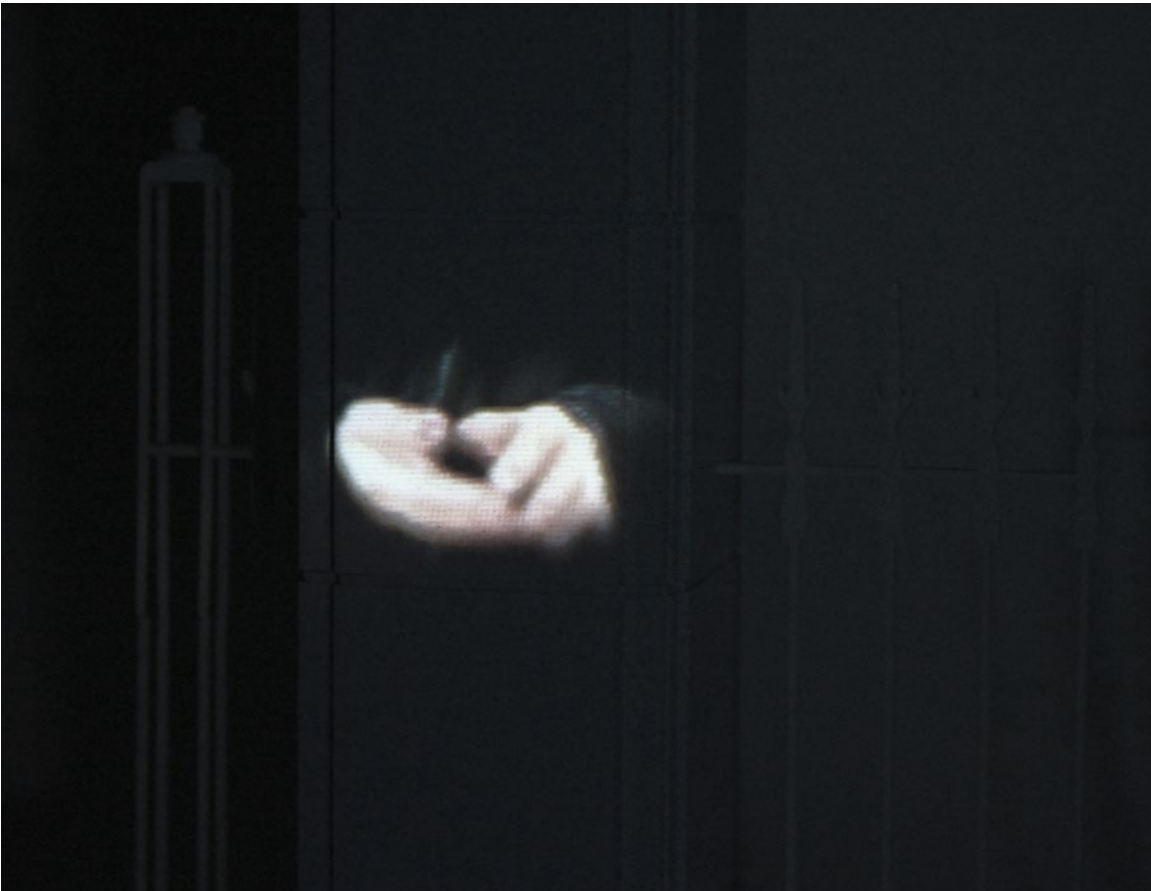




GRADUATION PORTFOLIO

M.S. ADVANCED ARCHITECTURAL DESIGN
COLUMBIA UNIVERSITY GSAPP

SITAN ZHU
CLASS OF 2025



*This book is dedicated to the year at Columbia GSAPP.
[The Guardians at the Gates] Spring 2025, Master Class, Individual Work*

SITAN ZHU
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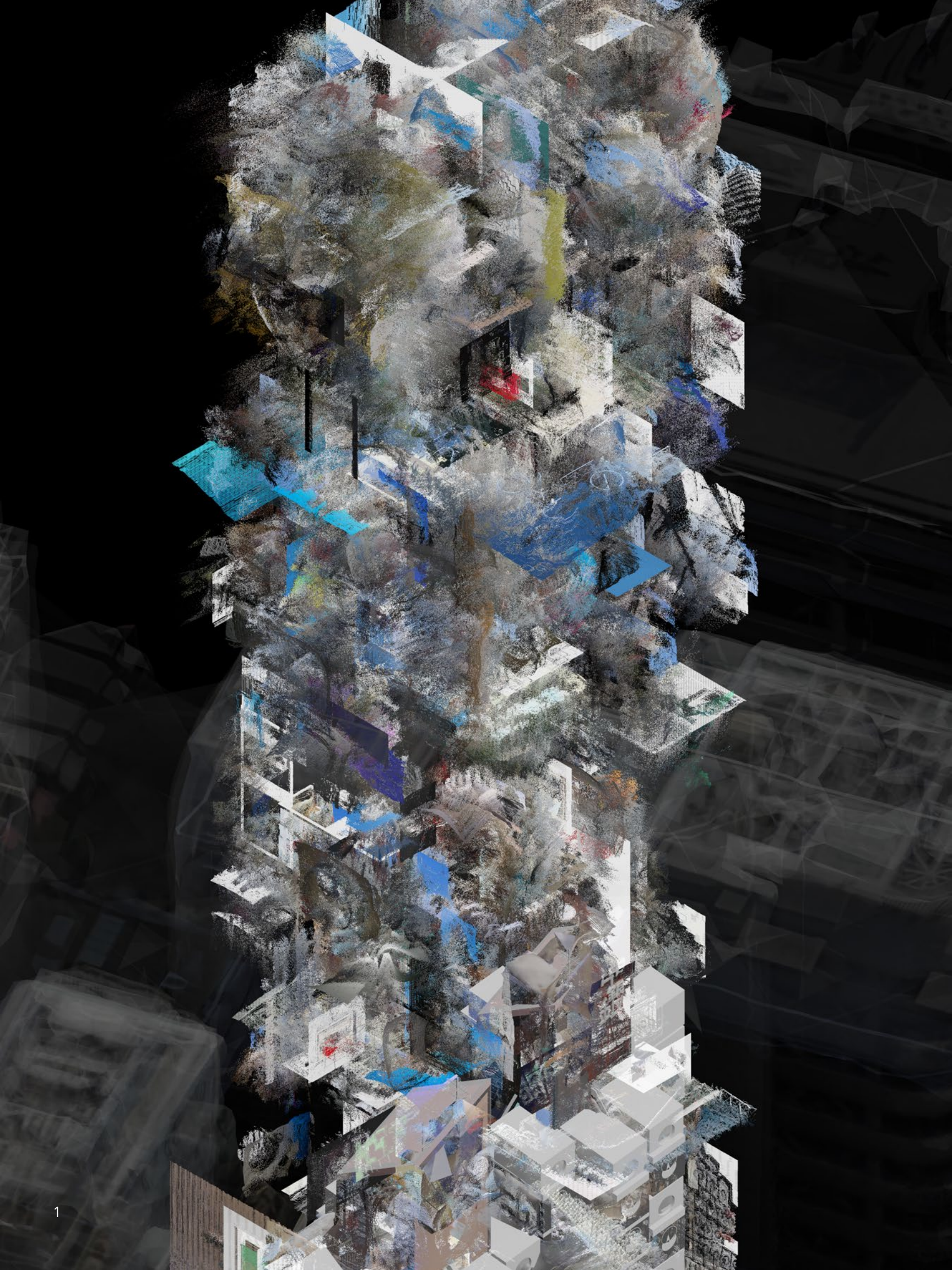
From a fine arts student to a professional architecture student, I realized the inclusiveness of architecture and the universality of knowledge, passion, and observational skills required to study it.

Different architectural projects will embody different insights into humanities and various other aspects, finally represented through architectural forms, spatial arrangements, and materials, encapsulating concepts and sustainability. While studying architectural history, I also observed the manifestos of each era and recognized the significant contributions that new construction technologies and materials can bring to architecture. This distinct inclusiveness shaped a unique growth and character formation process for me.

At Columbia GSAPP, I observed how research is developed into new forms of practice. In this portfolio, I tried to consider architecture from different scales, massings, and cultural backgrounds, which deepened my understanding of the inclusiveness of architecture.

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[Ghosts of Nakagin Tower]

Lost and Found in Translation

*Summer 2024, Advanced Studio Tutorial, Group Work
Professor Corneel Canaerts and Michiel Helbig
Partner with Hsiping Hung, hh3092@columbia.edu*

Through digitalisation of architectural practice and culture we have witnessed a shift from representation to simulation, from drawing to image. This shift in architectural media also affects how images relate to built architecture.

As design and construction is increasingly mediated through digital operations, images are increasingly shaping our physical environments. We can see traces of software and digital images in how buildings are constructed. This is visible in both high end projects using robotic and digital fabrication, but also in low-res, cheap materials of industrially produced building components. On the other hand digital scanning technologies, like Light Detection and Ranging and photogrammetry, are accessible on mobile phones, allowing for capturing existing environments and constructions as three dimensional files that can be integrated in architectural design software.

We take Nakagin Capsule Tower, built in Tokyo in 1972, as an example to further explore the idea of lost and found in translation. While the building is physically demolished, it has become part of our collective memory and a central reference in the history of 20th century architecture.



Link to Film



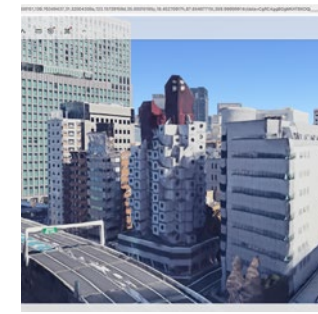
Form



Perspective



Materiality



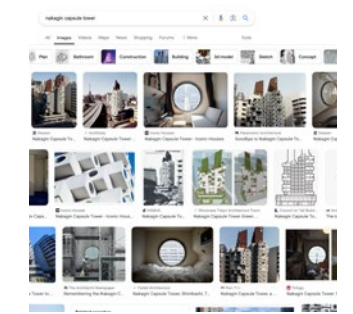
Google Earth



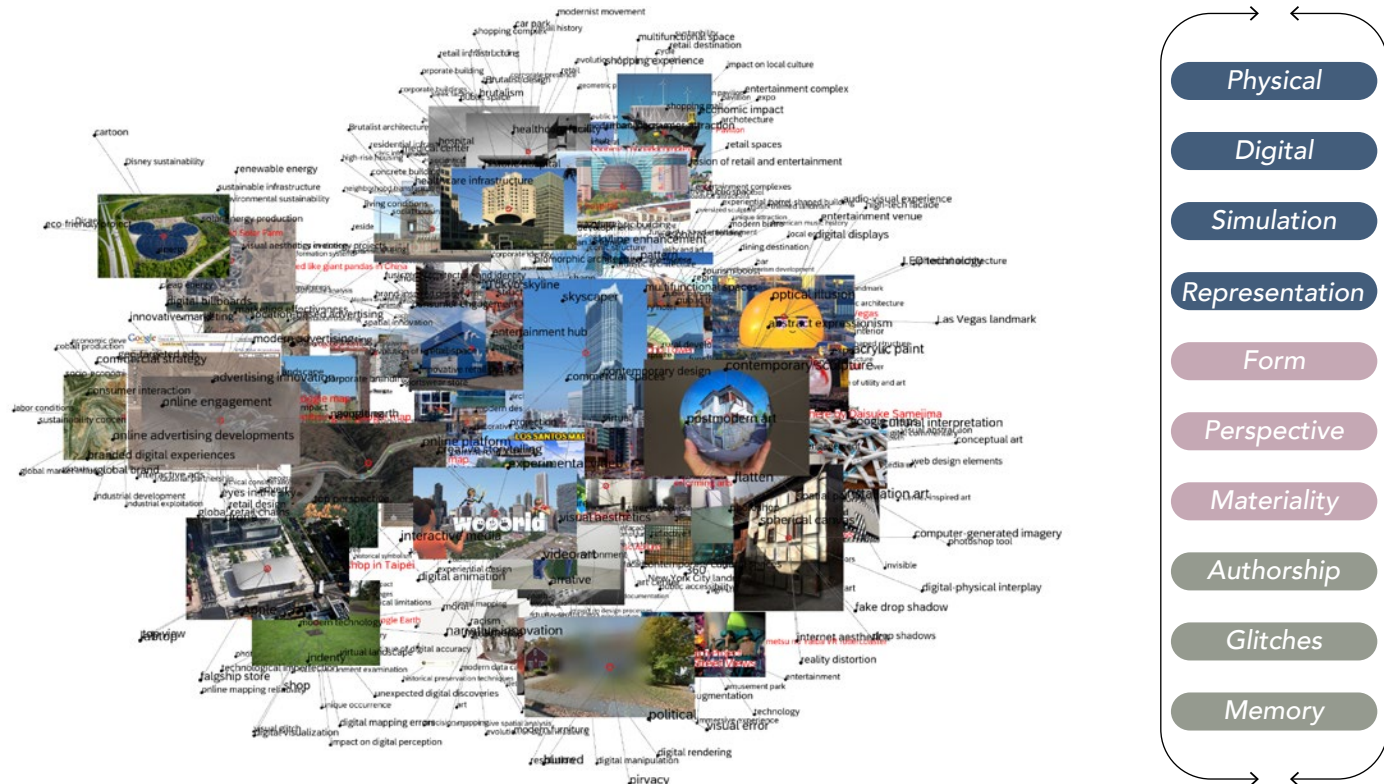
Google Street View



Digital Model

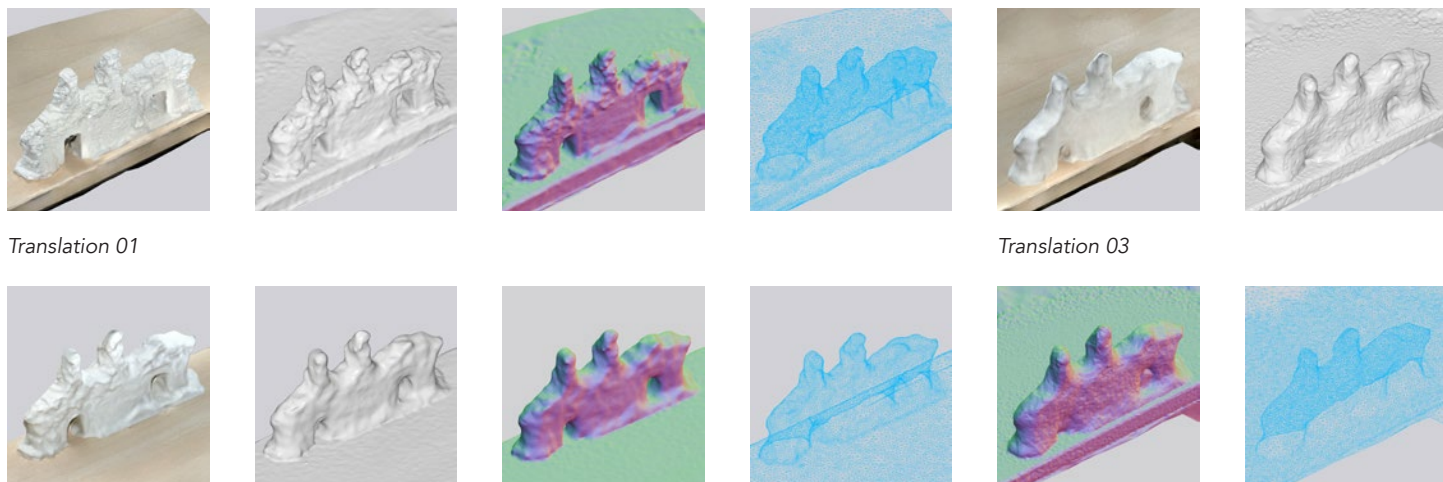


Online Information



Our research focuses on the shift from representation to simulation found in the operations of translation between digital and material and back. We are in particular interested in the potential of these processes, the errors, glitches and happy accidents introduced by translation, that could lead to novel post-digital materiality in architecture and provide our environments with a digital memory.

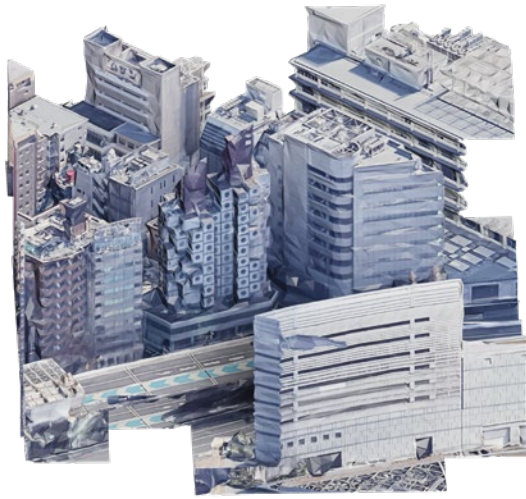
Nakagin Capsule Tower has left physical and digital traces in different media ecologies, in the form of images, models, descriptions, 3D scans, etc. For example Google Earth still displays its 3D model, but the building disappears when zoomed into Google Street View.



A Contrastive Study of Translation Between Physical and Digital Translation 02



Nakagin Capsule Tower Afterlife



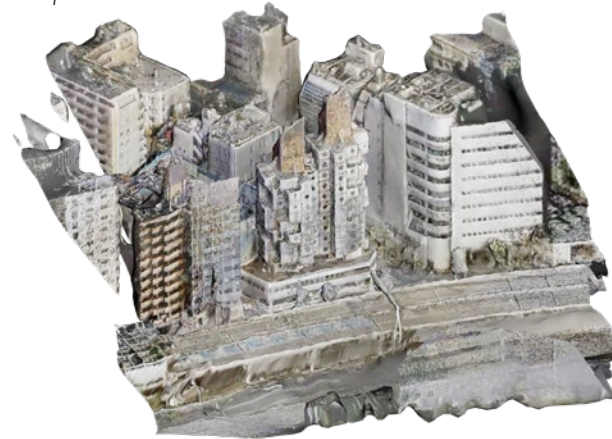
Google Earth



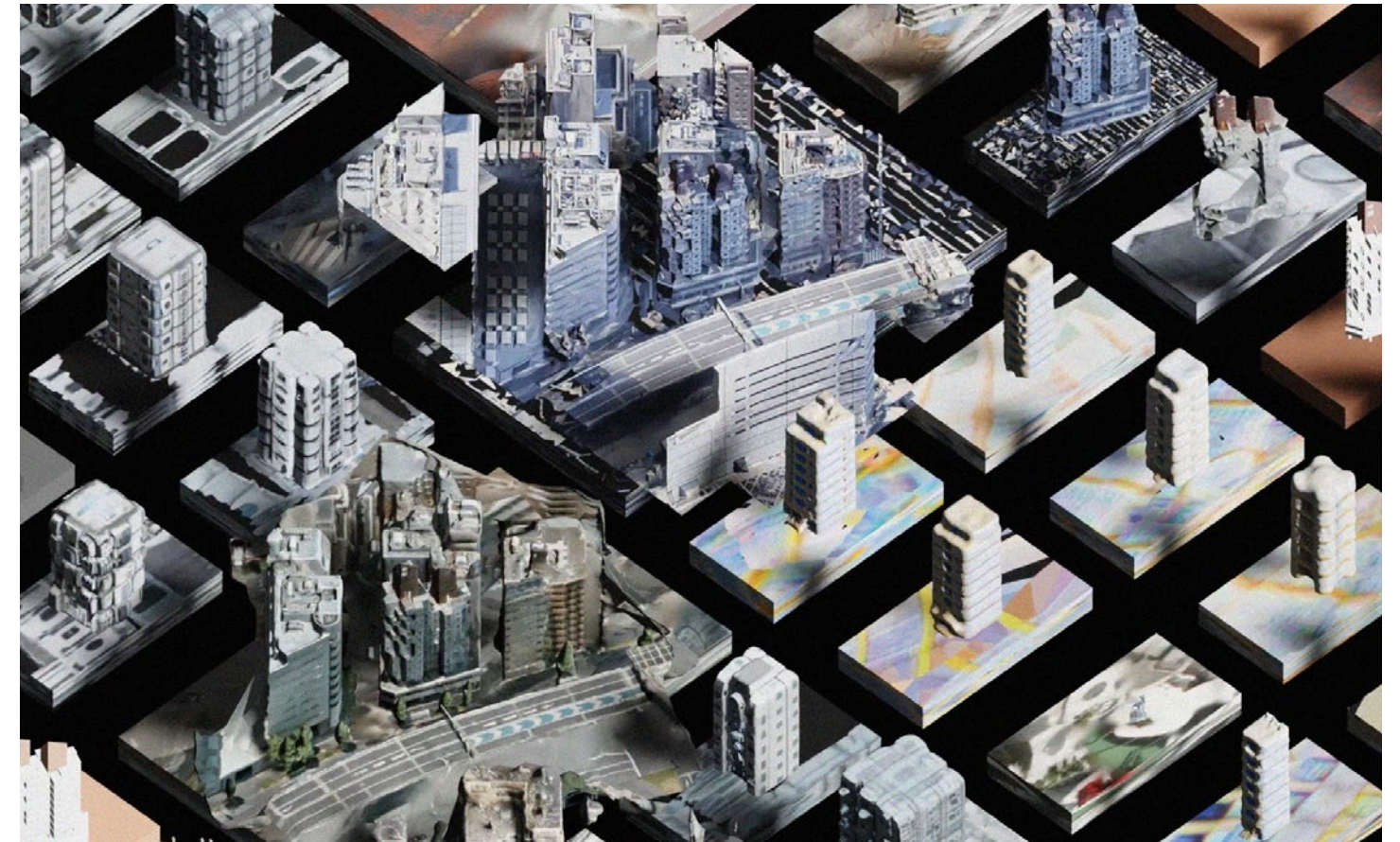
Apple Maps



Photogrammetry 01



Photogrammetry 02



Landscape Isometric



Version 01



Version 02



Version 03



Version 04



Version 05



Version 06



Version 07



Version 08



Version 09



Version 10



Version 11



Version 12



Version 13



Version 14



Version 15



Version 16



Version 17



Version 18



Version 19



Version 20



Version 21



Version 22



Version 23



Version 24



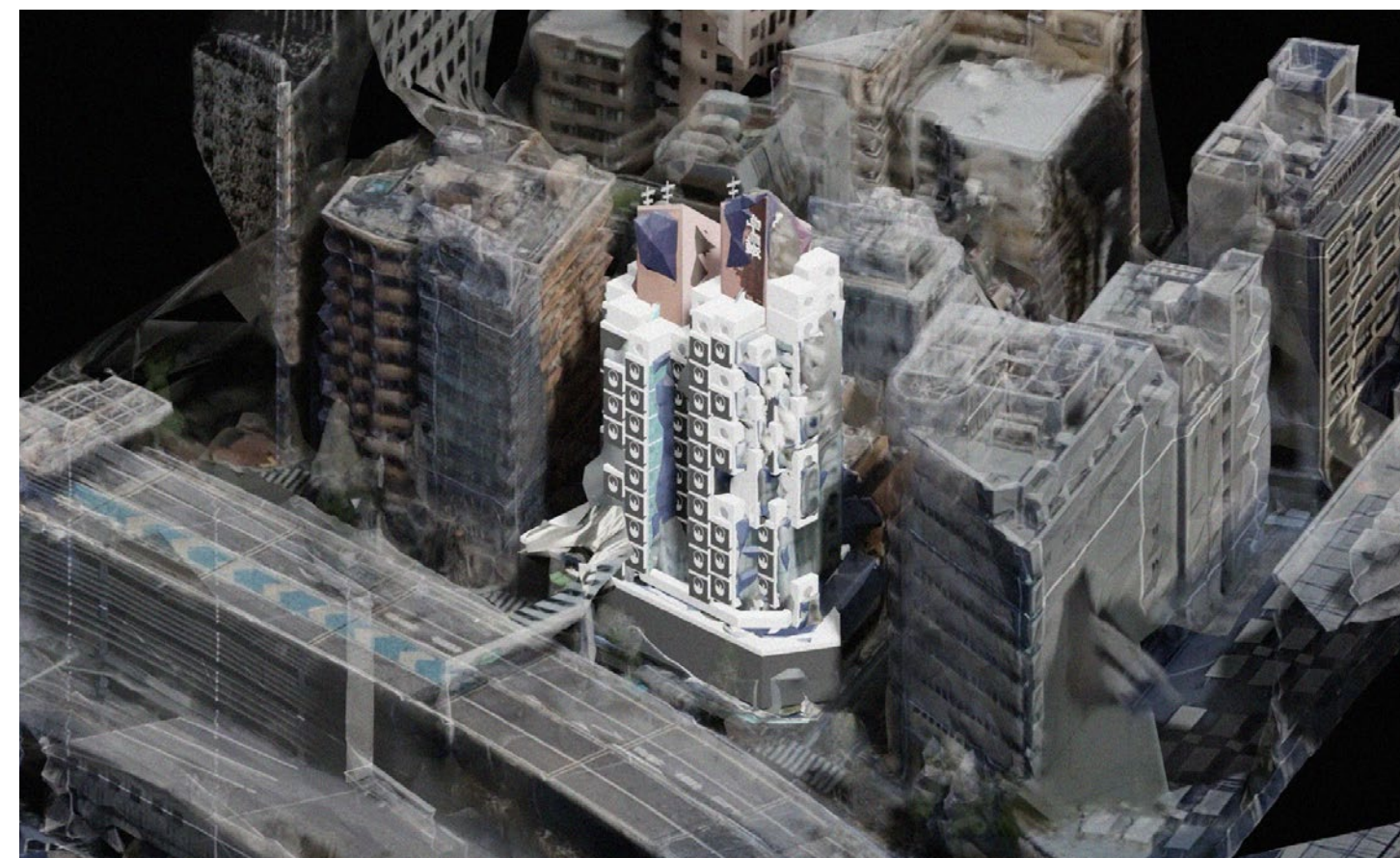
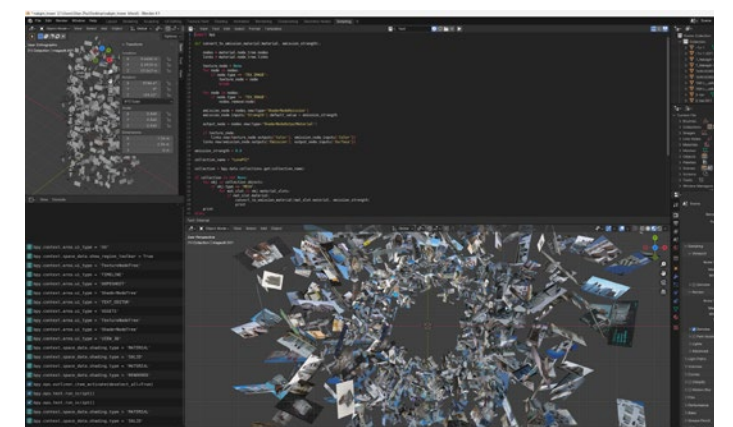
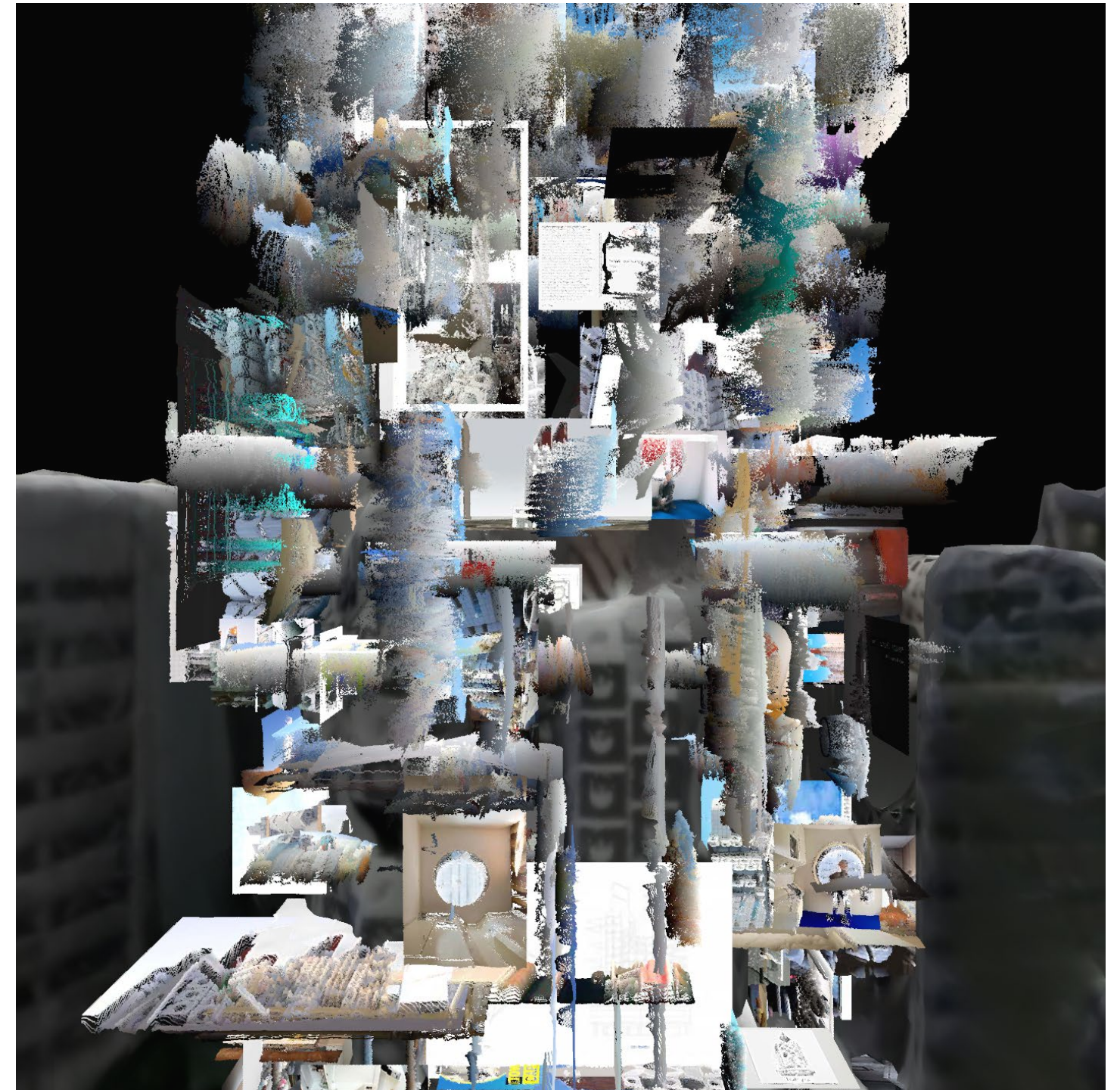
Landscape Full View

With images and traces online, the building is not digested but translated, and is still existing to some extent. By exploring similarities between metabolism and media ecology, images and glitches in the translation process, the project questioned the relationship between architecture and technology, existence and memory.

The idea of metabolism highlighted that a building should be capable of growth wherever and whenever required. Cities and buildings should be organic and ever-changing, and that they should use technology to grow flexibly and support human well-being. Through a comprehensive and contrastive study of Nakagin Capsule Tower, we argue a new complementation of metabolism in the post-digital era.



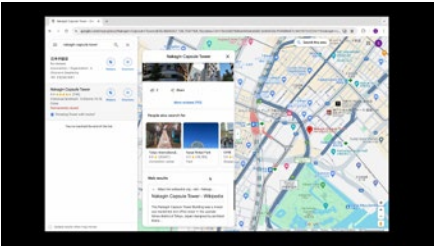
Interior with Traces Online



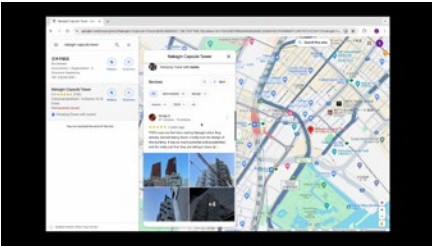
Scaling Different Versions

Reconstructing Nakagin Capsule Tower in 4D

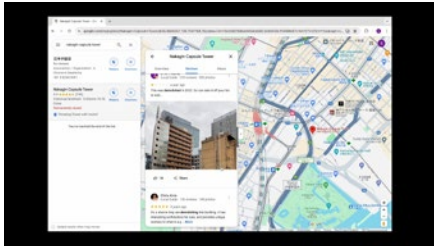
Left Screen Storyboard



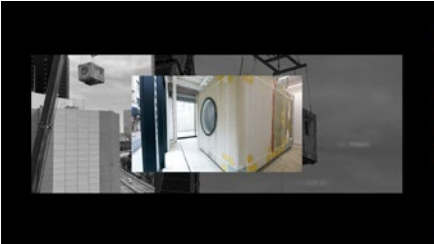
Searching on Google Maps



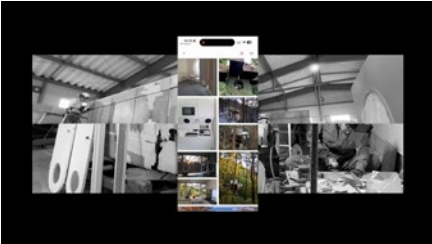
Traces Online



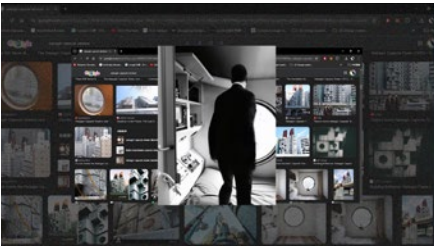
Traces Online



Afterlife of the Tower



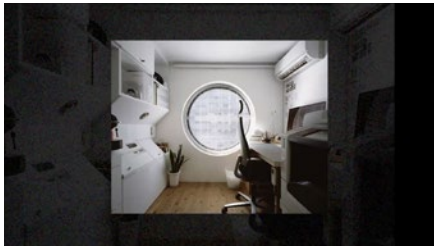
Afterlife of the Tower



Same Windows Different Memories



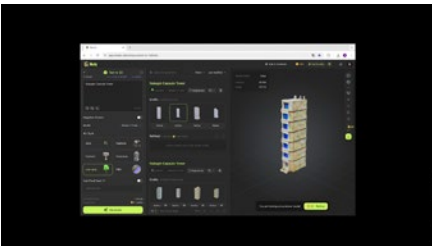
Same Windows Different Memories



Overlapping Windows



Data Cloud



Different Digital Model Versions



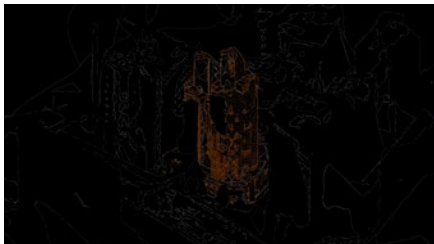
Nakagin Capsule Tower Skyline



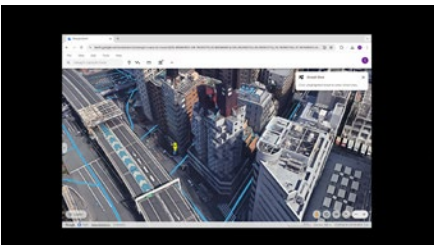
"Organic" Growth of the Tower



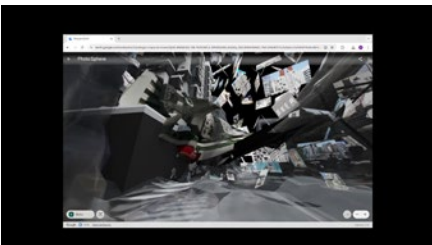
"Organic" Growth of the Tower



Scaling Different Versions

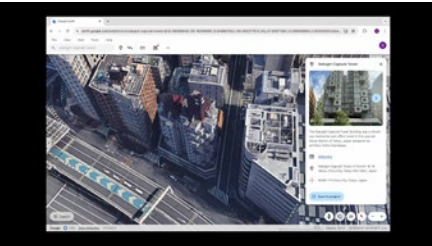


Searching on Google Earth



Updated Google Street View

Right Screen Storyboard



Remained on Google Earth



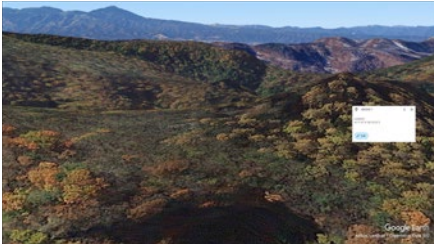
Demolished in Google Street View



Remained in Google Street View



Current Location of Capsules



Current Location of Capsules



Interior with Traces Online



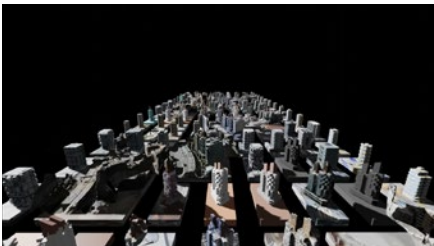
Window Point Cloud Zoom



Window Point Cloud Zoom



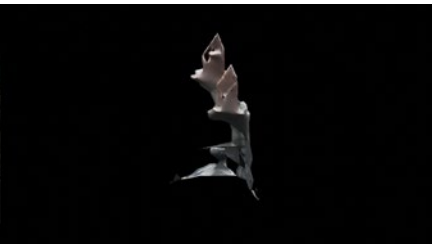
Reconstructing with Traces Online



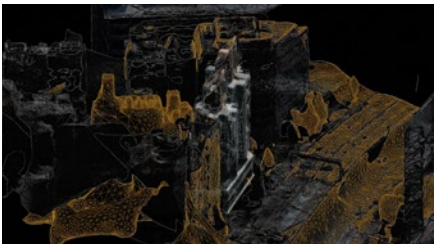
Nakagin Capsule Tower Landscape



Nakagin Capsule Tower Landscape



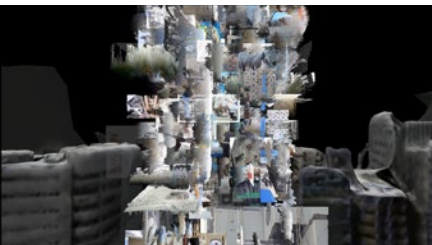
360-Degree Rotating Different Versions



Integrating Different Versions



Scaling Different Versions



Reconstructing Nakagin in 4D



Reconstructing Nakagin in 4D



Link to Film



[Little Wetland]

Reconfiguring Land and Water in New York City

*Fall 2024, Advanced Studio V, Group Work
Professor Michael Wang, mw3405@columbia.edu
Partner with Eric Zhou, lz2995@columbia.edu*

New York, like many modern cities built in and around water, holds land and water apart. Land reclamation, river channelization, sewage systems and the sealing of soils all separate water from the built environment of the city. Wetlands are the antithesis of the modern city: they emerge from the intermingling of water and land.

Wetlands are liminal spaces, developing where the ocean meets the shore, where rivers deliver soil to the sea, or where rain collects on its way from air to earth. Over the last four hundred years, the vast majority of New York City's wetlands have vanished, drained for development.

Today, fueled by climate change, water seeks its revenge on the city. Sea and river levels are rising, and more rain falls, often with unpredictable intensity, than in decades past. The project is a re-imagination of Little Island, which examines the existence of urban ecology and addresses the issue of contamination in wetlands by designing detoxification machines.



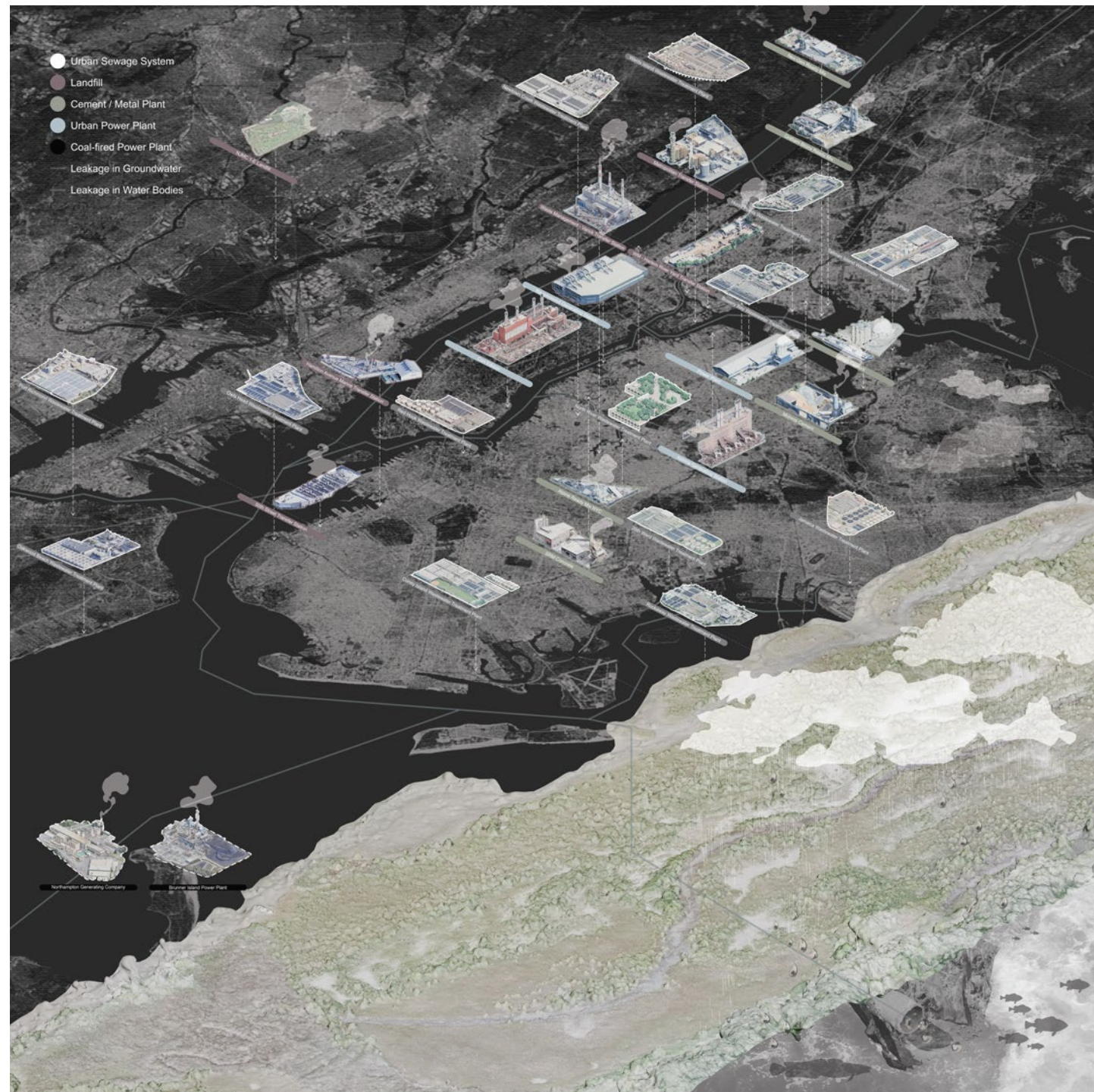
New York City Wetland



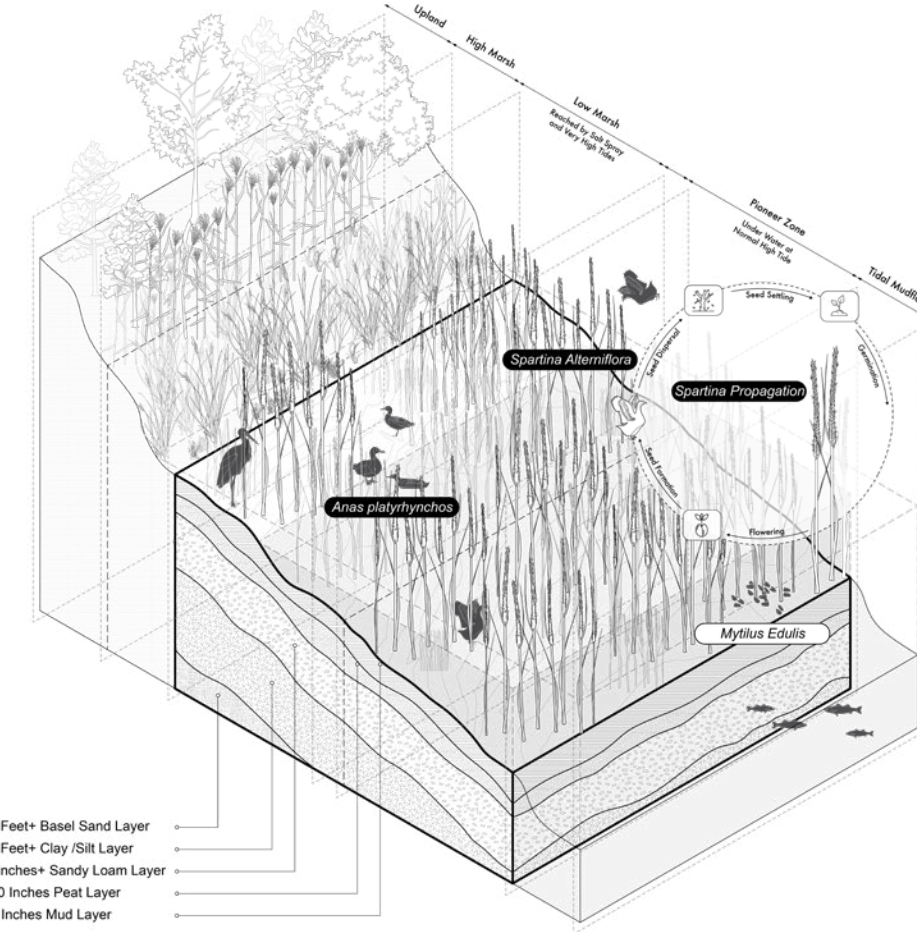
New York City Wetland



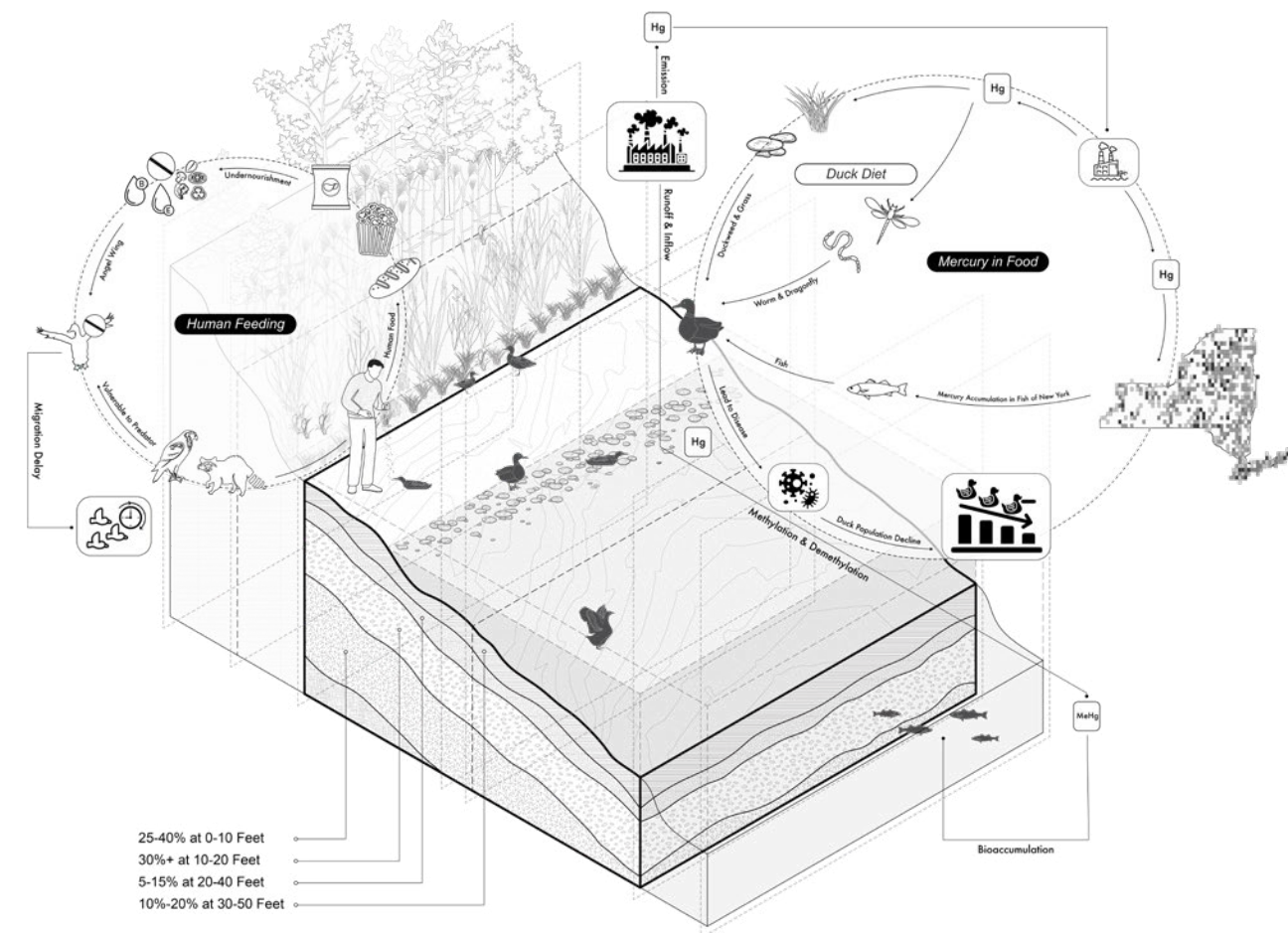
Wetland Contamination



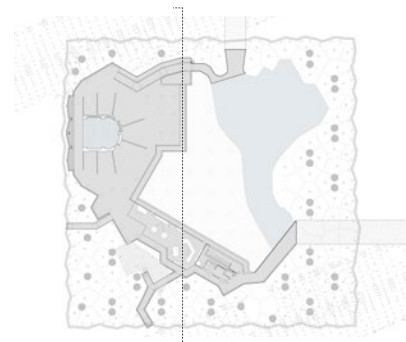
Mercury Emission in New York City



Wetland Organic Analysis



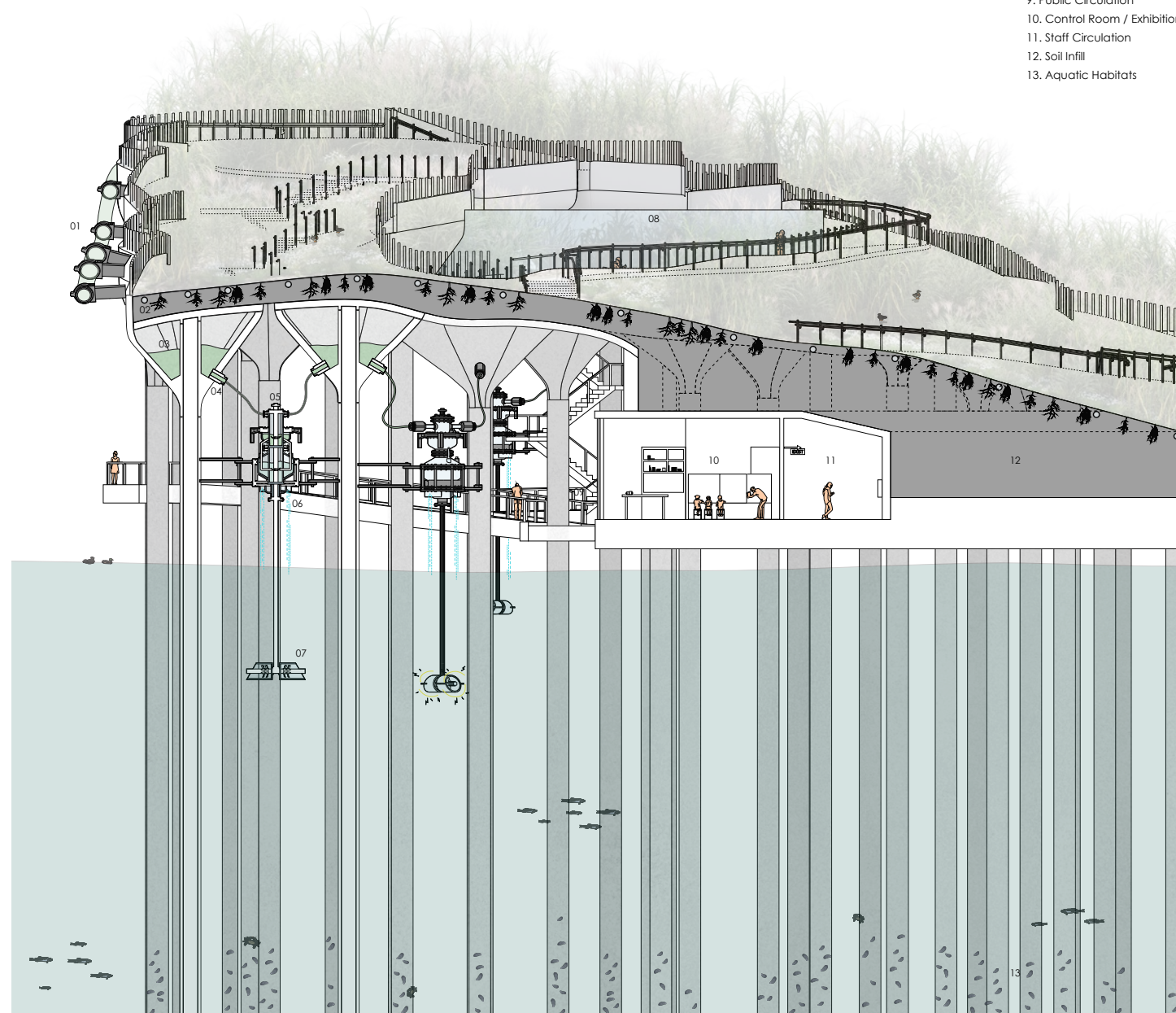
Wetland Inorganic Analysis



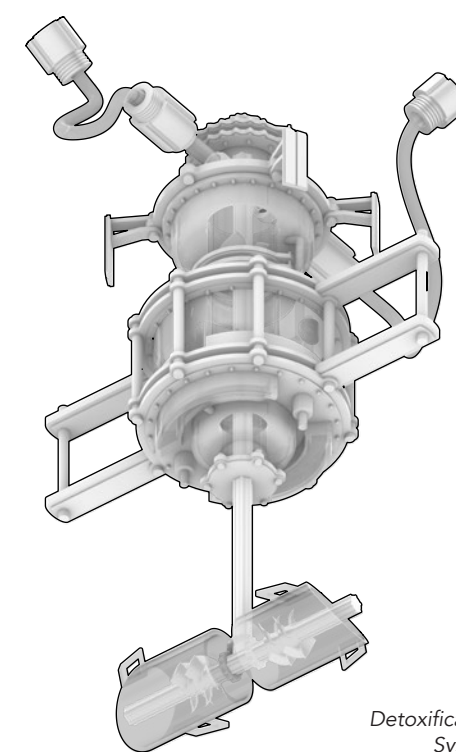
Renovated Plan

Little Island proposed to provide a natural connection in an urban setting, but its construction disturbs river habitats and sediments, and the landscape merely serves to attract people, not wildlife. By utilizing its fame and existing construction, Little Wetland transformed Little Island into a hybrid of wetland and machine that attracts, educates, and supports both humans and the ecosystem.

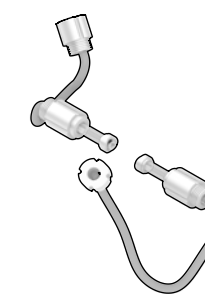
1. Water Supply Pipe
2. Irrigation Pipes
3. Toxin & Enzyme Collect
4. Toxin & Enzyme Extract
5. Bioreactor (Detoxification)
6. Clean Water Release
7. Tidal Energy Rotator
8. View Platform
9. Public Circulation
10. Control Room / Exhibition
11. Staff Circulation
12. Soil Infill
13. Aquatic Habitats



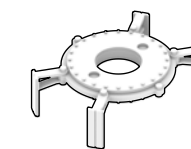
Renovated Section



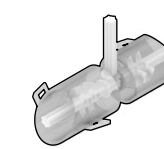
Detoxification System



Transfer Pipe



Wind Energy



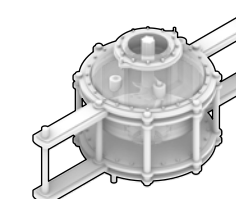
Tidal Energy



Power Storage



Enzyme Bed Rotator



Bioreactor



Skimmer Filter



Feeding Pump

People can only observe the the wetland from a respectful distance at the upper level, while the lower level provides a unique experience for visitors to closely observe the detoxification system. The system integrates three subsystems into an architectural machine that serves as a bridge between the wetland and the toxic environment.



3/8" = 1'-0" Scale Physical Model



3/8" = 1'-0" Scale Physical Model



Little Wetland Rendering 01



3/8" = 1'-0" Scale Physical Model

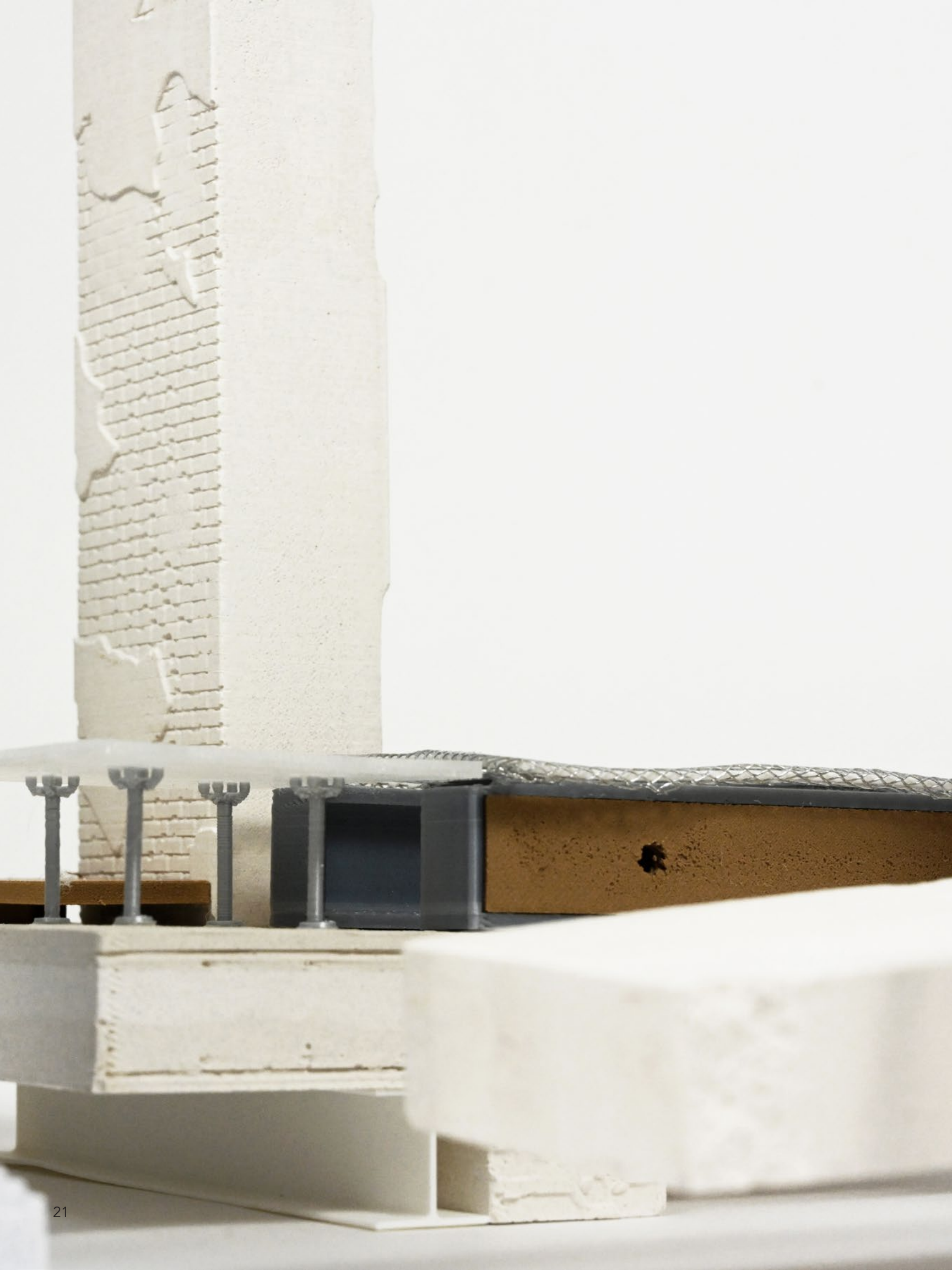


Little Wetland Rendering 02



Little Wetland





[Museu Nacional]

Revealing Presence Through Absence

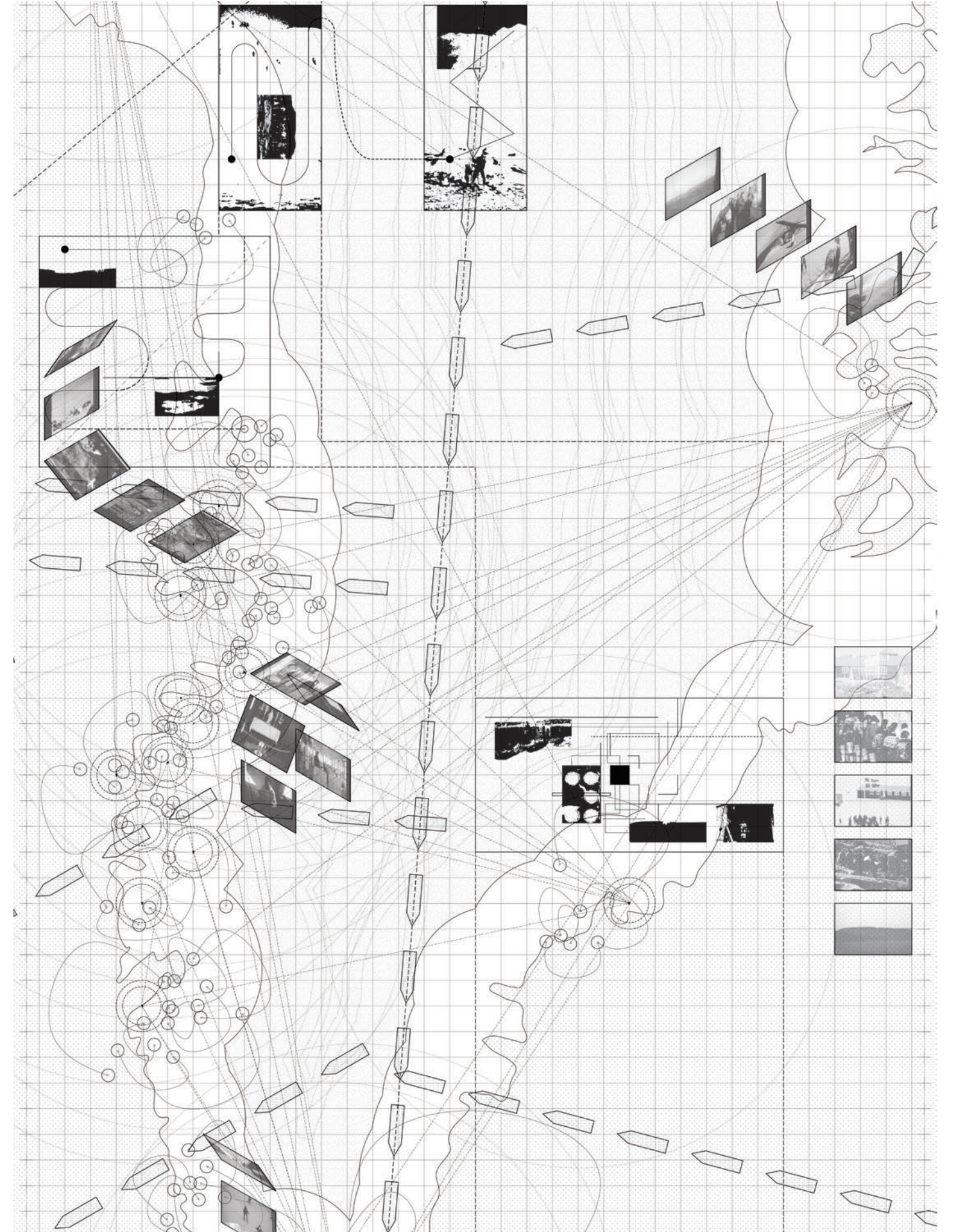
*Spring 2025, Advanced Studio VI, Individual Work
Professor Mario Gooden
mag6@columbia.edu*

The National Museum of Brazil has experienced several “ends of the world”, through colonialism, extraction of Indigenous knowledge, decline of power, and fire. It was a place where knowledge was taken and controlled, in which Indigenous knowledge, religious beliefs, and cultural objects were removed from their original contexts and put on display. The ruin left by the fire is emblematic of these catastrophes. Therefore, the absence of the artifacts and the presence of the ruin articulate how loss itself becomes a form of knowledge, revealing how memory becomes visible through what no longer exists.

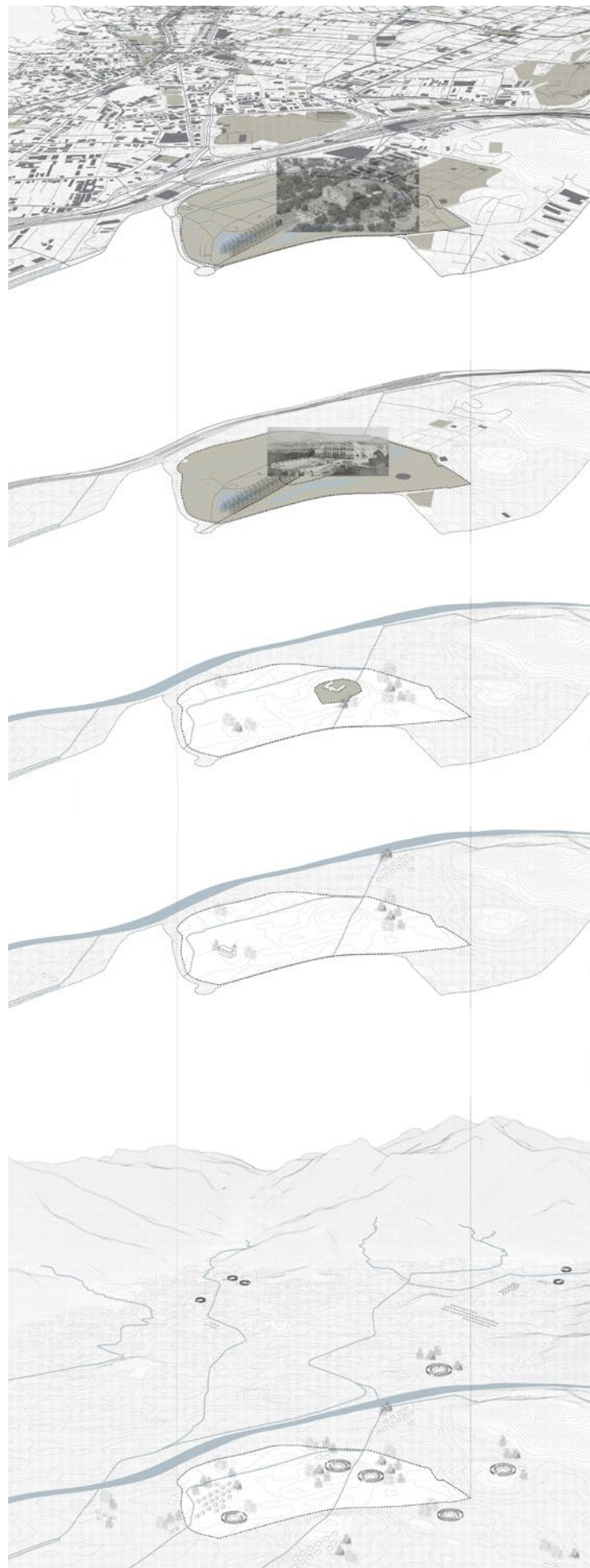
I consider the current site of the National Museum of Brazil, including the current public park it's sitting on, a site of five catastrophes. I was particularly interested in the continuous catastrophes that have taken place in this specific place. These events reflect not only physical destruction but also the long history of displacement and transformation. The project proposes architectural interventions within the post-fire context, where absence becomes a generative space to re-inscribe memory and reframe knowledge.



The Alien School of Drawing Epistemology and Liberation



Forensic Art Analysis (Drawn with Cyrus Du)



Five Historical Phases

Before Europeans came in 1500, this land was home to Indigenous peoples. They lived in communal dwellings called oca, oval-shaped structures made from wood and palm leaves, adapted to the environment. This was soon disrupted by colonial expansion.

From 1500 to 1759, the site was a Jesuit farm, marking early Portuguese colonialism in Rio. Jesuits converted Indigenous people and imposed European religion and customs.

In 1759, the Portuguese Crown expelled the Jesuits, fearing their influence. The site became private land owned by Elias Antônio Lopes in 1803. He built a house with a view of Guanabara Bay, inspiring the name “Quinta da Boa Vista” (Good View Farm). The two-story house had storage below and living quarters above, forming the site’s future core.

In 1808, the Portuguese royal family’s arrival changed the site’s role. The property was gifted to the King, ending its private use and turning it into a royal palace. Rio became the center of the Portuguese Empire. From 1808 to 1892, the palace underwent renovations reflecting its political role.

After the Empire ended in 1889, the palace became the National Museum in 1892. It held artifacts from Brazil’s imperial era and indigenous cultures. While preserving history, the museum also reflected power. A devastating fire in 2018 destroyed over 90% of the collection.



Site Visit



3D Scanning



Digital Reconstruction



Archival Photograph

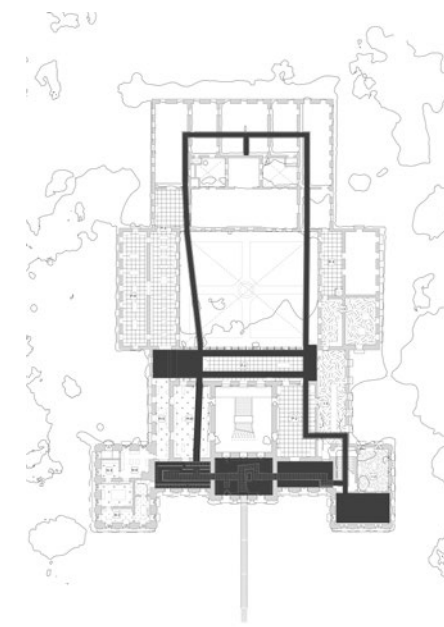


Forensic Investigation with Scanned Model

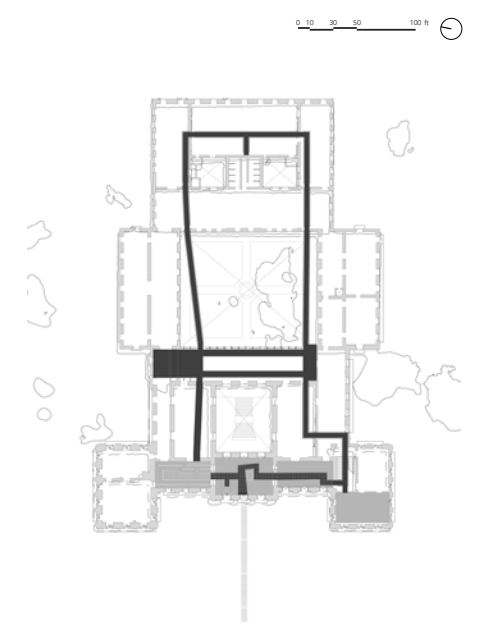
This scan captures the ruin, adding another layer to the history. The museum has witnessed catastrophic transformations: colonial appropriation, religious imposition, privatization, imperial occupation, and institutional destruction. By breaking down each layer, I visualized how knowledge has been continuously extracted and recontextualized.



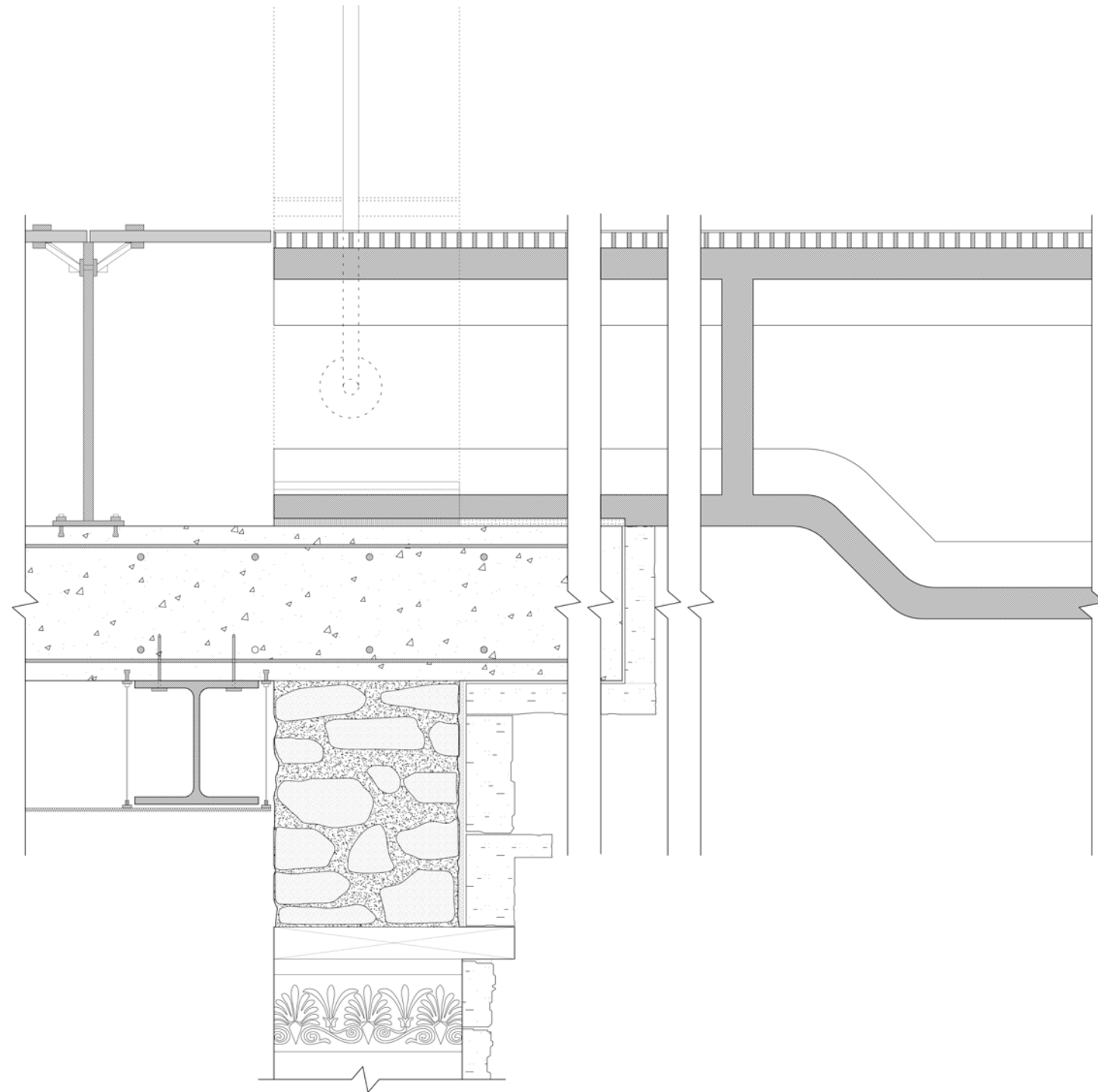
Ground Floor Plan



First Floor Plan



Second Floor Plan



Architectural Intervention 01

The project is not a renovation, but a spatial argument that considers knowledge not as something merely preserved, but as something continuously redefined through presence and absence.

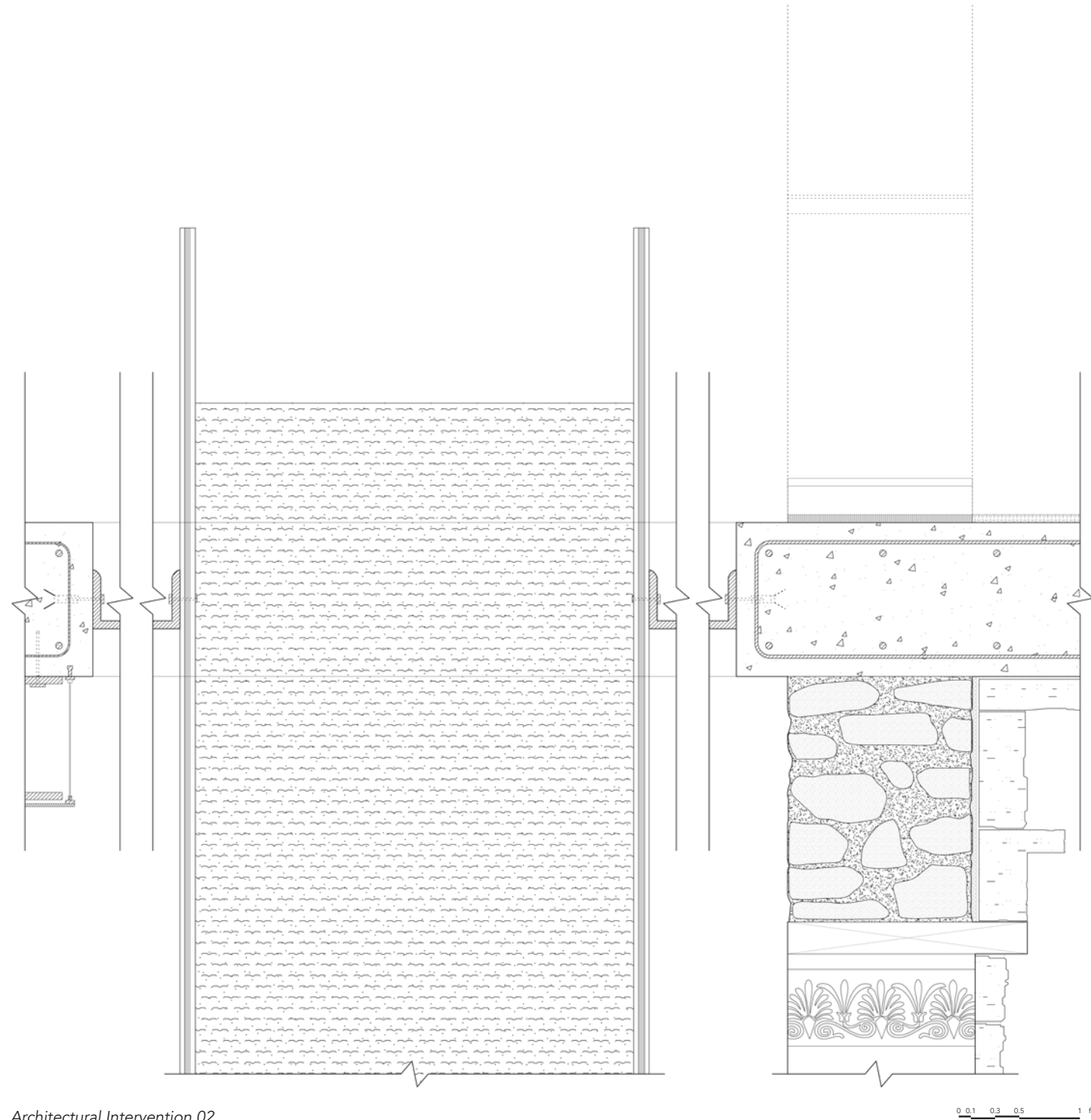
The first interventions aim to build a sequential experience inside the ruin, one that responds not just to the fire, but to all five historical catastrophes embedded in the site. The experience starts at the first level of the museum; the path leads into the original balcony. Walkways allow visitors to connect with an elevated glass floor that preserves the ruined floor below. The floor is supported by spider joints, which suspend the new circulation above the ruin without touching or altering the existing structure, emphasizing preservation through lightness and precision.



Architectural Intervention 01 Rendering



1"=1'-0" Scale Physical Model



Architectural Intervention 02

The second intervention corresponds to where indigenous ceramics were displayed. I selected two specific ceramic types and used voids and extrusions to make their absence visible. The first is from the Marajoara culture, known for its highly complex social structures and intricate pottery. The second is from the Tupi-Guarani peoples, whose ceramics were primarily utilitarian, used for cooking, storage, and ritual practices.

By creating voids on the ruined floor and ceiling, the absence marks the presence of the artifacts. These voids exist in the positions where the ceramics were displayed. Inside the glass cases, the ceramics have disappeared but are replaced by clay, nature, including plants, can grow inside. The remaining artifacts in the room are echoed with empty clay stands.

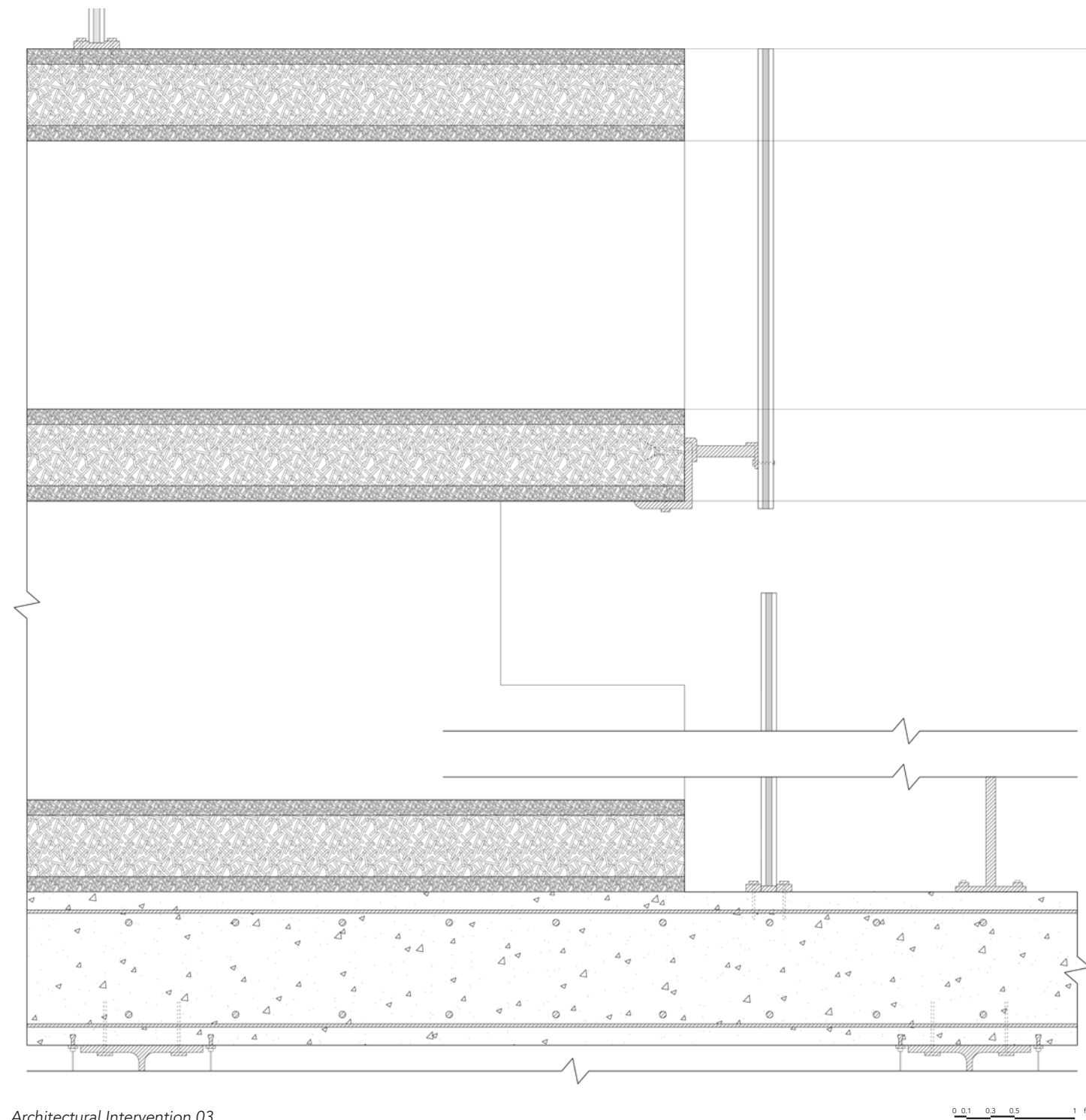
These voids are not reconstructions, but spatial traces that reference what was lost.



Architectural Intervention 02 Rendering



1"=1'-0" Scale Physical Model



Architectural Intervention 03

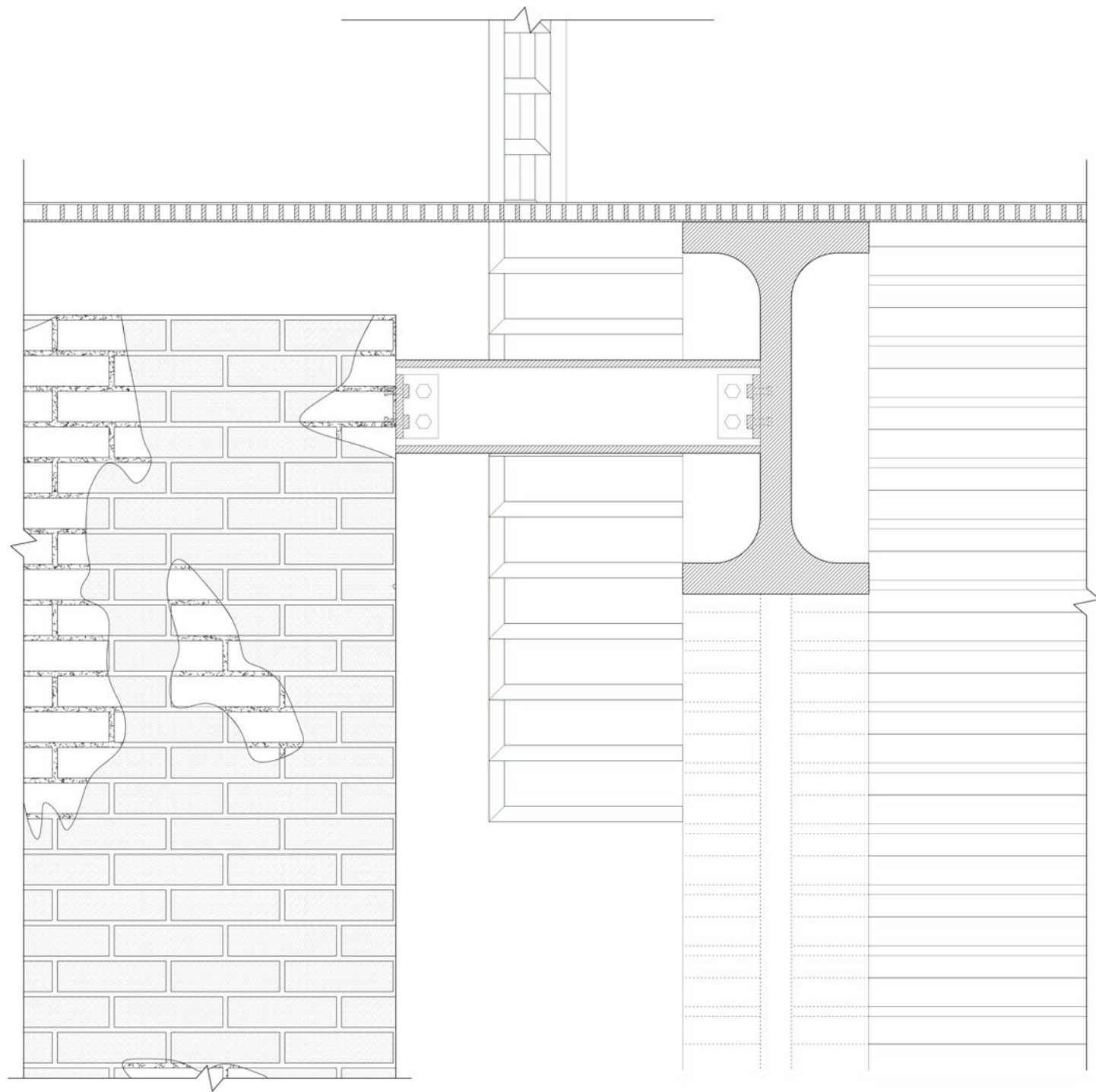
In the adjacent room, the third intervention responds to the display of the Zoólito, a fossilized carving found in sambaquis. Sambaquis are layered cultural landscapes, part cemetery, part village, part monument, constructed over generations by indigenous communities. In this intervention, I propose a participatory element: visitors bring earth materials to contribute to a growing mound, forming a contemporary sambaqui. This collective act restores cultural memory through embodied engagement, transforming the museum from a place of extraction into one of contribution and continuity.



Architectural Intervention 03 Rendering



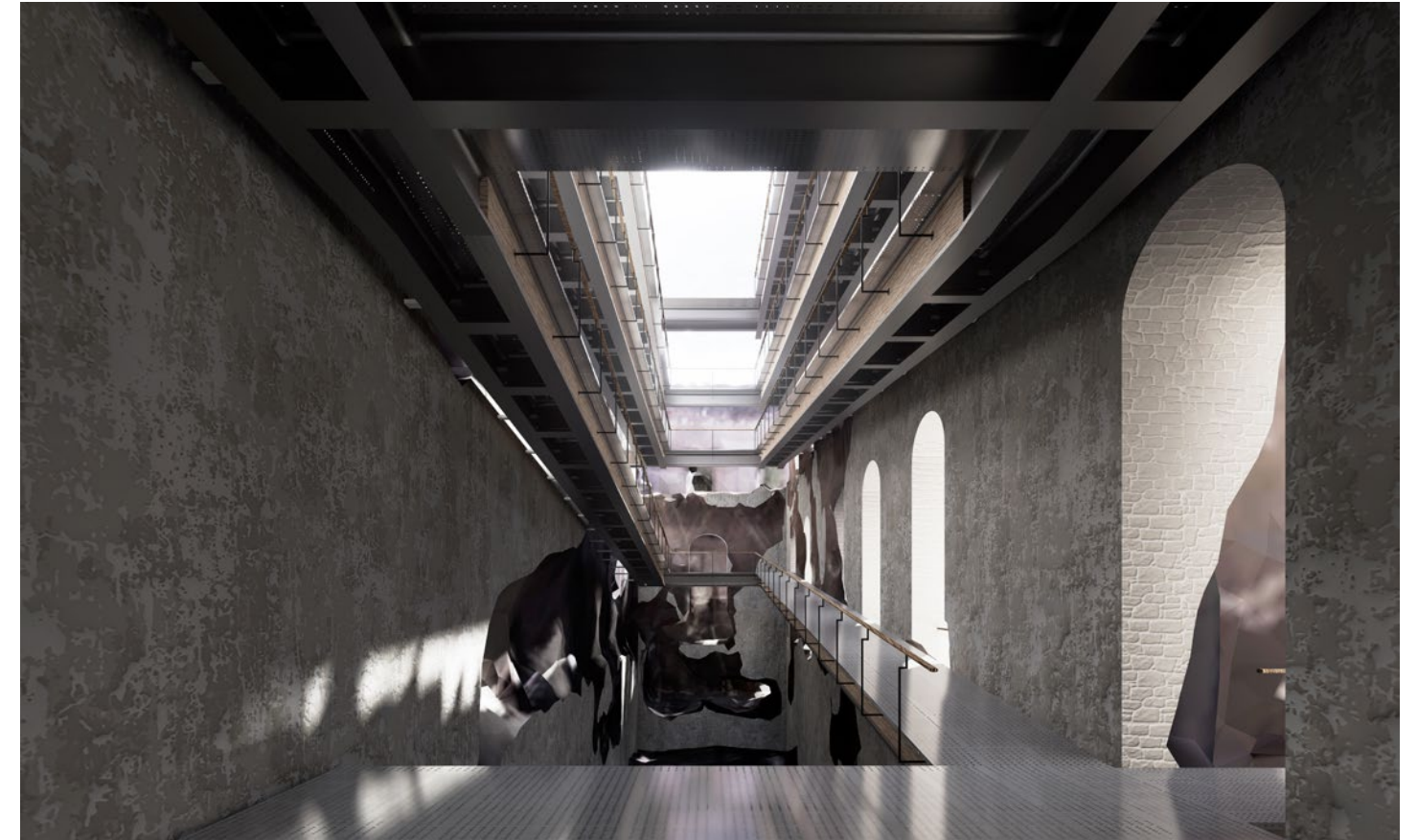
1"=1'-0" Scale Physical Model



Architectural Intervention 04

Finally, the fourth intervention includes a ramp and observation platform, continuing the circulation that brings visitors to the museum's roof level. This intervention responds to the private farm phase, when the Portuguese merchant Elias Antônio Lopes named the site Quinta da Boa Vista (Good View Farm) because of its view of Guanabara Bay. However, modern urban development has made that view invisible from the ground level. The ramp is connected to the existing wall, but gaps between the walkway and the wall reflect the catastrophes separating past and present.

This looped circulation allows visitors to experience the Indigenous display, the roof level, the church, the throne room... Through these interventions, the project presents the ruin not as a site of loss, but as a spatial archive where memory, absence, and transformation become tools for reinscribing history and knowledge.



Architectural Intervention 04 Rendering



1"=1'-0" Scale Physical Model





[GSAPP Electives]

Historic Preservation, Representation, Computation, and Building Technology

*Fall 2024 to Spring 2025
Individual Work
Forstheim2025*

GSAPP electives offer both technical depth and conceptual insight that complement the advanced studios. By focusing on visualization-based electives, I centered my coursework around representation techniques essential to architectural communication and design development.

In Visualization Techniques in Architectural Preservation, I explored 3D scanning as both a documentation method and a design tool. It connects historical accuracy with contemporary interventions, integrating digital technologies into preservation strategies. In Rendering Systems, I learned to construct spatial narratives through light, material, and layered imagery, pushing visualization beyond representation into speculative spatial thinking.

Video projection offered yet another mode of architectural representation, allowing me to experiment with how temporal media can activate monuments and reinterpret historical spaces. Finally, Seminar of Section reframed section drawing as both an analytical and generative tool, revealing how section influences form, material, and spatial experience.

[Cathedral of St. John the Divine]

Visualization Techniques in Architectural Preservation



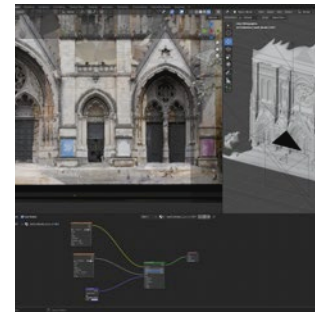
01 On-Site Scanning



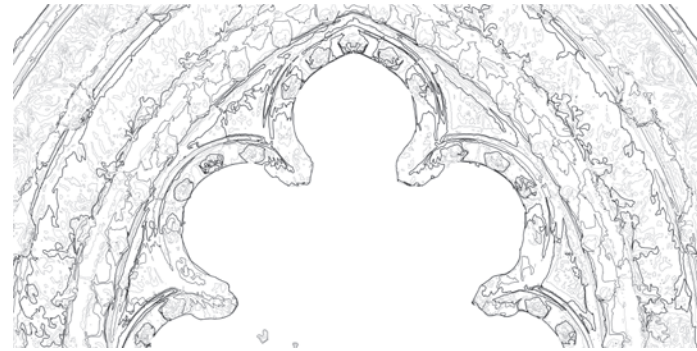
02 Faro Scene



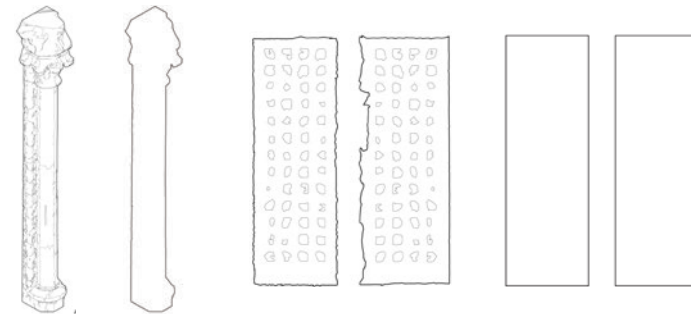
03 Reality Capture



04 Blender Rendering

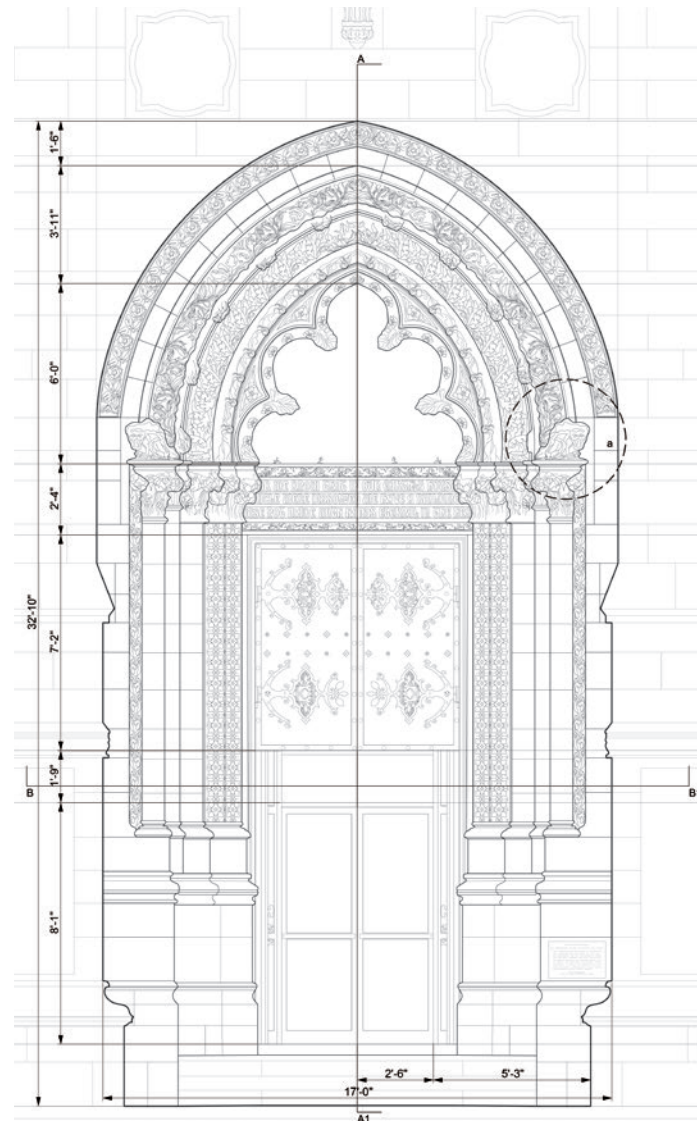


Live Trace Arch Detail

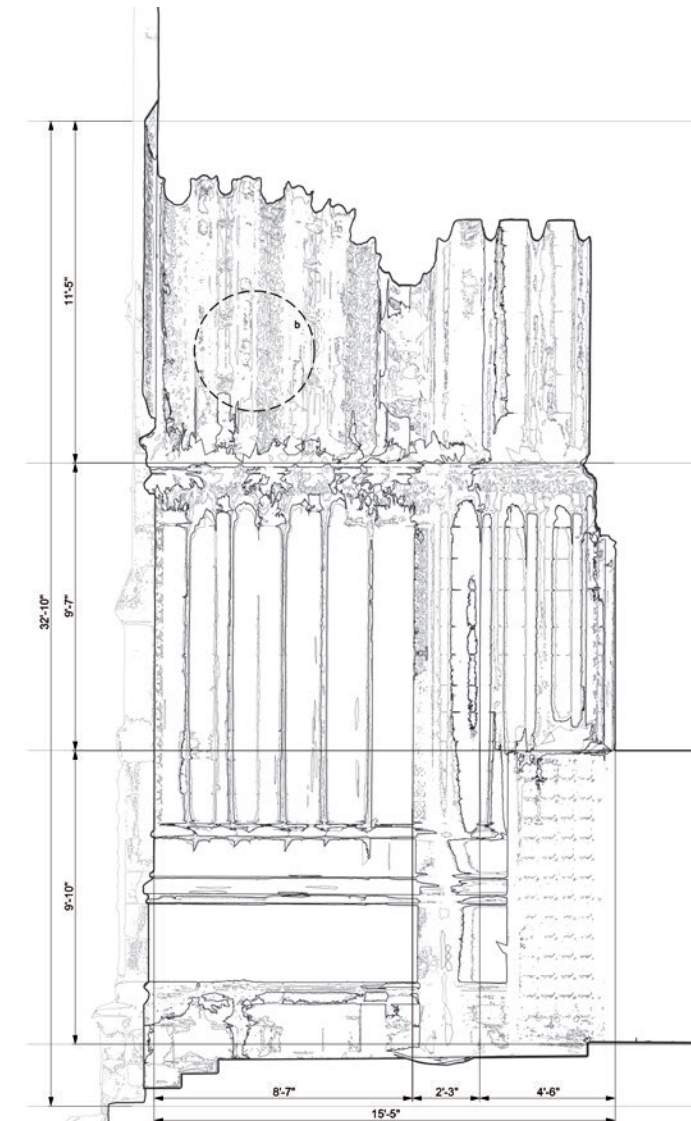


Extracted Detail

45 Square Feet
 Total Door Surface Area



Analog Elevation



Section A-A1



Facade Perspective Rendering



Bay 4 Close Up Detail

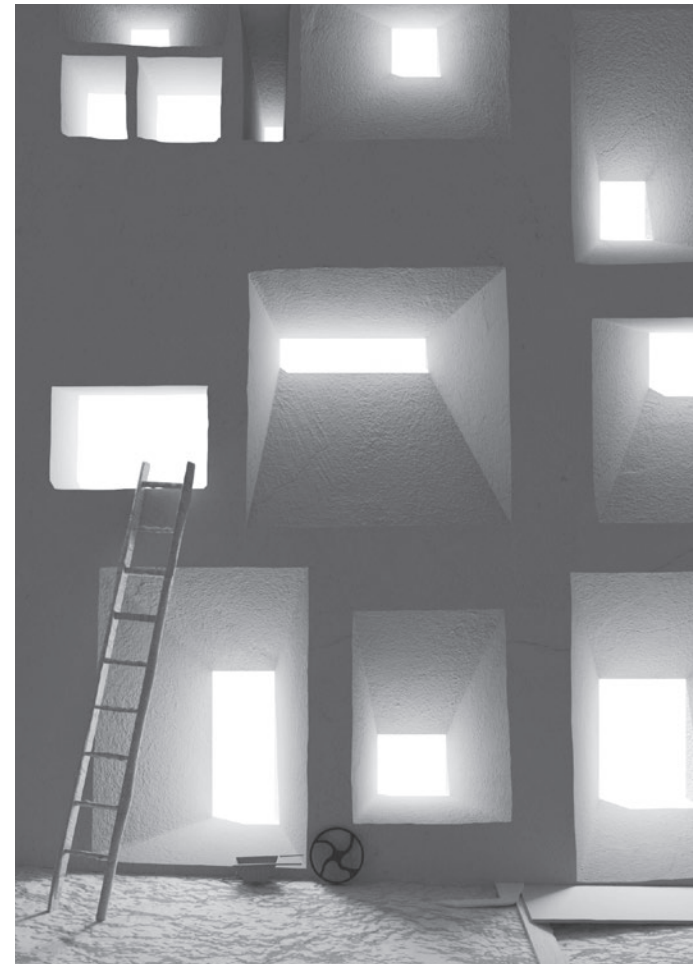
3D scanning accurately captures the intricate physical structure and shape of an object or space. The project exported the detailed 3D model of the world's largest cathedral into various digital formats for visualization, analysis, or use in different innovative applications. These include virtual reality, augmented reality, 3D printing, animation, simulation, and integration into other software tools for further analysis or design.



Diagrammatic Identification of Selected Element of Importance

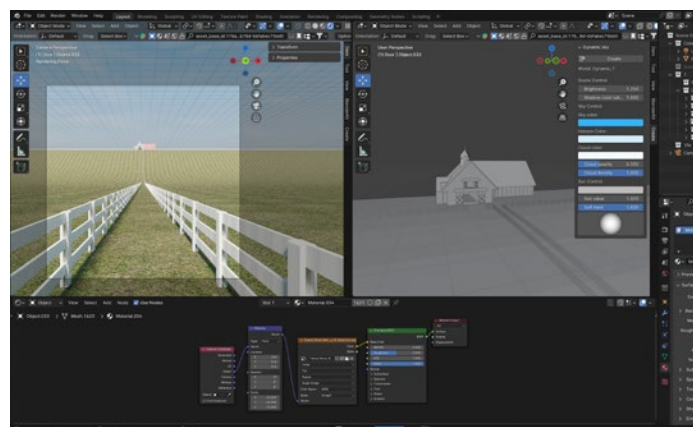


Chapel of Notre-Dame du Scene Simulation

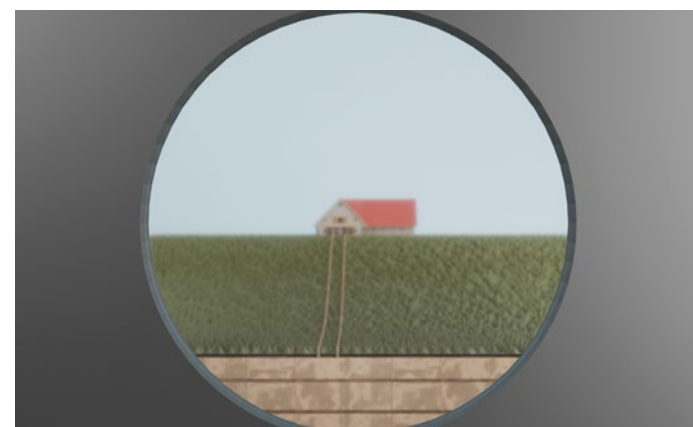


Eye Test House Blender Rendering 01

This project explores Investigative Aesthetics and Images within Images to reconstruct a “hidden” space, one that feels familiar but remains unseen. Drawing from archival sources, historical drawings, and photographs, I use Blender to create layered renderings that blur the lines between memory, imagination, and reality. These constructed images invite viewers to reconsider their perceptions of place, questioning how collective memory shapes spaces we may never have experienced directly. The project builds on my reconstruction of the Eye Test House, expanding it into a spatial narrative that shifts with observation and reveals new understandings of the intangible and the overlooked.



Process in Blender



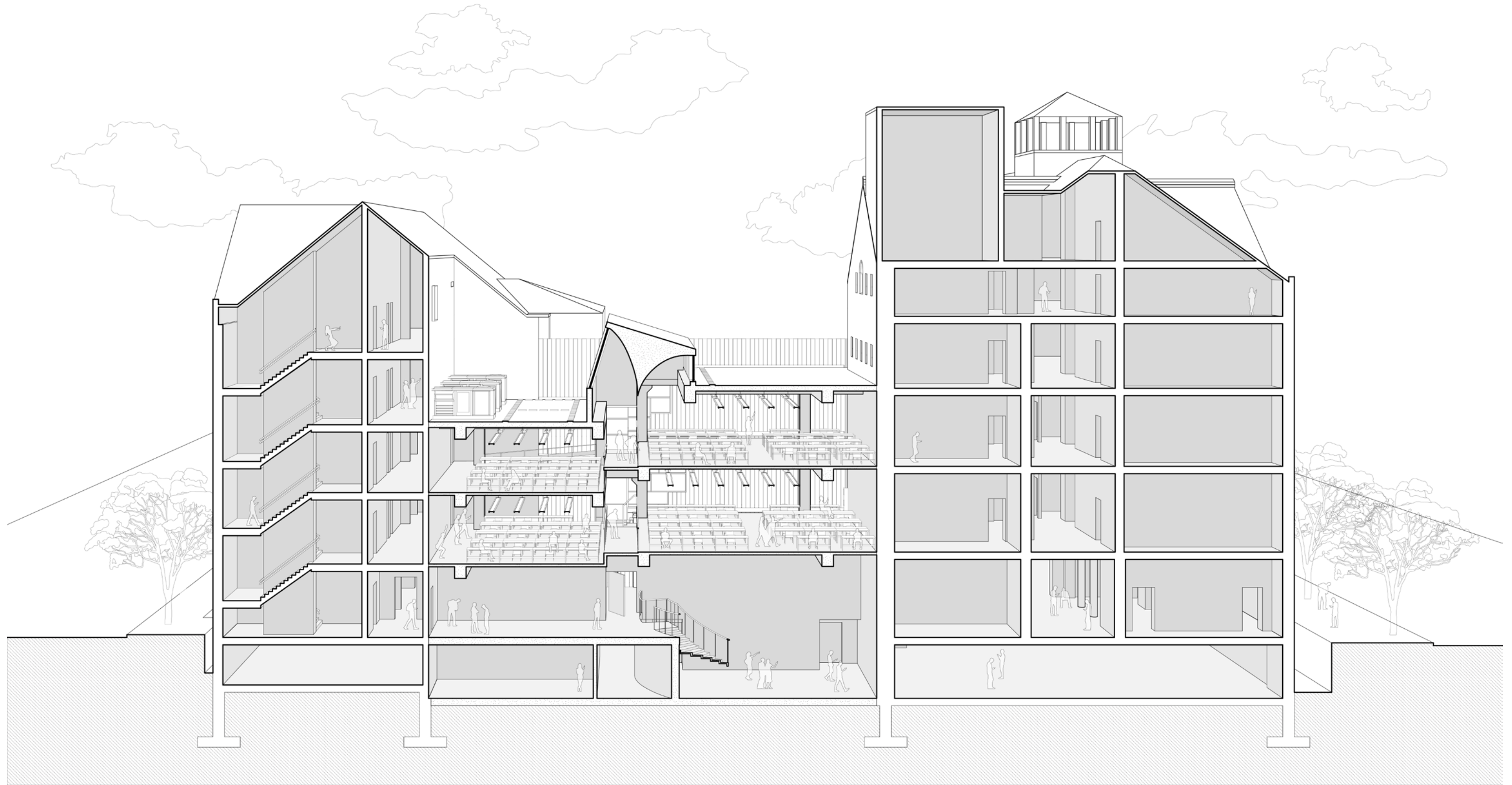
Eye Test House Blender Scene Simulation



Eye Test House Blender Rendering 02



The two monuments at Columbia University's 116th Street Broadway Gate, Letters and Science, were class reunion gifts. On the opposite side of campus, with the names Arts and Philosophy, these empty columns have become monuments in their own right, representing both absence and presence. This project uses video projection to complete the unfinished monuments and initiate a dialogue between disciplines, history, and the present.



The misalignment in floors can be seen in the dissonant zone which varies increasingly as it moves vertically in section: on the first floors, the misalignment is $\frac{1}{2}$ inch; on the second floors it is 1 foot 8 inches, on the third floors it is 4 feet 9 inches, and on the fourth floors it is 6 feet seven inches.