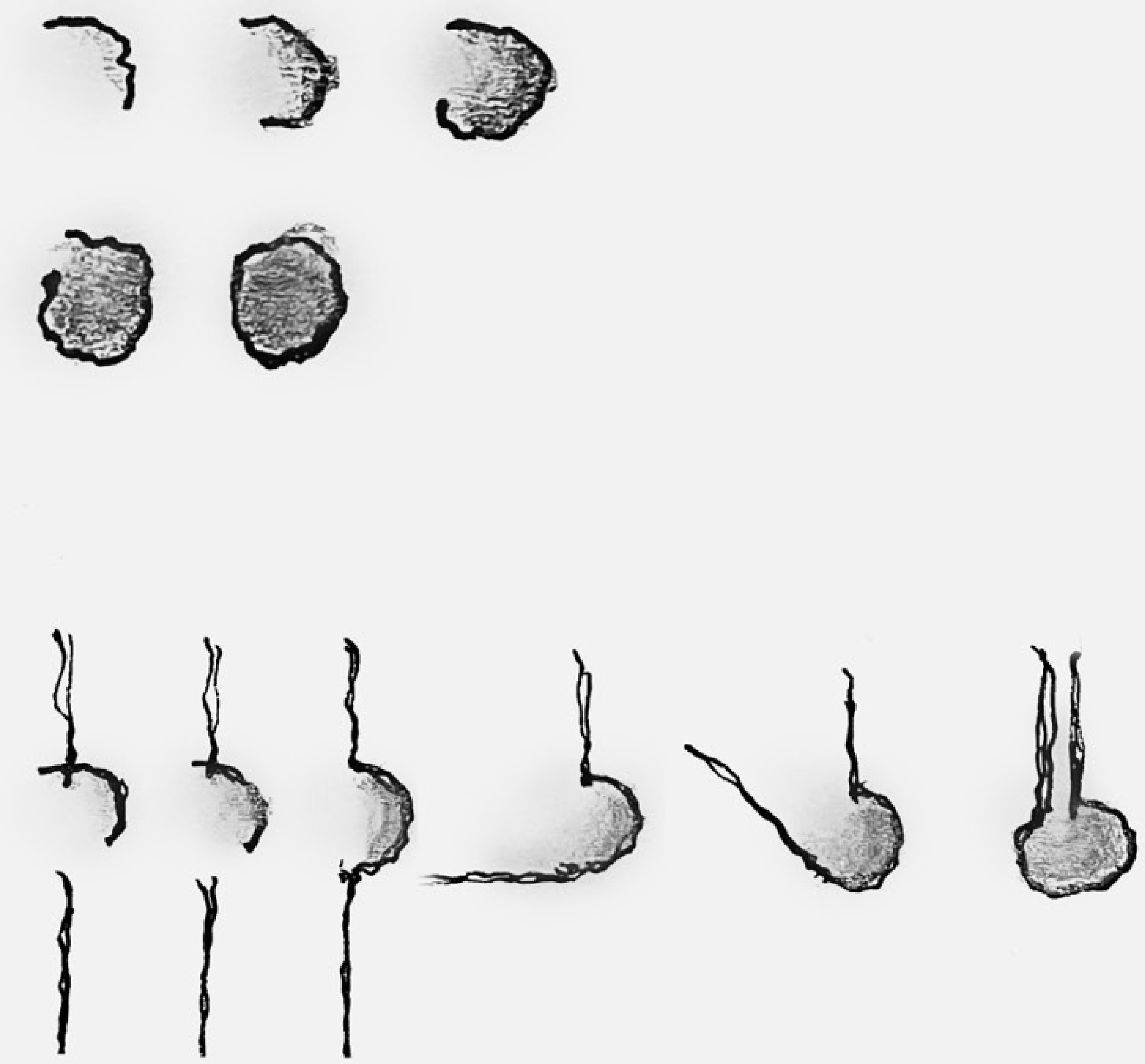
Ps Ai Id Pr

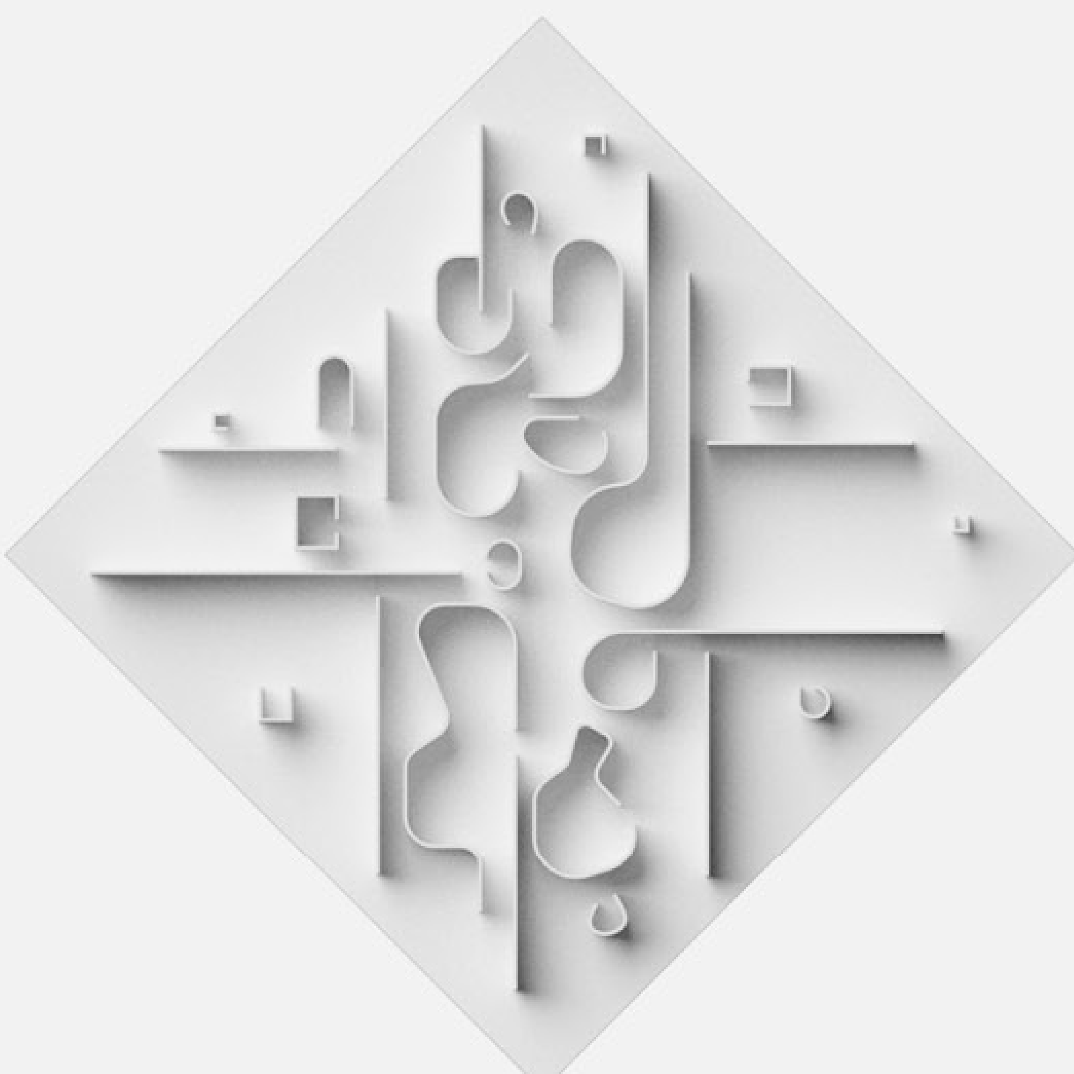
Over the next decade, the trucking industry is transitioning from diesel to electric-powered vehicles, resulting in the need for more frequent stops and refueling. To ensure safe trucking operations, the government and industry leaders have collaborated to revise regulations with a focus on the health and safety of truck drivers. As part of this shift, truck drivers are required to take a break and refuel every 3.5 hours, with each stop lasting up to 1.5 hours. During this waiting time, drivers can use the break to relax both physically and mentally. This policy adjustment presents an opportunity for architecture designers to rethink the design of truck stops, taking into account the unique needs of electric-powered trucks and their drivers.

My vision is to establish a series of small-scale truck stops situated strategically between large travel centers. These stops will be designed to offer a distinctive experience that evokes positive emotions and fosters deeper engagement. In this scenario, the physical and mental well-being of individuals serves as a catalyst for slowing down the accelerating world. The aim is to create spaces that encourage truck drivers, moreover for everyone from all walks of life, to take a moment to refresh their bodies and minds by truly "STOP". This design helps people counteract the adverse health effects of their job and promotes a more relaxed and rejuvenated mindset for the journey ahead.

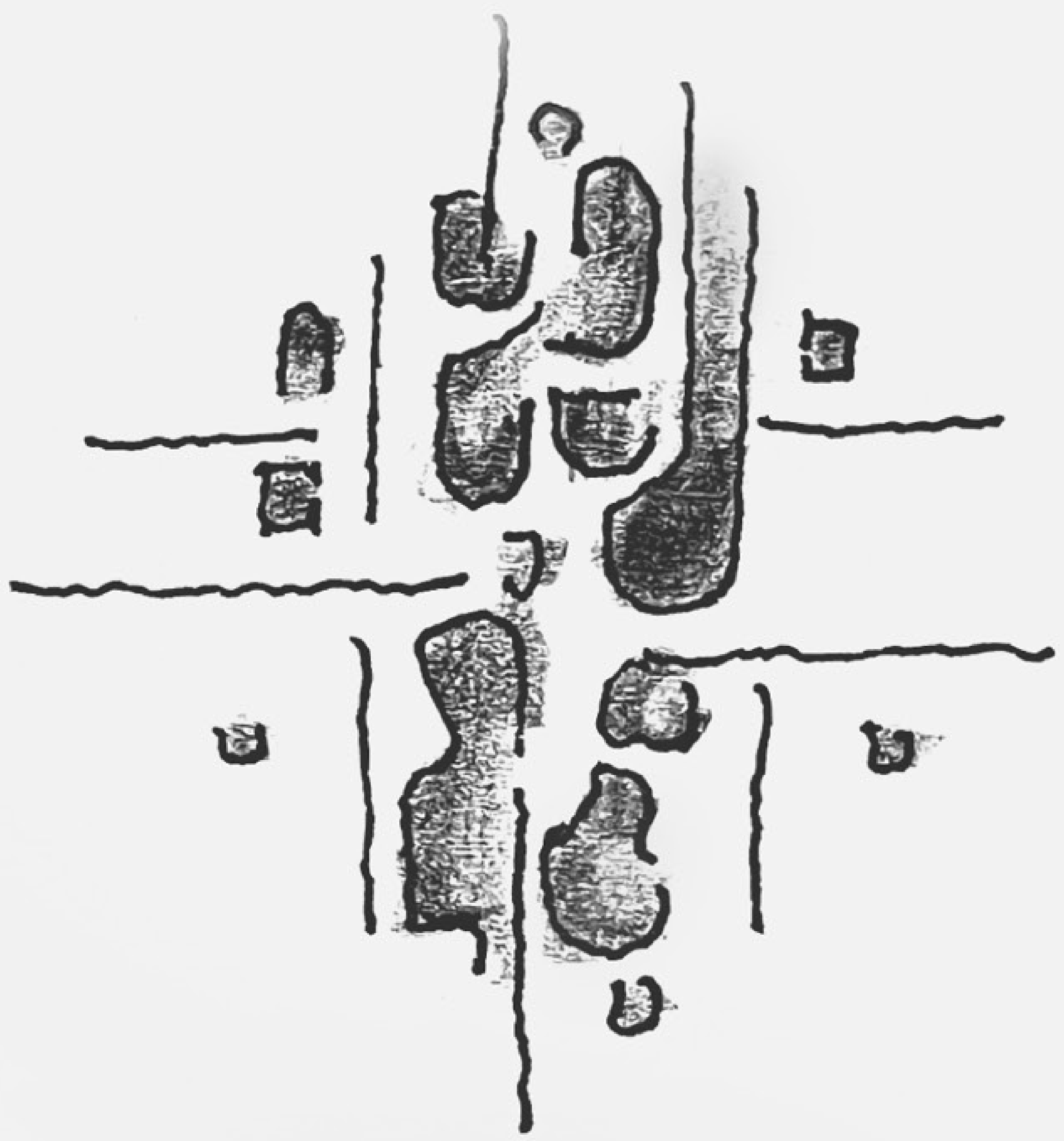
SONSBEEK SCULPTURE PAVILION
ALDO VAN EYCK | ARNHEM, HOLLAND. 1967

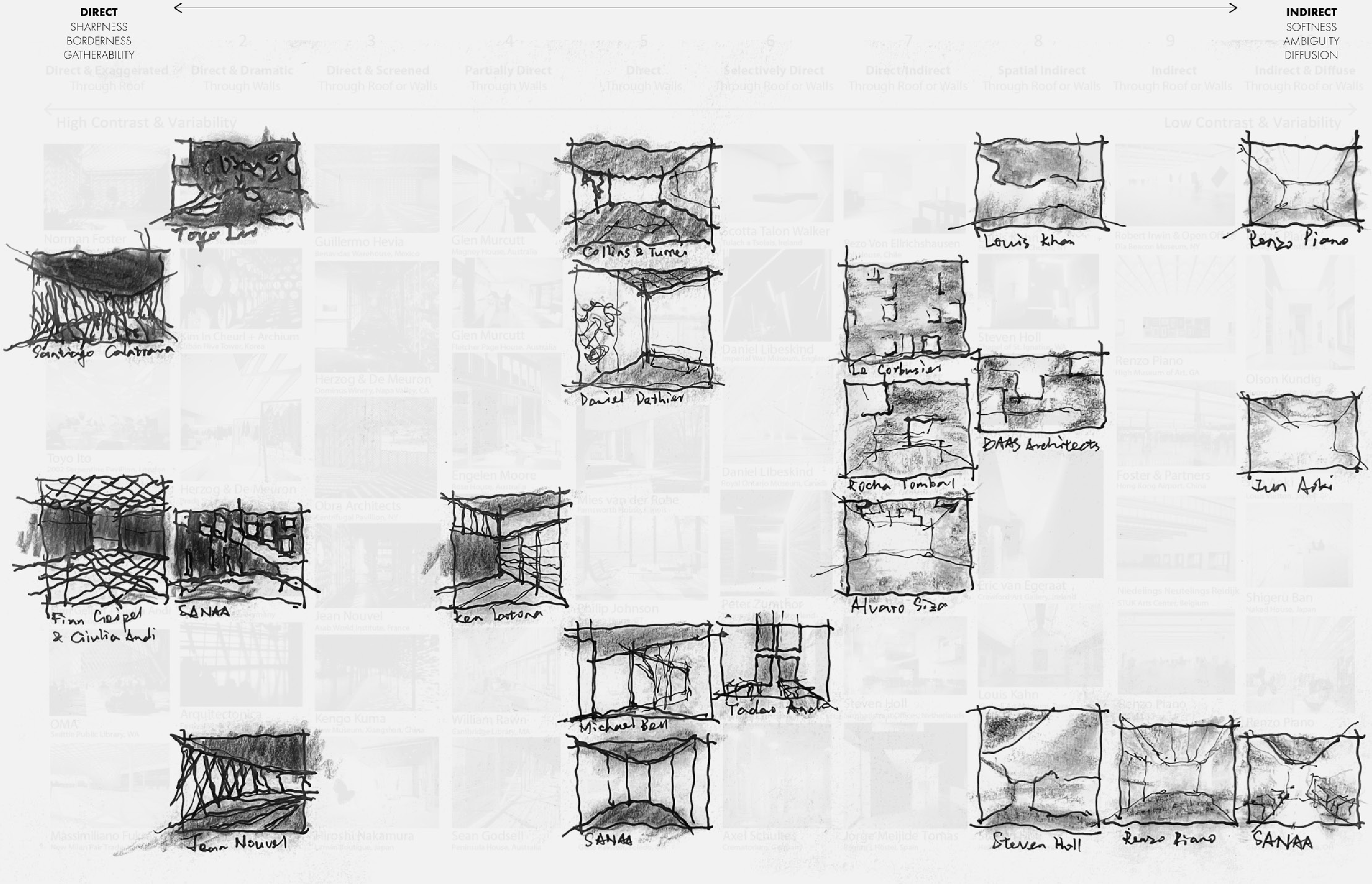


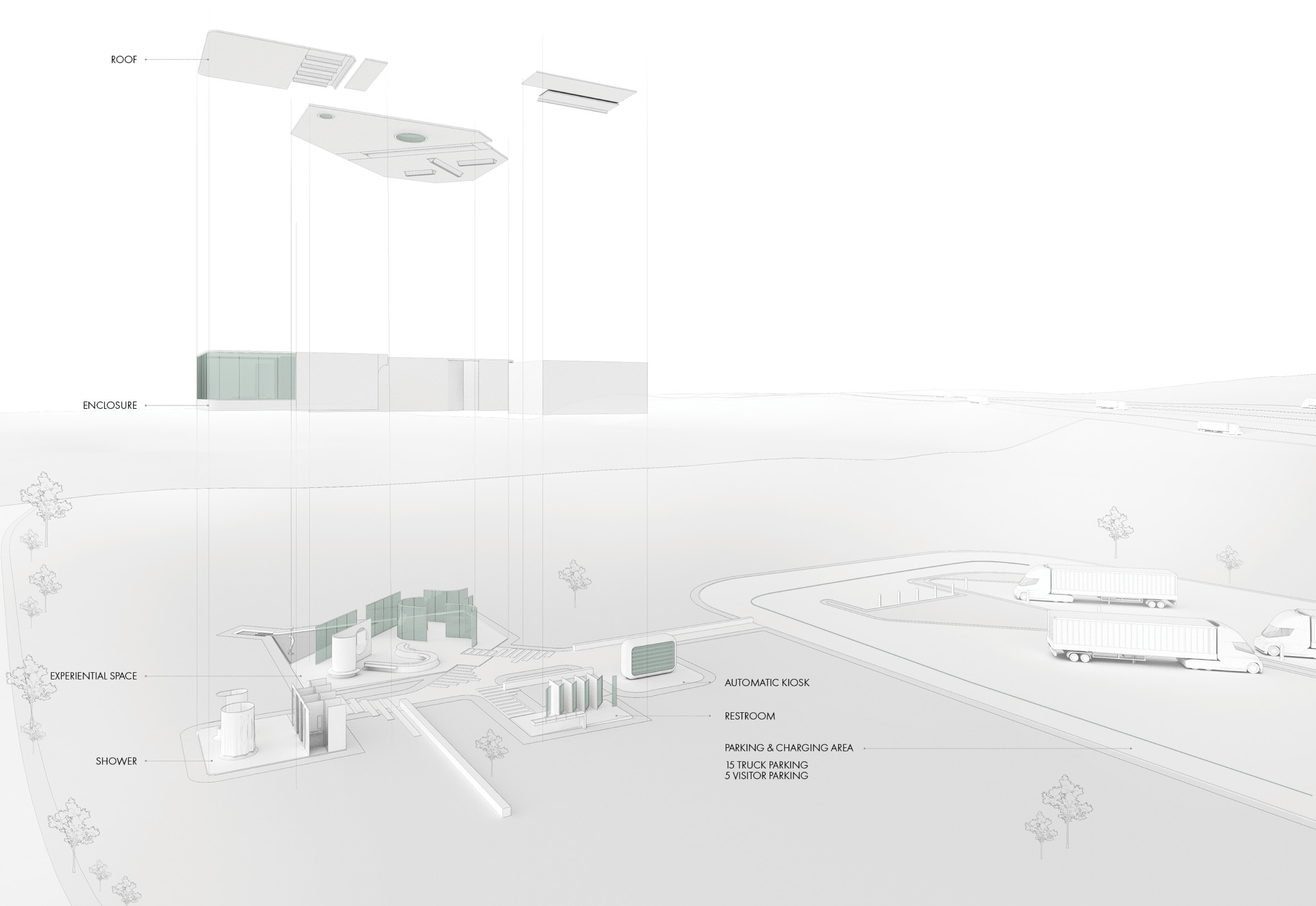


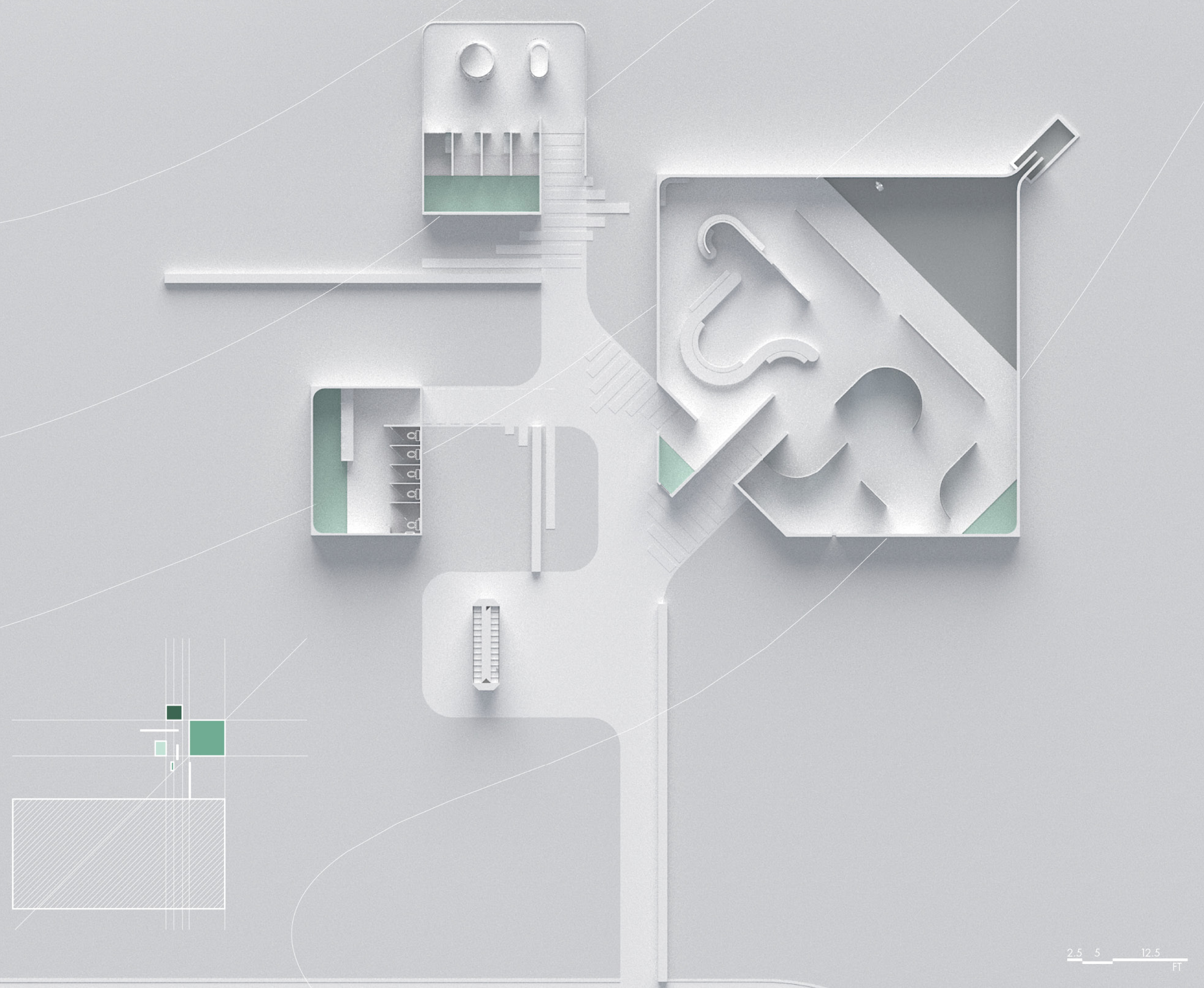


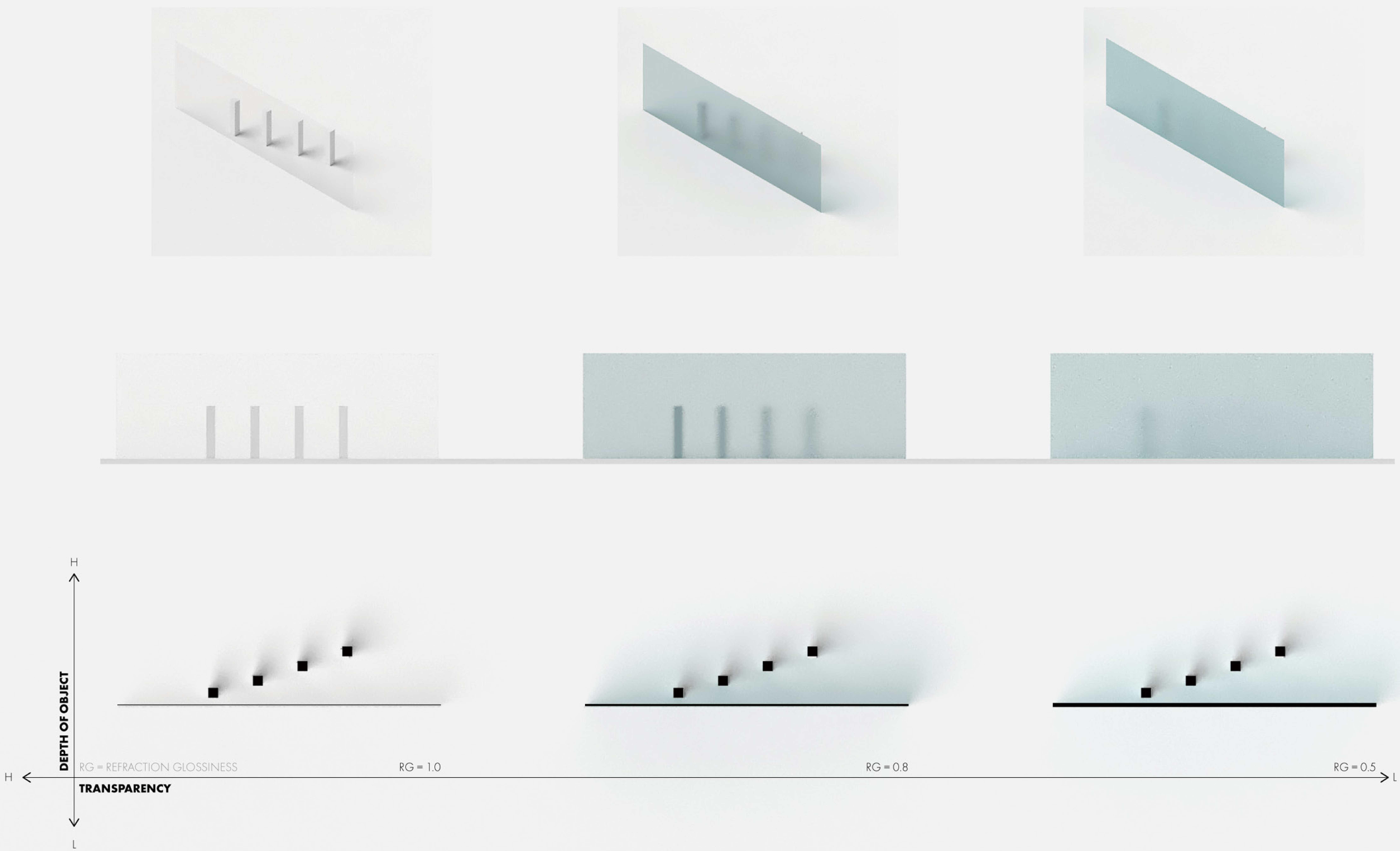
DIAMOND MUSEUM C
JOHN HEJDUK | DIAGRAM ARCHITECTURE. 1967

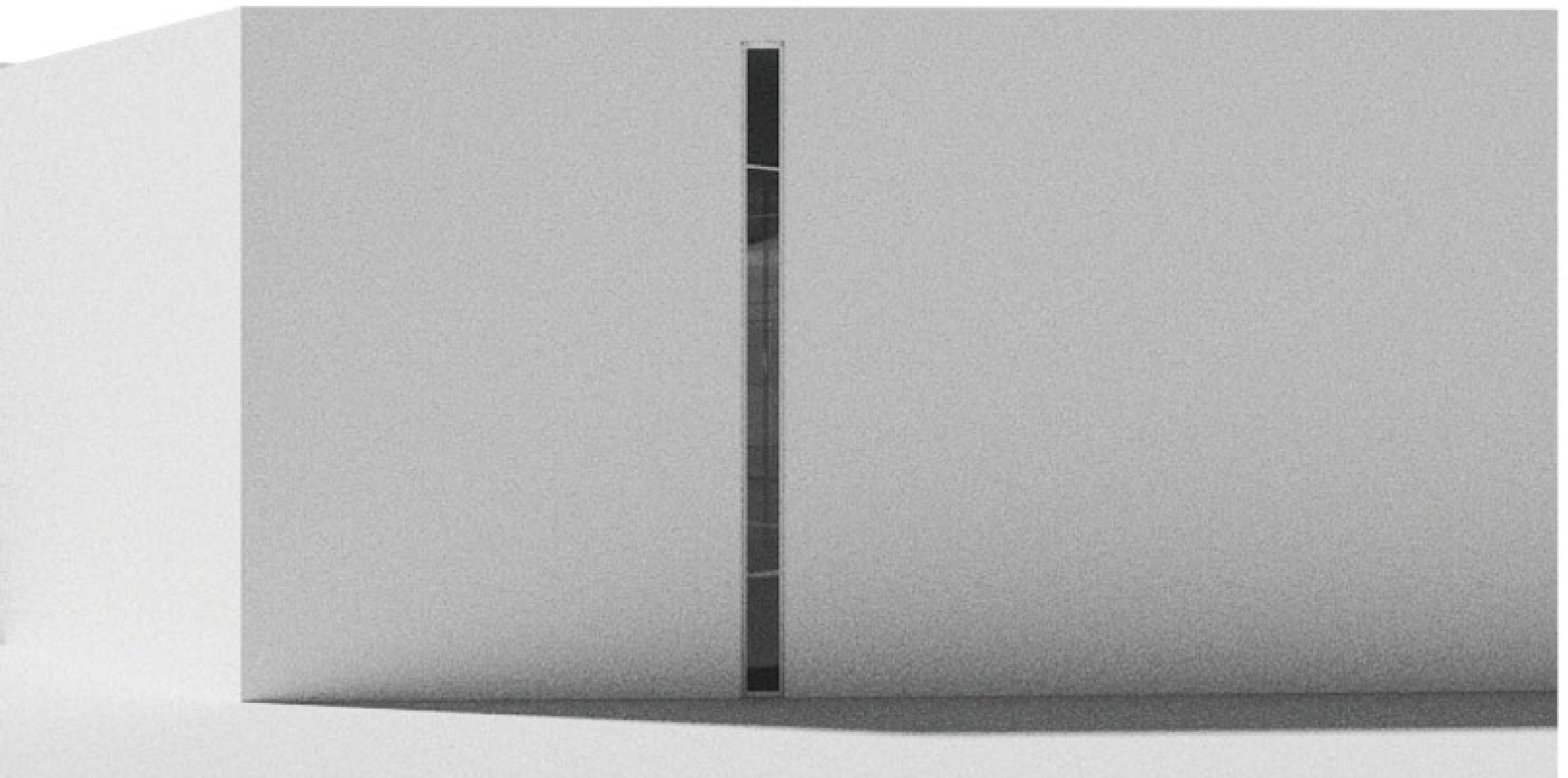


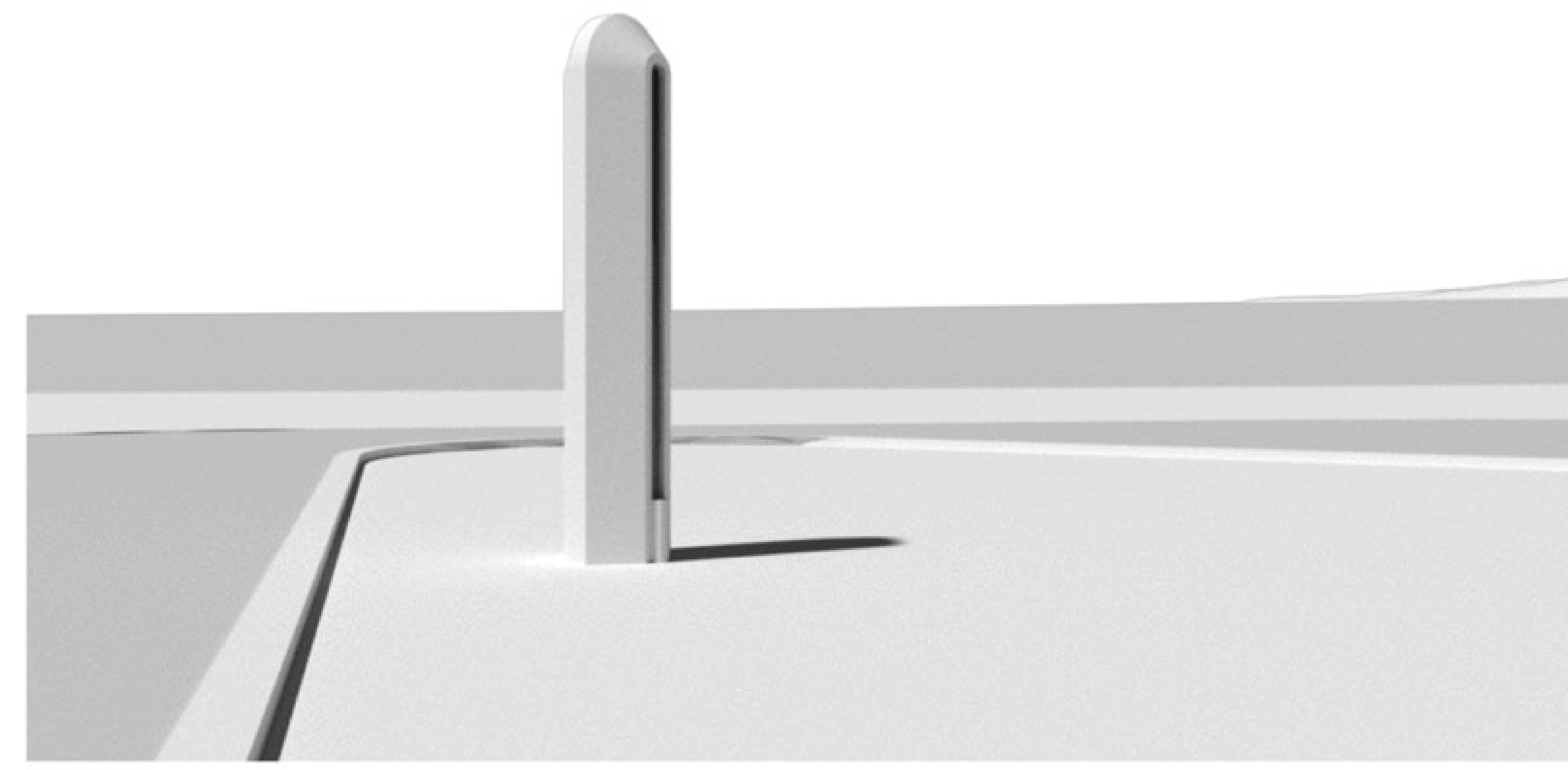

DIRECT
SHARPNESS
BORDERNESS
GATHERABILITY
INDIRECT
SOFTNESS
AMBIGUITY
DIFFUSION
Direct & Exaggerated Through Roof
Direct & Dramatic Through Walls
Direct & Screened Through Roof or Walls
Partially Direct Through Walls
Direct Through Walls
Selectively Direct Through Roof or Walls
Direct/Indirect Through Roof or Walls
Spatial Indirect Through Roof or Walls
Indirect Through Roof or Walls
Indirect & Diffuse Through Roof or Walls
High Contrast & Variability
Low Contrast & Variability
Toyo Ito
Santiago Calatrava
Finn Geipel & Giulia Andi
SANAA
Jean Nouvel
Ken Lattona
Collins & Turner
Daniel Dethier
Michael Bell
SANAA
Tadao Ando
Le Corbusier
Rocha Tombal
Alvaro Siza
Louis Khan
DAAS Architects
Steven Holl
Renzo Piano
Renzo Piano
Jun Aoki
SANAA

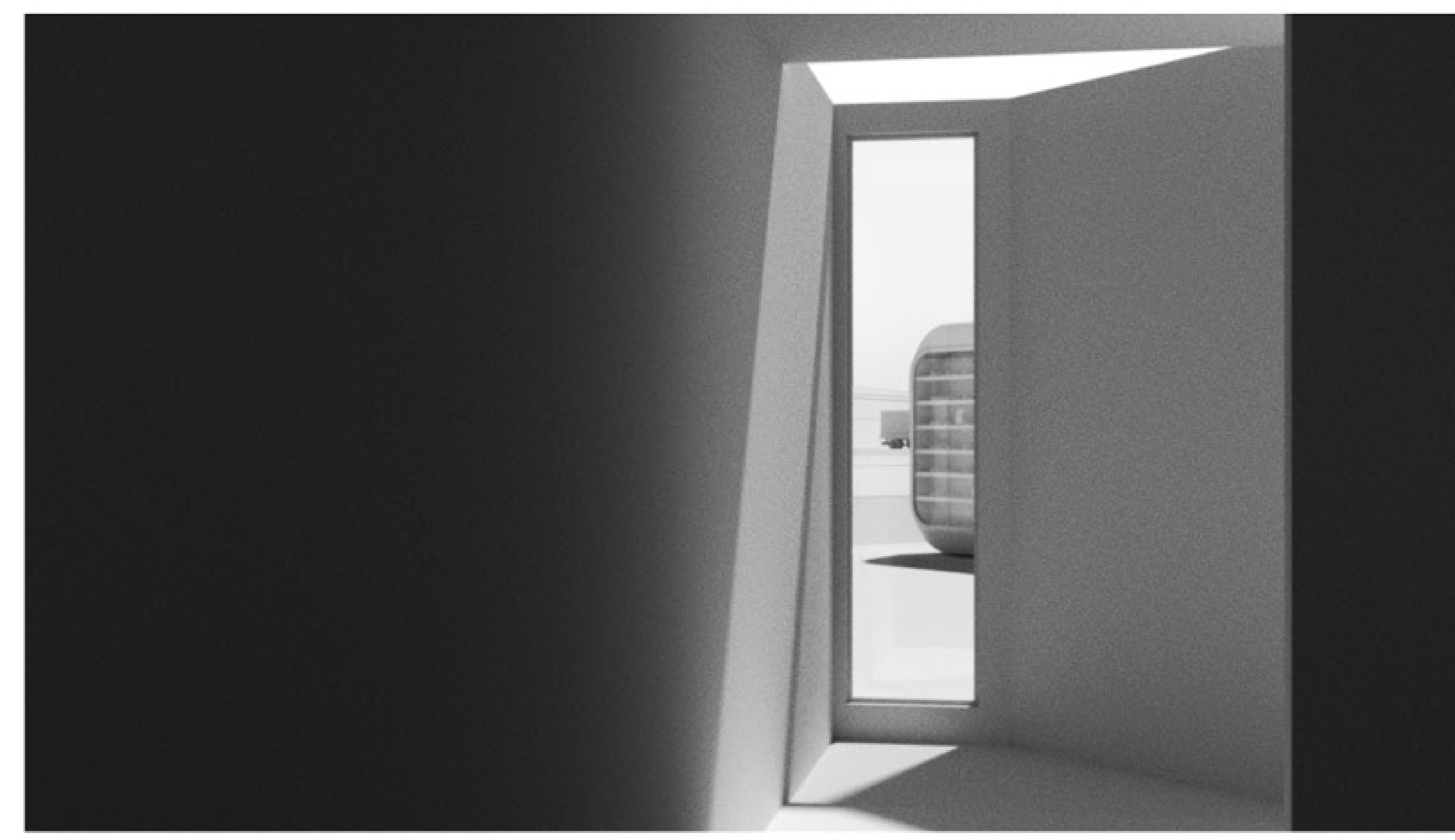
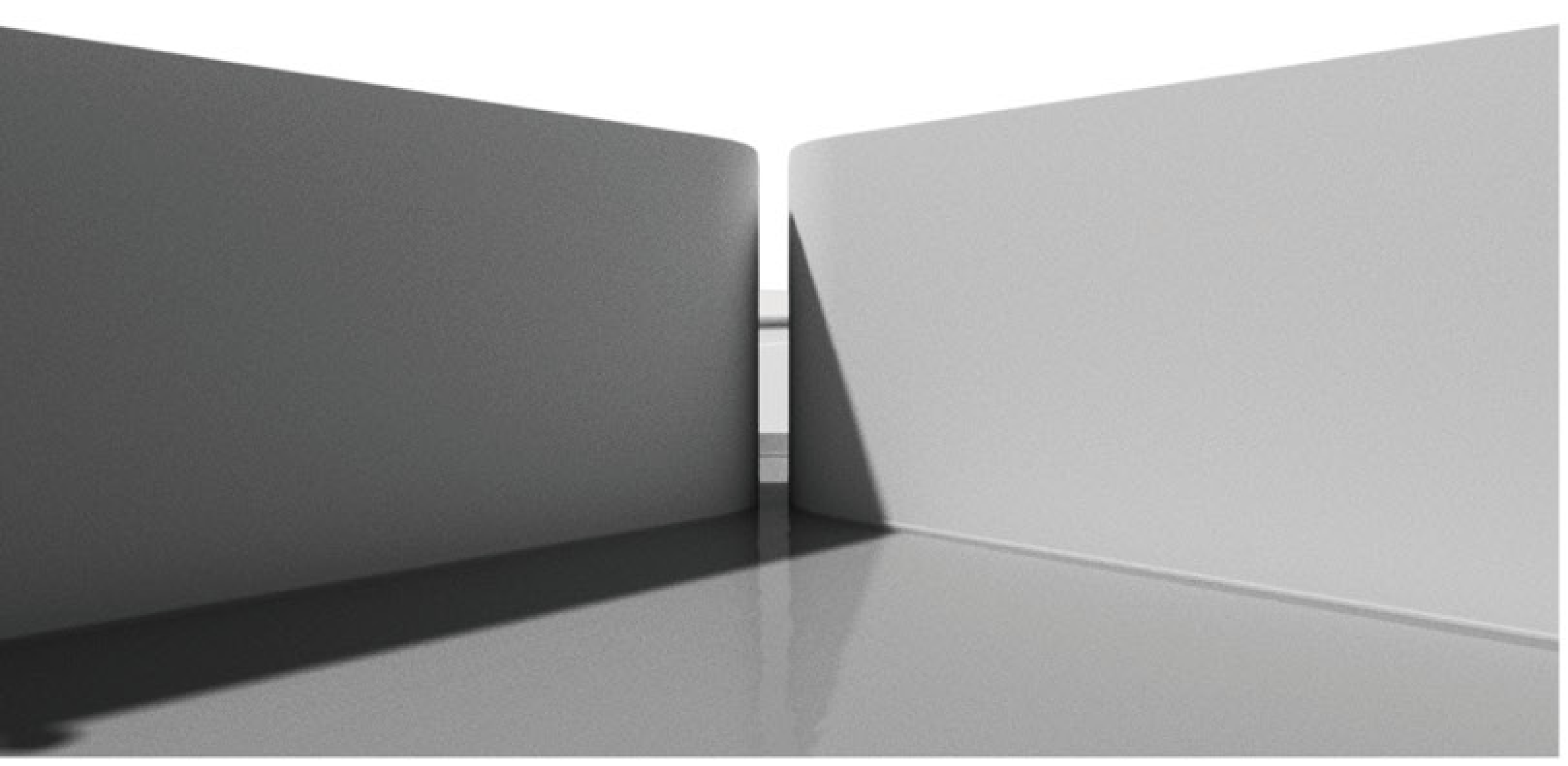
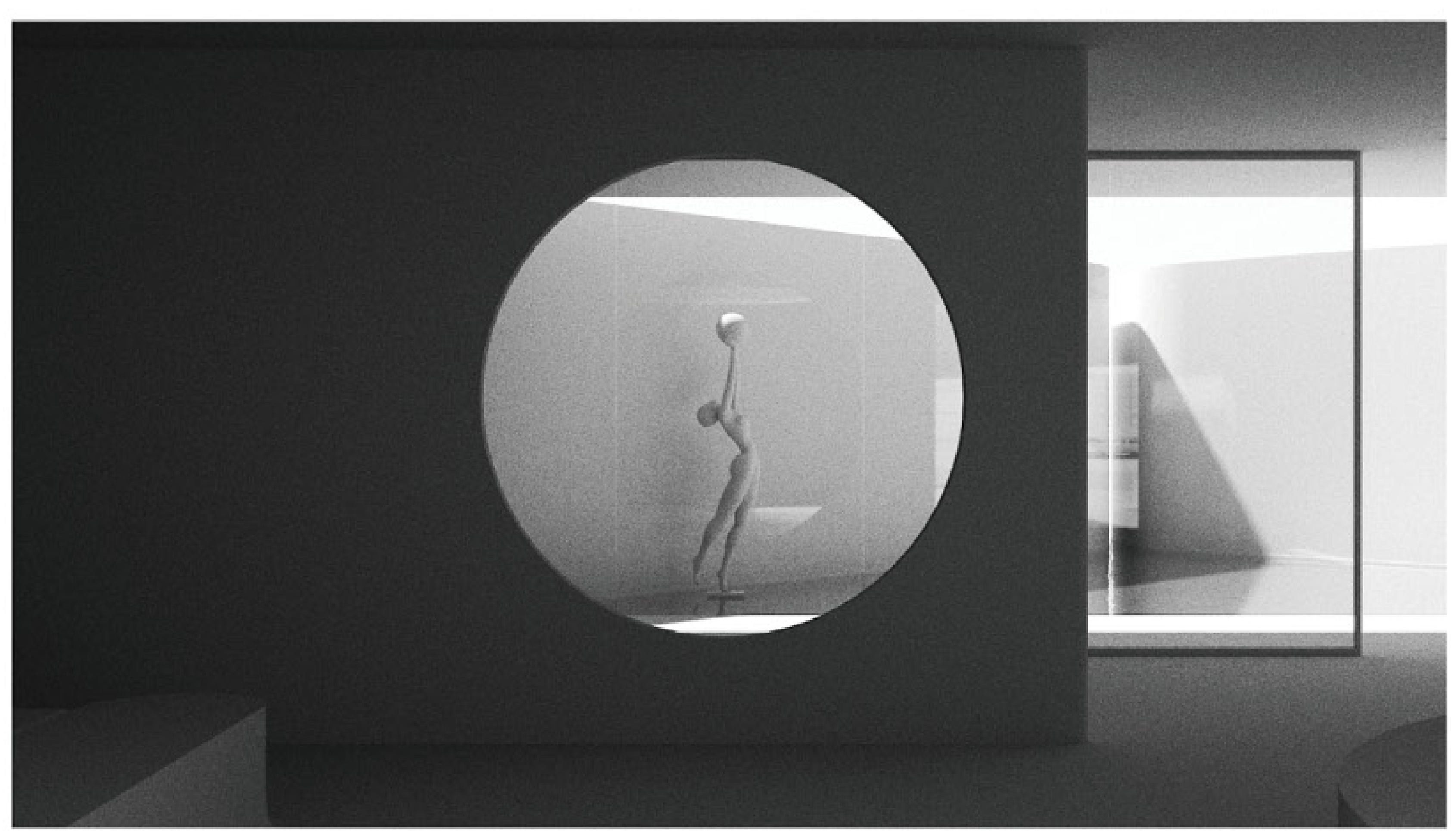
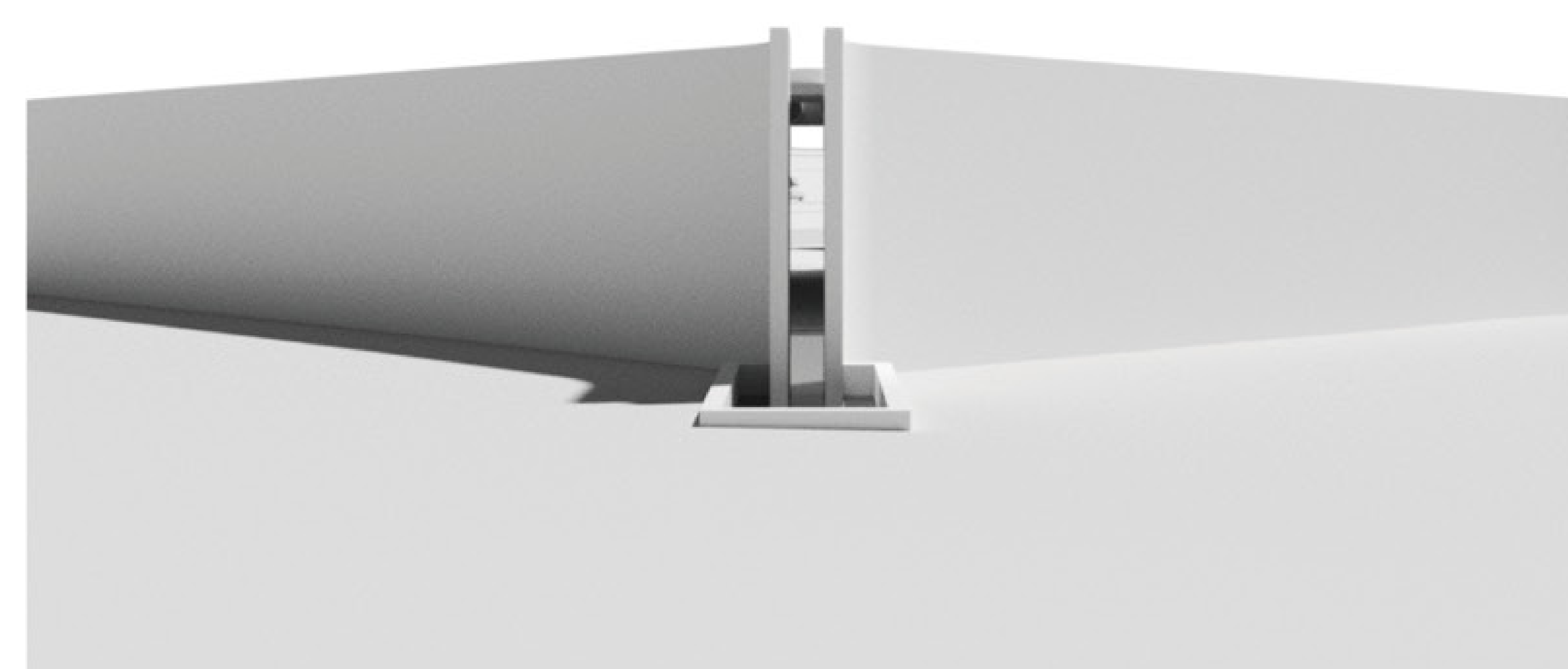

ROOF
ENCLOSURE
EXPERIENTIAL SPACE
SHOWER
AUTOMATIC KIOSK
RESTROOM
PARKING & CHARGING AREA
15 TRUCK PARKING
5 VISITOR PARKING


2.5
5
12.5
FT


H
DEPTH OF OBJECT
RG = REFRACTION GLOSSINESS
RG = 1.0
RG = 0.8
RG = 0.5
H
L
TRANSPARENCY
L





02

AAD STUDIO V | 2022

INSTRUCTOR: DAVID BENJAMIN
PARTNER: RUIZHAN HUANG|RENWEN YU

RICE ECOLOGY

CARBON-NEGATIVE MATERIAL - RICE STRAW
FACTORY |SILO | PROTOTYPE

Ps Ai Id

The world is suffering a food crisis nowadays. There is no doubt that rice takes the most appropriate position to cease this disaster. In the meantime, we are facing two problems: the first one is that the food suppliers prefer to burn the rice into biofuel with no carbon-saving benefit to relieve inventory pressure, which causes an increase in the unit price of rice products; Other one is that rice production is always regarded as a high carbon emission process.

In the scenario of rice ecology, the Government initiates, operates, and funds a program cooperating with National Farmers Union. The program encourages farmers to store more grains and sell them at lower prices to underdeveloped countries to mitigate the food crisis. More importantly, we consider how to convert carbon emissions into carbon sinks and contribute to the program in this scenario from the perspective of architectural designers. We help farmers to design a comprehensive prototype with multifunction including rice storage, material manufacture, and biogas generation. Through selling bio-friendly architectural and commercial products to the world, more carbon is sequestered in the media of products, so that it contributes to the 40% of global carbon emissions that are due to buildings.

2024

The ongoing food crisis persists as approximately 40% of the grains produced in the U.S. continue to be used for biofuel. Unfortunately, to prevent a decline in food prices, the U.S. government-controlled major grain traders still prioritize burning the grains as biofuel over exporting them to countries in need. This practice has resulted in higher food prices while reducing inventory pressure.

2028

The U.S. government is taking action to address the global food crisis by exporting surplus grains at a reduced cost to countries in need. In response to the government's appeal, food agencies across the nation are planning to construct numerous grain silos near rice fields for storage purposes.

However, this increase in grain production will inevitably lead to a significant rise in straw production. As a result, the government has mandated that the construction of these grain silos should prioritize minimizing carbon emissions and take into account the environmental impact of straw burning. The government has implemented several regulations to control carbon emissions, including carbon taxes for steel and concrete and government subsidies for biomaterials.

2032

An architectural team is embarking on the "Prototype Incubator" project, set to take place in California's rice fields. The project seeks to create a comprehensive prototype that includes grain silos, factories, paper production, distribution centers, and bioelectricity generation. The team is currently researching the potential of rice straws as building materials, as well as the integrated utilization and recycling of these straws. Rice straws can serve as insulation for grain silos, and straw-made paper boxes can be used for packaging, while the straw processing system can generate electricity for transportation and building needs. The system is designed to allow for the replacement of modular straw building products throughout the building cycle.

2034

The successful implementation of the Prototype Incubator project has led to the development of a thriving Rice Economy that is now being replicated in all rice-growing regions throughout the United States. By 2034, it is expected that approximately 1,500 prototypes will be operational, mitigating the world food crisis and reducing carbon emissions in the U.S. by a total of 3 billion tons through the innovative utilization of rice straws. The project is expected to expand globally, with a target of creating around 5,000 prototypes and storing billions of tons of carbon in buildings around the world.

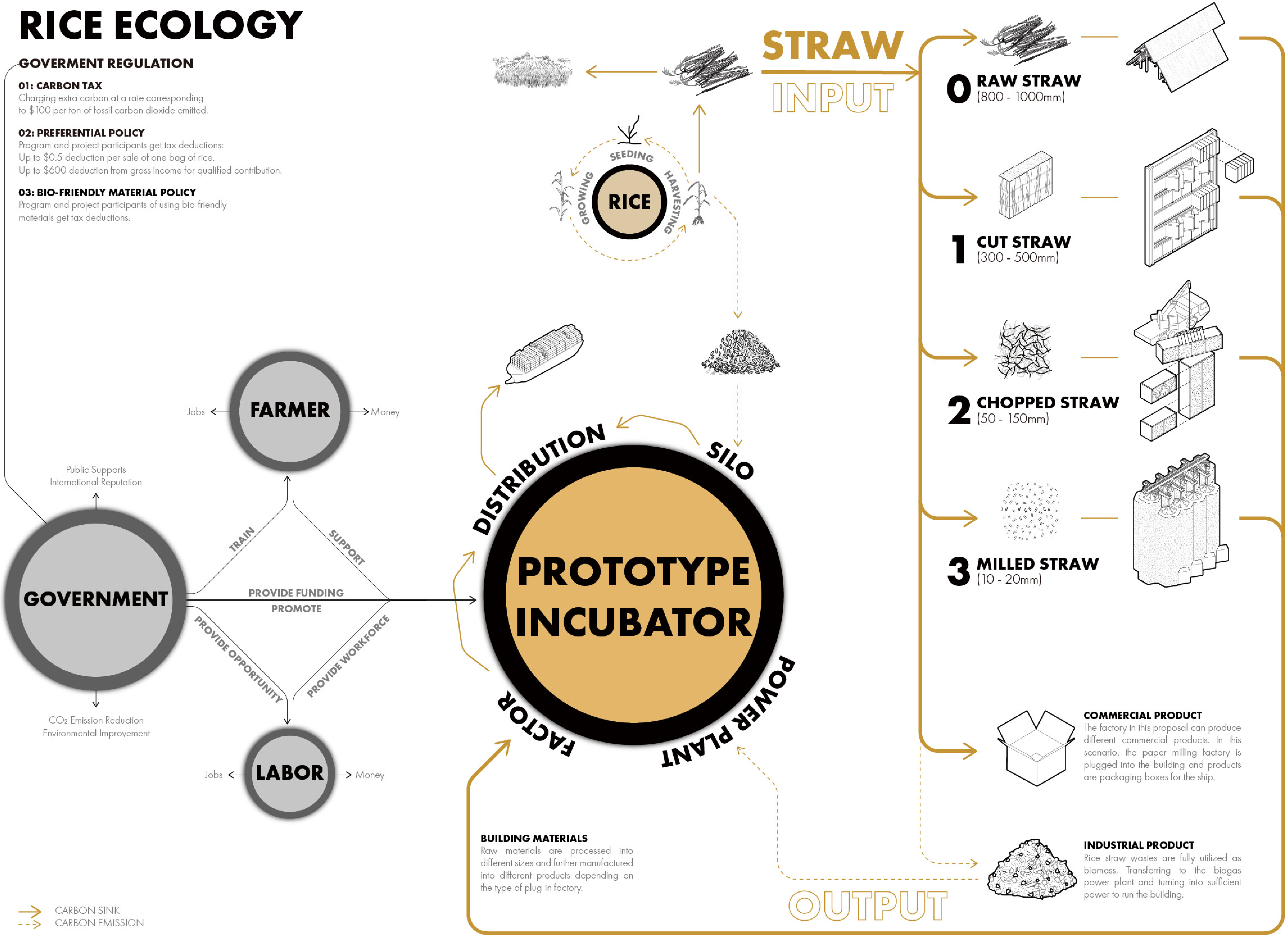
RICE ECOLOGY

GOVERMENT REGULATION

01: CARBON TAX
Charging extra carbon at a rate corresponding to $ 100 per ton of fossil carbon dioxide emitted.

02: PREFERENTIAL POLICY
Program and project participants get tax deductions:
Up to $0.5 deduction per sale of one bag of rice.
Up to $600 deduction from gross income for qualified contribution.

03: BIO-FRIENDLY MATERIAL POLICY
Program and project participants of using bio-friendly materials get tax deductions.



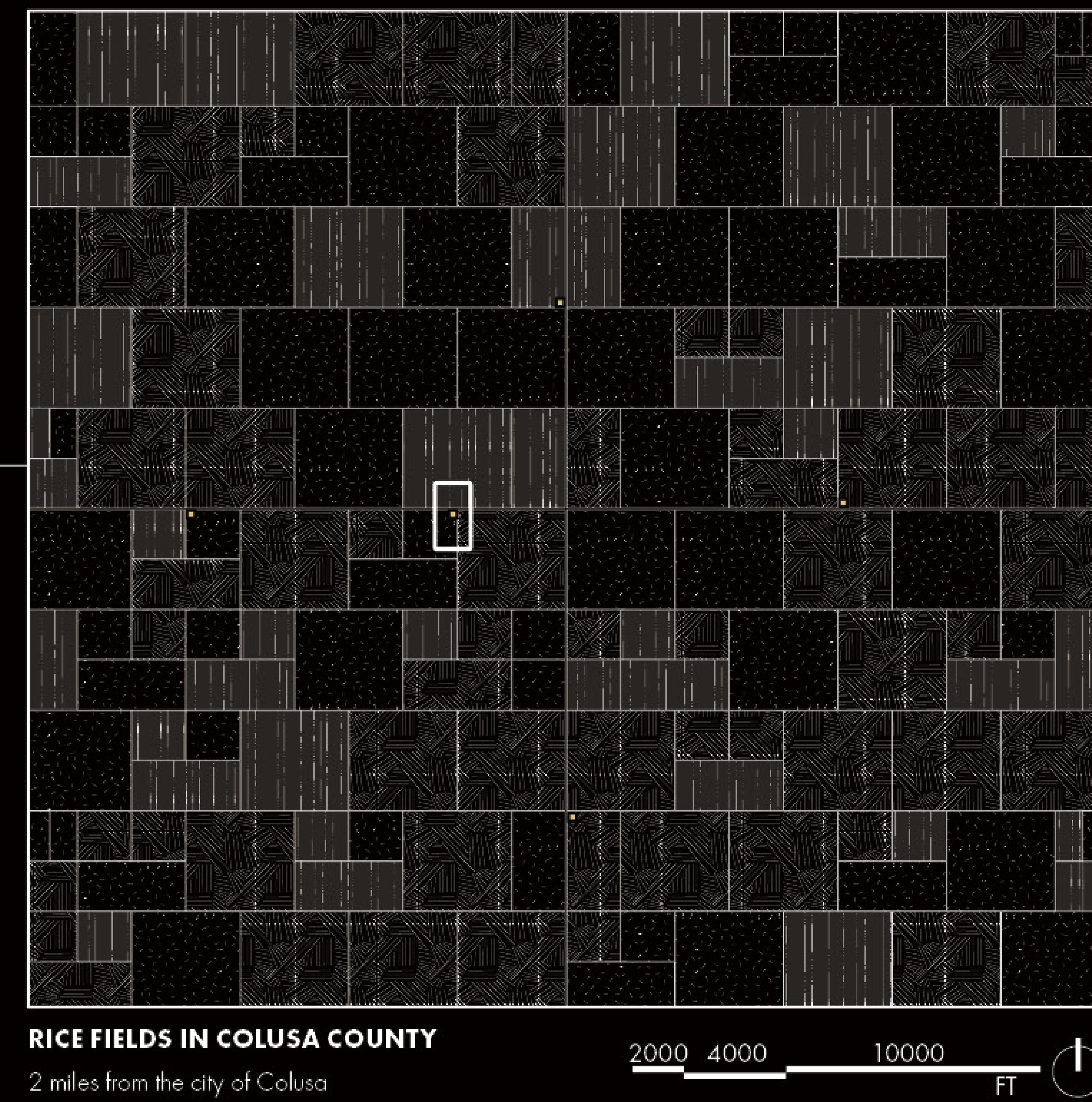
BUILDING MATERIALS
Raw materials are processed into different sizes and further manufactured into different products depending on the type of plug-in factory.

COMMERCIAL PRODUCT
The factory in this proposal can produce different commercial products. In this scenario, the paper milling factory is plugged into the building and products are packaging boxes for the ship.

INDUSTRIAL PRODUCT
Rice straw wastes are fully utilized as biomass. Transferring to the biogas power plant and turning into sufficient power to run the building.

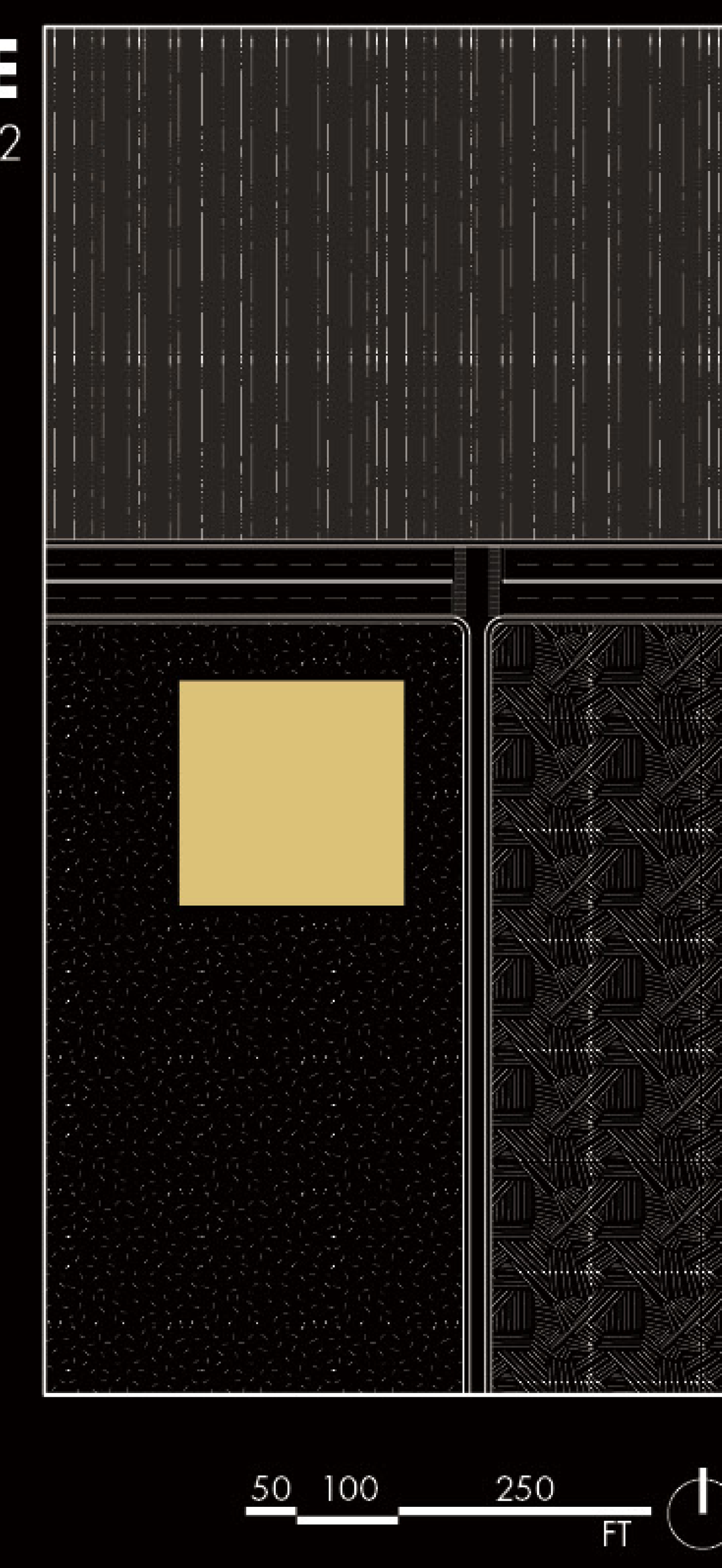
COLUSA COUNTY
Colusa County is one of five largest rice-producing counties in California.

CALIFORNIA
One of the Largest Rice Production State in U.S.



RICE FIELDS IN COLUSA COUNTY
2 miles from the city of Colusa

TESTING SITE
50,000 FT^2

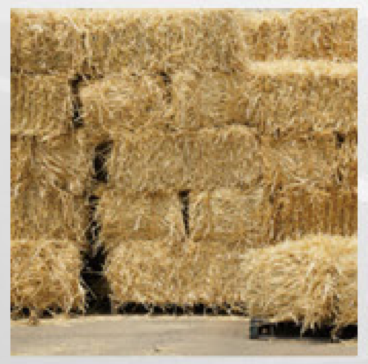


HUNDREDWEIGHT (CWT.)
- < 1,000,000
- 1,000,000 - 1,999,999
- 2,000,000 - 2,999,999
- 3,000,000 - 3,999,999
- 4,000,000 - 4,999,999
- 5,000,000 +

ALL RICE 2020 PRODUCTION BY COUNTY FOR SELECTED STATES
U.S. Department of Agriculture, National Agricultural Statistics Service

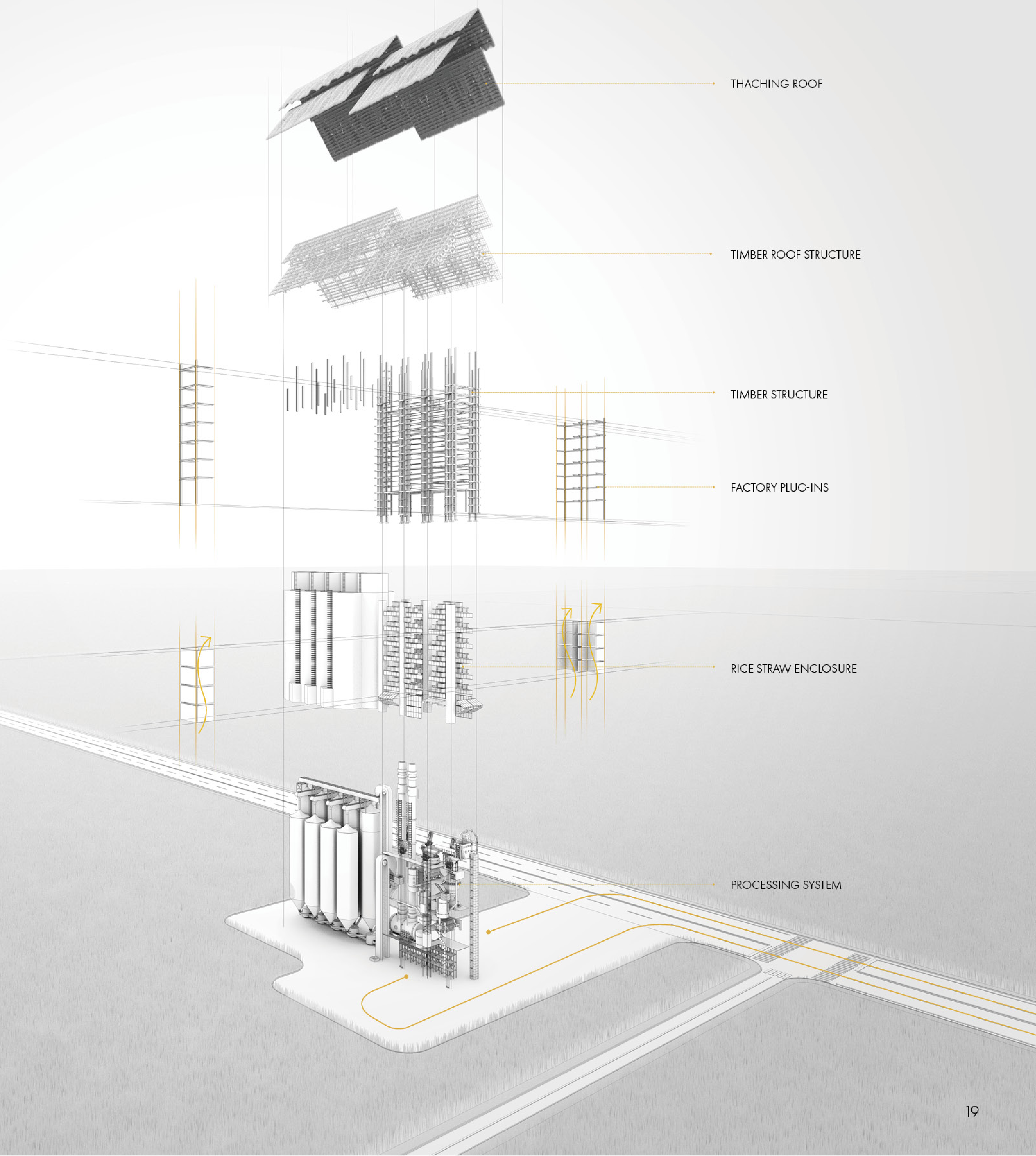
THATCHING
Thatching comprised of rice straw is widely used as roof material. Thatching roof has an angle of at least 50° which allows precipitation to travel quickly down slope. The roof can last from 15 to 40 years if properly maintained.

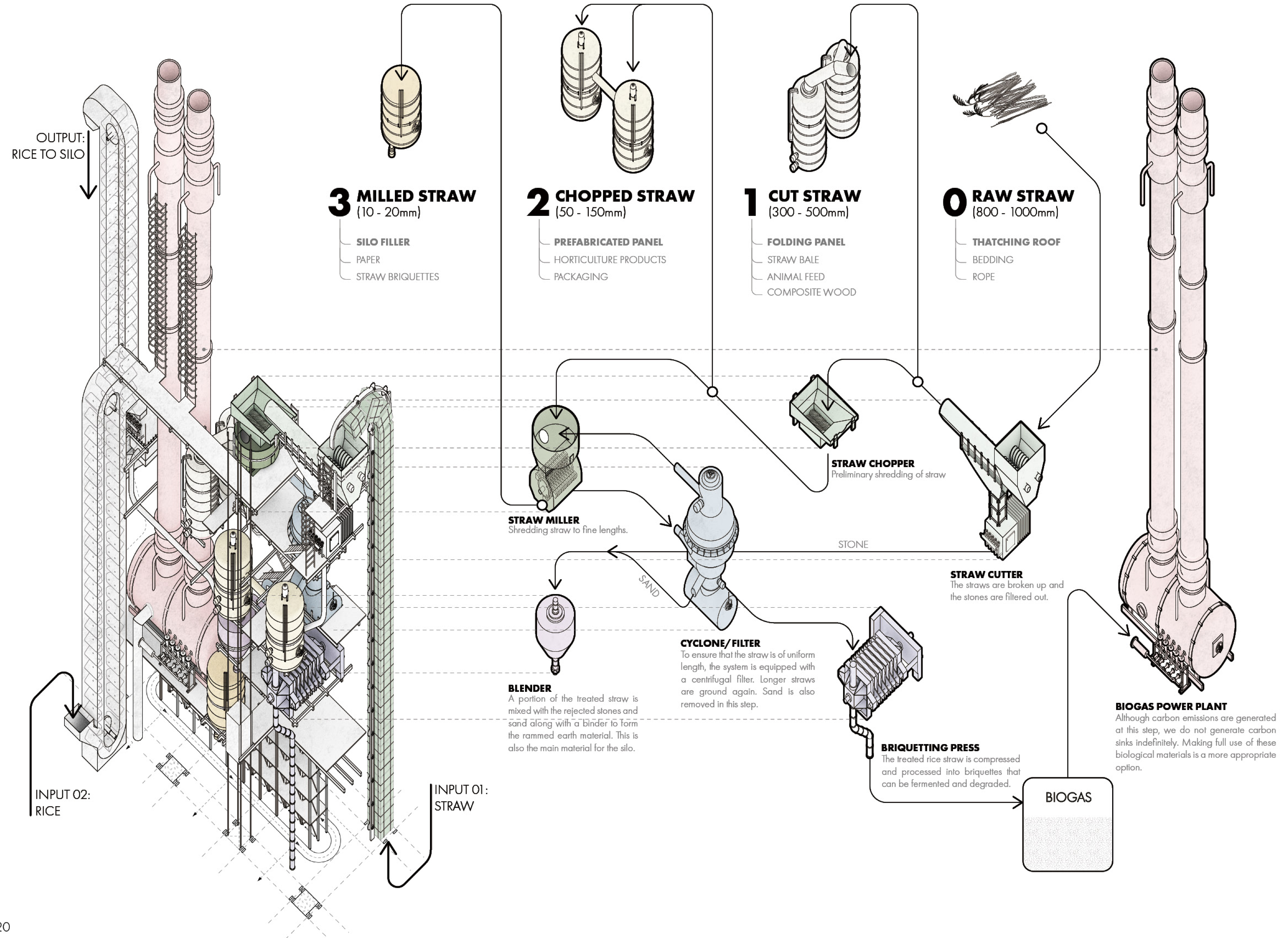
TIMBER
Timber is used as structure in the building. Timber is also carbon friendly material that could sequester certain amount of carbon. It's laso used as part of prefabricated panel unit.



RICE STRAW
Rice straw is a carbon negative material which is widely used in this project in form as building materials, industrial products, and energy resource.

RAMMED EARTH
Rmmed earth mixed with rice straw is used to create tall silo units. This material have very low carbon emissions comparing to aluminium which typically is used to make silo containers.



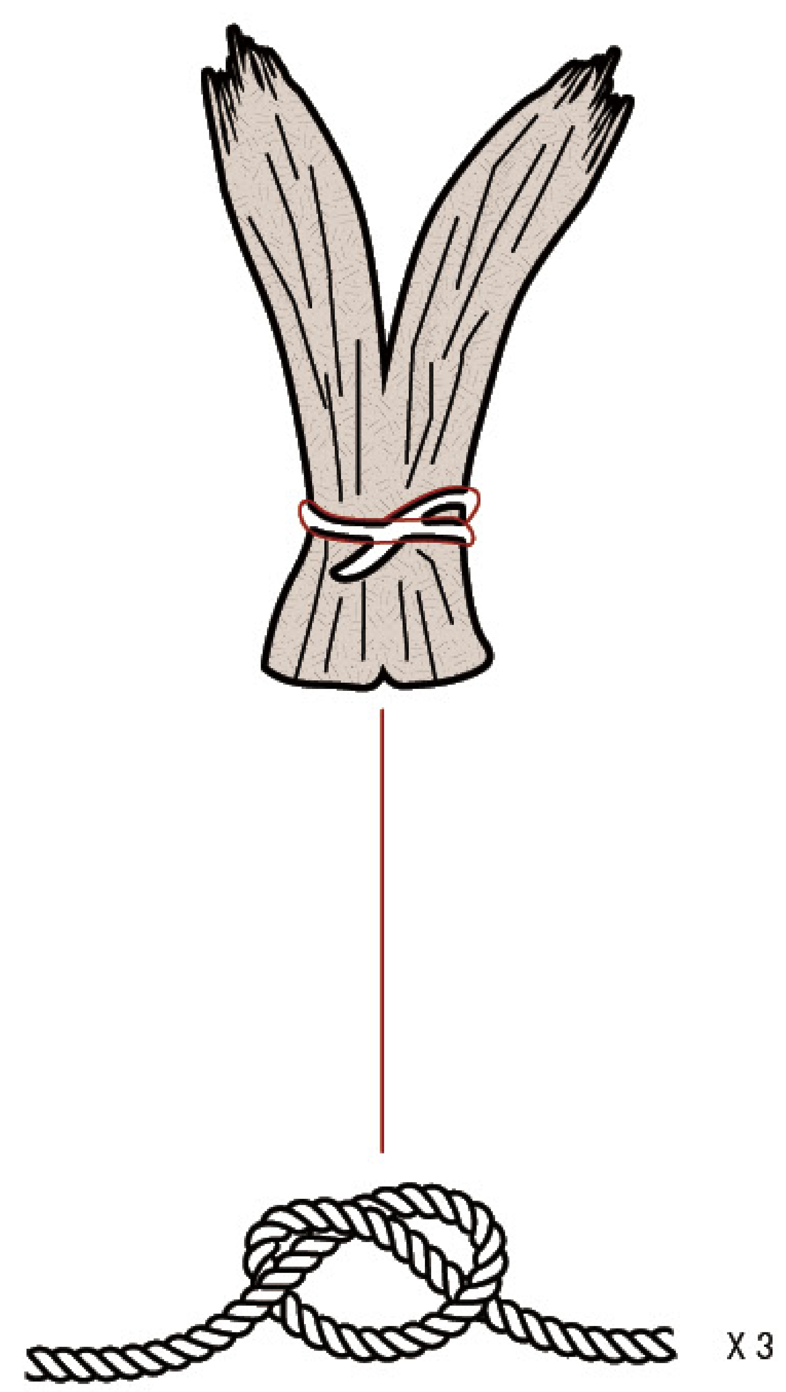

OUTPUT:
RICE TO SILO
3 MILLED STRAW
(10 - 20mm)
SILO FILLER
PAPER
STRAW BRIQUETTES
2 CHOPPED STRAW
(50 - 150mm)
PREFABRICATED PANEL
HORTICULTURE PRODUCTS
PACKAGING
1 CUT STRAW
(300 - 500mm)
FOLDING PANEL
STRAW BALE
ANIMAL FEED
COMPOSITE WOOD
0 RAW STRAW
(800 - 1000mm)
THATCHING ROOF
BEDDING
ROPE
STRAW CHOPPER
Preliminary shredding of straw
STRAW MILLER
Shredding straw to fine lengths.
STONE
SAND
STRAW CUTTER
The straws are broken up and the stones are filtered out.
CYCLONE/FILTER
To ensure that the straw is of uniform length, the system is equipped with a centrifugal filter. Longer straws are ground again. Sand is also removed in this step.
BLENDER
A portion of the treated straw is mixed with the rejected stones and sand along with a binder to form the rammed earth material. This is also the main material for the silo.
BRIQUETTING PRESS
The treated rice straw is compressed and processed into briquettes that can be fermented and degraded.
BIOGAS POWER PLANT
Although carbon emissions are generated at this step, we do not generate carbon sinks indefinitely. Making full use of these biological materials is a more appropriate option.
BIOGAS
INPUT 02:
RICE
INPUT 01:
STRAW

0 RAW STRAW (800 - 1000mm)
THATCHING ROOF

DENSITY OF STRAW:
50 KG/M³

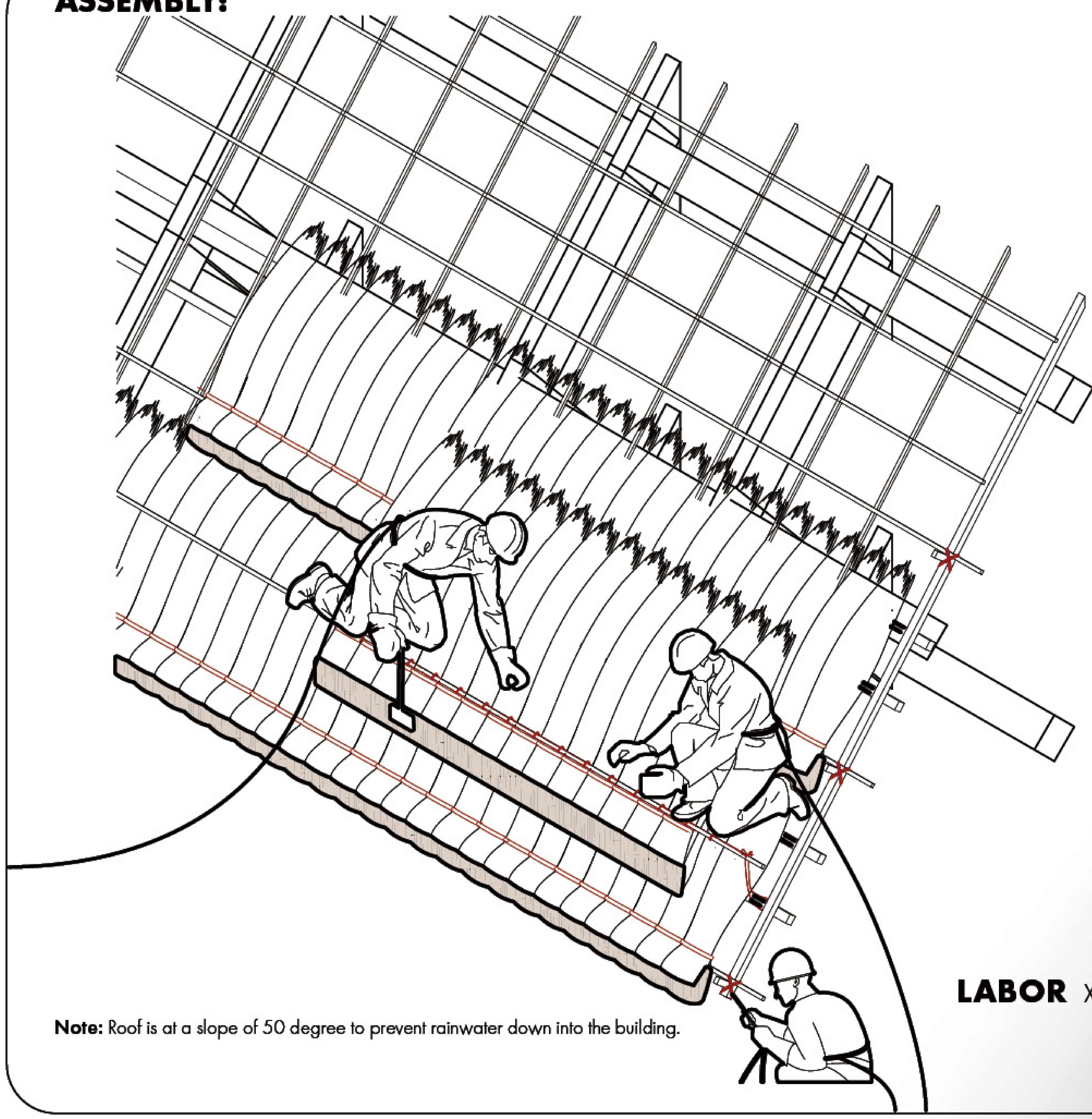
FIRE RESISTANCE:
100 MIN

PART:

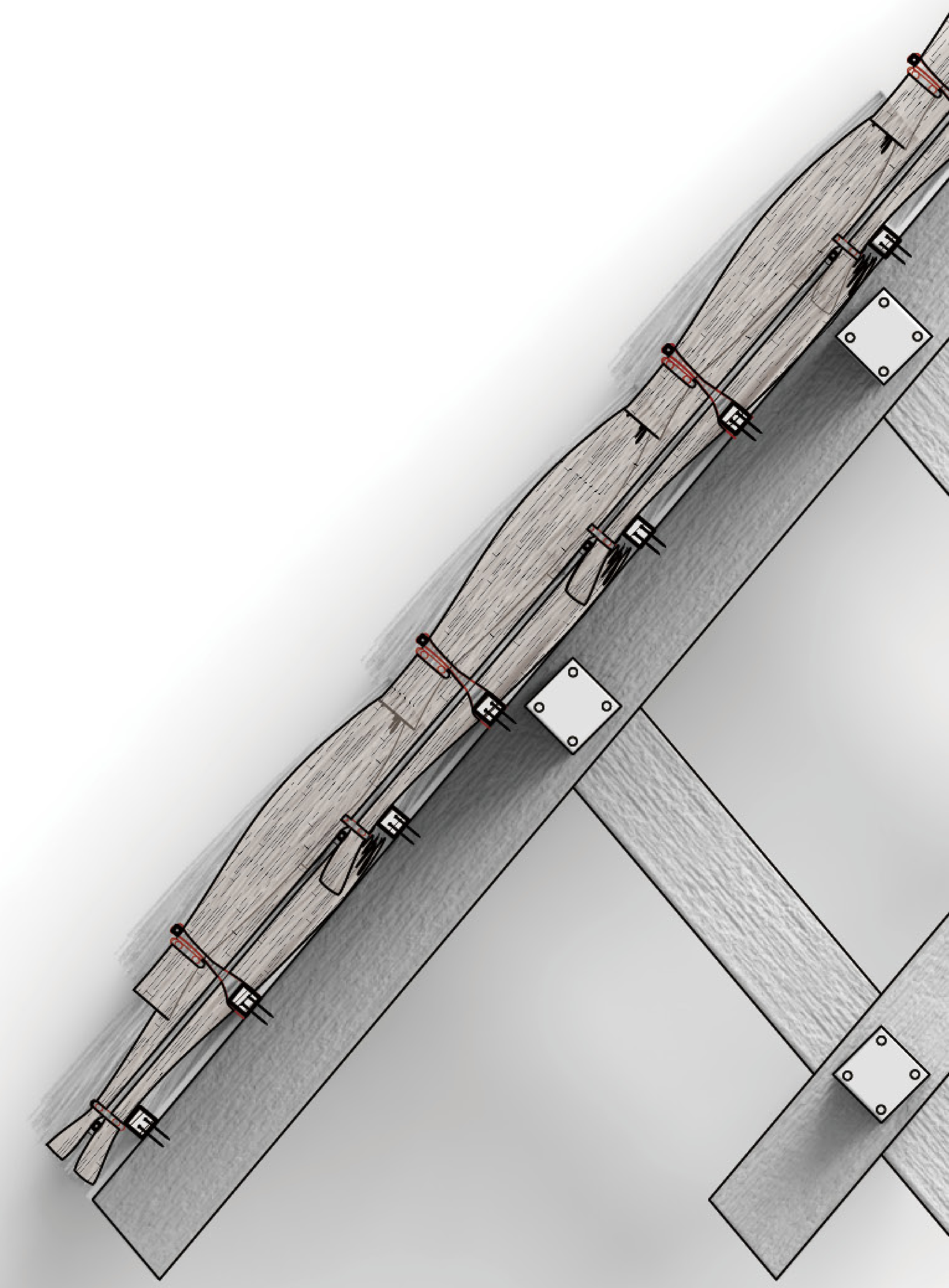


Note: Make sure the bundle have a thickness of 18 inches

ASSEMBLY:



Note: Roof is at a slope of 50 degree to prevent rainwater down into the building.



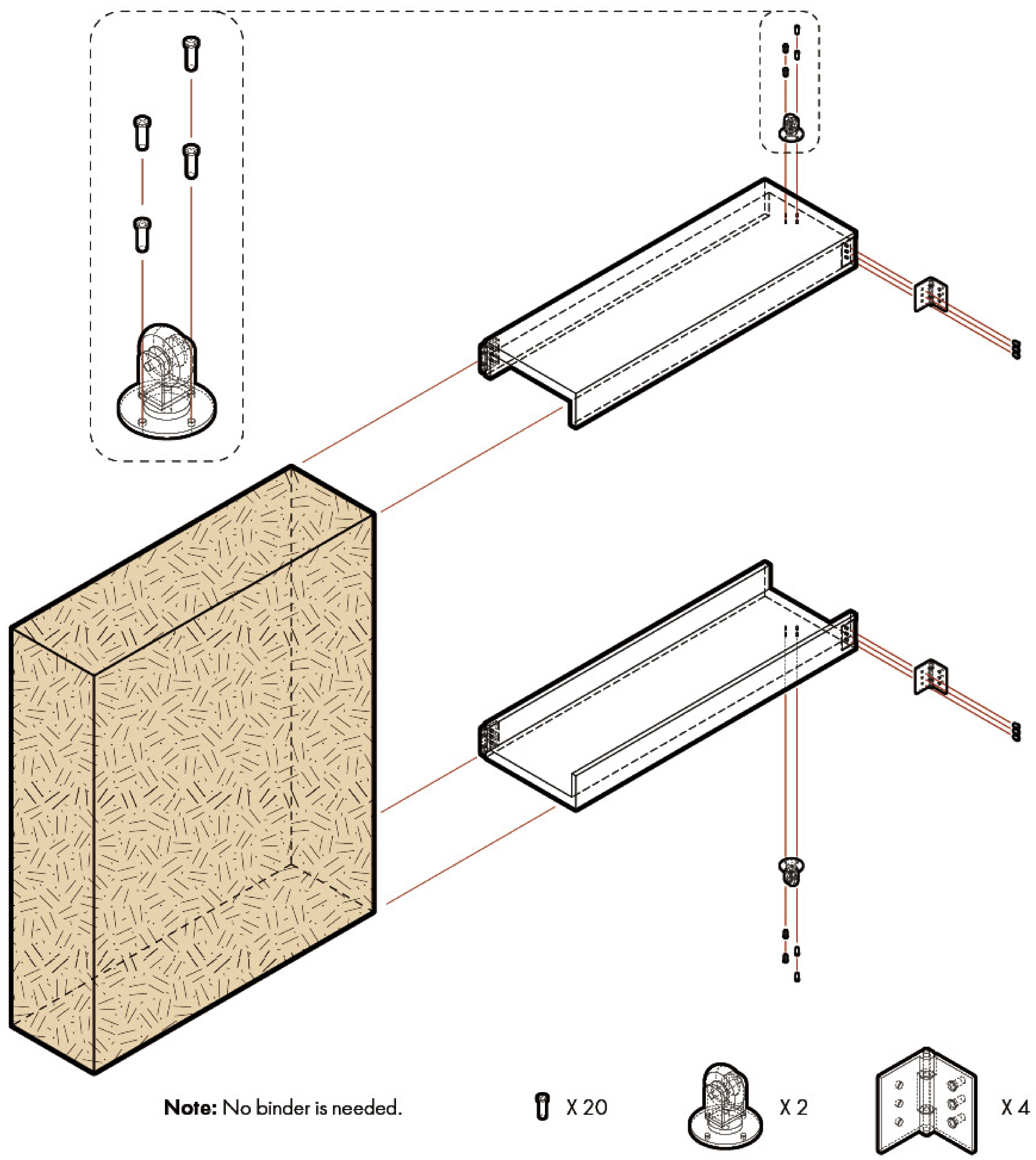
CARBON SINK: **25,022 KG**
PRODUCTIVITY: **REQUIRE 10 ACRE OF RICE FIELD**

1 CUT STRAW (300 - 500mm)

FOLDING PANEL

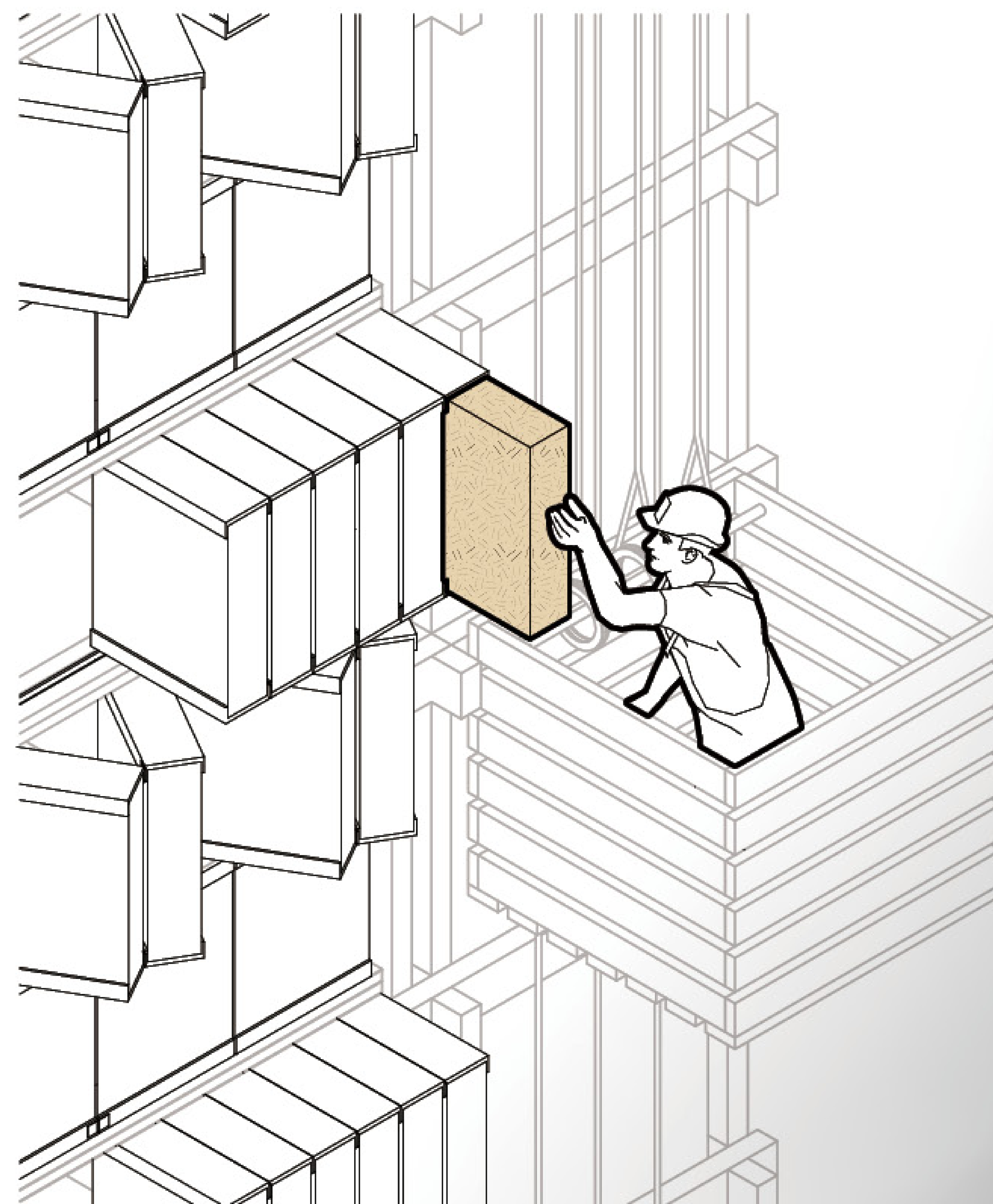
DENSITY OF STRAW:	FIRE RESISTANCE:	INSULATION COEFFICIENT:	AIRBORNE SOUND INSULATION:
75 KG/M³	**60 MIN**	**U = 0.12 W/M²K**	**32 DB**

PART:



Note: No binder is needed.

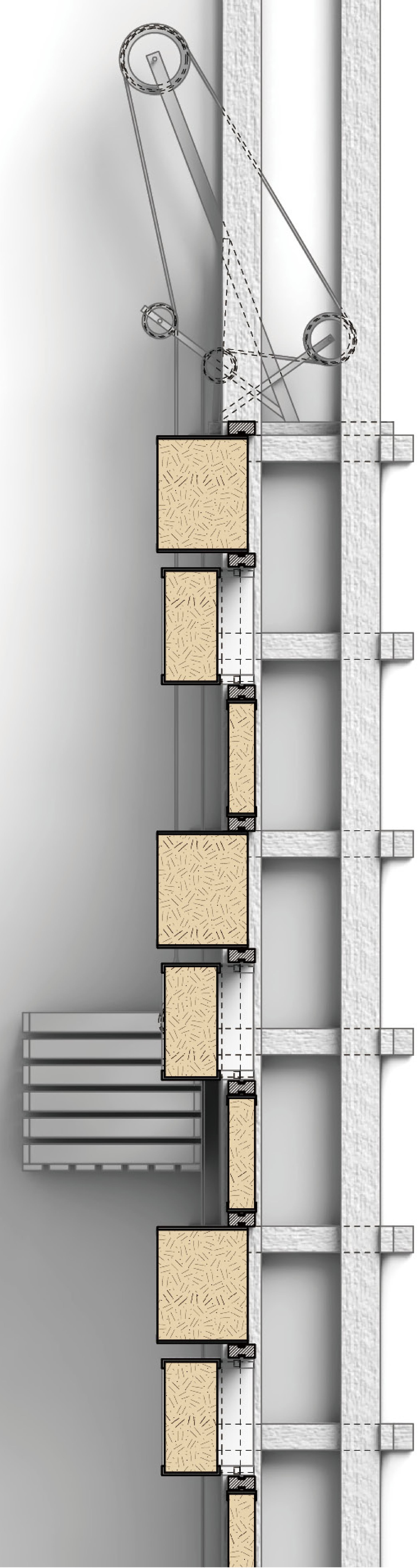
REPLACEMENT:



LABOR X 1

Note: Please replace straw bale 1 or 2 year when the annual average relative humidity in your area is higher than 80%.

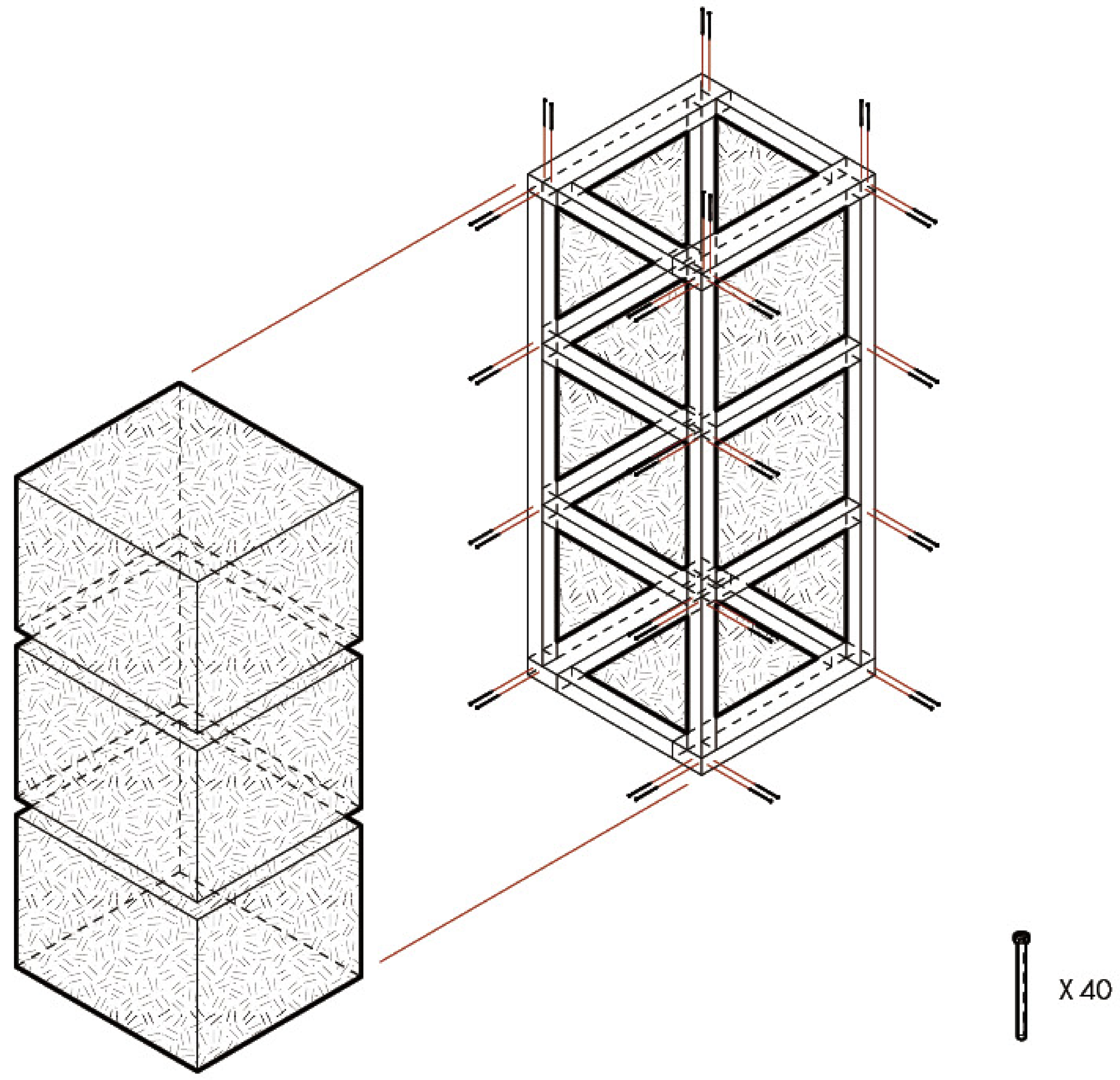
CARBON SINK: **15.8 KG/PANEL**
PRODUCTIVITY: **208 PANELS/ACRE OF RICE FIELD**



2 CHOPPED STRAW (50 - 150mm)
PREFABRICATED PANEL

DENSITY OF STRAW:	FIRE RESISTANCE:	INSULATION COEFFICIENT:	AIRBORNE SOUND INSULATION:
110 KG/M³	**120 MIN**	**U = 0.12 W/M²K**	**54 DB**

PART:



BINDER:

Corn Starch 50% Water 10%

Corn Starch 30% Water 10%

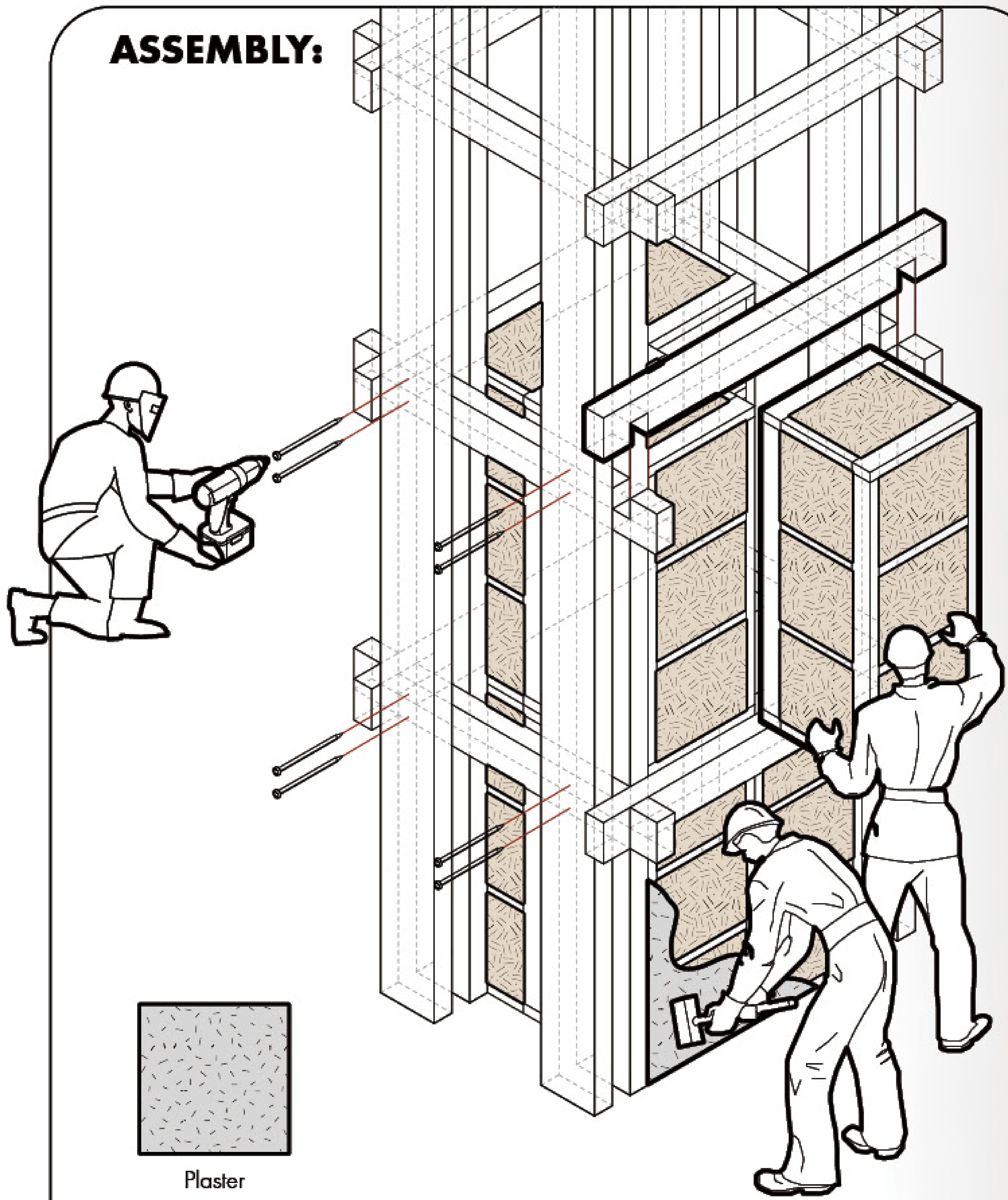
Corn Starch 10% Water 10%

Paper Pulp 50% Water 10%

Paper Pulp 30% Water 10%

Paper Pulp 10% Water 10%

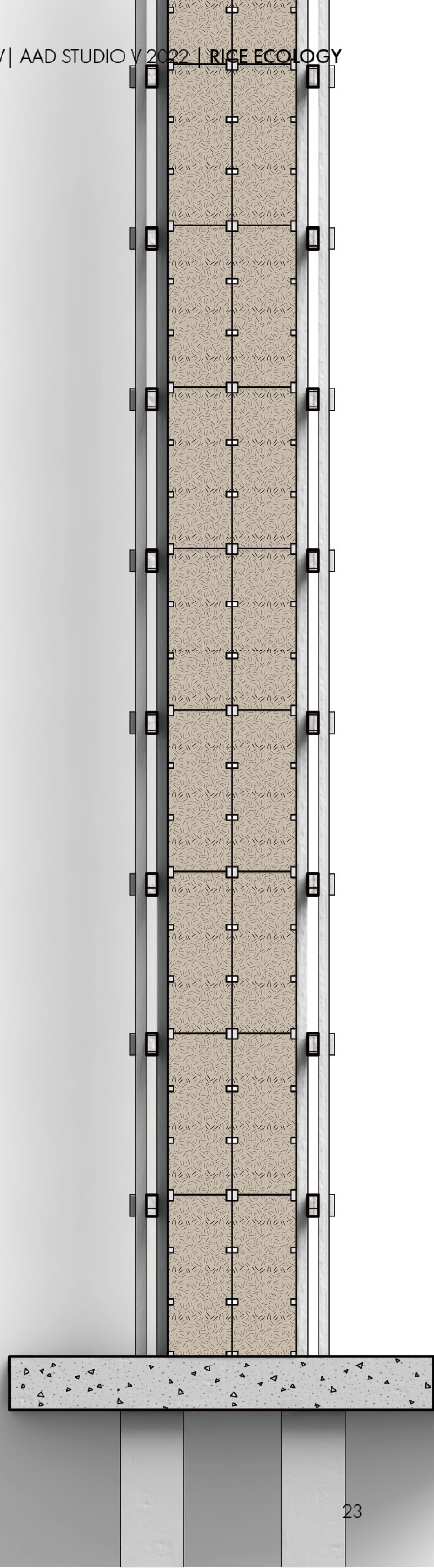
ASSEMBLY:



LABOR X 3

Note: Plastering the exterior of straw bale walls; irreplaceable. This action allows the wall to last more than **15 years**.

CARBON SINK: **15.3 KG/PANEL**
PRODUCTIVITY: **30 PANELS/ACRE OF RICE FIELD**

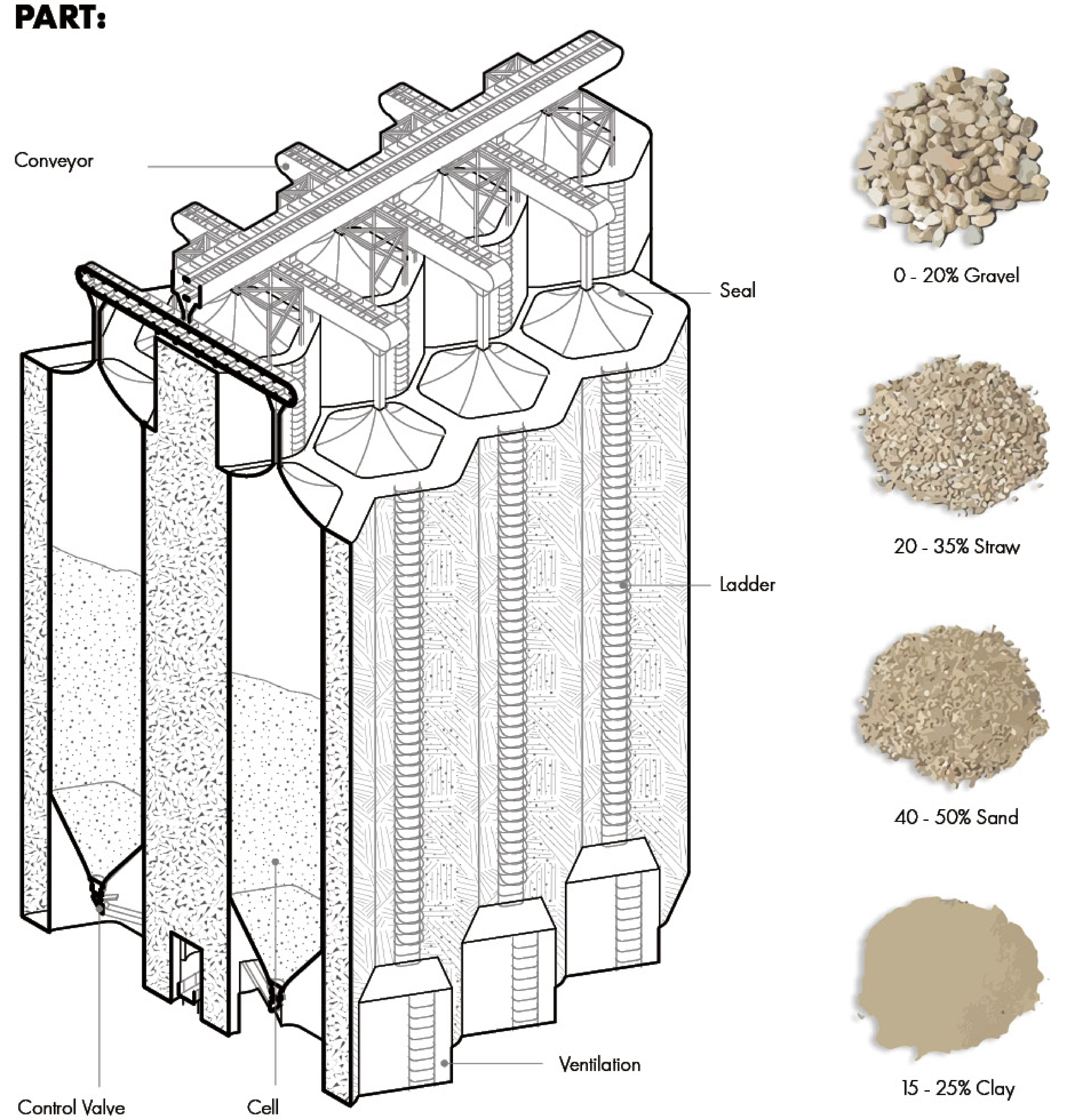


3 MILLED STRAW (10 - 20mm)
SILO FILLER

DENSITY OF STRAW: **30 KG/M³**

FIRE RESISTANCE: **240 MIN**

PART:



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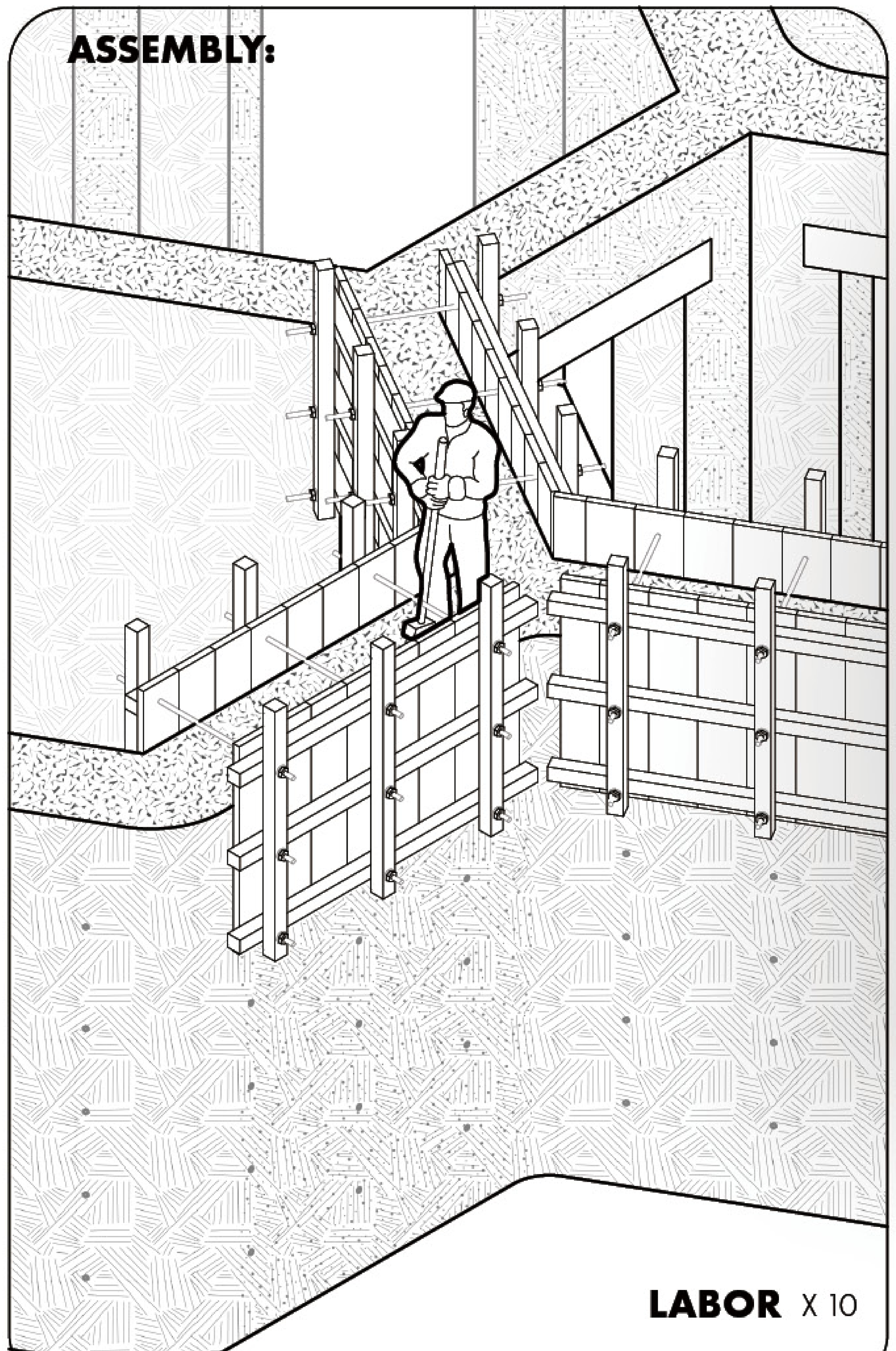
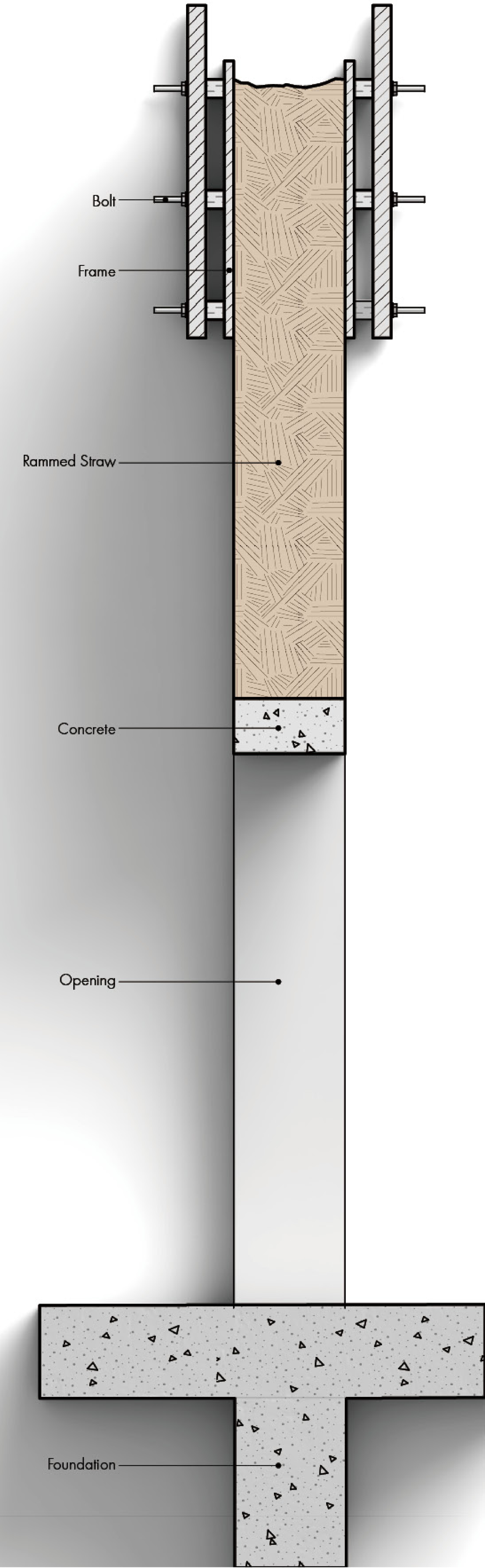




CARBON SINK: **157,059 KG**

PRODUCTIVITY: **REQUIRE 65 ACRE OF RICE FIELD**

CARBON FLOW


AIR
60%
10%
CH_4
CH_4
CO_2, N_2O
PHOTOSYNTHESIS
CO_2
DIFFUSION
EBULLITION
WATER
METHANE OXIDIZING BACTERIA
SOIL
ORGANIC MATTERS
CH_4
STRAW
60%
APPLICATION 01
MANUFACTURING TO BUILDING MATERIALS
BIOGAS
TURNING BIOMASS INTO POWER FOR BUILDING OPERATIONS.
BIOMASS
RECYCLING
10%
APPLICATION 02
MANUFACTURING TO INDUSTRIAL MATERIALS
STRAW BOX
CARBON SINK IN PRODUCTS
10%
APPLICATION 03
MANUFACTURING TO COMMERCIAL MATERIALS
EXPORTING RICE PRODUCTS AND ARCHITECTURAL MATERIALS ALL OVER THE WORLD.
20%
APPLICATION 04
RETURN TO FIELDS
CARBON SINK IS CONTINUING...
TOTAL CARBON SINK:
THATCHING ROOF
25,022 KG
FOLDING PANELS
7,543 KG
15.3 KG/ PANEL
PREFABRICATED PANELS
47,817 KG
15.8 KG/ PANEL
SILO FILLER
157,059 KG
CARBON SINK
CARBON EMISSION
HARVESTING
SEEDING
GROWING
YEAR ONE
Apr.
May
Jun.
Jul.
Aug.
Sept.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
YEAR TWO
TOTAL CARBON SINK IN THIS BUILDING:
237,441 KG

2032
START OF THE FIRST PROTOTYPE.

5 LABORS
1 PROTOTYPE
237,441 TONS CARBON SINK/YEAR

2033
EXPANSION OF THE PROTOTYPE IN CALIFONIA.
SALE OF THE ARCHITECTURAL PRODUCTS IN CALIFORNIA.

700 LABORS
100 PROTOYPES
2,000 ARCHITECTURAL PRODUCTS
27 MILLION TONS CARBON SINK/YEAR

2034
EXPANSION OF THE PROTOTOYPE TO ENTIRE AMERICA.
SALE OF THE ARCHITECTURAL PRODUCTS TO ENTIRE AMERICA.

15,500 LABORS
1,500 BUILDINGS
50,000 ARCHITECTURAL PRODUCTS
3 BILLION TONS CARBON SINK/YEAR

2038
EXPANSION OF THE PROTOTOYPE ALL OVER THE WORLD.
SALE OF THE ARCHITECTURAL PRODUCTS ALL OVER THE WORLD.

70,500 LABORS
5,000 BUILDINGS
1 MILLION ARCHITECTURAL PRODUCTS
12 BILLION TONS CARBON SINK/YEAR

03

AAD STUDIO IV | 2022

INSTRUCTOR: MARCO FERRARI | ELISE HUNCHUCK
PARTNER: RUIQI LI

EXPERIMENTAL ISLAND

RANDALLS AND WARDS ISLAND | NEW YORK
URBAN PLANNING | PROTOTYPE

Ps Ai Id

Water and land are tightly associated with each other. As the surface area with most human interaction with water, Shoreline became our focus of studying the relationship between water and land. We looked at the properties of land and water around the site and concluded that the material exchange process between geological and hydro-geological entities was our proxy condition. We have created a proxy by assembling a non-fictive historical core sample of Randalls and Wards Island that tells the story of how New York's filled shorelines are simultaneously eroded and sediment.

We consider flood as design element. Our projection is to utilize different flooding/water cycles in different future scenarios of sudden flooding events and long-term sea level rise on Randalls and Wards Island. Accommodating three shoreline conditions and human occupancy, we see Randalls and Wards Island as a test site for finding strategies and programs that could work with water coming to the land. Our proposal is based on several crucial time points in the future of sea level rise and the consequential hydrological events and the material exchange processes. In our project, Randalls and Wards Island will arguably become a testimony for this relationship of collaborating with water that is usually considered harmful in today's context.

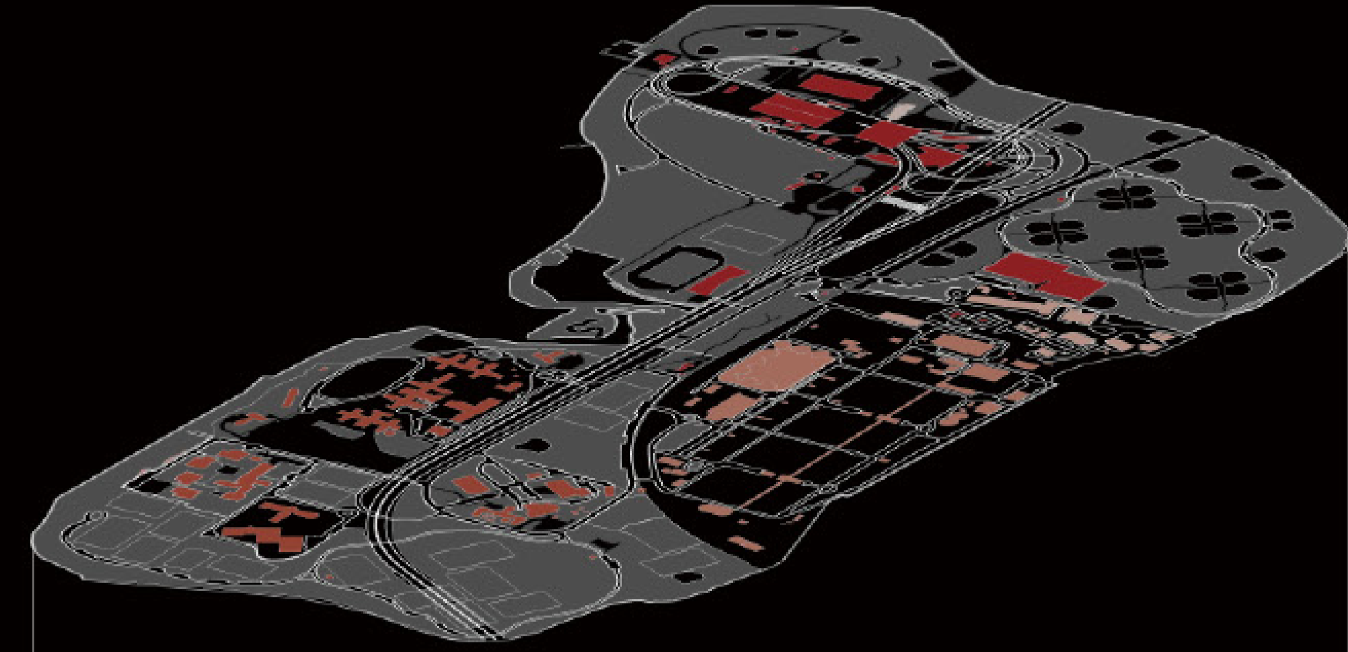
EXPERIMENTAL ISLAND | AAD STUDIO V 2022 | TESTING SITE

Randalls and Wards Island is a transitional zone with littoral and inter-tidal zones, a hybrid, political ecology that tells us of unwanted people and communities–and materials.

NEW YORK STATE

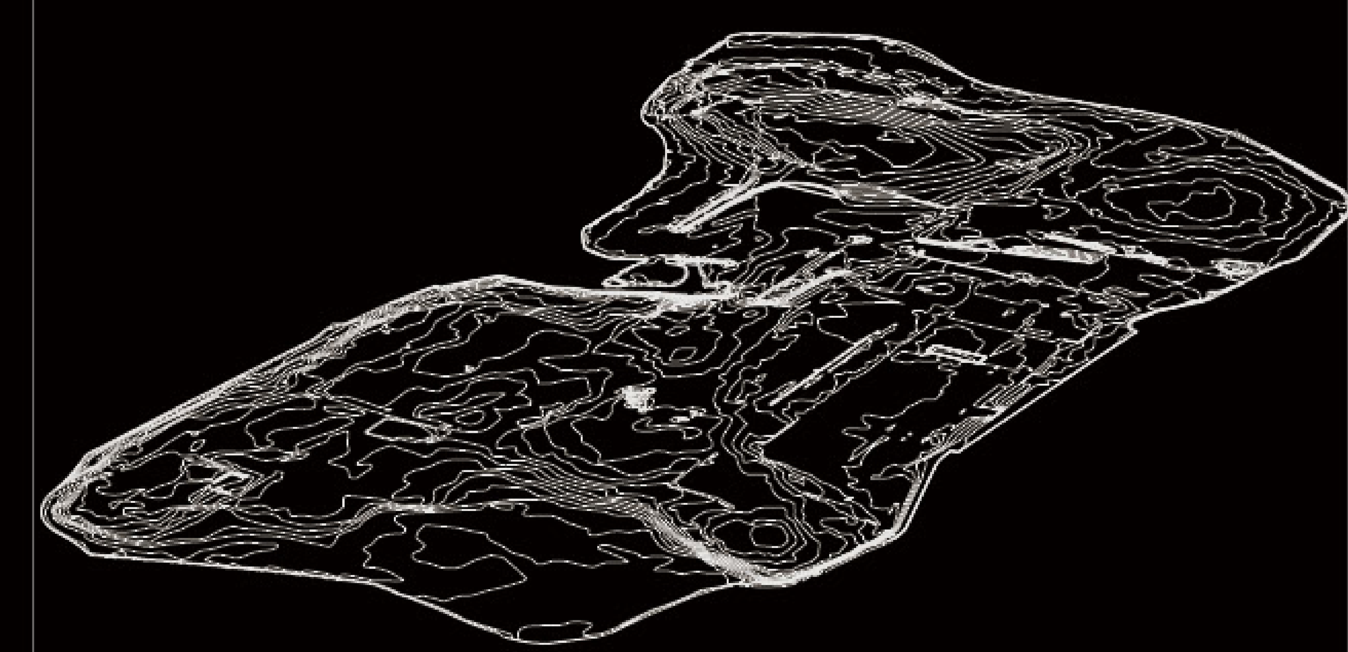
NEW YORK CITY

RANDALLS AND WARDS ISLAND



PROGRAM

- Green Space
- NYC Department of Parks and Recreation
- NYS Office of Mental Health
- NYC Department of Environmental Protection
- NYC Fire Department
- Historical Heritage

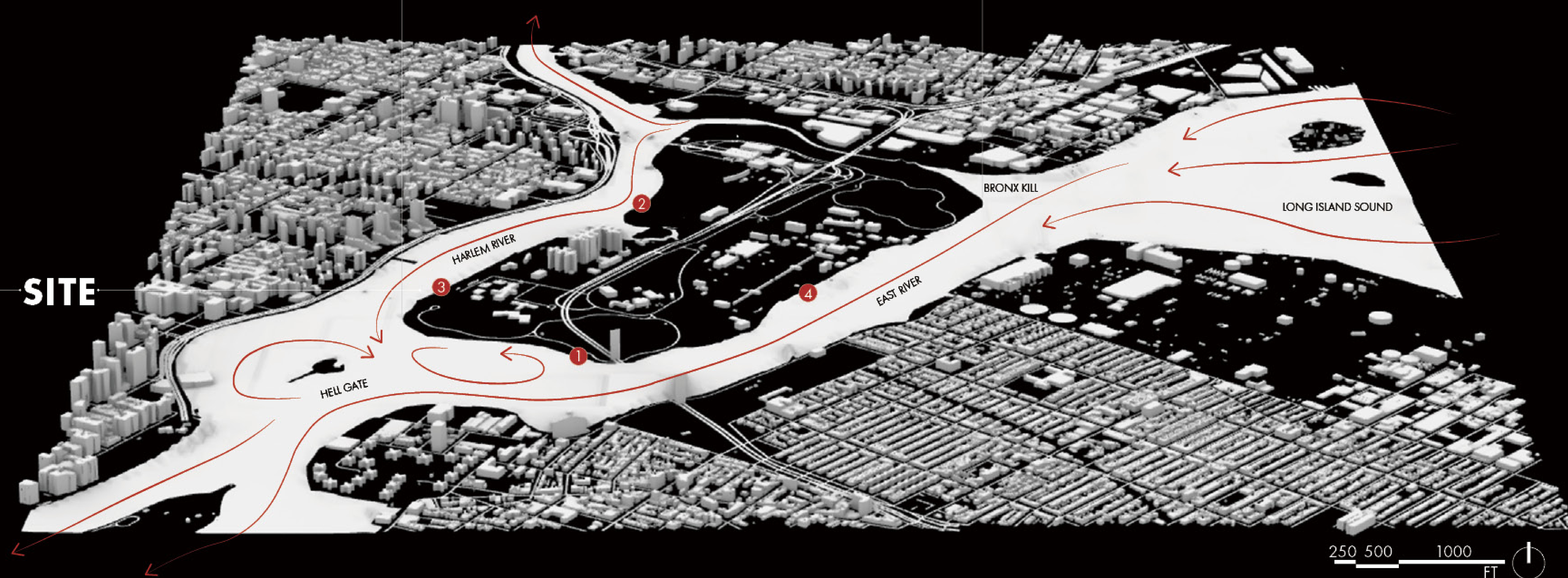


TOPOGRAPHY

1 RUBBLE FILL/BOULDERS | 2 LIGHT-COLORED CAPSTONES | 3 STONE W/CONCRETE | 4 CONCRETE SEAWALL

SEAWALL

1. Rubble fill/boulders behind deteriorating seawall.
2. Light-colored capstones atop seawall.
3. Stone mixing with concrete along breach of seawall.
4. Concrete wall along breach of seawall.



NATURAL EFFECT
Changes in the Earth's Orbit and Rotation
Variations in Solar Activities
Volcanic Activities
......

ANTHROPOGENIC EFFECT
Fossil Fuel Use
Human Activities
......

Greenhouse Gas Emissions
[CO_2, CH_4, N_2O, O_3]

GROUNDWATER PUMPING

Aquifers, lakes, rivers, reservoirs, soil moisture

CLIMATE CHANGE

Global Warming & Extreme Climate

Loss of ice from major ice sheets and glaciers on Greenland and Antarctica

Increase on rainfall and evaporation from soil, plants, oceans, and waterways

DECLINE IN LIQUID WATER ON GROUND

Aquifers, lakes, rivers, reservoirs, soil moisture

10%

MELTWATER

50%

OCEAN THERMAL EXPANSION

40%

SEA-LEVEL RISE

Aggravation

RAINFALL/STORMWATER

COASTAL FLOODING

Coastal areas often bear the brunt of severe storms, especially if these have gathered pace over the oceans. Low-lying seaside areas usually have defenses against the water - whether that's man-made defenses or natural barriers such as sand dunes. As global warming develops, coastal flooding is expected to be a recurring and increasingly severe problem.

FLASH FLOODING

Caused by heavy and sudden rainfall, flash flooding happens when the ground cannot absorb the water as quickly as it falls. This type of flood usually subsides quickly, but while it lasts can be fast-moving and dangerous. Flash flooding can be prevented by good drainage systems and by avoiding over-development on floodplains.

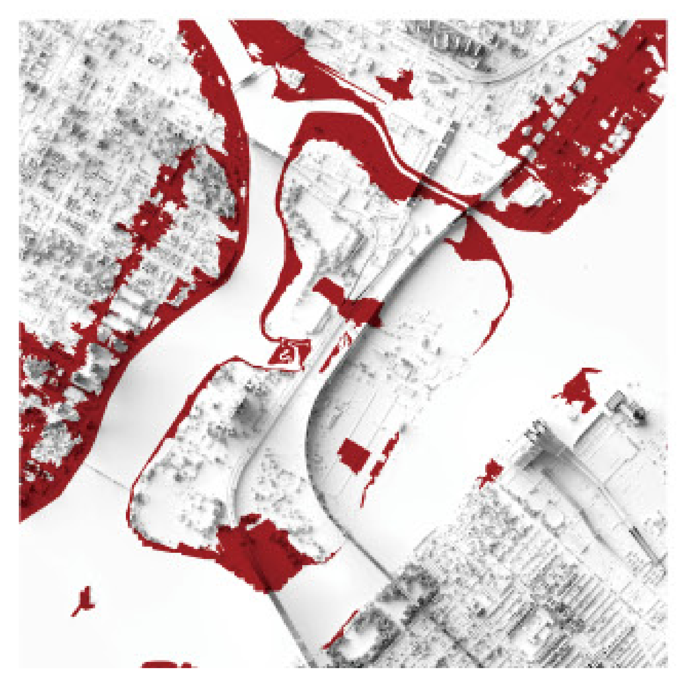
TIDAL EVENTS

DURATION
Extreme high tides(King tides or Spring tides) happen a few times per year when the sun, moon, and Earth align. The Effect of a Full or New Moon.

6 hours and 12.5 minutes from low to high and same from high to low.

CONSEQUENCES
Overflow
Marsh Fill
Shoreline Erosions
Contamination of the soil & groundwater
Habitat Destruction
Decline in Biodiversity
Saltwater Intrusion
Water Infrastructure Damage
......

STORM SURGE



DURATION
Tidally influenced storm surge lasts 20 minutes to an hour

Extreme Weather: Hurricane

CONSEQUENCES
Overflow
Marsh Fill
Shoreline Erosions
Contamination of the soil & groundwater
Habitat Destruction
Decline in Biodiversity
Saltwater Intrusion
Water Infrastructure Damage
......

RAINFALL/STORMWATER

DURATION
Most major ponding lasts seconds to a few minutes

CONSEQUENCES
Overflow/runoff of Sediments, chemicals, heavy metals, trash, debris, etc.
Water Quality Downgrade
Water Infrastructure Damage
......

MATERIAL EXCHANGES

LAND ⟷ WATER

Infiltration Percolation
Salt Water from Harlem River & East River
Chemicals
Heavy Metals
Bacteria

Overflow
Aquatic Organisms
Trash
Bacteria

←
......Na, Cl, Ca, Mg, K, SO_4, CO_2, NO_x, SO_x

$CaCO_3$, Au, Cu......
→
Surface Runoff
Sediments
Chemicals
Heavy Metals
Trash
Debris
Oil
Landfill
Bacteria
......

MATERIAL EXCHANGES

LAND ⟷ WATER

Infiltration Percolation
Salt Water from Harlem River & East River
Chemicals
Bacteria

Precipitation
Water from atmosphere
←
......H_2O, SO_2, NO_2, O_3

$CaCO_3$, Au, Cu......
→
Surface Runoff
Sediments
Chemicals
Heavy Metals
Trash
Debris
Oil
Bacteria
......

1850s

Survey of the Coast if the United States (1851)

City of New York brought Randalls Island in 1835 from Jonathan Randall. Meanwhile Wards island was mainly used as a relocation site for Manhattan potter fields.

1940s

NYC Gov Maps (1948)

In 1930, Dept of Parks and Recreations owns both island and focused on the public services. As the expansion of value and landmass, Robert Moses made plans to connect Randall's and Ward using landfill. It was infilled starting in 1955 when the city allowed construction companies to dump debris in between the islands for free.

2020s

US Dept of Commerce (1996)

Landfill II to Randalls and Wards Island was completed in 1988. Randalls and Wards Island was connected and current shoreline was shaped. Sunken Meadow was transformed into baseball fields and recreational parks.

2050s

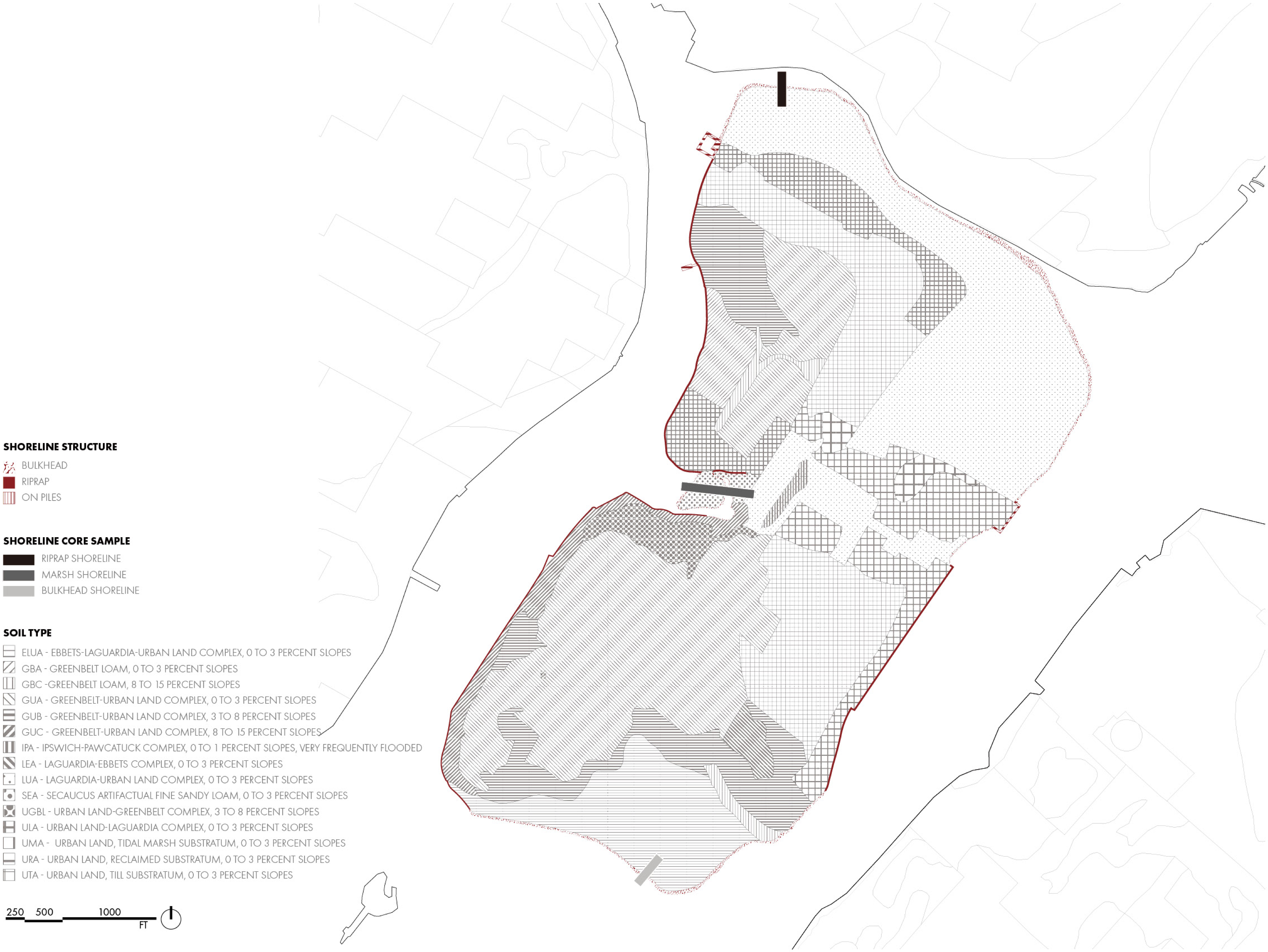
National Oceanic and Atmospheric Administration (2022)

In 2050 with 5 ft sea level rise, Bronx kill will be permanently under water. As well as some parts of Wards. Meadow where is covered by landfill II and is football fields.

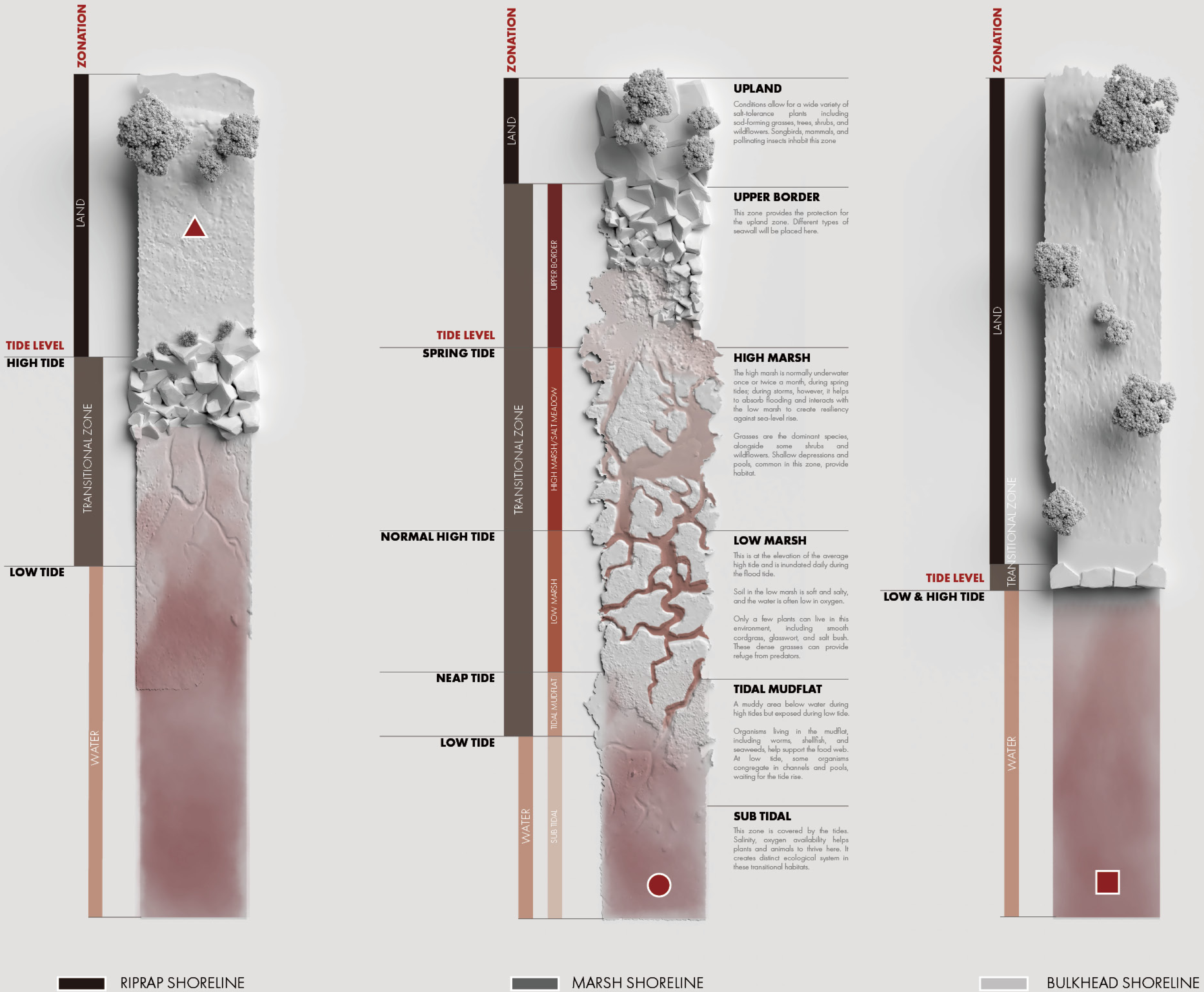
2100s

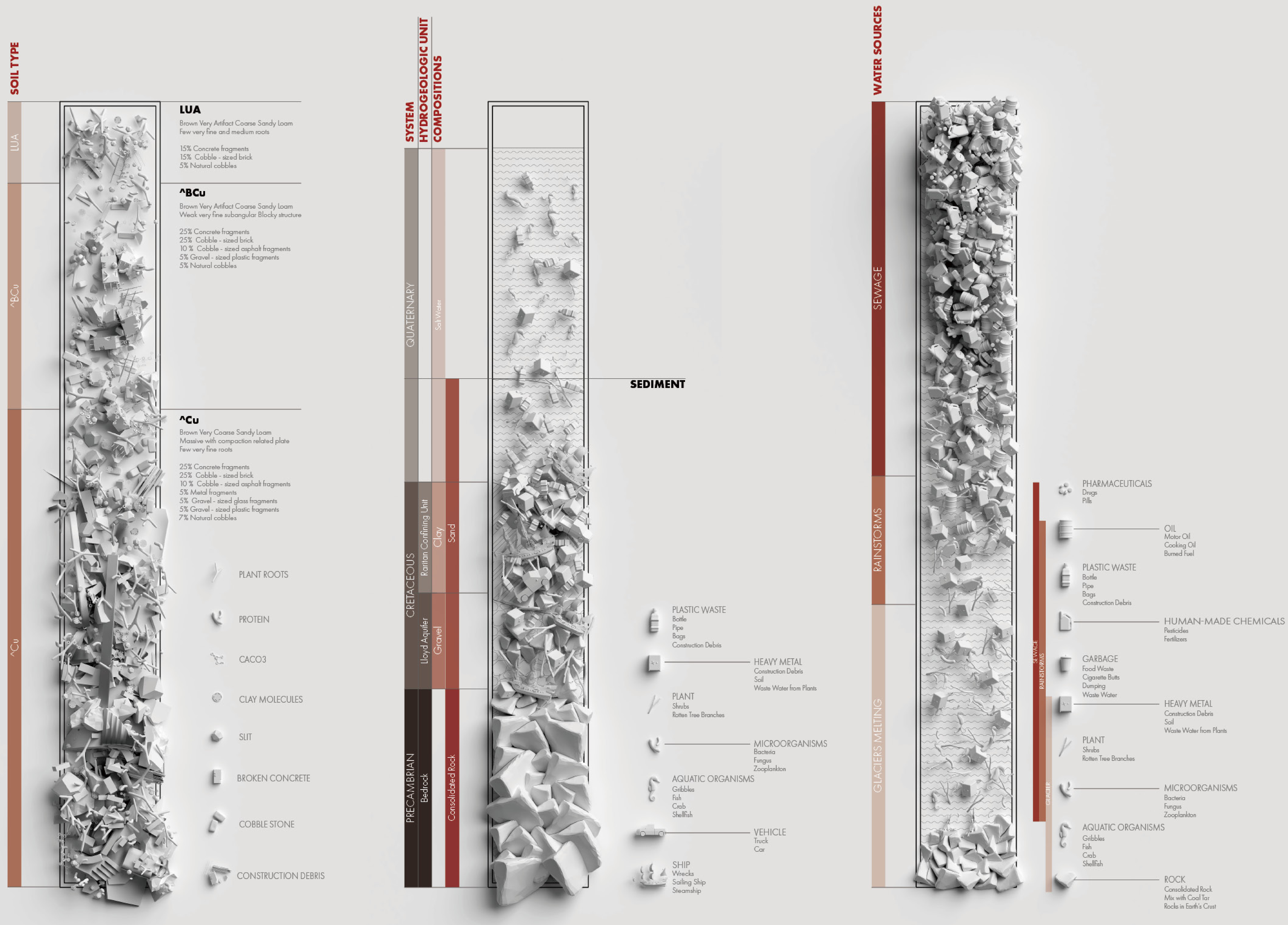
National Oceanic and Atmospheric Administration (2022)

With 10 ft sea level rise. Public amenities such as sports fields and stadiums will be covered by sea water. Combine with tidal events marsh land will formed.



SHORELINE STRUCTURE
BULKHEAD
RIPRAP
ON PILES
SHORELINE CORE SAMPLE
RIPRAP SHORELINE
MARSH SHORELINE
BULKHEAD SHORELINE
SOIL TYPE
ELUA - EBBETS-LAGUARDIA-URBAN LAND COMPLEX, 0 TO 3 PERCENT SLOPES
GBA - GREENBELT LOAM, 0 TO 3 PERCENT SLOPES
GBC -GREENBELT LOAM, 8 TO 15 PERCENT SLOPES
GUA - GREENBELT-URBAN LAND COMPLEX, 0 TO 3 PERCENT SLOPES
GUB - GREENBELT-URBAN LAND COMPLEX, 3 TO 8 PERCENT SLOPES
GUC - GREENBELT-URBAN LAND COMPLEX, 8 TO 15 PERCENT SLOPES
IPA - IPSWICH-PAWCATUCK COMPLEX, 0 TO 1 PERCENT SLOPES, VERY FREQUENTLY FLOODED
LEA - LAGUARDIA-EBBETS COMPLEX, 0 TO 3 PERCENT SLOPES
LUA - LAGUARDIA-URBAN LAND COMPLEX, 0 TO 3 PERCENT SLOPES
SEA - SECAUCUS ARTIFACTUAL FINE SANDY LOAM, 0 TO 3 PERCENT SLOPES
UGBL - URBAN LAND-GREENBELT COMPLEX, 3 TO 8 PERCENT SLOPES
ULA - URBAN LAND-LAGUARDIA COMPLEX, 0 TO 3 PERCENT SLOPES
UMA - URBAN LAND, TIDAL MARSH SUBSTRATUM, 0 TO 3 PERCENT SLOPES
URA - URBAN LAND, RECLAIMED SUBSTRATUM, 0 TO 3 PERCENT SLOPES
UTA - URBAN LAND, TILL SUBSTRATUM, 0 TO 3 PERCENT SLOPES
250 500 1000
FT


ZONATION
LAND
TIDE LEVEL
HIGH TIDE
TRANSITIONAL ZONE
LOW TIDE
WATER
ZONATION
LAND
UPPER BORDER
TIDE LEVEL
SPRING TIDE
HIGH MARSH/SALT MEADOW
TRANSITIONAL ZONE
NORMAL HIGH TIDE
LOW MARSH
NEAP TIDE
TIDAL MUDFLAT
LOW TIDE
WATER
SUB TIDAL
UPLAND
Conditions allow for a wide variety of salt-tolerance plants including sod-forming grasses, trees, shrubs, and wildflowers. Songbirds, mammals, and pollinating insects inhabit this zone
UPPER BORDER
This zone provides the protection for the upland zone. Different types of seawall will be placed here.
HIGH MARSH
The high marsh is normally underwater once or twice a month, during spring tides; during storms, however, it helps to absorb flooding and interacts with the low marsh to create resiliency against sea-level rise.
Grasses are the dominant species, alongside some shrubs and wildflowers. Shallow depressions and pools, common in this zone, provide habitat.
LOW MARSH
This is at the elevation of the average high tide and is inundated daily during the flood tide.
Soil in the low marsh is soft and salty, and the water is often low in oxygen.
Only a few plants can live in this environment, including smooth cordgrass, glasswort, and salt bush. These dense grasses can provide refuge from predators.
TIDAL MUDFLAT
A muddy area below water during high tides but exposed during low tide.
Organisms living in the mudflat, including worms, shellfish, and seaweeds, help support the food web. At low tide, some organisms congregate in channels and pools, waiting for the tide rise.
SUB TIDAL
This zone is covered by the tides. Salinity, oxygen availability helps plants and animals to thrive here. It creates distinct ecological system in these transitional habitats.
ZONATION
LAND
TRANSITIONAL ZONE
TIDE LEVEL
LOW & HIGH TIDE
WATER
RIPRAP SHORELINE
MARSH SHORELINE
BULKHEAD SHORELINE



GEOLOGIC HIERARCHY

HYDROGEOLOGIC HIERARCHY

HYDRO SOURCES & POLLUTION

2020S

SLR LE 2" - HE 10"

RIPRAP SHORELINE

Museum of land use.
Dome structure for protecting itself from hurricanes and flooding.
Floating pier for kayaking.

MARSH SHORELINE

Salt Marsh sediment laboratory and collection sample points.
The structure that enhance the sediment collection and designs the growth of salt marsh.

BULKHEAD SHORELINE

Soil displacement.
Poor drainage soil covered with fabric becomes the seating area and the wave energy breaker for flooding events.

2050S

SLR LE 8" - HE 30"

RIPRAP SHORELINE

Sea level rising is intruding more inland areas, the original floating museum still works, but the theater will be altered with a seminar classroom.
Kayaking area is added.

MARSH SHORELINE

The area of salt marsh keeps growing.

BULKHEAD SHORELINE

The first set of mud fill contacted the sea water level and the sediment collection started forming.

2080S

SLR LE 13" - HE 58"

RIPRAP SHORELINE

The program of theater is moved to an inland area
Access from the Bronx area will be added.

MARSH SHORELINE

Salt marsh keeps growing and pavement will be added for accessing.

BULKHEAD SHORELINE

The second set of mud piles contact with water, marshland starts forming, second stage sediments will cover the first stage.

2100S

SLR LE 15" - HE 75"

RIPRAP SHORELINE

Kayak harbor is added.
Access to Randalls Island is added.
A water park area is planned.

MARSH SHORELINE

Area of salt marsh keeps increasing, and pathways and more laboratories will be added.

BULKHEAD SHORELINE

The last sets of mud pile contact with water, and salt marsh will form on the surface level of the land.
Marshland creates the surface for the path.

TO BE CONTINUED

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