GSAPP 2022
Selected Works

Irmak Turanli

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FOREWORD

This portfolio includes work from 3 semesters within the AAD program at GSAPP. My goal as an architect is to reveal the hidden realities of contemporary processes and systems, from mining facilities and data systems, to the workings of the garment industry, analyzing their larger social and environmental impacts, making contemporary issues more visible to the public and compelling policymakers into taking action. I have specifically focused on investigating from 3 scopes and scales through the studio courses I have taken at GSAPP: a lithium extraction site in Sonora, Mexico equivalent to 15,000 soccer fields, a master plan for a think tank in LA, and a dance center in Harlem. Zooming in and out between studios, I studied the political and social capacity of our practice and how architecture operates on a larger scale of interconnected resources, materials and people. Instead of designing a singular output, I explored a larger network of relationships to maximize the architect's impact, and more crucially sought to exhibit these relationships in my design and material choices.

Throughout these studios, many recurring relationships and themes surfaced across the different sites and programs. One particular relationship was the impact of natural resources on systems and people, such as water's inseparable relationship with a majority of the networks. In my summer studio Extractive Taskscapes, where I focused on the environmental and social disruption of Sonora Lithium Project in Sonora, Mexico, the need for and use of water through the nearby Bavispe River closely tied the project to the inhabitants of four towns in an area of 8,000 hectares. Since the tributaries of the Bavispe run directly through the mining site, we brought light to the potential pollution that threatens the safety of the downstream towns that depend significantly on the river as the source of irrigation. In Galia Solomonoff's studio called A Think Tank in LA, where my studio partners and I investigated the physical necessities around data systems and the digital world, water also was the key critical component enabling these systems to function. Our research revealed that the typical data center uses an astounding 3-5 million gallons of water per day to cool a data center which is equivalent to the amount of water a city of 30,000-50,000 people would need in a day. We sought to both develop a system which recycled this water, and display the concealed but extreme use of water to maintain global technological systems, by surfacing the water used to cool the data center at various points in our site. Another theme that emerged across my projects was the use of material in relation to the programs of the projects. In the "Urban Stage" design proposal, a dance and performance center for Marc Tsurumaki's Cultural Matter studio, I explored the intersection of fabric as a material condition and dance as a cultural medium. My goal was to reuse waste fabric to create transformative performing arts and dance spaces. But in doing this, I also sought to explicitly present this process of reuse of fabric to the occupants and visitors of the performance center, by an in-house Textile Reuse Studio.
Material also played an important role in our Think Tank in LA, where we examined concrete, stabilized rammed earth and wood as primary construction materials to create minimal operational energy cost, reduce the human and environmental impact.

Throughout these studios, working across varying scales and scopes, I have questioned the relationships between resources, materials and people, and the architect's responsibility in exposing contemporary issues and challenges. GSAPP has given me the opportunity and perspective to examine processes and sites in relation to larger global networks of processes and stakeholders, which has deeply shaped my vision of my duty as an architect.

Urban Stage

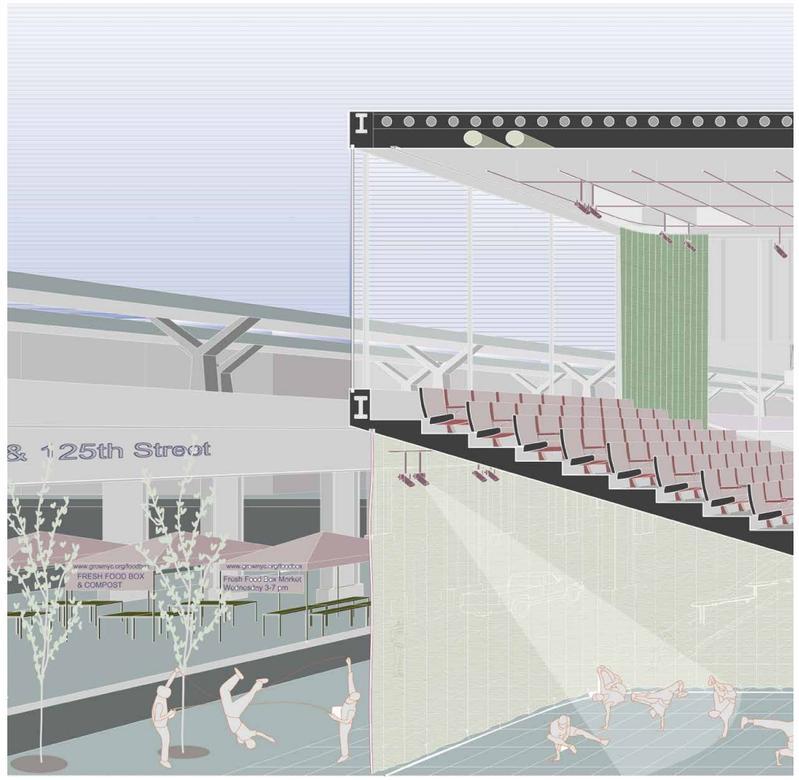
Advanced V Studio, Columbia University | Fall 2021
Critic: Marc Tsurumaki
Site: Harlem, New York City

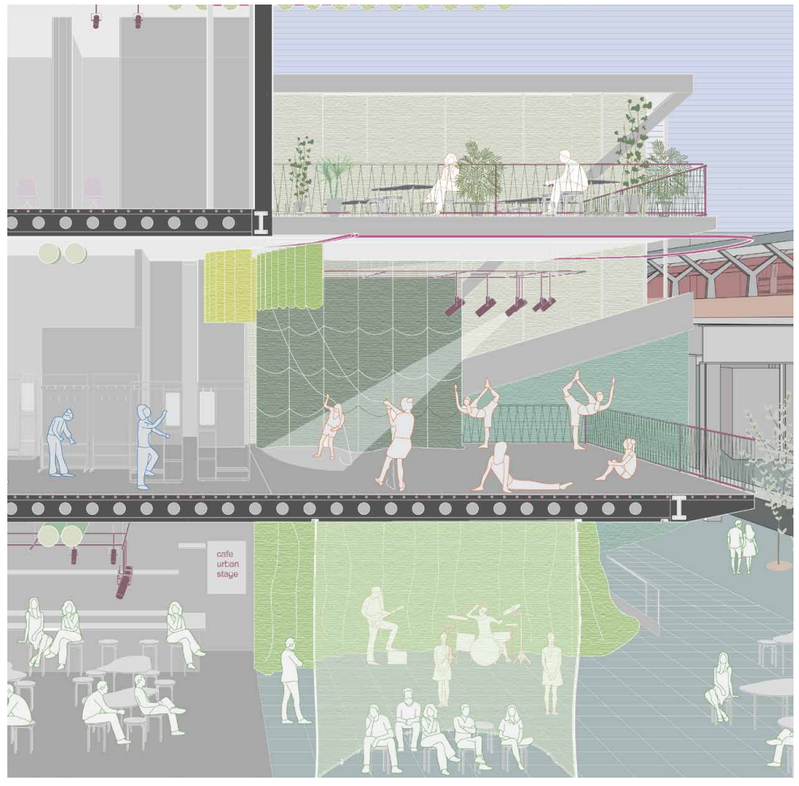
Urban Stage explores fabric as a material condition and dance as a cultural medium and looks at their intersection. The project aims to create easily accessible public and outdoor performance venues that can operate year long. It allows waste fabric to be reused on an architectural scale and on costume design as well as providing employment opportunities in the textile reuse studio.

Since the 1920's Harlem has been the focal point for black culture. This culture has kept evolving over time, starting from the 20s, important movements like Harlem Renaissance, Political Resistance, Civil Rights Movement, and this directly affected the dance and culture scene. Dance in Harlem has always been a social activity in nightclubs to release daily pressure. Many new dance genres were invented by working-class residents in ballrooms, speakeasies, and "buffet flats".

"Urban Stage" questions how the material quality and assembly of fabric can allow for spaces to be quickly and easily transformable for a variety of activities and events that exists in today's popular dance and performance arts scene. The proposal provides a system that collects waste fabric from demolition sites, businesses, organizations, and institutions. Then, in-house Textile Reuse Studio processes the fabric to be used for the space and costume design and the downcycles waste fabric to be sold at the Shop.

The site is a L-shaped vacant lot located at East 125th Street and Park Avenue, which is right next to the 125th St Metro North station in Harlem.

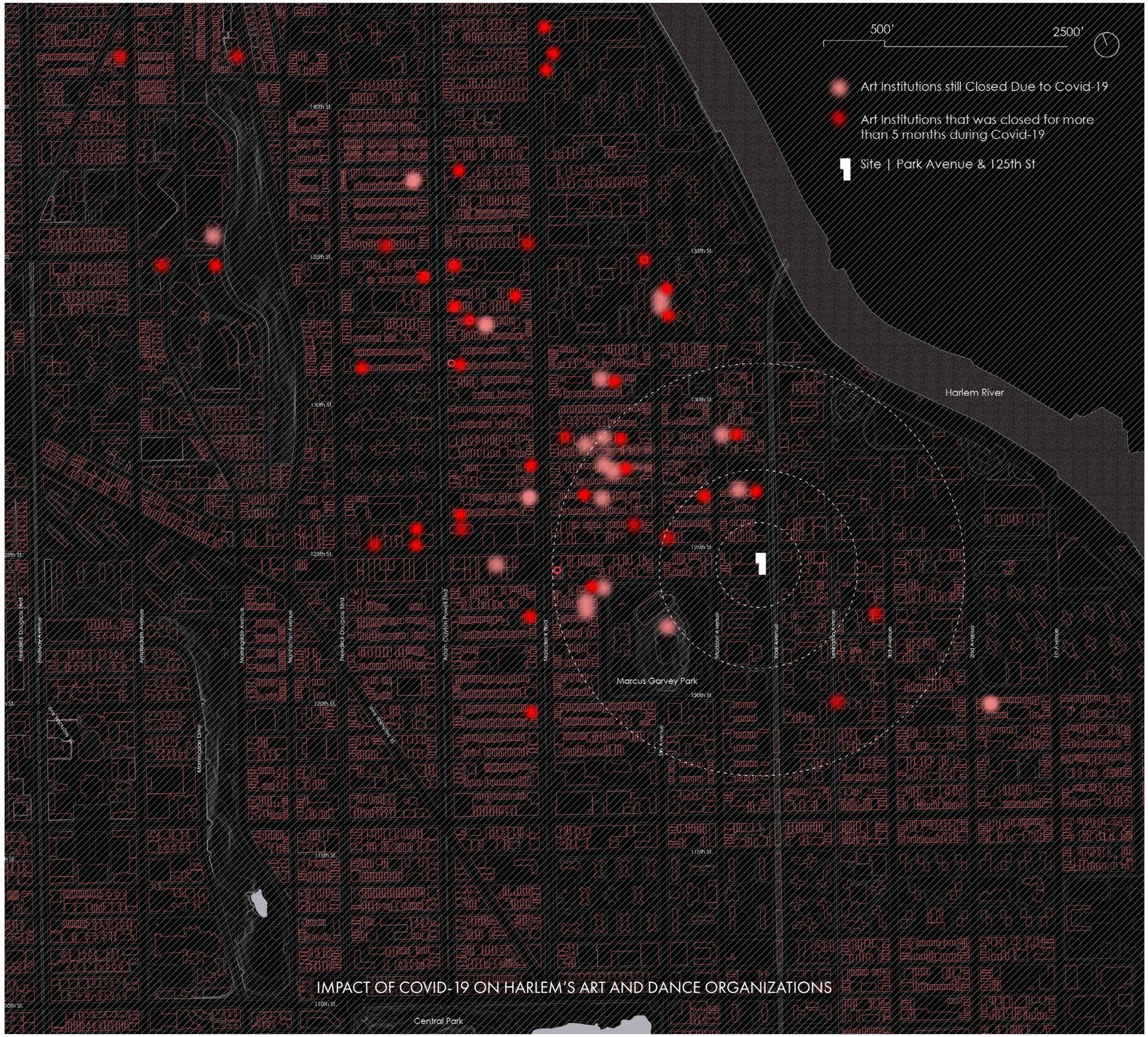




As defining Harlem's identity has become increasingly urgent as gentrification started to threaten to alter the historic and ethnic character of the 125th street corridor, performers started to take streets as medium to to protest it.

Dance in Harlem is a huge part of the culture. There are many well known, major dance companies like Alvin Ailey American Dance Theather from Harlem and the more informal and contemporary examples of dance that take place today in Harlem are seen in the forms of street parade and street festivals.

In March 2021, Dance NYC published a study on the impacts of Covid-19 and highlighted two important goals on how to cope with the negative impact. One objective was to find new areas of employment within the sector. The second objective was to make dance more accessible in public locations.



The pandemic had a big impact on the existing art and culture scene of Harlem. Since the beginning of Covid-19, a majority of the dance and performing centers in Harlem closed since they didn't have any outdoor activity spaces.Many live venues were forced to shut down almost completely, cutting off their ability to bring in crucial revenues and income.

This project addresses these two objectives set by Dance NYC while also reusing waste textiles and fabrics.

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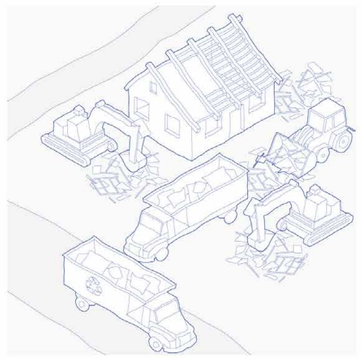
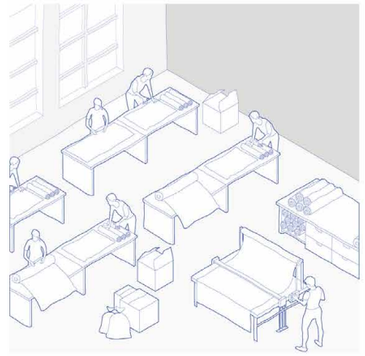
RECLAIMING WASTE FABRIC STRATEGY@ URBAN STAGE REUSE STUDIO



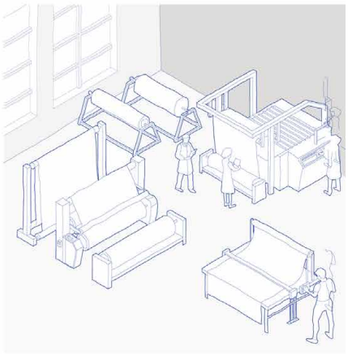
1. COLLECTION OF WASTE FABRIC

Waste fabric to be collected from demolition sites, businesses, organizations, or institutions.



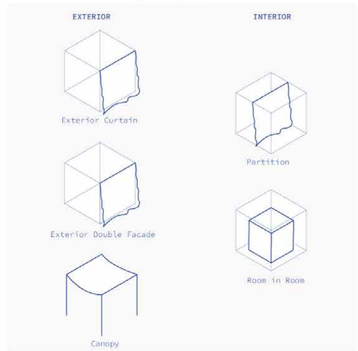
2. CONSOLIDATION + SORTING

LANDFIL UPCYCLING RECYLING



3. PROCESSING OF WASTE FABRIC

UPCYCLING



4.i SPACE DESIGN

Performance specific spaces are designed according to the manual by textile artists and interior designers.

UPCYCLING

4.ii COSTUME DESIGN

Costumes for performance arts are designed by textile artists and crafters in the studio.

DOWNCYCLING

4.iii SCRAP FAB SHOP

Scrap Fabric is sold in the shop + online store

"Urban Stage" provides a system that collects waste fabric from demolition sites, businesses, organizations, and institutions. Examples of this collected waste fabric include garment and roofing membranes such as aluminum vapor barriers, tensile roofing systems, ETFE systems or PVC coated net.

The focus on reusing textiles in Urban Stage also benefits craftsmen such as fabric experts, fashion designers as well as interior designers by providing them employment opportunities through the fabric reuse studio. As it can be seen in the 4.i diagram, the fabric here is used as exterior curtain, canopy, exterior double facade, partition and room in a room.

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Instead of purchasing the performance costumes from fast-fashion brands, textile artists in Urban Stage uses upcycled fabric pieces to come up with unique costumes.

The apparel industry accounts for 10% of global carbon emissions. In most of the countries in which garments are produced, untreated toxic wastewaters from textile factories are dumped directly into the rivers. Another major source of water contamination is the use of fertilizers for cotton production, which heavily pollutes runoff waters and evaporation waters.

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In-house Textile Reuse Studio at “Urban Stage” processes the fabric to be used for the space and costume design and the downcycled/waste fabric is sold at the Shop. The goal here is to take advantage of each fabric material’s unique characteristics and assemble them to an architectural or costume scale.

View of the textile studio with the dance stage in the background

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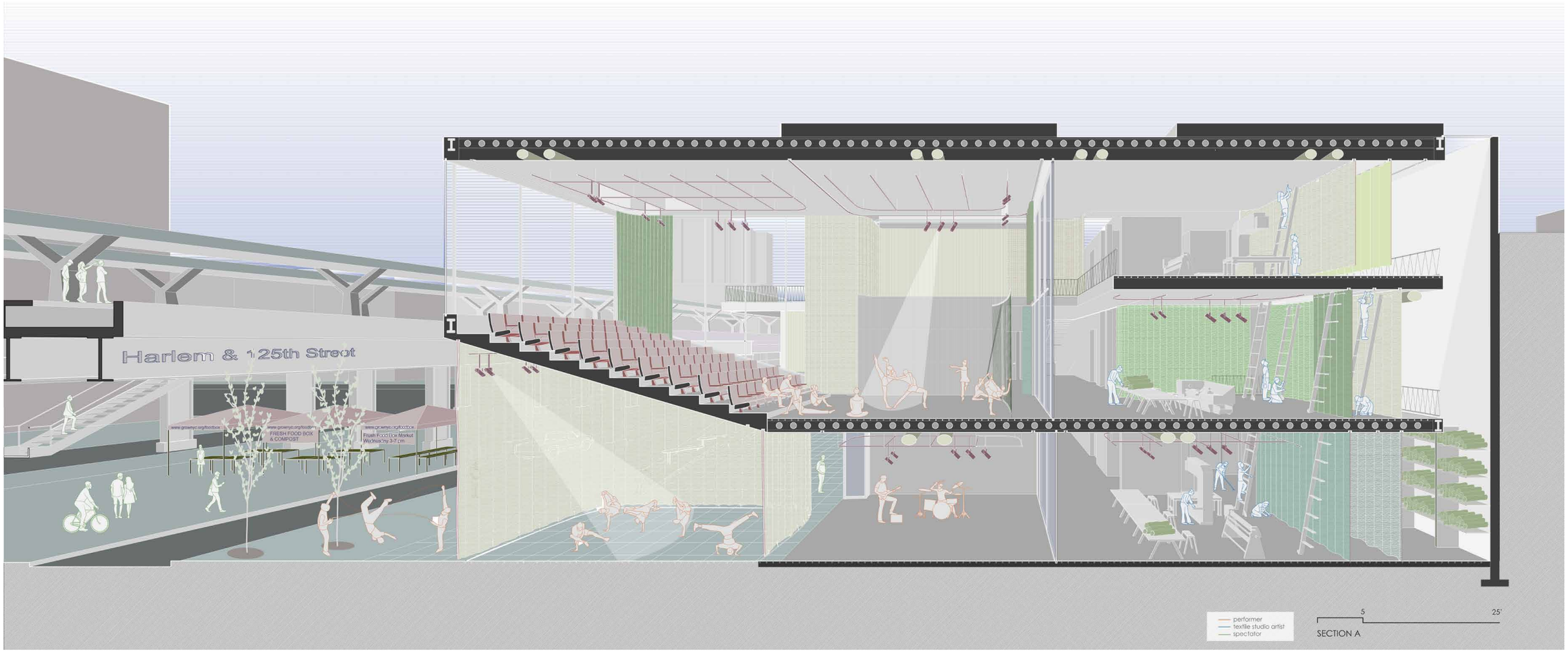
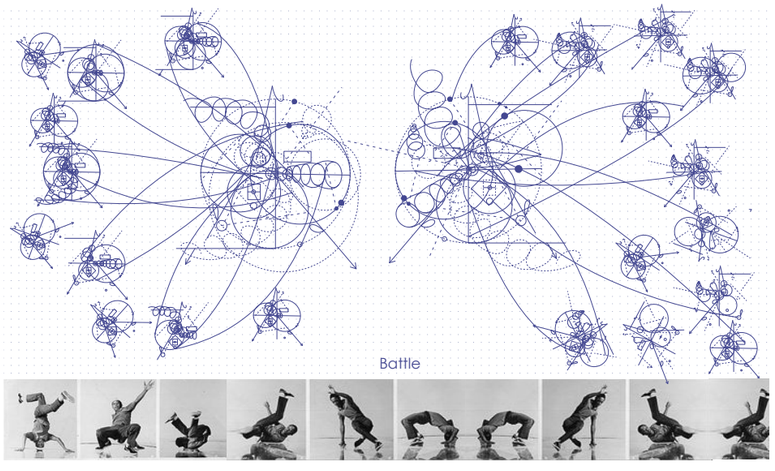
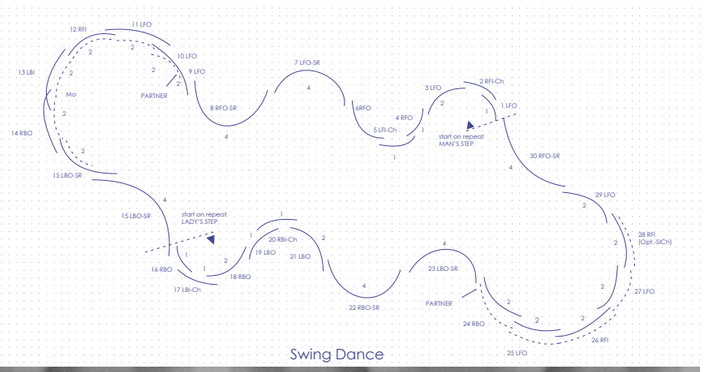
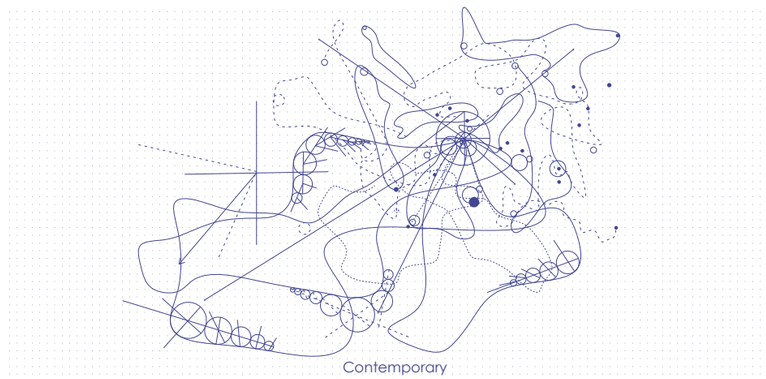




Battle



Swing Dance



Contemporary

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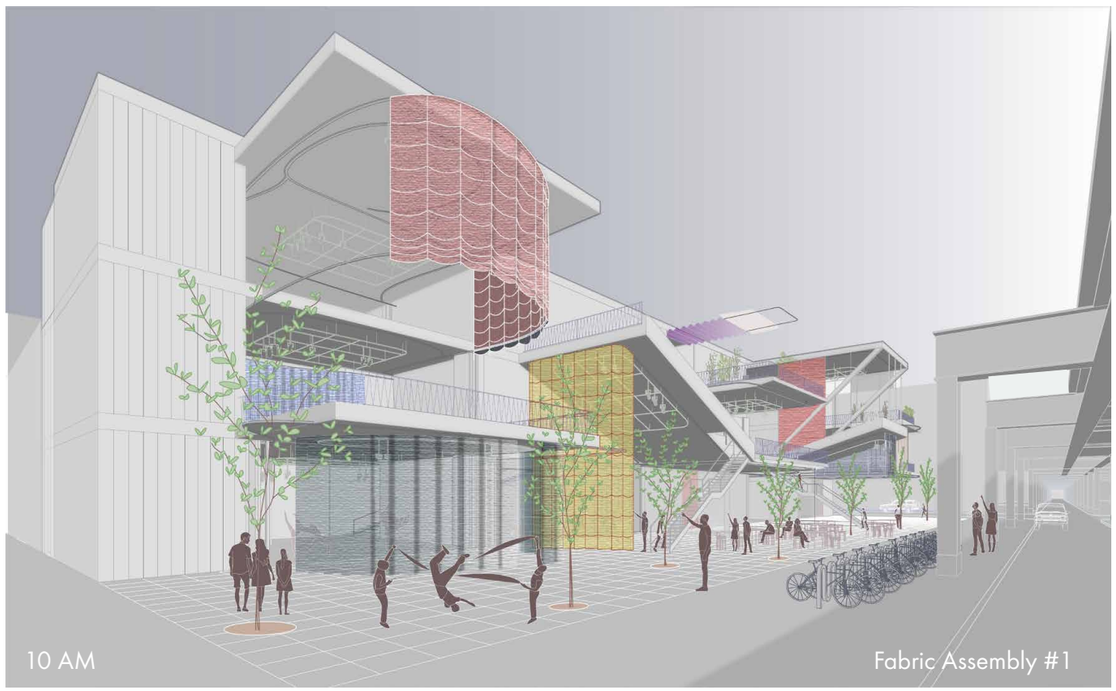

After looking at the choreography of some dances such as hip hop, contemporary, battle and swing dance, it became clear that every dance genre needed a different type of space. The curtain allows the performance studios to be organized relative to not a particular geometry of a specific dance but according to general parameters, as one performance might need a lot of space and arrangements but others could be more tight and precise.

This proposal challenges the idea of creating wide performance art spaces that can be transformed in a short period of time by using minimal physical effort. I explored how material could divide, reveal and create space for dancers.

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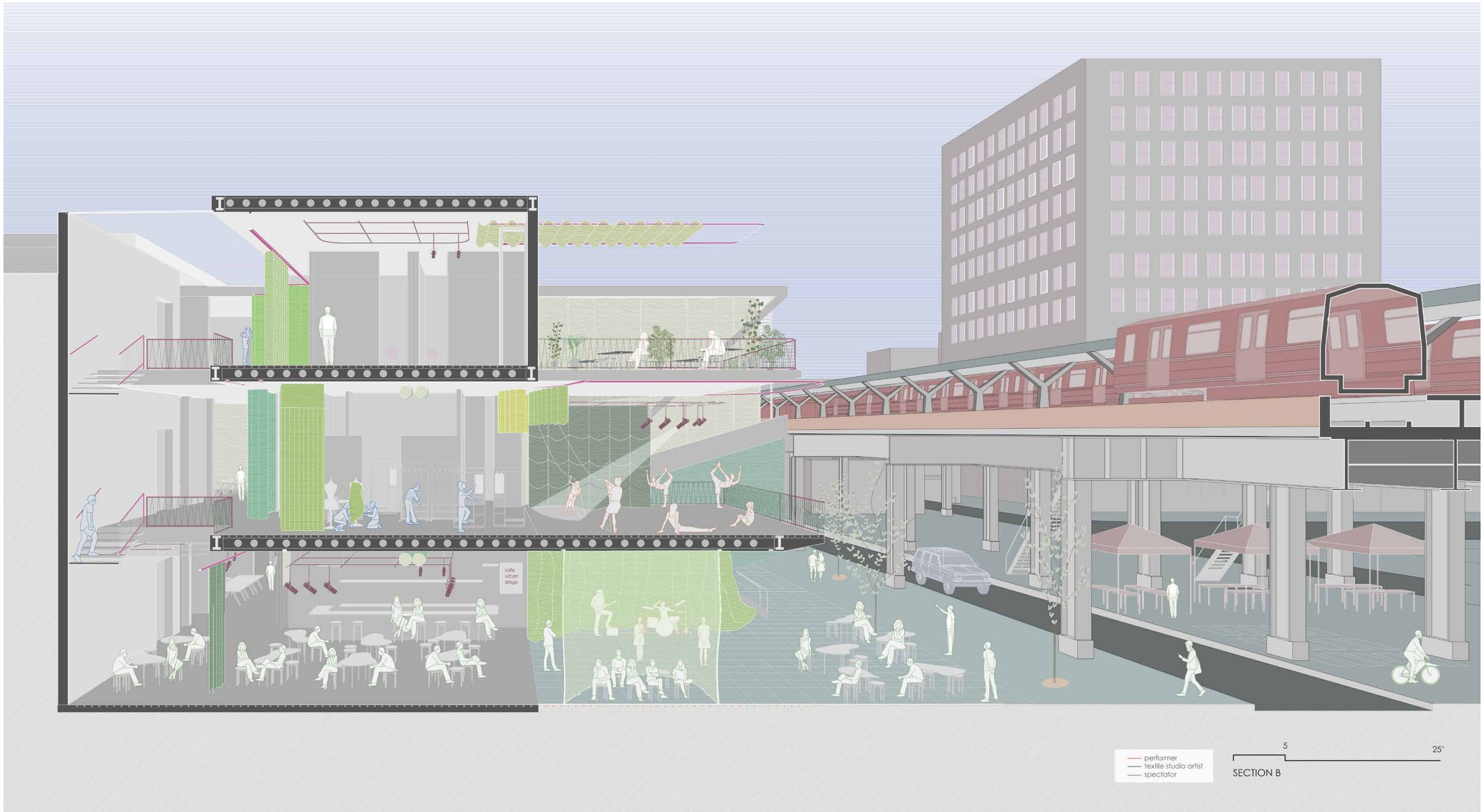

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Until the summer of 2015, the plaza underneath the Metro-North viaduct at East 125th Street and Park Avenue was known with a reputation among area residents for trash and drug use. Since the summer of 2015, Uptown Grand Central transformed the space underneath the metro-north station into an active community space to transform the East 125th Street into a thriving corridor.

Since then the space below the train platform hosts programs that include live music concerts, exercise classes, a year-round farmers market, and a “pop-up” small business snack shop.

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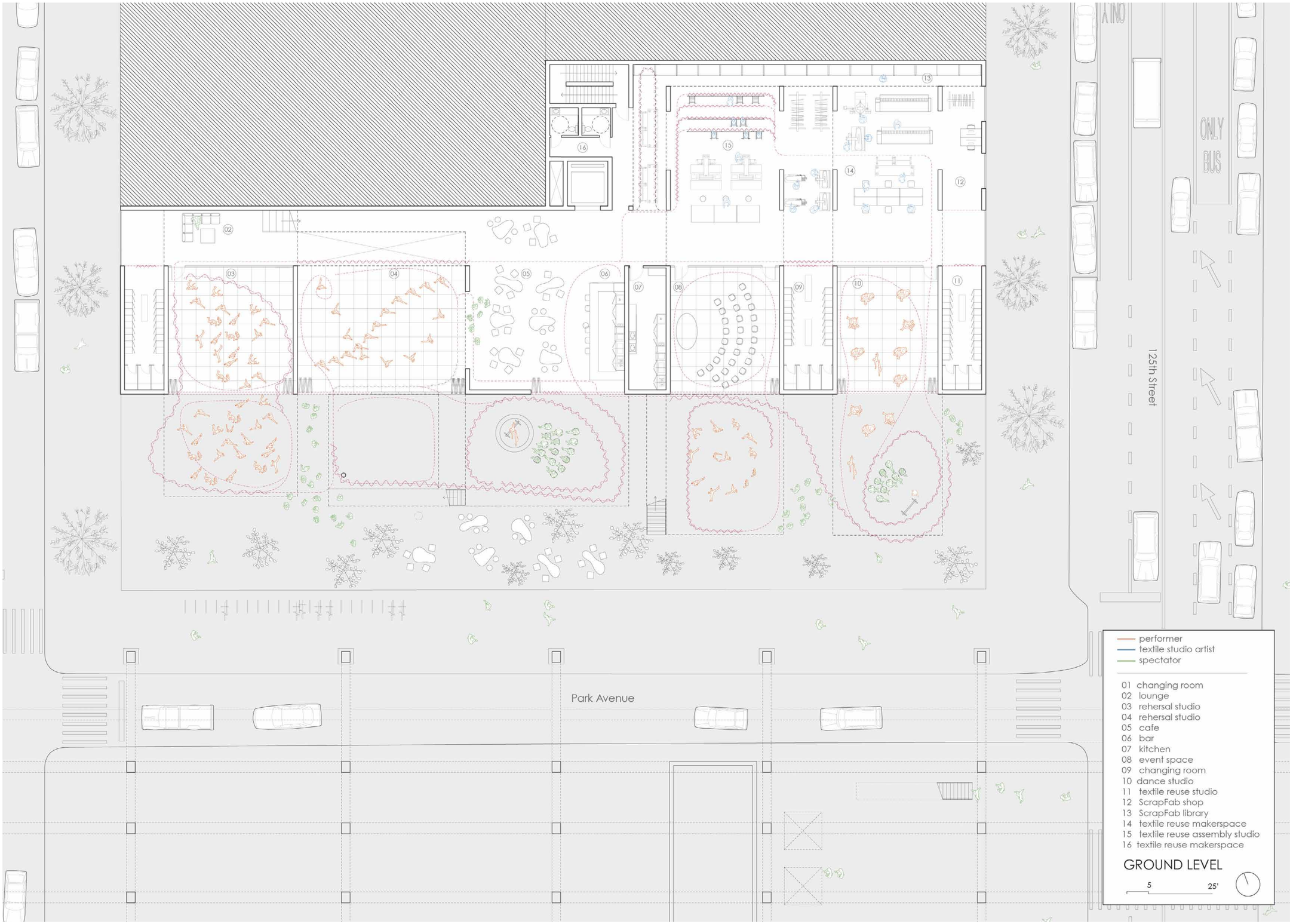

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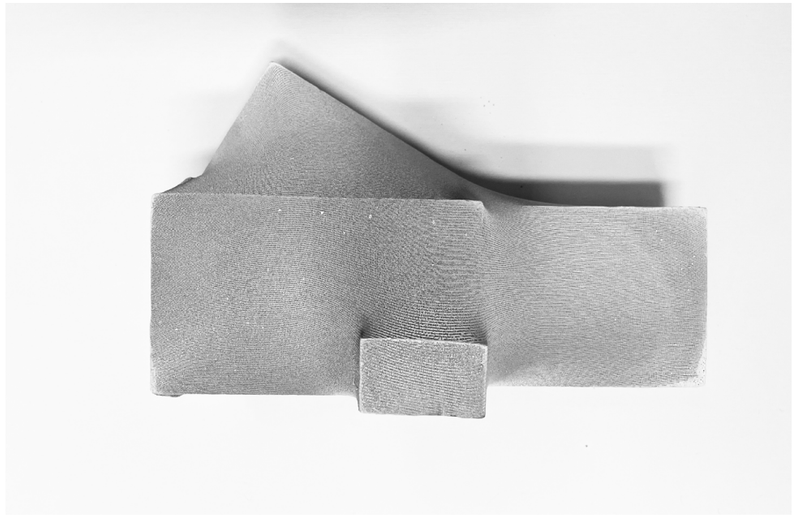

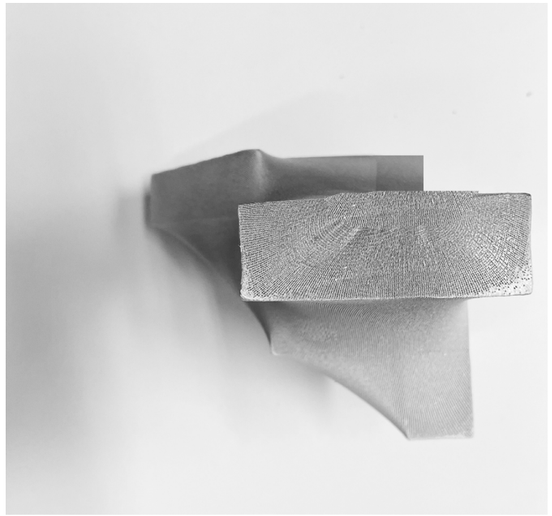

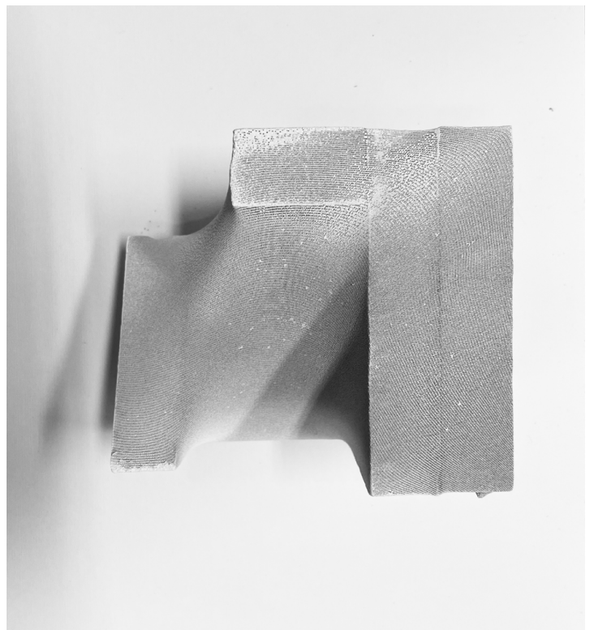

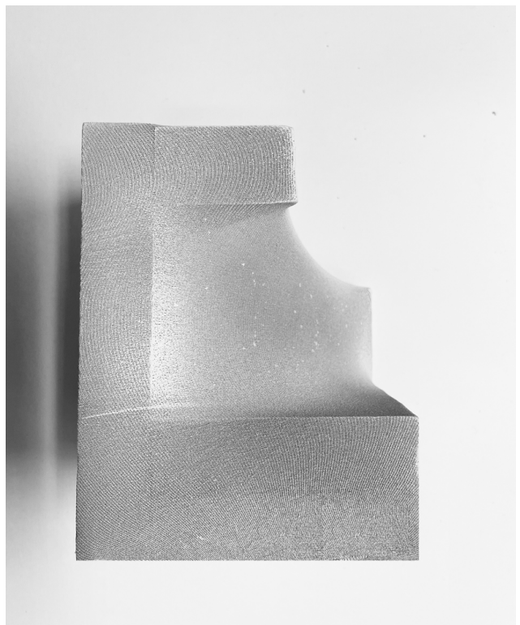

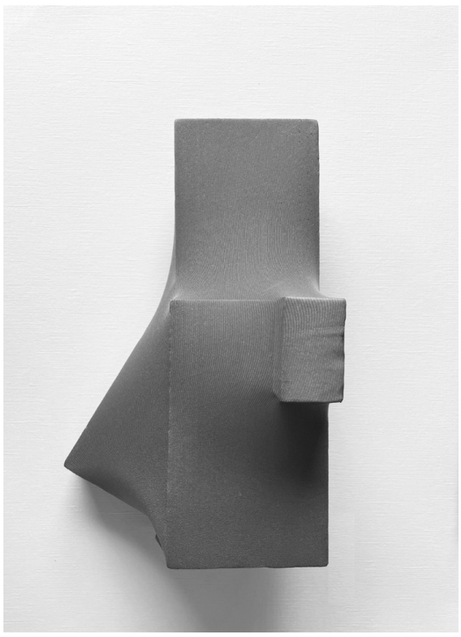

Early study to test the flexibility of the waste fabric materials

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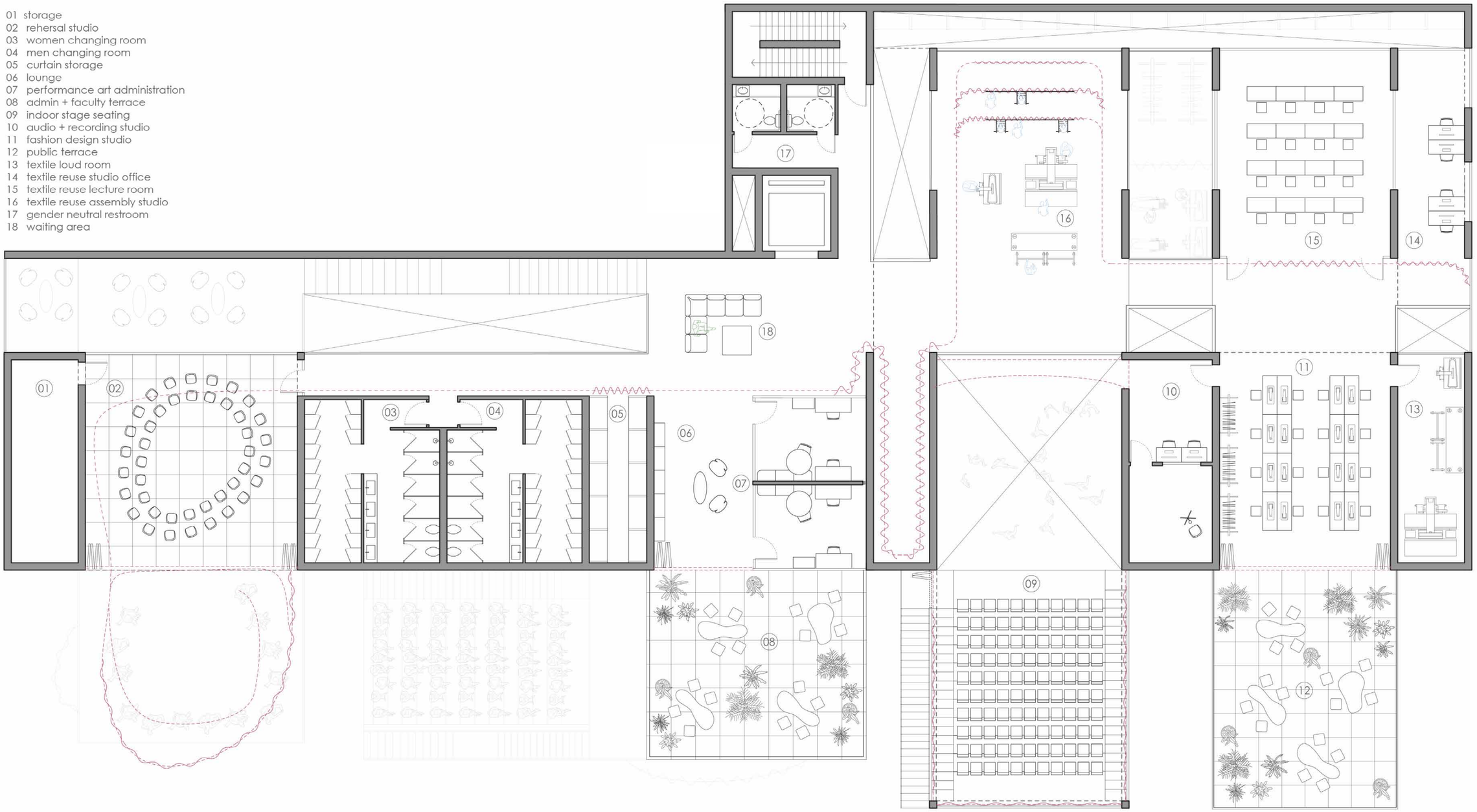
THIRD LEVEL

performer
textile studio artist
spectator

01 storage
02 rehersal studio
03 women changing room
04 men changing room
05 curtain storage
06 lounge
07 performance art administration
08 admin + faculty terrace
09 indoor stage seating
10 audio + recording studio
11 fashion design studio
12 public terrace
13 textile loud room
14 textile reuse studio office
15 textile reuse lecture room
16 textile reuse assembly studio
17 gender neutral restroom
18 waiting area



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The flow of the curtain around the building aims to blur the boundary between inside and outside to create transformable performance spaces. To create a continuous transition between spaces, curtain tracks are installed to fully blend in flush with the ceiling.

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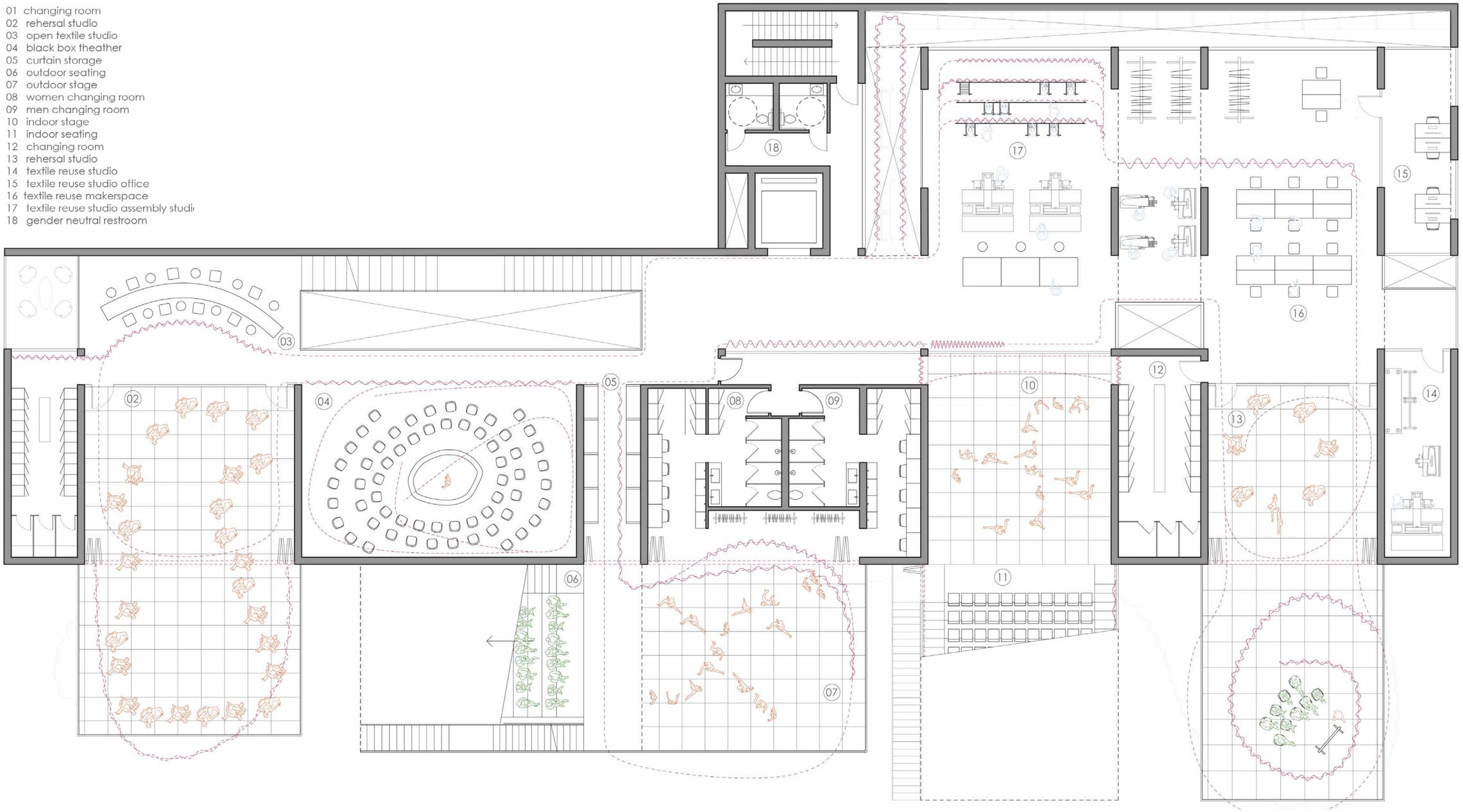
SECOND LEVEL

performer
textile studio artist
spectator

01 changing room
02 rehersal studio
03 open textile studio
04 black box theather
05 curtain storage
06 outdoor seating
07 outdoor stage
08 women changing room
09 men changing room
10 indoor stage
11 indoor seating
12 changing room
13 rehersal studio
14 textile reuse studio
15 textile reuse studio office
16 textile reuse makerspace
17 textile reuse studio assembly studi
18 gender neutral restroom



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Data + Ethics Think Tank

Advanced VI Studio, Columbia University | Spring 2022
Critic: Galia Solomonoff
Site: Los Angeles, CA

Data + Ethics is a think tank focused on effective use, outreach and development of scientific and digital technologies for ethical, transparent and sustainable data and information processes. Located at eastern portion of the Santa Monica Mountains, Data + Ethics features meeting and work spaces for 40 scholars in residence, 15 visiting scholars, an auditorium for lectures and events, a library, dining and catering areas. Providing collaborative spaces for data engineers, designers, sociologists, computer engineers and policy makers, Data + Ethics focuses on digital ethics, information tracking, media and communication technologies. Data center spaces continuously flow at the site along with landscape, water component and circulation path.

We investigated the physical necessities around data systems and the digital world, water also was the key critical component enabling these systems to function. Our research revealed that the typical data center uses an astounding 3-5 million gallons of water per day to cool a data center which is equivalent to the amount of water a city of 30,000-50,000 people would need in a day. We sought to both develop a system which recycled this water, and display the concealed but extreme use of water to maintain global technological systems, by surfacing the water used to cool the data center at various points in our site.

Data Visualization Exhibition Space

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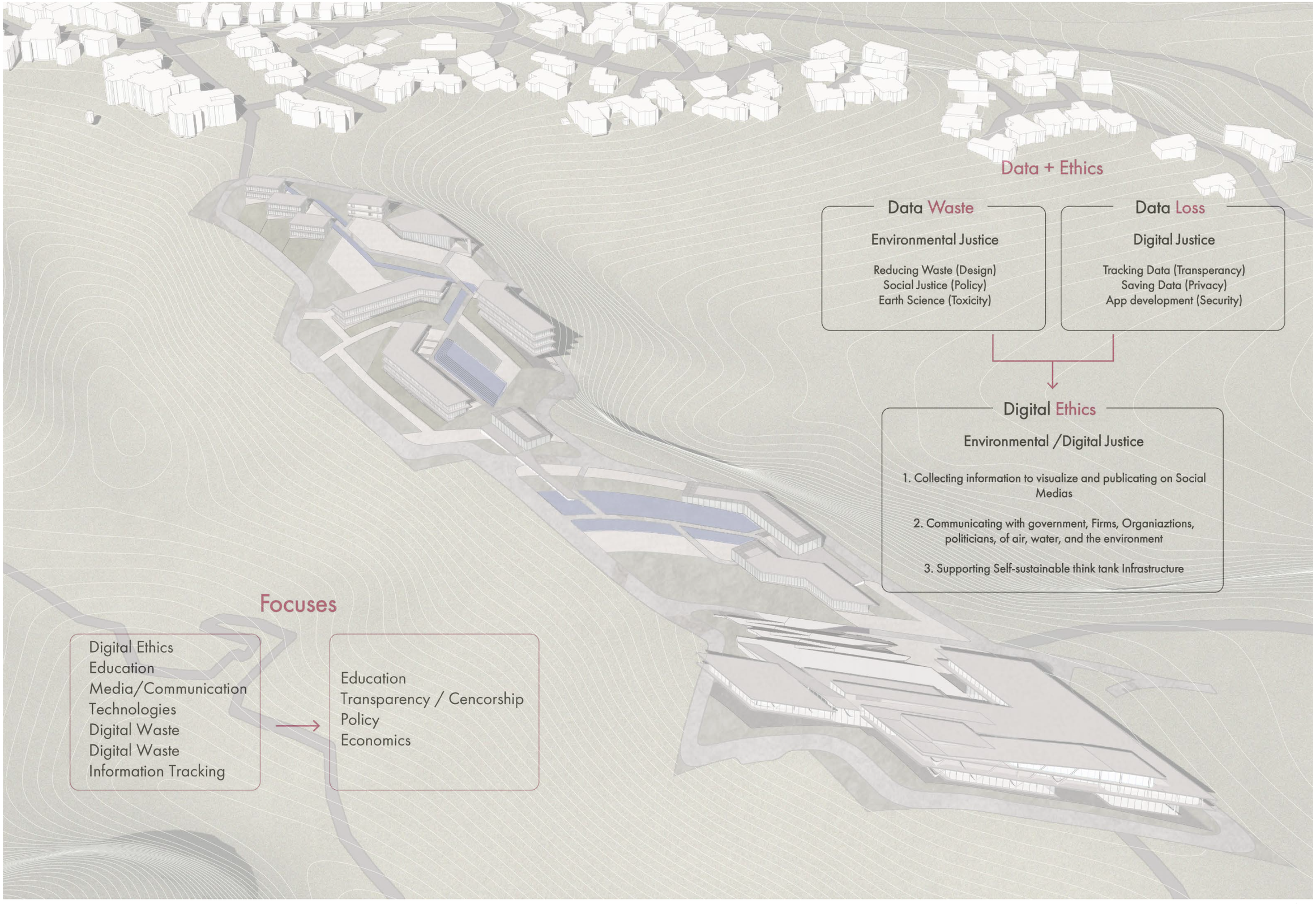

Masterplan

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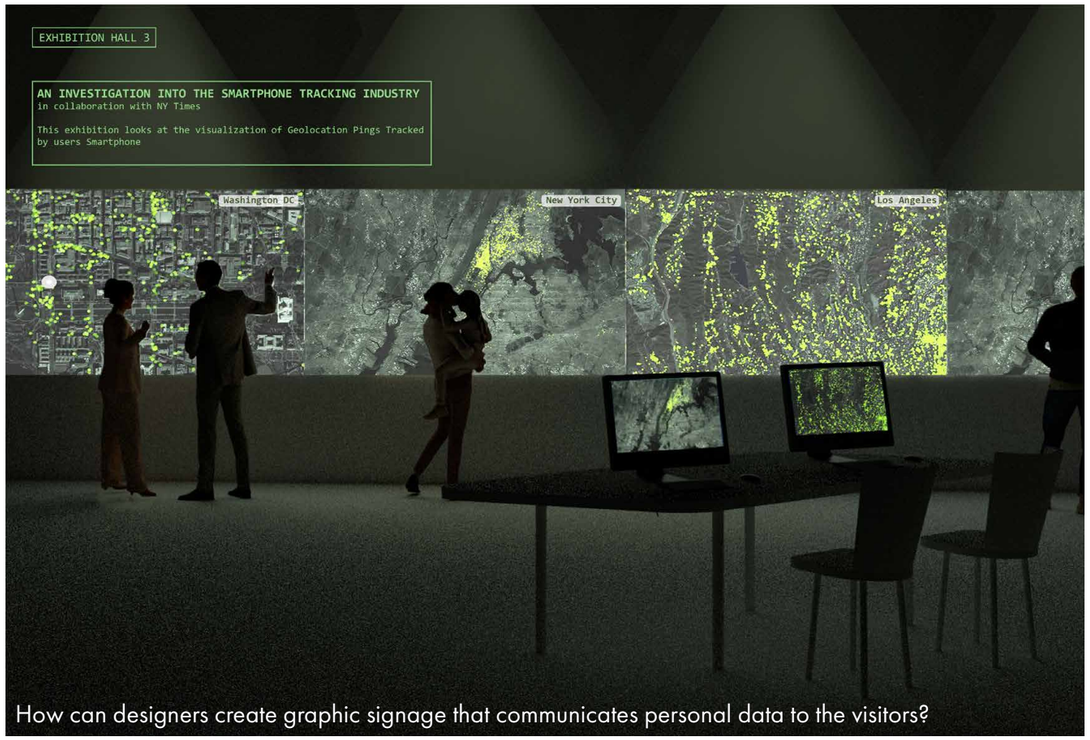

Data Visualization Exhibition Space

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Entrance of the Main Institute

Masterplan

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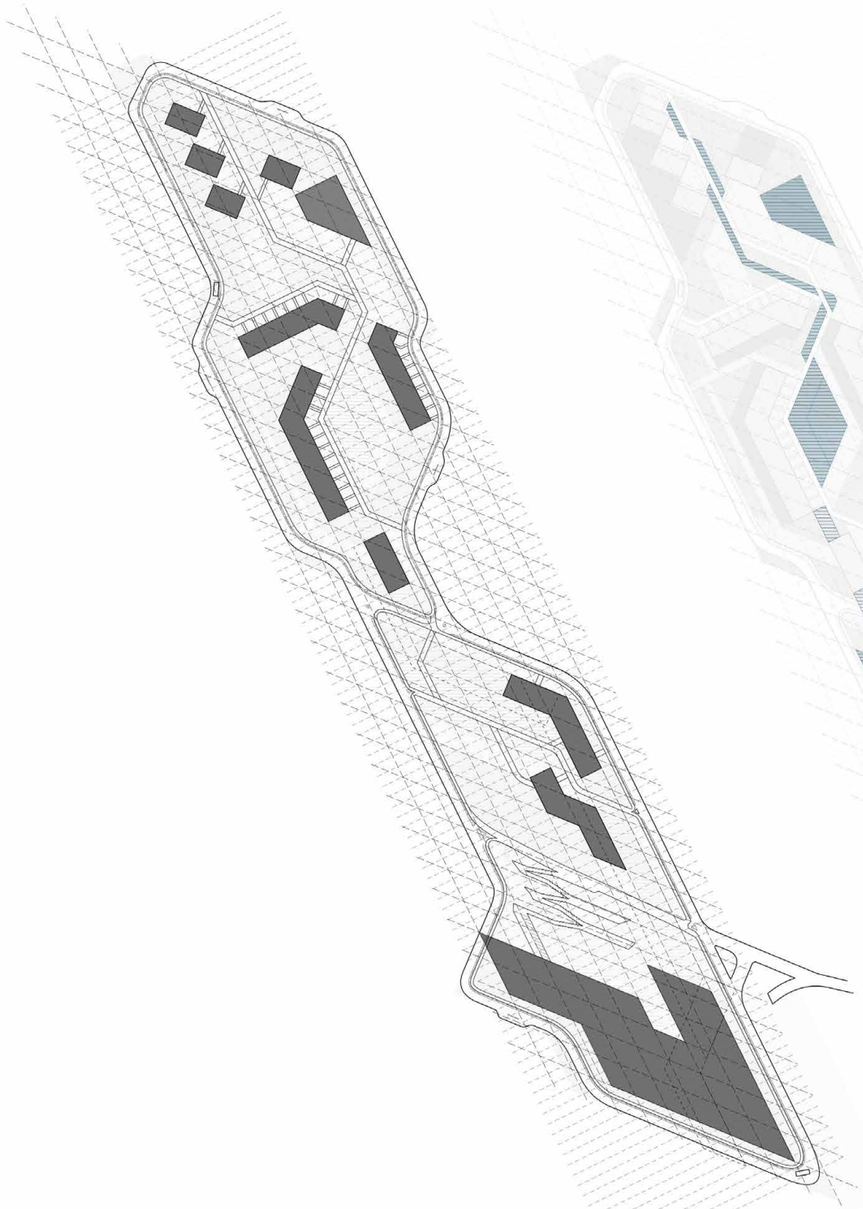
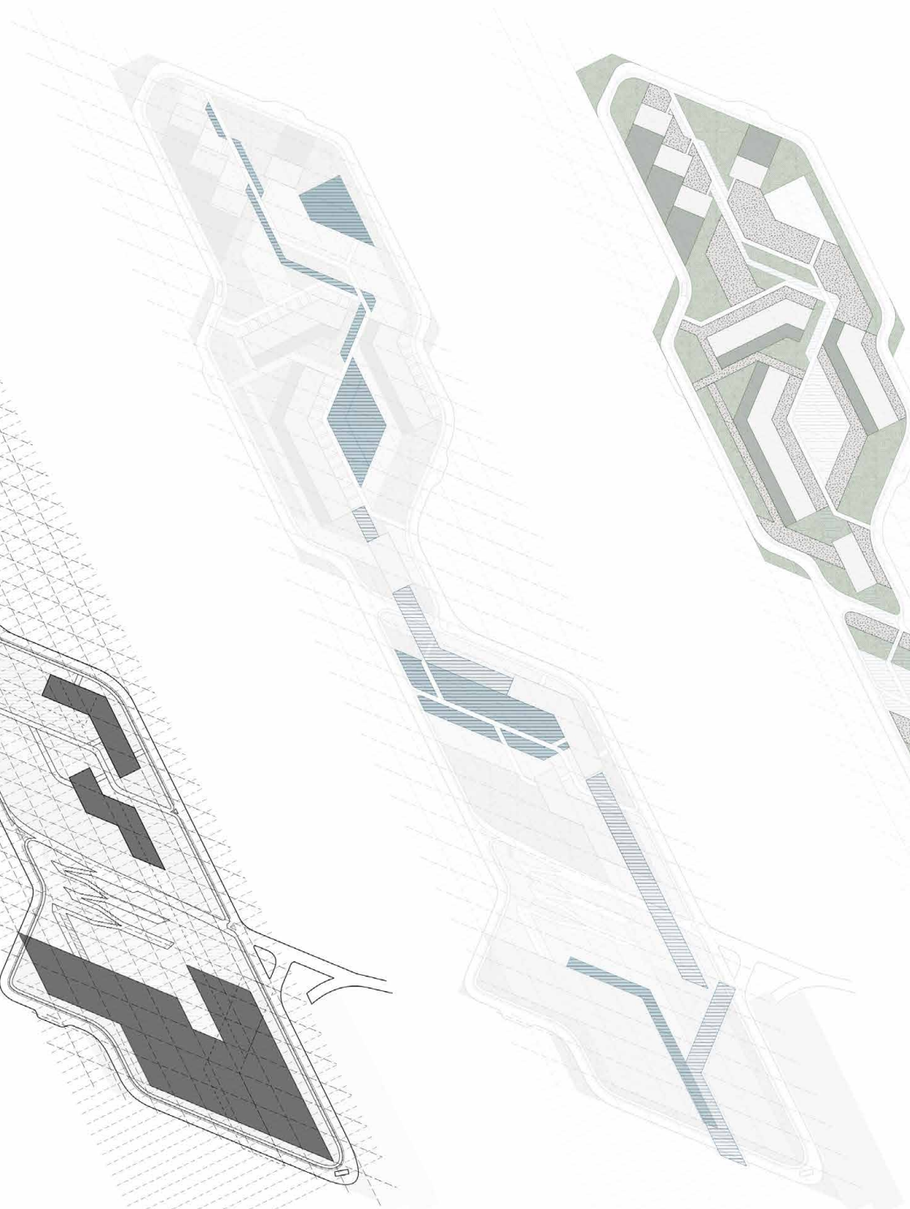
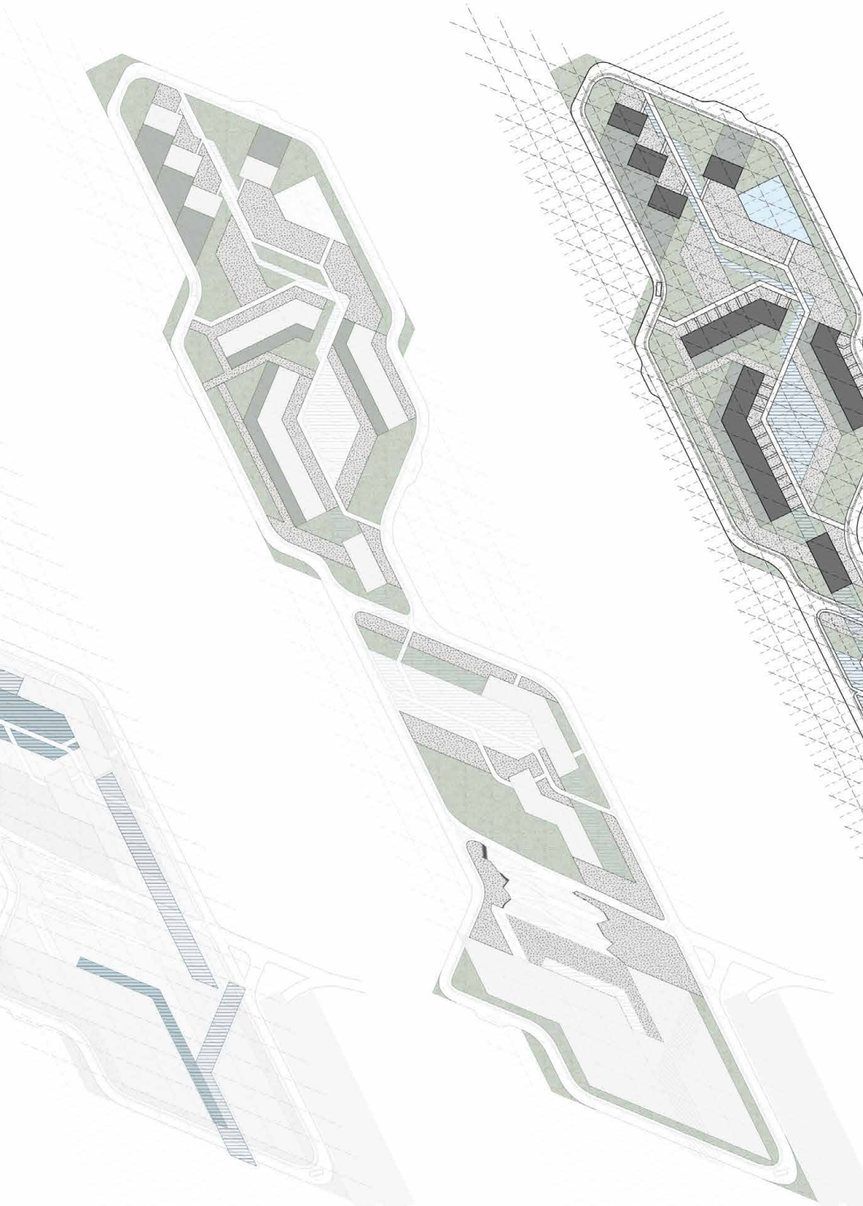
Massing + Circulation



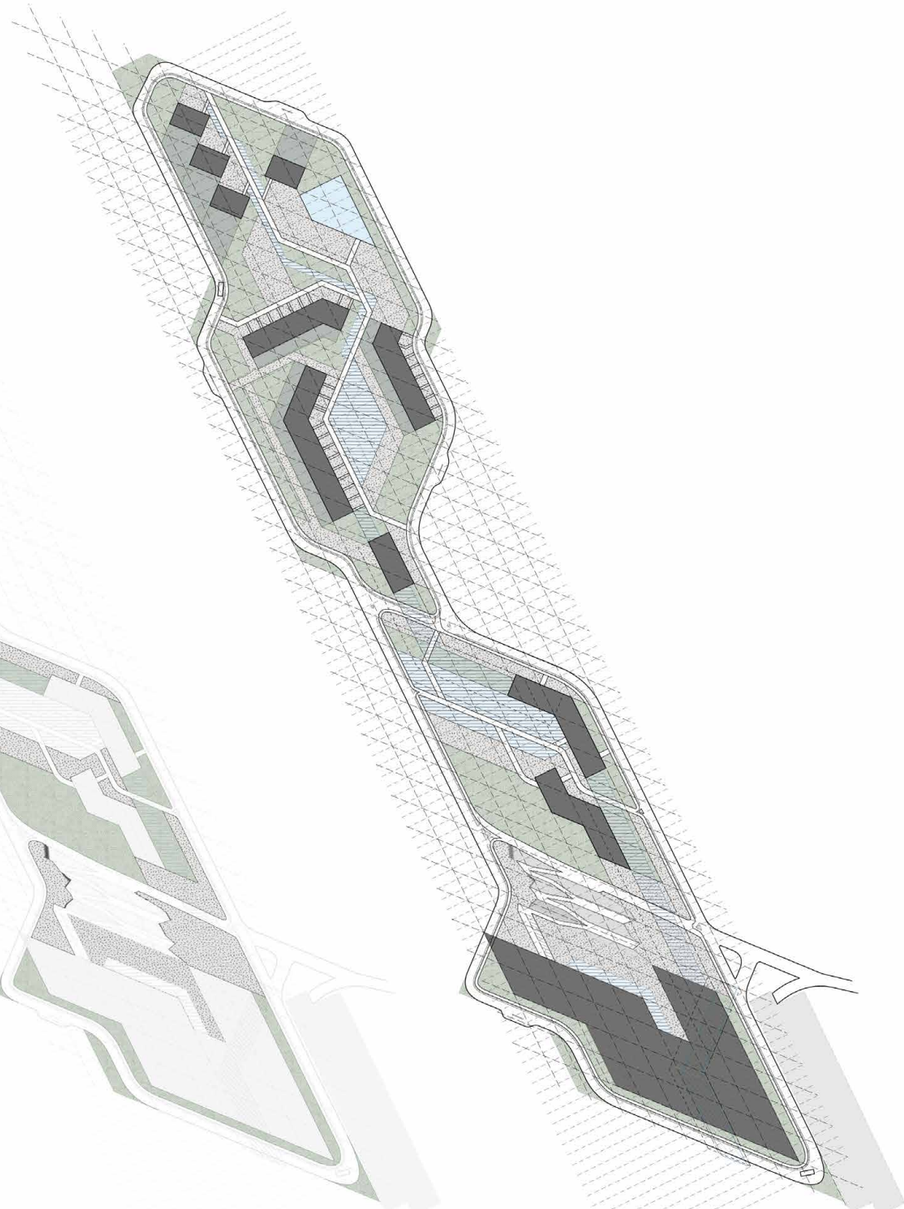
Water



Landscape



Masterplan



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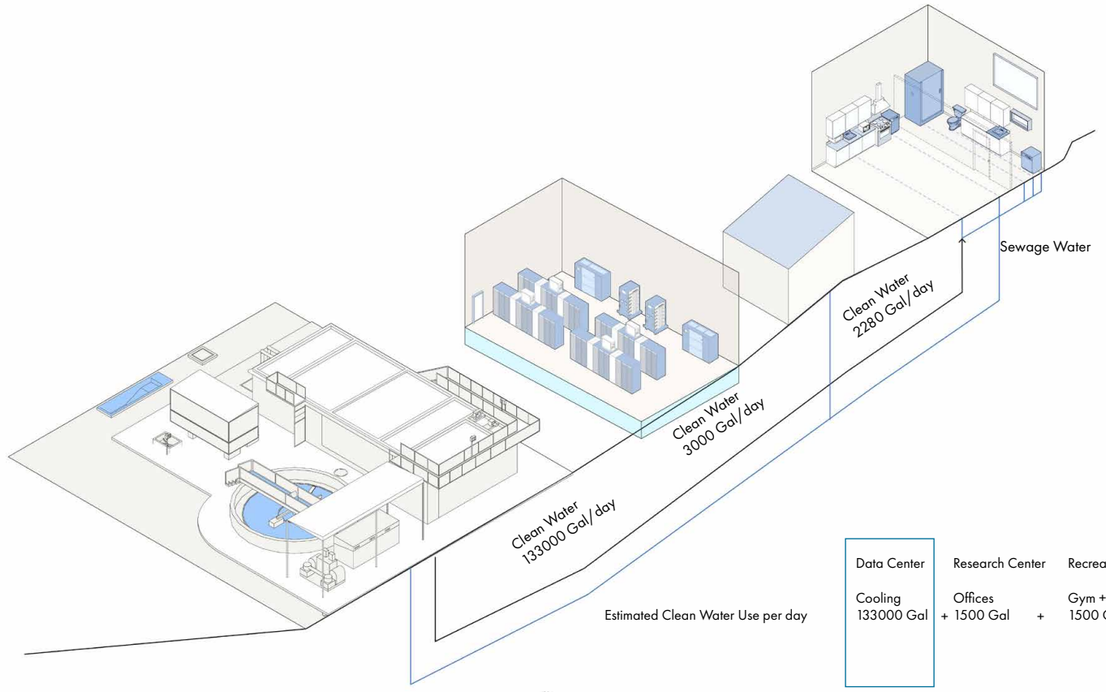
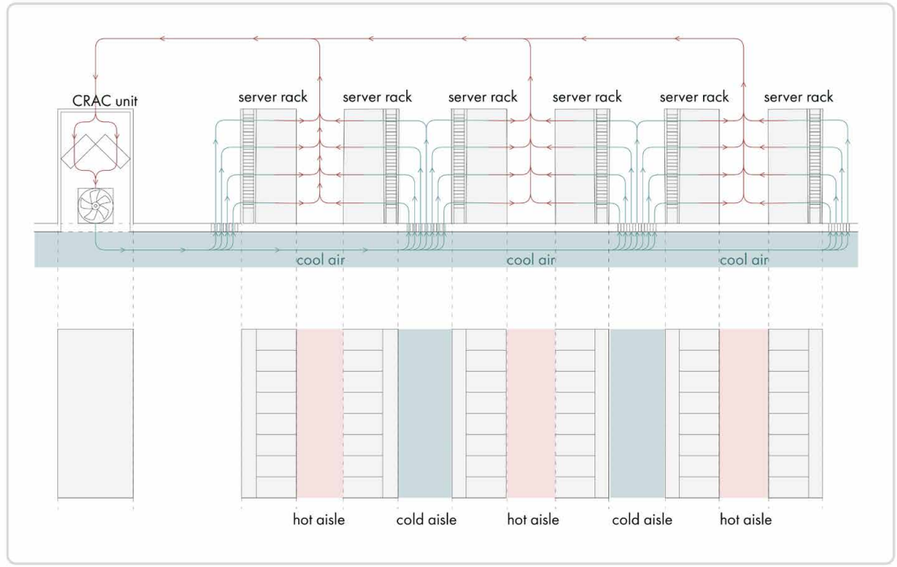
Data Visualization Offices + Public Path

Data + Ethics Think Tank in LA



	Data Center		Research Center		Recreation		Residential
Estimated Clean Water Use per day	Cooling 133000 Gal	+	Offices 1500 Gal	+	Gym + Cafe 1500 Gal	+	40 ppl occupancy 2280 Gal

Columbia GSAPP



Cooling Diagram of a Data Center

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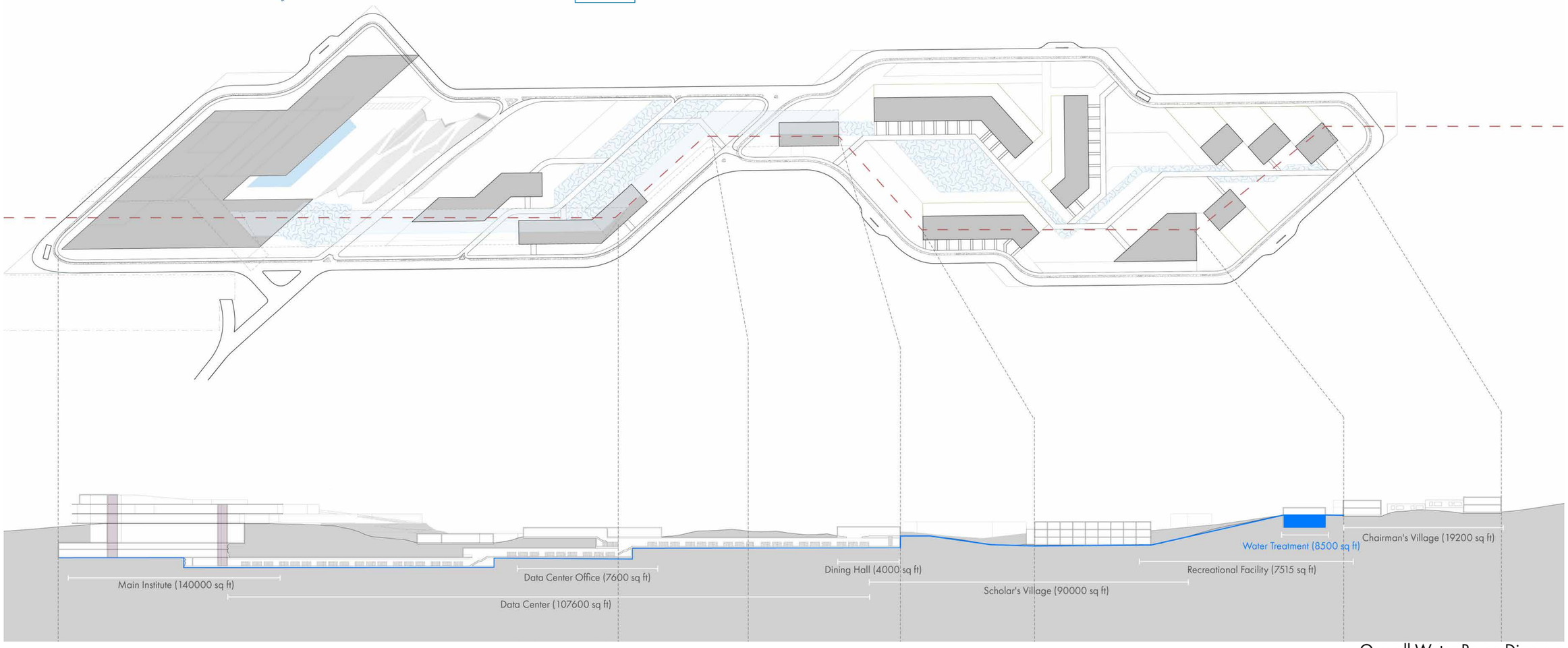

Overall Water Reuse Diagram

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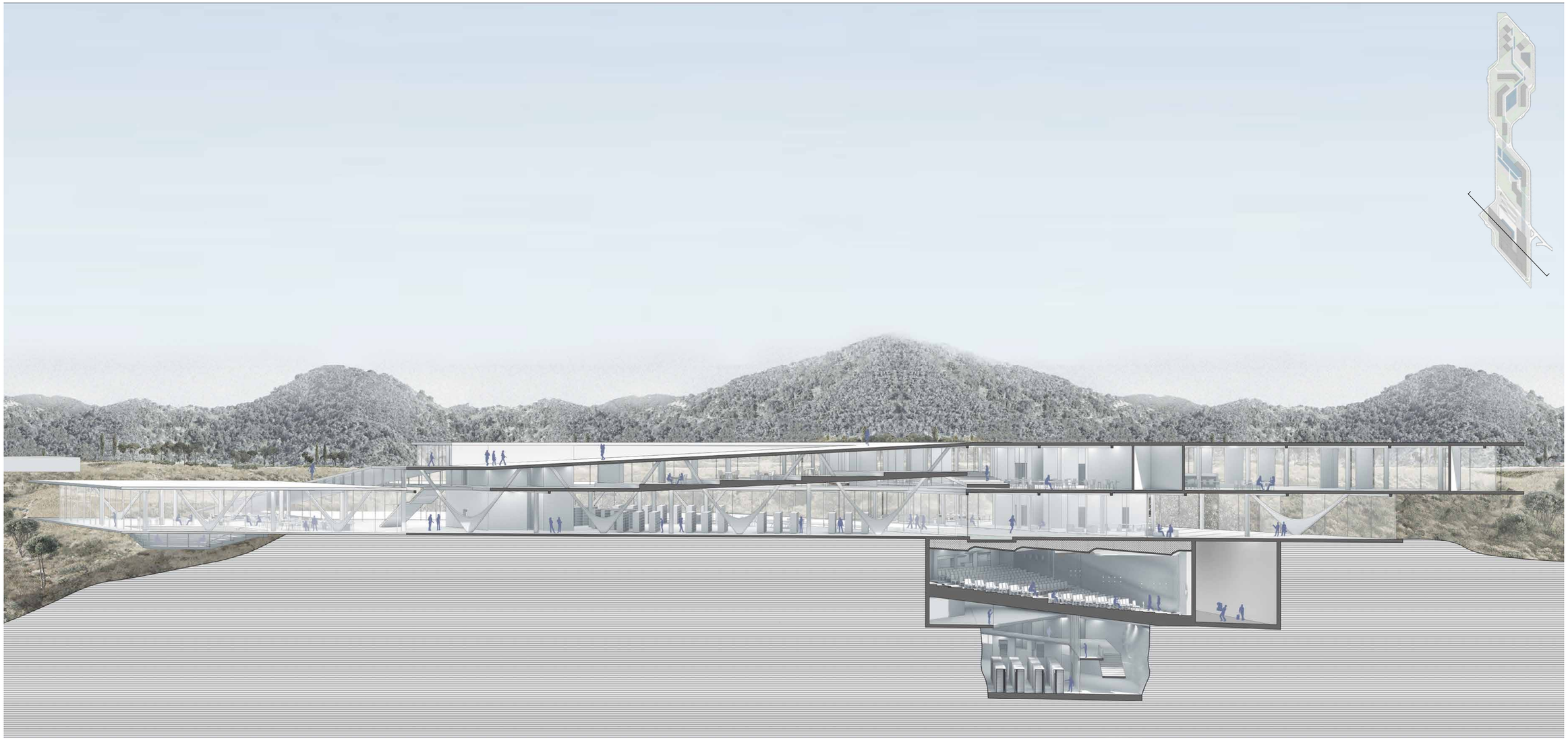
Data + Ethics Think Tank in LA

Columbia GSAPP



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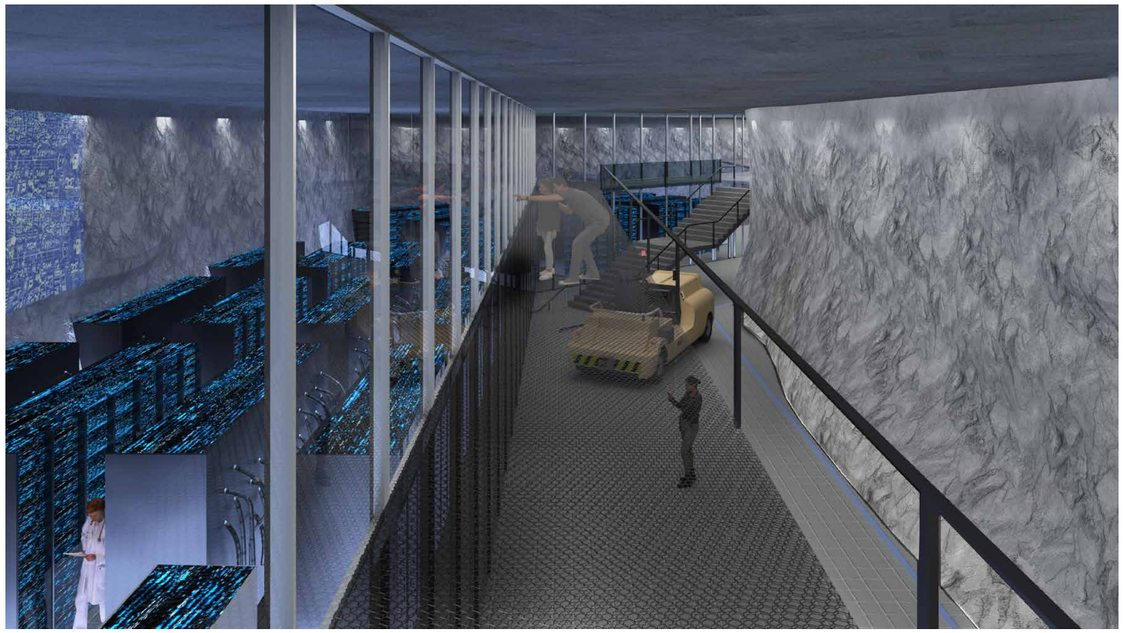
Think Tank Main Institute Section

Furkan Emrah Turanli

Data + Ethics Think Tank in LA

Columbia GSAPP

Cafe with the Data Center in the background



Data Center

How can designers create graphic signage that communicates personal data to the visitors?

Public Library and Data Visualization Lab

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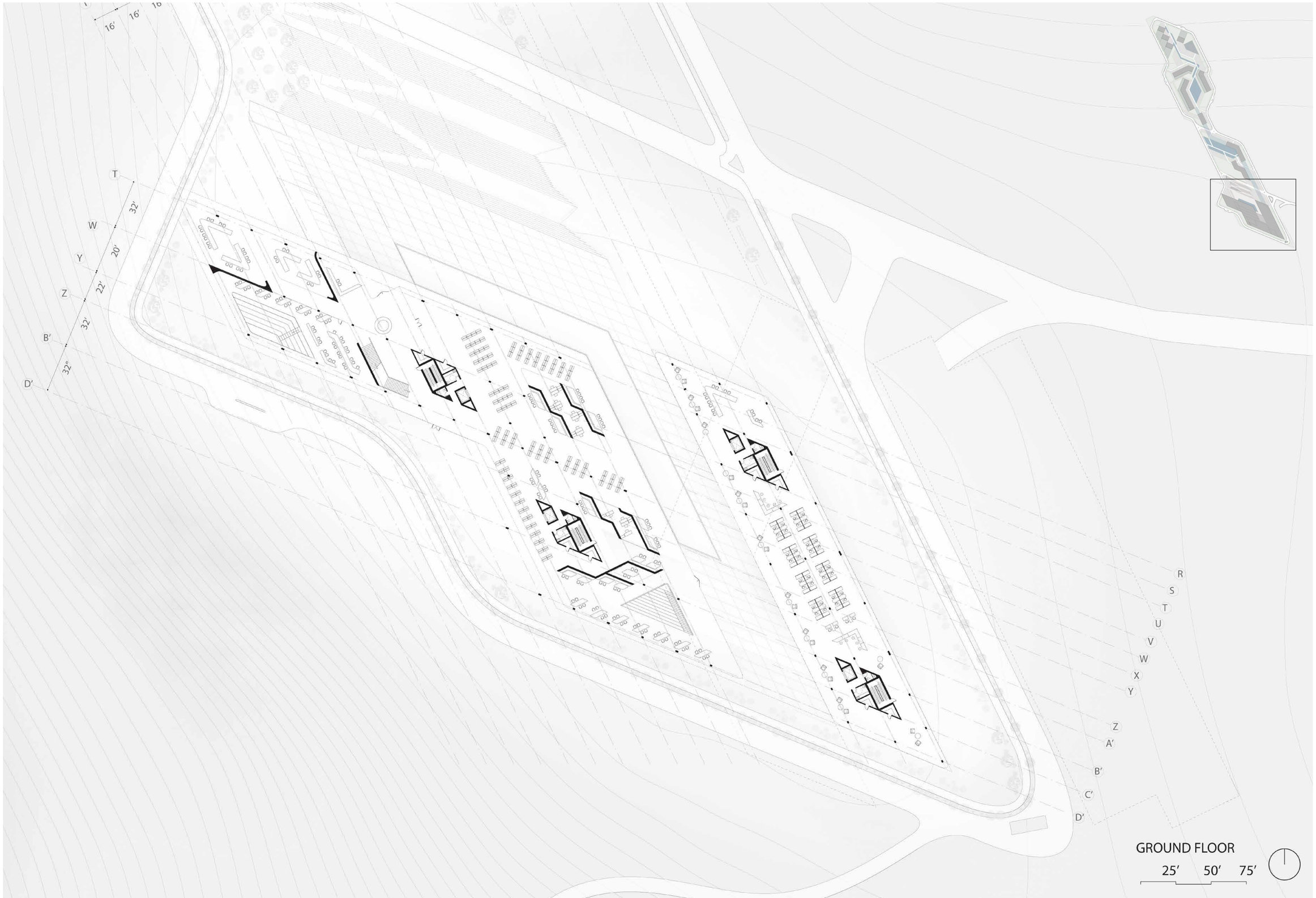

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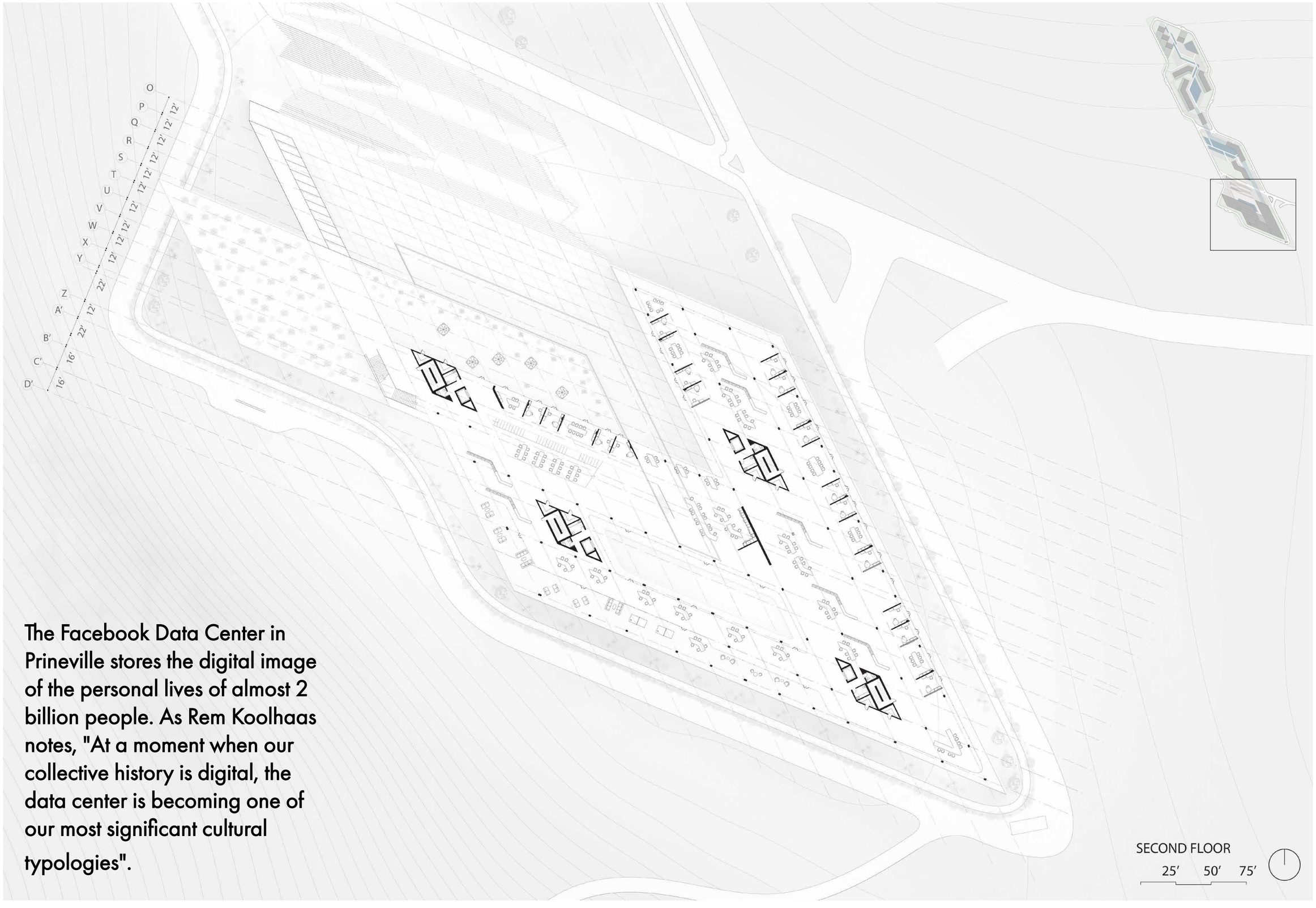

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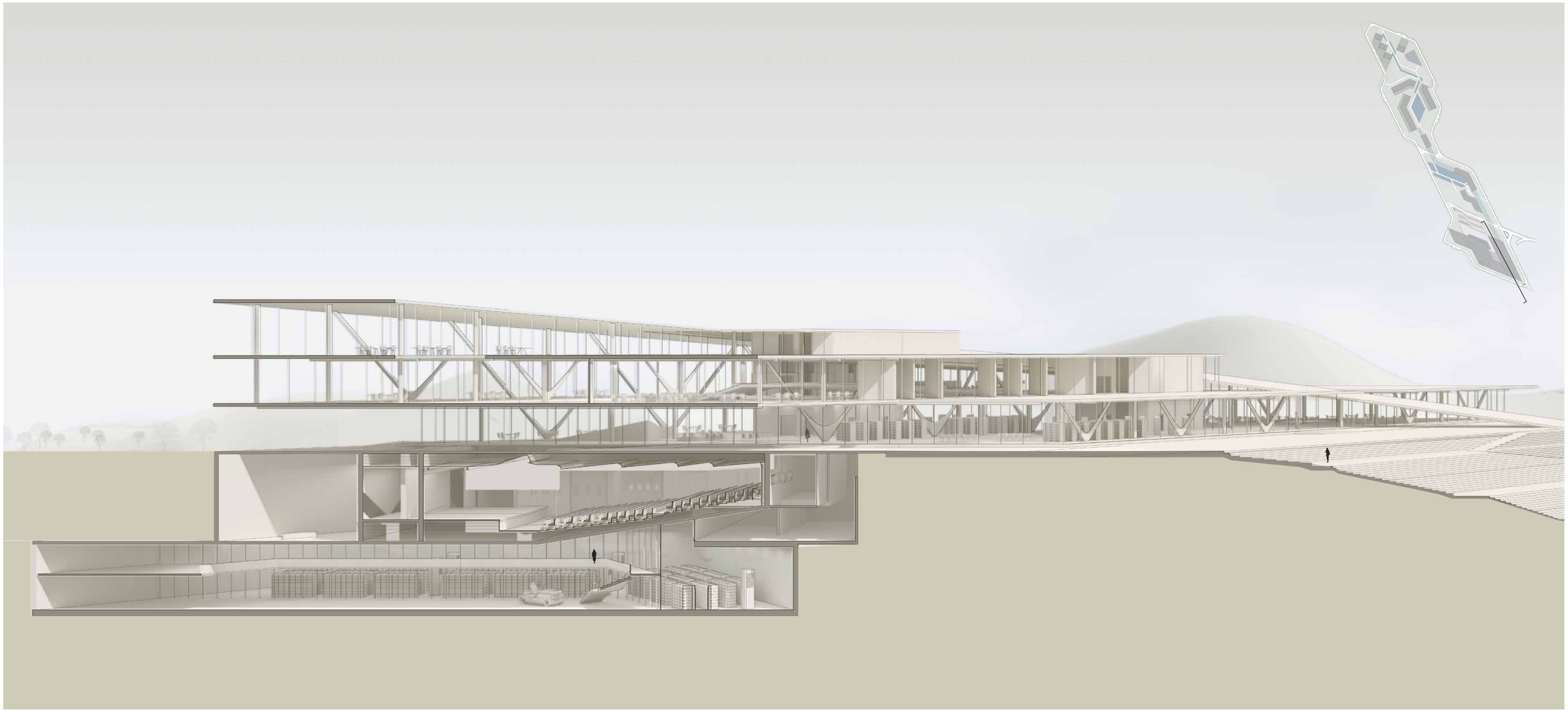
The Facebook Data Center in Prineville stores the digital image of the personal lives of almost 2 billion people. As Rem Koolhaas notes, "At a moment when our collective history is digital, the data center is becoming one of our most significant cultural typologies".

Irmak Turan



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Think Tank Main Institute Section

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View from the Entrance of the Main Institute

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Located at eastern portion of the Santa Monica Mountains, Data + Ethics Think Tank includes 3 residential buildings which has 40 units for scholars and their family. There are 2 different type of dublex units and every unit has a private yard as well as terrace spaces. The rotation of the buildings aim to face the Atlantic Ocean and the Santa Monica Mountains. A plaza has been created in the center of the residential buildings to bring the think tank commnity together. The water features becomes a prominent feature of the plaza and it can be used throughout the year.

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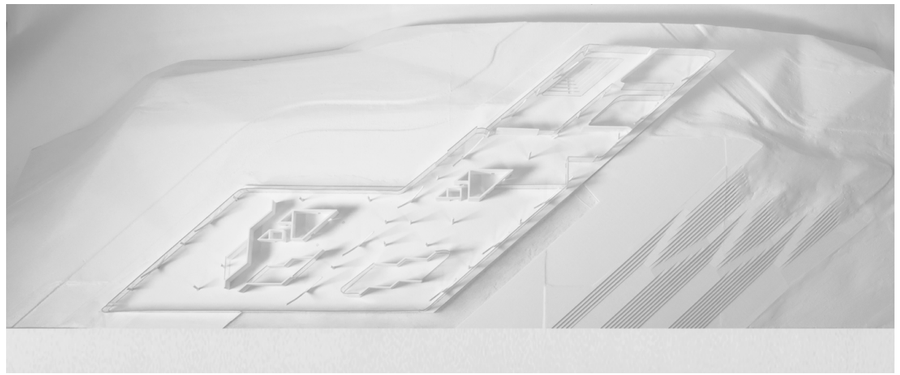
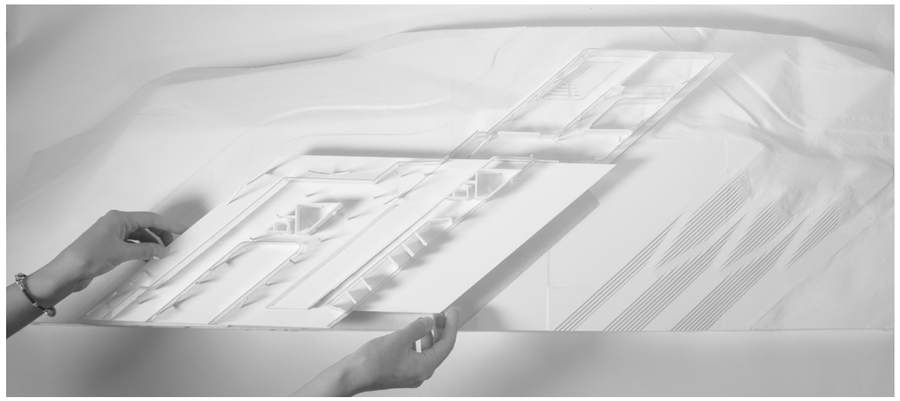
Data + Ethics Think Tank in LA

Columbia GSAPP



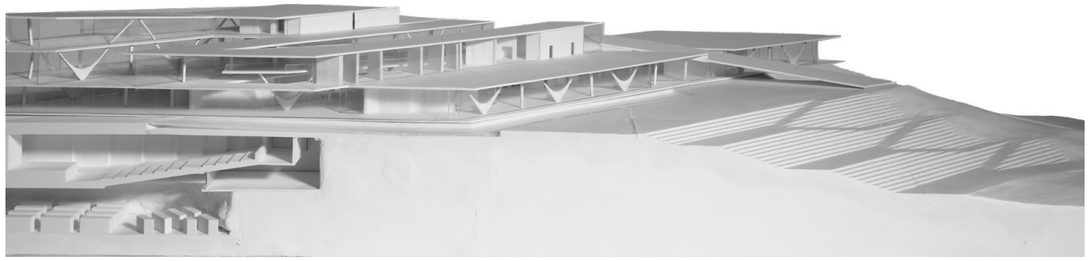
Ground Floor

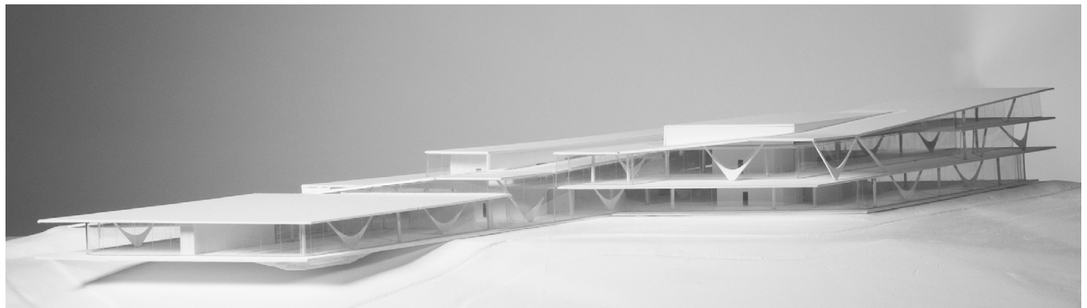


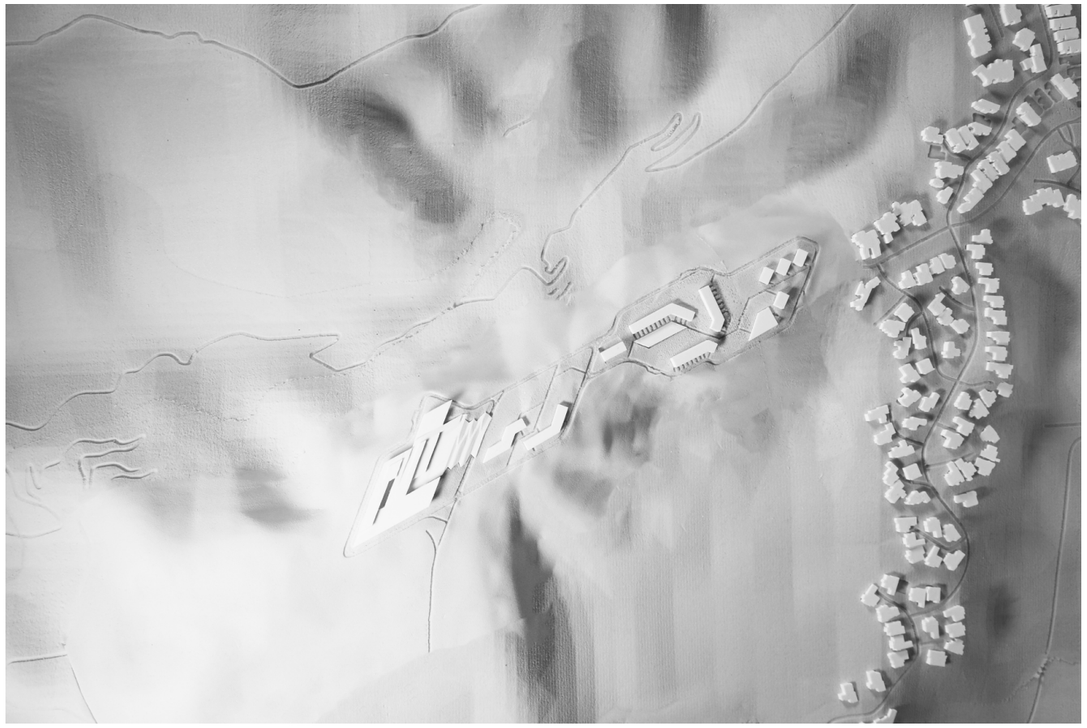
Second Floor

Third Floor

Roof







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Irmak Turanli

1:100

Non Toxic Materials for a Think Thank in LA

Healthier Building Materials, Columbia University | Spring 2022
Professor: Catherine A. Murphy
Site: Los Angeles, CA

At a time when we are so acutely focused on human health, vulnerable populations, and the inequity that exists due to a range of socio-economic barriers, the relationships between health and the built environment are more vivid than ever. Through this course, I addressed how architects can overcome the negative health outcomes that have been caused by toxics in building products. By analyzing the use of rammed earth, concrete, and wood as structural materials for my studio project in Los Angeles, I explored the relationships between these building materials and their chemical toxicity, and the environmental exposures that directly impact human health and the communities which are most adversely affected. Based on the health and performance criteria I produced for my think tank proposal in LA, I analysed the health and performance impact of rammed earth, concrete and wood for my think tank proposal. The overall goal was to create a framework for 3 chosen structural materials that engages all stakeholders and understand their construction and maintenance practices that affect long term health conditions.

EXTERIOR + STRUCTURAL

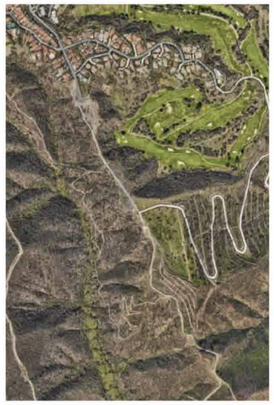
Irmak Turanli + Qingfan Wu

Project: A Think Tank
Location: Los Angeles, CA
Program: Research Center for scholars and researchers

When the climate of Los Angeles is taken into consideration, what material use while designing a think tank presents the minimum operational energy? Which material use allows to reduce the work of mechanical environmental control systems? At the same time, which material produces the minimal human and environmental impact to the people occupying the building?

The program of the building is a research includes and it includes offices spaces and a library. Because Los Angles is located in an earthquake zone, we had to think about exterior and structural materials that would present durable and stable architecture. We also had to consider the climate of Los Angeles where it gets very hot in the summer and colder at night.

Site:



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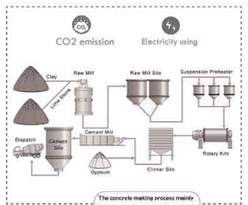
Precedents in LA, California:
-

What is it made of?

CEM	Cement	CO2 emission
SA	Sand	
AG	Aggregate	Air Pollution, CO2 emission
WA	Water	
ADM	Admixtures	
FA	Fly Ash	Asthma, Cancer, Inflammation

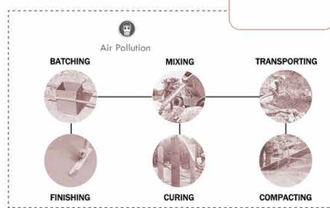
Manufacturing Process:

STEP #1:



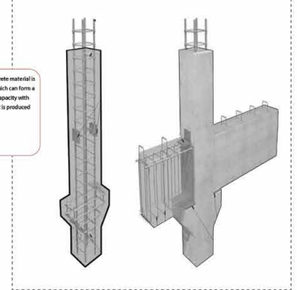
The concrete making process mainly involves the chemical reaction between clay and Limestone, which will produce a lot of CO2. In the production process, all kinds of equipment will also consume a lot of electricity. Most electricity now comes from thermal power, which also produces CO2.

STEP #2 :



Concrete needs to be moulded on site, which generates dust. As the main raw material for cement material, its production process needs a lot of mainfenance, relatively large water consumption.

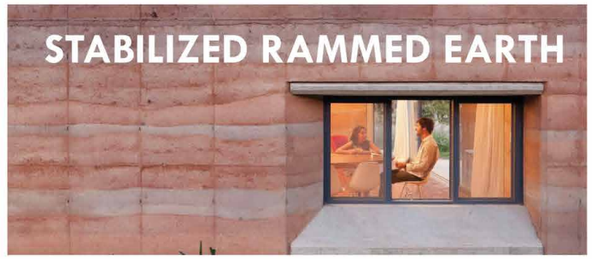
Thermal Quality + Structure:



The structure of concrete material is mainly reinforced, which can form a very strong bearing capacity with concrete. A lot of CO2 is produced as it hardens.

Maintenance + Affordability:

Concrete needs water to maintain after construction to ensure proper wettability during hardening. The main materials of concrete can be obtained directly from nature.



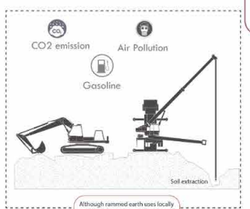
Precedents in LA, California:
- Glendale Childcare Center by Marmol Radziner Architecture, 10,00-25,000 sq ft

What is it made of?

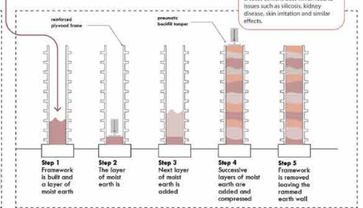
CL	Chrushed Limestone	
CEM	Cement	
RCA	Recycled Concrete Aggregates	Air Pollution, CO2 emission
FA	Fly Ash	Asthma, Cancer, Inflammation
ELS	Engineered Local Soil	
+ CCR	Calcium Carbide Residue	Reduced Agriculture, Impaired plant life

stabilized rammed earth

Manufacturing Process:

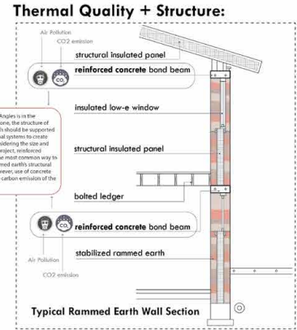


Although rammed earth uses locally available materials such as soil, it still needs to be extracted from the ground. The processing involved in the making of rammed earth includes machines drilling the ground. This process has a high carbon footprint as those excavators rely on gasoline.



Cement is mixed to make rammed earth more stable and durable since Los Angele in is earthquake zone. Manufacture of the cement itself creates 1.25 tonnes of carbon dioxide per tonne of cement produced. Although moist earth is nontoxic, stabilized rammed earth creates cement dust which lead to issues such as silicosis, kidney disease, skin irritation and similar effects.

Thermal Quality + Structure:



Because Los Angles is in the earthquake zone, the structure of rammed earth should be supported with additional systems to create stability. Considering the size and scale of the project, reinforced concrete is the most common way to increase rammed earth's structural capacity. However, use of concrete increases the carbon emission of the material.

Maintenance + Affordability:

They last extremely long. A Rammed earth house can easily sustain its integrity for 1000+ years. Raw materials of cement can be shipped anywhere for production. Because the site is rich in tons of clay-rich subsoil, there are no supply chain considerations.

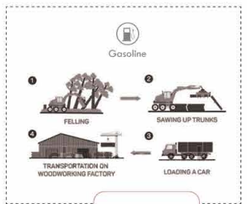
Precedents in LA, California:
- Glendale Childcare Center by Marmol Radziner Architecture, 10,00-25,000 sq ft

What is it made of?

NP	natural plants	
SAROT	stem and root of trees	
RWB	recycled wood board	Air Pollution, CO2 emission
GFSB	glue for sticking boards	Asthma
AFF	Artificial forest farm	

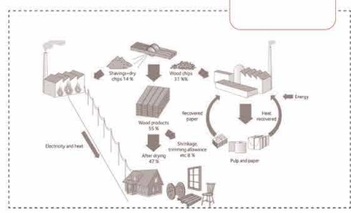
Manufacturing Process:

STEP #1:



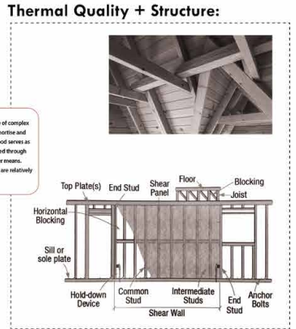
The greatest need for wood is to grow it in a specific place.Large machinery is used to cut the wood, and large vehicles are used to transport it, a process that uses a lot of petrol.

STEP #2 :



When wood is used in construction, it first needs to be cut to a certain scale. This can be achieved by measuring the scale and cutting directly or using CLT technology.

Thermal Quality + Structure:



Most timbers are made of complex frames connected by mortise and tenon joints. When wood serves as wall, need to be installed through agglutination and other means. Anyway,Wooden walls are relatively weak.

Maintenance + Affordability:

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Wood lasts for fifty years and needs to be removed as it ages. Wood that has not aged due to accidental collapse can be recycled.

HUMAN HEALTH	Dust will be generated when it is made, which affects health	Although soil is nontoxic, concrete that is used to increase its durability has concrete aggregates that pollutes air	There is no harm in the material itself, only a small amount of influence from processed raw materials
INDOOR CLIMATE	very high thermal mass, can keep indoor climate stable	Rammed earth walls function to absorb heat during the day and release it at night, cutting energy costs dramatically.	Have certain heat preservation ability, but sound insulation effect is bad
ENVIRONMENT - ENERGY	It takes a lot of energy to mine stone and make cement	The process of extracting soil requires machines to drill the ground. This process relies on high energy and high carbon emission.	The energy contained in itself is very small, and it is difficult to have an energy effect
ENVIRONMENT - CARBON	The production process emits a lot of carbon dioxide	Both the process of extracting soil and using concrete to stabilize the rammed earth structure creates high carbon emission	Carbon negative.There are certain carbon emissions in the process of cutting and processing
AFFORDABILITY	A plain concrete slab costs an average of $6.60 per square foot	The cost per m2 for a rammed earth wall can vary from $450 to $750 per face m2, on average.	Average price is about 1000 dollar per thousand board feet
MAINTENANCE	As long as the repair is in place, maybe there is no problem	Stabilized rammed earth walls are extremely low maintenance.	Most of wood can be used over 50 years. The best of them can keep useful for 100 years
DISASSEMBLY / RECYLING	concrete can be crushed and reused as aggregate in new	Although soil and limestone can return directly to the ground, recycling dry and hardened concrete requires crushing.	Easy to disassemble and move, and can be burned or used for paper.

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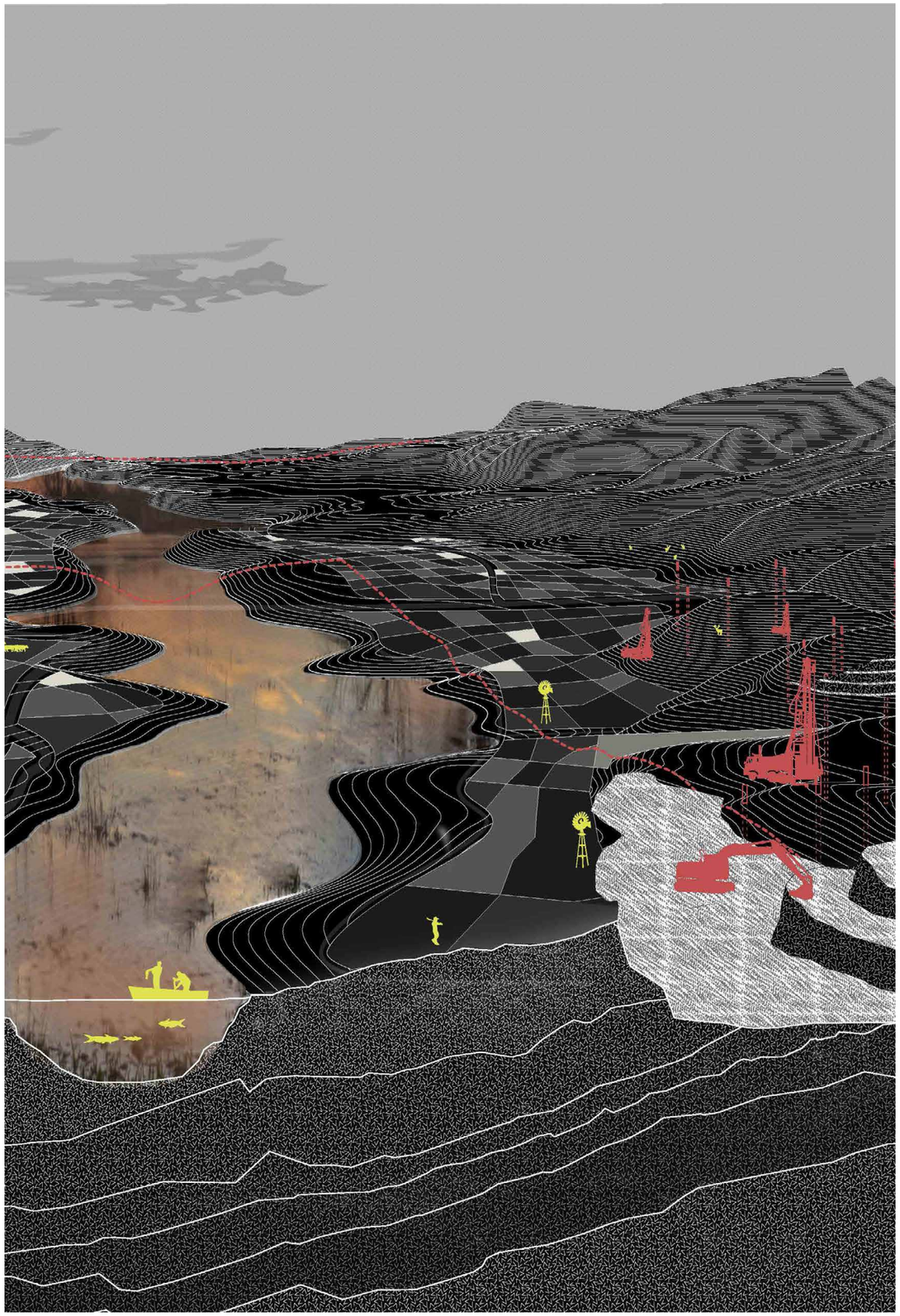
Slow Violence and Lithium in Sonora

Advanced IV Studio, Columbia University | Summer 2021
Critic: Gabriela Etchegaray & Jorge Ambrosi
Site: Sonora, Mexico

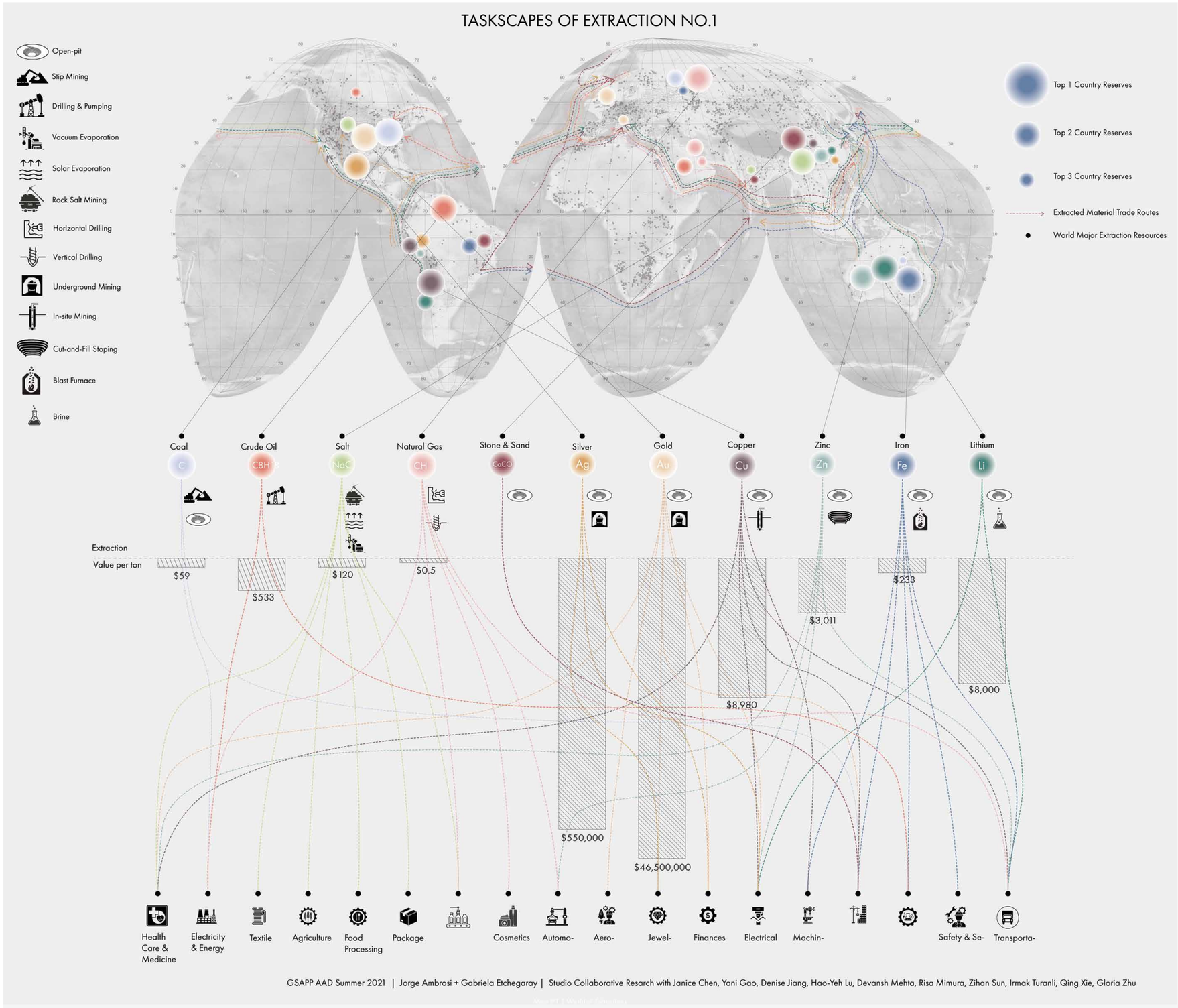
In collaboration with Yani Gao, Zihan Sun

Lithium, the main component of fast charging, electricity storing lithium-ion batteries, has become the most forthcoming mineral globally. The demand for lithium ore is growing triple folds, responding to our desire to be constantly connected on electronic devices and the worldwide transition to 'green' electric cars. In the hope to lead to a social consciousness of the invisible violence and shorten the distance between us and this industry's productional, environmental and societal impact, we are investigating the processes and relationships from the birthplace of lithium- the mining site. By drawing the taskscape of a new lithium mine in Sonora, Mexico, we examined the violence brought on by the production of this mineral, which lies hidden behind a facade that the developed world comfortably ignores. A mineral that supposedly helps construct a greener future for us while the burdens are imposed upon the invisible many.



Lithium extraction in Huasabas has already started destrying the river, which is the main resource for the town that relies on agriculture

Extraction is always undertaken for the sake of 'information': with this action we are always 'uncovering'. As we extract 'information', we only leave behind the conclusions: an open pit mine, an empty fuel reserve, a data set.



We began with a group investigation on mineral extraction activities whose outputs include atlases and cartographic models, analytic assemblages, image and textual premises that explore the territory, its actors, the processes, and routes that are undertaken in the abstraction to ore products.

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. Most extraction involves excavating the earth surface, blasting and alternating the original landscape.

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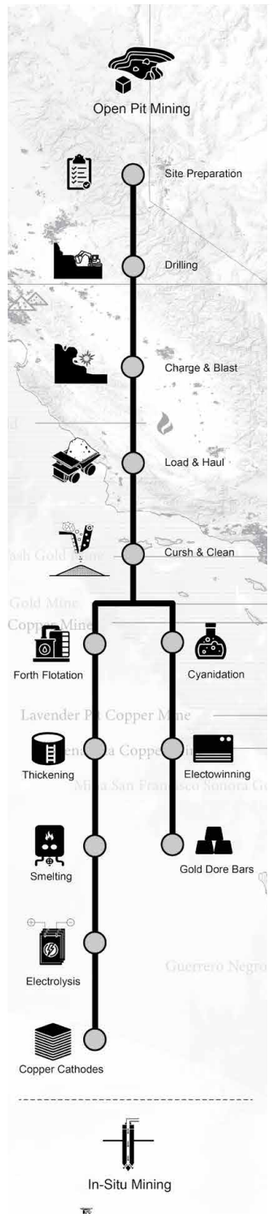
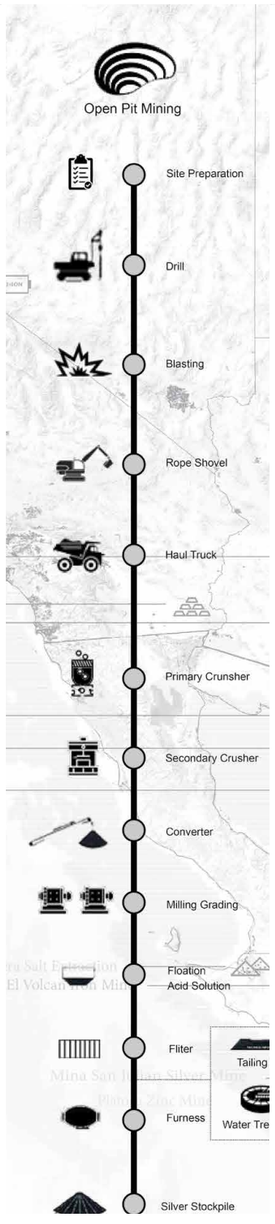
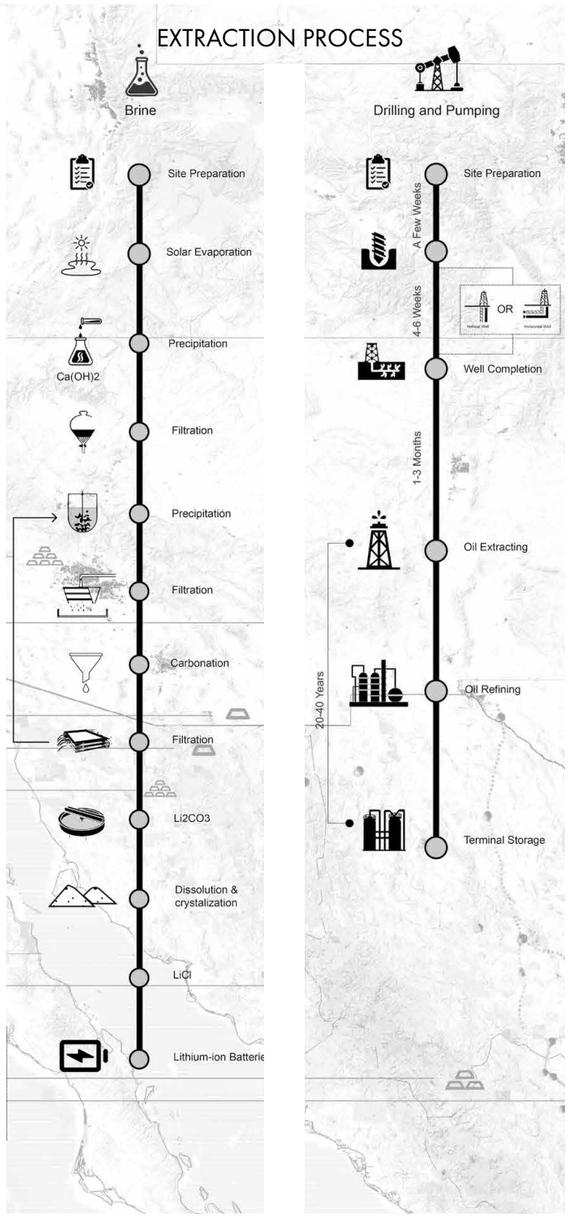
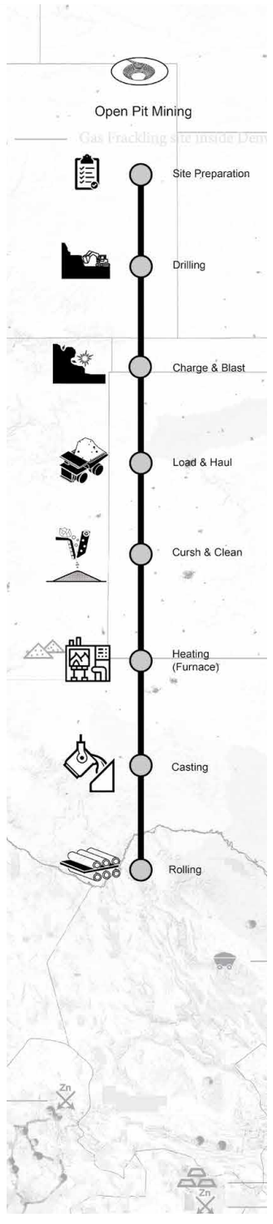
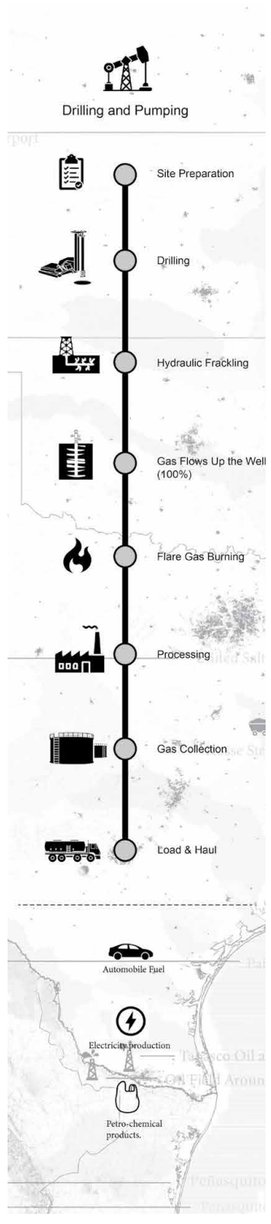
For lithium extraction, saline water is evaporated and filtered for salt, and further refined for extraction of lithium. The evaporation takes place in regions that are arid and with low precipitation rate. The entire process of extraction to finished products to consumers requires a collaborative effort from a huge network of companies, factories and transportation.











Copper + Gold | Cananea Mine, Sonora, Mexico
30.9707, -110.3281

Silver | Mina Peñasquito, Zacatecas, Mexico
24.63161, -101.70672

Lithium | Silver Peak, Nevada United States
37.7549, -117.6348

Crude Oil | Big Well, Texas United States
28.515613, -99.387815

Iron | Peñasquito Mine, Mazapil, Zacatecas Mexico
24.63516, -101.7067

Natural Gas | Lost Hills, California United States
35.6970, -119.7907

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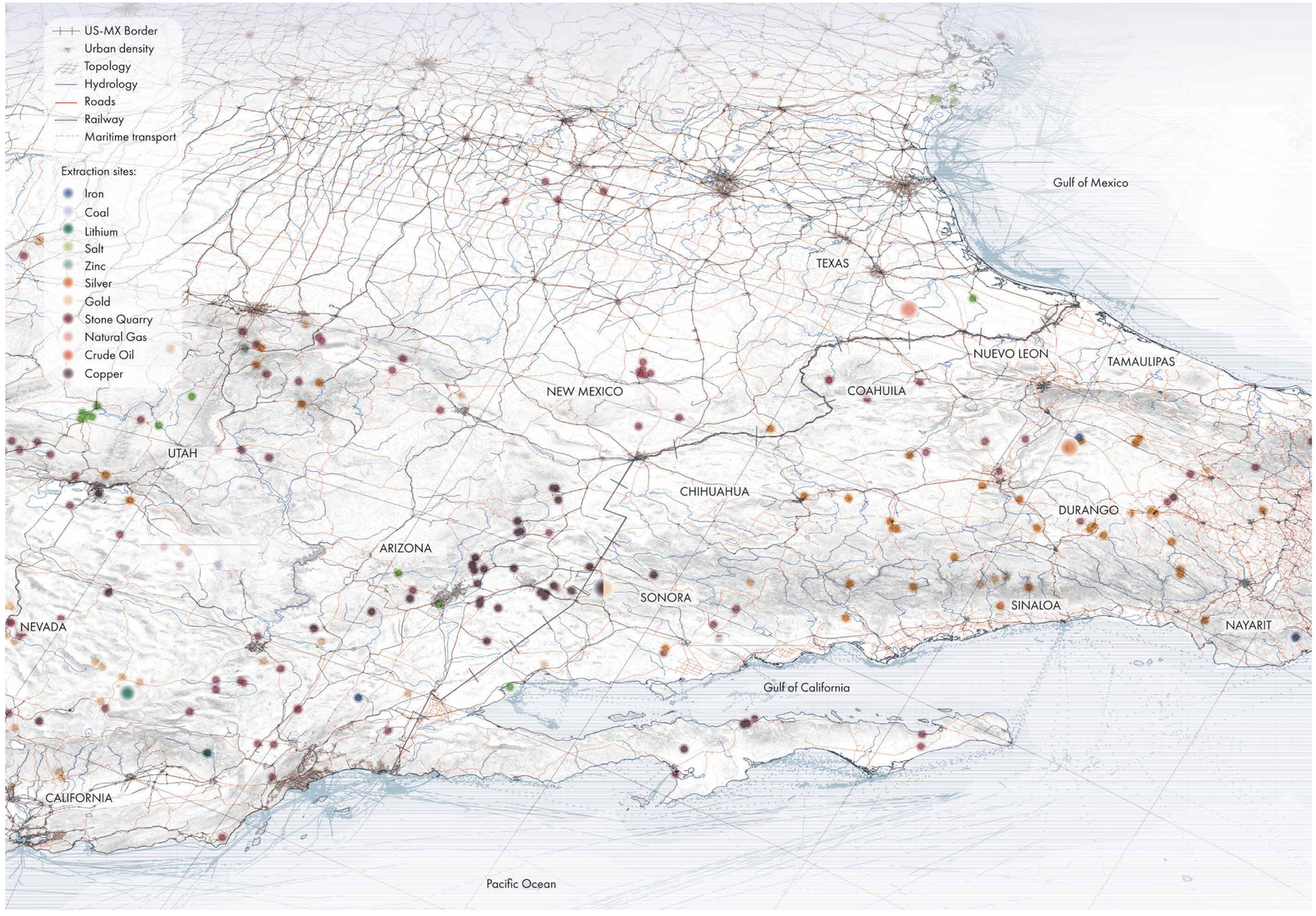
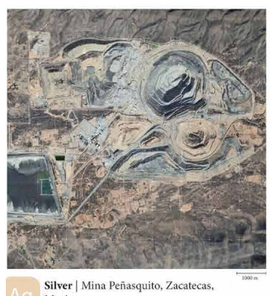
The river network is a major geographic criteria since mining demands heavy use of water in processing ore. Mining companies usually stored enough water to sustain the operations for more than half the mine's operating life. However, the rivers are the vulnerable points facing the potential polluted water spill from the mine sites.



Geographically linking the US and Mexico border, the Sierra Madre Occidental is seen here visibly rich in mineral deposits, acting as a canal bringing in northern investments and mining sites. When it comes to the States, the Sierra Nevada mountain range between California and Nevada, and the Rocky Mountain range between Utah and Colorado both have an evident population of mining sites.


Cu **Copper + Gold** | Cananea Mine, Sonora, Mexico
30.9707, -110.3281


Ag **Silver** | Mina Peñasquito, Zacatecas, Mexico
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C_8H_{18} **Crude Oil** | Big Well, Texas United States
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CH_4 **Natural Gas** | Lost Hills, California United States
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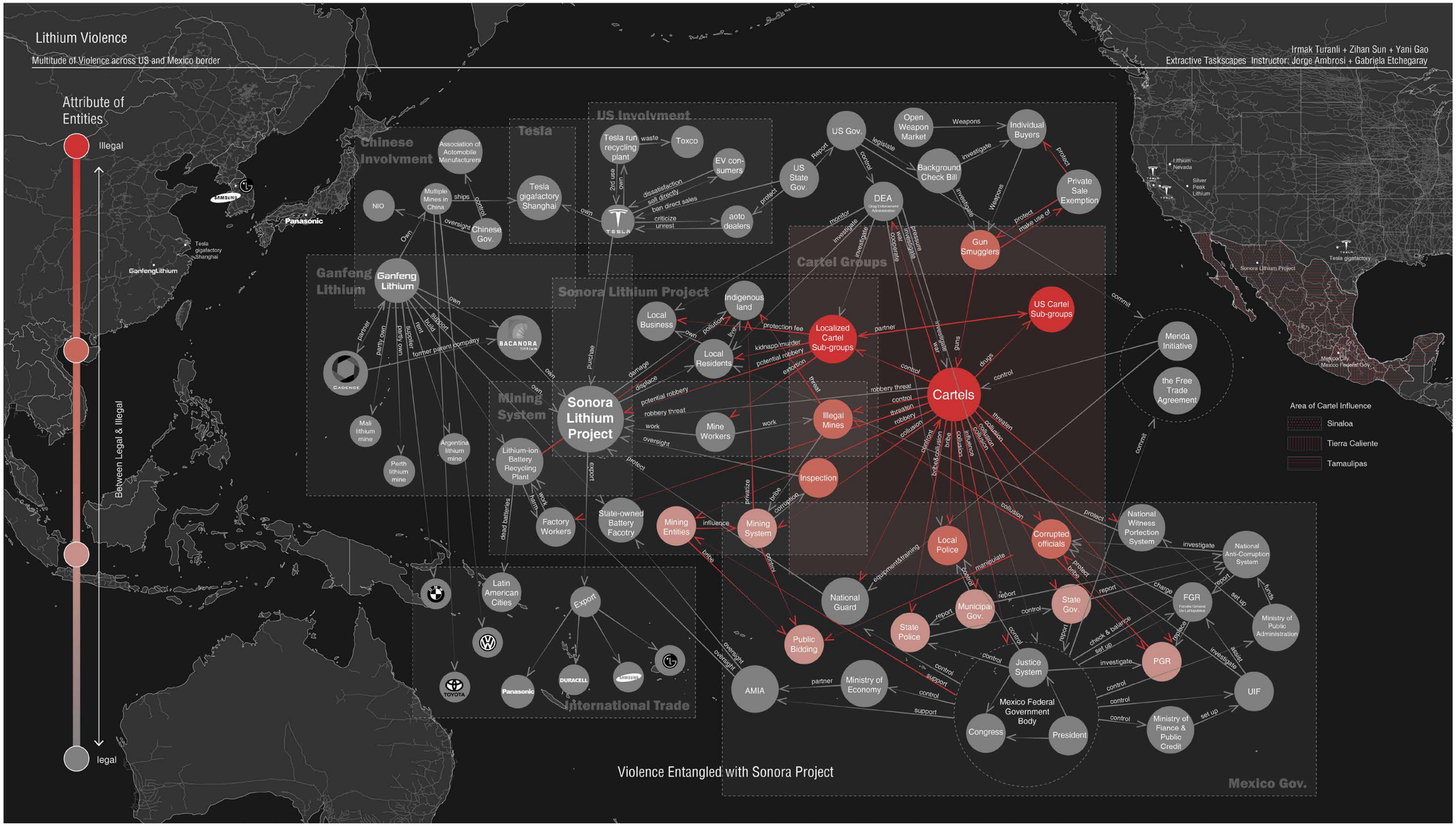

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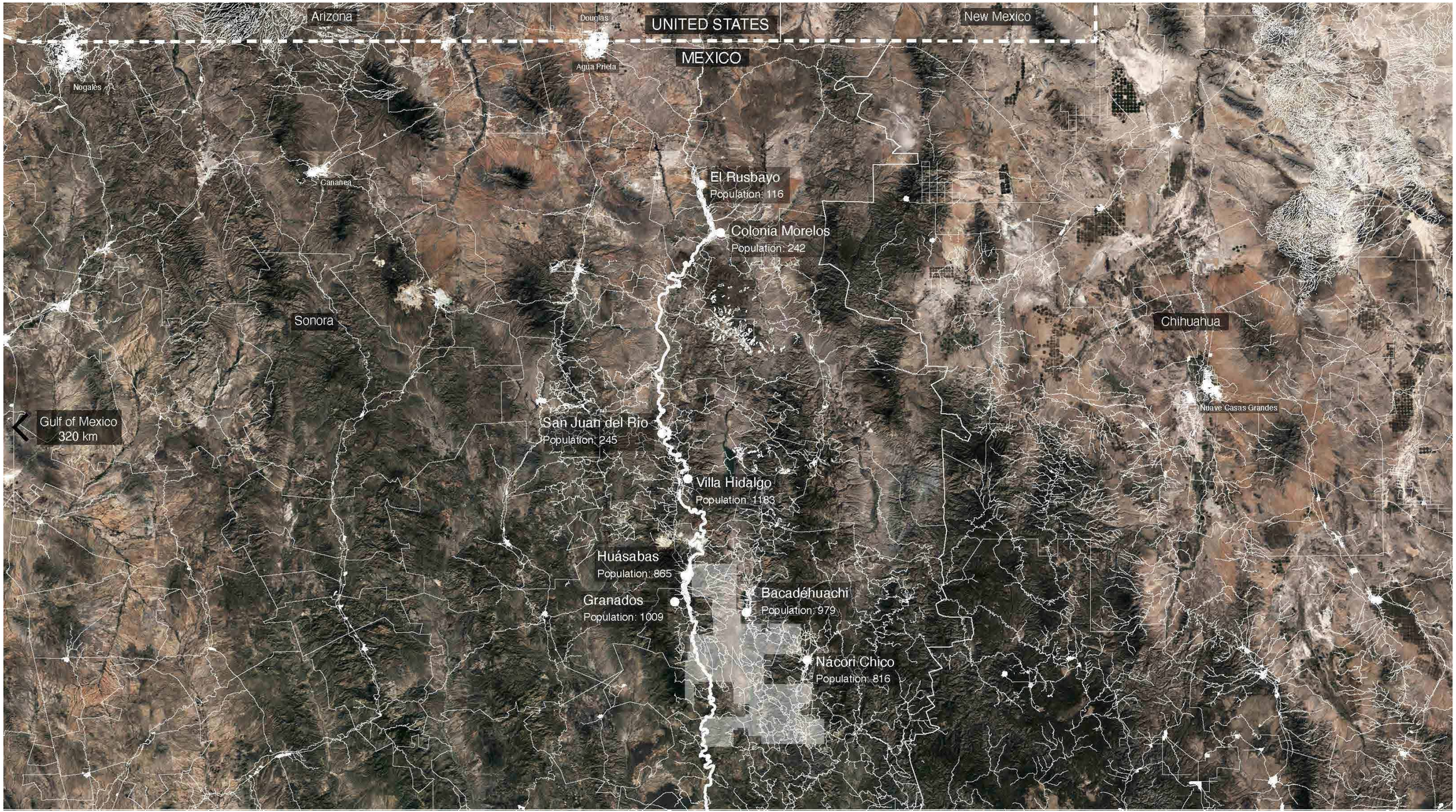

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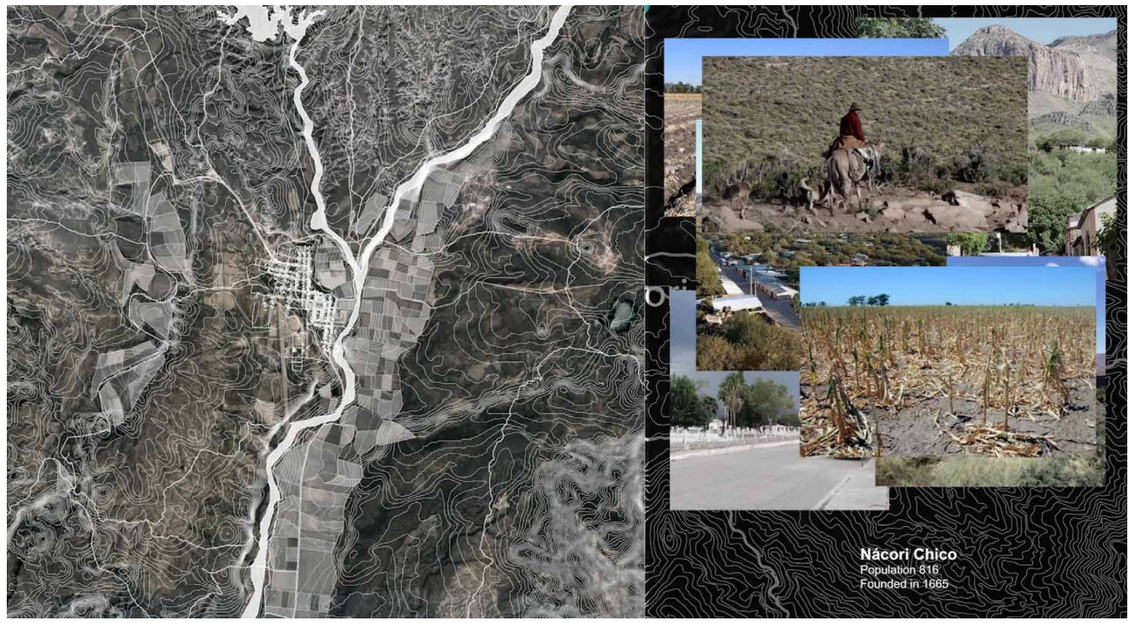
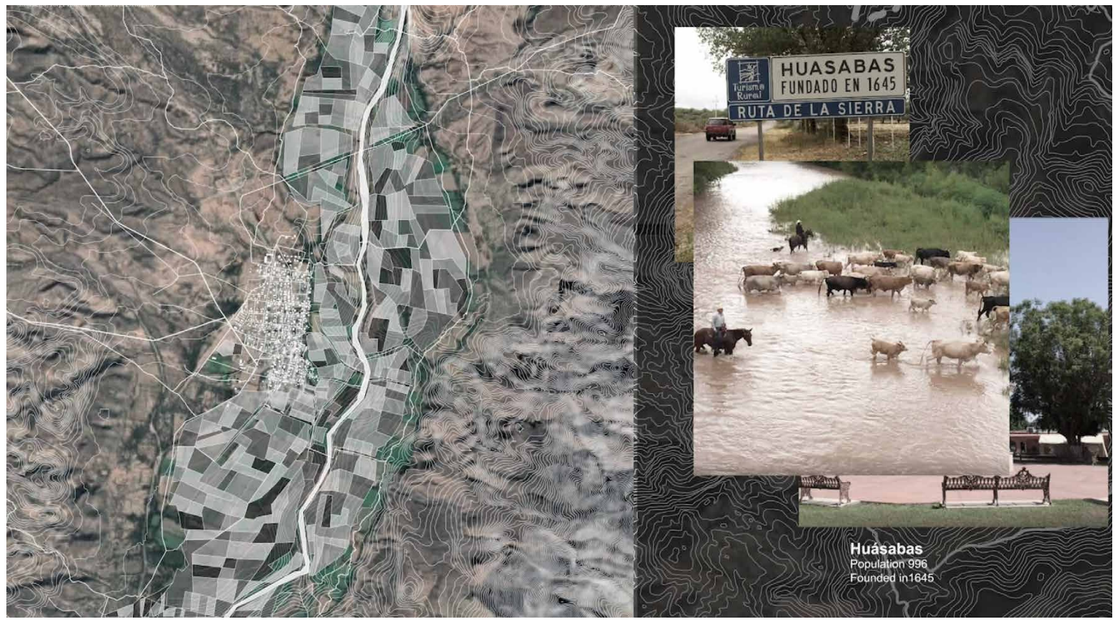
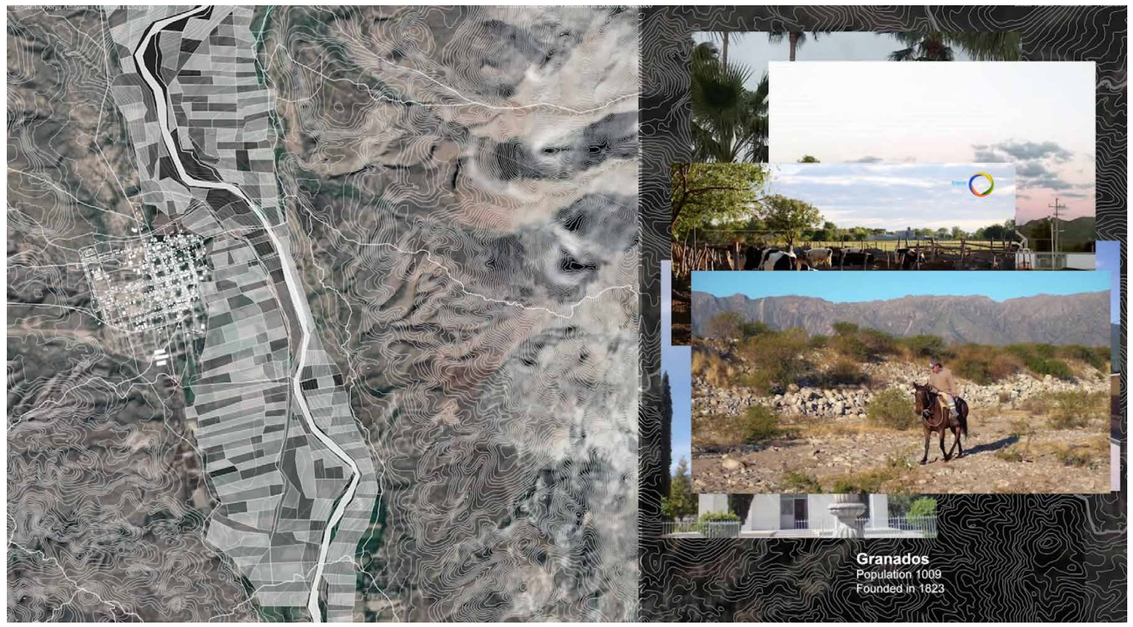
Sonora Lithium Project is planned to be developed within the boundaries of 4 towns, in an area of 8,000 hectares equivalent to 15,000 soccer fields. The mine site will be sourcing water from the nearby Bavispe River, which has been supporting the towns downstream for hundreds of years.

Since the tributaries of the Bavispe runs directly through the mining site, the potential pollution will threaten the safety of the downstream towns that depend significantly on the river as the source of irrigation.



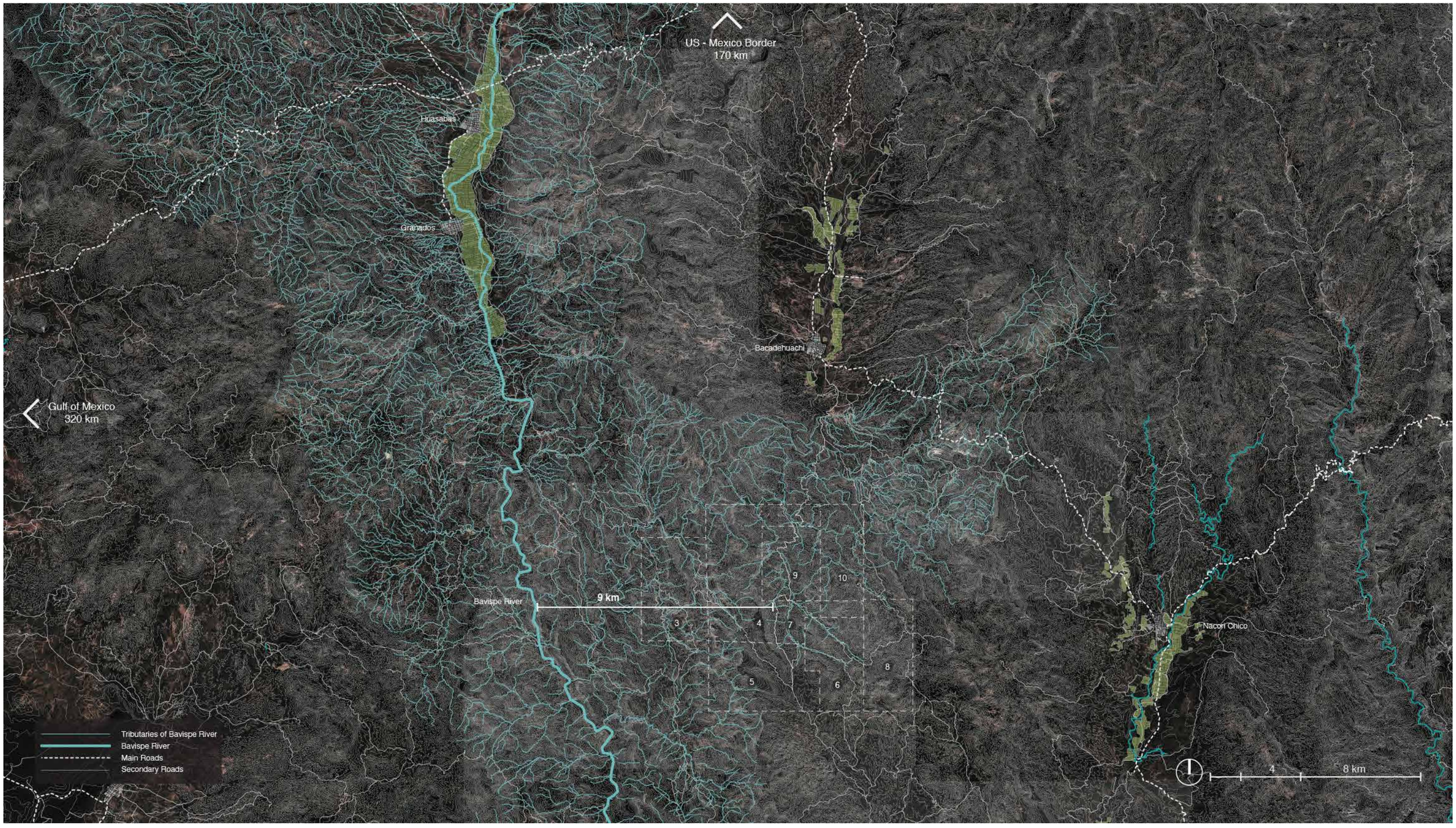




We looked at 8 agriculture-focused towns are hugging the northern boundary of the concession. All of them are agriculture-based towns with supporting farming industries, mainly cattle raising.

As of the report in March 2021, Bacadehuachi residences are already voicing doubts about how the mine will affect the town who is already facing poverty and constant drought for the past 30 years.

1:1000



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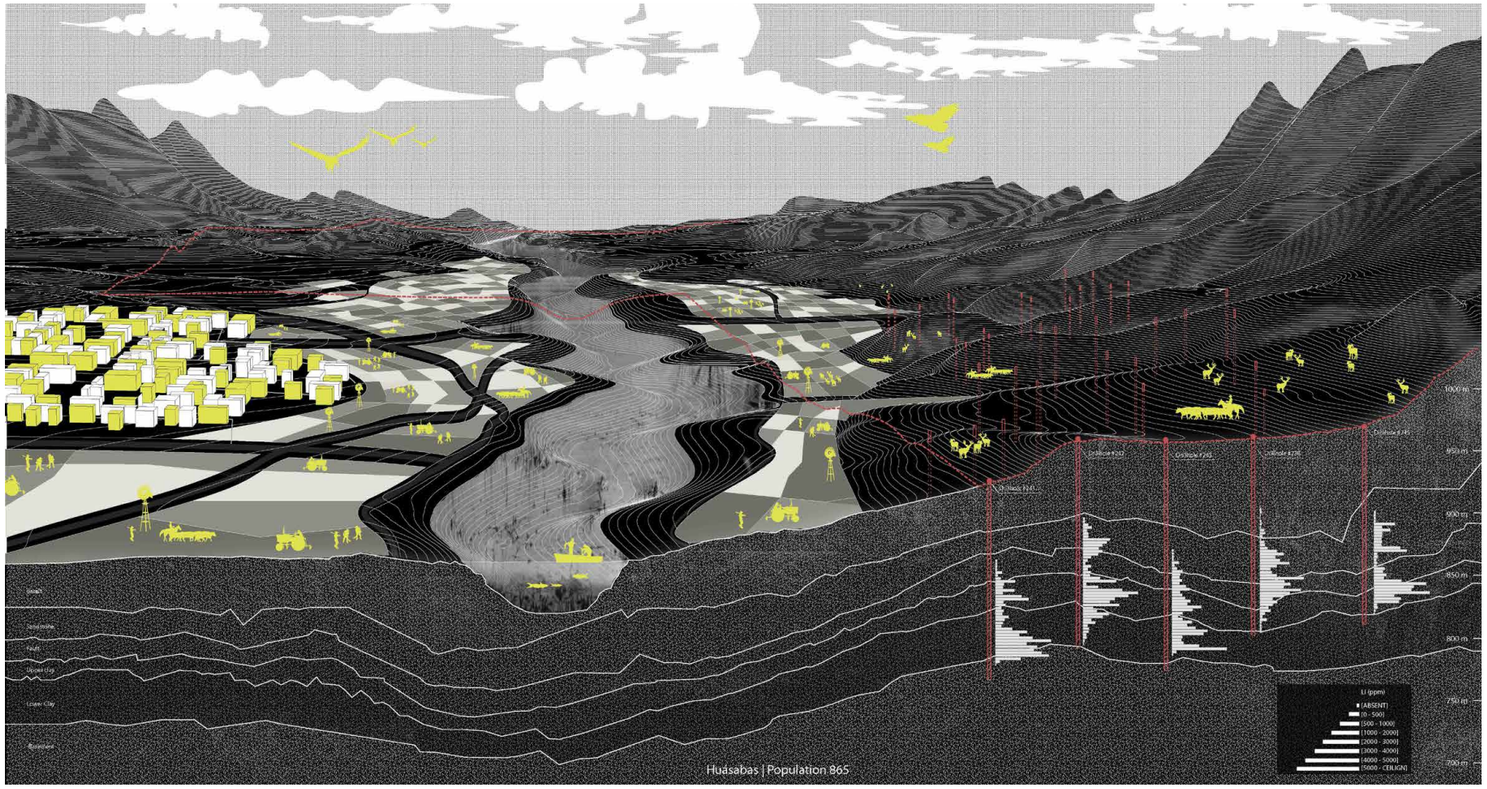
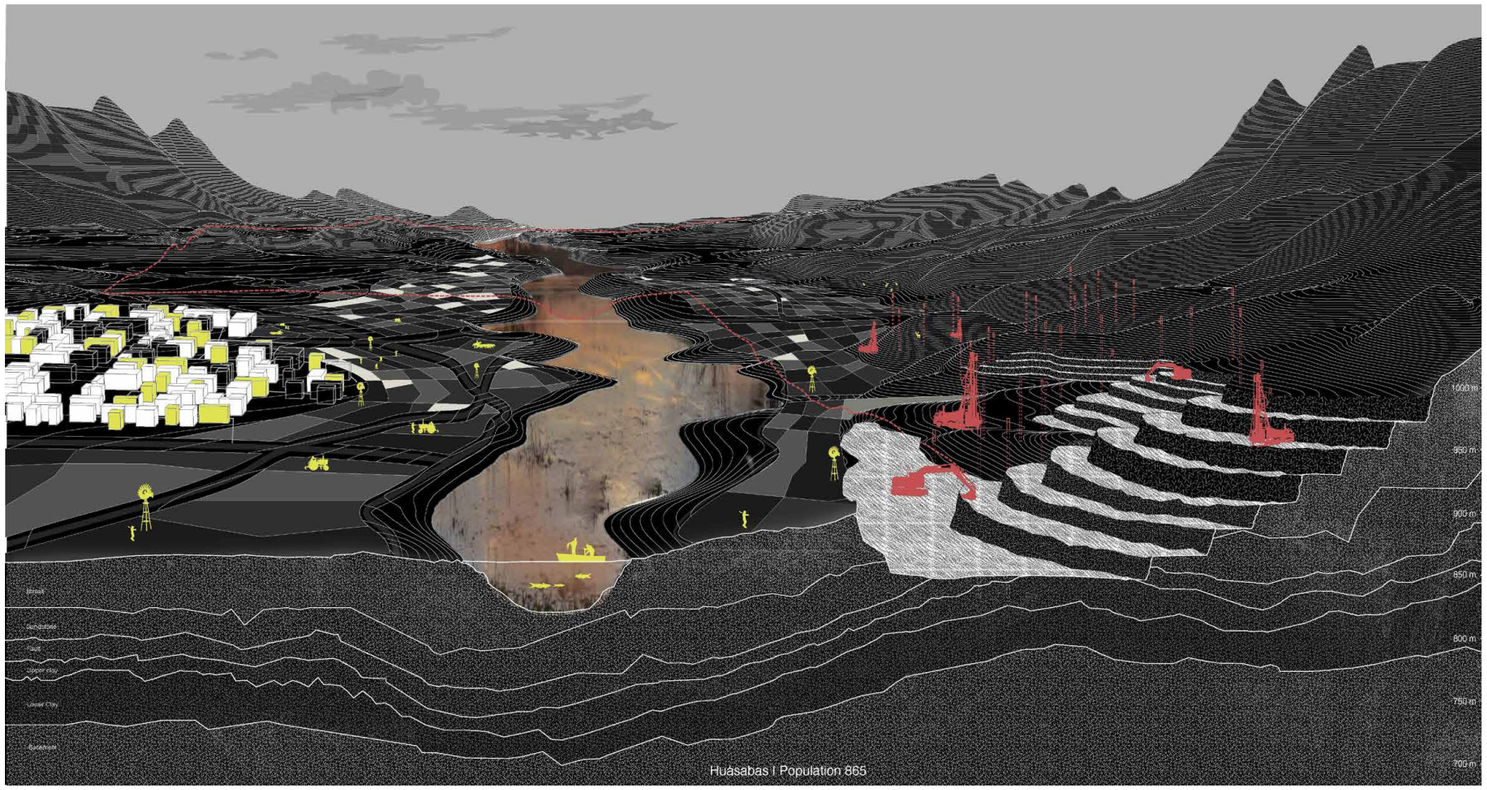
"Just as this medium thinking inverts the typical focus on object over field, maybe medium design can invert some habitual approaches to problem solving,
aesthetics and politics."

— Keller Easterling,Medium Design





As architects and designers, how do we capture and visually lay down the violence that is specific and unique to a site? How do we trace and represent the slow violence that is often long-lasting and far-reaching.

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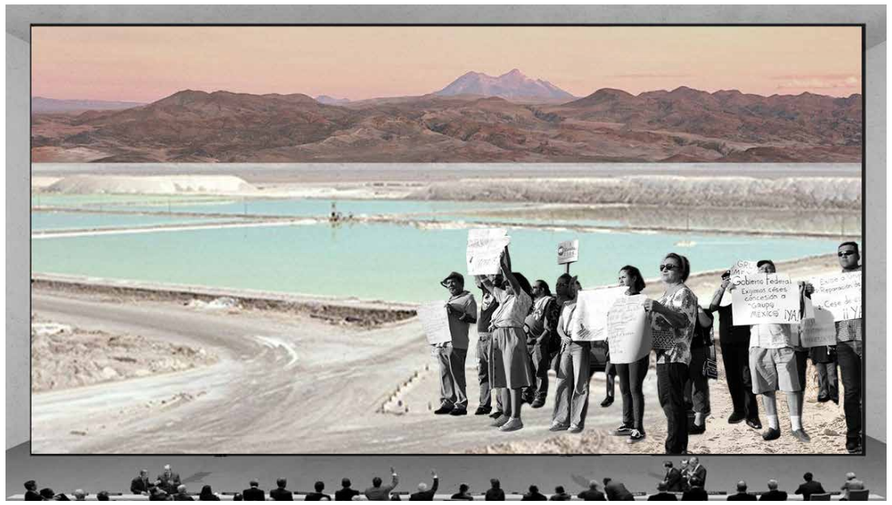

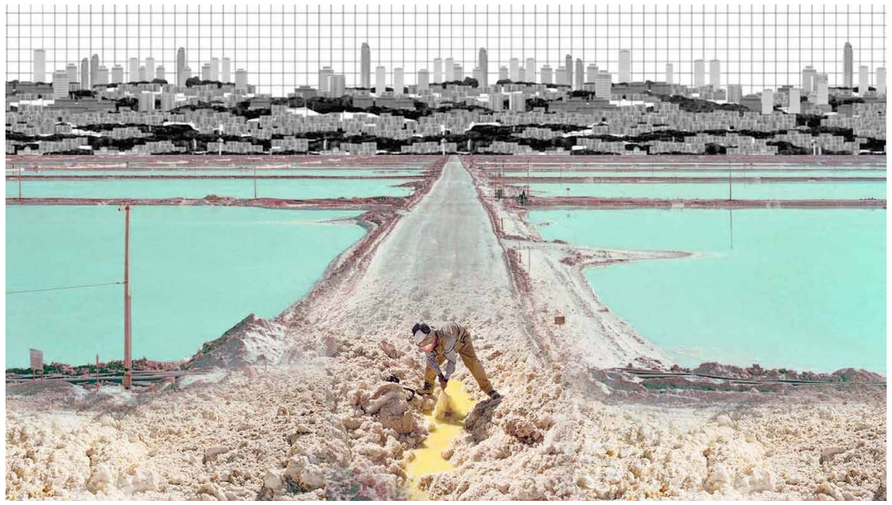

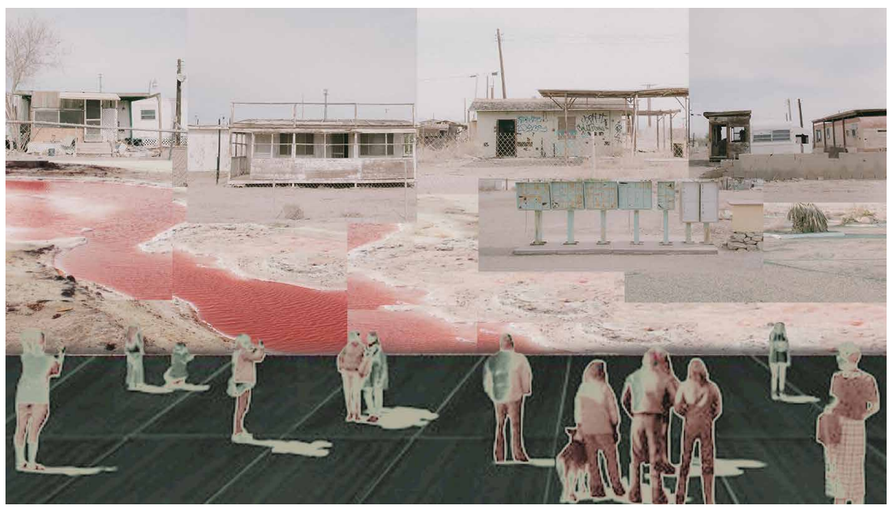

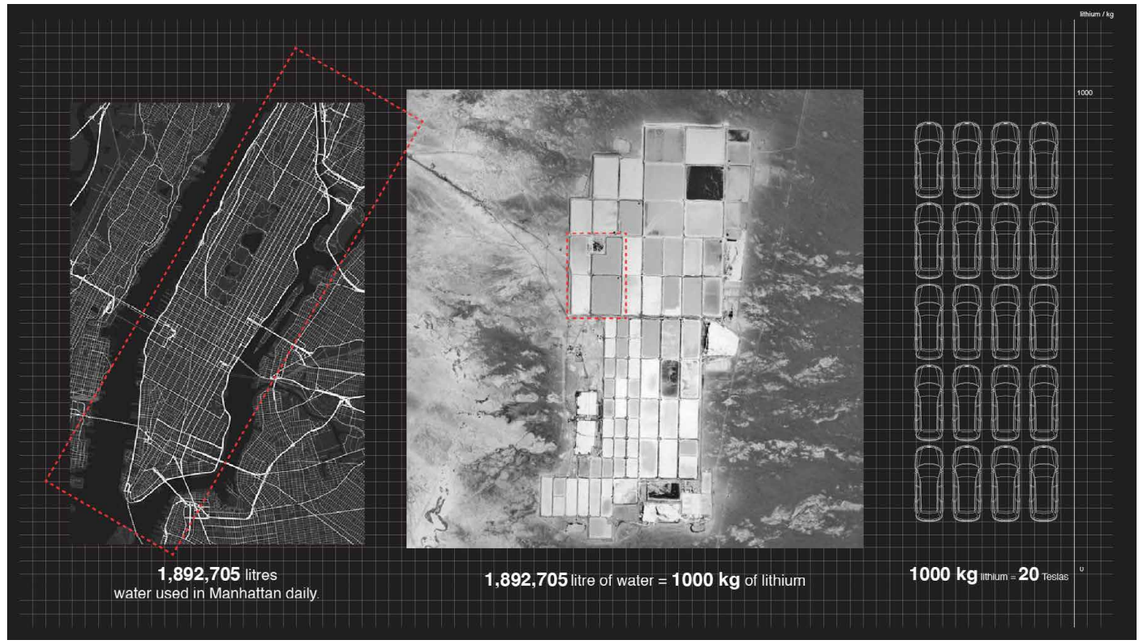

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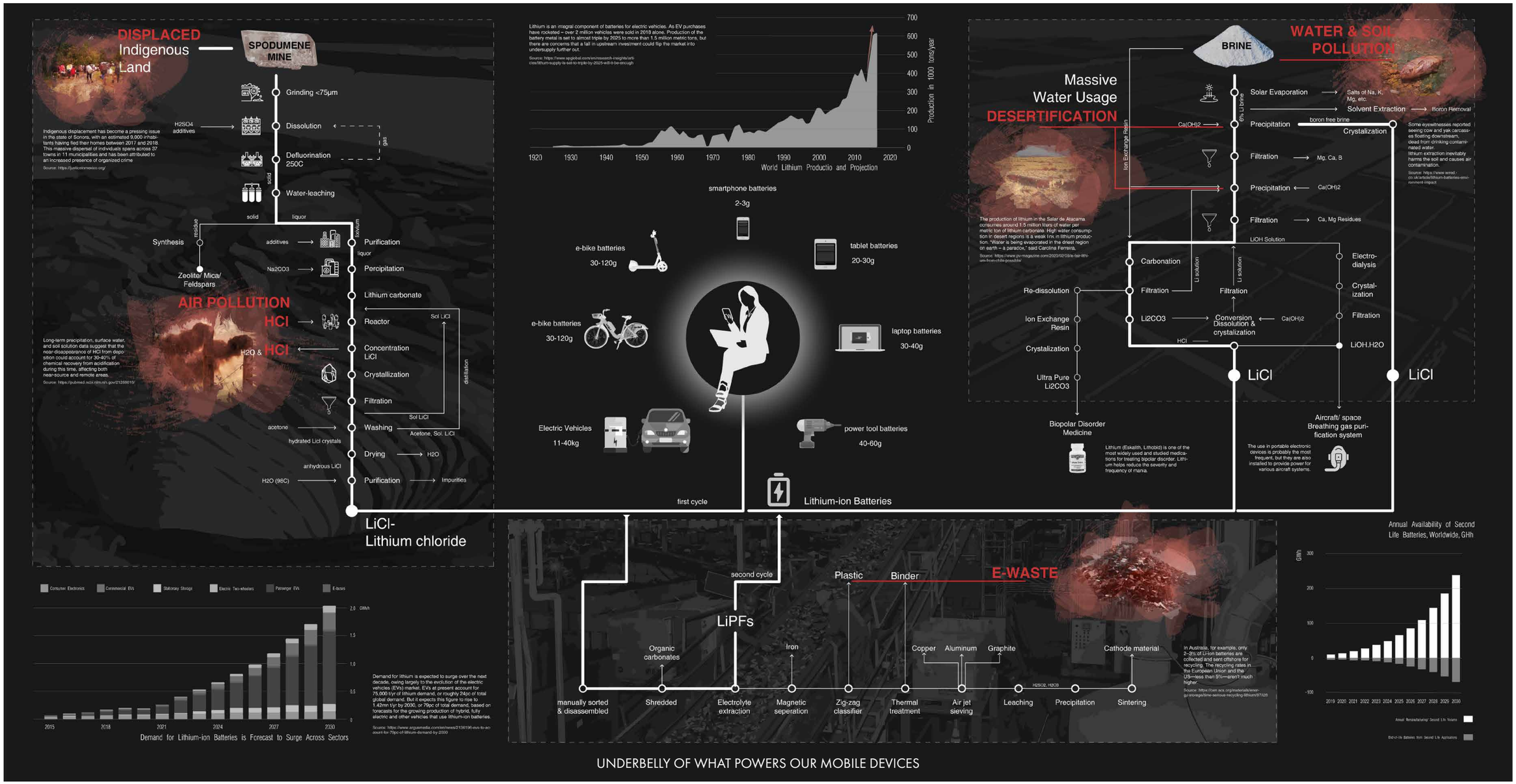
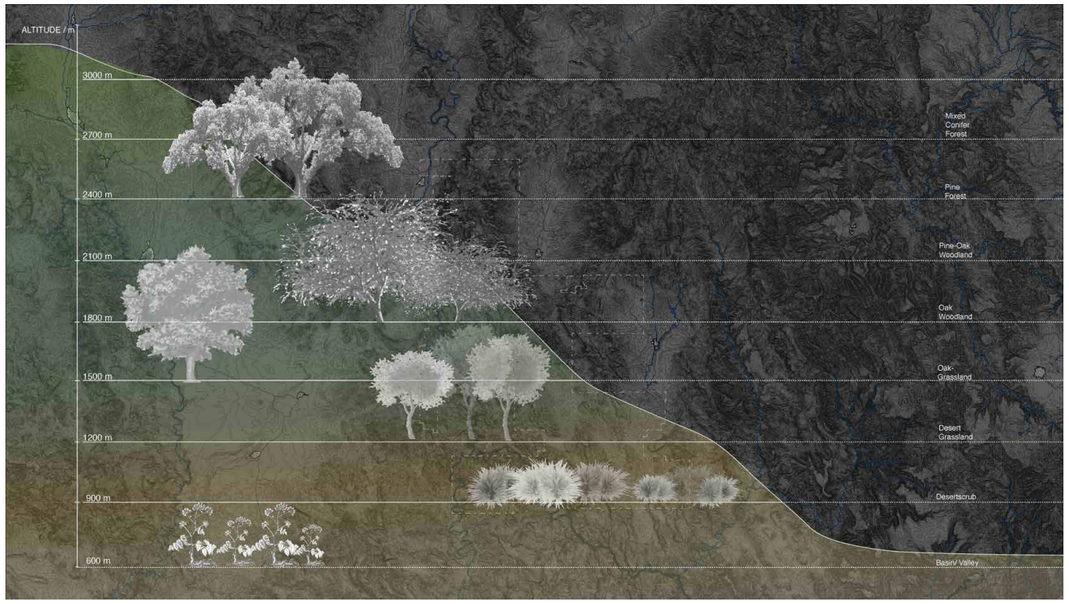

DISPLACED
Indigenous Land
SPODUMENE MINE
Grinding <75µm
H2SO4 additives
Dissolution
Defluorination 250C
gas
solid
Water-leaching
solid
liquor
residue
Synthesis
Zeolite/ Mica/ Feldspars
additives
Purification
liquor
Na2CO3
Percipitation
Lithium carbonate
AIR POLLUTION
HCl
Reactor
Sol LiCl
H2O &
HCl
Concentration LiCl
Crystallization
Filtration
distillation
Sol LiCl
acetone
Washing
Acetone, Sol. LiCl
hydrated LiCl crystals
Drying
H2O
anhydrous LiCl
H2O (98C)
Purification
Impurities
LiCl-
Lithium chloride
Indigenous displacement has become a pressing issue in the state of Sonora, with an estimated 9,000 inhabitants having fled their homes between 2017 and 2018. This massive dispersal of individuals spans across 37 towns in 11 municipalities and has been attributed to an increased presence of organized crime
Source: https://justiceinmexico.org/
Long-term precipitation, surface water, and soil solution data suggest that the near-disappearance of HCl from deposition could account for 30-40% of chemical recovery from acidification during this time, affecting both near-source and remote areas.
Source: https://pubmed.ncbi.nlm.nih.gov/21269015/
Lithium is an integral component of batteries for electric vehicles. As EV purchases have rocketed – over 2 million vehicles were sold in 2018 alone. Production of the battery metal is set to almost triple by 2025 to more than 1.5 million metric tons, but there are concerns that a fall in upstream investment could flip the market into undersupply further out.
Source: https://www.spglobal.com/en/research-insights/articles/lithium-supply-is-set-to-triple-by-2025-will-it-be-enough
700
600
500
400
300
200
100
0
Production in 1000 tons/year
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
World Lithium Productio and Projection
smartphone batteries
2-3g
e-bike batteries
30-120g
tablet batteries
20-30g
e-bike batteries
30-120g
laptop batteries
30-40g
Electric Vehicles
11-40kg
power tool batteries
40-60g
first cycle
Lithium-ion Batteries
BRINE
WATER & SOIL POLLUTION
Massive Water Usage
DESERTIFICATION
Ion Exchange Resin
Solar Evaporation
Salts of Na, K, Mg, etc.
Solvent Extraction
Boron Removal
6% Li brine
Ca(OH)2
Precipitation
boron free brine
Crystallization
Filtration
Mg, Ca, B
Precipitation
Ca(OH)2
Filtration
Ca, Mg Residues
LiOH Solution
Carbonation
Li solution
Filtration
Electro-dialysis
Crystal-ization
Filtration
Re-dissolution
Filtration
Li solution
Ion Exchange Resin
Li2CO3
Conversion Dissolution & crystalization
Ca(OH)2
HCl
LiOH.H2O
Crystallization
Ultra Pure Li2CO3
LiCl
LiCl
Biopolar Disorder Medicine
Lithium (Eskalith, Lithobid) is one of the most widely used and studied medications for treating bipolar disorder. Lithium helps reduce the severity and frequency of mania.
Aircraft/ space Breathing gas purification system
The use in portable electronic devices is probably the most frequent, but they are also installed to provide power for various aircraft systems.
The production of lithium in the Salar de Atacama consumes around 1.5 million liters of water per metric ton of lithium carbonate. High water consumption in desert regions is a weak link in lithium production. "Water is being evaporated in the driest region on earth – a paradox," said Carolina Ferreira.
Source: https://www.pv-magazine.com/2020/02/03/is-our-lithium-from-chile-possible/
Some eyewitnesses reported seeing cow and yak carcasses floating downstream, dead from drinking contaminated water. lithium extraction inevitably harms the soil and causes air contamination.
Source: https://www.wired.co.uk/article/lithium-batteries-environment-impact
Consumer Electronics
Commercial EVs
Stationary Storage
Electric Two-wheelers
Passenger EVs
E-buses
2.0 GWh
1.5
1.0
0.5
0
2015
2018
2021
2024
2027
2030
Demand for Lithium-ion Batteries is Forecast to Surge Across Sectors
Demand for lithium is expected to surge over the next decade, owing largely to the evolution of the electric vehicles (EVs) market. EVs at present account for 75,000 t/yr of lithium demand, or roughly 2Apc of total global demand. But it expects this figure to rise to 1.42mn t/yr by 2030, or 79pc of total demand, based on forecasts for the growing production of hybrid, fully electric and other vehicles that use lithium-ion batteries.
Source: https://www.argusmedia.com/en/news/2136196-evs-to-account-for-70pc-of-lithium-demand-by-2030
second cycle
LiPFs
Plastic
Binder
E-WASTE
Organic carbonates
Iron
Copper
Aluminum
Graphite
Cathode material
H2SO2, H2O3
manually sorted & disassembled
Shredded
Electrolyte extraction
Magnetic seperation
Zig-zag classifier
Thermal treatment
Air jet sieving
Leaching
Precipitation
Sintering
In Australia, for example, only 2–3% of Li-ion batteries are collected and sent offshore for recycling. The recycling rates in the European Union and the US—less than 5%—aren't much higher.
Source: https://chem.acs.org/materials/energy-storage/time-serious-recycling-lithium/97/i28
Annual Availability of Second Life Batteries, Worldwide, GWh
GWh
300
200
100
0
-100
2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030
Annual Remanufacturing Second Life Volume
End-of-life Batteries from Second Life Applications
UNDERBELLY OF WHAT POWERS OUR MOBILE DEVICES

The surrounding area is home to watchlisted species: four labeled endangered species have territories overlapped here as it can be seen with different colors. In addition, North American jaguar and forest grey wolf seasonally migrate across the US and Mexico border. At the same time, local horned goats and antler deers inhabit the surrounding landscapes. Farm animals such as mules, cows, bulls, goats, horses make up the livestock industry in the area.



1:1000

Irmak Turanli

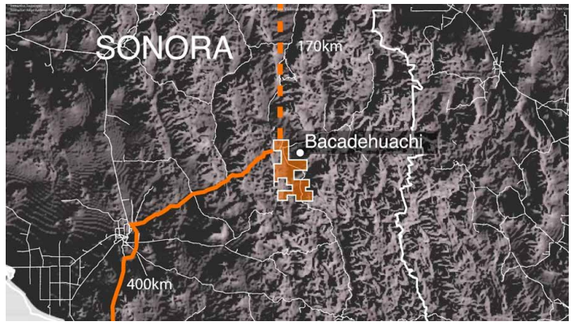
FRAME

TIME

[camera panning into the border map of US and Mexico]
(00:13)

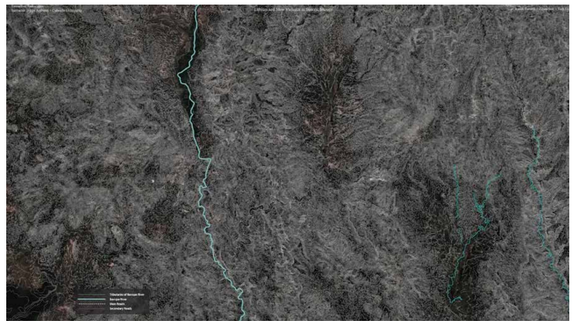
[The Guaymas Port and the transportation route to the Asian markets are introduced]
(00:22)

[Sonora Lithium Project is getting introduced]
(00:34)



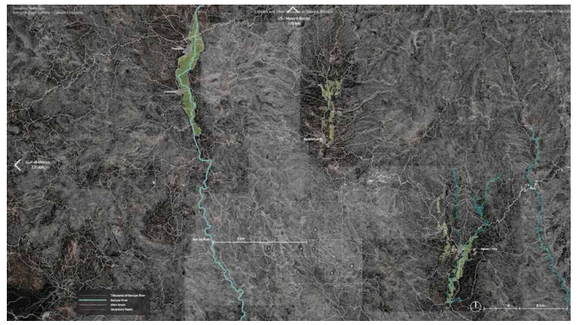
[Camera zooming in to the concession]
(00:37)

FRAME

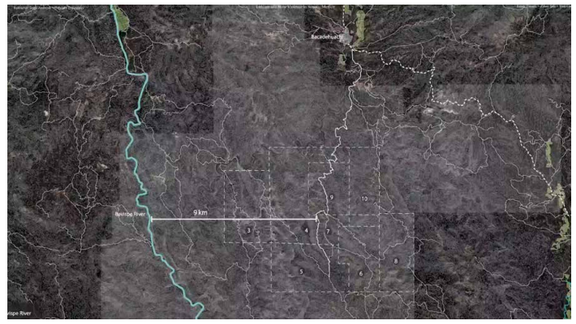


TIME

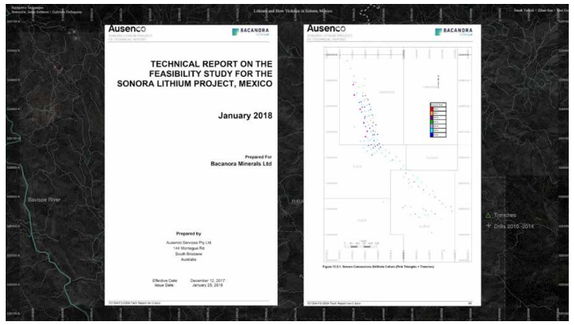
[Bavispe River is shown with blue]
(00:45)



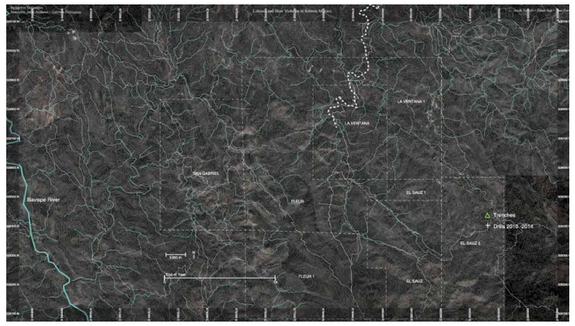
[The four towns that are within the boundary of concession are getting introduced]
(00:52)



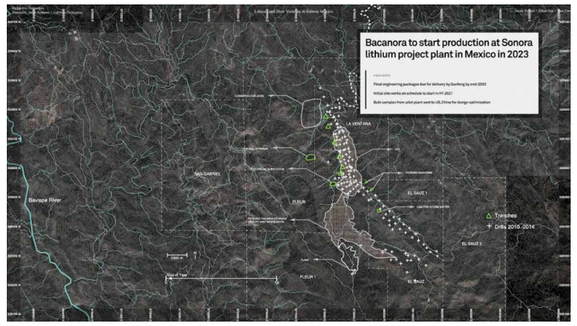
[Access route to the town of Bacadéhuachi is shown
(00:59)



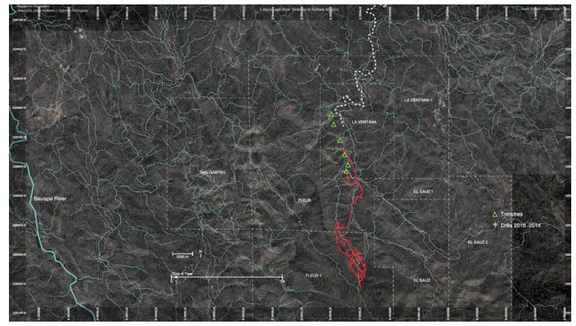
[Technical Report on the Feasibility Study for the Sonora Lithium Project are shown]
] (01:13)



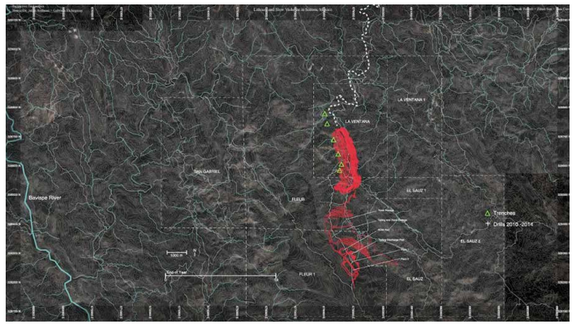
[camera panning out to show the concession]
W(01:18)



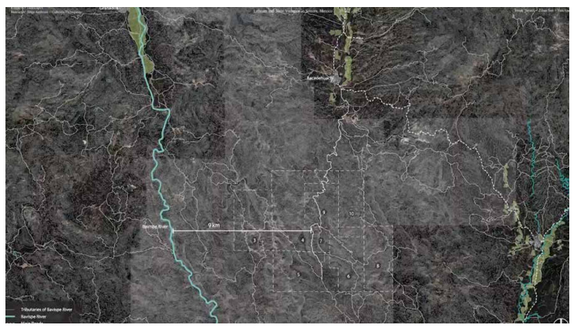
[Drilled trenches among the extraction site are shown]
(01:44)



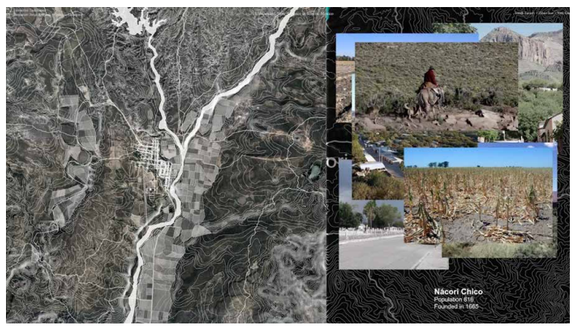
[camera panning into the border map of US and Mexico, showing the concession]
(02:01)



[camera panning into the border map of US and Mexico, showing the concession]
(02:09)

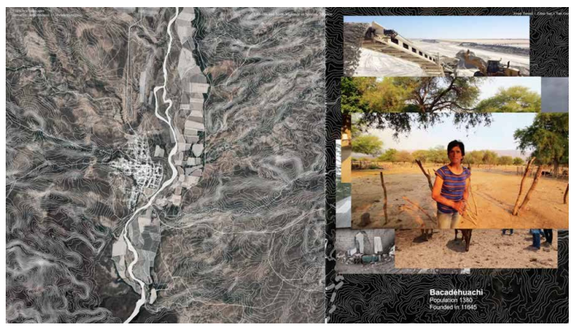


[camera panning into the concession] (02:19)



[Nacori Chnino, one of the surrounding town is getting introduced]
(02:29)

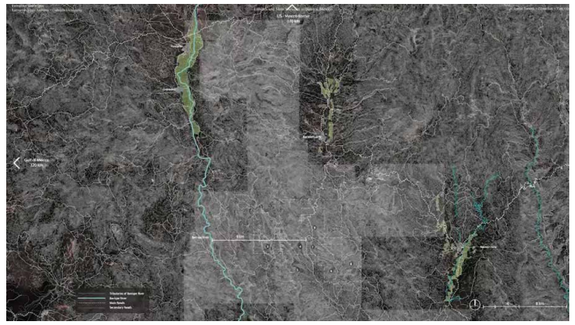
[camera zooming out]
(02:40)



[camera zooming into Bacadehuachi]
(02:45)

Storyboard

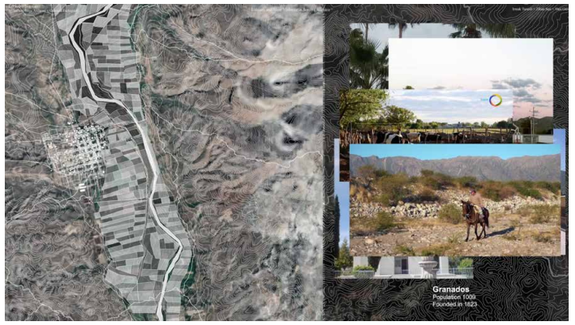
FRAME



TIME

[camera zooming out]
(02:50)

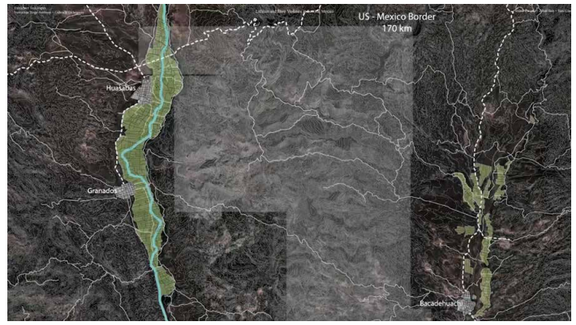
FRAME



TIME

[camera zooming into Granados]
(02:52)

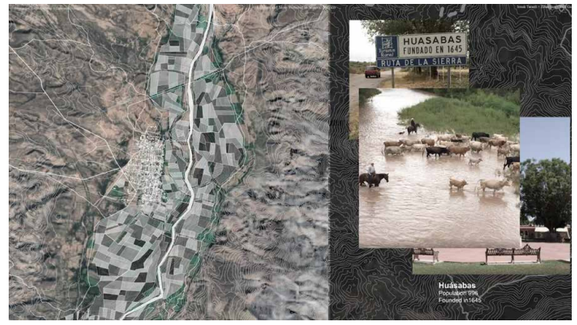
FRAME



TIME

[camera zooming out]
(02:45)

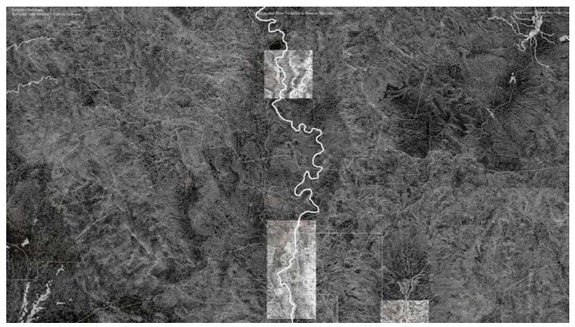
FRAME



TIME

[camera zooming into the town of Huasabas]
(02:55)

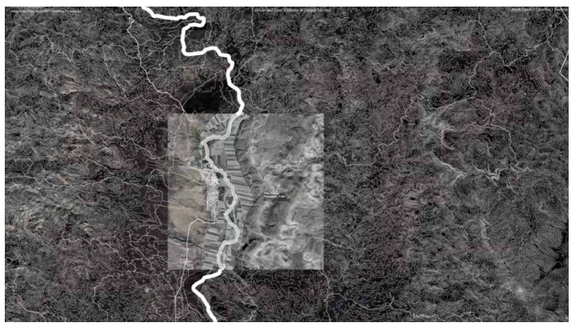
FRAME



TIME

[Camera zooming out]
(03:01)

FRAME



TIME

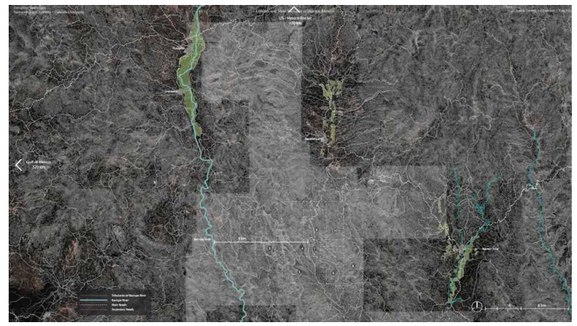
[camera panning into the border map of US and Mexico, showing the concession]
(03:05)

FRAME

TIME

[camera zooming into the town of Huasabas]
(03:09)

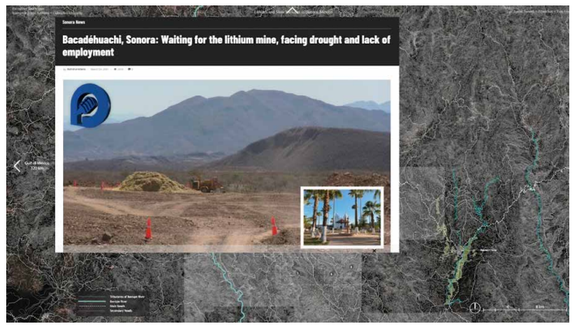
FRAME



TIME

[camera zooming out]
(03:13)

FRAME



TIME

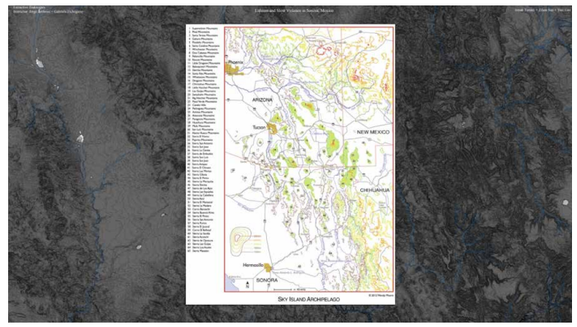
[Video clips of the locals are being shown]
(03:15)

FRAME

TIME

[Video clips of the locals are being shown]
(03:20)

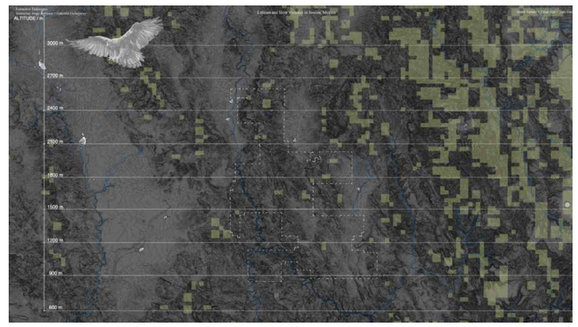
FRAME



TIME

[Climate mao is being shown
(03:33)

FRAME



TIME

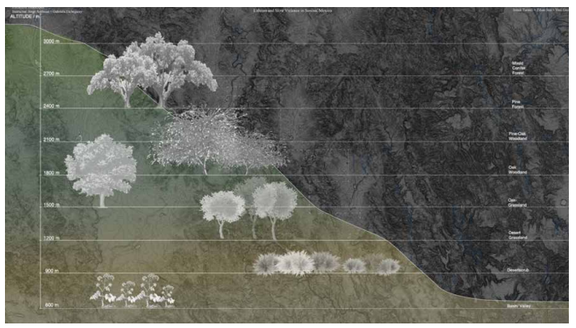
[Endangered species are getting introduced]
(03:49)

FRAME

TIME

[Endangered species are getting introduced]
(03:46)

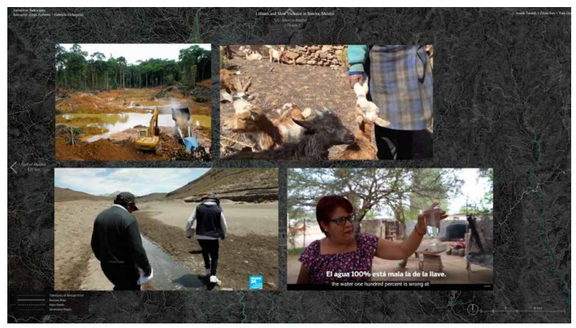
FRAME



TIME

[Endangered animals are getting introduced]
(03:49)

FRAME



TIME

[Video clips about deforestation and water contamination are shown]
(04:42)

FRAME

TIME

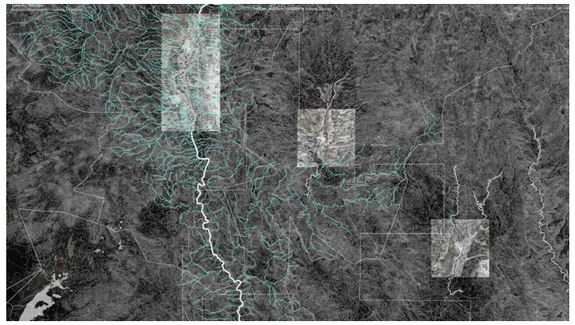
[Video clips about deforestation and water contamination are shown]
(04:59)

Storyboard

1:1000

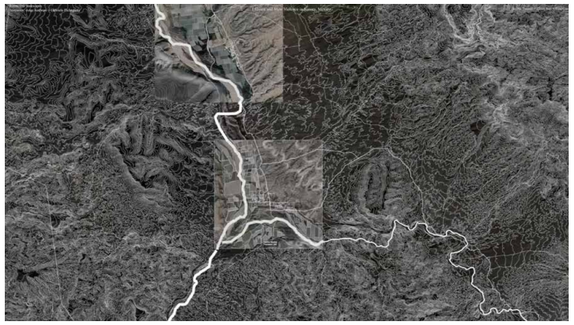
Irmak Turanli

FRAME

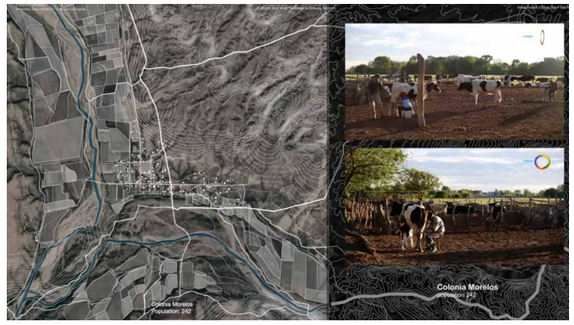


TIME

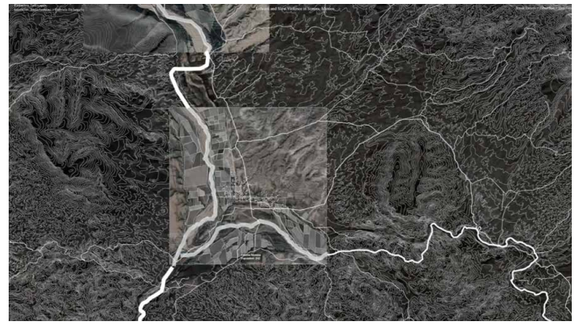
[camera zooming out]
(05:42)



[camera zooming into the towns]
(05:46)

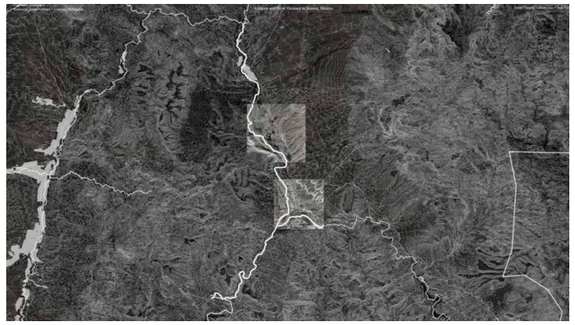


[camera zooming into Colonia Marelos]
(05:49)



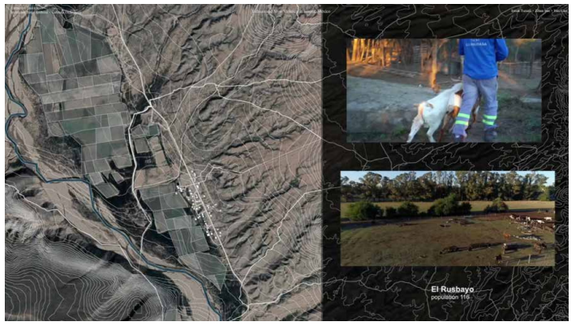
[camera zooming out of Colonia Marelos]
(05:51)

FRAME

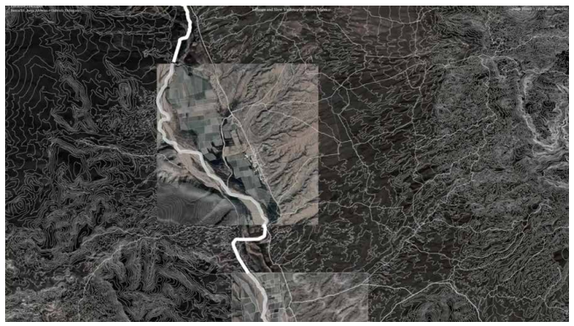


TIME

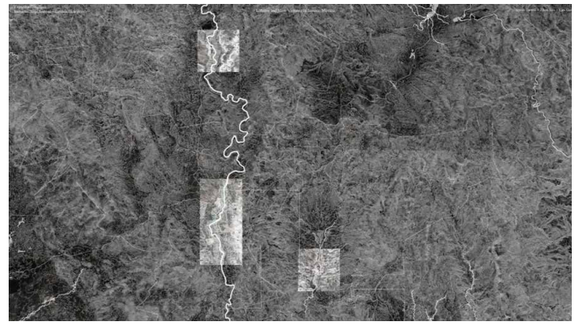
[camera zooming out]
(05:57)



[camera zooming into El Rusbayo] (06:13)

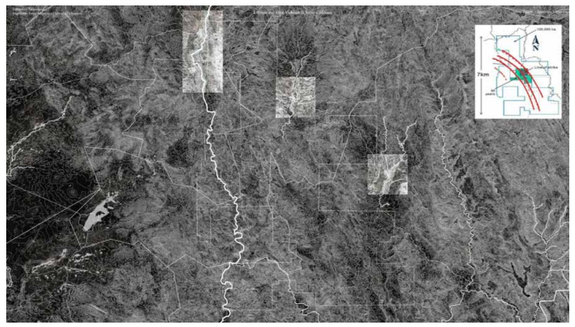


[camera zooming out]
(06:20)



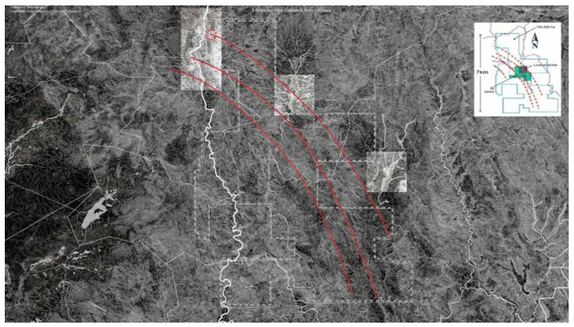
[camera zooming out]
(06:24)

FRAME



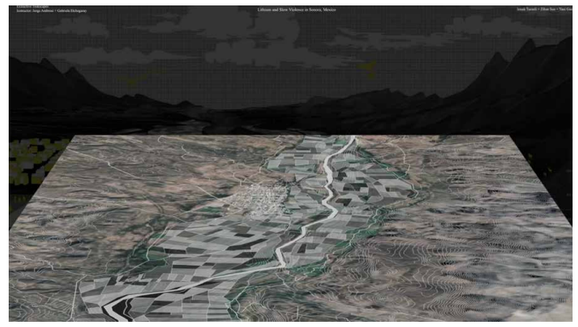
TIME

[camera panning into the border of Sonora, showing the concession] (06:25



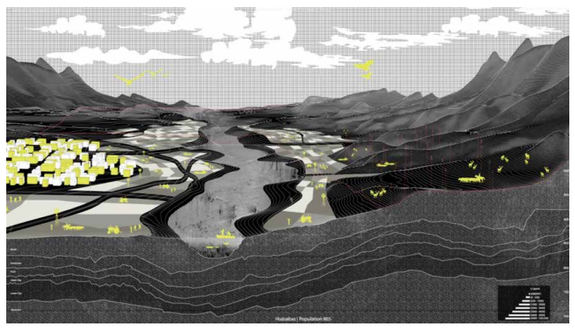
[camera zoom-in shows the interpreted next zone of struck near Huasabas]
(06:48)

[camera zooming-in near Huasabas]
(06:32)



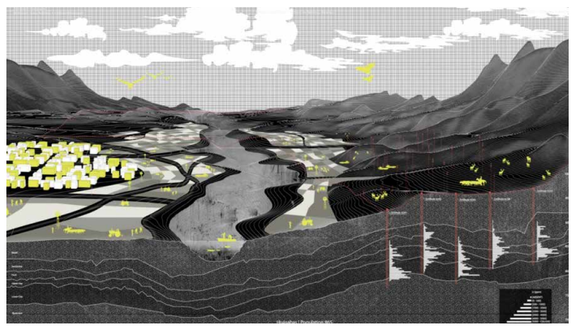
[camera shows the sectional perspective of Huasabas with the river and drilling rigs]
(06:36)

FRAME

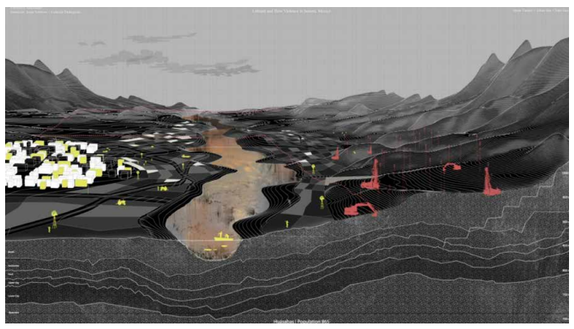


TIME

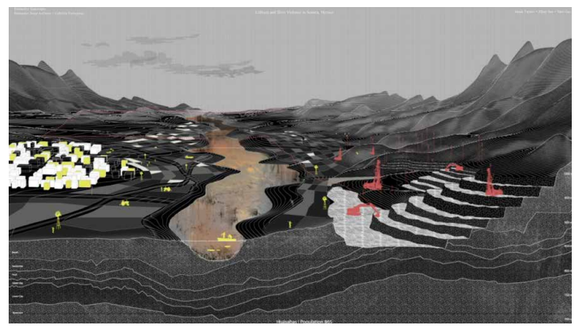
[camera showing the agriculture and livestock in Huasabas] (06:16)



[camera showing the drilling activity near the town] (06:54)



[camera showing the water contamination in Bavispe River due to drilling] (07:40)



[camera showing the water contamination in Bavispe River due to the extraction]
(07:45)

Storyboard

1:1000

Irmak Turanli

1:1000

Sea Level Rise in Rockaway Boardwalk

Transscalarities, Columbia University | Summer 2021
Professor: Andres Jacque
TA: Ultan Byrne
Site: Rockaway Beach, New York City

Through this course, I investigated the ways in which architectural devices of reference, which have shaped the discourse of the field over the last few decades, are characterized by their transitioning through spatial and temporal scales. I tried to explore the agencies architectural devices unfold through transscalar conditions—that is to say, the specific political modes that architectural devices perform, and the way they multiply their reach, influence, and sensitivity: for instance, from the microbiological to the mineral, the atmospherical, the ecosystemical, the genetic, and the planetary.

U.S. Army Corps of Engineers' Questionable Intervention at Rockaway Boardwalk

Why is sea level rise a military competence? Will the U.S. Army Corps of Engineers be able to bring a sustainable, ecological and long-term solution to the impact of sea-level rise on Rockaway Boardwalk? Currently, the US is at risk of losing land at many coastal areas including the Rockaway Boardwalk, where vital infrastructure and housing for thousands of residents currently exist. Over time, gradual sea level changes magnify the impacts of storm surge, and may eventually result in permanent inundation of this land.

Figure 1: Rockaway Beach after Hurricane Sandy

The Rockaway Boardwalk originally opened in 1931 and became a landmark of the peninsula. In the wake of Hurricane Sandy, which struck New York City in October 2012, Rockaway Beach has also become a testament to New York's resilience, and a model for sustainable rebuilding. (Figure 1) After Hurricane Sandy, more than $140 million was invested to repair and restore Rockaway Beach. As part of this work, intact sections of the boardwalk were repaired, damaged beach buildings were renovated with new boardwalk islands, and public restrooms and lifeguard stations were installed to replace destroyed facilities. Most importantly, long term shoreline protection and anti-erosion works began to cope with the consequences of rising sea levels and hurricanes.

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In 2014, in the wake of such need, New York City Department of Parks & Recreation partnered with the U.S. Army Corps of Engineers to reconstruct over 5 miles of the Rockaway Boardwalk as a means to declare sea level rise a military competence. The U.S. Army Corps of Engineers, a separate, permanent branch of the US Army established in 1802, was given the responsibility of keeping pace with the changing defense requirements of the country such as services in environmental management. In 2014, U.S. Army Corps of Engineers started the work in order for the 346,000 cubic yards (CY) of dredged sand to be removed from the inlet and to be pumped further west. (Figure 2) The method was used along Rockaway Beach to replace sand lost due to hurricane Sandy and heavy erosion in March 2018.

Figure2. U.S. Army Corps of Engineers' effort to bring dredged sand to Rockaway Beach.

Figure 3. Rockaway Beach after the storm in 2021

These efforts of replacing the dredged sand and the construction of 19 new jetties or "groins" have been controversial and its effects are being questioned. First of all, the replacement of that much sand is questionable due to its ecological consequences to the environment and especially to the hundreds of species living in the sea. Second of all, heavy storms hitting the Boardwalk in the 2021 have called into question the efficiency and effectiveness of replacing sand through dredging. (Figure 3) When a strong storm hit the area in February 2021, much of what the U.S. Army Corps of Engineers accomplished until 2019 had been wiped away. As can be seen in Figure 4, the new boardwalk had been widened and filled with sand in 2019. However as Figure 5 depicts, these efforts of bringing sand seemed to be wiped away after the snowstorm in February 2021.

Figure 4: Rockaway Beach in 2019, after the efforts of the U.S. Army Corps of Engineers of bringing sand to the beach.

Figure 5: Rockaway Beach in February 2021, after the snowstorm.

This questions the efficiency of the method deployed by the U.S. Army Corps of Engineers. Perhaps, such large scale human interventions to the natural environment could also have unexpected consequences. In conclusion, the relatively short-term failure of the actions of the U.S. Army Corps of Engineers challenges their competence in this area and highlights the importance of bringing long-term and sustainable solutions for sea level rising.

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Thank You!