PORTFOLIO

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Decolonizing Hawaiian ecologies
2800 Bissonnet St
The Waterfalls
My Microhome
Dreamscapes
Flooring
Renewable Energy
Selected Commentaries
Mass Transit Systems
DECOLONIZING HAWAII

DECOLONIZING HAWAII

Seven Star Houses / Lady Columbia / Landscape
Year: 2021
Location: Hawaii
Type: Academic Project (Group)
Collaborators: Nanjia Jiang and Iris Hong
Instructors: Prof. Dominic Leong and Prof. Sean Connelly

The Puowaina volcanic crater rises 461 feet above sea level and offers views of most of the Oahu island. As an isolated space overlooking the city, Puowaina was considered a sacred burial site to its indigenous people. The US military chose the Puowaina crater for its unique cultural and historical background as the perfect site for the National Memorial Cemetery of the Pacific which opened in 1949 and in which more than 13,000 American soldiers were buried.

After many years of debates over the construction of the cemetery for the soldiers who died in the numerous wars in the Pacific, the National Memorial Cemetery of the Pacific was opened to the public in 1949. Before the US Congress approved the construction of the cemetery in Honolulu, many locals were against the idea of building a city of the dead over the city of the living. However, once Congress gave the authorization, the governor of Hawaii offered the Puowaina as the site for the new cemetery. During the Second World War, a tunnel was dug under the peak for the placement of the batteries to protect the shore. Also at the peak of the crater, the earth mound was removed to construct the viewing platform where tourists could see the panoramic view of the city and the sea.

In our attempt to decolonize the site we looked back at native practices and ancestral knowledge. Ho'oponopono was a healing ceremony that was practiced in Hawaii to set things right with each other and God to restore and maintain good relationships among family through prayer, discussion, correction, repentance, and mutual restitution and forgiveness followed by closing prayers and periods of silence. Hooponopono is about conflict resolution. We look at healing as an opportunity to give back to a community that has long suffered from US colonialism. Our project aims to decolonize Hawaii by enabling and strengthening the independence of the people and the land through healing practices. Thus, we approach the concept of healing in a twofold manner: healing of the land and healing of the people.
We looked back at navigation practices when thinking about healing the natives from colonization, as navigation enabled them to restore their faith in the importance and value of their ancestral knowledge. This demonstration of indigenous knowledge and technology led to a revitalization of voyaging. The star compass used by navigators was based on seven houses that were defined by elements of nature such as the sun (La), the stars (Nalani), the birds, the clouds… and through refocusing attention on these elements we aim to restore indigenous knowledge. Towards this objective, we developed a series of silent rooms for prayer and contemplation, that redirect/reorient the visitor from the pre-existing axis created by the cemetery to the natural elements that were used by Hawaiian navigators to orient themselves.

References:

- Van Waardenburg (Thompson, Nainoa), Hawaiian Voyaging Tradition. https://archive.holulea.com
- A global map of wind, weather, and ocean conditions. https://earth.nullschool.net/
- Hawaiian Star Compass. Kamehameha Schools - Kealapono Ohana Engagement Ohana - Resources to help the ohana flourish.
In the cemetery the trees which are 60 yrs old are invasive to this experience of space which used to be a field. Through the removal of the trees and by planting a field of piligrass (Scientifically Heteropogon), an indigenous plant native to Hawaii, we aim to restore the native ecology. Piligrass is unfortunately now only found on 27 out of 41 sites. Piligrass means “to stick together”; it is a symbol of connectivity, one that we hope to restore on Puowaina.

Moreover, at the peak of the crater we removed the existing viewing platform and re-created the land that used to be there, thus restoring the original landscape.
Aligning with summer solstice, the Hawaiian burial axis started from Honolulu Harbor, passing by the ancient heiau site where the Iolani Palace, the Sacred Mound, and the Hawaii State Capitol directly lined the axis at the peak of Puowaina. Here, Hawaiians used the sacred peak for offering humans as sacrifices for the punishment of violators of taboos to appease pagan gods. Our intervention emphasizes that axis as opposed to the one created by the national cemetery.

Design Process:

- **Existing Memorial**
- **01: Flipping Memorial**
- **02: Lifting Up**
- **03: Introducing Sun and Moon Light Channel**
- **New Memorial**

**Lady Columbia Intervention**

Lady Columbia is the personification of the United States. The settlers wanted a figure representing themselves, not the Native Americans. The name “Columbia” was used for the New World (America) in 1792. In the National Cemetery of the Pacific, she represented a sitting mother figure overlooking the memorial. One of the ways in which our project aims to decolonize Hawaii and restore the independence of the people is through reversing the hierarchy by flipping the memorial and creating a concrete structure that also alters part of Lady Columbia and represents an opposition to colonization.
As Jamaica is increasingly experiencing the severe impacts of climate change and food insecurity, people have turned towards more environmentally and financially sustainable farming practices such as aquaponics, a system in which the waste produced by farmed fish supplies nutrients for plants grown hydroponically. Fish eat food and excrete ammonia, nutrient-rich water is then pumped to the top of the grow bed system, the water trickles down through the cascading grow beds, irrigates the plant roots, roots take up the nutrients thus filtering the water for the fish. Clean water goes back and oxygenates the water in the fish bowl.

Initially, we developed a device for vertical farming based on aquaponics, which could be deployed on water. The device helps revive fisheries, lower sea water temperatures thus promoting marine life; acts as a flood and erosion barrier and offers training and education opportunities.

We experimented with VR to show the invisible forces in play such as the way water and air particles are affected by our device and the positive effects of plants and coral reefs on the environment.

Thinking of how this system could be applied at a larger scale and in different contexts such as along a river, we developed a series of collages that capture the type of environment we intend to create. Accumulated yet inclusive complex of that benefits from the aquatic system, that comprises a housing center, visitor center and inclusive territory, research center, educational center and living arrangements.

We developed Holland Bay along the Canal that stems from the plantain garden river, a complex of environments and landscapes that comprises multiple complementary programs that exist in a symbiotic relationship revolving around the system of aquaponics. The Eco-lodge houses student researchers from the University of the West Indies and their international partners. The complex comprises 12 units each with a housing capacity of up to 4 people, so a total housing capacity of 48 people, and is elevated above ground level to protect it from flooding. It is connected through elevated and ground-level pathways to all other facilities in the complex.

JAMAICAN ECOLOGIES
Aquaponic Center / Eco-Lodge / Market
Year: 2021
Location: Jamaica
Type: Academic Project (Group)
Collaborators: Aahana Banker and Anthea Viloria
Instructor: Prof. Vanessa Reith
Aptly named, this multiple program consisting of:

- the Aquaponic center, which will grow a variety of products such as basil, kumya, and greens such as lettuce, spinach, kale, tomatoes, cucumbers, green beans, and more; connected to a fish tank, a communal kitchen, communal eating space, covered outdoor spaces for gathering, a market, and finally eco-lodge housing units.

- This overall site plan shows the multiple programs coming together: The Aquaponic center which will grow a variety of products such as basil, kumya, and greens such as lettuce, spinach, kale, tomatoes, cucumbers, green beans, and more; connected to a fish tank, a communal kitchen, communal eating space, covered outdoor spaces for gathering, a market, and finally eco-lodge housing units.
Ground Floor Plan

Upper Floor Plan

Closed Louvers

Open Louvers (semi-enclosed)

Open Louvers
ARTPLANT #2800

ARTPLANT #2800 is located on the site of the former Coca-Cola bottling plant in Houston, considered a transitional site back in 1951, to now part of an available neighborhood and employment center. Houston is a densely populated, and its built environments are often spread-out due to lack of zoning, urban planning and building codes. However, there are a few pockets of density in Houston that complicate the conception of the region as the capital of sprawl. Houston is experiencing a rapid urbanization. Through a grid organization, we aim to densify the block. We organized street fronts and boundaries in well-packed sequences in a way that helps maximize land use. Moreover, the original building footprint is laid out in a sort of randomized manner with a lot of open spaces. Through the grid, we aim to add clarity to the site, facilitate navigation on the site and increase efficiency. We organized the streets as extensions of preexisting ones to facilitate access and maneuverability. We organized the streets as extensions of preexisting ones to facilitate access and maneuverability. We introduced courtyards within the existing long and dark factory buildings, to allow more natural light in the gallery, artist workshops and office spaces. The factory is an industrial landmark. When implementing our arts and design incubator, following the concept of a circular building economy, we intend to repurpose the existing facilities. To emphasize the boundaries between the inner blocks and internal elements, the blocks are demarcated either by a change in the flooring materiality, or by adding brick walls of varying heights. These variations create unique spatial moments between one block and another, and between the blocks and the street. We envision the site as a permeable city block, one of walking urbanism where after defining a grid system the spaces left open provide many programmatic opportunities.

ARTPLANT (2022)

Adaptive Re-Use of Coca-Cola Bottling Plant into Art Incubator
Year: 2022
Location: Houston, Texas
Type: Academic Project (Group)
Collaborators: Vasco Li
Instructor: Prof. Wonne Ickx
Through a grid organization we aim to densify the block. We organized street fronts and sense when we visited Sawyer yards in Houston.

Through the grid system we propose to maximize land use by clearly defining the Inner Blocks. To define the streets clearly, the blocks are demarcated and differentiated from the streets either by a feeling of the adobe brick is reminiscent of the previous use of the site as a plant.

Produced adobe brick. We looked at adobe brick walls as a typology to enclose the internal blocks and define buildings. The earth uses clay bricks that are made of earth, clay, sand and straw using local construction techniques. The earth is cast in open molds onto the ground and left to dry out. When used for construction the bricks are laid up in rows and set into a mortar. The row shows industrial feel of the adobe brick reminiscent of the previous use of the site as a plant.

To define the streets clearly, the blocks are demarcated and differentiated from the streets either with a change in the flooring material, or by adding brick walls of varying heights that make the spaces become brick buffer. These variations create unique spatial movements between one block and another, and between the block and the streets.
Through a grid organization we aim to densify the block. We organized street fronts and internal streets. We are working on the site of the former Coca-Cola bottling plant, and follow the existing streets on site. The existing blocks contain several buildings arranged in a sort of randomized manner with a lot of open space, which was also the case in a similar industrial context...
Step 01: Add water to the mixing station first (easier to mix)

Step 02: Screen the clay rich soil

Step 03: Add chopped straw to the mixing station

Step 04: Add the filtered clay rich soil to the mixing station

Step 05: Mix

Step 06: Add coarse sand to the mixing station

Step 07: Poor mixture into the wooden frame placeholder

Step 08: Pull the forms out the next day

Step 09: Flip the bricks and let them dry out in the field for about a week then put them on pallets

Through a grid organization we aim to densify the block, maximize land use, add clarity and order to the layout, facilitate navigation on the site and increase efficiency.
THE WATERFALLS - 459 SMITH GOWANUS

DESIGN BY DEVELOPMENT

Multi-Use Center
Year: 2021
Location: Gowanus - New York
Type: Academic Project (Group)
Collaborators: Rita Gonzalez, Preet Aneja, Sanjana Gupta, Molly Zijia Liu, Kass Abol-Melle
Instructors: Prof. Eran Chen

Challenge:
Complex Site & Zoning
“Toxic” Neighborhood Reputation
Ripple Effect along the Canal

Goals:
Calmness
Tranquility
Greenery

Response:
Attraction: Iconic Design
Activation: Seamless Densification
Animation: Green Space

To Integrate Community needs:
Green space and infrastructure with waterfront
Commercial and Office Space
Luxury with affordable housing
Recreational facilities

Public Green Space
Green Terraces
Architectural Waterfall
Zoning Envelope

Tower A
- Max Heights:
  - 305' from Huntington St
- Shoreline:
  - 40' step back from the canal on wide lots
- Base Height:
  - 65' along the canal
  - 105' from the street
  - 85' for 200' in between

Tower B
- Max Heights:
  - 245' from Huntington St
- Easement:
  - 60' street cutting through the site to connect Nelson St to Hoyt St
- Base Height:
  - 85' along the canal
  - 95' from the street
  - 75' for 200' in between

Target Market

Focus
- Biggest goal under the new zoning proposal is to foster a more diverse and less segregated neighborhood that matches the racial demographics of the rest of New York City
- Look to attract young working professionals while housing low-income families who have historically lived in the neighborhood for generations

Plan Under New Zoning Proposal
- Affordability will be measured through a "dissimilarity index"
- Affordable housing targets to accommodate 60% AMI income rates
- Developers behind Gowanus Green plan to initiate a further remediation to appeal to more affluent target market with green, sustainable building plans and high-end amenities.

Facilities Accessibility

Population

Income/Employment

Focus
- "South Brooklyn" 506-Commercial zone
- Superfund site in 2010, allocated $506MM for the cleanup.

Canal Corridor Zoning Proposal
- Non-zoning community priorities
  - Sustainability and Resiliency
  - Community and Cultural Resources
  - Economic and Job Development
  - Transportation / Waterfront and Open Space

Community Engagement

Canal Corridor Zoning Proposal
- Gowanus as a Sustainable and Resilient Neighborhood
- Key Aspects
  - Remediation of Brownfield Sites
  - Creation of the Boulevard
  - Strategies for Climate Resilient Development
  - Canal corridor
  - Enhanced Industrial & Commercial
  - Enhanced Mixed Use

Site Information
- Zoning M1-1 / RT-2 Special Gowanus Zoning
- South Lot: Frontage 420'
- Lot Area: 168,865 sqft
- Lot Type: Corner
- Mixed Use FAR 5 (4.4 + 0.3 + 0.3)
- Max Residential 4.4 (743,006 sqft)
- Commercial 4.0 (675,460 sqft)
- Manufacturing 3.0
- Bonus Area
  - Light Industrial, Arts Related, Cultural, Civic Services FAR 0.3
  - Non-Residential Flex FAR 0.1
- Developable ZFA 446,372 sqft

Population
- Focus
- "South Brooklyn" 506-Commercial zone
- Superfund site in 2010, allocated $506MM for the cleanup.

Community Engagement
- The community and city agencies have been engaged in building the Gowanus Neighborhood Plan together through a series of public events, meetings, and online engagement.

Canal Corridor Zoning Proposal
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Floor Area Breakout

BOE - Capital and Returns

BOE - Assumptions

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Floor Area Breakout

BOE - Capital and Returns

BOE - Assumptions
The topic of a living and working space has enjoyed a spotlight in recent years as the value of space in major cities increases, and as the global community searches for ways to redefine productive, healthy environments that promote holistic lifestyles. Just over the last year and a half, as COVID-19 altered our typical daily lifestyle, quarantines and large periods of ‘work from home’ forced changes in the way we use our personal spaces. Never before have our living rooms and kitchens enjoyed such a critical analysis than during the pandemic. How a home, office or other living space is arranged can determine a variety of related issues. My Microhome offers a solution to these recent changes in ways of living, by using design generation to create a multifunctional space that optimizes the use of a wall in a typical micro-home by maximizing the distribution of activities across it. We chose specifically to use a micro-home as a precedent for the design space because it is a typical apartment which is usually designed for efficiency in plan. A microhome forces our attention on any available space in the unit, including walls, ceilings and floors. For the purposes of this optimization, we viewed a wall in the micro home and designated certain furniture that can fold out and back into the wall to allow for the best use of space elsewhere in the apartment and create a multi-purpose room. In response to these recent changes in ways of living, this investigation proposes a solution that relies on user preferences to generate designs that fit their needs.

My Microhome optimizes the use of a wall in a typical micro-home by maximizing the distribution of activities across it. We chose specifically to use a micro-home as a precedent for the design space because it is a typical apartment which is usually designed for efficiency in plan. A microhome forces our attention on any available space in the unit, including walls, ceilings and floors. For the purposes of this optimization, we viewed a wall in the micro home and designated certain furniture that can fold out and back into the wall to allow for the best use of space elsewhere in the apartment and create a multi-purpose room. To generate a Microhome wall, the user inputs their lifestyle, sets a routine for the wall to follow, and then selects a single design option that best suits their needs.

The process to accomplish this design task without optimization, while not impossible, would be difficult to maintain consistently. By deploying design through generation, multiple solutions based on the user’s preferences can be revealed quickly, and a large number of options can be developed through the ‘Discover’ process which generates optimal solutions for placement and operation.
COMPARISON

Our team was interested in and referenced the article from the site Code InComplete: "Binary Tree Bin Packing Algorithm" by Jack Gordon. In it, Gordon tackles the challenge of developing a bin packing algorithm to pack rectangular blocks with specific dimensions into a single, fixed rectangle. The article helpfully outlines the goals Gordon aimed to achieve as well as the challenges and systems he discussed, and details the solutions he arrived at as the reason behind his decisions. We acknowledged 'bin packing' as one way to pack a space full of objects using subdivision, but we wondered how the notion of 'efficiency' might look different when it comes to an individual's living space, where unique design, preferences, the ability to feel emotionally connected to a space might prompt packing the space with as many pieces as possible. We therefore took an object-oriented approach, specifically objects moving to each other based on some predefined behavioral preferences.

METHODOLOGY

INPUTS

The project begins by allowing a user to define a specific routine. In doing so, a series of suggested items/furniture populate a catalogue. We used a JSON text file to define each item's name; dimensions, in this case width and height (all typical furniture sizes); constraints on location, some items when placed on a wall have to be a certain distance from the ground in order to remain functional (i.e. the surface of a table should be no higher than 2.5 feet); and adjacency, meaning other items that would sit in proximity to said item in order to establish a pattern of use.

This data list was then converted into point locations randomly generated using Discover. Continuous input parameters that were constrained in range only by a specified "wall" boundary. These point locations were then passed through another python script to receive a series of behavioral treatments in order to determine their final locations for evaluation. The python behaviors are defined as follows:

a) Constrain: Keeping the newly generated locations within the same bounding box they were generated in. Also implementing the 'height constraint' input specified in their JSON profile by raising the center points to a specific 'y' value.

b) Collide: Evaluating whether or not the 'widths' and 'heights' of the rectangles surrounding the center points overlap, and if so, moving them in the 'x' and 'y' directions so that their collective dimensions are no longer overlapping.

c) Cluster Adjacencies: Pulling items designated 'adjacent' in their JSON profiles closer together by applying a clustering logic: if the distance between 'adjacent' objects is greater than their combined widths and heights, move these closer together.

OUTPUTS

Generated outputs include the new item locations (based on a new center point) and number of adjacencies established. We associated the original dimensions of the items to the newly generated center points and produced a bounding area. We then multiplied this new bounding area by the established quantity of adjacencies and in doing so aimed to maximize the potential area these items can occupy inside the wall boundary while increasing their adjacency.

RESULTS

The model was able to generate ideal options based on JSON preferences. The image below demonstrates that it did take a certain number of generations for the model to recognize and eliminate overlap, and move the items to their optimal positions based on adjacency. The Discover plot was set up to output 20 designs per generation over 30 generations at a mutation rate of 0.05. Having Discover do the work of finding an optimal location for key items in a wall allows designers to focus on how to fill the space between those items, and create actual "rooms" out of the generated spaces.

CONCLUSIONS

The model developed here is simple and at times predictable. There is room to introduce a wider variety of items and integrate a broader hierarchy in order to attain objectives that generate a more searchable model. There are also opportunities to introduce different types of the same functions generating even more possibilities for the area. There is, however, an excitement surrounding the possibility of extending the hand of the designer to the user directly through the kind of methodology My Microhome attempts to define. The notion that a user can design a space based on parameters that they are most familiar with, like their own routines, is a novel approach to architectural and interior design. My Microhome expands and facilitates the role of the architect/designer in the same way that it helps provide optimal design solutions. Direct user and designer exchanges see the generative model become a catalyst for collaborative and participatory design.
"As the dreamscape around me grows clearer, I slip further away from it. The mind is a magical thing, I'm discovering. A dreamscape is made of thought and is wider than the sky, able to grow large enough to fit not just our own world, but every possibility and impossibility beyond it." - Beth Revis

Looking at modeling not simply as a means of representation but as a 'tool for design', this project experiments with the use of 3DS Max as a design instrument that enables unexpected results and fantastic imagery. The project exhibits an illogical, irrational juxtaposition of familiar architectural elements belonging to different movements (such as classical columns in contrast with pure modernist walls) and is set in the realm of surrealism with elements such as arches distorted or stretched beyond the familiar and the use of natural elements such as water in unusual ways, thus creating dream-like scenes through bizarre renderings. By drifting away from the laws of physics and the boundaries of realistic feasibility, the dreamscape is a manipulation of the mind, and an expression of impossibility.
Material Research
Year: 2022
Location: Houston, Texas
Type: Academic Project (Individual)
Instructors: Prof. Catherine Murphy

FLOORING: HEALTHY BUILDING MATERIALS

Product Category: Flooring

Project Description: Adaptive Re-Use Project, Houston, TX. 10,000 sqm.

Selection Criteria:
- Strong and dependable surface, can withstand movement, non porous
- Avoidance of certain chemical classes of concern

Specific Area (Where the material/product will be installed):
- Artist Studios and Office spaces

Programs / Populations of Concern:
- Mostly mid 20's - mid 30's
- Art Studios / Workshop Spaces / Fabrication Lab: Artists and Designers
- Small and Large Office Spaces: Office Employees
- Art Gallery / Cafes / Restaurants: Visitors
- Education Center: Students

The construction team working on installation.

I have chosen to relate my material research to my current studio project which is the adaptive re-use of the former Coca Cola Bottling Plant in Houston, TX. After investigating the existing structures we are trying to incorporate a 10,000 m² ‘Incubator for Arts and Design’.

To select the healthiest products, I have chosen to focus on the additional studio and workshop spaces in the new buildings that we’re implementing on site as these are where artists will spend the majority of their time, thus they are the spaces with the highest potential for exposure. For the flooring material I am looking for a strong and dependable surface that can withstand movement and is non porous, and intend to avoid certain chemical classes of concern.

The existing seamless monolithic concrete floors (made from a mixture of Portland cement, expanding additives, gravel and sand) are better than regular monolithic concrete when it comes to strength, durability and corrosion. They would work well as the flooring in the larger fabrication labs in the existing buildings. However, in the newly implemented buildings that will house smaller artist studios and workshop spaces, where the risk of spilling and corrosion is higher, here are some other material alternatives: Linoleum, natural rubber and Engineered Wood.

Material Research
Year: 2022
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“Coca Cola requires industrial floors that can withstand the incredibly high volume of product that moves throughout their operations. Our daily tours and reports on industrial flooring that is easy to clean. The reason for the preferences for seamless flooring is the nature of the operational load on the floors in such buildings. Shock loads arising from the fall of various objects, the movement of goods and people quickly cause damage to the floor of the coating elements. To avoid the risk of corrosion, monolithic floor coatings are the best with the highest potential for exposure. For the flooring material I am looking for a strong and dependable surface that can withstand movement and is non porous and intend to avoid certain chemical classes of concern.

The existing seamless monolithic concrete floors (made from a mixture of Portland cement, expanding additives, gravel and sand) are better than regular monolithic concrete when it comes to strength, durability and corrosion. They would work well as the flooring in the larger fabrication labs in the existing buildings. However, in the newly implemented buildings that will house smaller artist studios and workshop spaces, where the risk of spilling and corrosion is higher, here are some other material alternatives: Linoleum, natural rubber and Engineered Wood.
Texas has long been considered the energy capital of the world with abundant resources of natural gas and petroleum. However, during winter storm Uri in 2021, the state’s natural gas supply was disrupted, unwinterized power plants were unable to perform, and Texas experienced one of the worst power outages. The energy crisis of 2021 brought up the question of whether the current independent energy grid in Texas is reliable or not, and led to a significant shift towards the ongoing renewable energy transition. UN climate summits and Biden's Climate Plan have pushed renewable energy to a new level of significance. Energy resiliency is especially relevant in today's context with the Russia-Ukraine war, when countries that used to depend on Russia for energy have to look for resources elsewhere.
towards 100% renewable energy. Moreover, Texas needs a balance of multiple renewable energy sources, to succeed in the transition for storage with renewable energy sources. This only highlights the critical and concurrent need for a storage unit, according to Solar United Neighbors, an organization focused on community solar in the US. Storage, according to the organization, is critical to achieve the 100% renewable energy objective. Yet it remains under-served by homeowners in Texas, which they consider to be too costly. There was however, a notable change after Winter Storm Uri. Over 50% of the new private contracts signed by homeowners in Texas had included the tax benefit for installing solar panels. This was a major change, as Tori Wolfe from the Houston Renewable Energy Group suggests that establishing a carbon emission policy with market-driven carbon price would also help the transition. Tori sees a bigger picture for the future of energy. She said “solar is the most democratic form of energy we have, and we should all have a right to own a piece of the sun”. Matt Dulin from Rice University also agrees that solar roofs “offer a kind of “energy independence” for the homeowner who may not want to be reliant on natural gas.

Map 1 - The Effects of the 2021 Energy Crisis

Zooming in to Houston, through better data visualization, we see the locations of power plants operating during the 2021 winter storm. The crisis exposed the deficiency of existing power grids, which spoke to the need for them to be reformed. At the same time, the state now faces the need to address the challenging transition to renewable energy. For one, renewable energy such as wind and solar relies greatly on weather conditions, which can be inconsistent. The integration of storage with renewable energy sources is thus critical to achieve the 100% renewable energy vision. As the technology is very mature and is easy to access. It is the first renewable energy source to be deployed, and its consumption is 37.7 kWh, which can be rounded to 1.57 kw. 4,600 megawatts is enough to power 2.9 million households if adequate storage is employed. The technology is very mature and is easy to access. The technology is very mature and is easy to access. The technology is very mature and is easy to access.

Map 2 - Natural Gas Power Plants

The diagram shows how 46% of natural gas use to source energy is contributed to by the natural gas power plants in Houston. Houston is one of the leaders in environmental transparency and positive climatic impact, which recognize their efforts in the energy transition.

Map 3 - Battery Storage

The image shows the locations of energy storage, one of the challenges to the full transition to renewable energy. There are a few units in solar and battery energy storage. According to the Shining Cities 2020 Report, the second-biggest urban solar rooftop capacity in the US with 4,600 potential megawatts to generate, which is enough to power 2.9 million households if adequate storage is employed.

Map 4 - Solar Roof, an Alternative to the Grid

According to the Shining Cities Report 2020 suggested that Houston has the second-biggest urban solar rooftop capacity in the US with 4,600 potential megawatts to generate, which is enough to power 2.9 million households if adequate storage is employed, based on the data from (The Shining Cities Report 2020 suggested that Houston has the second-biggest urban solar rooftop capacity in the US with 4,600 potential megawatts to generate, which is enough to power 2.9 million households if adequate storage is employed. The technology is very mature and is easy to access. The technology is very mature and is easy to access. The technology is very mature and is easy to access. The technology is very mature and is easy to access.)

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Clive Dutton
Primary Readings:

- ‘Animal People’ by Indira Sinha
- ‘A Cyborg Manifesto’ by Donna Harraway

Response:

‘The animal rights Rover advocates for “philosophical revelations” on those who are held captive by invisibility and those who have to deal with invisibility. This has highlighted the importance of engaging with the project by being directly involved in it. Architects have a responsibility to care about the living conditions of the construction workers employed to build their design, after they have worked on the construction sites of their projects. Architects cannot explain away this fact when the building process to ensure human rights and stop abuse once and for all’. ‘Animal People’ exposes its two main fault lines: ignorance and callous for the empirical realities inside the construction site. The project is to be designed and is to be associated with the theme that construction processes face against the market’s dual standard and callous for the empirical realities inside the construction site. According to ‘Inviting Atmospheres to the Architecture Table’ by Calvillo, ‘The world of pipes is a world of silence… non-human “speak” and one of the few locations in the pipes that are visible to us, they are all no longer dead because they are nowhere but electronic, electromagnetic waves, a network of pipes and elements that make up the building functional exposed and find simplicity in their infernal aesthetic qualities.

Material Cyclabilities
Primary Readings:

- ‘Who Builds Your Architecture’ by Mabel O Wilson

Response:

‘Decolonizing Design’

- ‘The University and the Camp’ by Anooradha Iyer Siddiqi
- ‘Race, Reason, and the Architecture of Jefferson’s Virginia Southampton’ by Malo O’Wilson

In her essay “The University and the Camp”, Anooradha Iyer Siddiqi simplifies the importance of understanding that colonialism equals colonization. This declarative sentence in the ongoing paradigm of power emerges as a result of colonization, but that does culture, law, ideology, political structures and knowledge production will go beyond the strict limits of colonial administration and that there is no meaningful way to understand colonialism as “the force that naturalizes, enforces, and domesticates people”. She looks at the refuge camps for cover of the knowledge with which to decolonize the mind, and explains that those camps were “constructed on opposite sites of colonial realities which are ongoing, and to acknowledge, validate, and value the complex layering of these experiences”. Mark Wigley in ‘Pipeless Dreams’ describes how architecture was about the skin: the art of creating thin elements to take into consideration. First, housing is not an issue of ‘offsite’ problem but an integral part of any construction project: I absolutely agree with WBYA’s claim that “migrant workers’ camps are a mirror of their design, who work on the construction sites of their projects. Architects have a responsibility to care about the living conditions of the construction workers employed to build their design, after they have worked on the construction sites of their projects. Architects cannot explain away this fact when the building process to ensure human rights and stop abuse once and for all”. ‘Animal People’ exposes its two main fault lines: ignorance and callous for the empirical realities inside the construction site. The project is to be designed and is to be associated with the theme that construction processes face against the market’s dual standard and callous for the empirical realities inside the construction site. According to ‘Inviting Atmospheres to the Architecture Table’ by Calvillo, ‘The world of pipes is a world of silence… non-human “speak” and one of the few locations in the pipes that are visible to us, they are all no longer dead because they are nowhere but electronic, electromagnetic waves, a network of pipes and elements that make up the building functional exposed and find simplicity in their infernal aesthetic qualities.

Describing Design
Primary Readings:

- ‘The University and the Camp’ - Anooradha Iyer Siddiqi

In her essay “The University and the Camp”, Anooradha Iyer Siddiqi simplifies the importance of understanding that colonialism equals colonization. This declarative sentence in the ongoing paradigm of power emerges as a result of colonization, but that does culture, law, ideology, political structures and knowledge production will go beyond the strict limits of colonial administration and that there is no meaningful way to understand colonialism as “the force that naturalizes, enforces, and domesticates people”. She looks at the refuge camps for cover of the knowledge with which to decolonize the mind, and explains that those camps were “constructed on opposite sites of colonial realities which are ongoing, and to acknowledge, validate, and value the complex layering of these experiences”. Mark Wigley in ‘Pipeless Dreams’ describes how architecture was about the skin: the art of creating thin elements to take into consideration. First, housing is not an issue of ‘offsite’ problem but an integral part of any construction project: I absolutely agree with WBYA’s claim that “migrant workers’ camps are a mirror of their design, who work on the construction sites of their projects. Architects have a responsibility to care about the living conditions of the construction workers employed to build their design, after they have worked on the construction sites of their projects. Architects cannot explain away this fact when the building process to ensure human rights and stop abuse once and for all”. ‘Animal People’ exposes its two main fault lines: ignorance and callous for the empirical realities inside the construction site. The project is to be designed and is to be associated with the theme that construction processes face against the market’s dual standard and callous for the empirical realities inside the construction site. According to ‘Inviting Atmospheres to the Architecture Table’ by Calvillo, ‘The world of pipes is a world of silence… non-human “speak” and one of the few locations in the pipes that are visible to us, they are all no longer dead because they are nowhere but electronic, electromagnetic waves, a network of pipes and elements that make up the building functional exposed and find simplicity in their infernal aesthetic qualities.
The rapid mass transit systems that developed over time presented many advantages, and the subway system身子 to those claims. The expansion of transit facilities attracted many people to New York and facilitated new developments which in turn created an increased demand for rapid transit systems. Both the radii and numbers of subway systems grew. The number of passengers grew from 1 million in 1904 to 77 million in 1913; and is nearly 770 million in 1955 (Plotch, 19). Mass transit systems created a new sustainable alternative for transportation, providing an efficient and environmentally friendly alternative to the horse-drawn carriages and coal burning steam locomotives, urban public train and bus operations, from the 1840s to 1930s. The subway system more so than any other mass transit facilities attracted more people to New York and facilitated new developments which in turn created an increased demand for rapid transit systems.

The steam engine was the only workable choice available… but the steam engine with all the smoke, gases, noise and pollution was a hardly desirable choice for operation in a confined space” (Middleton, 57). Alfred Ely Beach proposed one of the earliest systems (1832), a suspension type street car. Beach's system was never built in New York due to its being considered a public nuisance. He thought that pneumatic (or atmospheric) power was the answer to an environmentally viable subway. He was not the first. Robert Fulton was working on a pneumatic railway. Beginning in the 1830s, several had already been developed and demonstrated in Europe. Such railways were also referred to as "atmospheric" railways because they made use of air pressure for propulsion. The idea of a pneumatic railway was first proposed in France by a Mr. Turpin in 1811. However, it was not until 1870 that Beach developed a practical system.

Moreover, technological advances have constantly induced the improvement of transit services in terms of energy consumption and development. For instance, electrification enabled the transformation from horse street cars to trolleys. In 1867, Charles Harvey introduced the rapid transit system into New York as the Rapid Transit Company (SRT) to build and operate it (Plotch, 12). The SRT was a "technological triumph, providing a rapid transit service that was both reliable and efficient" (Middleton, 76). Thus, the advancement in technology played a vital role in enabling the development of rapid mass transit systems. "The most foolish thing ever heard of. New York people will never go into a hole in the ground to ride" - Russell Sage.

The subway is an important component of public transportation, exemplifies the three common pillars of sustainability: environmental, social, and economic "(Abdallah, 142)." Moreover, mass transit service presents many sustainable advantages and reduces the congestion and pollution caused by over-reliance on private vehicles. Many of these advantages were already known in the 1850's when the street railway industry did not properly meet the need for public transportation in New York City, which was at that time developed all the way up to 42nd street; and had begun experiencing severe congestion as its population continued to grow. "The long narrow shape of Manhattan Island compounded New York's congestion problems, and the south thoroughfares were jammed with drays, cabs, omnibuses, and horse cars" (Middleton, 2). On the contrary, the subway system provided "a much needed relief for the congestion on the street and improve the traveling experience. Many proposals of elevated railways ensued, (Abdallah, 142)." But the elevated railways, which provided relatively modest fixed costs of operation and were subject to the control of the line's owners, were not developed due to the substantial capital cost required and the environmental impacts while operating (Abdallah, 142)." Moreover, there was a public movement to provide sustainable economic revitalization to the urban areas. Public transportation attracted people that travel in their cities, and people who live in cities are generally more sustainable" (Abdallah, 142)." It reduces the cost of travel, which also makes it more sustainable. For example, in countries like China and Japan, the subway systems are highly developed and provide a similar level of service to the elevated railways but with much lower costs. "The subway service is more sustainable than the elevated railway as it reduces the pollution by providing a cleaner and more efficient mode of transportation. "The subway is the only form of public transportation that is environmentally friendly and sustainable" (Abdallah, 142)." Moreover, mass transit service presents many sustainable advantages and reduces the congestion and pollution caused by over-reliance on private vehicles. Many of these advantages were already known in the 1850's when the street railway industry did not properly meet the need for public transportation in New York City, which was at that time developed all the way up to 42nd street; and had begun experiencing severe congestion as its population continued to grow. "The long narrow shape of Manhattan Island compounded New York's congestion problems, and the south thoroughfares were jammed with drays, cabs, omnibuses, and horse cars" (Middleton, 2). On the contrary, the subway system provided "a much needed relief for the congestion on the street and improve the traveling experience. Many proposals of elevated railways ensued, (Abdallah, 142)." But the elevated railways, which provided relatively modest fixed costs of operation and were subject to the control of the line's owners, were not developed due to the substantial capital cost required and the environmental impacts while operating (Abdallah, 142)." Moreover, there was a public movement to provide sustainable economic revitalization to the urban areas. Public transportation attracted people that travel in their cities, and people who live in cities are generally more sustainable" (Abdallah, 142)." It reduces the cost of travel, which also makes it more sustainable. For example, in countries like China and Japan, the subway systems are highly developed and provide a similar level of service to the elevated railways but with much lower costs. "The subway service is more sustainable than the elevated railway as it reduces the pollution by providing a cleaner and more efficient mode of transportation. "The subway is the only form of public transportation that is environmentally friendly and sustainable" (Abdallah, 142)."

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Whether unrealized or short lived, the numerous mass transit proposals that unfolded over time played an important role in the gradual development of the subway system. Many of the proposals didn’t work because they failed to address the existing problems that they were supposed to solve. For instance, William Deitz’s proposal of four feet wide cars running on an inclined rail, supported by an overhead cable system did not work because the cars were situated at ground level, thus ignoring the congestion problem on the streets. The elevated railroads led to the idea of moving the transportation system underground, so the adjacent properties and streets would not be affected. This concept was introduced in the 19th century and many cities, including New York, started to build elevated systems to solve the congestion problems.

However, the elevated systems also had their problems. They were noisy, they were dusty, and they blocked the view of the city. Moreover, many of the proposals never saw the light of day because they faced some kind of political opposition. Some schemes were quite innovative and some completely impractical. Reality, however, began to set in during the 1860s. The need for a transit system of some kind became clearer and clearer as the problems of congestion became worse and worse. The elevated railroads were20 the age of subways, the elevateds survived well into the 20th century, and indeed many continue to operate today. The age of subways, the elevateds survived well into the 20th century, and indeed many continue to operate today. The age of subways, the elevateds survived well into the 20th century, and indeed many continue to operate today. The age of subways, the elevateds survived well into the 20th century, and indeed many continue to operate today. The age of subways, the elevateds survived well into the 20th century, and indeed many continue to operate today. The age of subways, the elevateds survived well into the 20th century, and indeed many continue to operate today.
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