

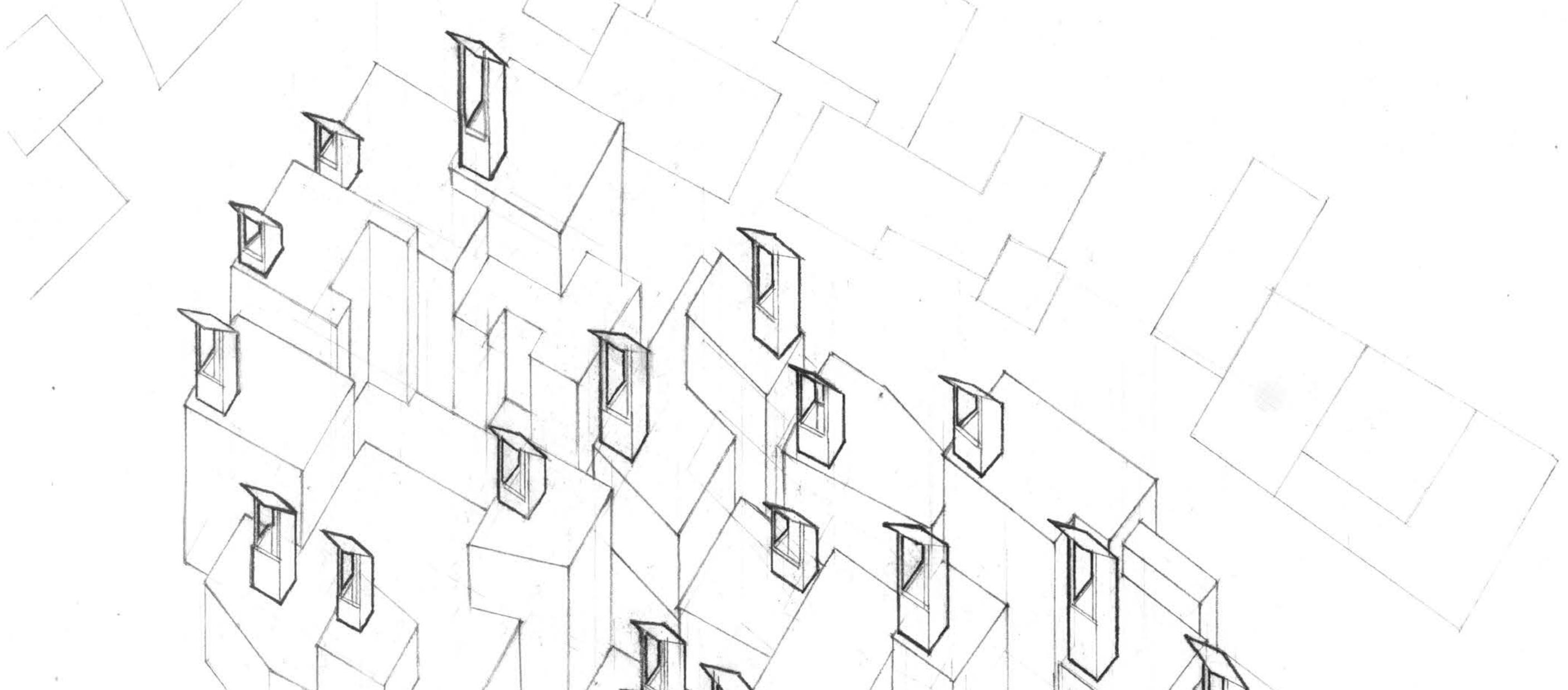
# ADAM YUZHEN ZHANG

SPRING 2017 DESIGN PORTFOLIO

CORNELL UNIVERSITY, AAP  
ARCH 1102  
DESIGN II

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SECTION 2  
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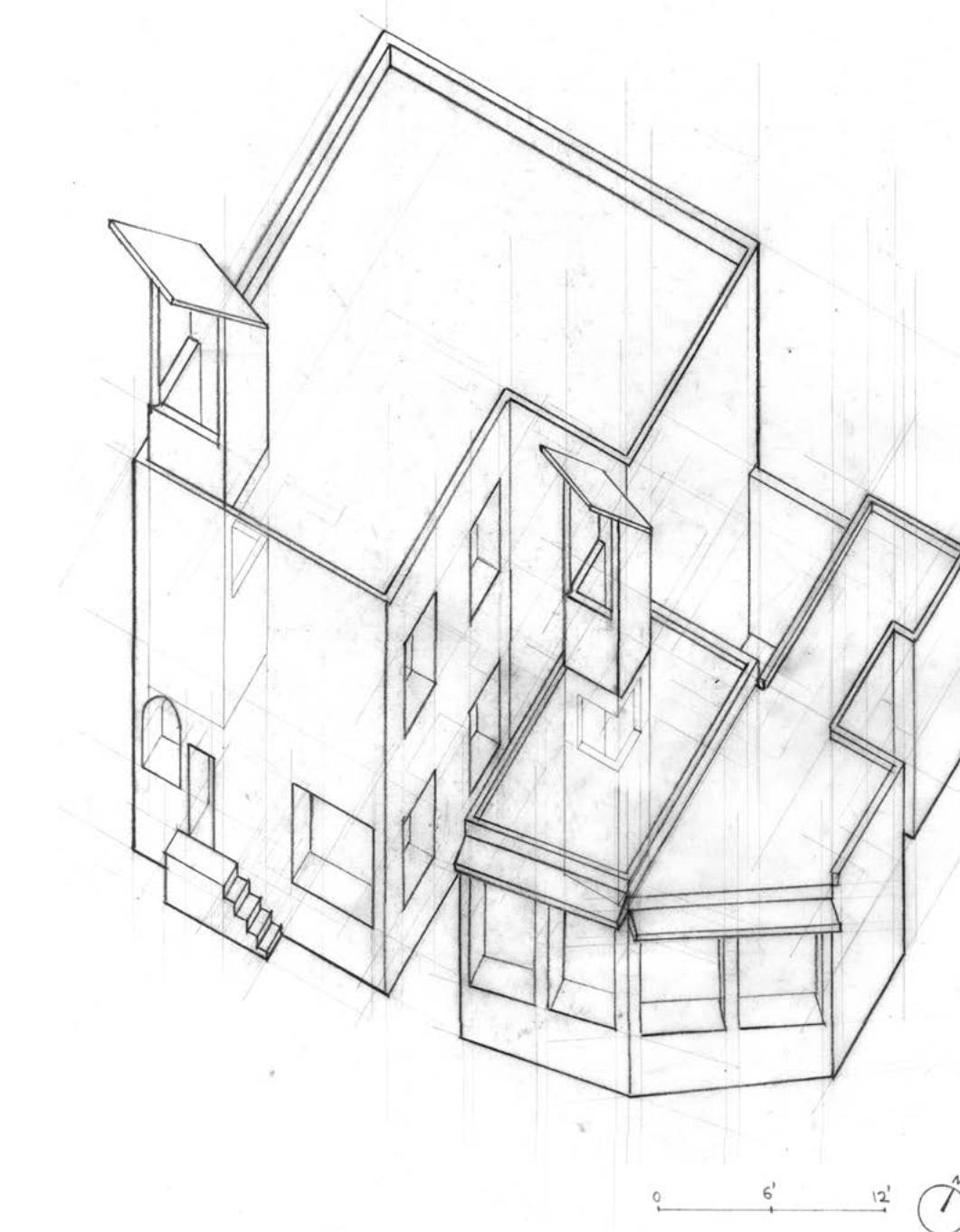
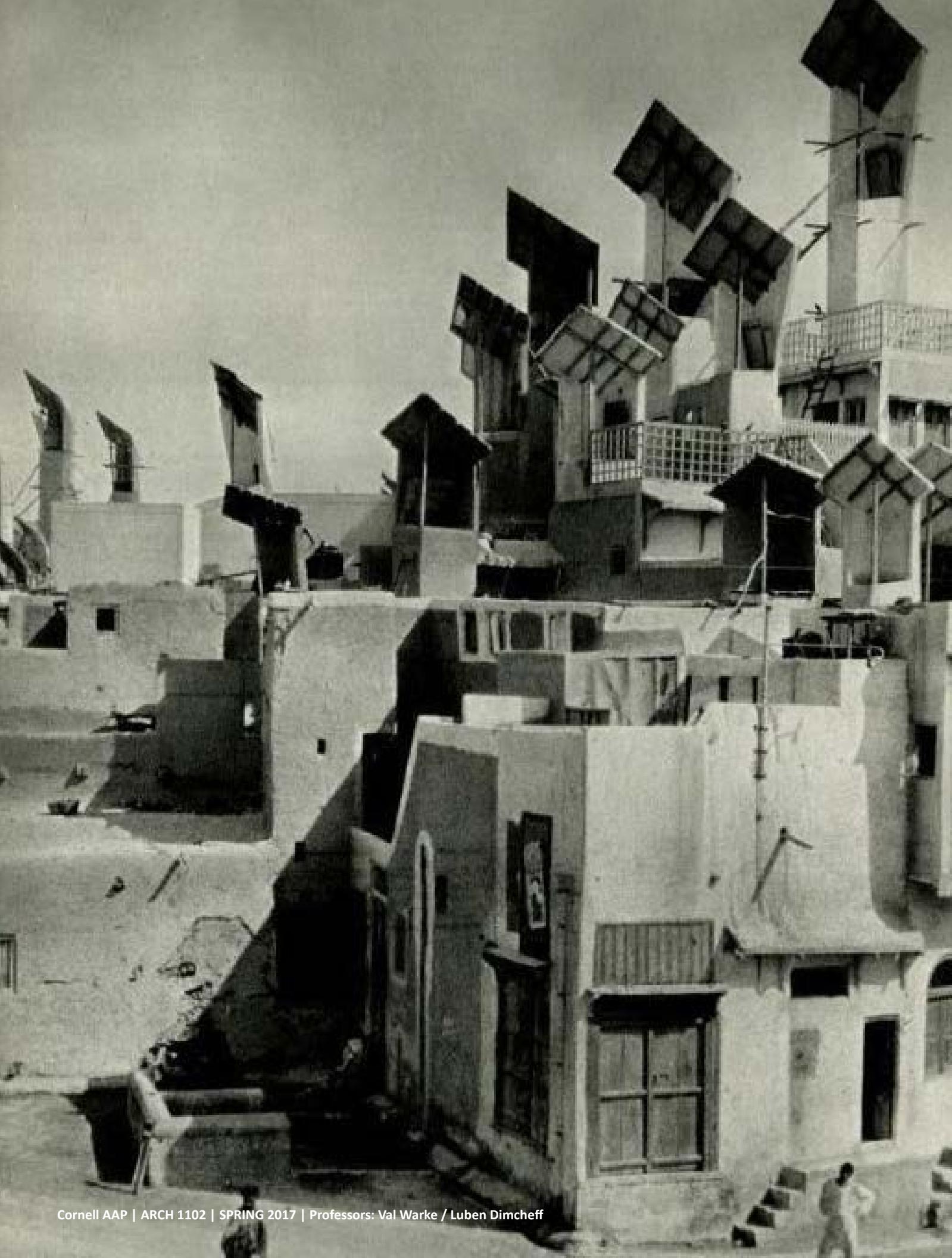


## I. ANALYSIS

Given one vernacular precedent that was well adapted to its environment. Analyzed it through drawings. Then studied a modern, more recent precedent that adapted to its environment similarly as the first precedent did. Used diagrams to present their unique aspects. All these studies led to the following works. This chapter was done in collaboration with Jingjing Liu.

**WINDSCOOP HOUSE**  
Hyderabad, Pakistan  
Asia

19th Century



**Left:** Windscoop house in Hyderabad  
**Top:** Axon

Analysis

**Located** at the east bank of river Indus, Hyderabad generally has high illumination, low rainfall and consistent cool breeze from the sea. In the 19th century, local people built up tunnel-like installation on the top of their houses as windscoop to introduce the cool air into the ventilation system of their residences.

**CLIMATE**  
TROPICAL  
ARID  
TEMPERATE  
COLD [CONTINENTAL]  
POLAR

**USE**  
COMMUNAL  
DOMESTIC  
AGRICULTURE  
AQUACULTURE  
INDUSTRY

**LIFESPAN**  
NOMADIC  
SEASONAL  
PERMANENT

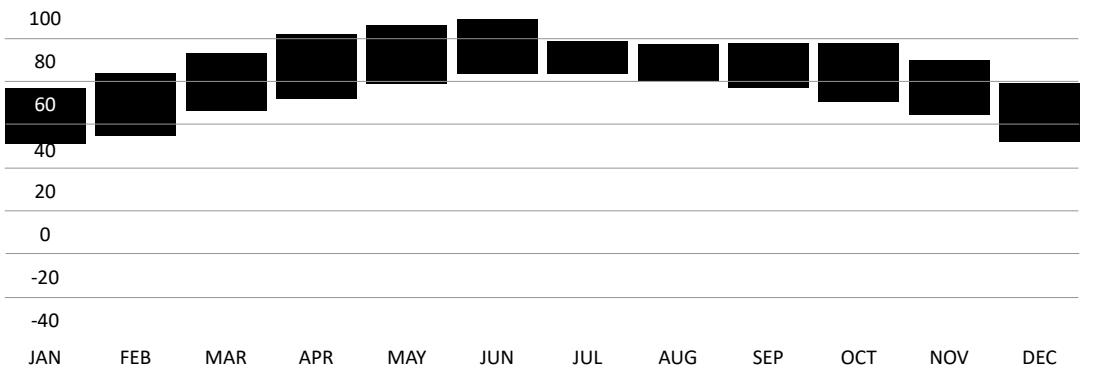
**TECHNIQUE**  
MASONRY  
FRAME  
WOVEN  
EXCAVATION

**MATERIAL**  
BRICK  
STONE  
EARTH  
WOOD  
GRASS  
HIDE  
ICE

**TERRAIN**  
FLAT  
SLOPE  
EDGE  
SUBTERRANEAN

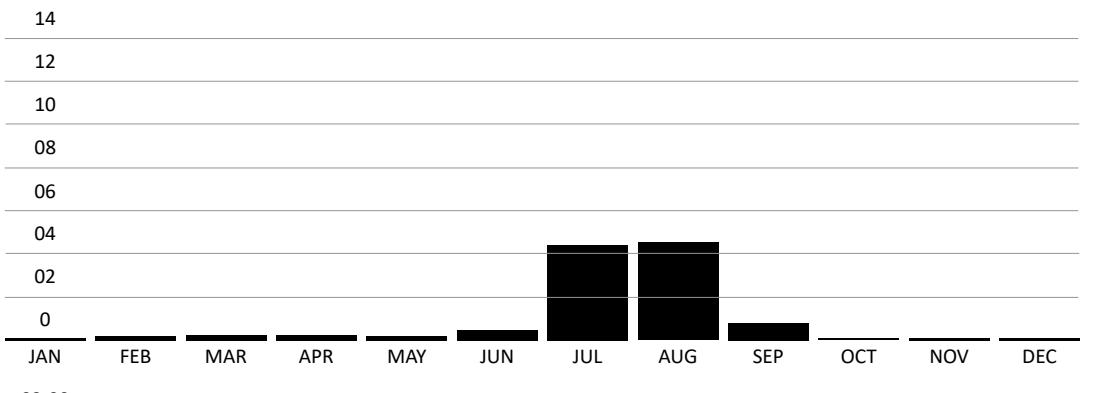
### ANNUAL TEMPERATURE MIN/MAX [°F]

Situated in Sindh, Pakistan, Hyderabad has a relatively high temperature on average with the highest up to 107 °F and the lowest around 52 °F.



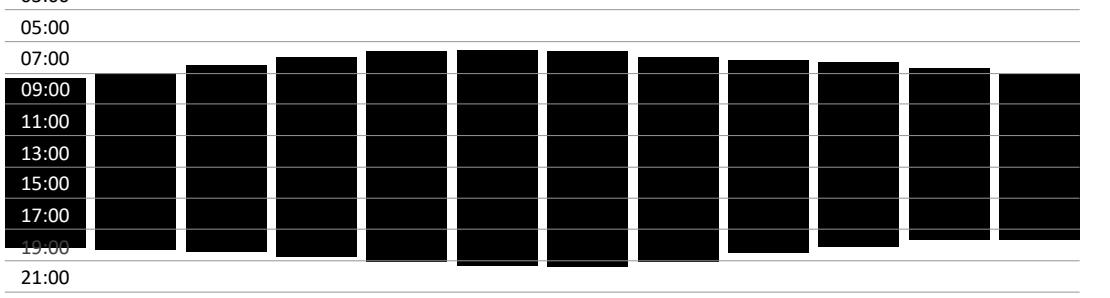
### PRECIPITATION MONTHLY AVG [IN]

Extremely arid area with obvious monsoon and dry season. The maximum precipitation is only around 2.4 in.



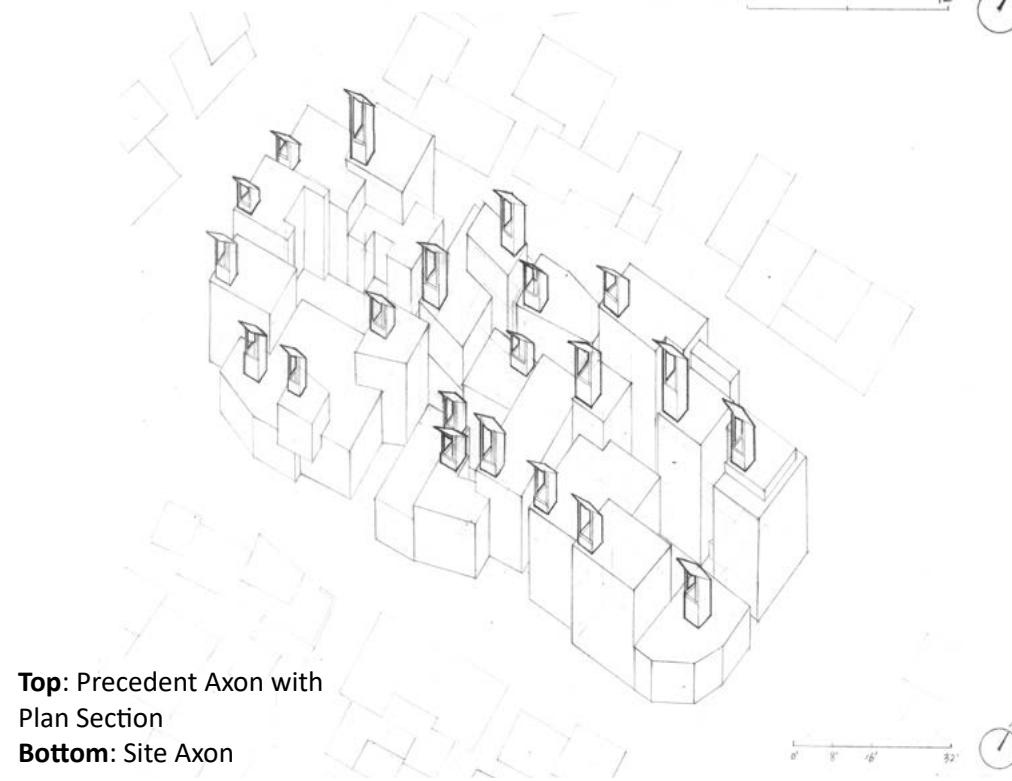
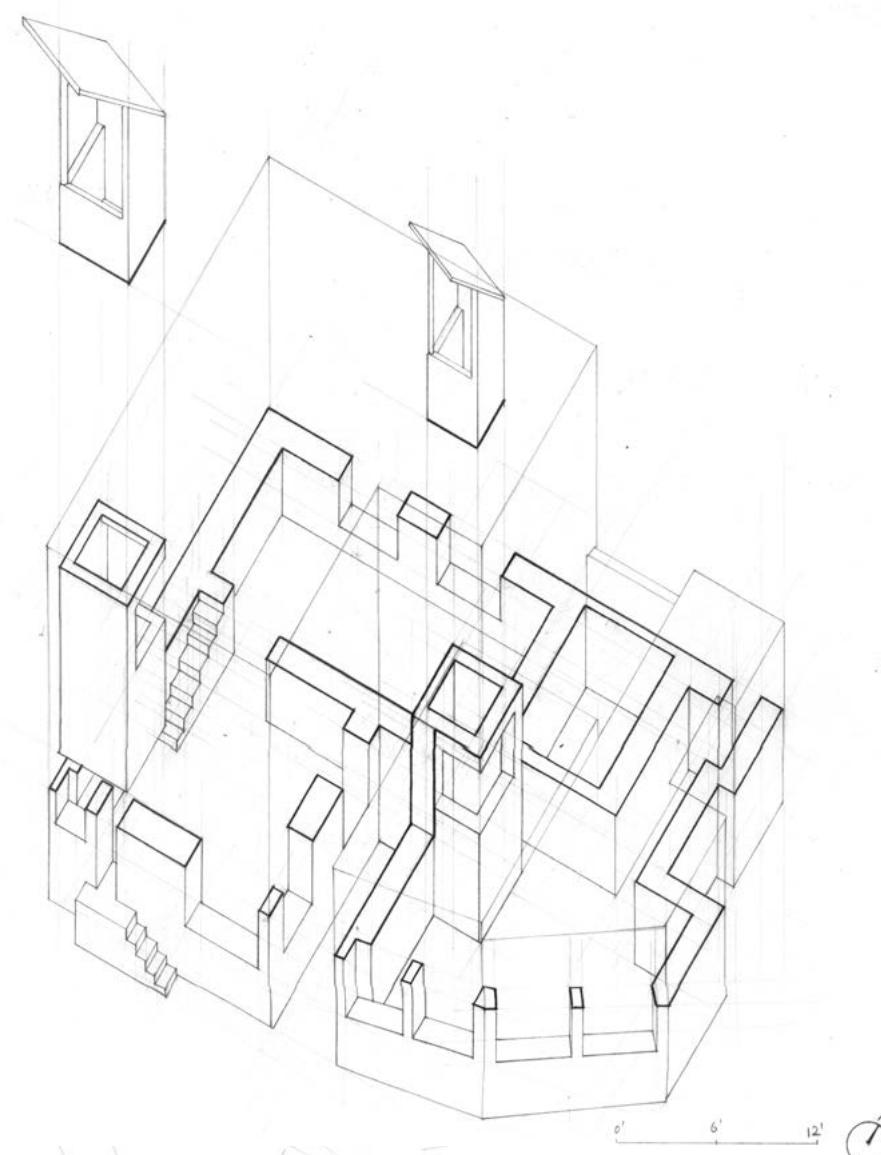
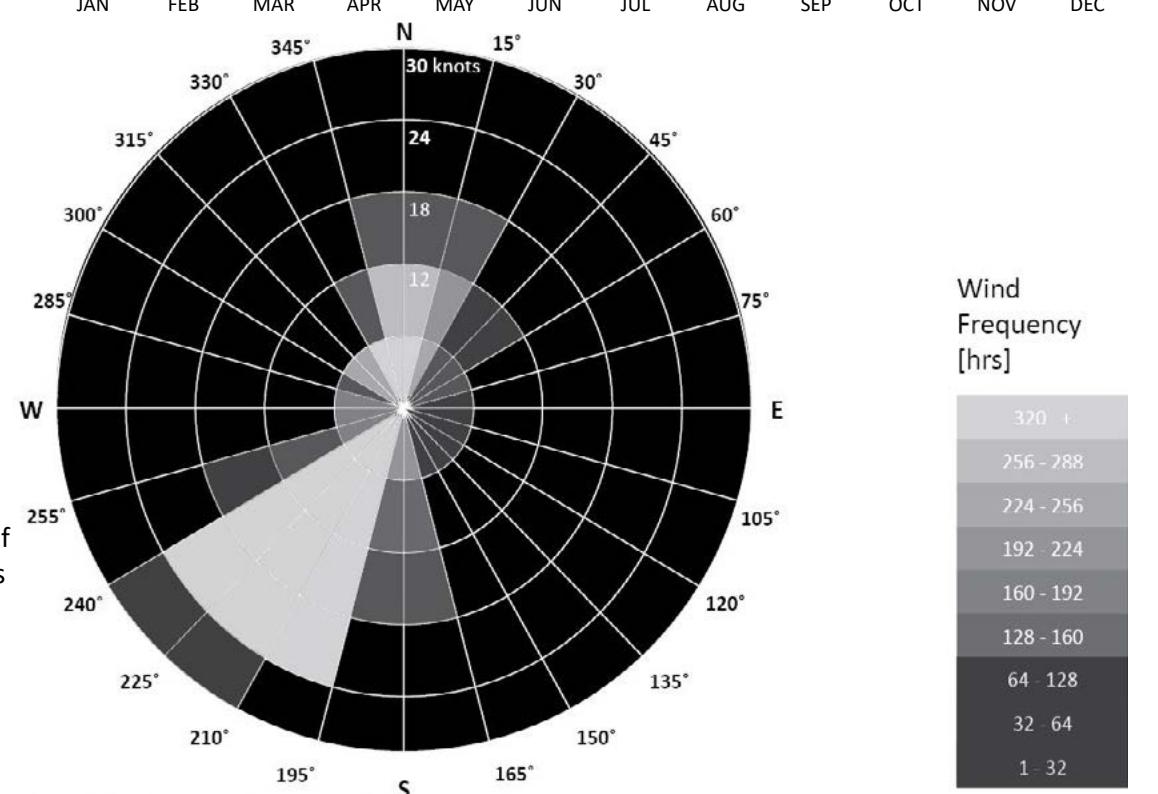
### DAYLIGHT HOURS SUNRISE TO SUNSET

Generally high illumination duration with the highest up to 10.1 hours.



### ANNUAL WIND DISTRIBUTION

Located at the east bank of river Indus, Hyderabad has a prominent characteristic of consistent cool breeze from the southwest in the summer.



**Top:** Precedent Axon with Plan Section  
**Bottom:** Site Axon

### WINDSCOOP HOUSE Hyderabad, Pakistan

Asia

19th Century

CLIMATE  
TROPICAL

ARID  
TEMPERATE  
COLD [CONTINENTAL]  
POLAR

USE  
COMMUNAL  
DOMESTIC  
AGRICULTURE  
AQUACULTURE  
INDUSTRY

LIFESPAN  
NOMADIC  
SEASONAL  
PERMANENT

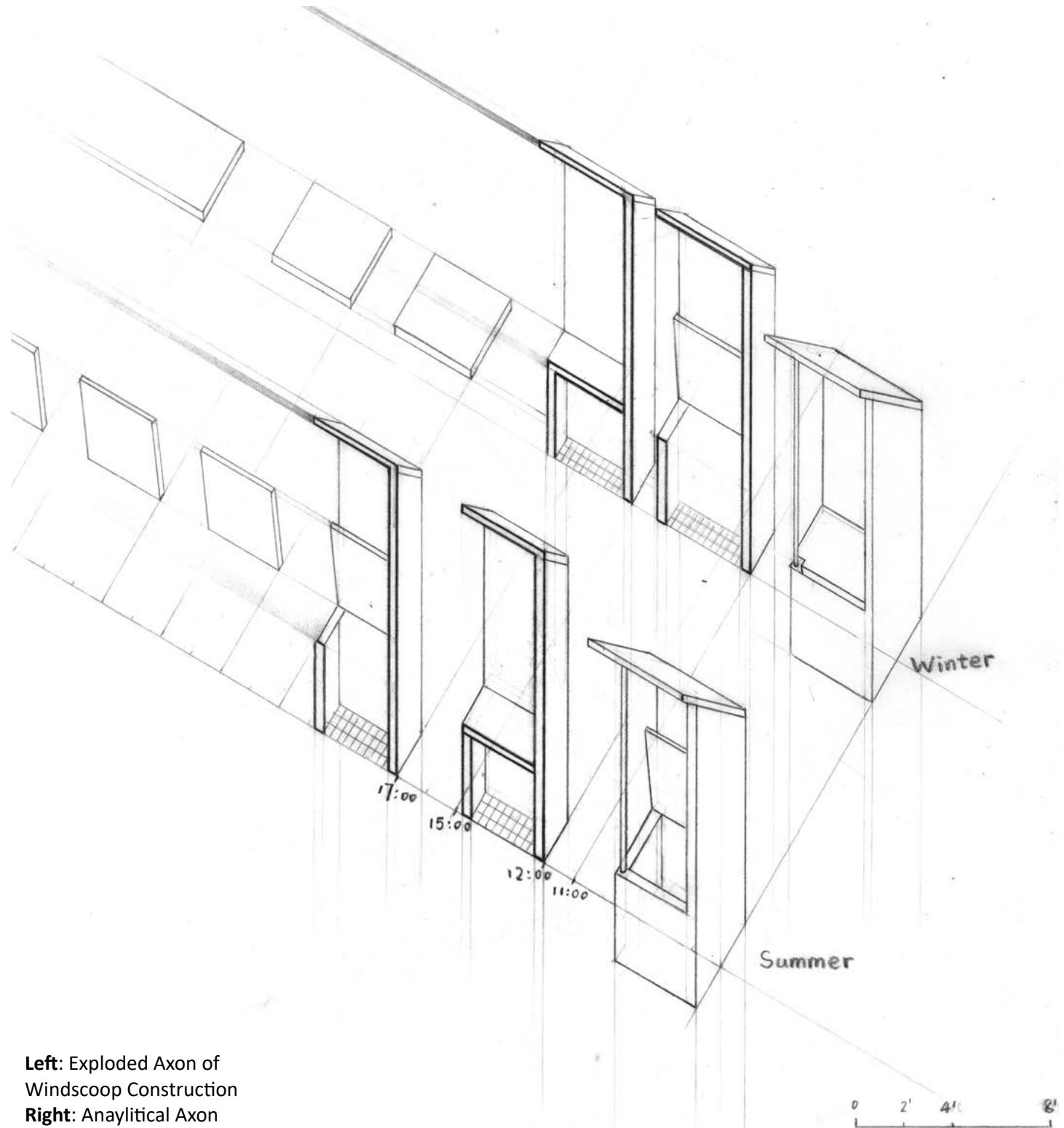
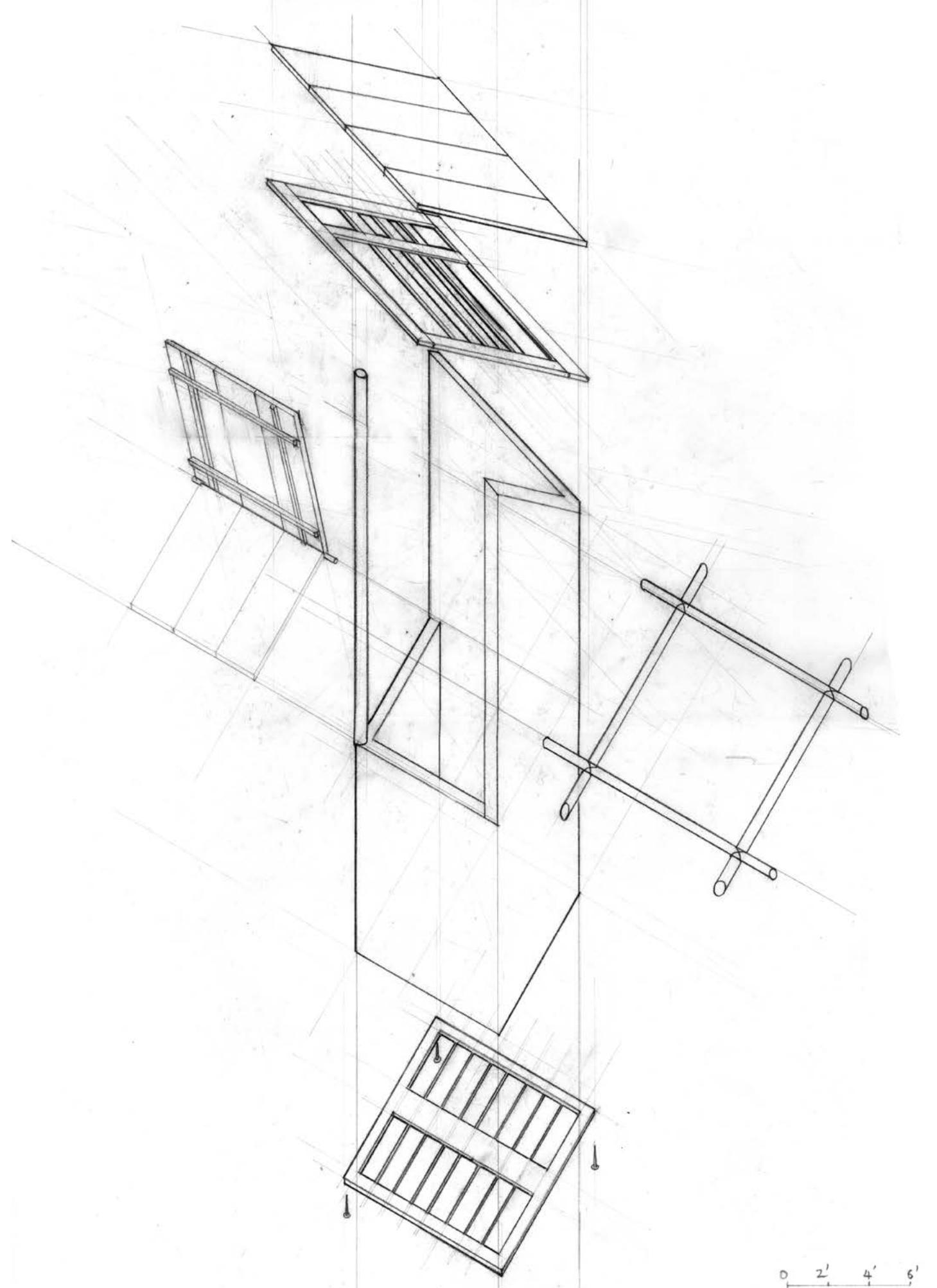
TECHNIQUE  
MASONRY  
FRAME  
WOVEN  
EXCAVATION

MATERIAL  
BRICK  
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EARTH  
WOOD  
GRASS  
HIDE  
ICE

TERRAIN  
FLAT  
SLOPE  
EDGE  
SUBTERRANEAN

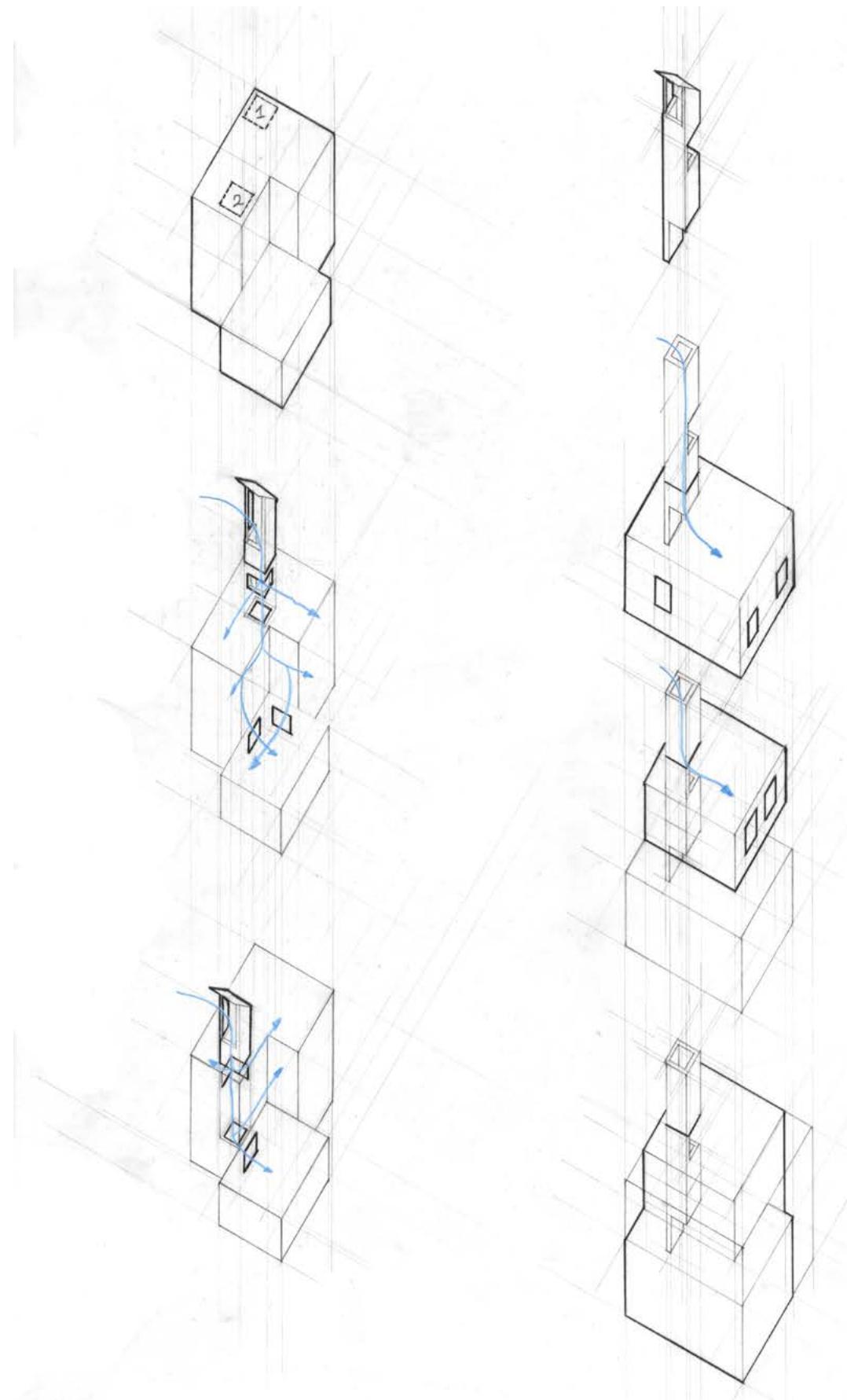
WINDSCOOP HOUSE  
Hyderabad, Pakistan  
Asia

19th Century

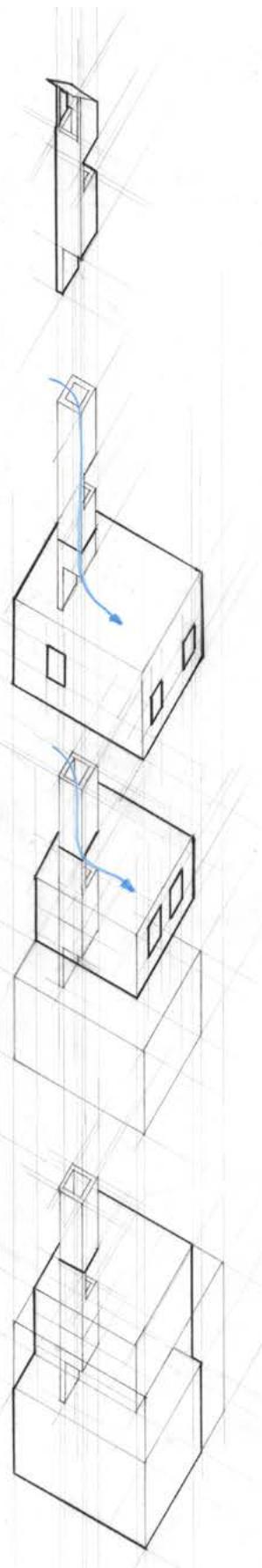


**Left:** Exploded Axon of Windscoop Construction  
**Right:** Analytical Axon

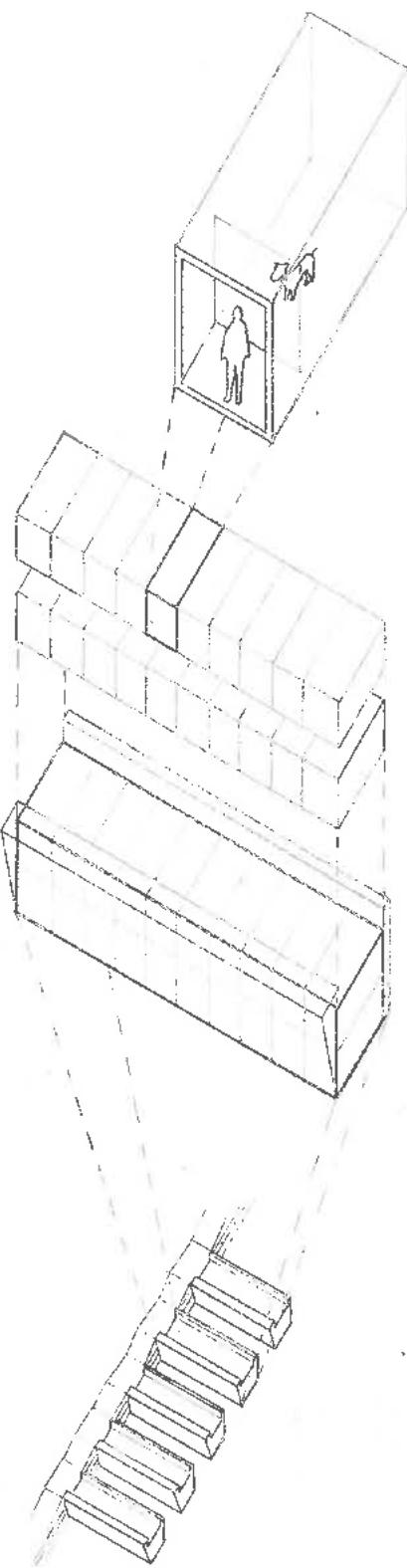
Analysis



Building First

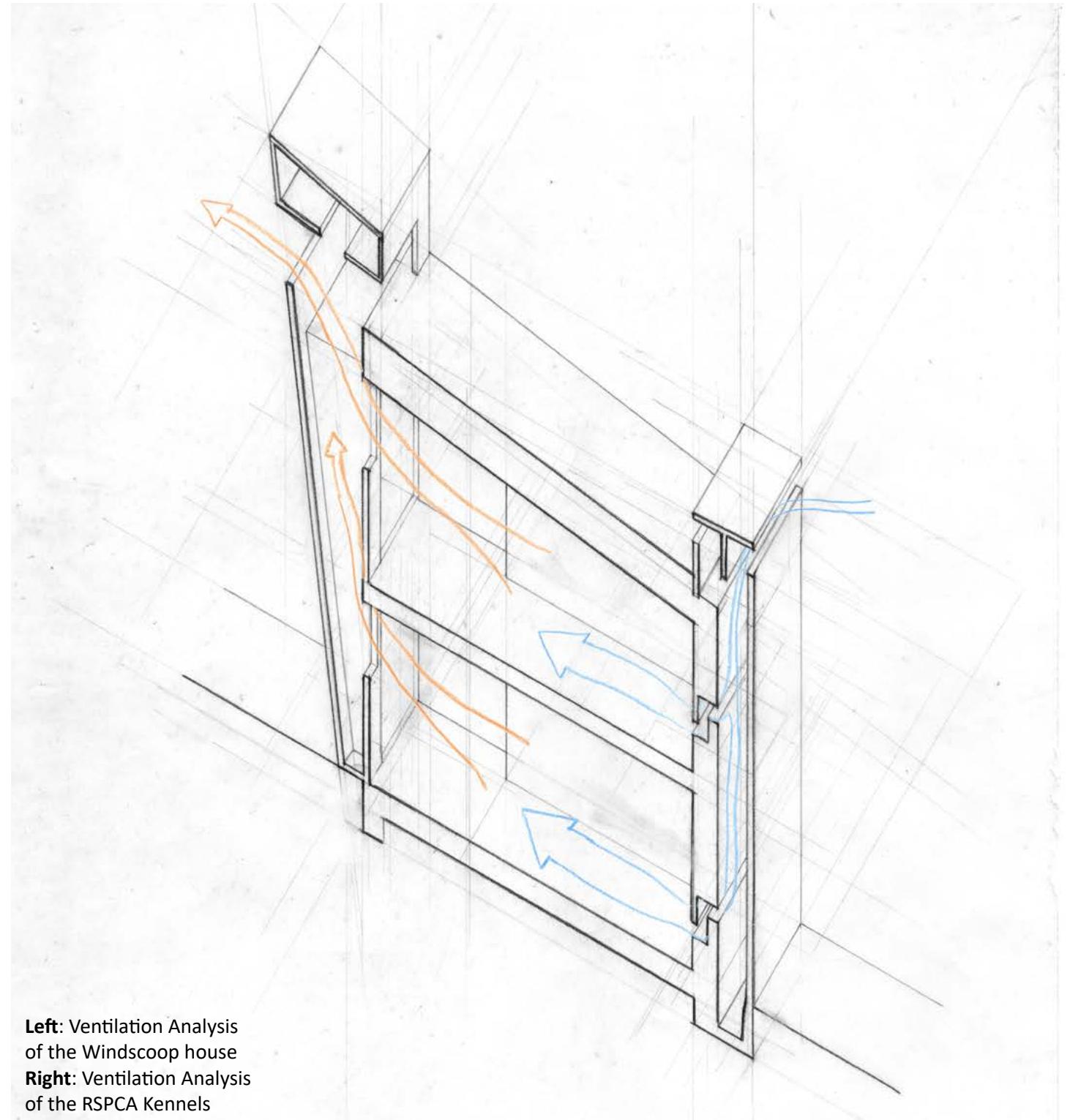
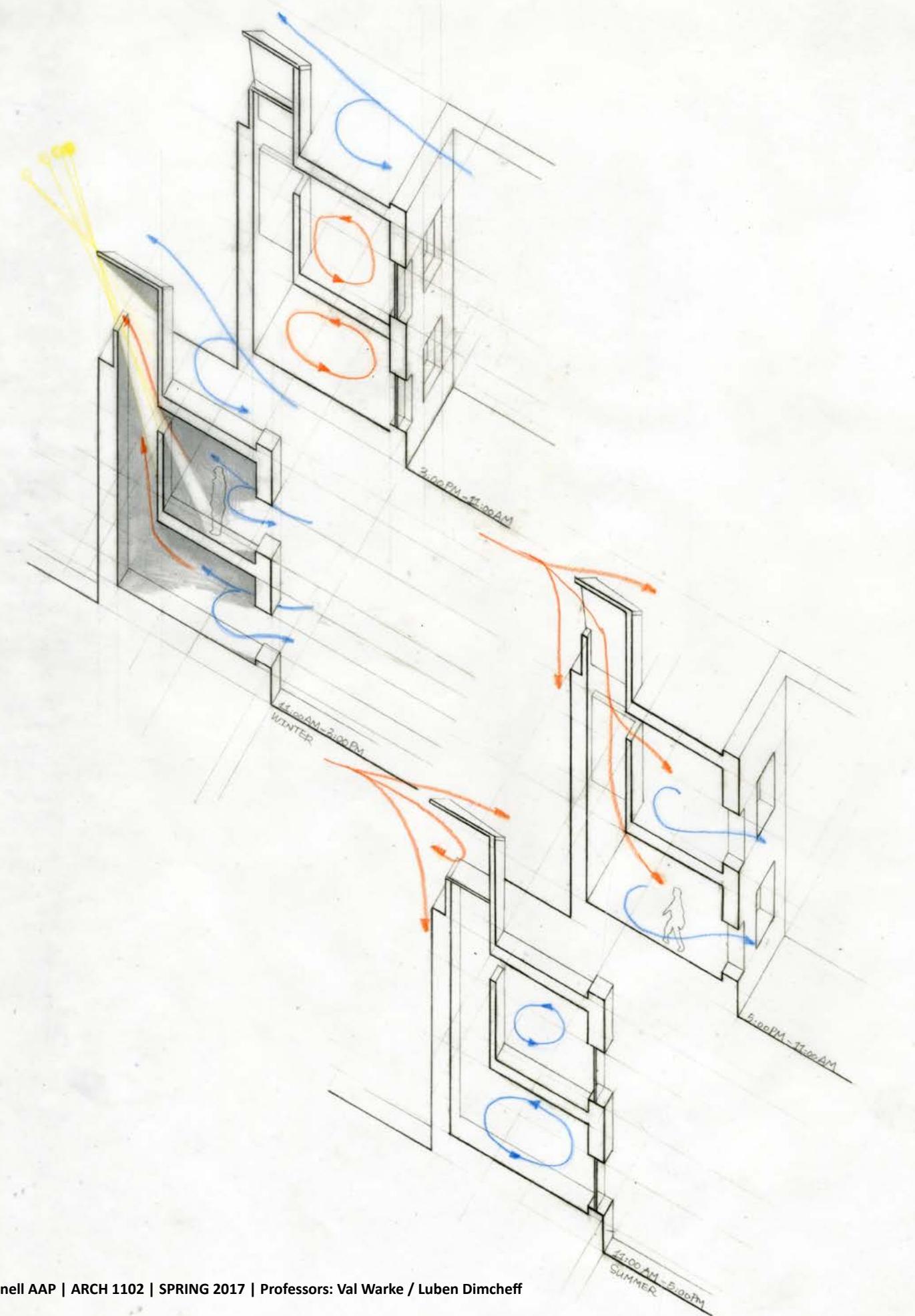


Windscoop First



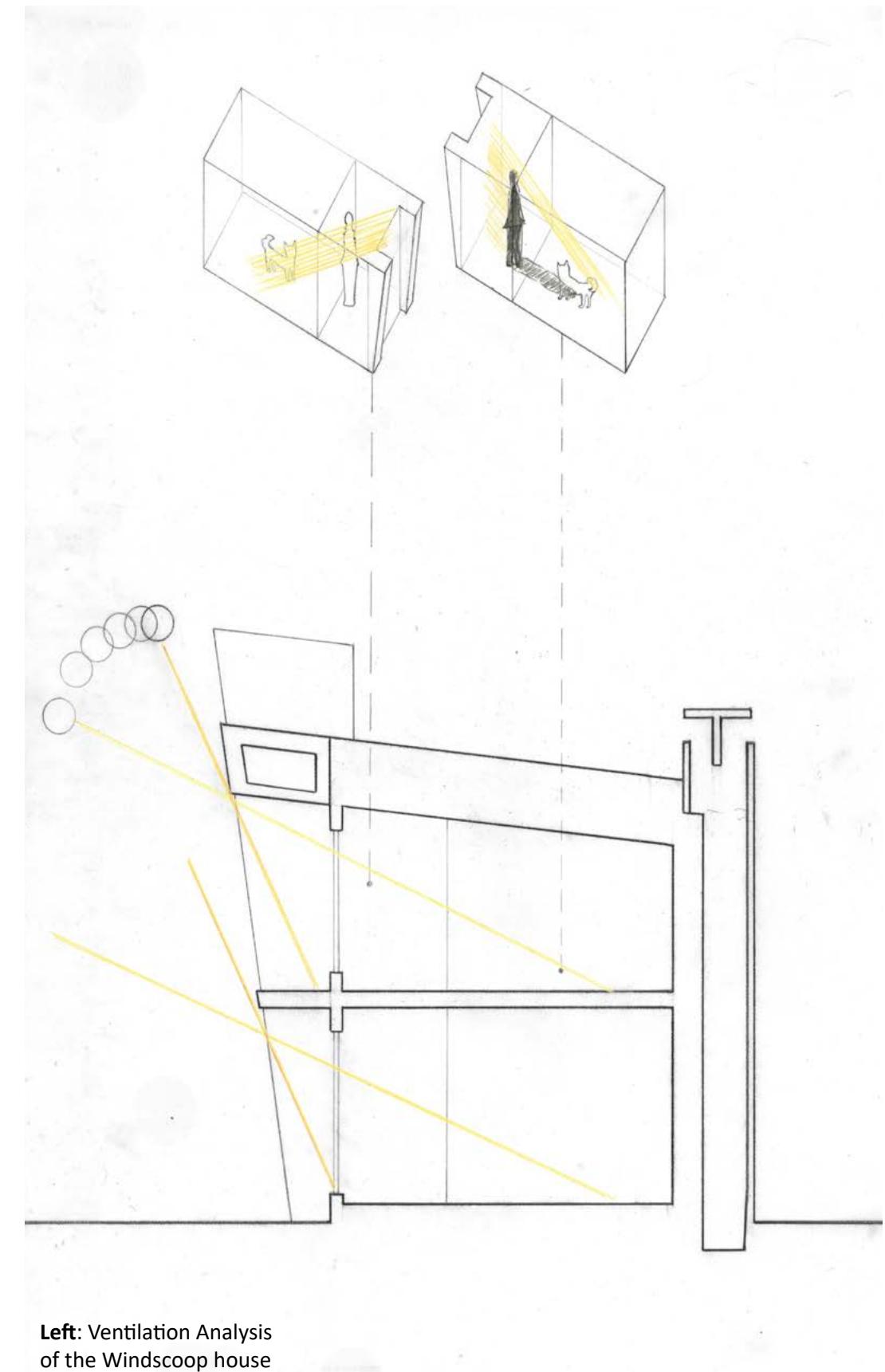
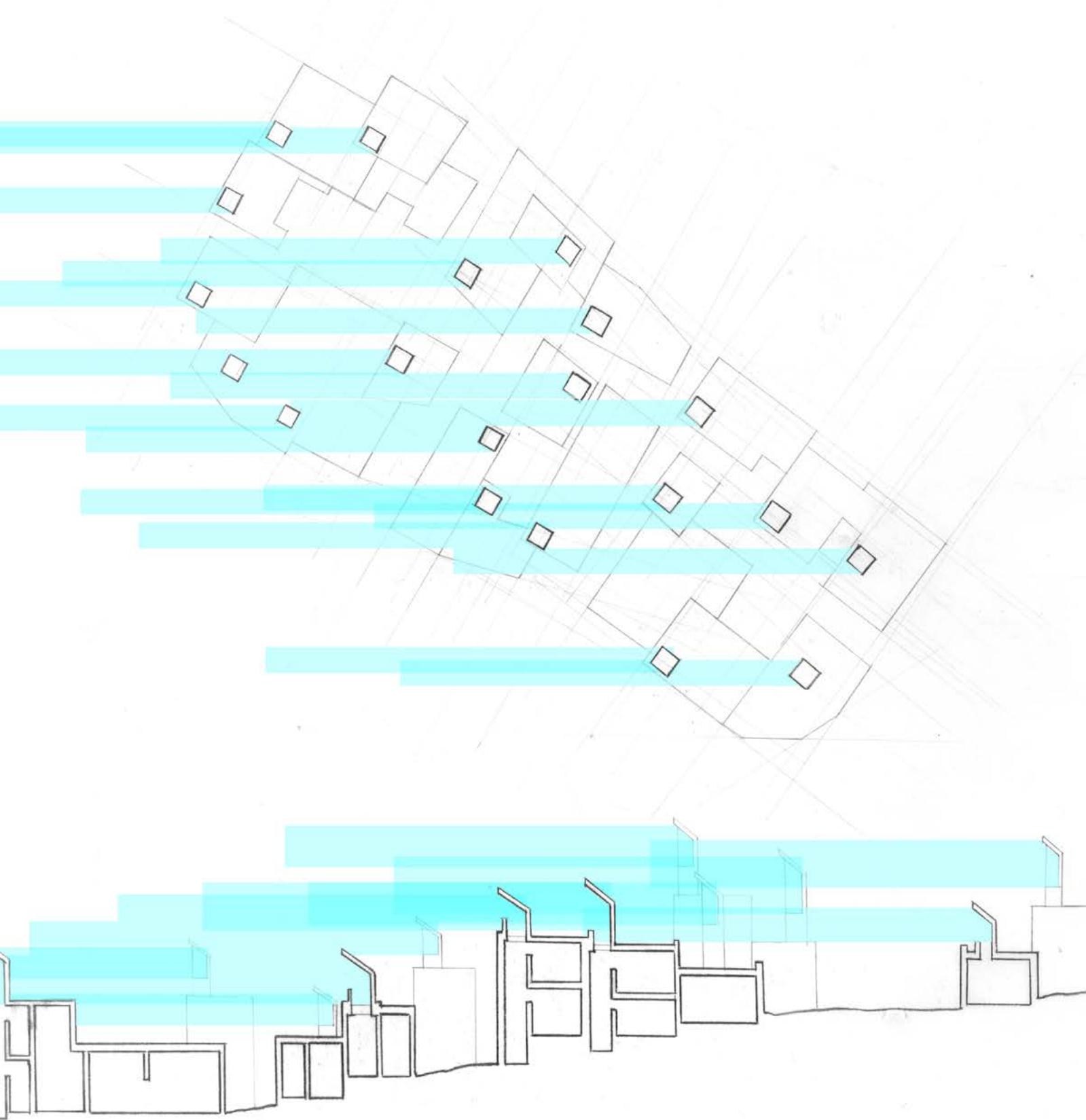
Left: Analytical Axon of Windscoop house  
Right: Analytical Axon of RSPCA Kennels

Analysis



**Left:** Ventilation Analysis  
of the Windscoop house  
**Right:** Ventilation Analysis  
of the RSPCA Kennels

Analysis

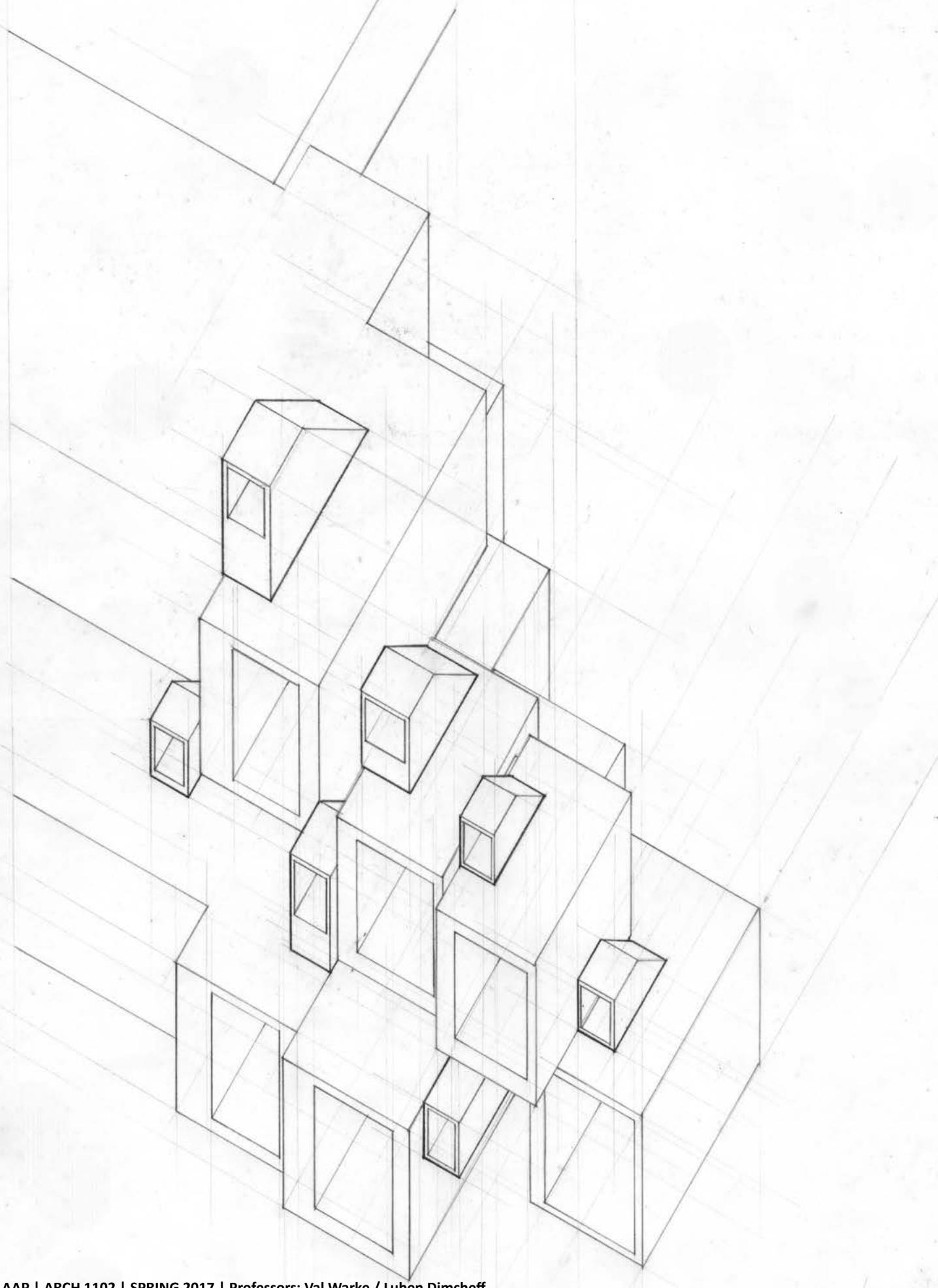


**Left:** Ventilation Analysis  
of the Windscoop house  
**Right:** Sunlight Analysis of  
the RSPCA Kennels

Analysis

RSPCA KENNELS  
Burwood, Australia  
2006

NH Architecture



**Top:** RSPCA Kennels  
Burwood, Australia  
**Left:** Hybrid Drawing

Analysis

RSPCA at Burwood, Australia is a two-story building designed to keep dogs inside. Dog rooms are arrayed linearly with one hallway for human circulation connecting them. Wind catchers are incorporated to capture the breeze from the top of the building and guiding it through the building for ventilation purpose.

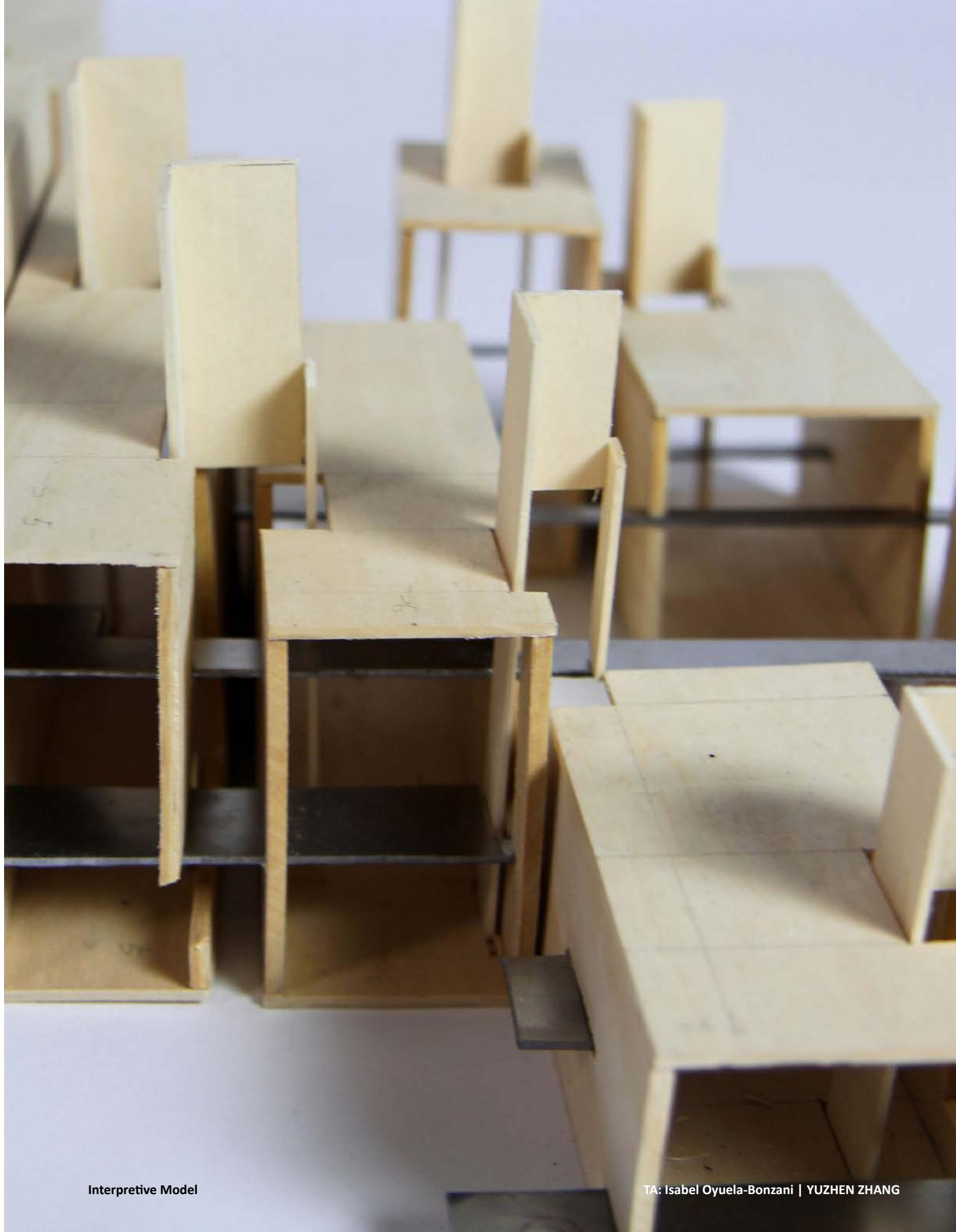
## II. INTERPRETIVE MODEL

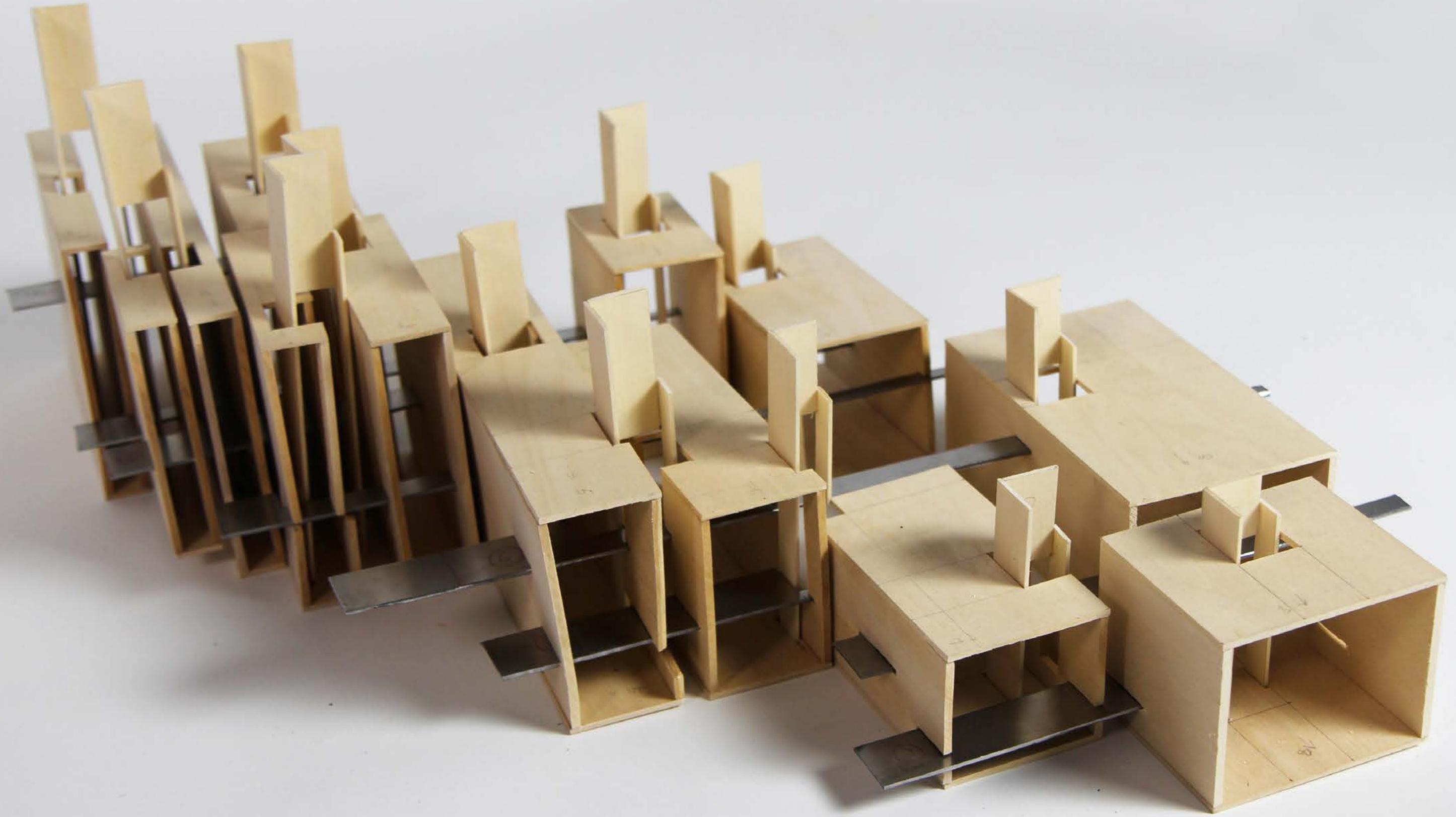
The aggregation of block-like spaces, the vertical windscoop and the horizontal human circulation were the three essential elements shared by the two precedents. This interpretive model demonstrated the relationship among the three elements. After a process of pushing and intersecting, a stable system was formed.

PUSHING: a solid mass was cut into smaller pieces and the pieces were pushed to form an aggregated layout. Density change was shown by varying the width of the blocks so the scale of the space between two

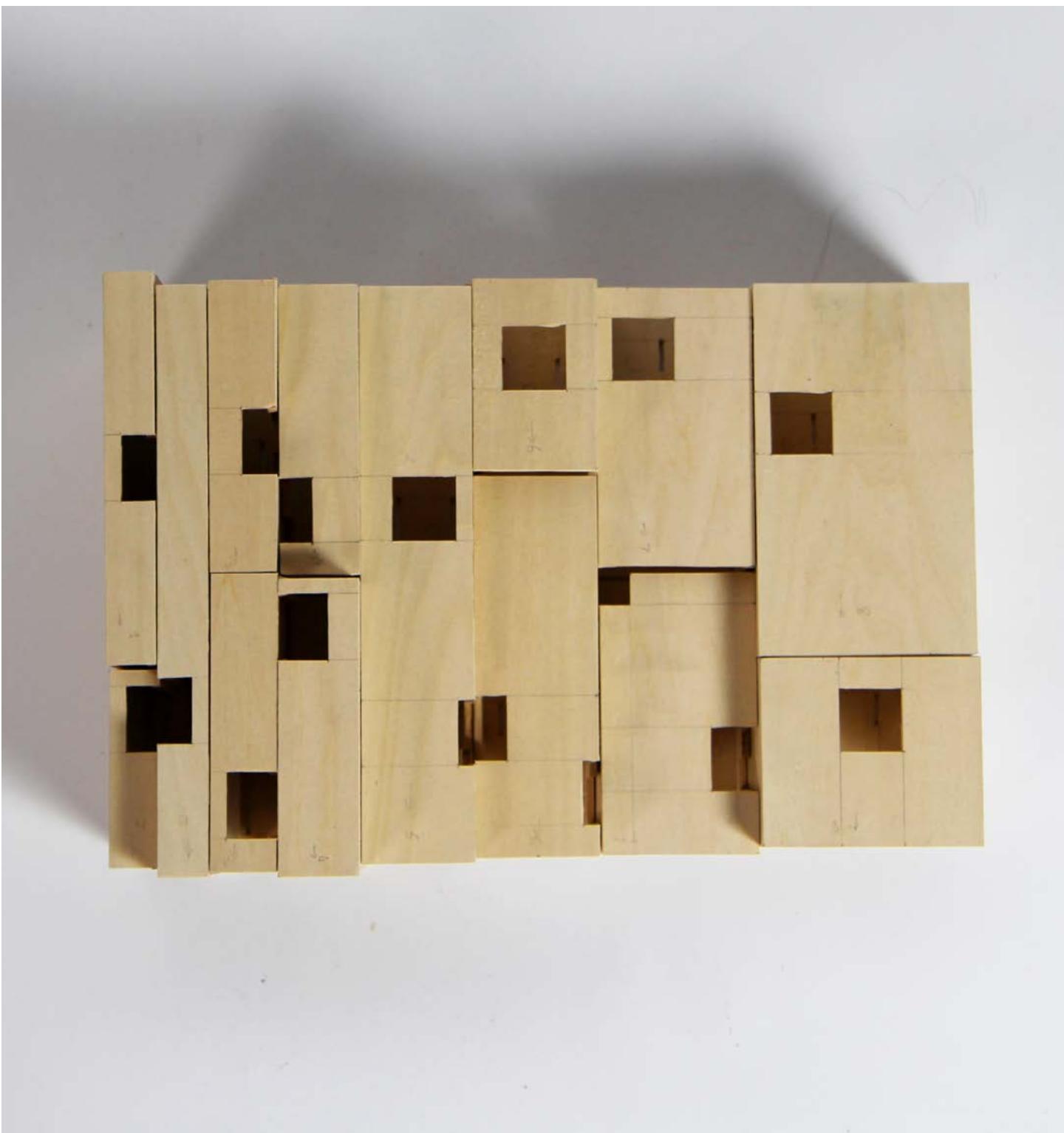
vertical panels gradually increased along one direction.

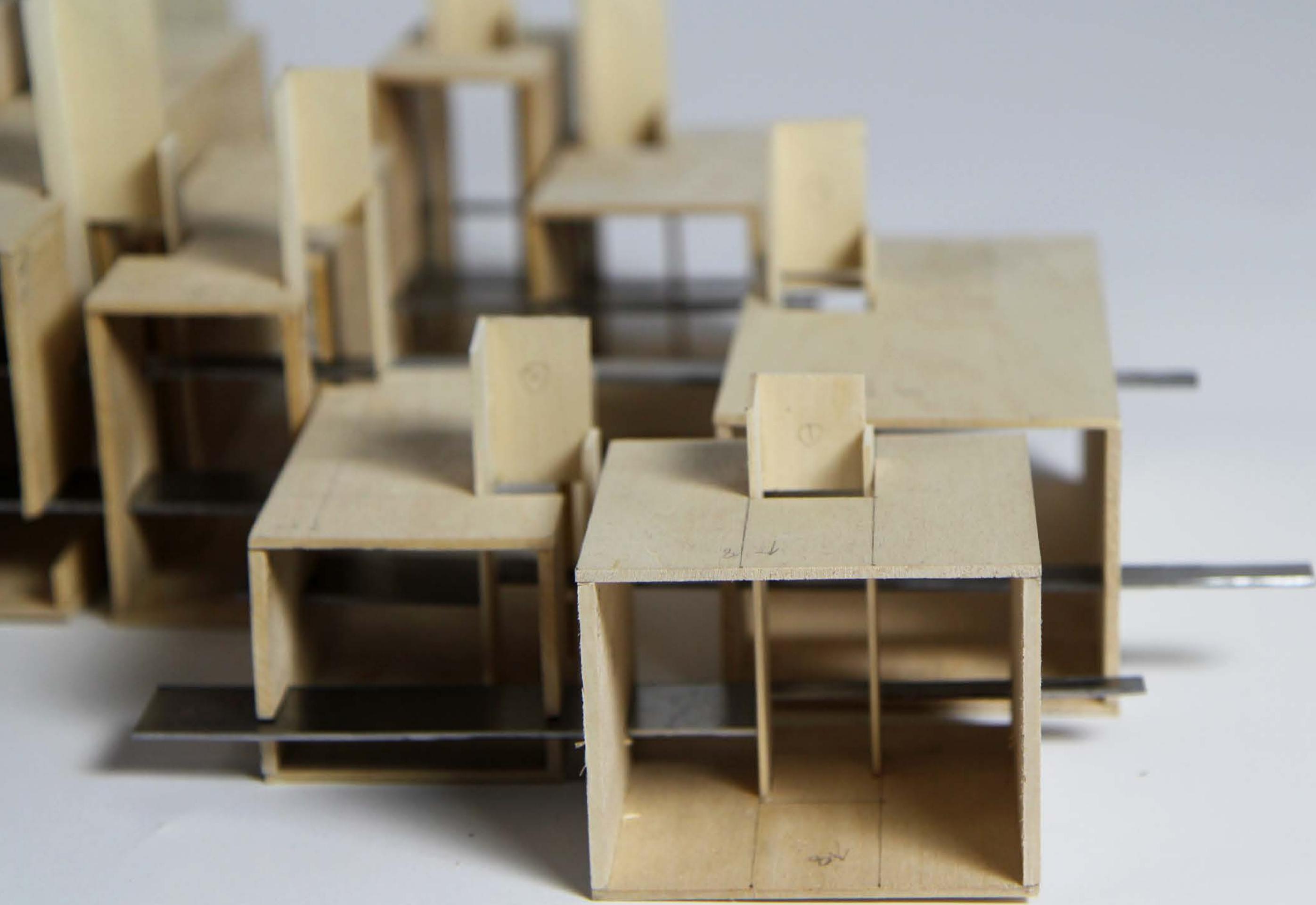
INTERSECTING: With pushing, the vertical windscoops were inserted at the openings on top of the blocks. Their heights varied along the direction of wind to maximize the amount of wind captured. Then, the horizontal metal pieces showing circulation were inserted through the blocks and the windscoops, locking the whole system. The metal pieces always appeared right next to the windscoops and were partially cut off by windscoop at intersection points.





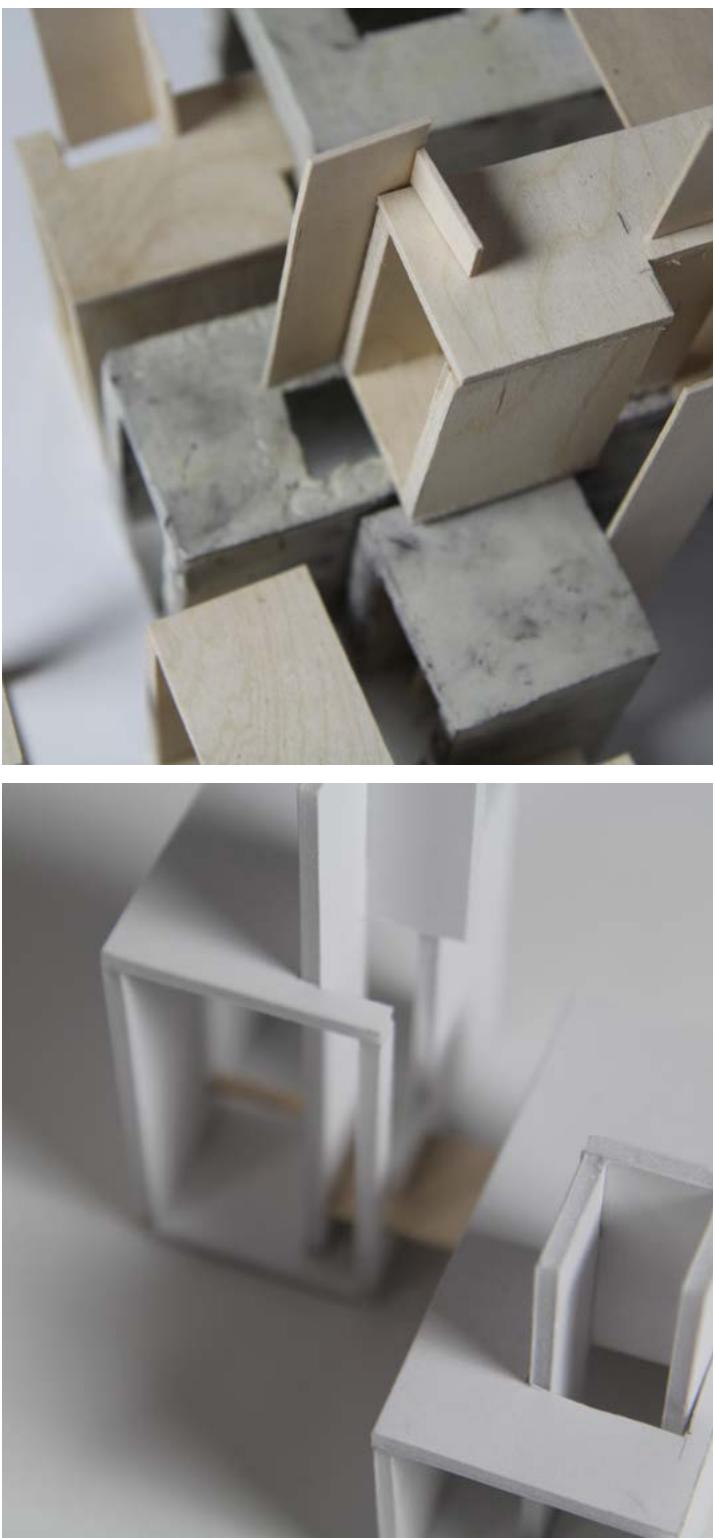








**Study Models of Components**



**Interpretive Model**



**TA: Isabel Oyuela-Bonzani | YUZHEN ZHANG**



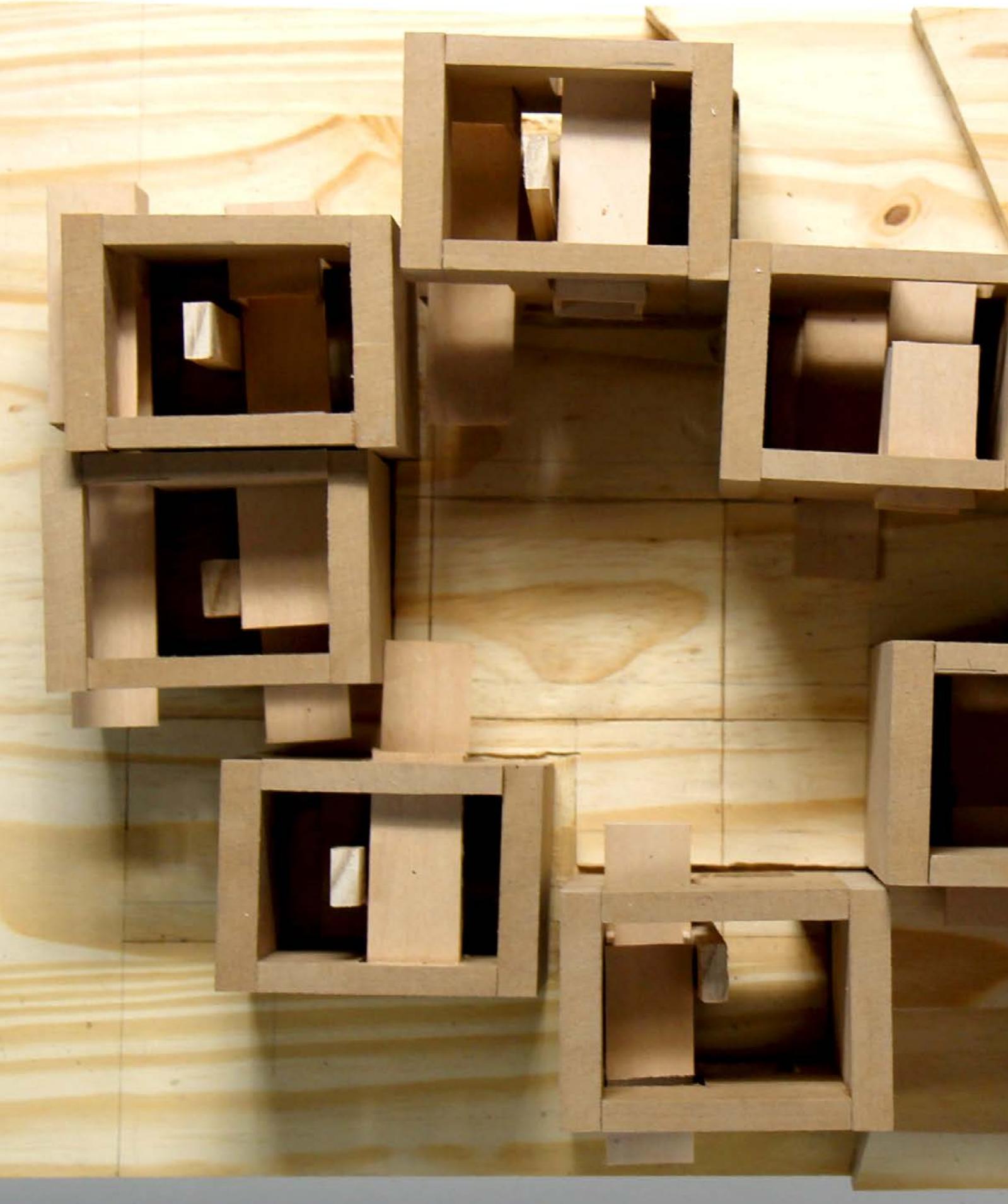
### III. ADAPTIVE MODIFICATION

Adapted the interpretive project into various climates using the logic developed and extracted from the interpretive model: pushing blocks and creating intersections among three different elements. My project was separately set in temperate,

polar, and tropical climates. The blocks of spaces, windscoops, and circulation pieces in the model were modified to preserve heat, support structures, etc. The concept extracted from the two precedents always remained the same.

TULOU  
Longyan, China  
Asia

12th - 20th Century



The project is well-adapted to the site of Tulou in Longyan, China. Eight blocks were cut from a solid mass, which were then pushed to form a circular layout that formed a protected central area, like the communal central space in Tulou's inward-looking plan. Windscoops from the model turned into tubular spaces that were inserted into the solid blocks horizontally. Circulation pieces changed into vertical ones inside the blocks, connecting tubular

spaces of different heights. Such an intersection formed a massive complex, similar to the bustling city in Tulou. The whole system was partly submerged in a small hill to react to the ground plane. It also cooled itself down passively by reacting to the wind and forming a low-pressure area above the central void. Air would therefore be sucked in through tubular spaces.

Adaptive Modification

CLIMATE  
TROPICAL  
ARID  
TEMPERATE  
COLD [CONTINENTAL]  
POLAR

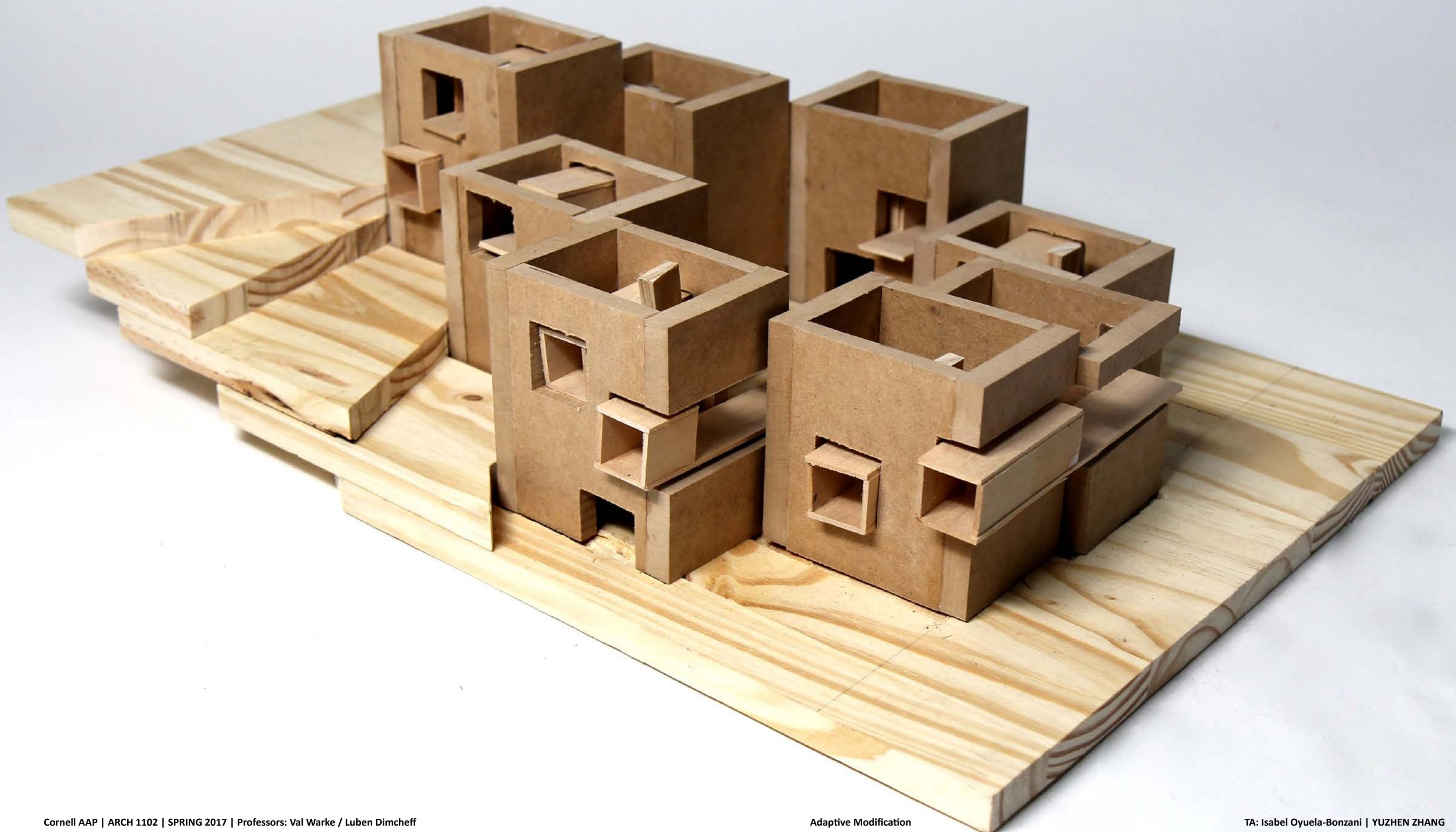
USE  
COMMUNAL  
DOMESTIC  
AGRICULTURE  
AQUACULTURE  
INDUSTRY

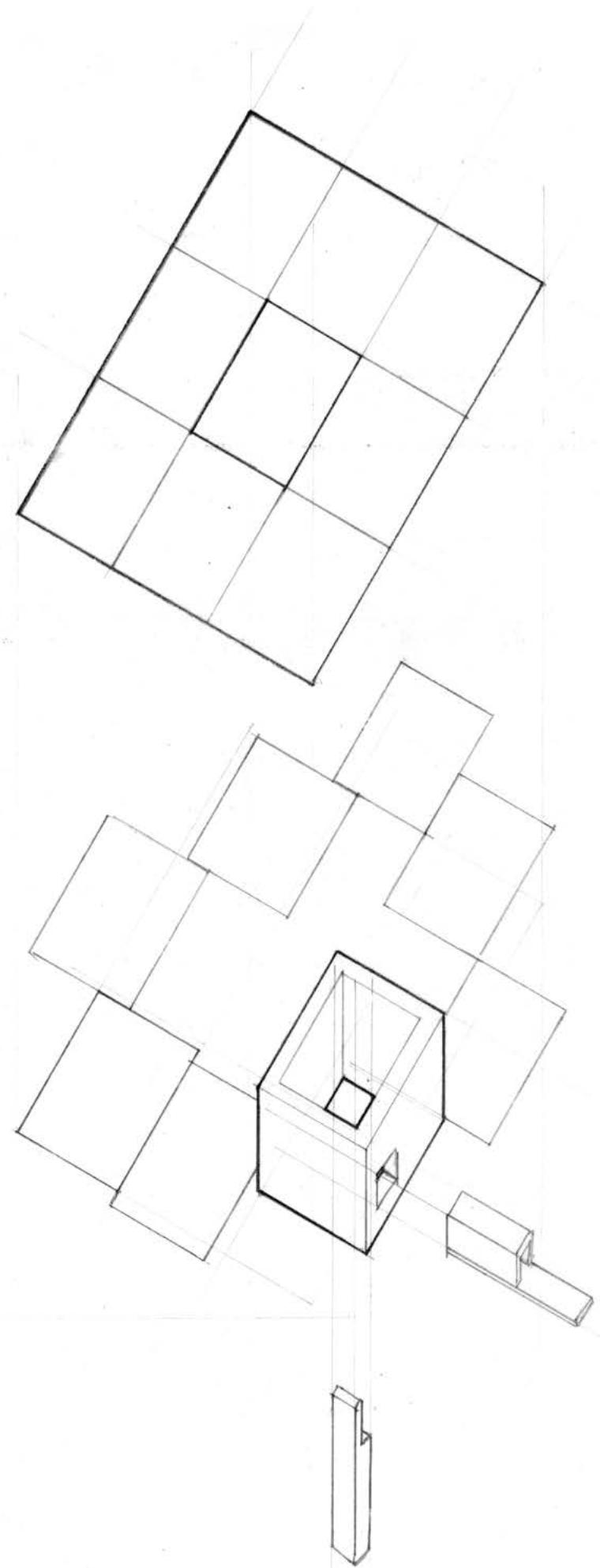
LIFESPAN  
NOMADIC  
SEASONAL  
PERMANENT

TECHNIQUE  
MASONRY  
FRAME  
WOVEN  
EXCAVATION

MATERIAL  
BRICK  
STONE  
EARTH  
WOOD  
GRASS  
HIDE  
ICE

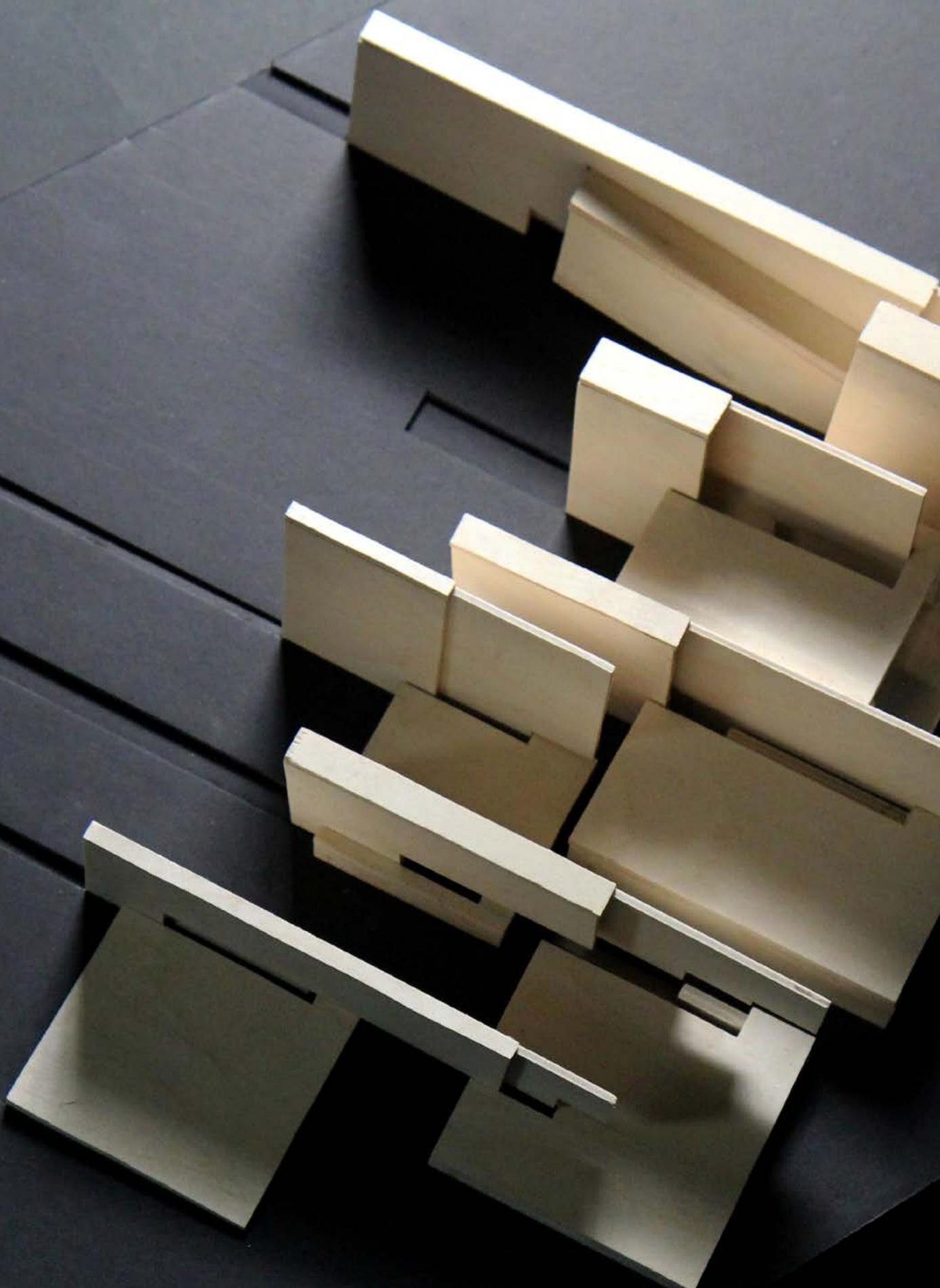
TERRAIN  
FLAT  
SLOPE  
EDGE  
SUBTERRANEAN





**INNUIT IGLOO**  
Greenland and W Canada  
North America

Since 1000 AD



The system was then moved to the site of igloo. The temperature was substantially low and constant wind from the west brought snow that covered the ground, creating a seasonal changing ground level. Small blocks were cut from a solid mass, which were then pushed sideways along the direction of the wind and downward into the ground. The first block was tilted to serve as an entrance like that of an igloo. This prevented heat

loss. Windscoops were now transformed into "Snowblockers" that were inserted into the blocks and blocked the wind and snow. This formed an outdoor area with less snow, with circulation pieces pushed inside the ground as a connection of the blocks, so that heat could be preserved. The intersection among the three created openings on the blocks, where light could be reflected and illuminate the spaces underground.

Adaptive Modification

CLIMATE  
TROPICAL  
ARID  
TEMPERATE  
COLD [CONTINENTAL]  
**POLAR**

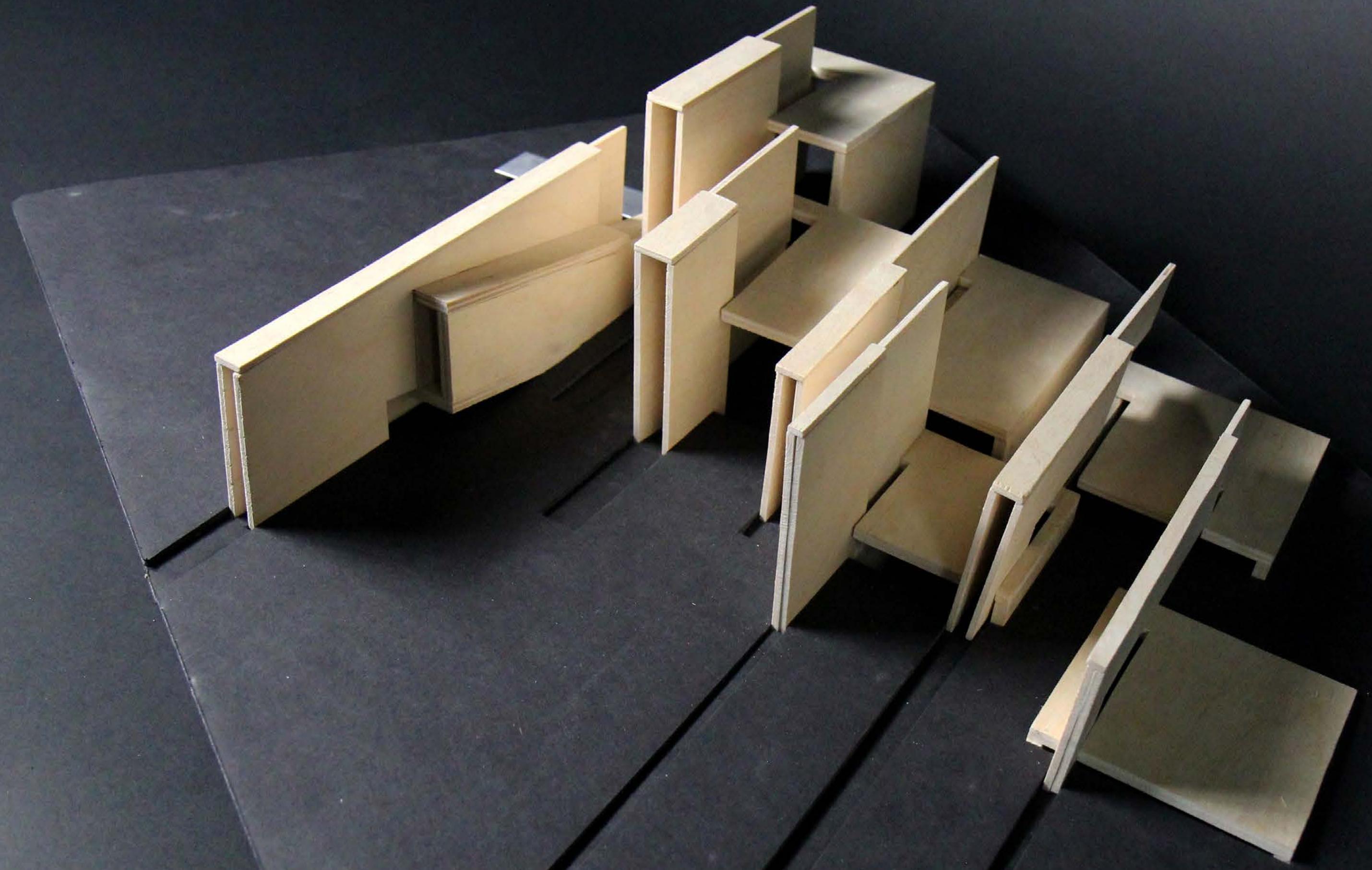
USE  
COMMUNAL  
**DOMESTIC**  
AGRICULTURE  
AQUACULTURE  
INDUSTRY

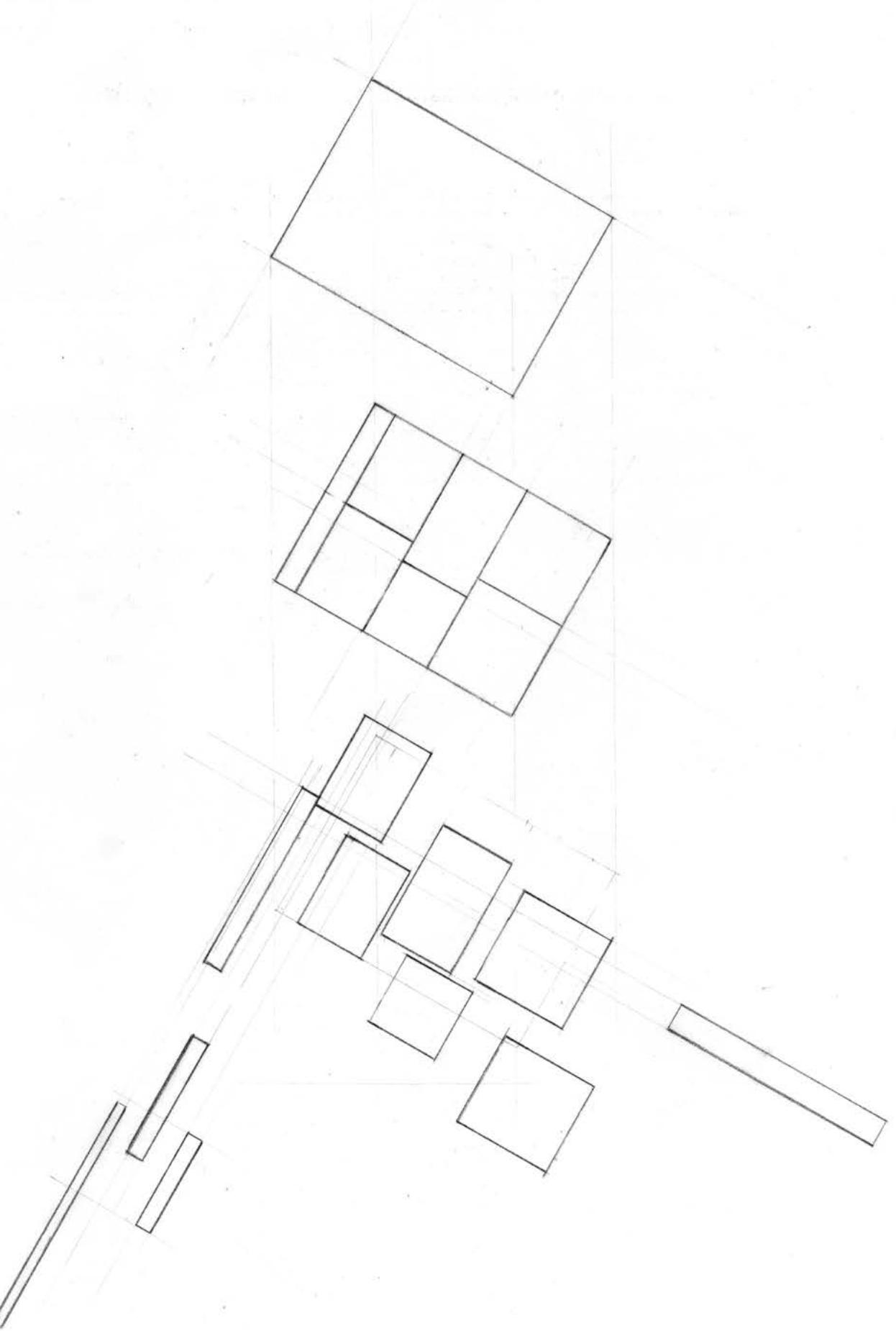
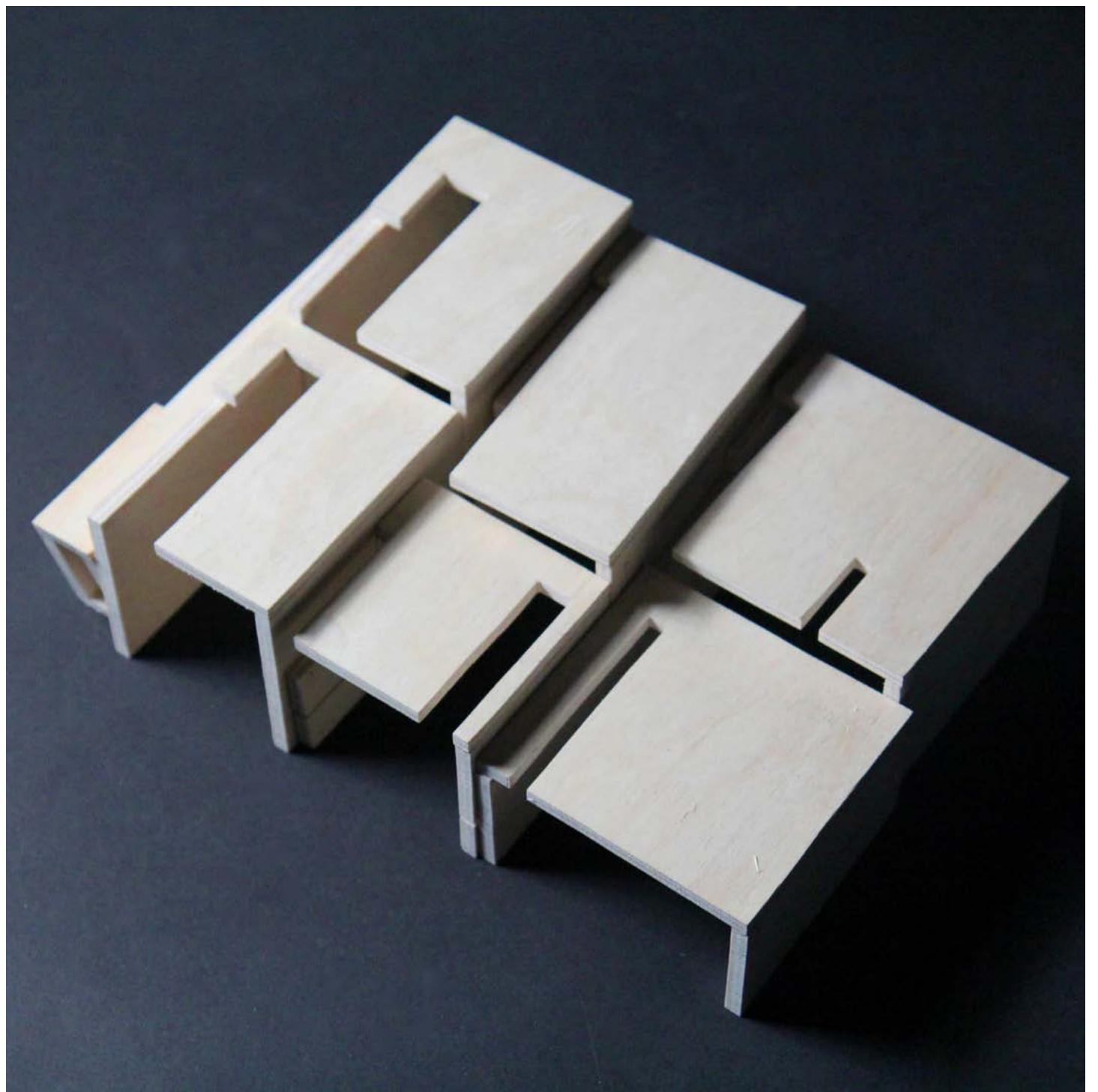
LIFESPAN  
**NOMADIC**  
SEASONAL  
PERMANENT

TECHNIQUE  
MASONRY  
FRAME  
WOVEN  
**EXCAVATION**

MATERIAL  
BRICK  
STONE  
EARTH  
WOOD  
GRASS  
HIDE  
**ICE**

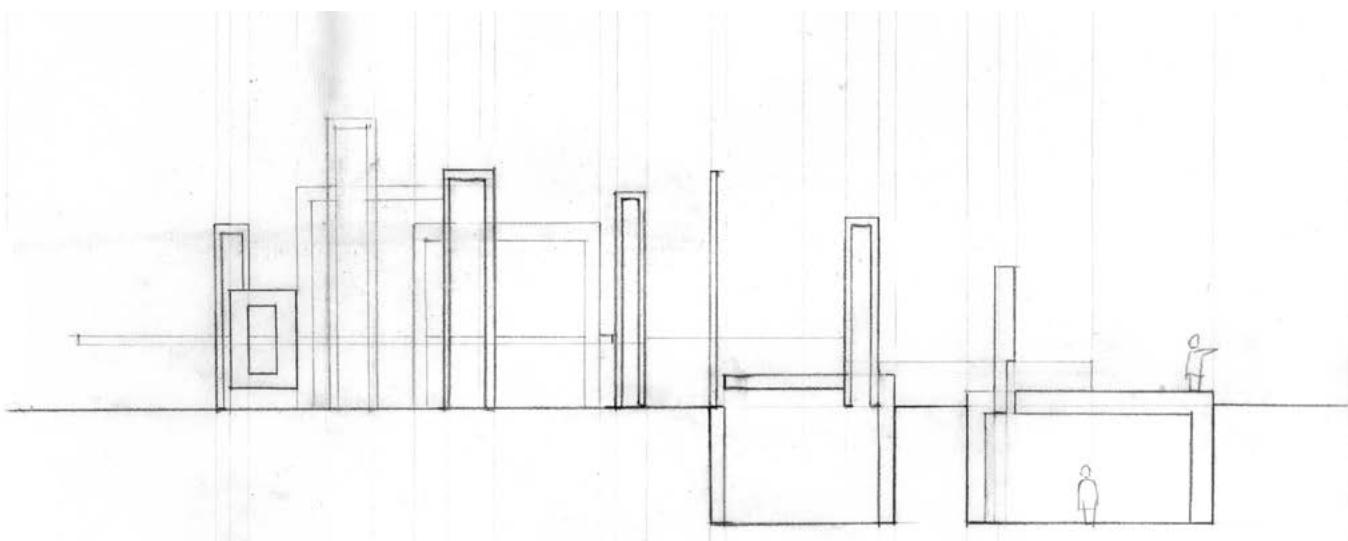
TERRAIN  
**FLAT**  
SLOPE  
EDGE  
SUBTERRANEAN



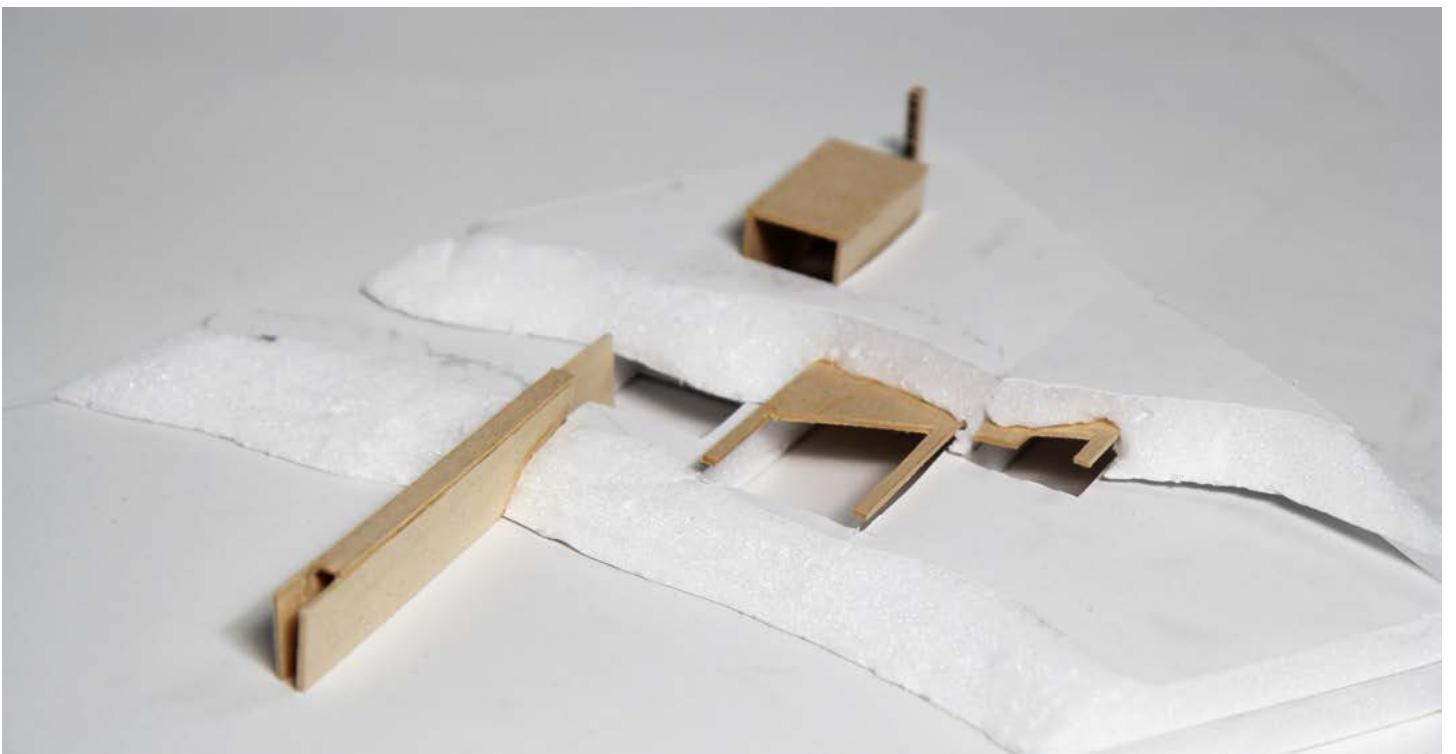
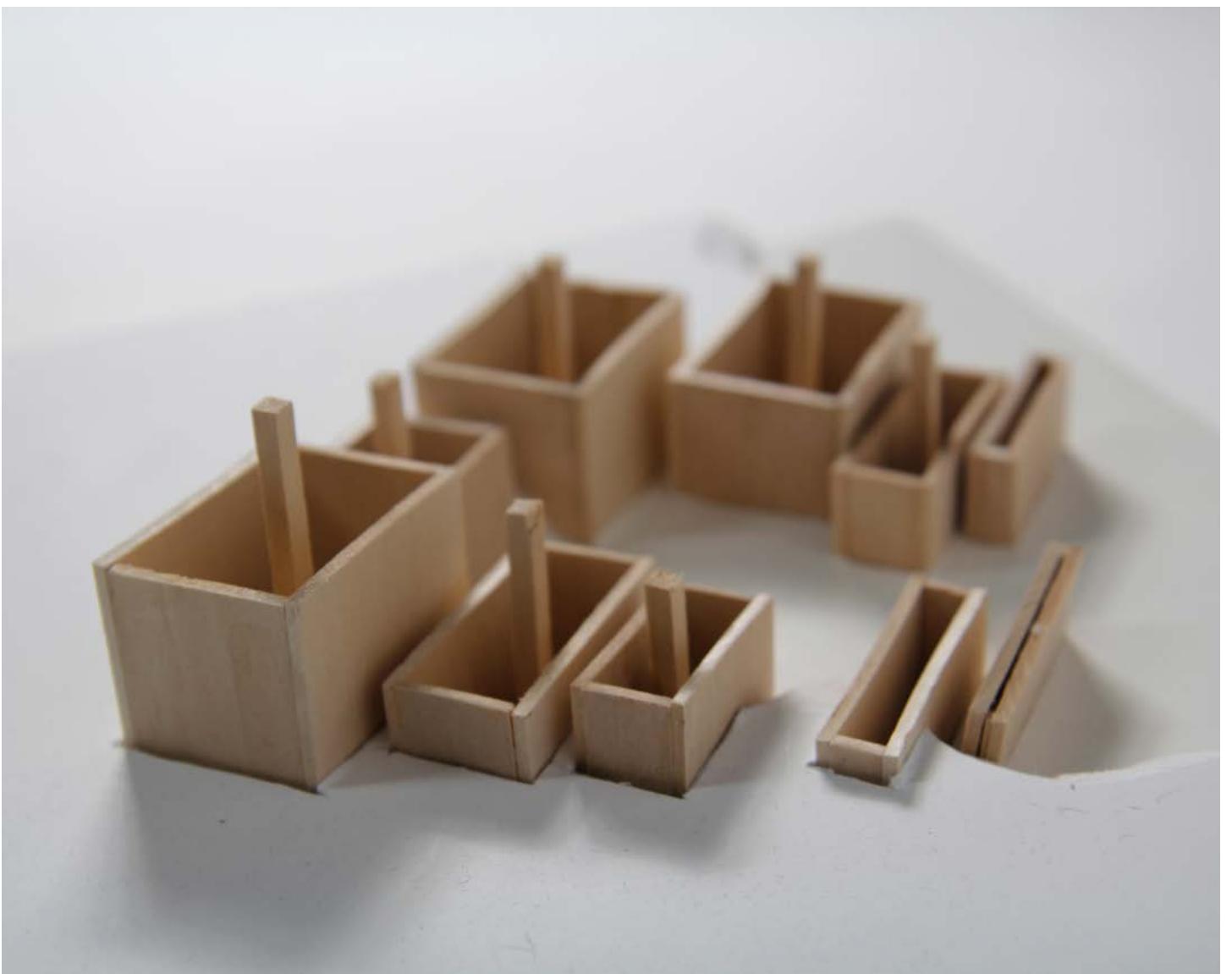




Plan



Section



Adaptive Modification

**PERUVIAN STILTHOUSE**  
Iquitos, Peru  
South America

1800s - present



CLIMATE  
TROPICAL  
ARID  
TEMPERATE  
CONTINENTAL  
POLAR

USE  
COMMUNAL  
DOMESTIC  
AGRICULTURE  
AQUACULTURE  
INDUSTRY

LIFESPAN  
NOMADIC  
SEASONAL  
PERMANENT

TECHNIQUE  
MASONRY  
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WOVEN  
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MATERIAL  
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ICE

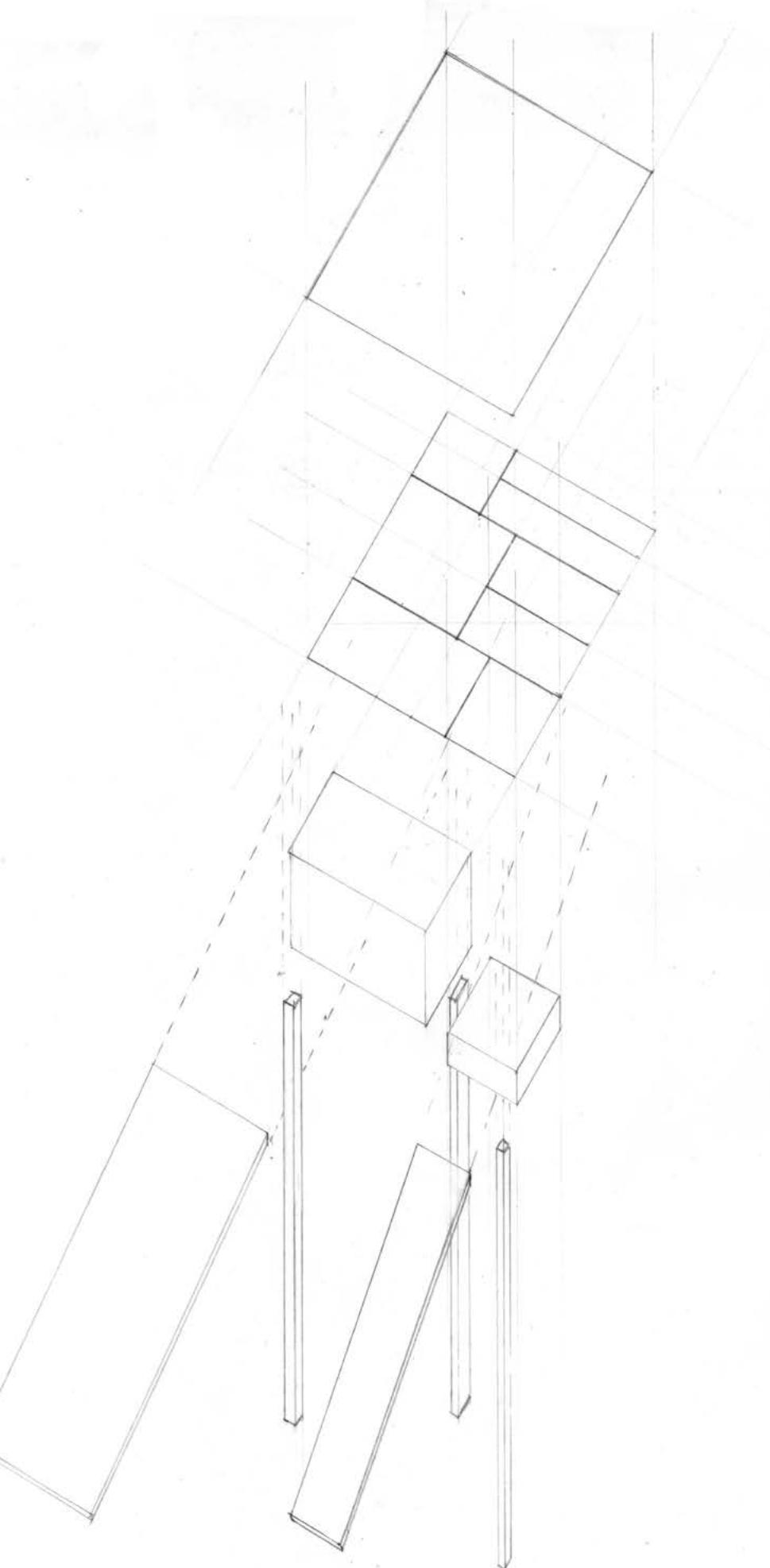
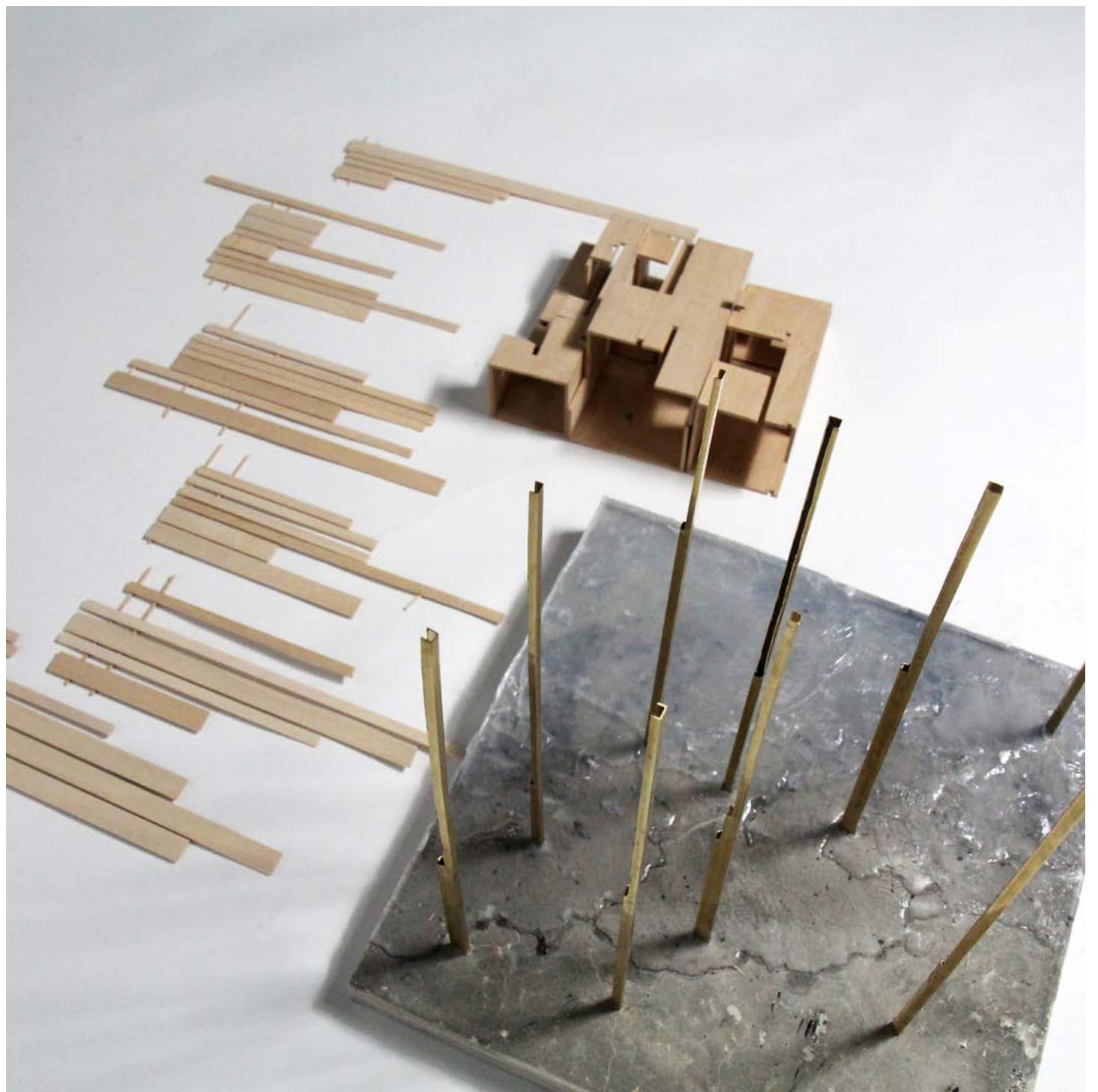
TERRAIN  
FLAT  
SLOPE  
EDGE  
SUBTERRANEAN

Transported to the tropical climate, the project rested along a river with frequent flood. Therefore, the blocks cut from a solid mass were lifted to avoid water, being pushed three-dimensionally instead of two-dimensionally on a plane. Partially chopped off at intersection points, windscoops became the vertical tubular metal structure that supported the blocks. Circulation pieces were substituted with tilted wooden panels that could connect

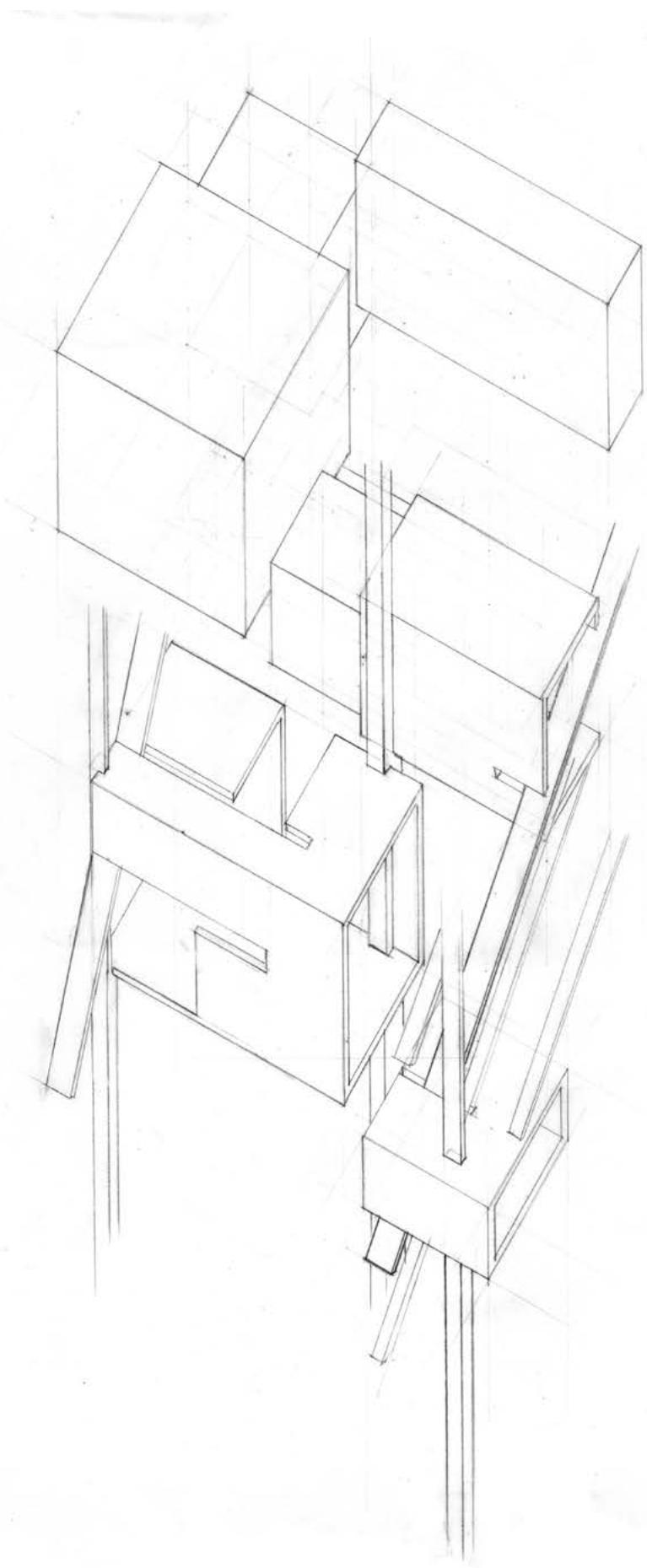
the blocks to form a rigid system. They match up when viewed from the south and the north, thus also working like shading devices as well as wind-catching panels. The angles of these panels vary—some panels helped lead rain water down while others became human circulation panels. The intersection created openings on the blocks. Therefore, the spaces became more open towards the wind, which aided passive cooling.

Adaptive Modification

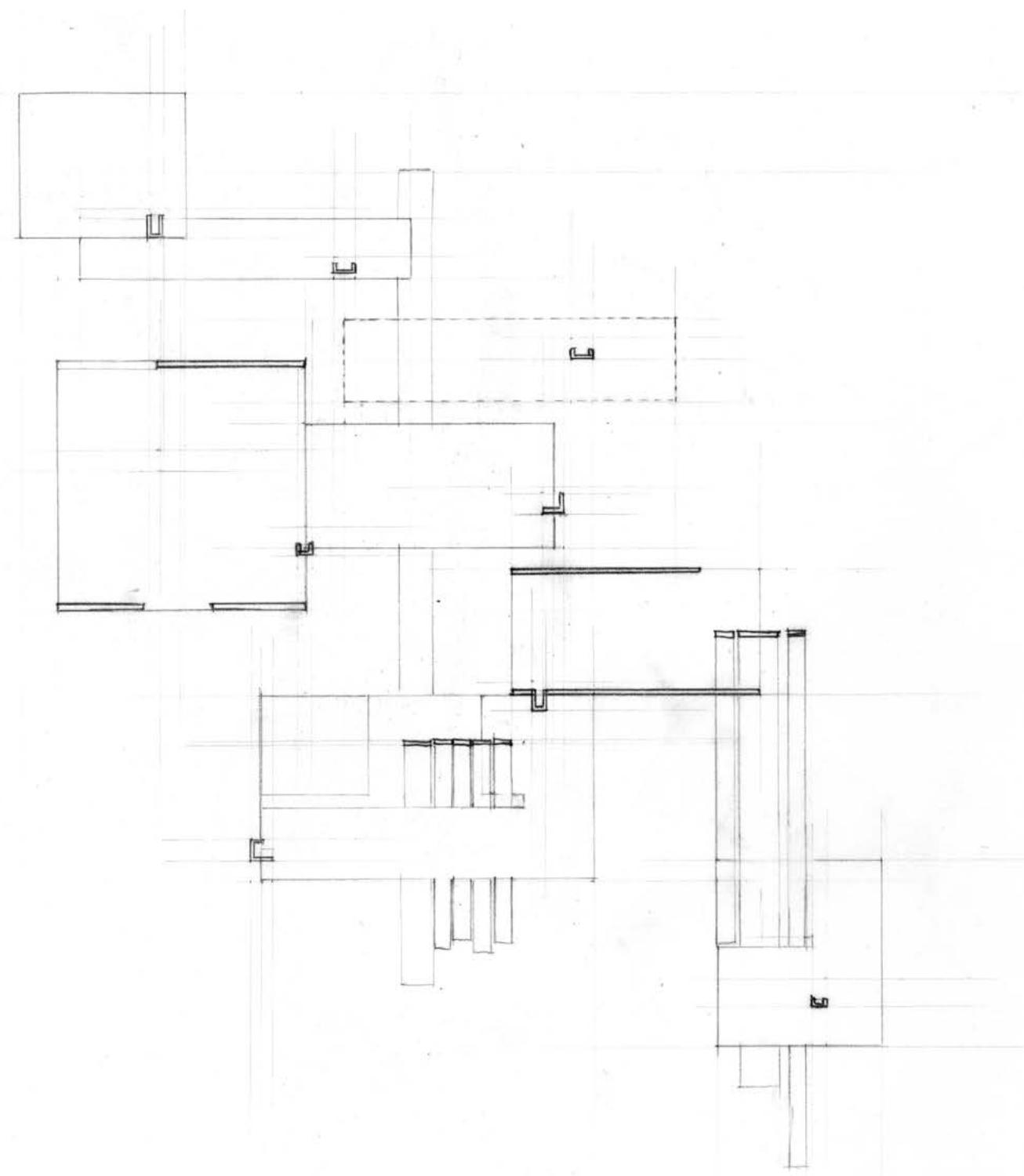




Adaptive Modification



Detailed Axonometric



Adaptive Modification

Plan

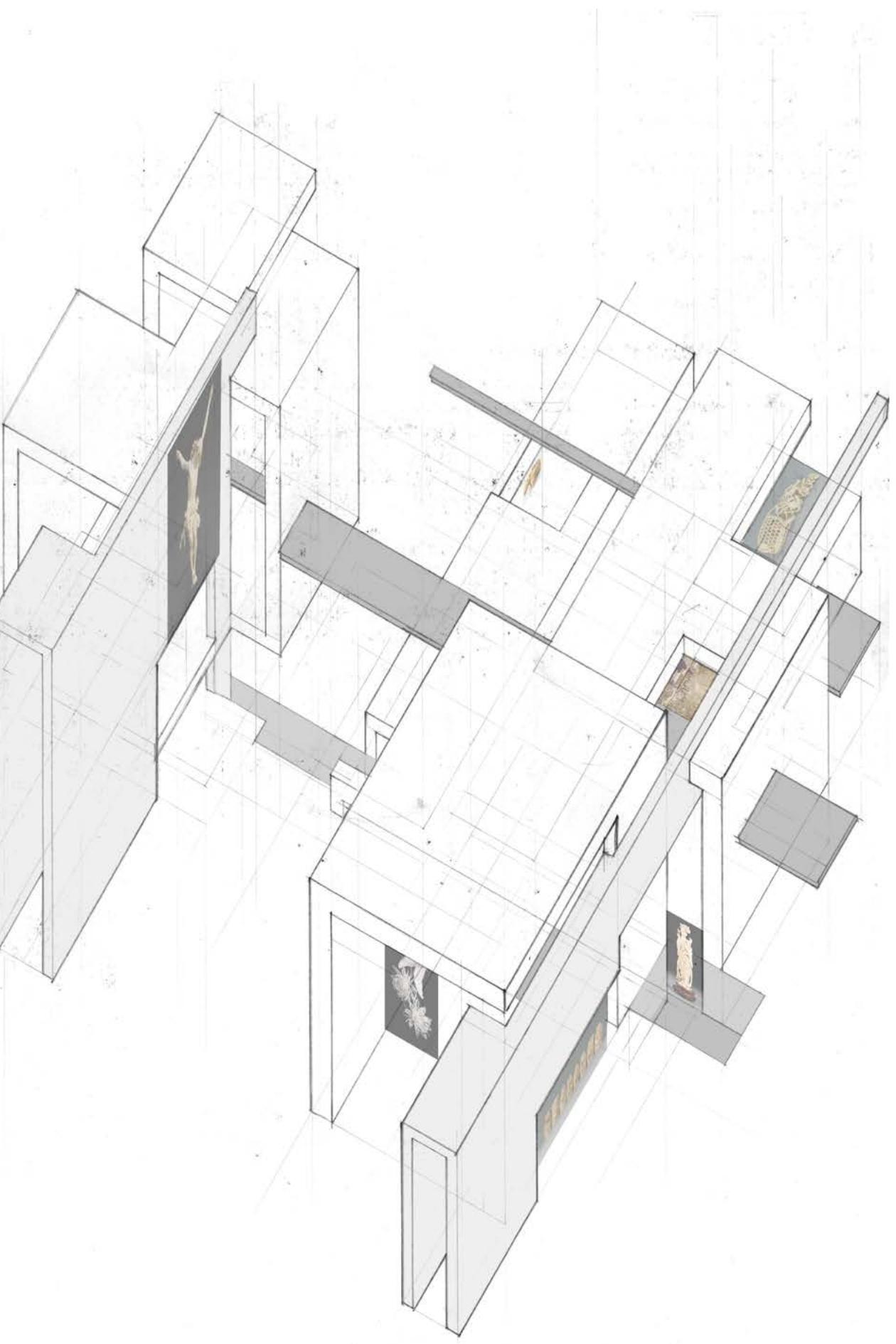
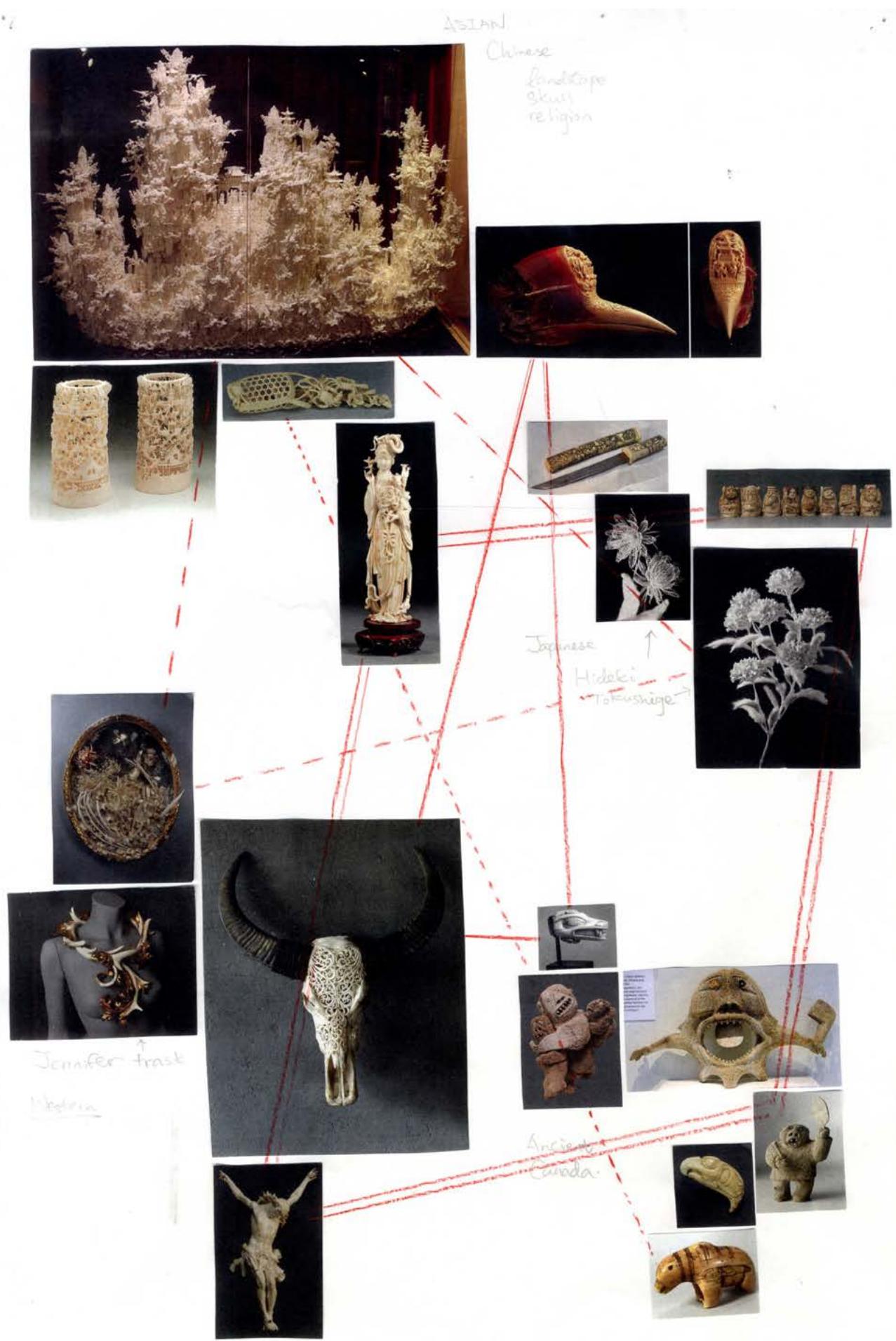


## IV. THE ADAPTIVE COLLECTION

This is an exhibition facility for carvings, located in Greenland with the polar climate. Based on the logic developed from the two precedents, this complex that adapted to the cold climate of the site was created.

Cut from a whole solid mass and mobile three-dimensionally, the blocks of spaces were pushed along both the direction of the constant wind and the trend of

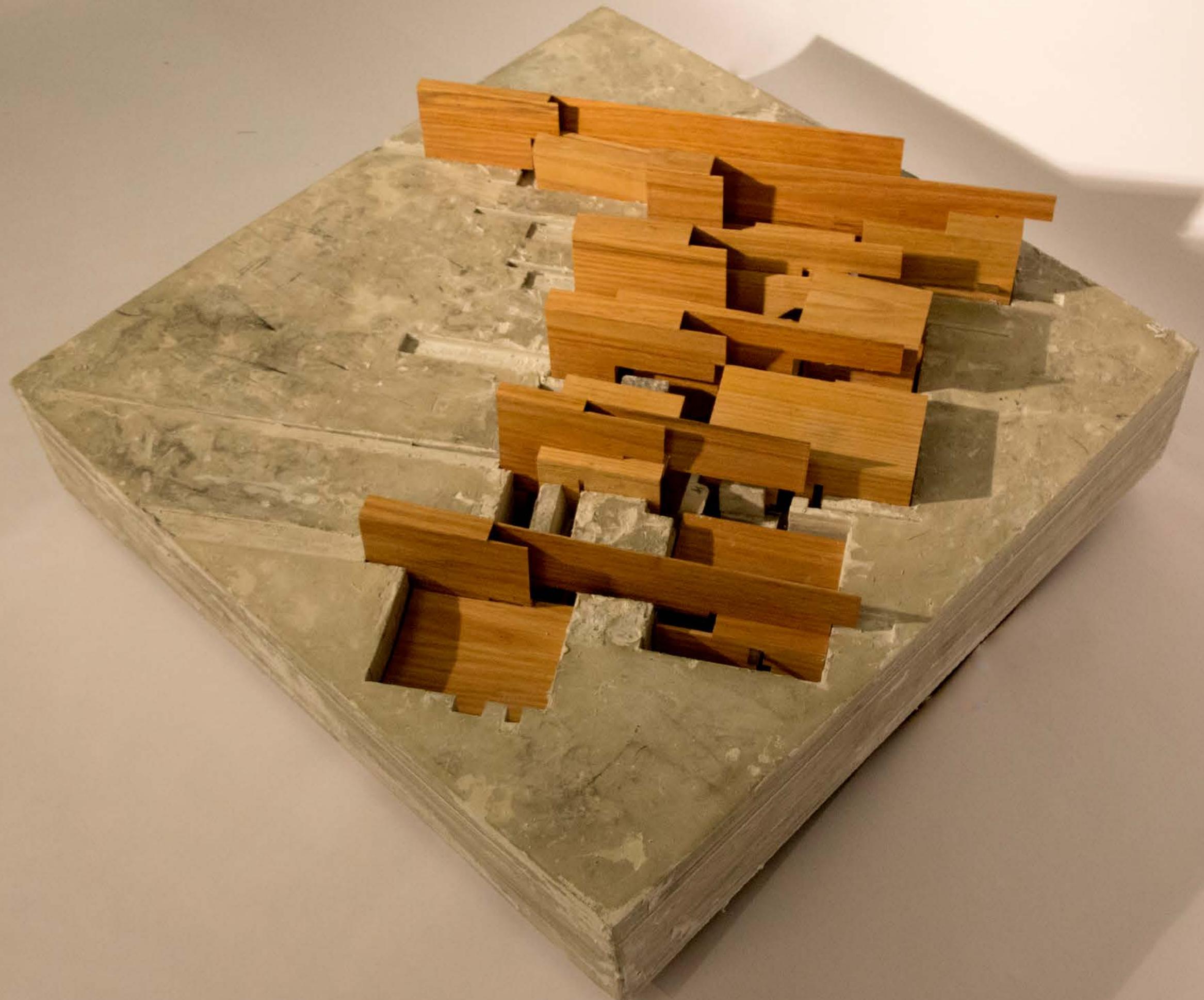
downward movement. Snowblockers were inserted into the blocks, creating openings for sunlight on the blocks. Metal circulation pieces were then used to lock the blocks and snowblockers. They also created openings on the blocks. The earth and snow covering the structure helped with passive heating, while snowblockers blocked the constant wind with snow from the west.

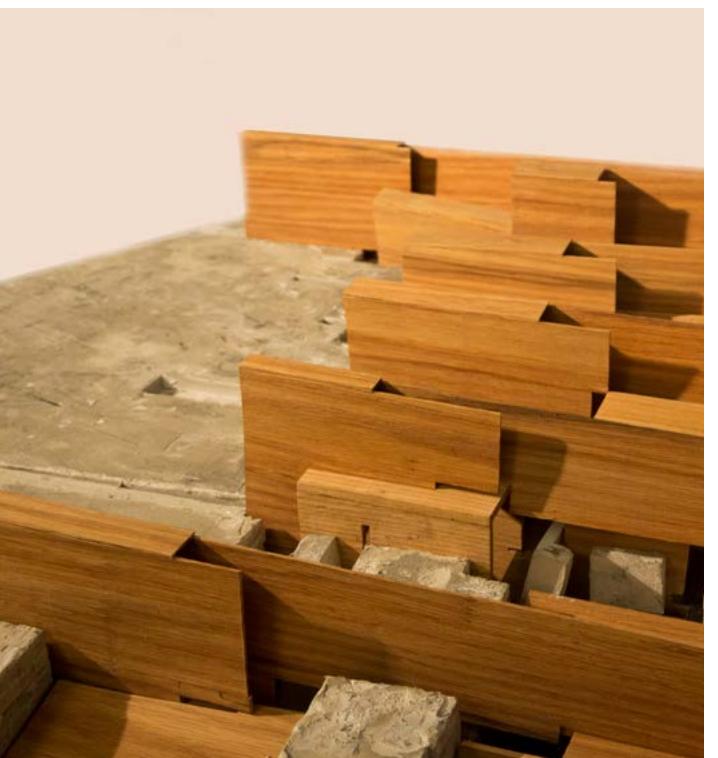
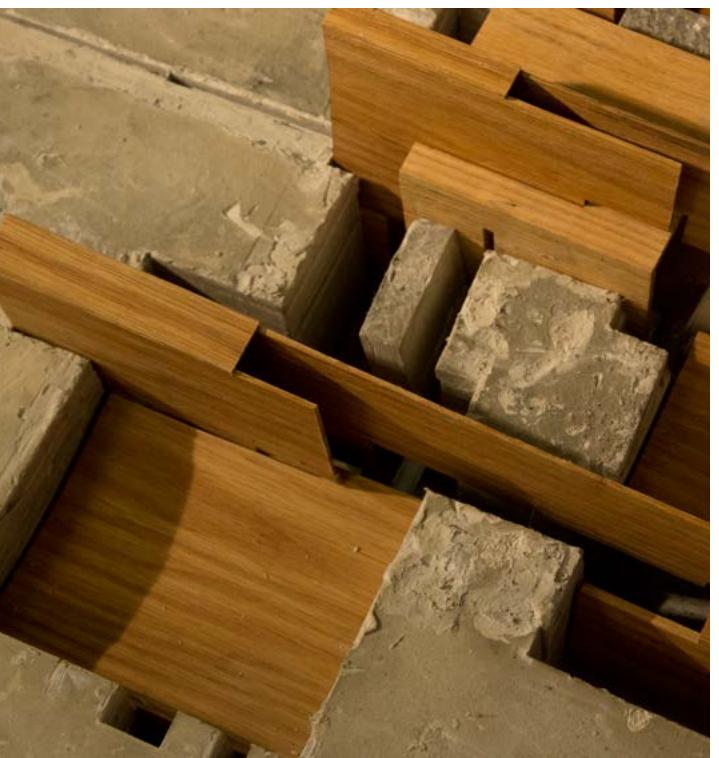


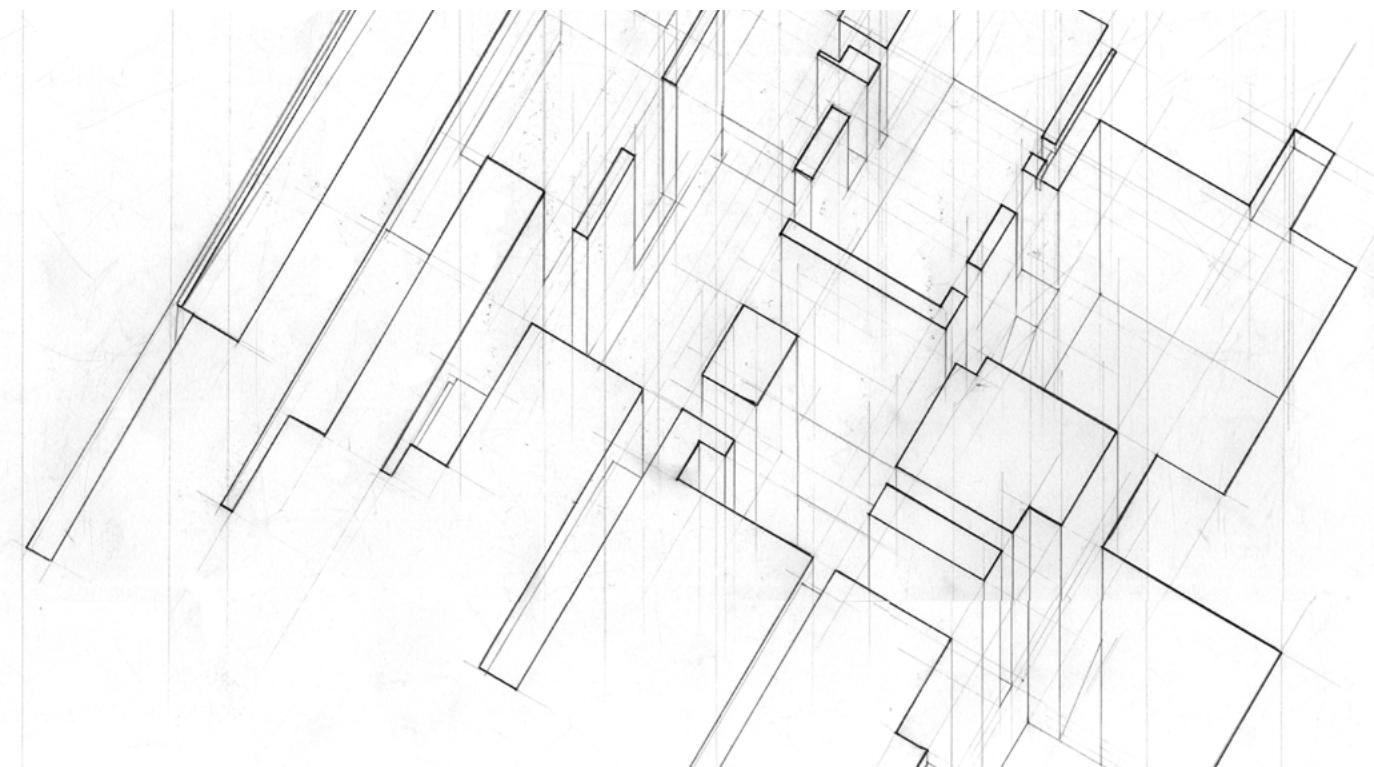
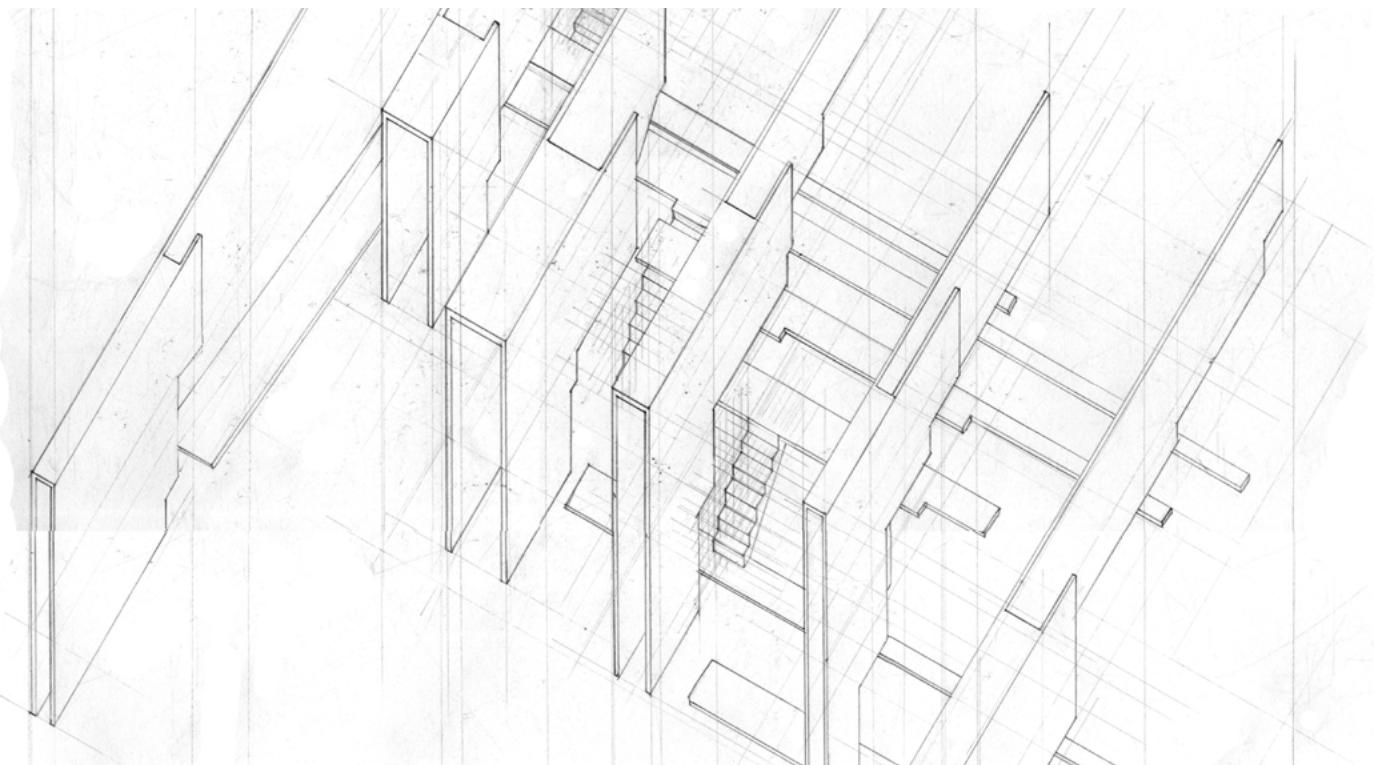
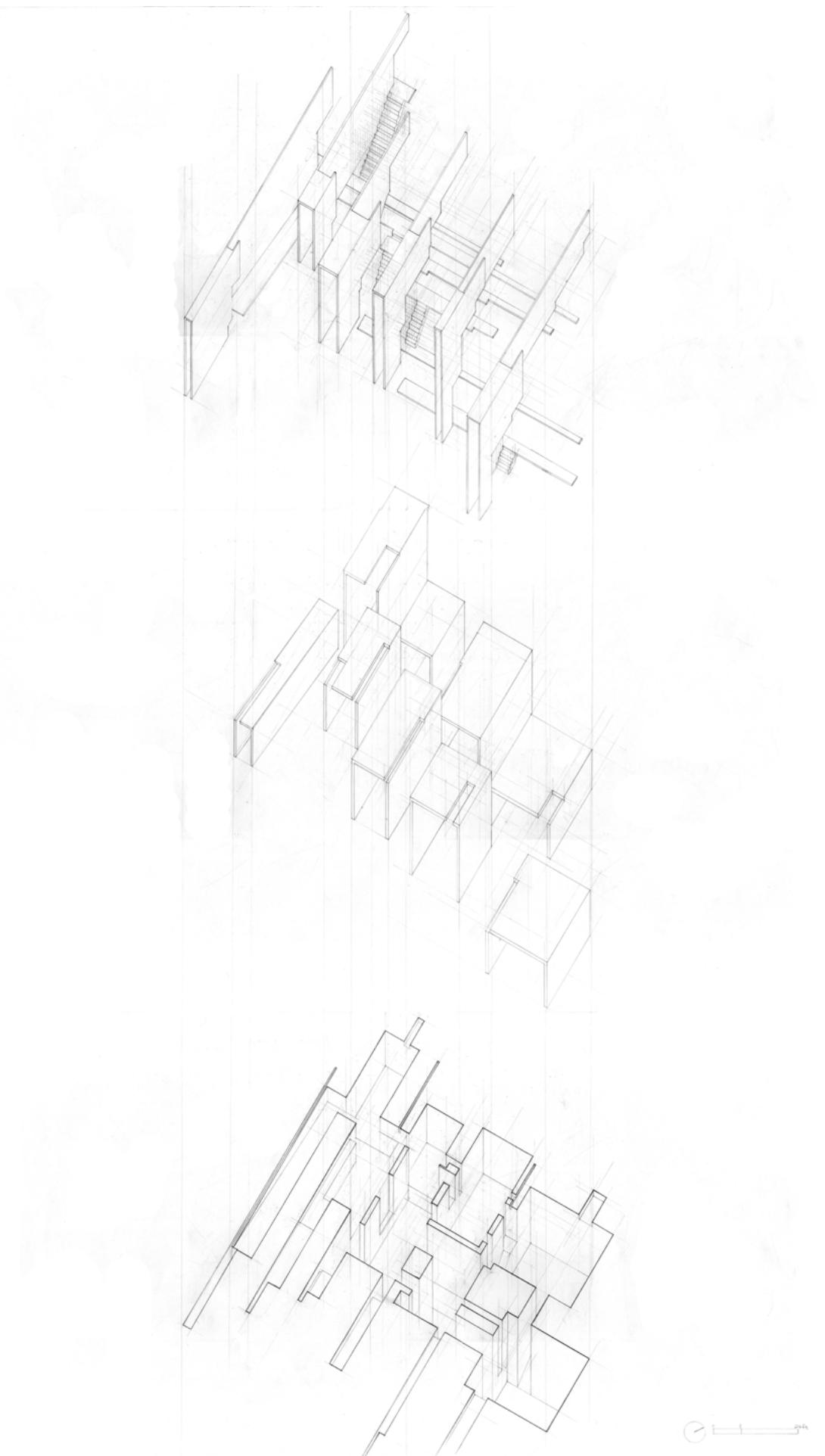


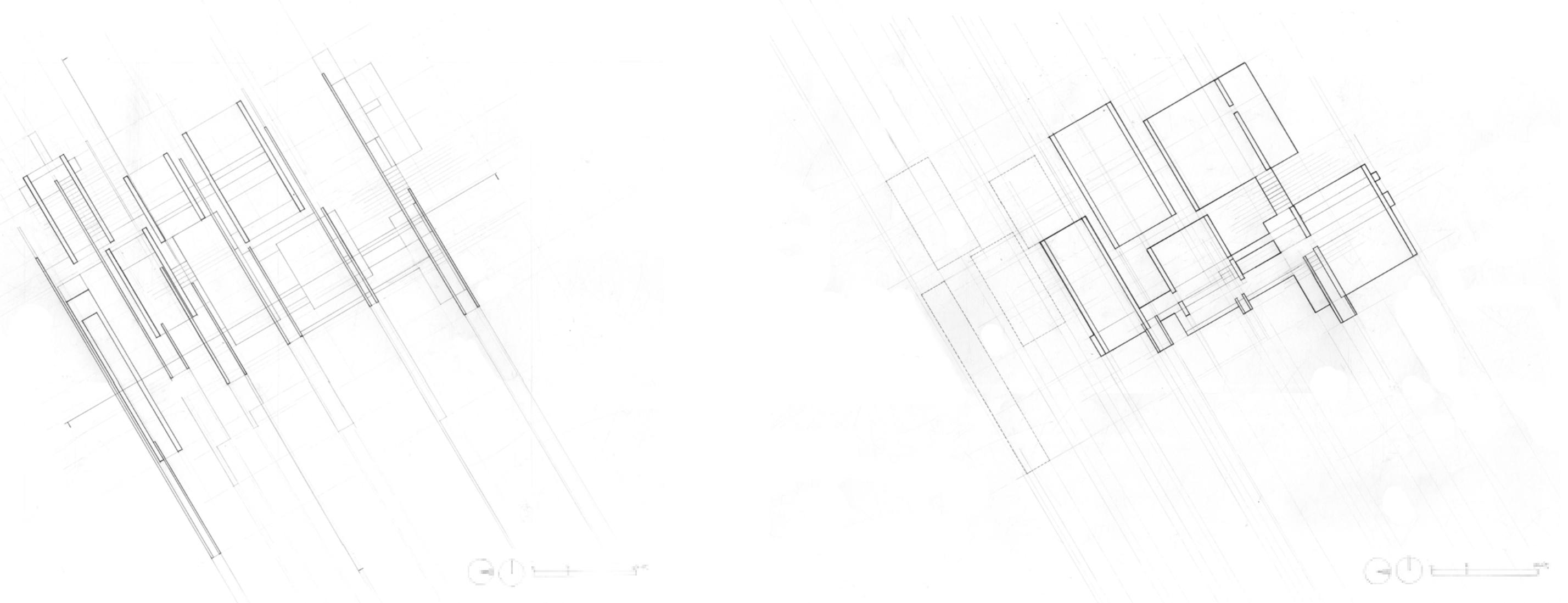
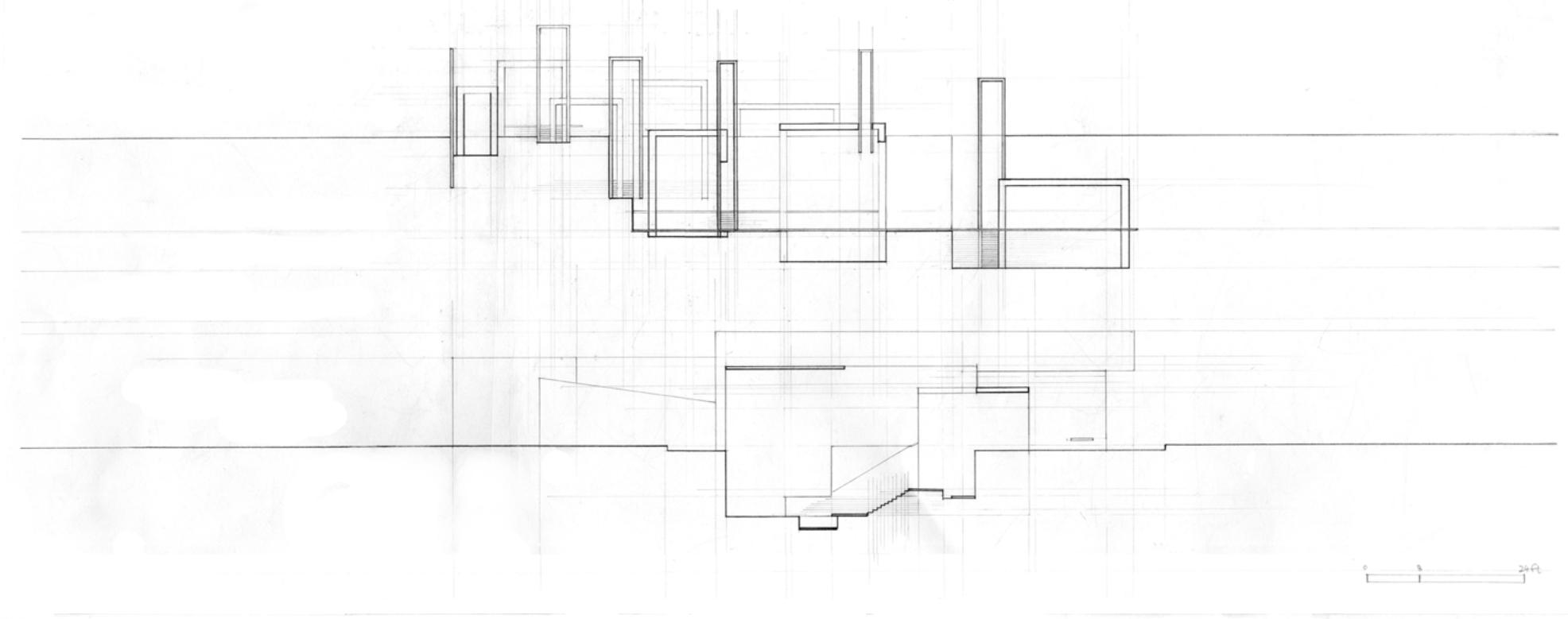
The intersected spaces helped present the intersected relation of the collections. Carvings from different regions were displayed in blocks of spaces, and cross-cultural relationships were shown through the spatial connections of the placement of the circulations. This visual logic created by the openings at intersection points, connected related collections in different blocks. Thus when audiences observe a human sculpture from China, they might peer through the gaps on the walls and see a western human carving.

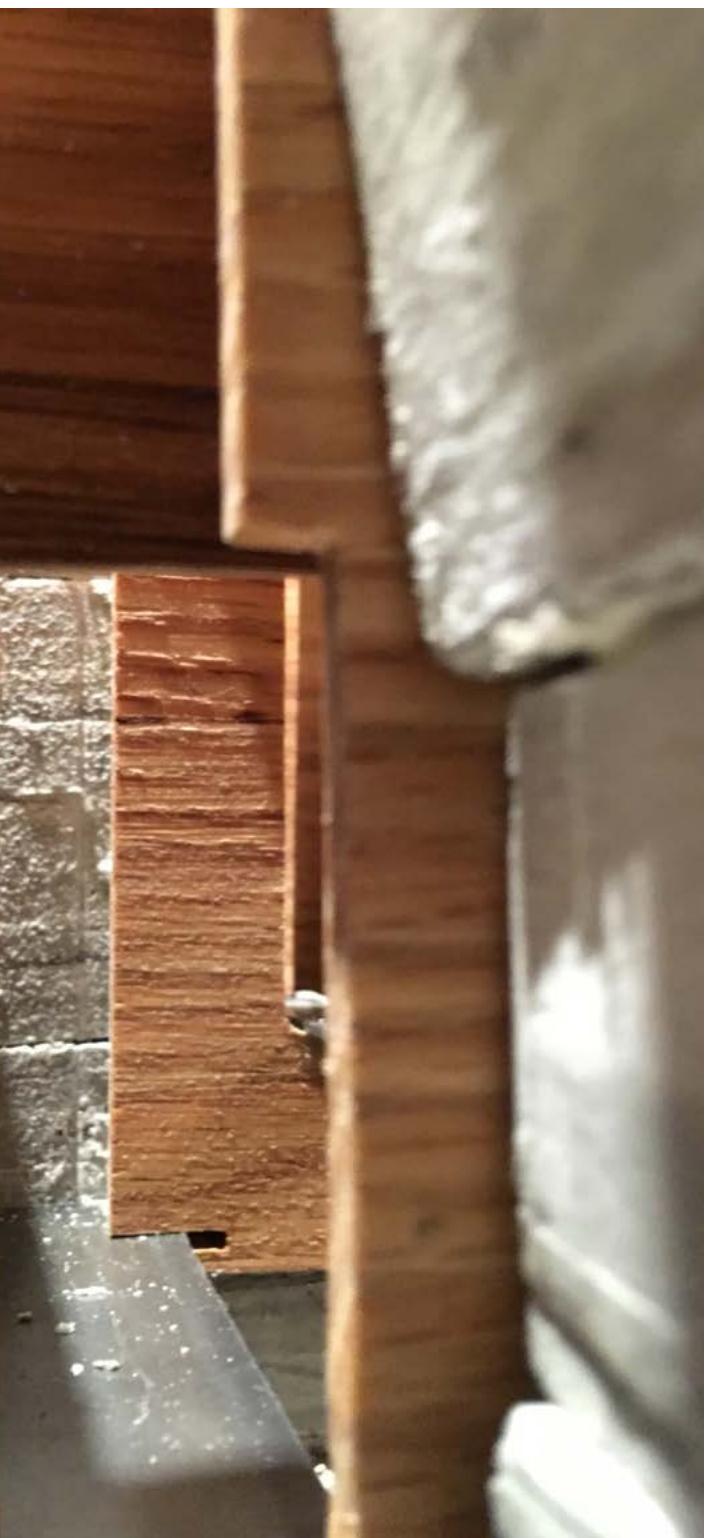
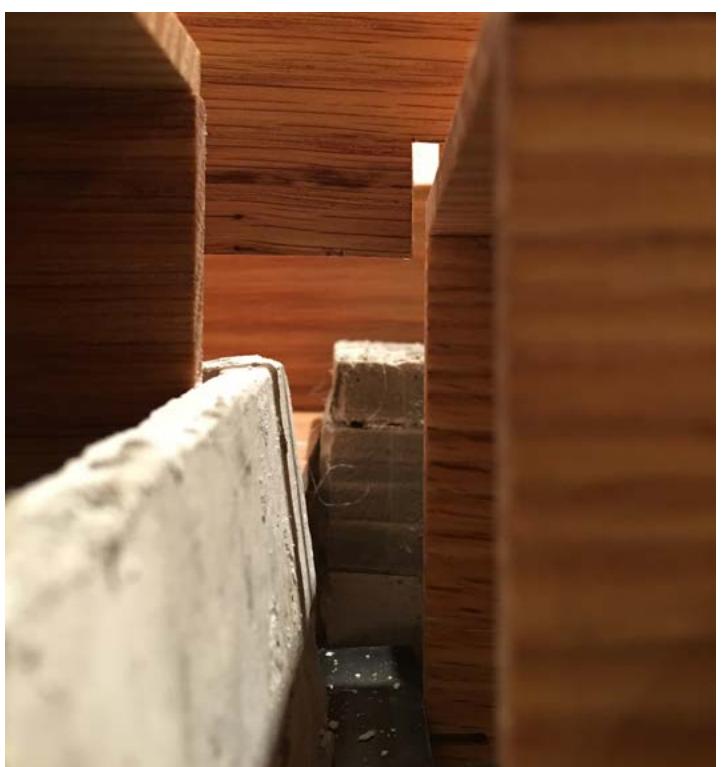
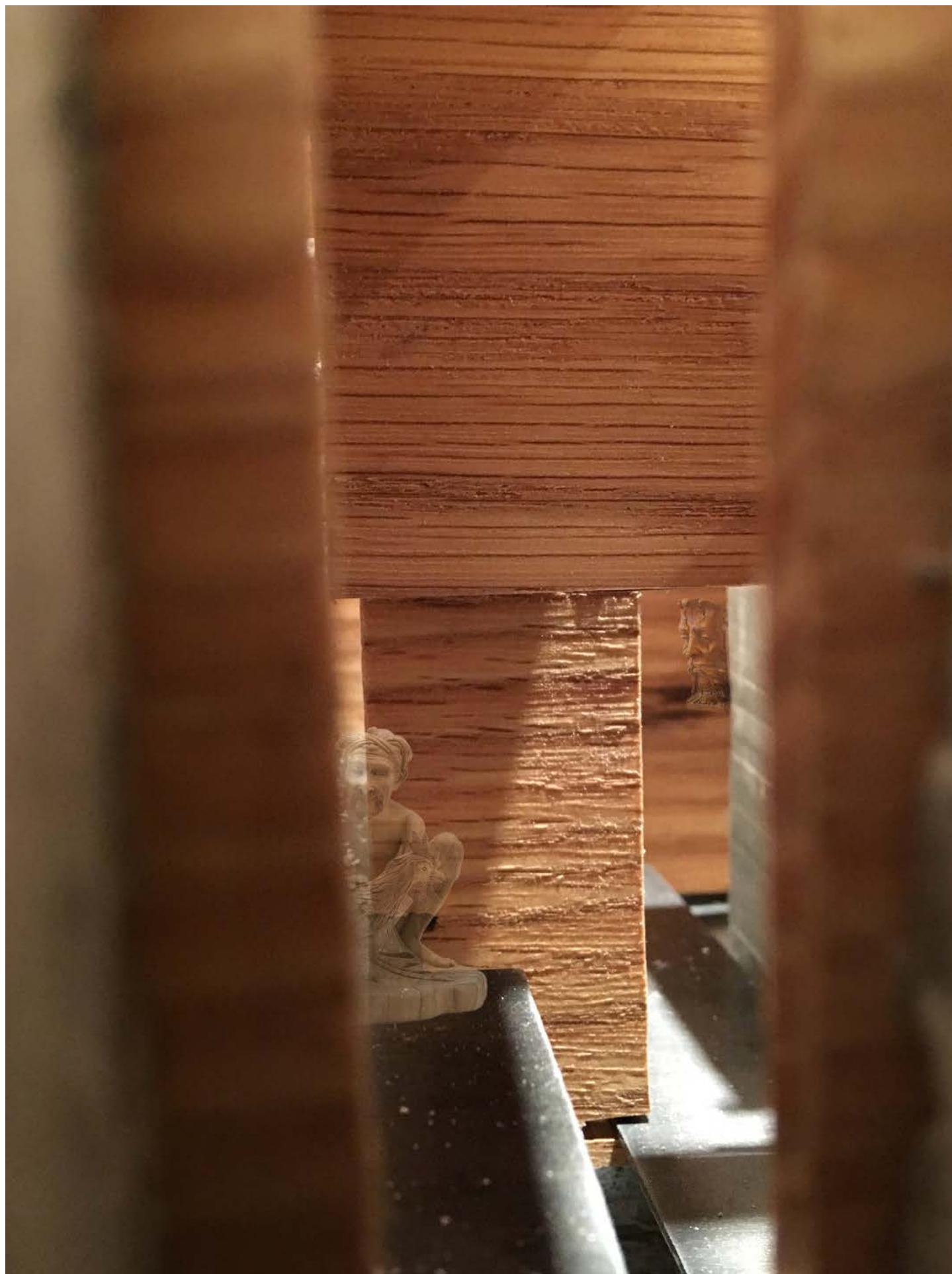
Guided by the long and narrow entrance, visitors could descend into the interlocking spaces underground. They could first enter the café to warm up and get ready for traveling further downstairs to the exhibition. Visitors move horizontally along circulation pieces and vertically in the stair cases in snowblockers. They could go as far as the library and storing space at the lowest block. The artist could enter the block for residence through a private entrance.

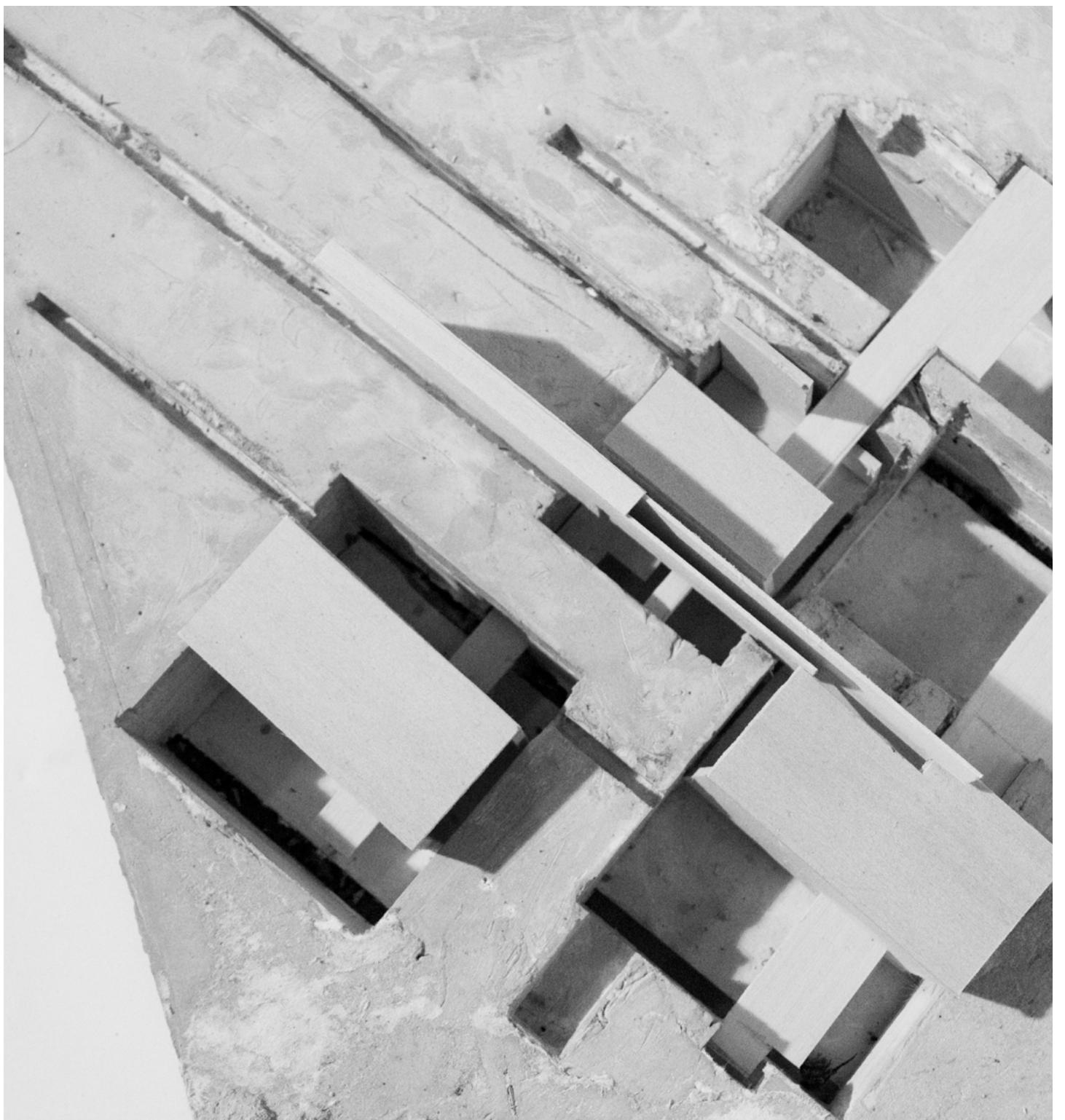




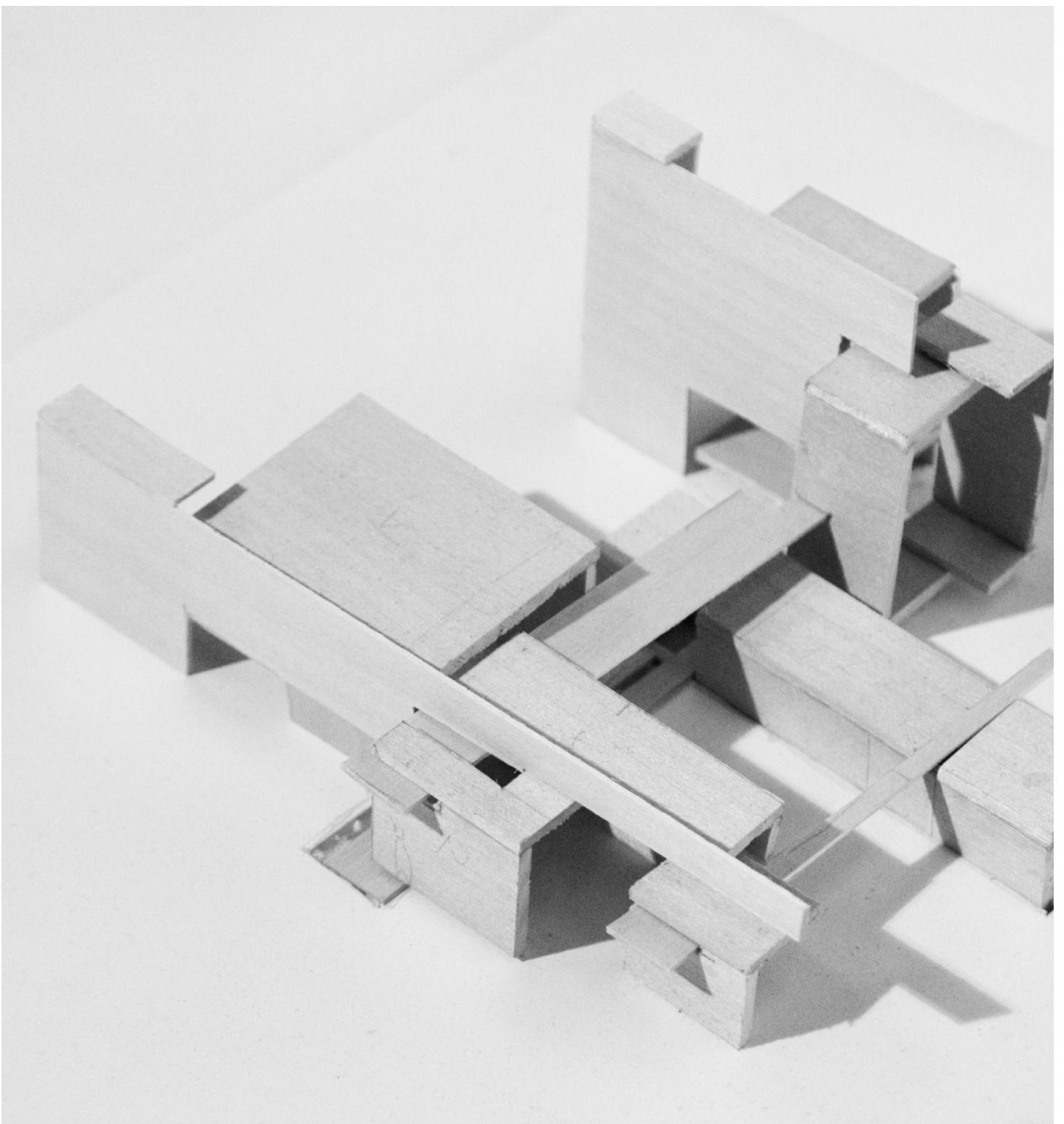








**Study Models**



**The Adaptive Collection**

