UMA EDULBEHRAM

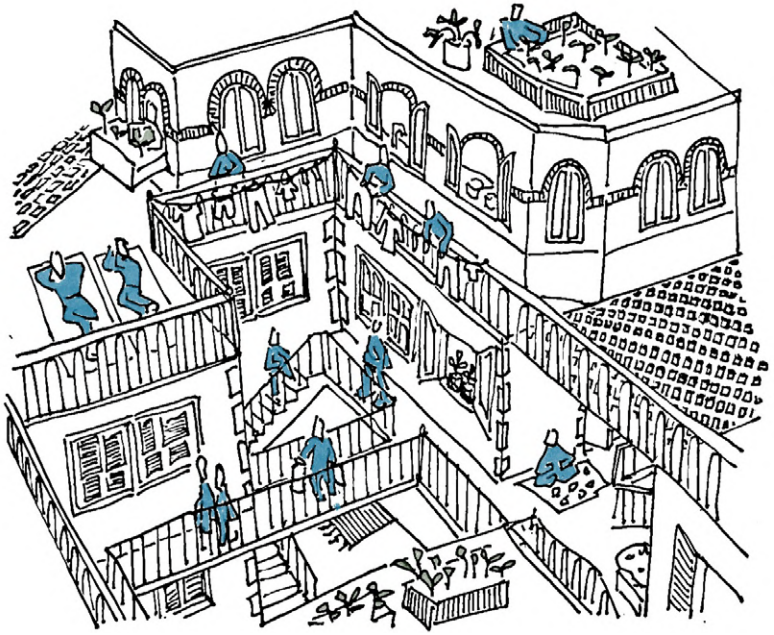
Downtown, Handcut Linoleum Print 11” x 11”

CONTENTS

This portfolio exhibits work demonstrating skill in design and analysis. Projects span from fully developed programs to more abstract exploratory design. Interaction with environmental and climatic forces is seen as a critical throughline. More visual art and design work can be seen at umaedulbehram.com

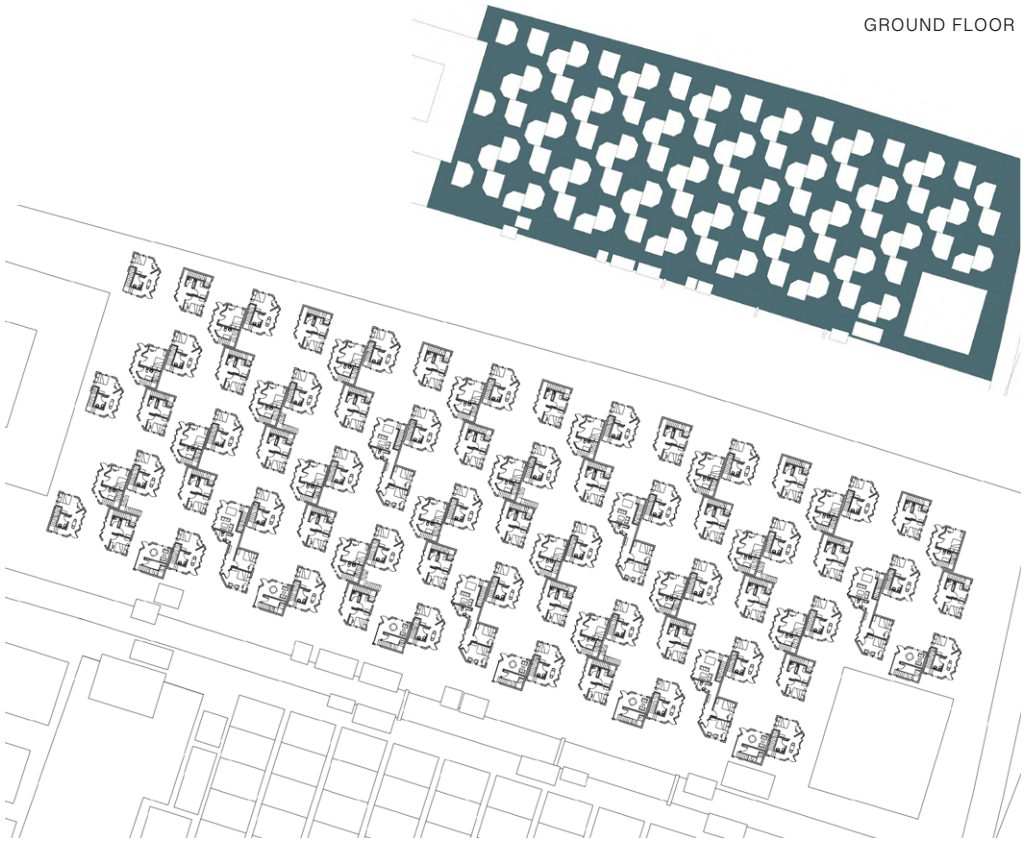
01 DIAMOND HARBOR HOMES

INDEPENDENT DESIGN



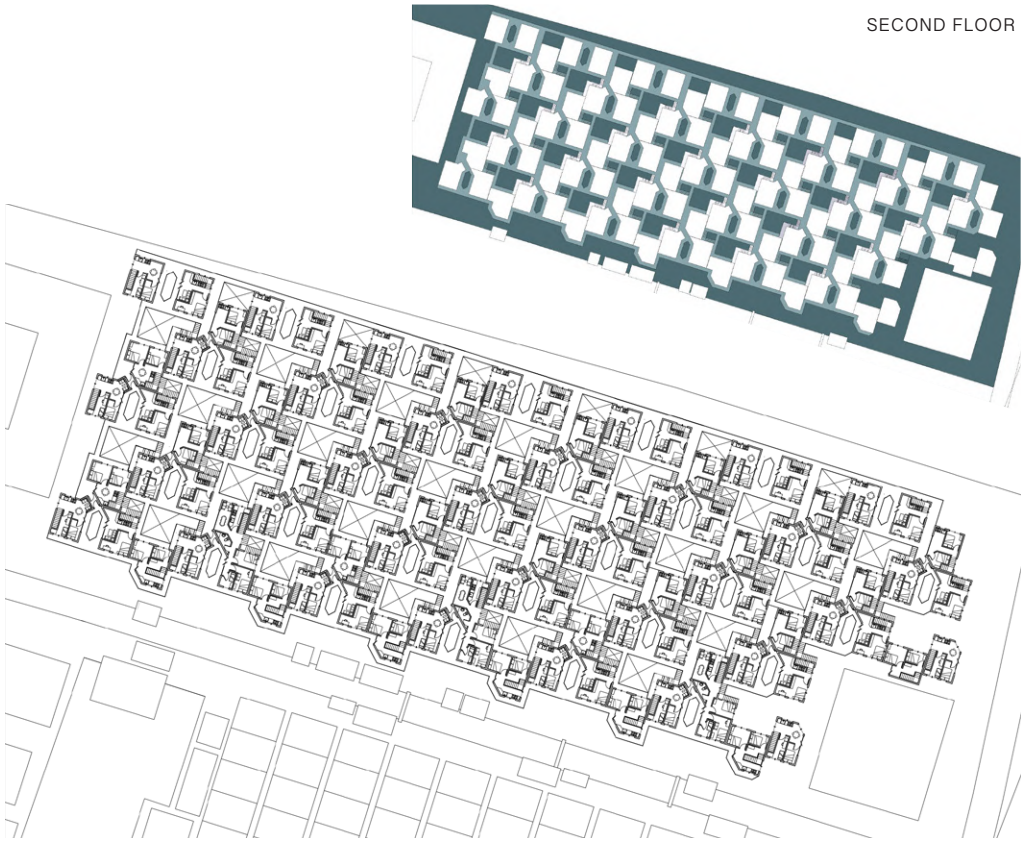
Inspired by an informal community development in Kolkata, India, the Diamond Harbor Homes project attempts to reimagine dignified, cost-effective housing. Drawn from interviews of current residents, the project focuses on modularity and circulation to create a more sustainable and equitable built environment conducive to the diverse needs of residents. The project additionally prioritizes density, achieving a higher FAR than the precedent development.

GROUND FLOOR

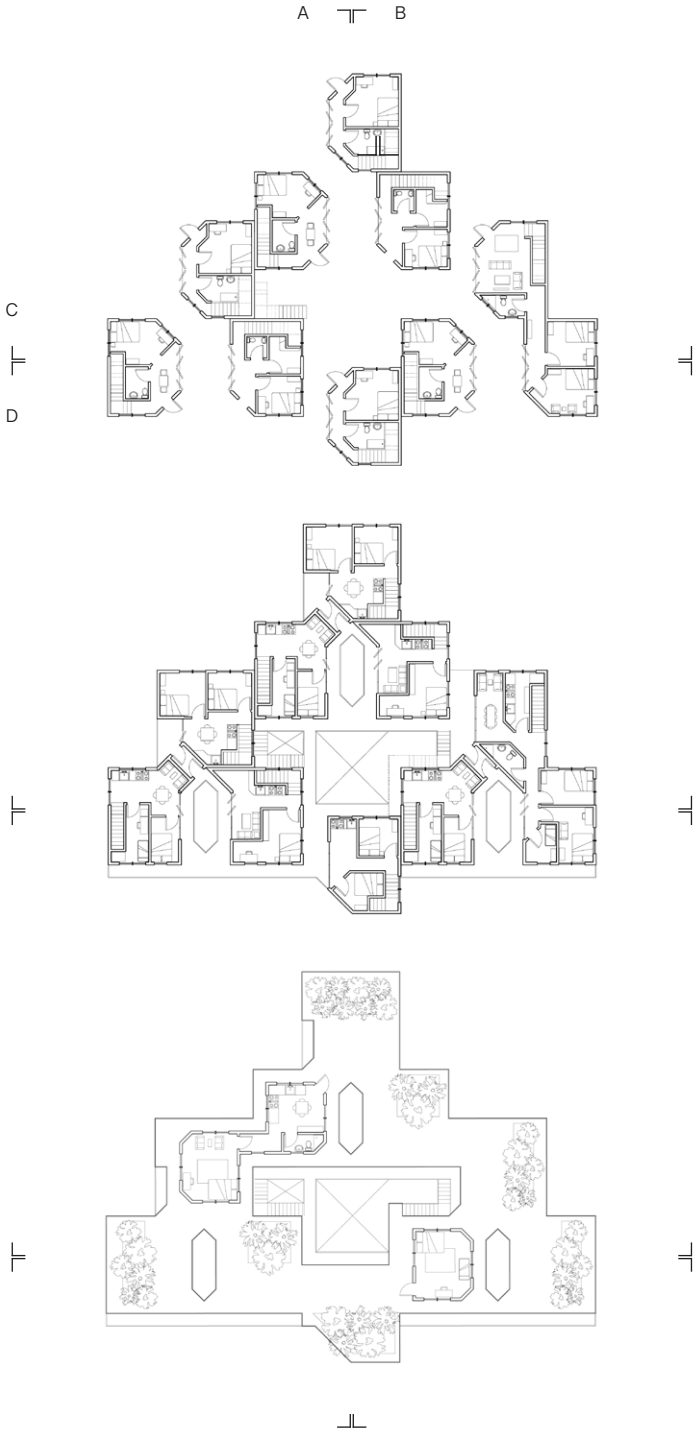


The project redefines circulation to include mobility, air, and light. The development comprises of a system of interconnecting units, with multi planar ciruclation routes and spaces to gather serving as the glue. Public courtyards and walkways weave private program together to create space for social and economic activity.

SECOND FLOOR

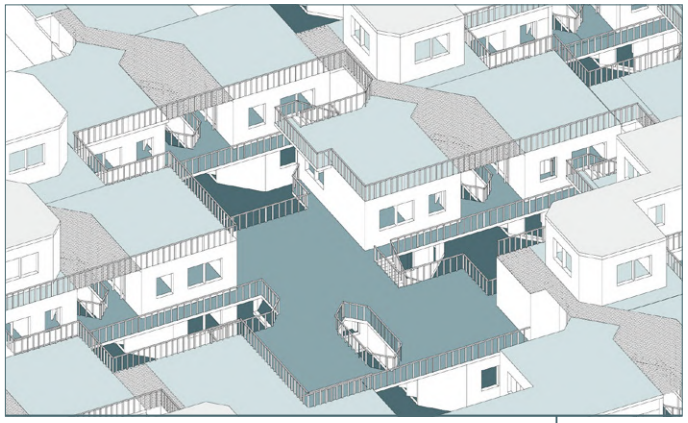


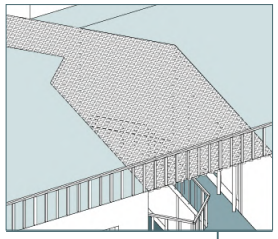
Air and light filter through central courtyards creating systems of light filtration and cross ventilation that reduces oppressive heat in high density housing. Expanded open space reduces pressure of overcrowding and the urban heat bubble.



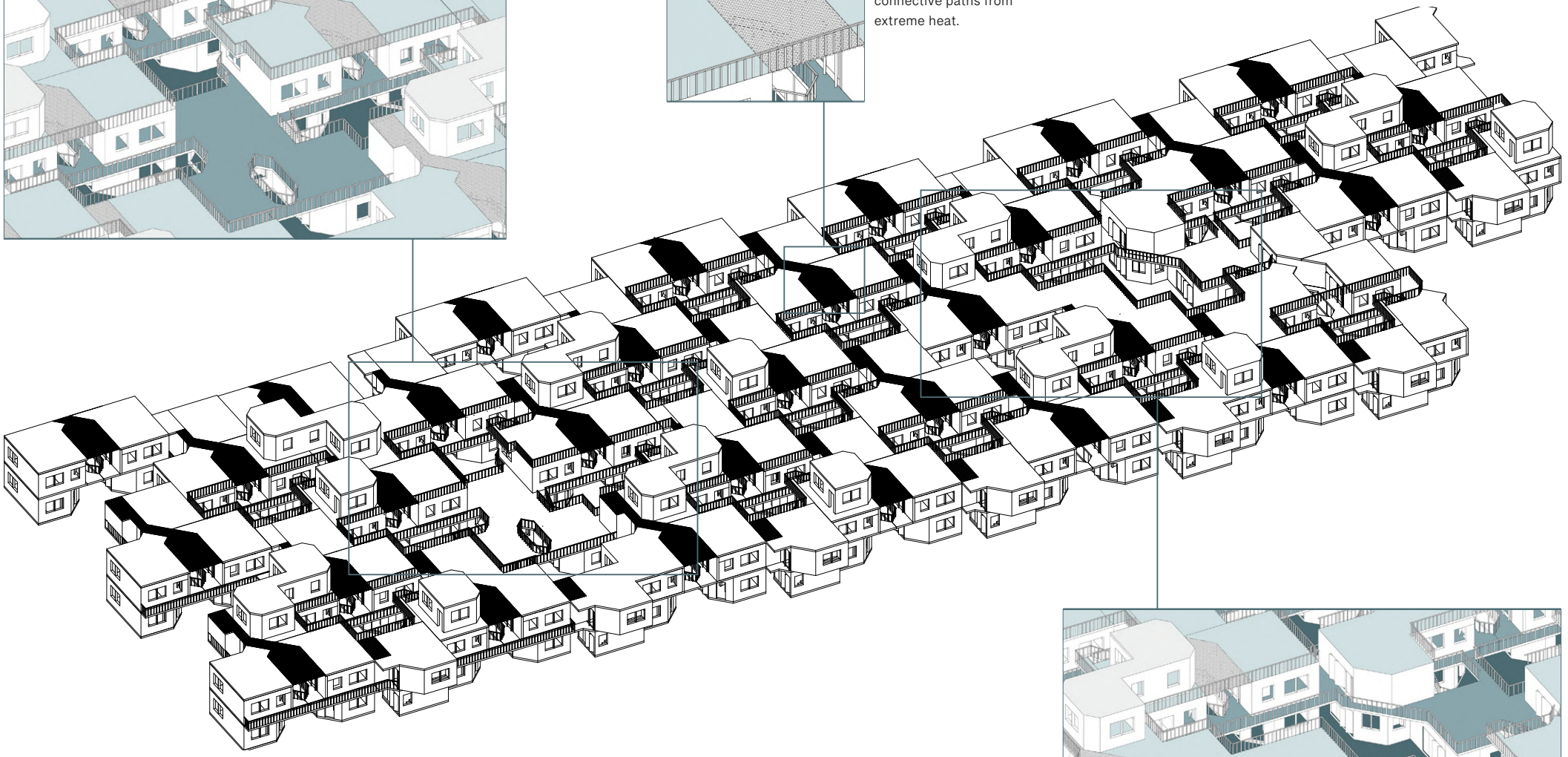
Drawings of a cluster of units demonstrates an intentional organization system that can be expanded or contracted to fit the needs of the community. Ample third connects each unit while retaining privacy. Each unit contains 2-3 bedrooms, a bathroom, living space, kitchen, and a flexible shared balcony space.

Expanded second floor terrace creates elevated third space for social engagement.

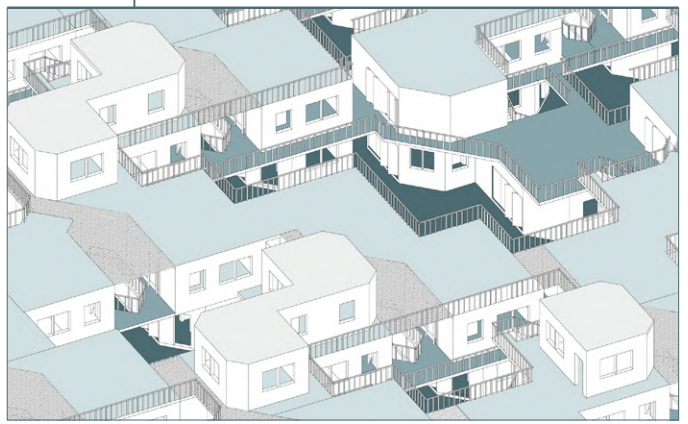




Jali roof paneling ensures ample circulation of air and light while shading connective paths from extreme heat.



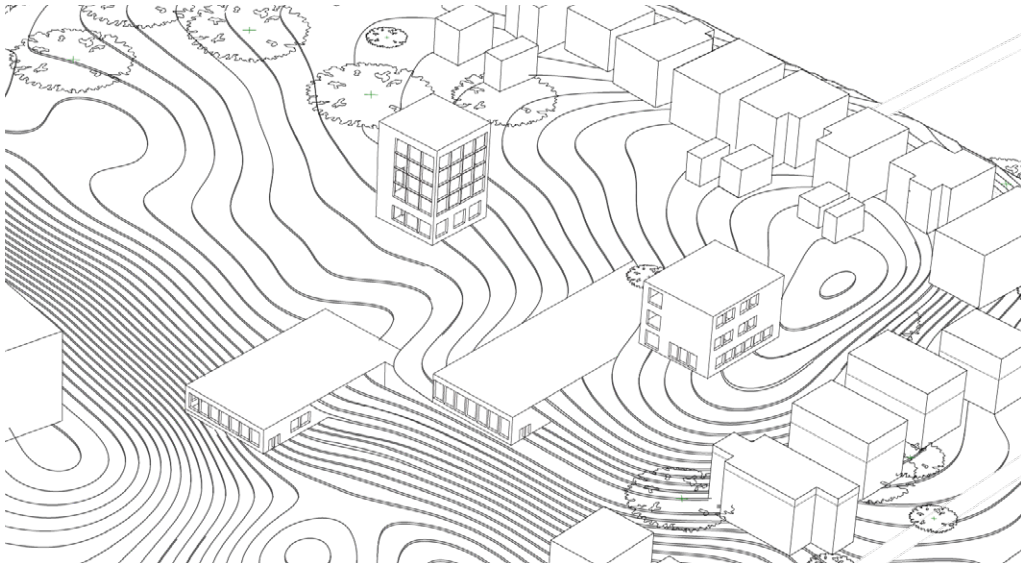
In discussion with current residents of the Diamond Harbor Homes, air and light circulation, increasing pathways of mobility and modularity emerged as central design pillars. Connective elevated third space is reimagined to include space for economic and social activity from gardening to gathering. Centrality of courtyards and *jali* screens increases air and light circulation while referencing precedents in regional architecture. After the establishment of a primary system of repeating clusters, moments of irregularlity are brought into the picture. Modular by design, the units can be shuffled, removed, or combined to create a more dyanmic built environment tailored to the needs of inhabitants.

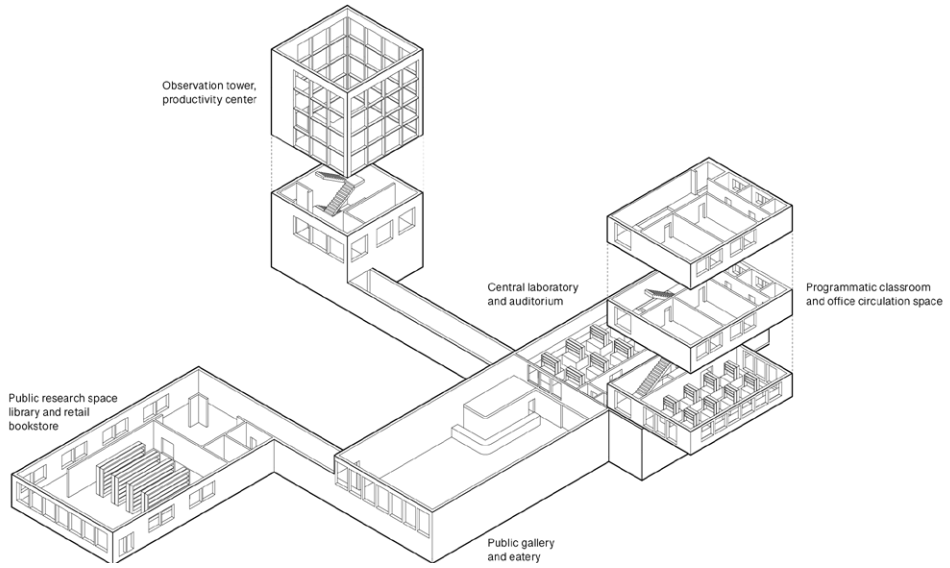


Connected roof is enlarged, creating space for gathering and green roofs.

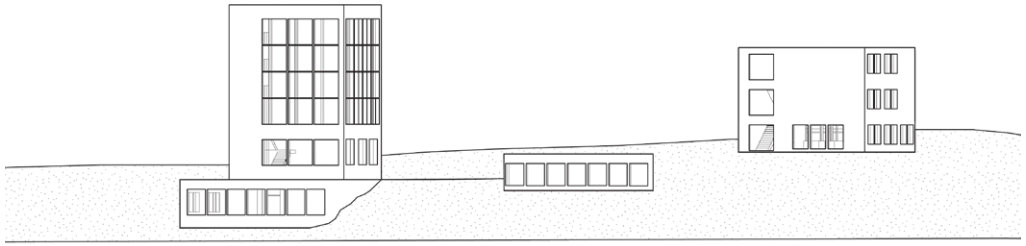
02 THE METEOROLOGICAL INSTITUTE

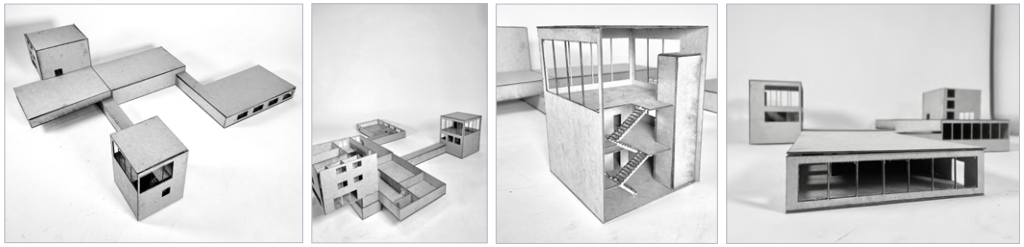
INDEPENDENT DESIGN

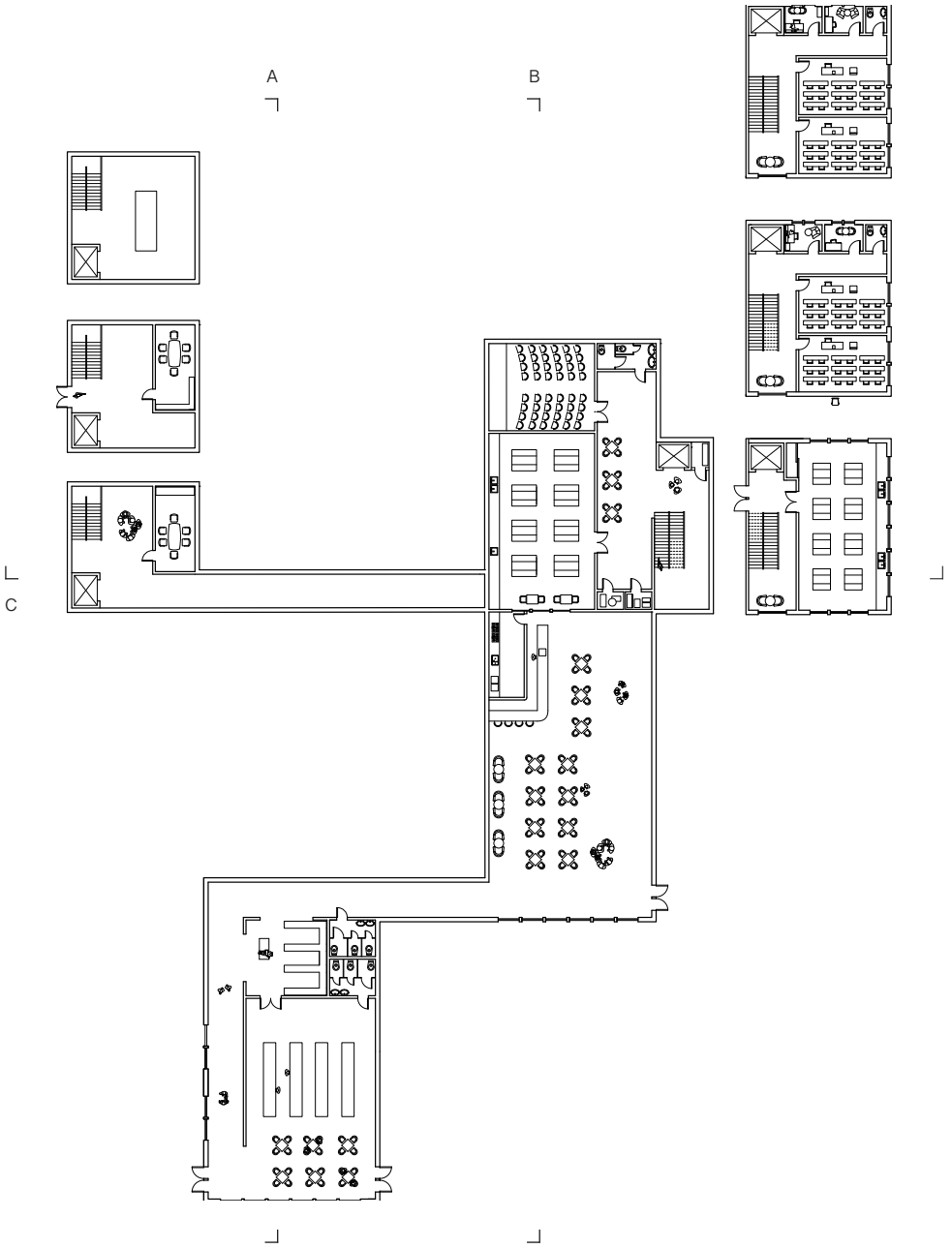


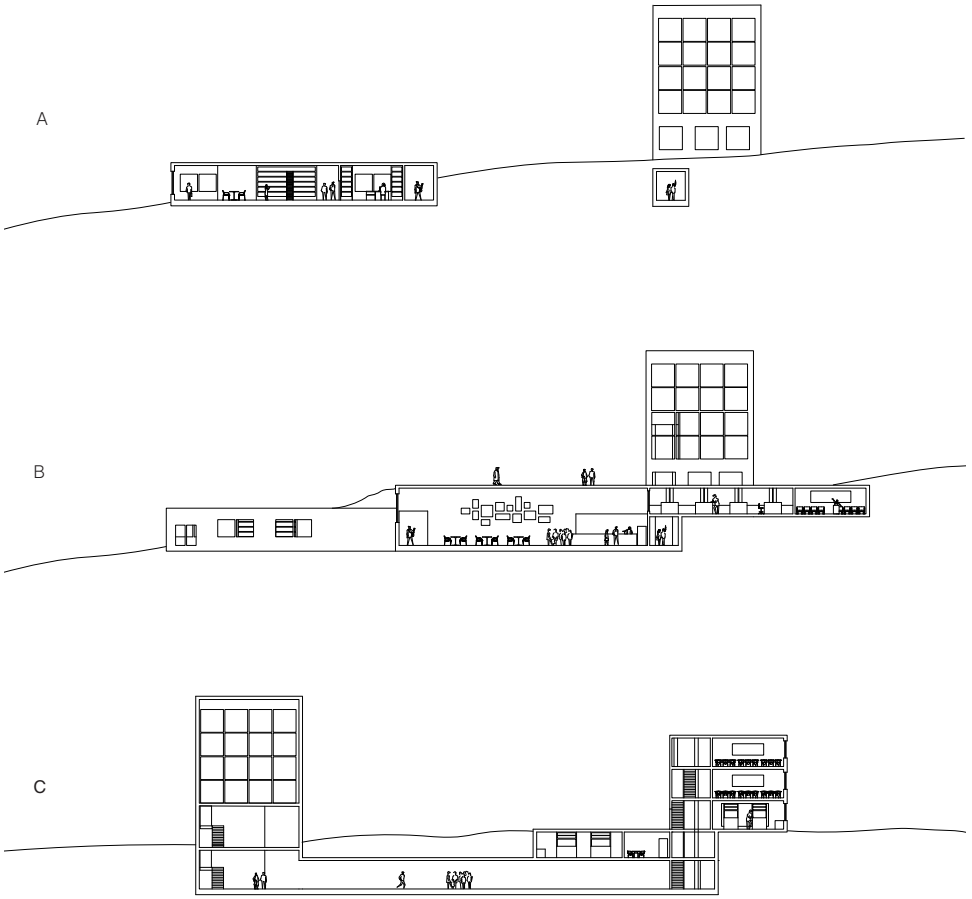


In conceptualizing a new academic space for the Tufts University community, this project seeks to work with the climate and sloped site in both form and program. Roof sections lie flush with the ground blending together the built and natural environments, seamlessly transitioning from interior, to patio, to exterior. The low lying form is unobtrusive to the neighborhood, yet the observation tower rises above as a bold gesture towards meteorological study. Hard lines represent a modernist aesthetic while biophilic design moves the project into the contemporary. The program is broken down by use into different buildings, fostering concentrated zones of interaction with circulation along central axes. Public zones for the surrounding residential community, including a library, bookstore, art gallery, and cafe form the front street-facing section of the project. Private academic university spaces are stacked in the back tower, accessible through the gallery or from the central roof patio. Tunnels connect the three main forms allowing for underground interior circulation.





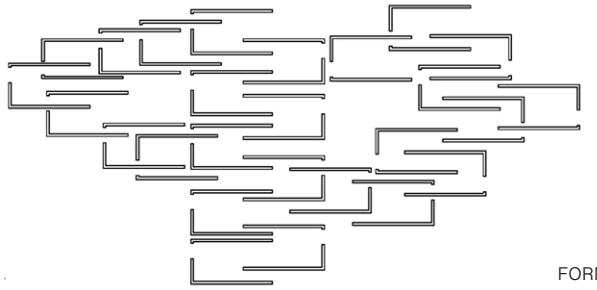

A
B
C


A
B
C

03 THE ART SPACE

INDEPENDENT DESIGN

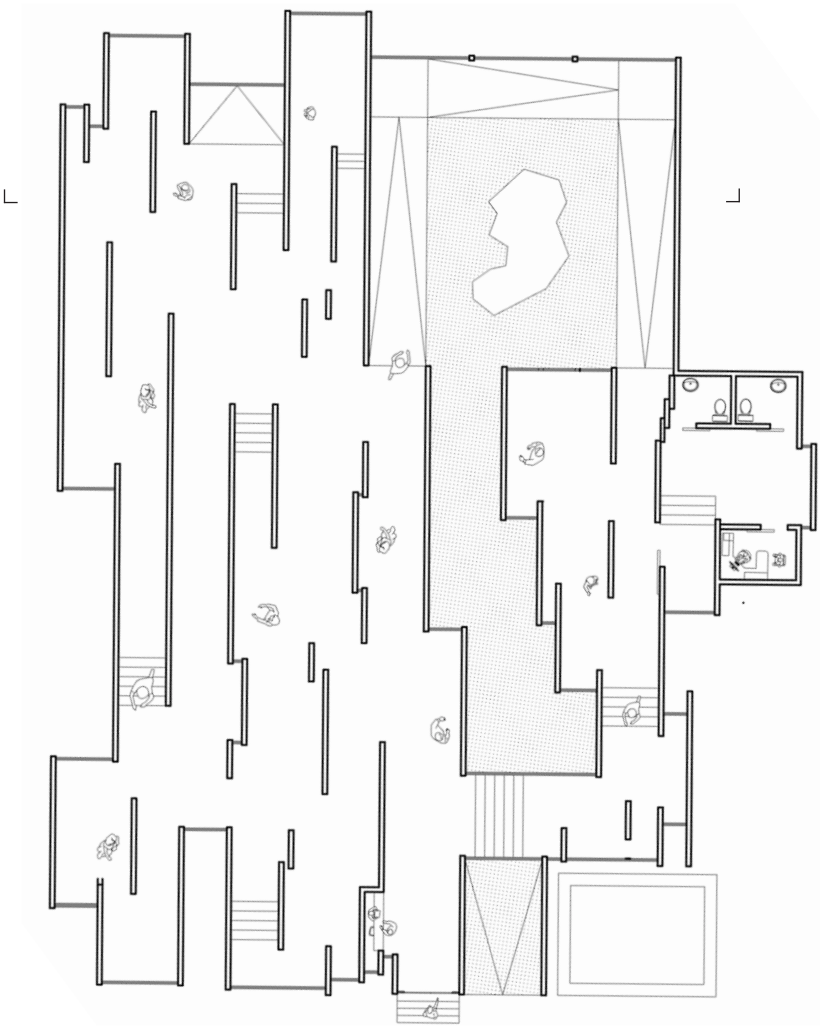
This project represents an experimentation in process to discover design opportunities. Starting with a simple iterating form and the predetermined condition “loose,” the process flowed from collaging to physical replication. The final result is an art space that exists on a singular axis and subverts the expectation of typical museum circulation. The space is tailored to the multi-media work of artist Nicole Eisenman.

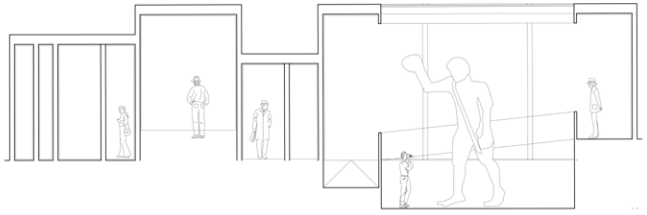


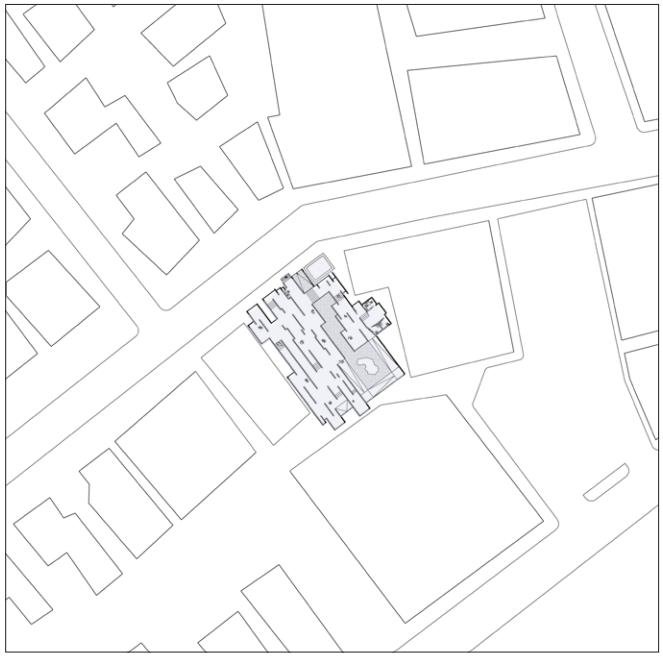
FORM EXPLORATION

CONCEPT COLLAGE

Located in an urban center in Somerville, Massachusetts, the final design allows the visitor to be immersed in Eisenman’s work from multiple levels. With solid walls built along a single axis and windows along the perpendicular, the art spaces flows into the urban landscape. The courtyard condition allows for both public and private access.

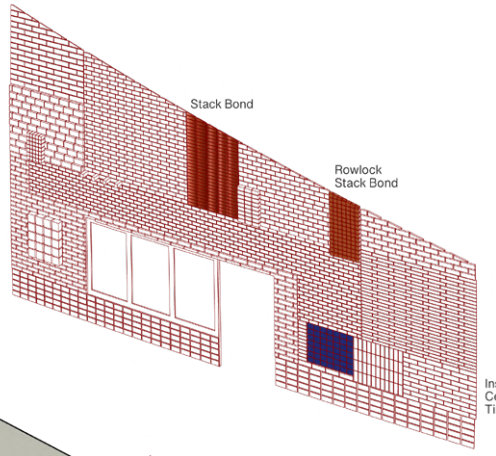


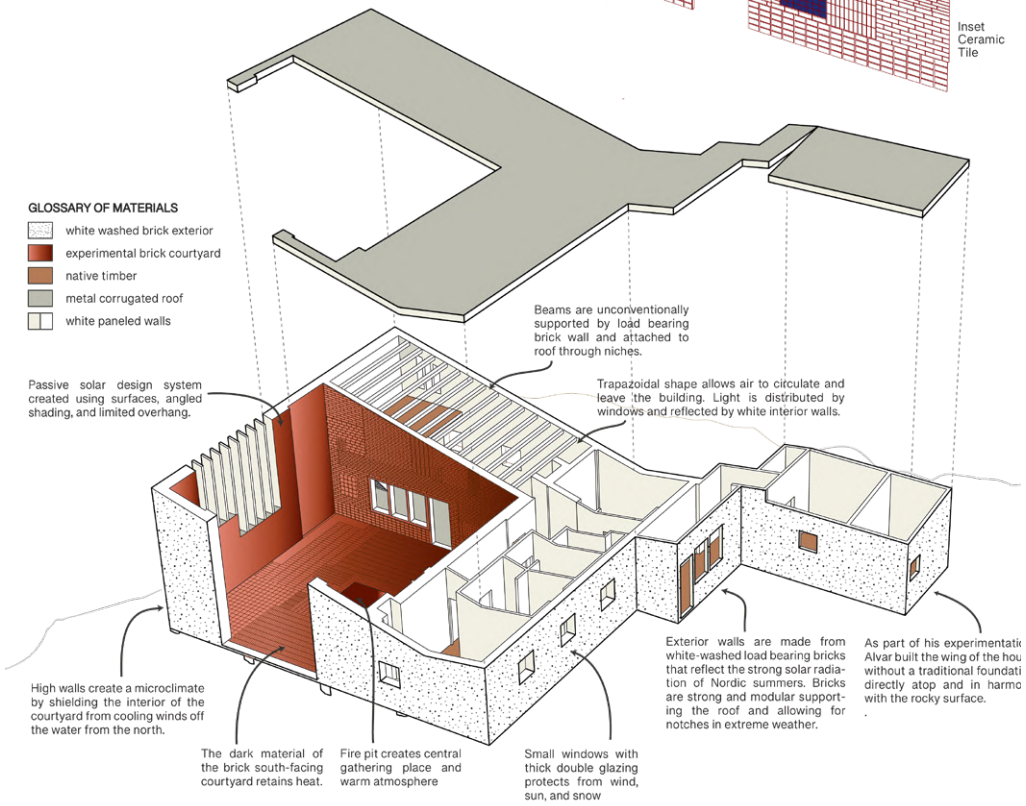


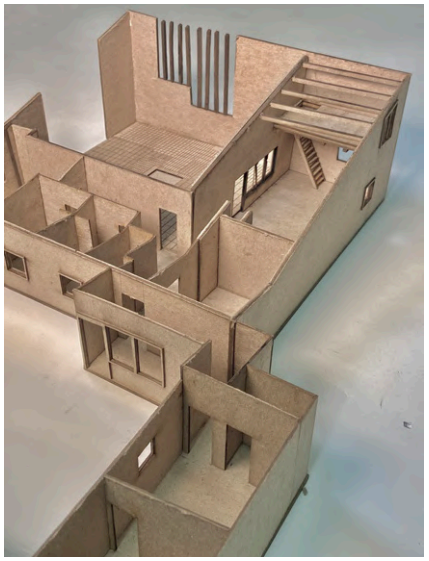

0 20 50 100 ft

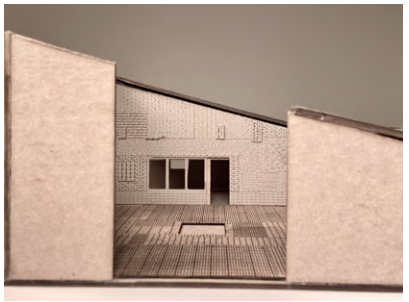
04 MUURATSALO EXPERIMENTAL HOUSE

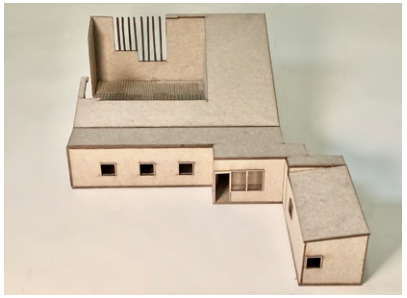
Precedent analysis of Alvar Aalto's Muuratsalo Experimental House provides an opportunity to understand architectural techniques while practicing representation and programmatic diagramming. Built in 1952 on Muuratsalo island on the banks of Lake Päijänne in Jyväskylä, Finland, this sanctuary served as both residence and architectural design playground for Aalto.

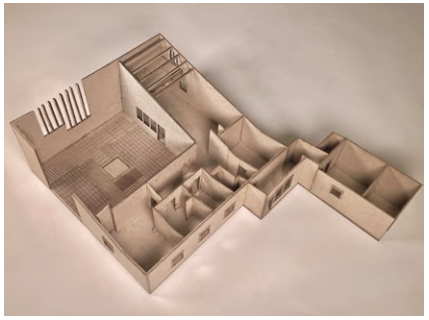


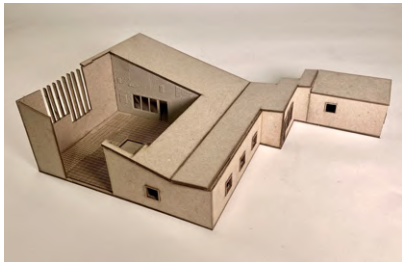




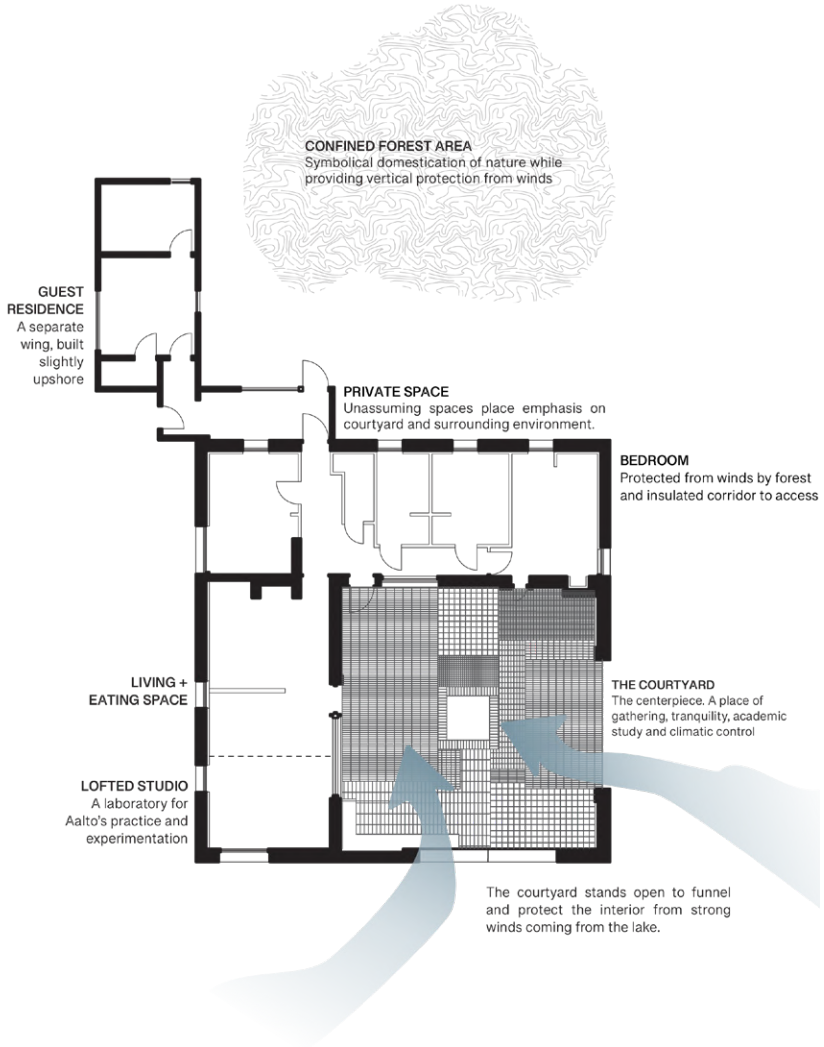


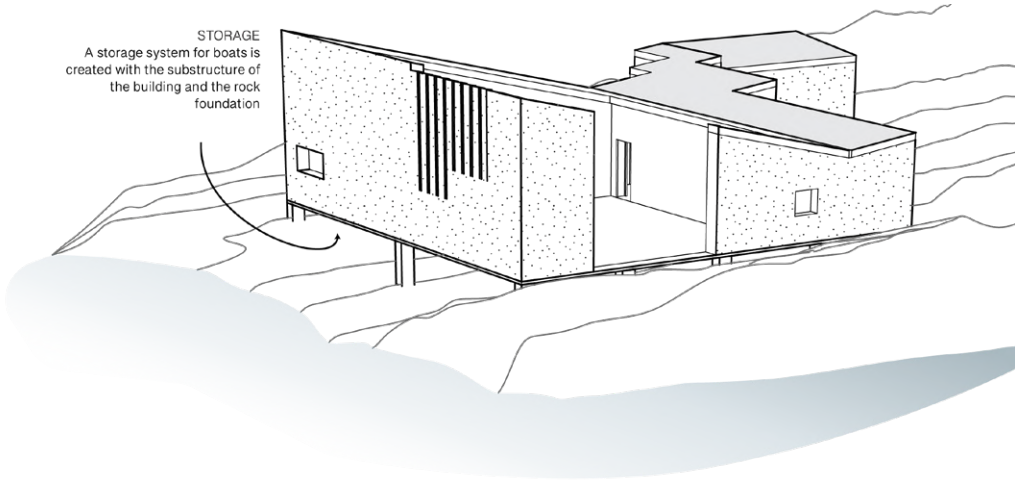




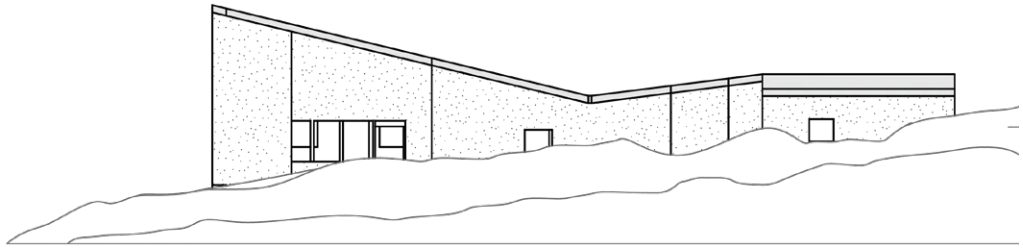


The project is defined by passive experimentation, where natural harmony is seen as the primary goal. The courtyard's tall brick walls represent the peak of Aalto's laboratory in construction techniques and materiality. Built using free-form construction techniques, Aalto used tested how different bricks, mortars, and finishes would weather with the factor of time in the harsh climate. Physical fabrication of the reknown architect's work allows for greater insights into the project and Aalto's practice of design through experimentation.



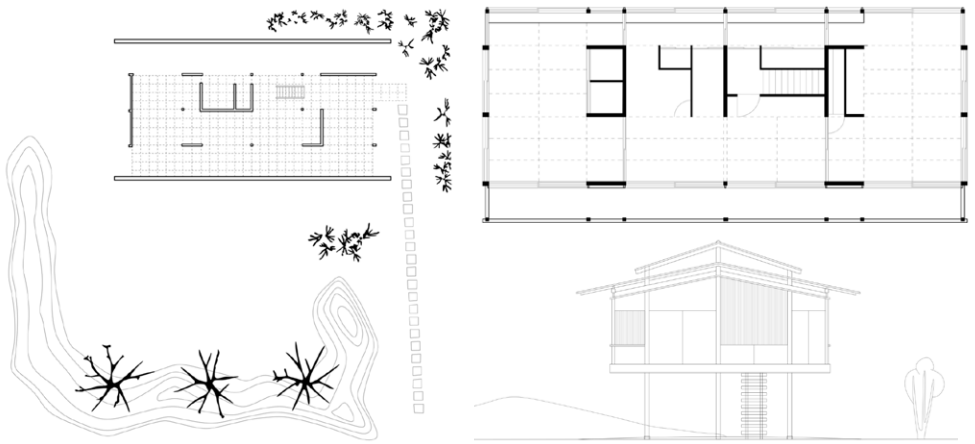


Critical to Aalto's thesis of harmony with nature is the anchoring of the project into the existing rocky lakeside. The home adjusts to different floor heights in subservience to the unleveled natural foundation. The courtyard stands open to the shore providing easy access to sun and wind, creating natural systems of passive temperature control



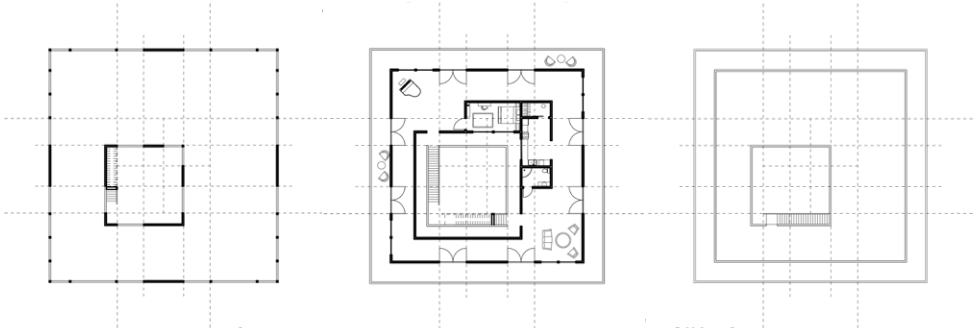
05 THE SOLITAIRE HOUSE

PRECEDENT INSPIRED DESIGN

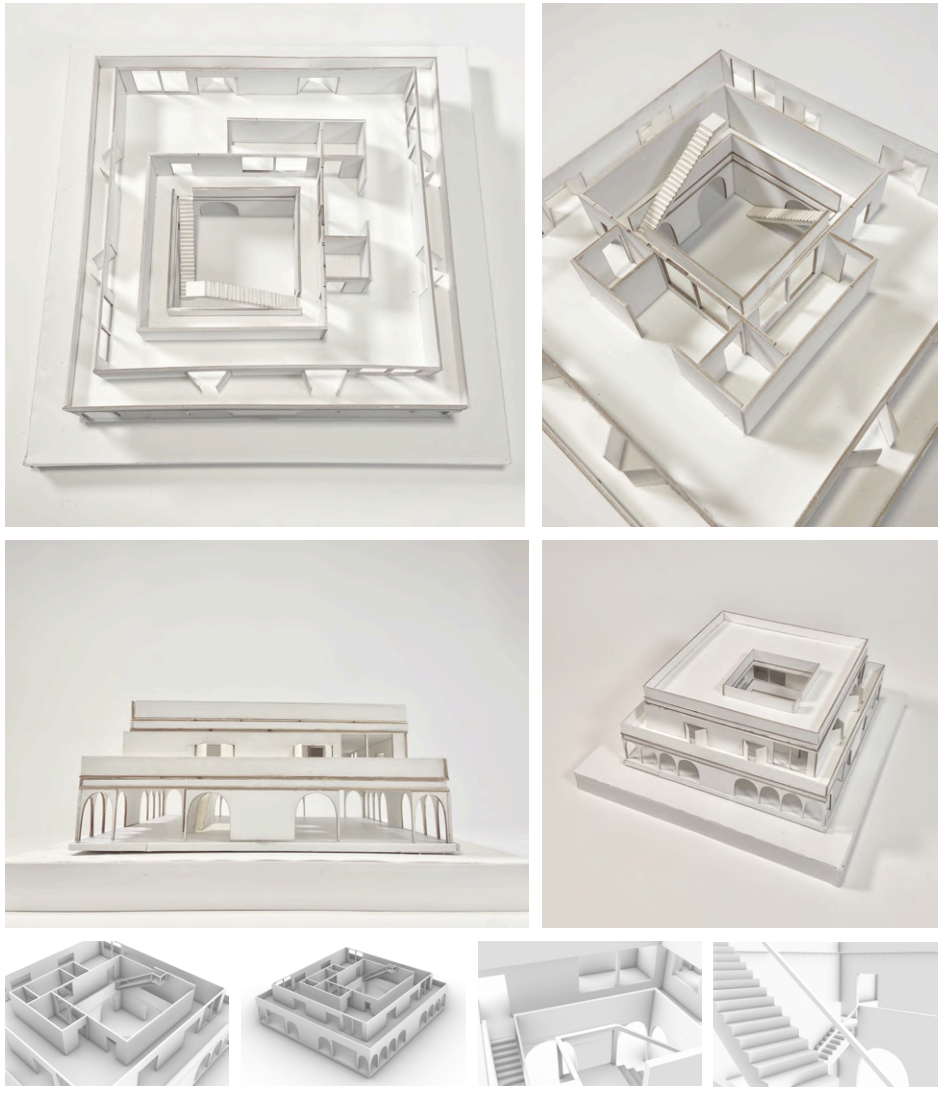


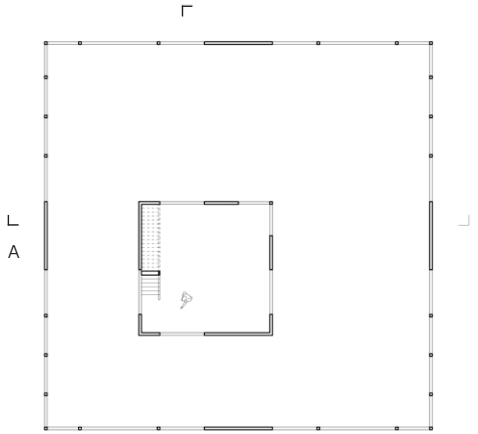
TANGE HOUSE

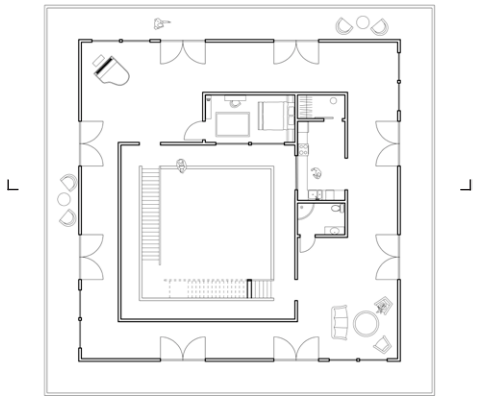
This project emerged through a detailed study of Kenzo Tange's Seijo House in Tokyo, Japan. Tange brings traditional Japanese design and materiality into modernity. The Solitaire House applies this method to a traditional Bengali townhouse, a nod to my personal hertiage, while incorporating modern architecutral elements of Tange's design including a central core, a systematic outer facade, and a raised engawa porch.

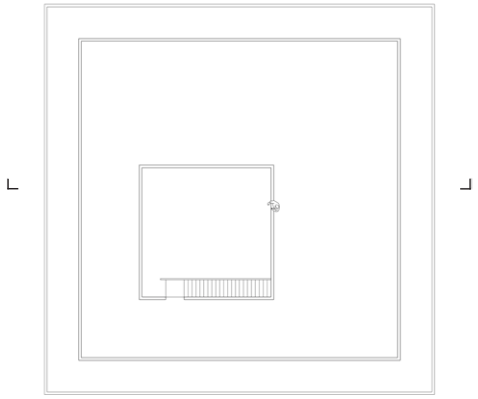


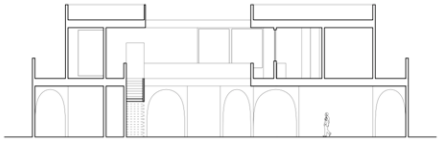
SOLITAIRE HOUSE DESIGN SCHEME

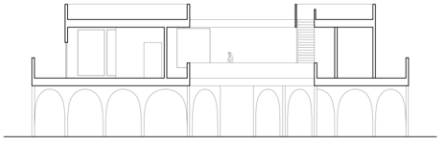


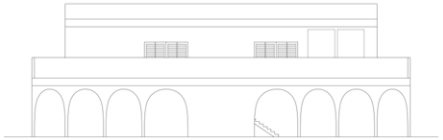

A
B

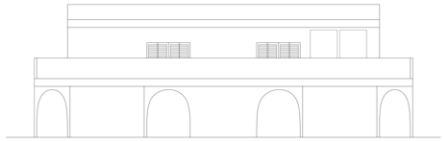





A

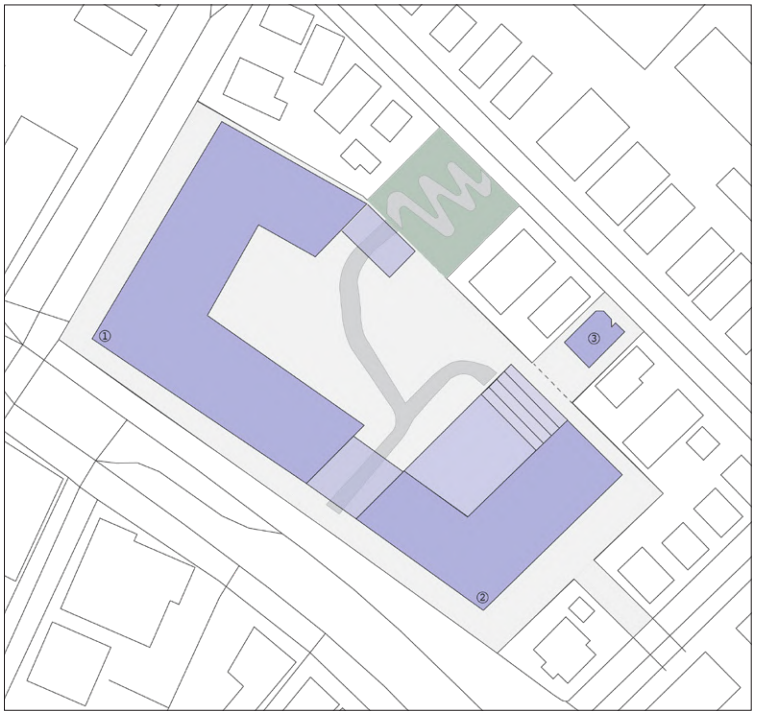

B



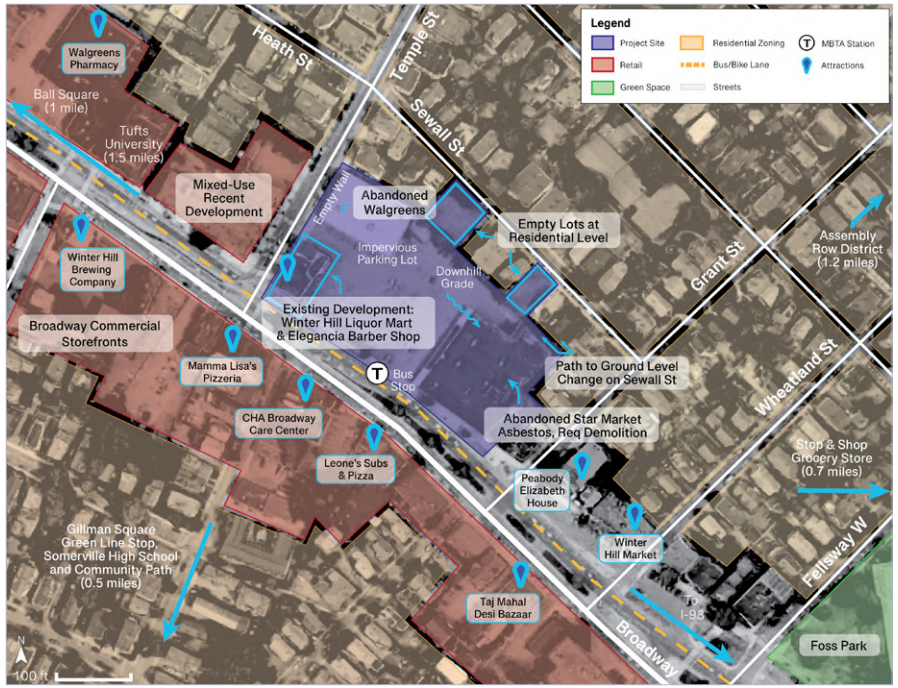


06 299 BROADWAY

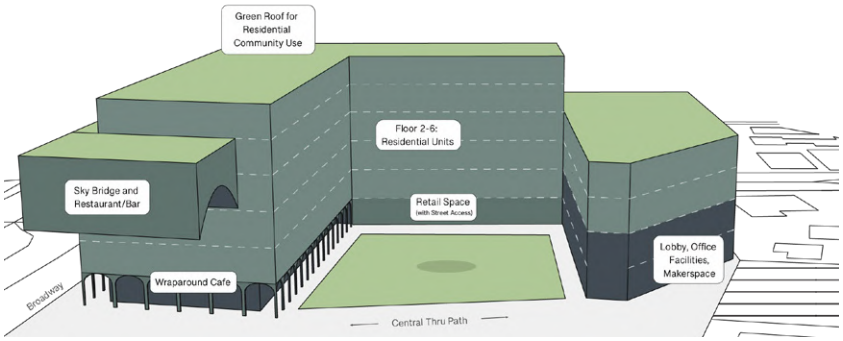
URBAN SCALE DESIGN & ANALYSIS

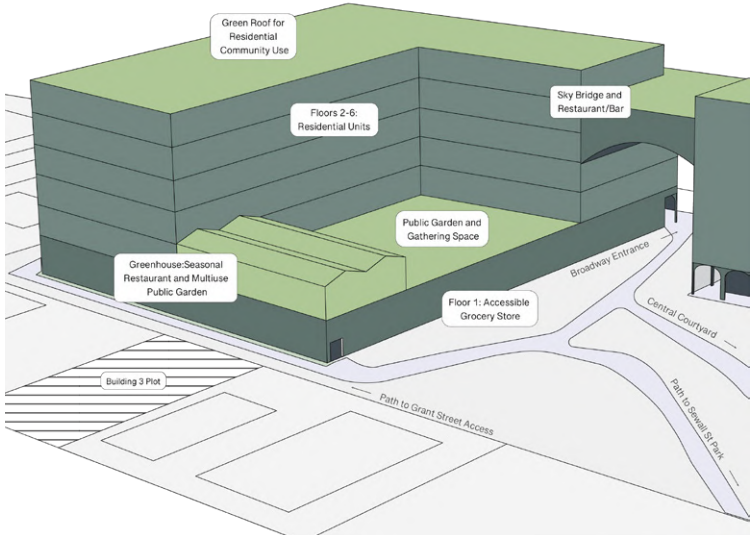


This project approaches sustainable and community development goals at the urban scale guided by the principles of the built environment as a product of intentional design decisions. The result is the proposed development of an empty lot at 299 Broadway in Somerville's Winter Hill neighborhood currently occupied by an abandoned Star Market . The project began with detailed analysis of the site, noting neighborhood opportunities and challenges, and moved to design experiments and a formal presentation to relevant stakeholders.

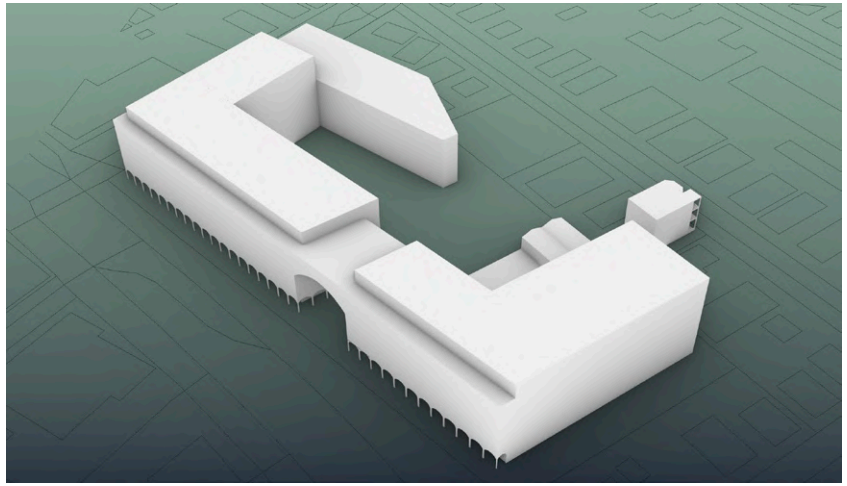


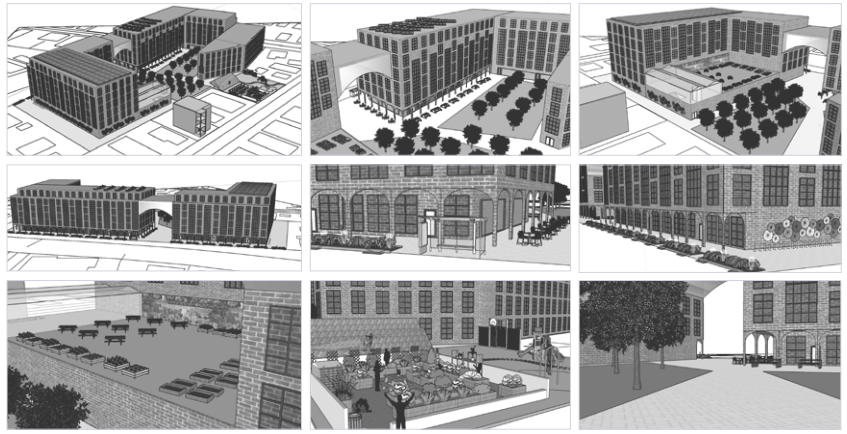
On a 2.7 acre site, the project stands as a 305,000 square foot mixed-use LEED Platinum development spread between three buildings accompanied by a detailed program of uses delineated by square footage. The development works to functionally and aesthetically enhance the neighborhood without representing a force of gentrification and displacement, creating spaces for public social interaction. Aligned with community needs, the design centers an affordable grocery store in addition to 161 housing units. The project also includes underground parking,





office and community maker spaces, a sky bridge with a bar and view of commercial Broadway, and a raised patio with a seasonal restaurant. The courtyard design showcases a determination to create green and open permeable spaces working toward environmental justice and sustainability goals. Two land parcels on a lower land grade connect the bulk of the site to Sewall Street and the residential neighborhood. Here, design focused on seamless integration into the neighborhood with plans to build a community park, and standard triple decker house.



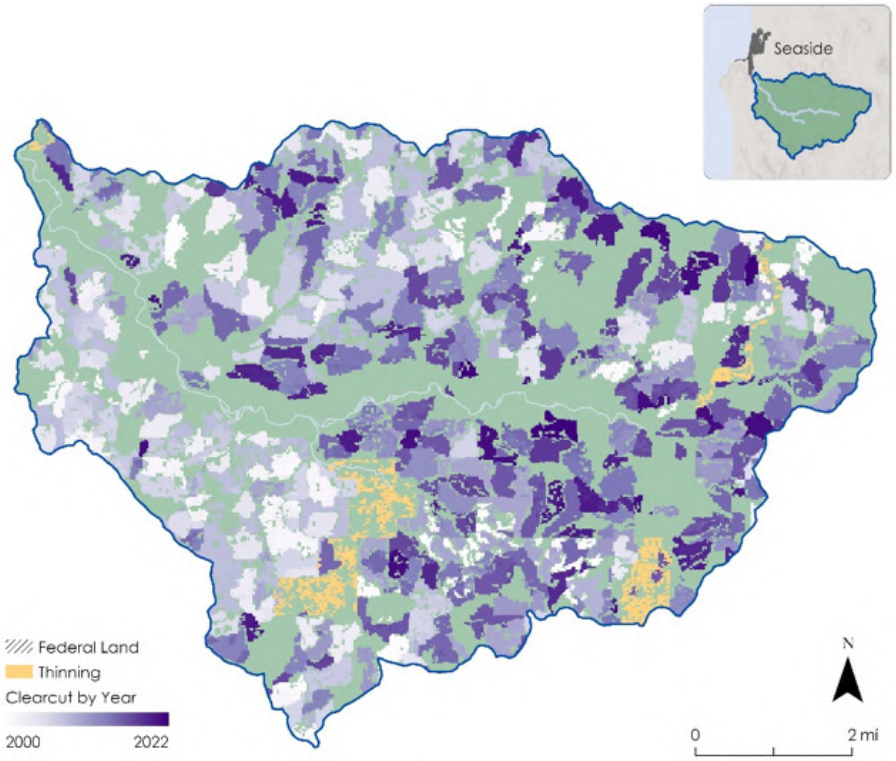


07 NASA DEVELOP

GEOSPATIAL ANALYSIS

Sample of work completed collaboratively as a remote sensing analyst for NASA DEVELOP. Mapping recent logging within drinking watersheds of Oregon's Coastal Range to support future drinking resource management policies. Focused on quantifying the extent of both clear cutting and selective harvesting. Materials completed collaboratively on Google Earth Engine and ArcGIS for visualization.

Analysis focused on 80 drinking watersheds in the Oregon Coast Range. The Oregon Coast Range is a mountainous region between the Willamette Valley, which includes the cities of Portland, Salem, and Eugene, and the Pacific Ocean. Land cover in this region is dominated by coniferous forests, with study watersheds ranging from 38% forest to 100% forest. Study period spanned from 2000-2022 using images from Landsat satellites.



56% of land in the Seaside watershed experienced clearcutting during the study period.
Highlighted case study of drinking watershed serving the municipality of Seaside, Oregon. 97.9% of this watershed is classified as forested area. The above figure exhibits clearcutting and commercial forest thinning in the watershed from 2000-2022.

CLEARCUTTING RESULTS

26% of study area clear cut from 2000 - 2022

Utilized the Continuous Change Detection and Classification (CCDC) algorithm to quantify the extent of clearcutting. Figures above depicts a forested area that experienced a 2022 clearcutting and demonstrates CCDC's efficacy in identifying the event.

COMMERCIAL THINNING RESULTS

16% of study area commercially thinned from 2000 - 2022

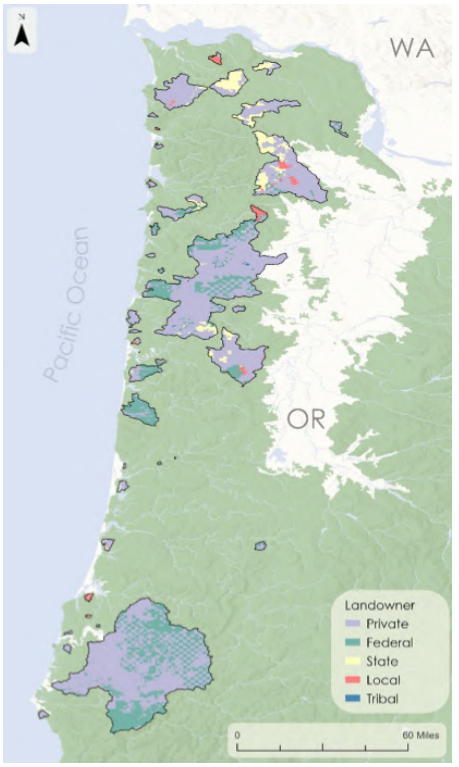
Identified areas of commercial thinning using the yearly percent change of the Normalized Difference Vegetation Index (NDVI). Figures above depict 2022 thinning and the success in team methodology to mapping the event.

% of Land in Watersheds	Number of Clearcut Watersheds	Number of Commercially Thinned Watersheds
0 - 10 %	23	33
10 - 25 %	18	41
25 - 50 %	35	5
50 - 75 %	2	0
75 - 100 %	2	0

Results indicate the number of watersheds that experienced a given percentage of clearcutting or thinning.

Areas highlighted in yellow are managed by private companies, and most clear cut patches fall here creating a distinct checkerboard pattern. Industrial private companies (primarily timber companies) are the largest land-owners in this region, followed by the US Forest Service, and Bureau of Land Management. Most of the remaining area is managed by private non-industrial owners or the State Department of Forestry.

RESULTS BY LAND OWNERSHIP



Land ownership over the study area

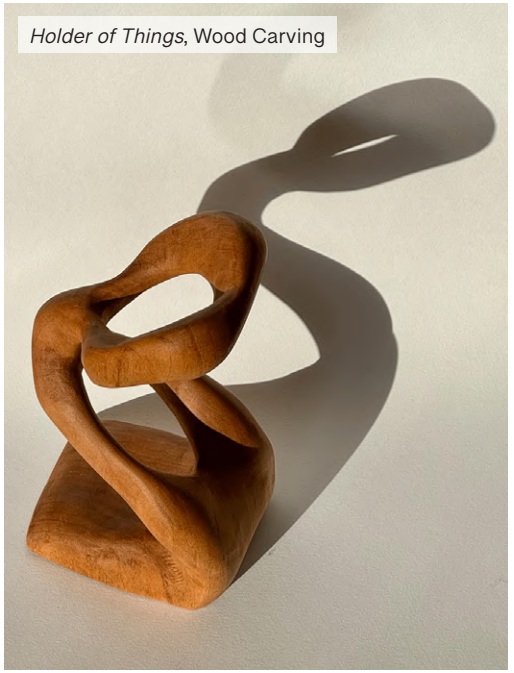
Land Ownership	% Clearcut	% Thinned	Total % Logged
Federal	3%	12%	15%
State	18%	24%	42%
Private	42%	0%*	42%
Local**	13%	18%	31%
Tribal**	18%	27%	45%

*Results identifying thinning on private land can mostly be attributed to clearcutting, detected thinning is thus attributed to clearcutting events.
**Percentages based on very small areas.

08 HANDCRAFTED WORKS

ART & OBJECT DESIGN

Flower Lamp, Welded Steel and Mulberry Paper



Holder of Things, Wood Carving

Atomic Vase, Pit Fired Stoneware Clay

Modular Heads, Plastic and Resin from Silicone