Portfolio

2023-2024

Yiyang Liao

Prologue

Architecture is a structure of endless possibilities.
This structure has solved many problems, including public housing, centralized campuses, skyscrapers, and commercial complexes. But beyond these existing structures, we need more. Minorities, women, and LGBTQs maintained silenced for centuries in this professional field and its designs. Architecture has its constraints; Sometimes, the skin and structure are treated as the primary design aspects. Beyond that, architecture can be used as a medium to emphasize the disadvantaged groups concealed inside the modern structure.

Drawing from four different types of projects, this portfolio explores how architecture can respond to sociological issues at different scales and functions. As a female architect, I want to reflect my views and corresponding designs in these projects. In addition, this portfolio contemplates the relationship between the city and architecture, particularly concerning issues of identity and migration.

In my future academic research, as an Asian female, I would love to put the narrative and history of our group on a broader platform and show it to the world. I also want to unite my research and design with more women of color. With the wave of feminism that has yet to die, we are all unquestionably allies.

Content

The City Pavilion

Group Project with Ammar Rassai
Site: Coney Island, NY
Advisor: David Eugin Moon
Columbia University, GSAPP, 2023

Pavilions are aspirational building typologies: a reflection of the constructional form of wandering and nomadic cultures, the opposite of settlement. Derived from the latin word ‘papilio’ meaning butterfly, it was first officially designed to be fleeting and transitional. While they often masquerade as modest or innocuous amusement, they are highly rhetorical and discursive objects of design.

The Coney Island of the 1960s and 70s would become known for its high levels of crime, arson, and racial unrest. Moreover, Coney Island lacks any truly public space for its residents apart from the boardwalk and the beach, most of which caters to its five million visitors each year.

Our designs strive to intervene at the nodes at which three or more racial groups or ethnicities co-exist alongside Mermaid Avenue. Through these “little infrastructures”, equipped with moving parts and intersectional programs, we create space for unprecedented inter-communal interaction. We treat the street as the true leveler of urban space: one which warrants use without force. Through the operatives of distortion, extension, rotation, translation and convergence we transform the sidewalk and adjoining defunct plots to create urban spaces endowed with complimentary programs triangulated to existing ones.

ASPIRATION & ARCHITECTURE

BIG WORLDS
UNDER LITTLE TENTS

I THE PAPILIO

In the ancient Roman Empire and beyond, these acquired the name 'butterflies' – papilio in Latin, from which the modern French pavillon derives.This was possibly on account of their fleeting appearance in the landscape, and the way that their canopies appeared to flap in the breeze. Such structures were undoubtedly utilitarian, but they were also heraldic, stately and ornamental, in keeping with their purpose.

II POWER, WEALTH & PLEASURE

As it enters palatial gardens, villa parks and country estates, however, the pavilion is still very much tied to power and wealth, as well as to land and territorial claims.

III MONUMENTAL, RIGID, AUSTERE

Amidst he classical revival, pavilions now took on the character of more permanent fixtures in the landscape; some became extremely monumental, rigid and austere that they lost the sprightliness of butterflies altogether.

IV COLONIAL & IMPERIAL FANTASIES

They served as lodges, boathouses, gazebos, seats, pergolas, stages, bandstands, conservatories, aviaries and cabinets. They were now built to resemble rustic cottages, Grecian sanctuaries, Gothic follies, or Orientalist exotica – e.g., Turkish kiosks, Moorish fortresses, Indian temples, Chinese pagodas and later Japanese teahouses - to imperial aspirations and fantasies of remote times or places.

V IDENTITY & CULTURE OF SPECTATORSHIP

With modernity came the evolution of an entirely different species of pavilion. This was inseparable from a new culture of exhibition, of spectatorship and spectacle – of the kind that turned all and sundry into consumers. Thereafter, the architecture of the pavilion was mobilised in events that – as contemporary observers found – were 'not just exhibitions of the world, but the ordering up of the world itself as an endless exhibition. This was the age of nation-building after all. It was also the age of empire.

VI LABORATORY FOR EXPERIMENTATION

In modernist circles, the pavilion became a laboratory for experimentation and for showcasing new forms, materials or techniques. It became a work of pure architecture, dressed up as a housing prototype or model factory. Here was a new pavilion again. More than anything else, it was exhibiting itself, or the potential for architecture to be something else. It was oriented to the future rather than retrospectively dwelling on some antique ideal or mythical Asia.

ROMAN TEMPORARY
& TRANSITIONARY PAVILIONS
27th CENTURY BC ONWARDS

PALATIAL & PLEASURE GARDEN
PAVILIONS FOR THE ELITE
15th CENTURY BC ONWARDS

ANCIENT AGORA
OF ATHENS
6th CENTURY BC

ASIAN GAZEBO'S
TURKISH/MOORISH ARCHWAYS
1800 AD ONWARDS

AL-WASL DOME,
DUBAI EXPO 2020
2020

SERPENTINE PAVILION,
BJARKE INGELS
2016

BARCELONA PAVILION,
BARCELONA
1929

PARC DE LA VILLETTE,
PARIS
1987

CRYSTAL PALACE,
GREAT BRITAIN
1851

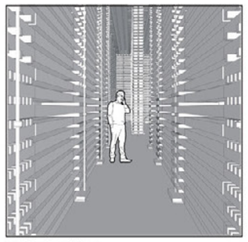
Analysis Drawing

REFERENCES

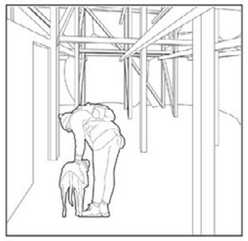
1. Robinson, Joel. "Introducing Pavilions: Big Worlds under Little Tents." Open Arts Journal 2 (2014): 1-22.

TEMPORAL
MECHANICS

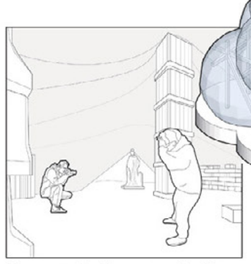
FROM STATIC
TO MOBILE



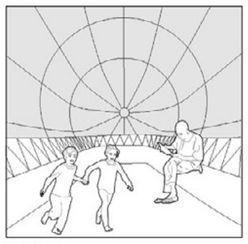
Swiss Pavilion



Pavilion of Naoshima

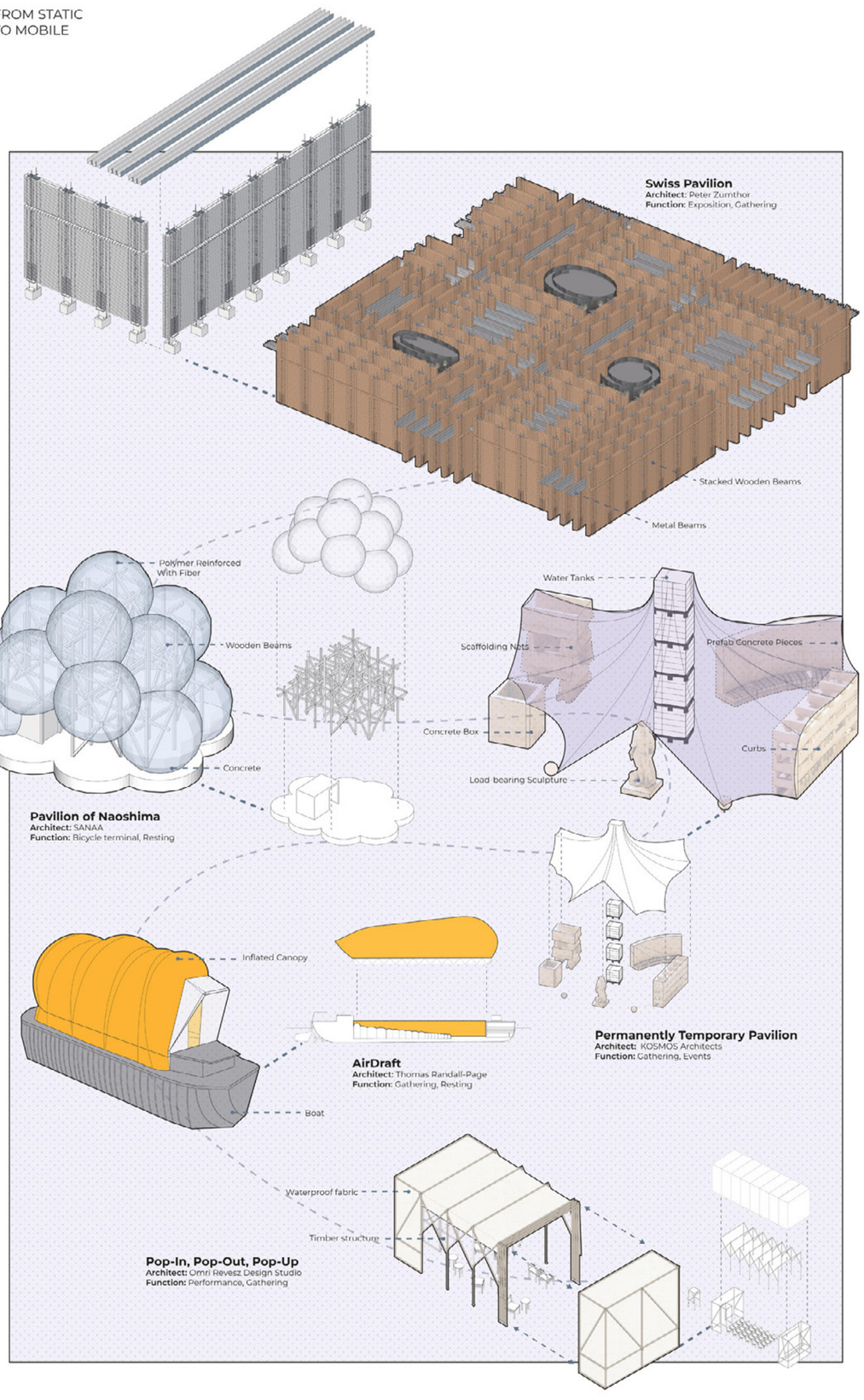


Permanently Temporary Pavilion



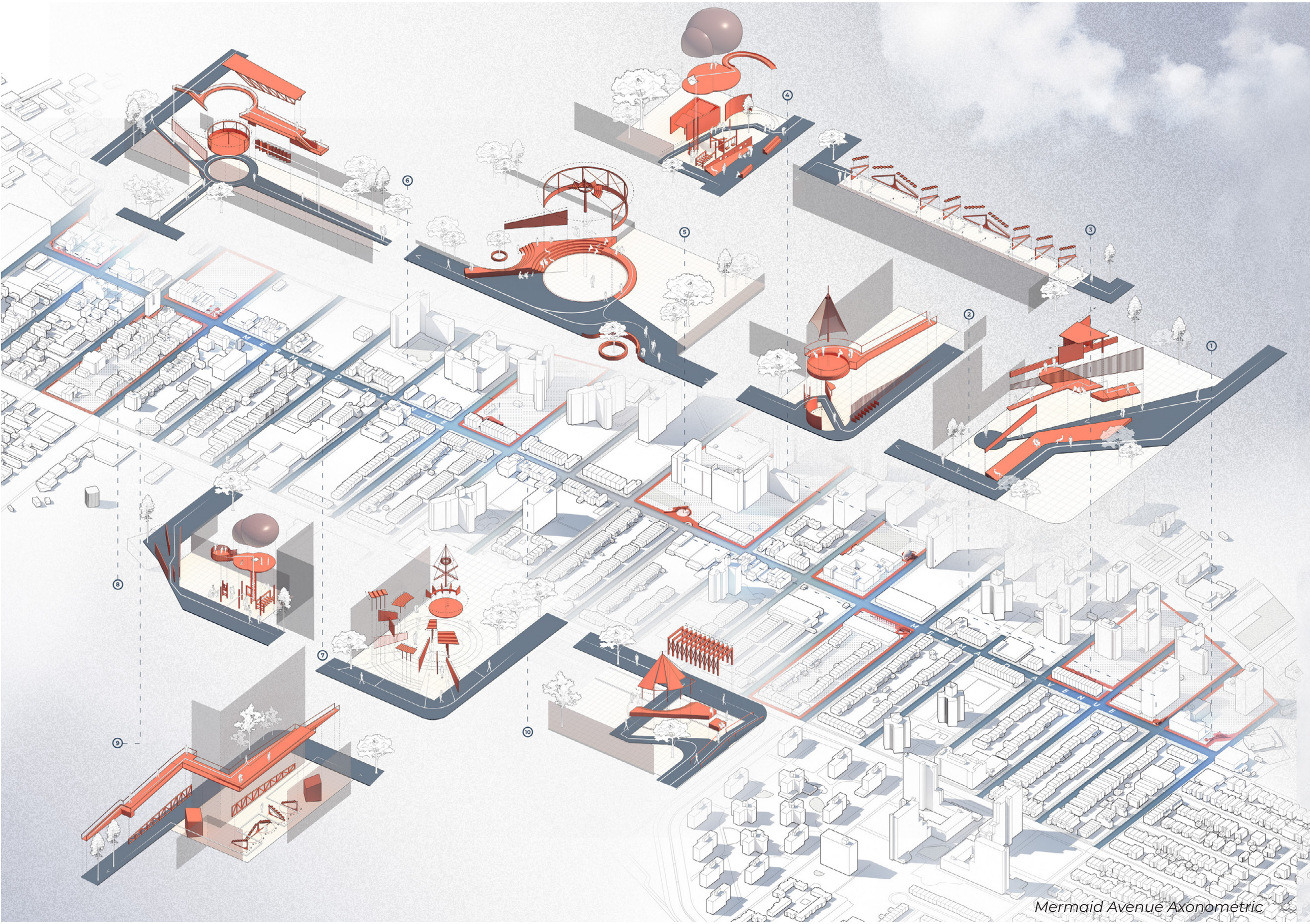
AirDraft

Pop-In, Pop-Out, Pop-Up

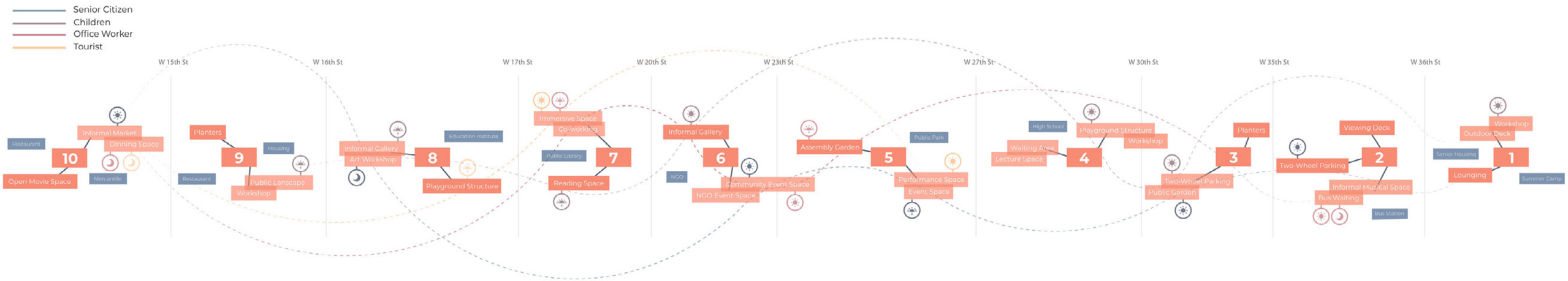


Analysis Drawing

Conceptual Collage



Mermaid Avenue Axonometric



Activity Diagram

Revitalizing the Neighborhood

All the pavilions on this street have uniquely shaped structures that are based on the distribution and function of the surrounding neighborhoods. They vary in size and features, but they all possess one common feature - walls that can be rotated and slid. These walls are essential as they allow the space's size to be adjusted to accommodate different purposes. Different groups cross paths at

Render (GIF)

Informal Exhibition

Community Market

Communal Lecture Center

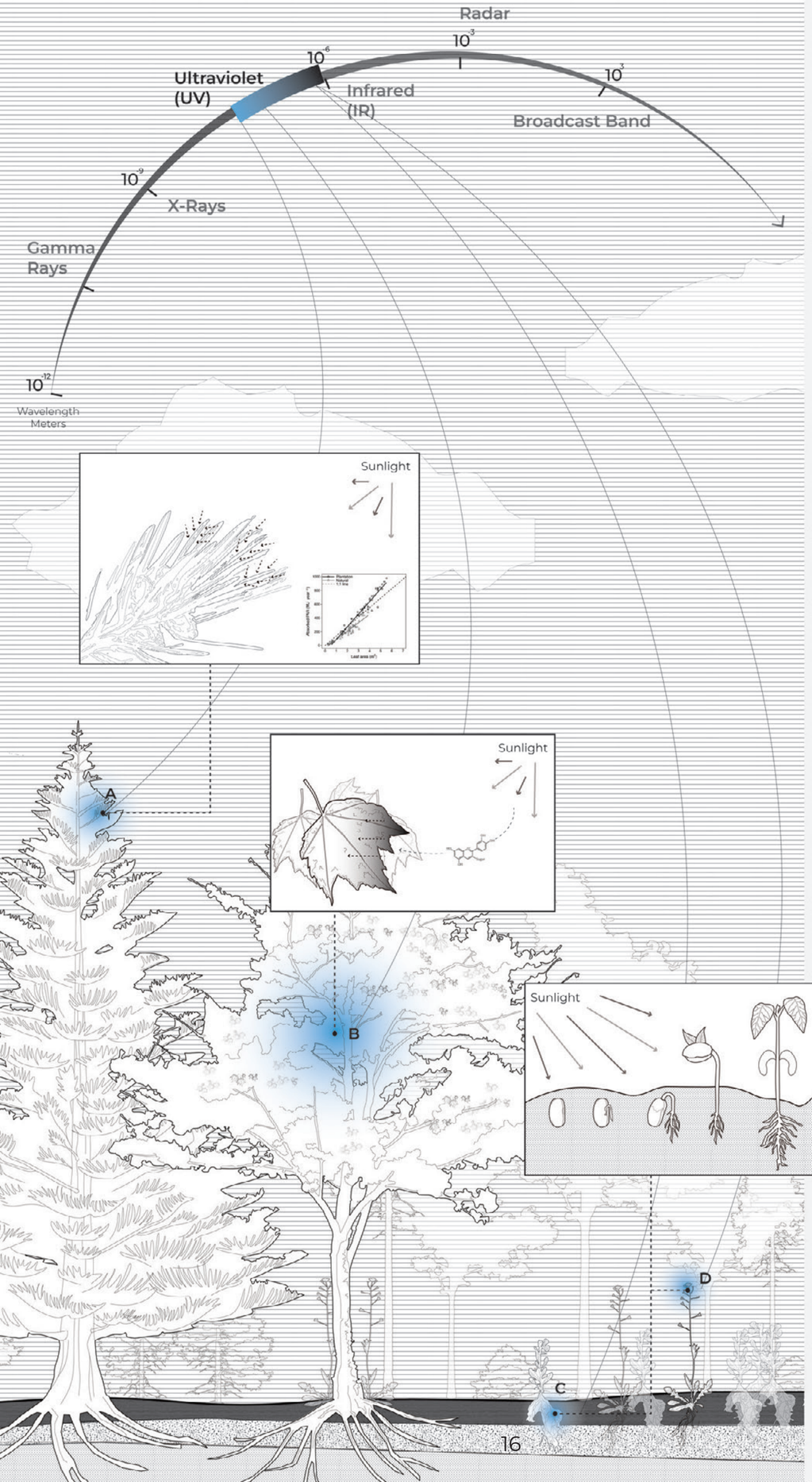
Mountain Aven House

Individual Project
Site: Manhattan, NY
Advisor: Philippe Rham, Mariami Maghlakelidze
Columbia University, GSAPP, 2023

This project aims to enhance sustainability within Columbia University's campus through the strategic integration of low-E (low emissivity) glass and the analysis of sunlight shadow rates. Situated in the vibrant landscape of New York City, the university faces the dual challenge of maintaining architectural excellence while minimizing environmental impact. Low-E glass presents a promising solution, offering enhanced thermal insulation and reduced heat transfer, thus optimizing energy efficiency within buildings.

Our approach involves a comprehensive assessment of selected buildings for low-E glass integration, coupled with detailed analysis of sunlight shadow rates across campus. By leveraging advanced simulation techniques, we seek to quantify the impact of low-E glass on indoor thermal comfort, energy consumption, and overall building performance. Additionally, through precise mapping of sunlight shadow rates, we aim to evaluate the implications for outdoor environments, pedestrian comfort, and vegetation health. By fostering a collaborative dialogue with university stakeholders and leveraging empirical data, this project endeavors to provide actionable insights and recommendations for sustainable architectural practices, aligning with Columbia University's commitment to environmental stewardship and innovation.

A _ Non-visible Light and Arctic Plants in NYC

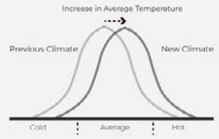


A White Spruce
B Red Maple
C Large-leaf avens
D Mountain Avens (Dryas octopetala)

NYC and Climate Change

Mean annual temperature has increased at a rate of 0.3°F per decade (total of 3.4°F). Sea level rise in New York City has averaged 1.2 inches per decade (total of 1.1 feet), nearly twice the observed global rate over a similar time period.

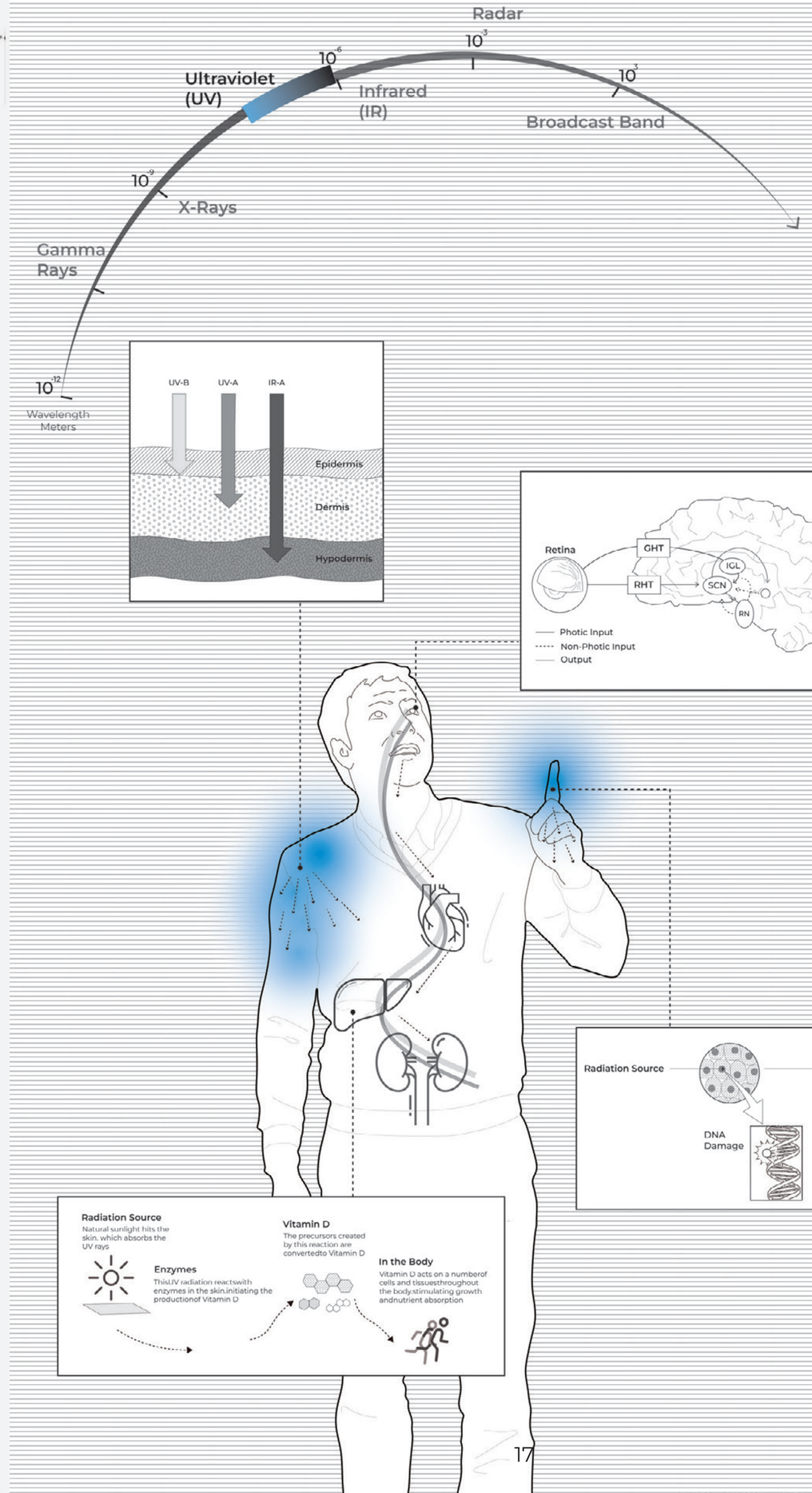
The Trend of Climate Change in NYC



Precipitation is expected to increase in New York, with longer and more frequent precipitation events, and heavier downpours. Increased precipitation through more frequent and intense rain events is impacting New York by increasing flooding throughout many parts of the state.

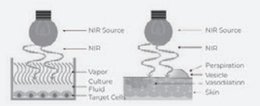
Climate change is already affecting New York, and these changes will have profound effects on its ecosystems, plants and animals. Spring arrives a full week earlier than it did several decades ago, causing plants to bloom earlier and pollinating bees and migrating birds and insects to arrive sooner.

B _ Non-visible Light and Human



Human body and IR Light

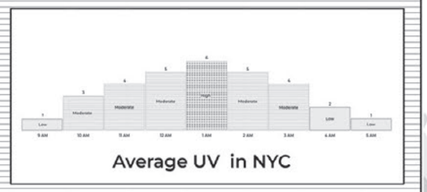
Vitamin D has long been considered the principal mediator of beneficial effects of sun exposure. However, oral vitamin D supplementation has not been convincingly shown to prevent the above conditions; thus, serum 25(OH)D as an indicator of vitamin D status may be a proxy for and not a mediator of beneficial effects of sun exposure. New candidate mechanisms include the release of nitric oxide from the skin and direct effects of ultraviolet radiation (UVR) on peripheral blood cells. Collectively, this evidence indicates it would be wise for people living outside the tropics to ensure they expose their skin sufficiently to the sun. To minimize the harms of excessive sun exposure, great care must be taken to avoid sunburn, and sun exposure during high ambient UVR seasons should be obtained incrementally at not more than 5–30 min a day (depending on skin type and UV index), in season-appropriate clothing and with eyes closed or protected by sunglasses that filter UVR.

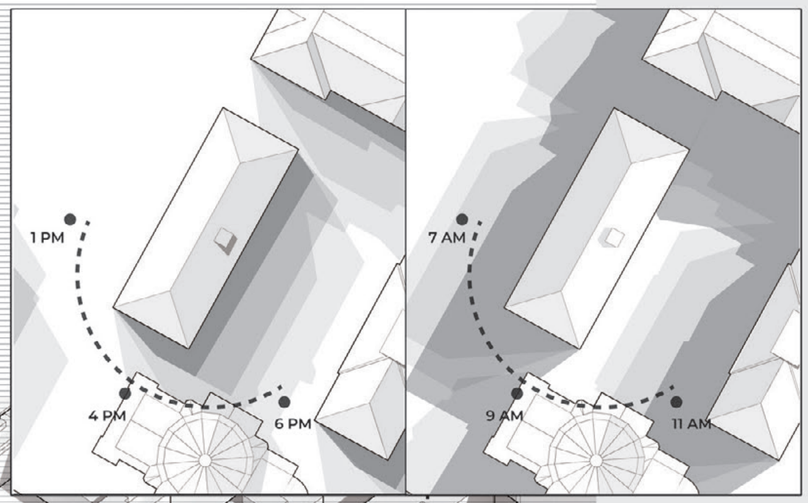


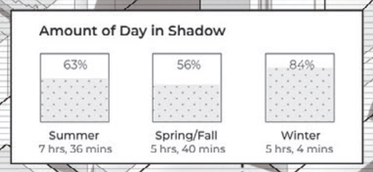
IR thermal injury may have significant biological effects on the human skin. The IR-A rays induce free radicals in the dermis and diminish the skin's antioxidant capacity, the main cause of premature skin aging.

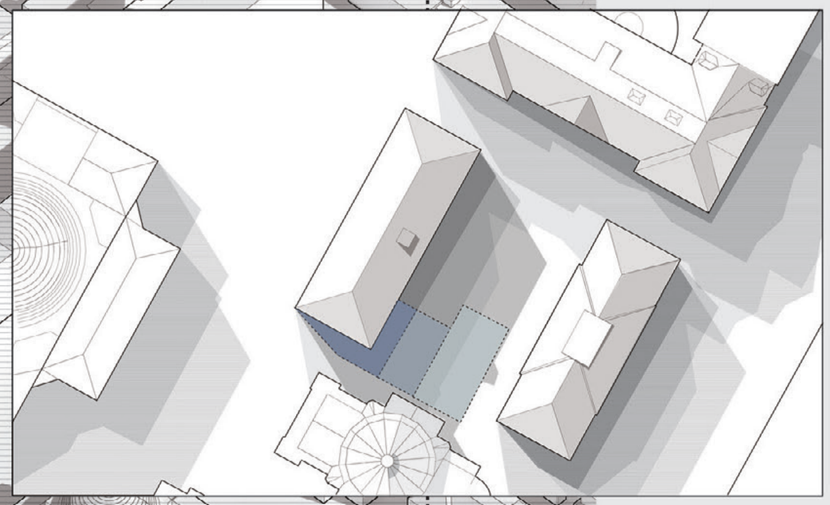
When X-ray radiation is absorbed within our bodies, it can damage molecular structures and potentially cause harm. Very high doses of radiation cause damage to human cells, as evidenced by skin burns, loss of hair, and increased incidence of cancer. Because high doses of radiation can cause cancer, it is therefore generally assumed that low doses may also cause cancer.

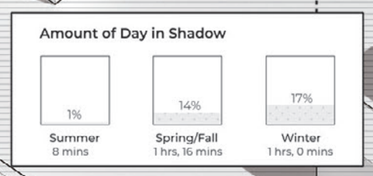
C _ Non-visible Light and the Site

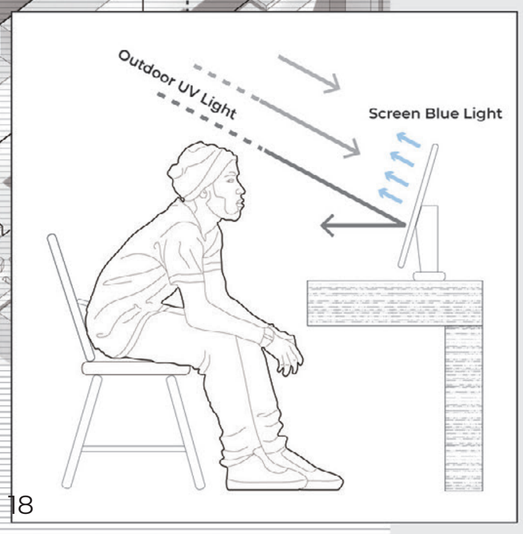




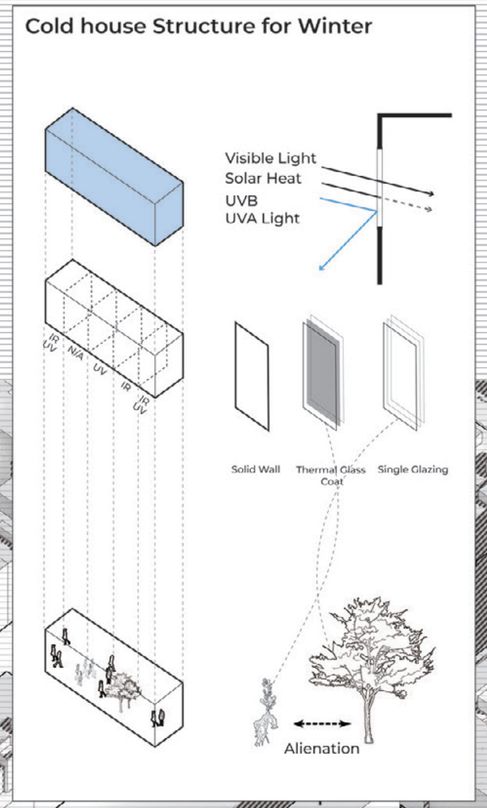


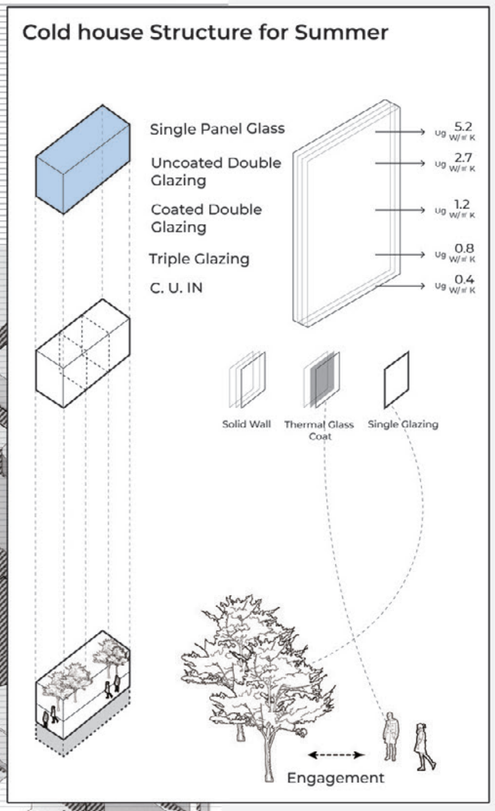






D _ Initial Design



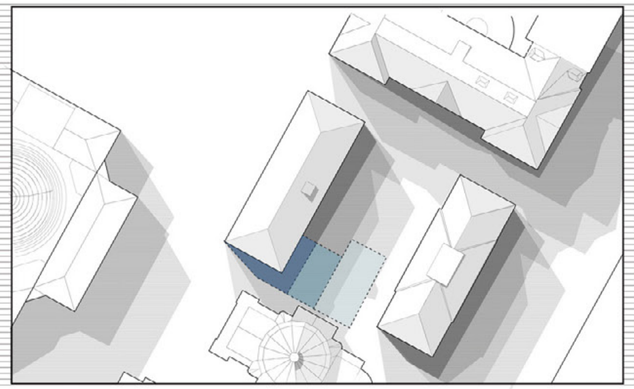


Glass that is transparent to visible light absorbs nearly all UVB. This is the wavelength range that can cause a sunburn, so it's true you can't get a sunburn through glass.

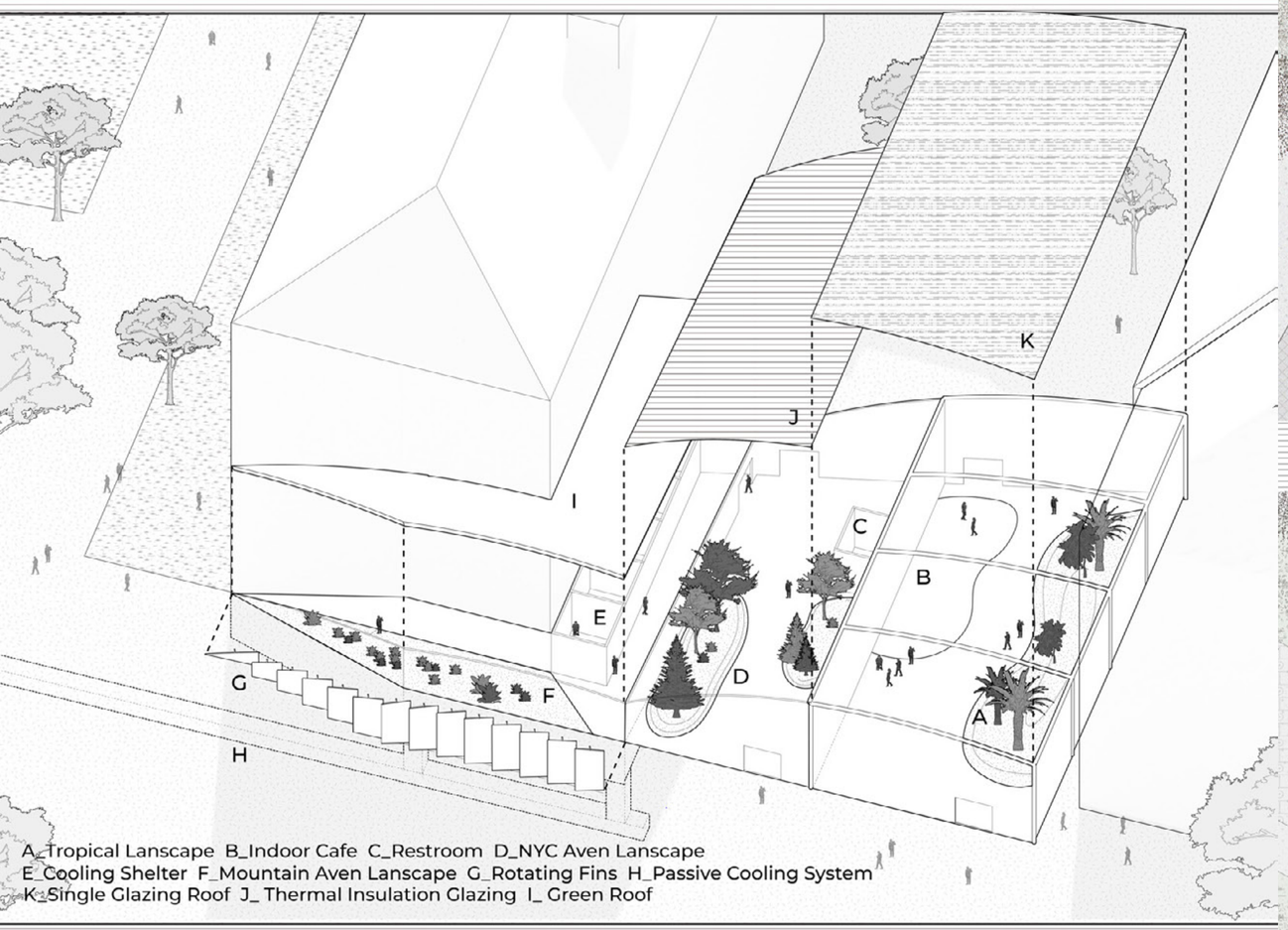
However, UVA is much closer to the visible spectrum than UVB. About 75% of UVA passes through ordinary glass. UVA leads to skin damage and genetic mutations that can lead to cancer. Glass does not protect you from skin damage from the sun. It affects indoor plants too. Have you ever taken an indoor plant outside and burned its leaves? This happens because the plant was unaccustomed to the higher levels of UVA found outside, compared with inside a sunny window.

Material	Thermal Conductivity (W/ (mK))	Thickness Required fpr U=0.13 (W/ (m̊K)) (m)
Reinforced Concrete (1% steel)	2.3	17.30
Solid Brick	0.80	6.02
Soft Wood	0.13	0.98
Porous Brick/ Concrete	0.11	0.83
Straw	0.055	0.11
Typical Insulation Material	0.040	0.20
Vacuum Insulation Material	0.002	0.015

B _ Radiation (infrared), Emissivity (thermal) and Design

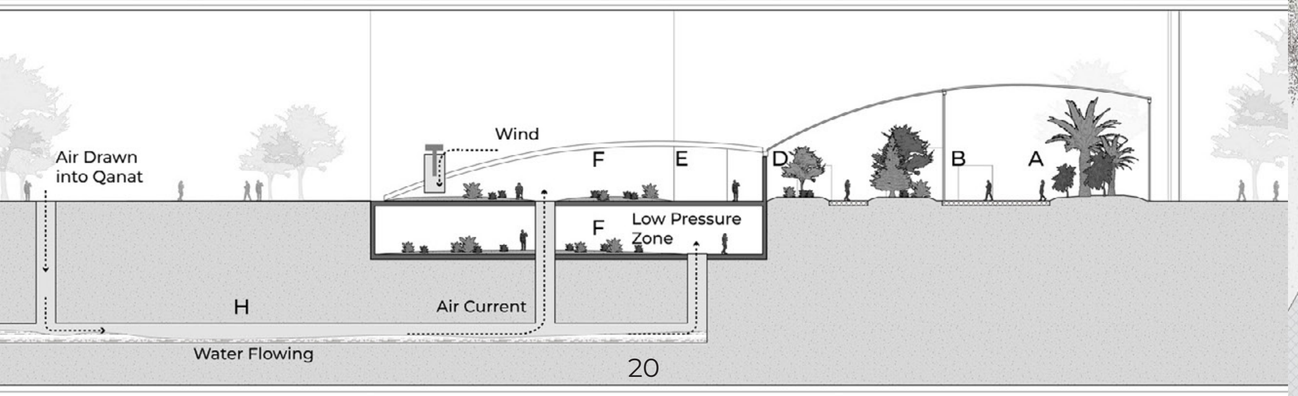


Isometric



A_Tropical Lanscape B_Indoor Cafe C_Restroom D_NYC Aven Lanscape
E_Cooling Shelter F_Mountain Aven Lanscape G_Rotating Fins H_Passive Cooling System
K_Single Glazing Roof J_ Thermal Insulation Glazing I_ Green Roof

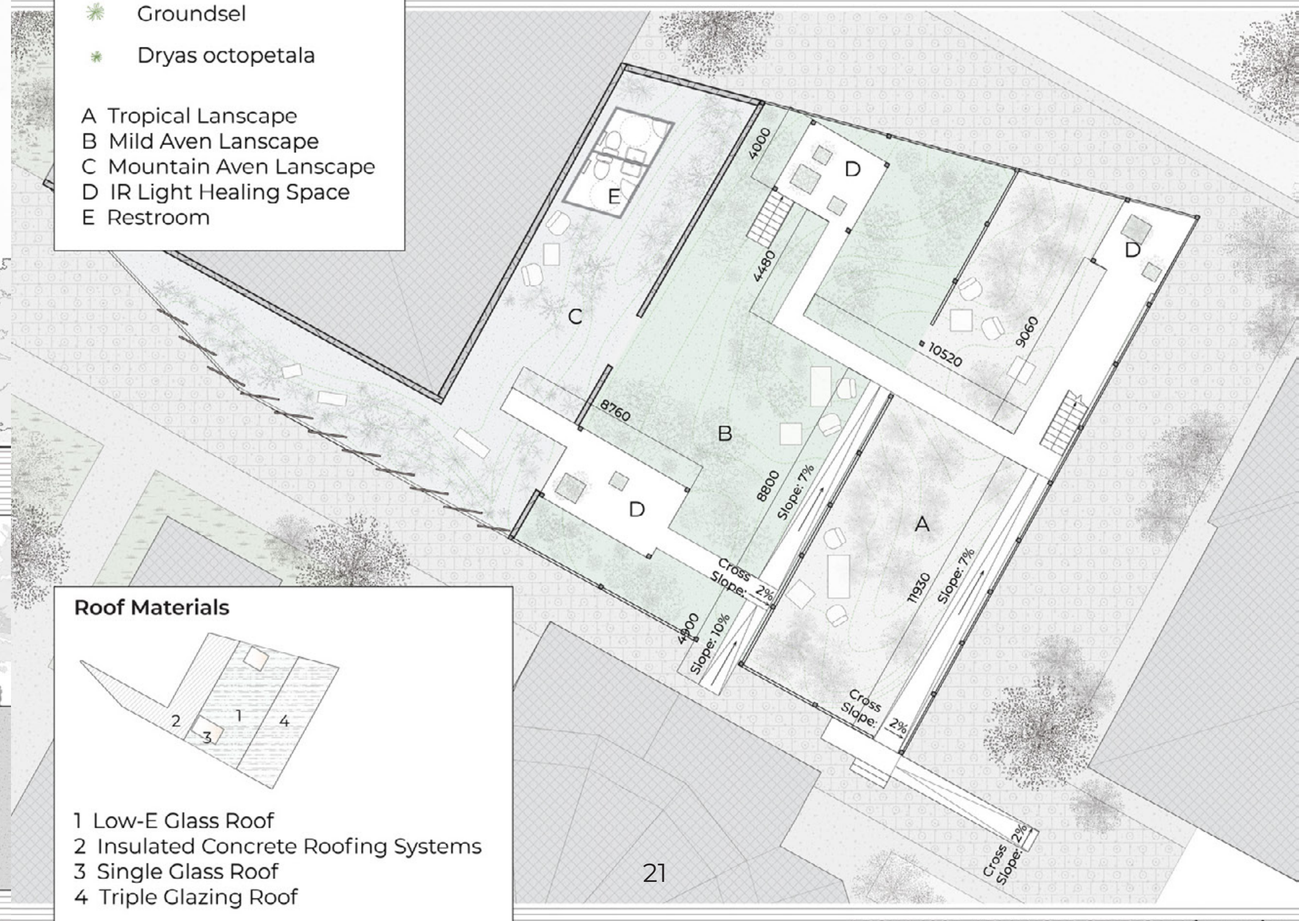
Section



A _ Main Design

- Bontia daphnoides
- European fan palm
- Thevetia ovata
- White spruce
- Wild geranium
- Red maple
- Shepherd's Purse
- Groundsel
- Dryas octopetala

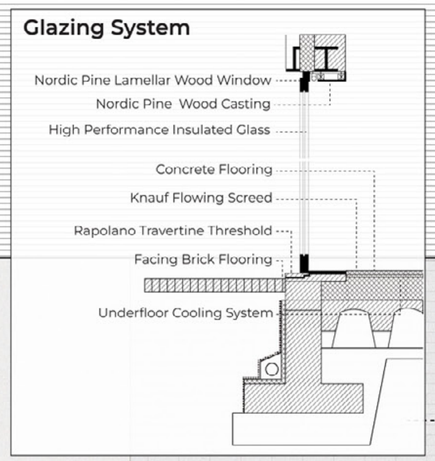
A Tropical Lanscape
B Mild Aven Lanscape
C Mountain Aven Lanscape
D IR Light Healing Space
E Restroom

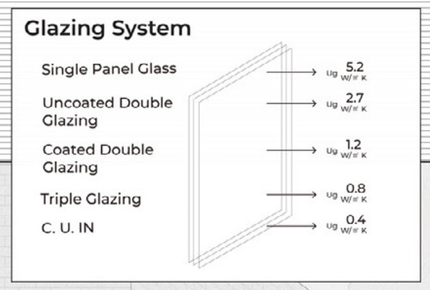


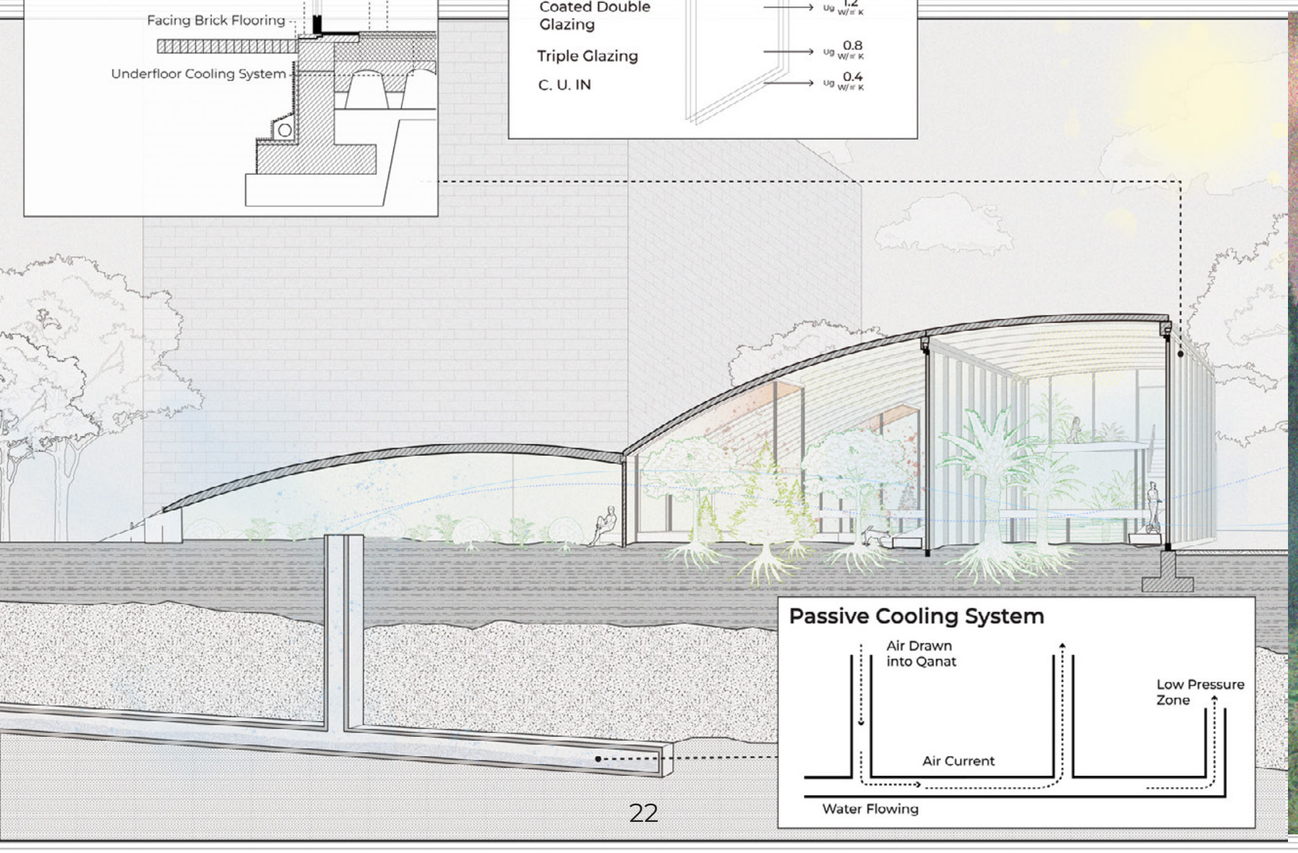
Roof Materials

1 Low-E Glass Roof
2 Insulated Concrete Roofing Systems
3 Single Glass Roof
4 Triple Glazing Roof

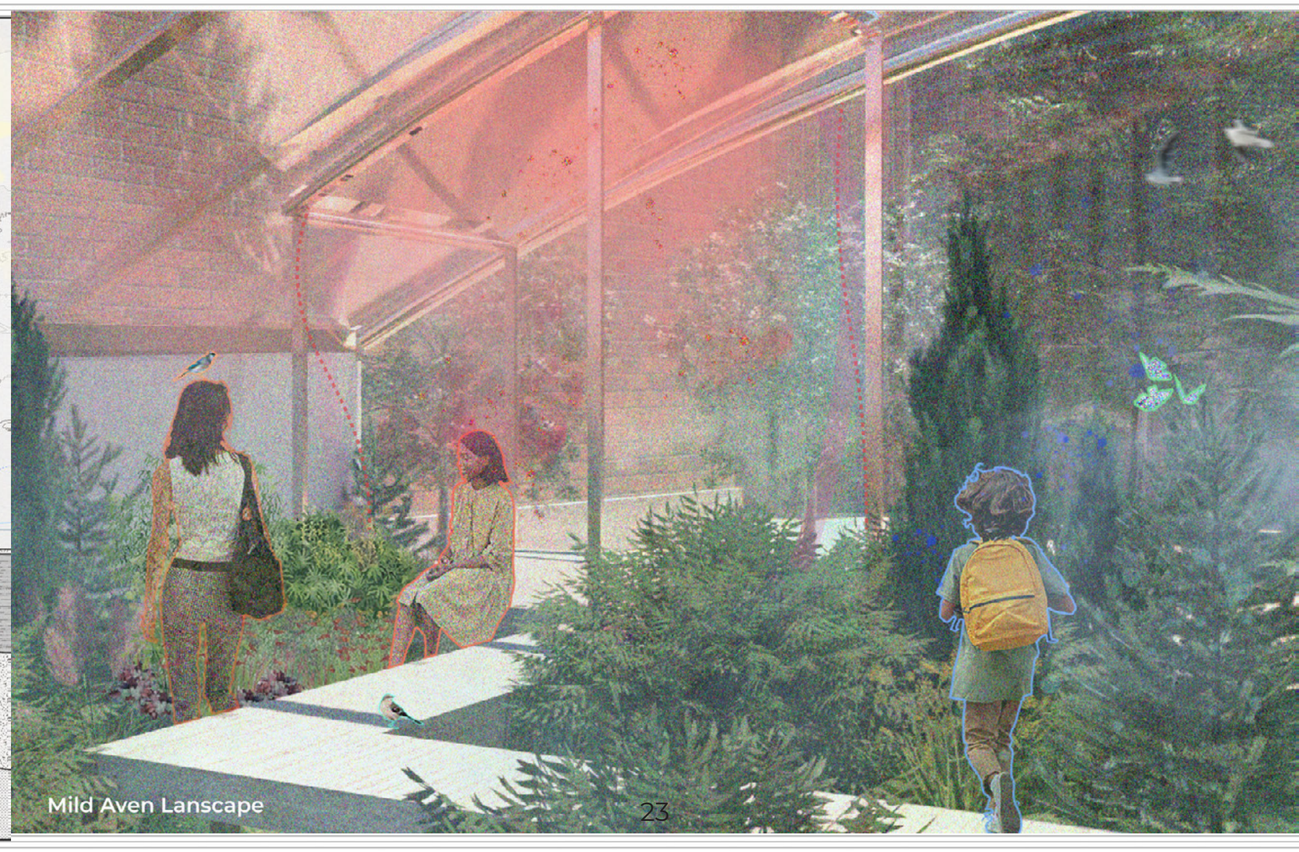
B _ Final Design







C _ Main Design



Non-Visa

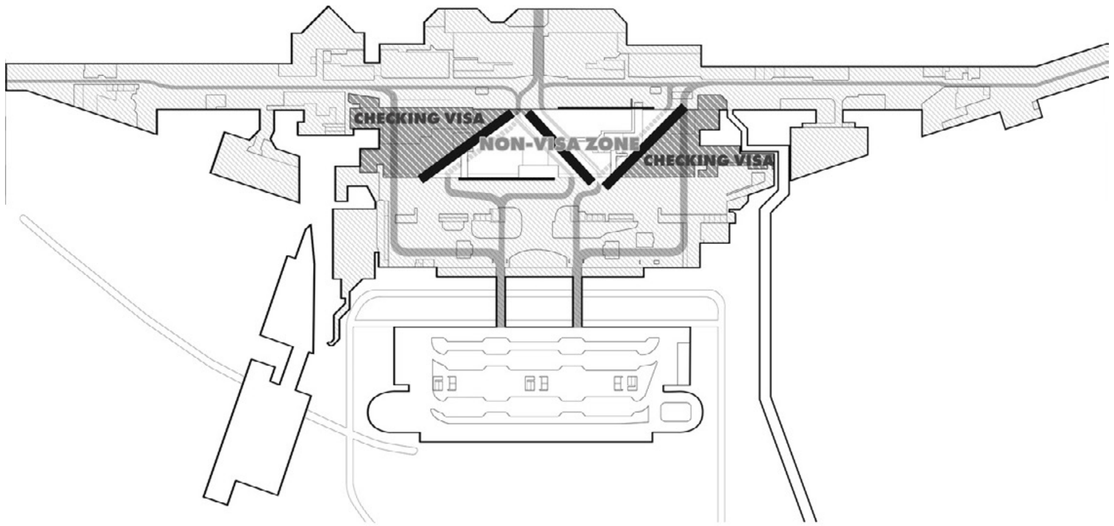
Group Project with Sharon Kang
Site: London, United Kingdom
Advisor: Emanuel Admassu
Columbia University, GSAPP, 2024

The site we are working with is Heathrow Airport in London, and we are using the statue of Ramses II in the British Museum as the starting point of our research. Our goal is to create intervention structures that foster the restitution process of museum objects, diverging from traditional museums in materiality, form, and purpose. Our design aims to revolutionize the traditional hierarchy of the airport, boldly asserting the imperative of restoration while revolutionizing the visa-checking process at Heathrow Airport. These initiatives serve as manifestos challenging the conventional architectural regulations governing both Heathrow Airport and the British Museum.

Hierarchy Diagram

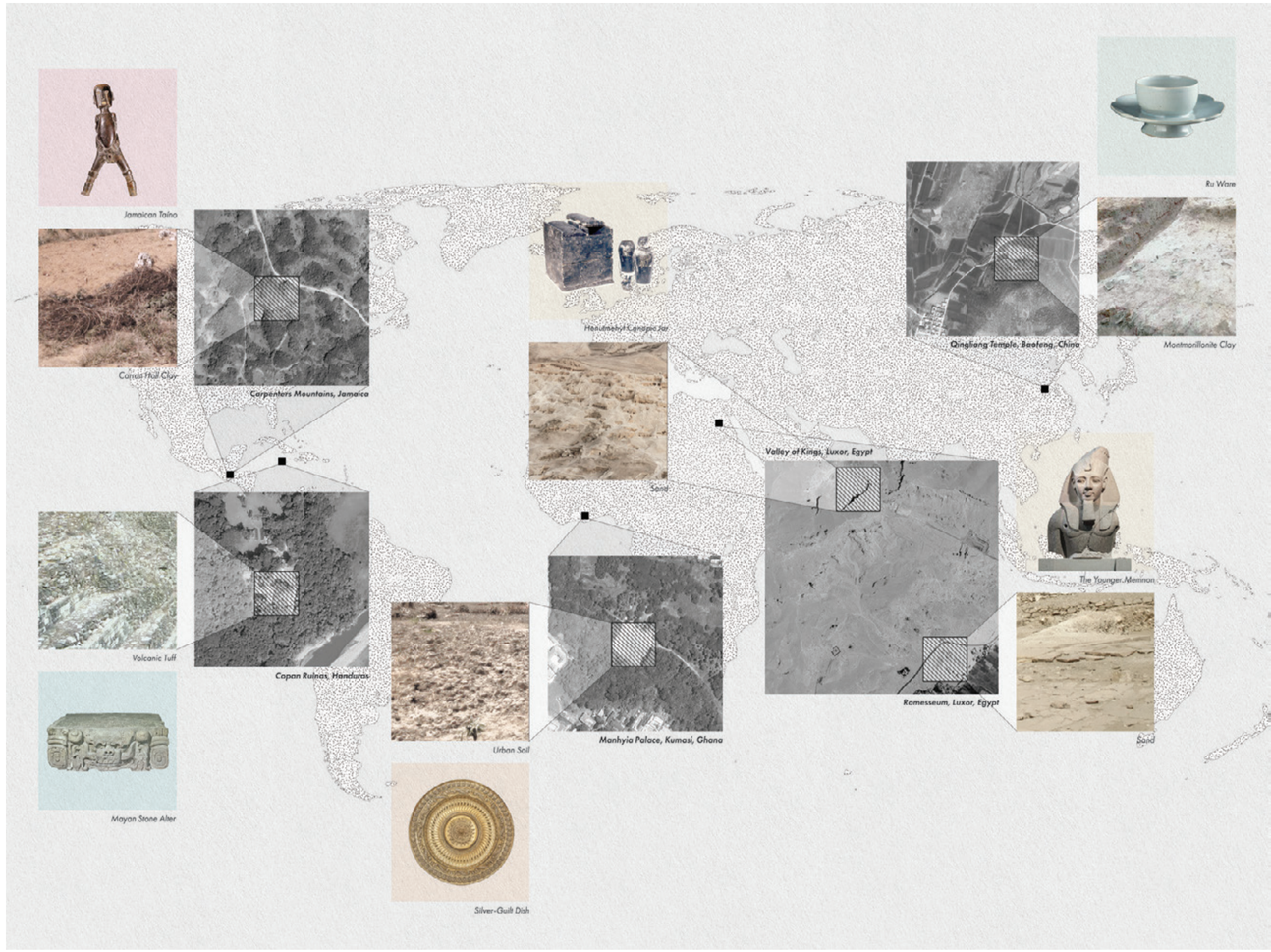
Heathrow Airport is the main international airport serving London, the capital of England and the United Kingdom. It is the largest of the six international airports in the London airport system.

In line with the protocols observed at many international airports, Heathrow adheres to a stringent hierarchy governing security and visa procedures for international travelers. British nationals enjoy expedited passage through check-in counters and security checkpoints, proceeding directly to departure gates.



As the pinnacle of scrutiny within an international airport, the security zone serves not only as a functional necessity but also as a stark symbol of the systematic regulations governing international travel, scrutinizing every traveler with unwavering precision. We have expanded the non-visa zone significantly, and our architectural vision is to enable passengers to traverse this area without the need for visa checks.

Objects Material Catalog



As we began to construct the non-visa zone, given the British Museum's inaccurate portrayal of context, we decided to take a different approach to the materiality of our restitution intervention, one that is opposite to the approach of the British Museum. Our process began with a material analysis of the selected objects in our studio. The diverse geographical origins of these objects guided us in selecting materials that authentically reflect their respective contexts, which we plan to use in constructing the restitution space. From the geographical locations of these six objects, we identified four main categories of materials: clay soil, urban soil, sand, and volcanic tuff.

EXISTING RESTITUTION

Objects have been acquired in a variety of ways. Some objects are subject to questions about, or requests for, return to other countries. Statements on the most frequent requests and information on the current status of the discussions can be found below.

SOUVENIR

Browse our range of fascinating and highly-detailed replicas, many of which are exclusive to the British Museum. From ornaments inspired by the ancient Egyptian god Anubis to hand-made recreations of the armour of Saxon Britain, from the Rosetta Stone to the Lewis Chessmen, discover extraordinary replicas, ornaments, busts and bronzes of all sizes to add a touch of history

TOURIST

The British Museum was the UK's most-visited attraction for the first time since before the Covid pandemic. The Association of Leading Visitor Attractions (ALVA) showed there were 5,820,860 visits to the central London museum in 2023, a 42% increase on 2022.

LONDON

ARCHIVE STORAGE

The British Museum collection totals at least 8 million objects. Roughly 80,000 objects are on public display at the British Museum in Bloomsbury at any one time.

BRITISH MUSEUM

PARIS

PARIS ETHNOLOGICAL MUSEUM

NEPOLEAN

Napoleon's men tried but failed to dig and remove it to France during his 1798 expedition there. It was during this attempt that the hole on the right of the torso (just above Ramesses's right nipple) is said to have been made.

BARON DOMINIQUE VIVANT DENON

ETCHING

During Napoleon's expedition to Egypt, Baron Dominique Vivant Denon, produced numerous etchings depicting Egypt, which contributed to a distorted narrative and perception of Egypt that persists to this day on a global scale.

GIOVANNI BELZONI

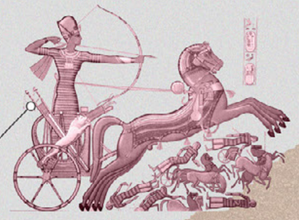
STATUE OF RAMESSES II

The British Consul General Henry Salt hired the adventurer Giovanni Belzoni in Cairo in 1815 for this purpose. Using his hydraulics and engineering skills, it was pulled on wooden rollers by ropes to the bank of the Nile opposite Luxor by hundreds of workmen.

LUXOR

VISA

In 1975, Maurice Bucaille said that the mummy was threatened by fungus and needed urgent treatment to prevent total decay. French laws dictated that entry and transportation through the country required a valid passport. To comply with local laws, the Egyptian government issued a passport to the Pharaoh.



LOCAL PERCEPTION

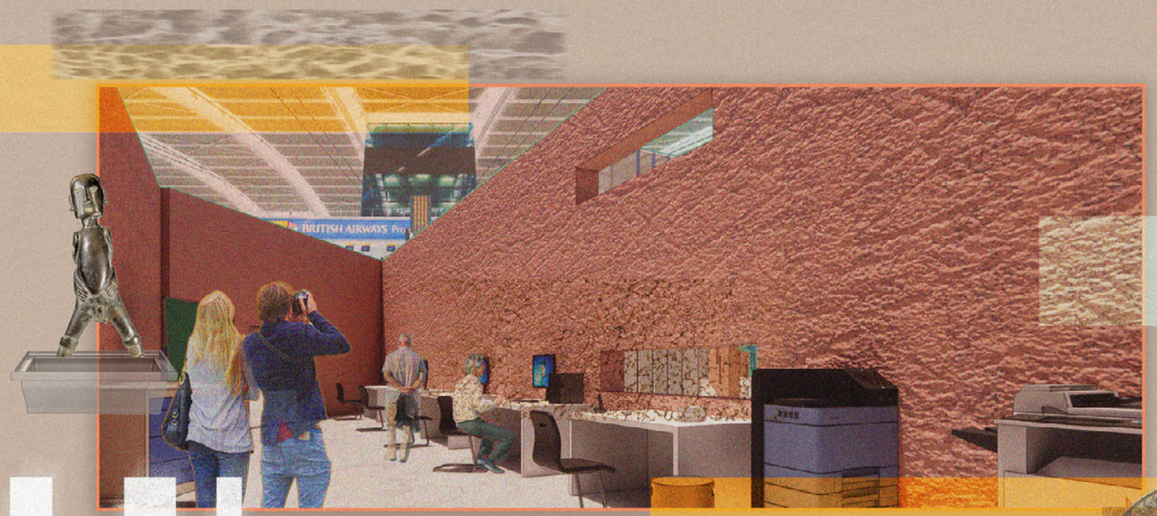
Ramses II, commonly known as "Ramses the Great," is one of the most famous pharaohs of Egypt. He was known to the ancient Egyptians as Userma'atre'setepenre, which means "Keeper of Harmony and Balance, Strong in Right, Elect of Ra." Ramses II is viewed as a great warrior, fighting many battles.

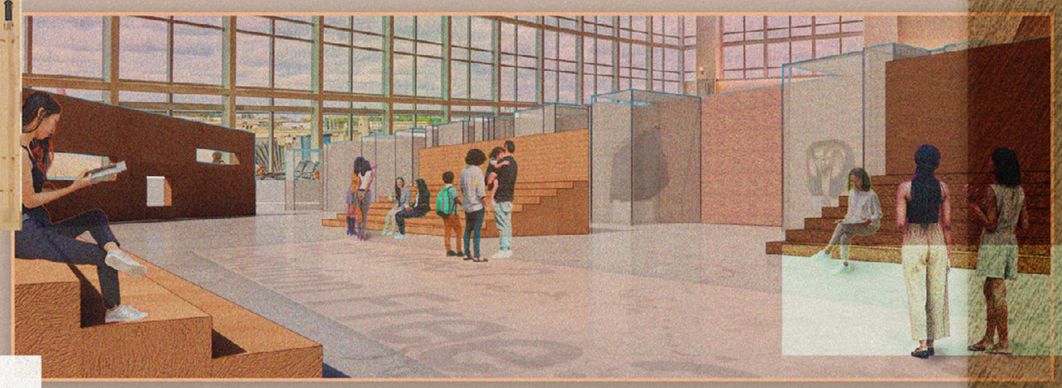
RAMESSEUM

The Ramesseum is the memorial temple (or mortuary temple) of Pharaoh Ramesses II ("Ramesses the Great", also spelled "Ramses" and "Rameses")

RAMESSES II

"Object" Diagram



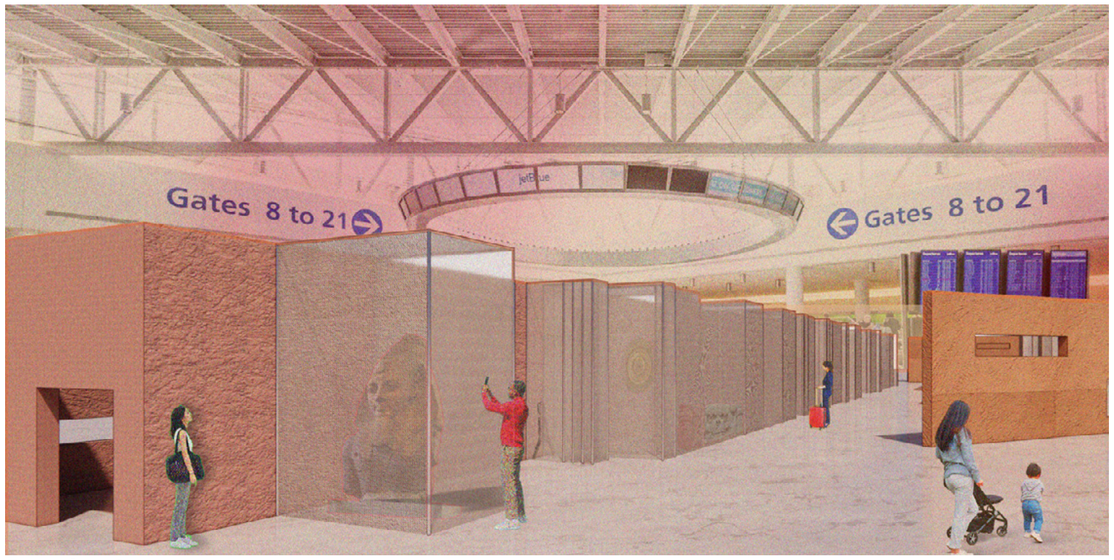


“Sample” Drawing

“Site” Drawing

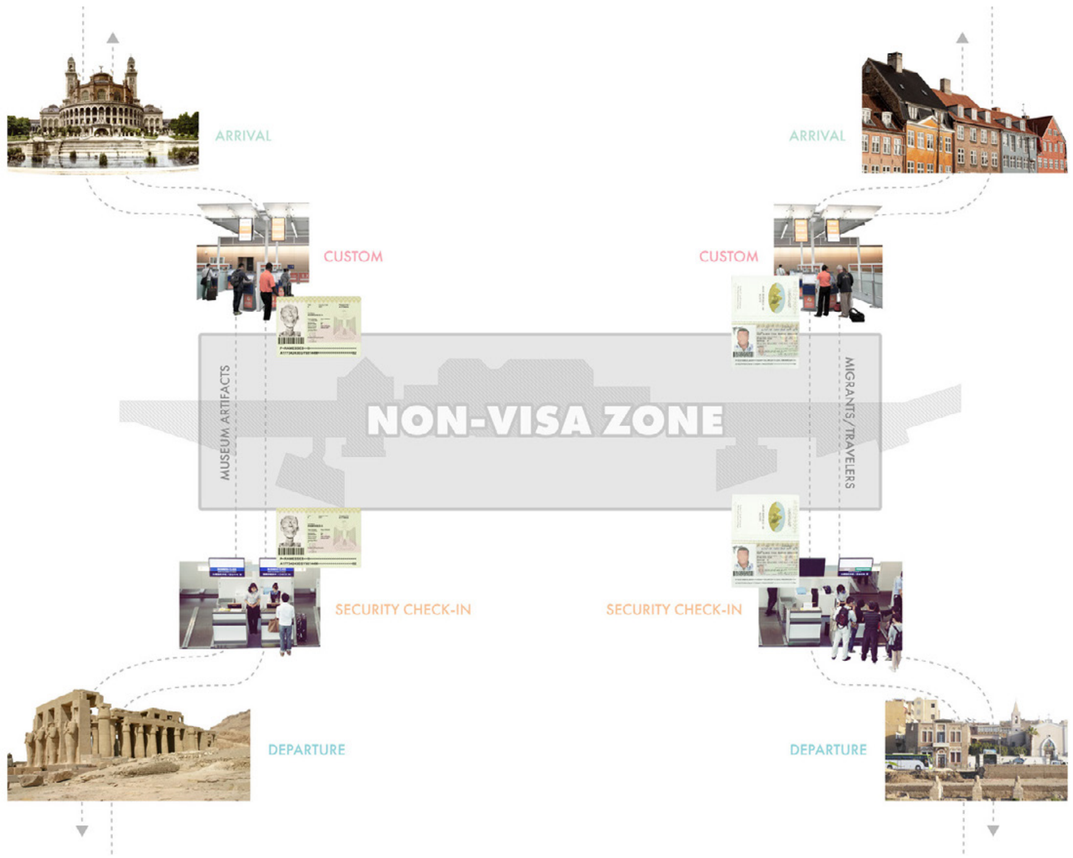
Interior Render

Render 1



Render 2

Render 3



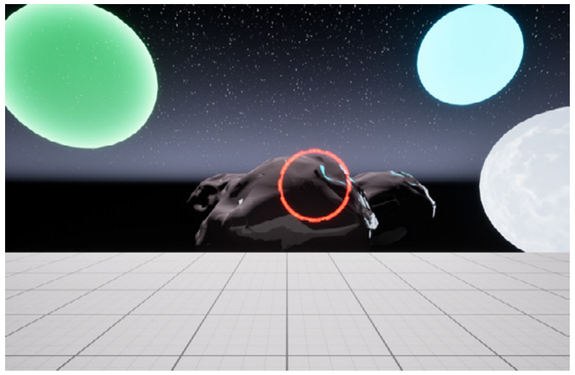
Render 1:
In our design, visitors to the airport are afforded glimpses of artwork awaiting transport and restitution, presented in captivating silhouettes that evoke curiosity and intrigue.

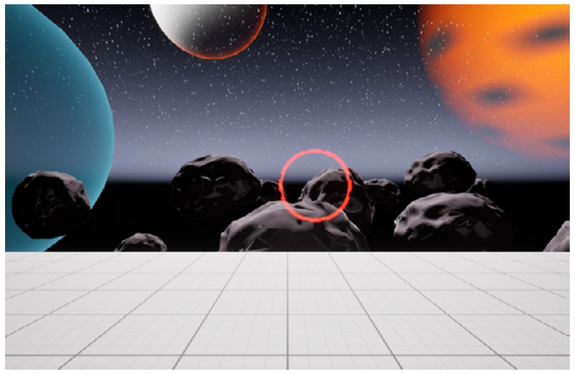
Render 2:
Visitors are invited to freely navigate through the office where the restitution paperwork is processed, fostering an environment of transparency and openness. Unlike traditional restitution processes, we aim for full accessibility, allowing anyone to bear witness to the proceedings.

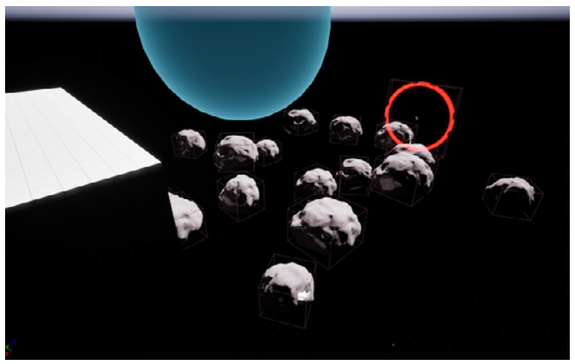
Render 3:
This public discussion forum serves as a focal point for debate and the exchange of ideas surrounding the significance of restitution. Positioned strategically in the heart of the bustling security area, its prominent location underscores the importance of taking restitution seriously and promoting public awareness.

Galactic Escape

Group Project with Sharon Kang and Yao Xiao
Advisor: Nitzan Bartov
Columbia University, GSAPP, 2024







“Galactic Escape” will invite players to embark on a heart-pounding adventure as they take on the role of a daring space explorer fleeing from a hostile alien invasion. Utilizing the intuitive jumping and moving mechanisms popularized by Temple Run and Subway Surfers, players will navigate through dynamic environments and evade obstacles while racing against the clock.

First-Person Perspective: Experience the adrenaline rush of a thrilling escape in first-person view, immersing players in the action like never before.

Space Exploration: Departing from a futuristic spaceship, players will traverse diverse galactic landscapes, ranging from asteroid fields to alien planets, each with its own unique challenges and hazards.
Dynamic Obstacle Course: Dodge obstacles, leap over chasms, and slide under barriers as you strive to outmaneuver pursuing enemy spacecraft and environmental hazards.

Engaging Narrative: Unravel the mystery behind the alien invasion through a compelling storyline, featuring immersive world-building and memorable characters.

Target Audience: “Galactic Escape” is designed to appeal to a broad demographic of mobile gamers, including casual players seeking fast-paced entertainment and enthusiasts of science fiction and action genres.