

Catalysing Climate-Resilient Dwelling

As temperatures are rising around the globe, many areas of the world are exposed to the direct effect of climate change. In extremely dry conditions adjacent to the Sahel region, communities are forced to migrate as their only mean of survival against the crisis.

The Site.

The Great Green Wall (GGW) is an ecological restoration project against land degradation, desertification, and drought. This African-led initiative constitutes an 8000km long, 16km wide living greenbelt across the entire breadth of the Sahel-Savannah desert region comprised from West to East of Senegal, Mauritania, Mali, Burkina Faso, Niger, Nigeria, Chad, Sudan, Ethiopia, Eritrea, and Djibouti. The project aims to restore an estimated 100 million hectares of degraded land, capture 250 million tonnes of carbon dioxide to fight climate change, and create self-sustainable communities along its borders by 2030. (Fig. 1)

The Opportunity for Research.

Re-greening initiatives such as planting trees and recycling nutrients into the soil prove to be a crucial part of the solution to land degradation. However, understanding the newly-built ecosystem of the GGW will enable displaced communities to find a home and meet their needs across the boundaries of the wall without compromising it. This initiative has an opportunity to use the environment as a design resource for creating self-sustainable, livable communities.

As a John Belle Fellow, my research will be investigate the region around the GGW as an opportunity to enhance resiliency in Sahelian landscape practices and the livelihoods of future communities around the wall.

This research will serve as:

- A visual report of the GGW as a culture-sensitive productive rural landscape,
- An exploration of current dwelling settlements in regions adjacent to the GGW,
- An investigation of indigenous architectural practices as a precedent to speculate on a new built language around the

GGW ecosystem.

The Itinerary.

- The travel proposal begins in Senegal, where 18 million trees have already been planted over 250,000 acres of restored land. In Boki Diawe, northeast Senegal, circular gardens, known locally as Tolou Keur, are the most recent incarnation of the project, the GGW. (Fig. 2) Recently engineered by locals, this garden technique allows the roots to grow inward, traps liquids, and improves water retention and composting.
- The second point of interest is Koulikoro, Mali, where TREES, a nonprofit organization, runs a pilot project under the GGW initiative. Mali will also provide an opportunity to investigate dwelling settlements that share a similar architectural language to Northern Senegal, Burkina Faso, and Niger. (Fig. 3)
- The last stop will be in Gojjam, Ethiopia, where local ecologists have been preserving and documenting the unique biodiversity in pockets of the landscape surrounding Ethiopian orthodox churches. These small but fertile oases are some of the last remaining scraps of forests that once covered Ethiopia, one of the countries where the GGW initiative is currently taking place. This precedent will present ideas on how communities could start building within the green wall and begin protecting it upon completion. (Fig. 4)

The Budget.

The proposed budget covers the travel research in Senegal, Mali, and Ethiopia over 30 days from June 19th to August 05th, 2023 (seven weeks).

Airfare (NYC – Dakar – Bamako – Addis Ababa): \$4000
 Car rental for internal travel inside the countries: \$1000
 Accommodation (\$55 per day): \$2695
 Food (\$20 per day): \$980
 Equipment & Contingency: \$500

Total: \$9175

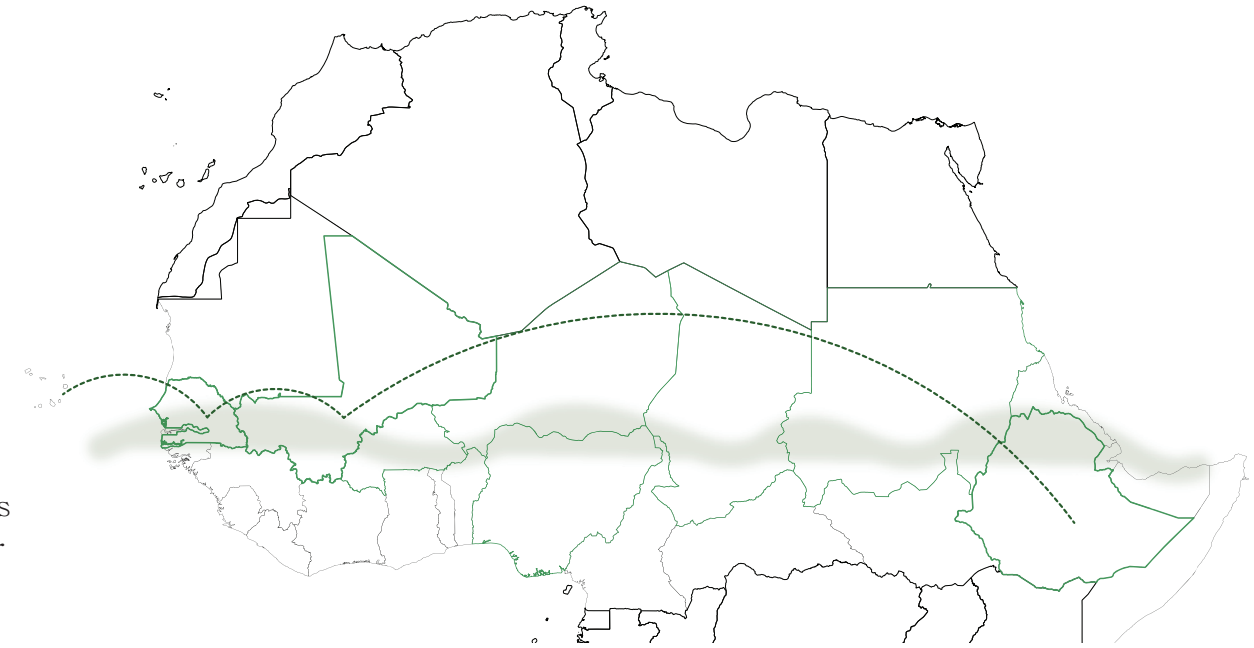


Fig. 1: Map of the Great Green Wall Initiative.



Fig. 2: Tolou Keur Gardens in North Senegal.



Fig. 3: Dwelling Settlement in Mali



Fig. 4: The Church Forest in Gojjam, Ethiopia.



Sambou Toura Drame Elementary School. *Marsassoum, Casamance, Senegal.*

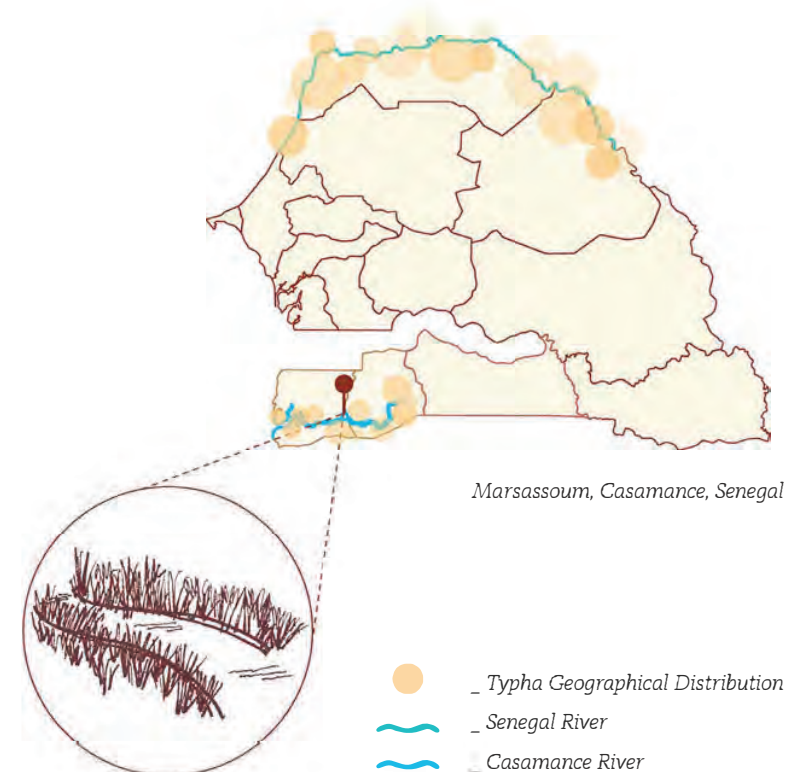
Providing access to education in rural areas, alongside reducing the environmental impact of the construction sector in Senegal, is imperative. With this project, we do not wish to only build a school. We aim to transform the construction process into a training program for the Senegalese youth, bringing awareness to the potential of traditional building materials and the architectural methods of their cultural legacy. Our proposal highlights the use of vegetable fibers associated with recycled and affordable materials into a culturally driven, low technology architecture.

The Typha reed has become invasive in Senegal's hydrological areas, making it a significant problem in terms of biodiversity, water resource management, health, and economics. Through regional precedence, the project formulates an innovative way to reduce Typha's invasion in the ecosystem.

Project Category
*Humanitarian
Educational*

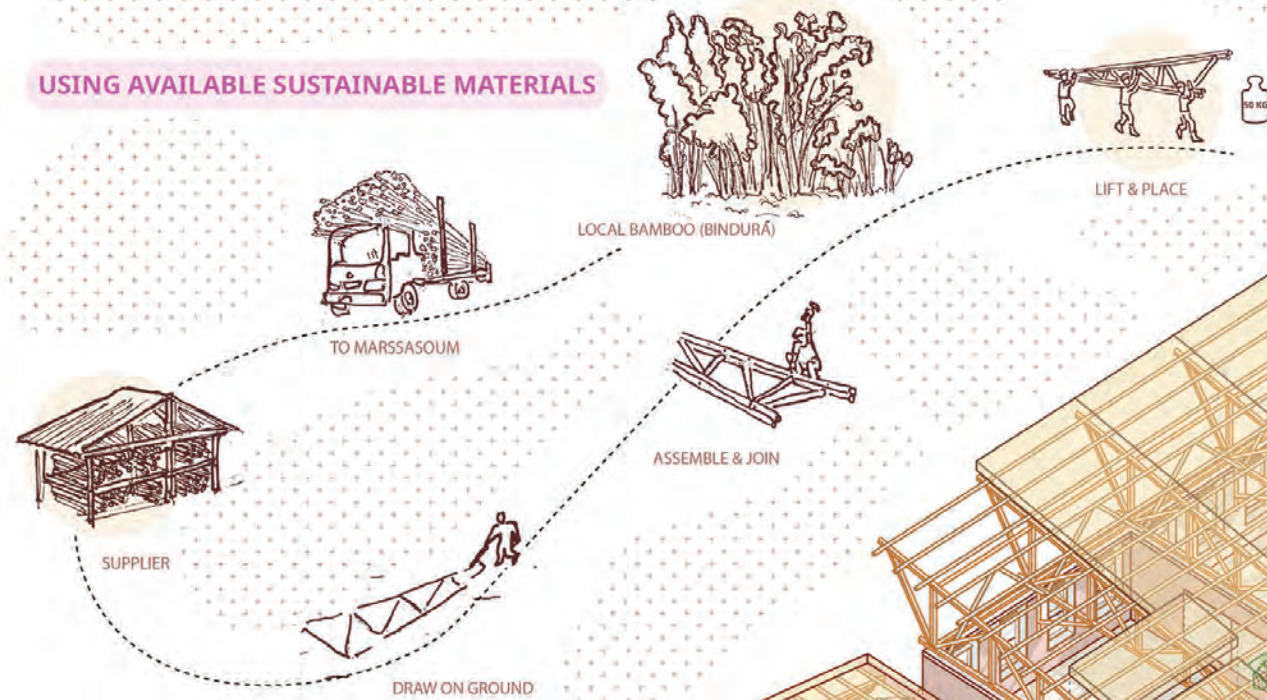
Area of Focus
*Innovative and Low-Tech
Construction Methods
Budget: \$60,000*

*Collaborative Project
(Duo)/ Research and
Competition*

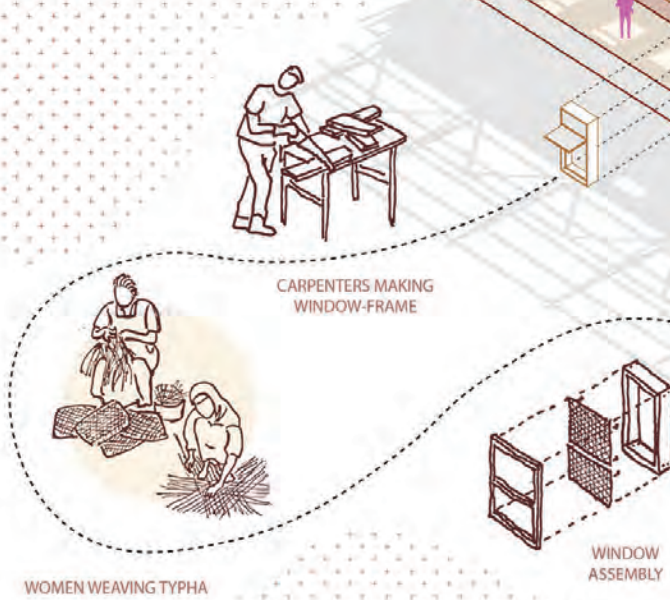




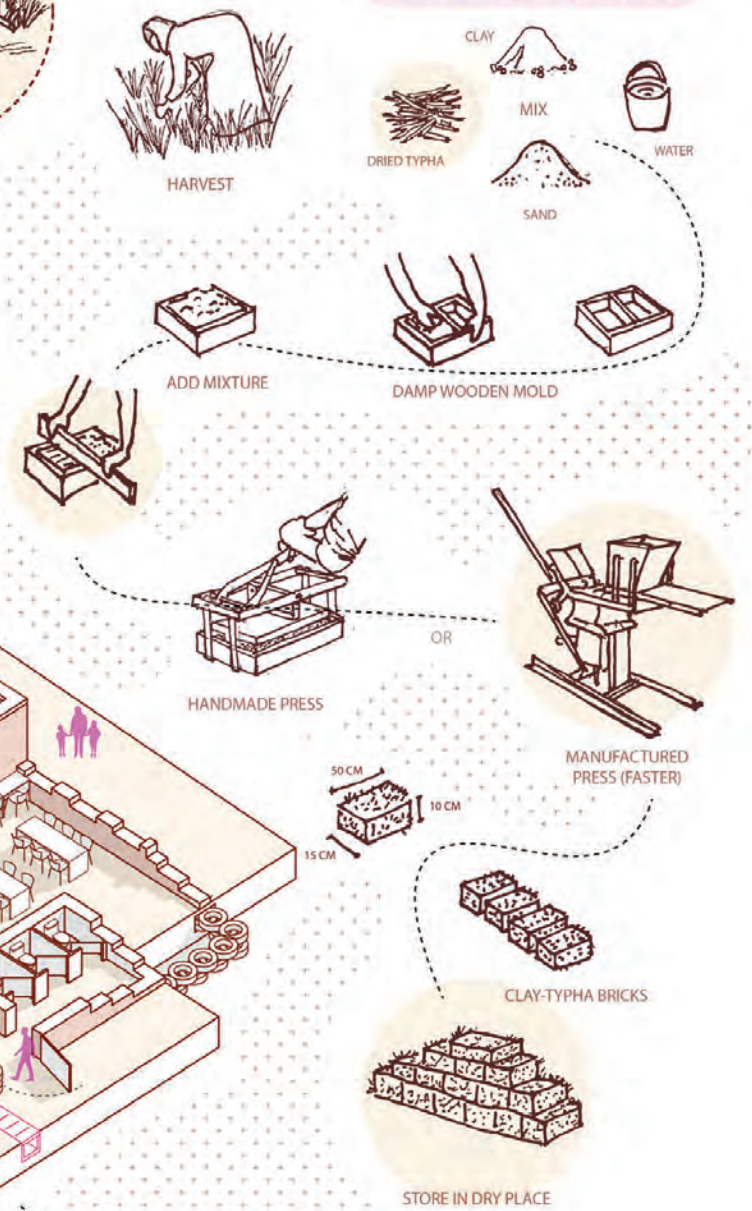
USING AVAILABLE SUSTAINABLE MATERIALS



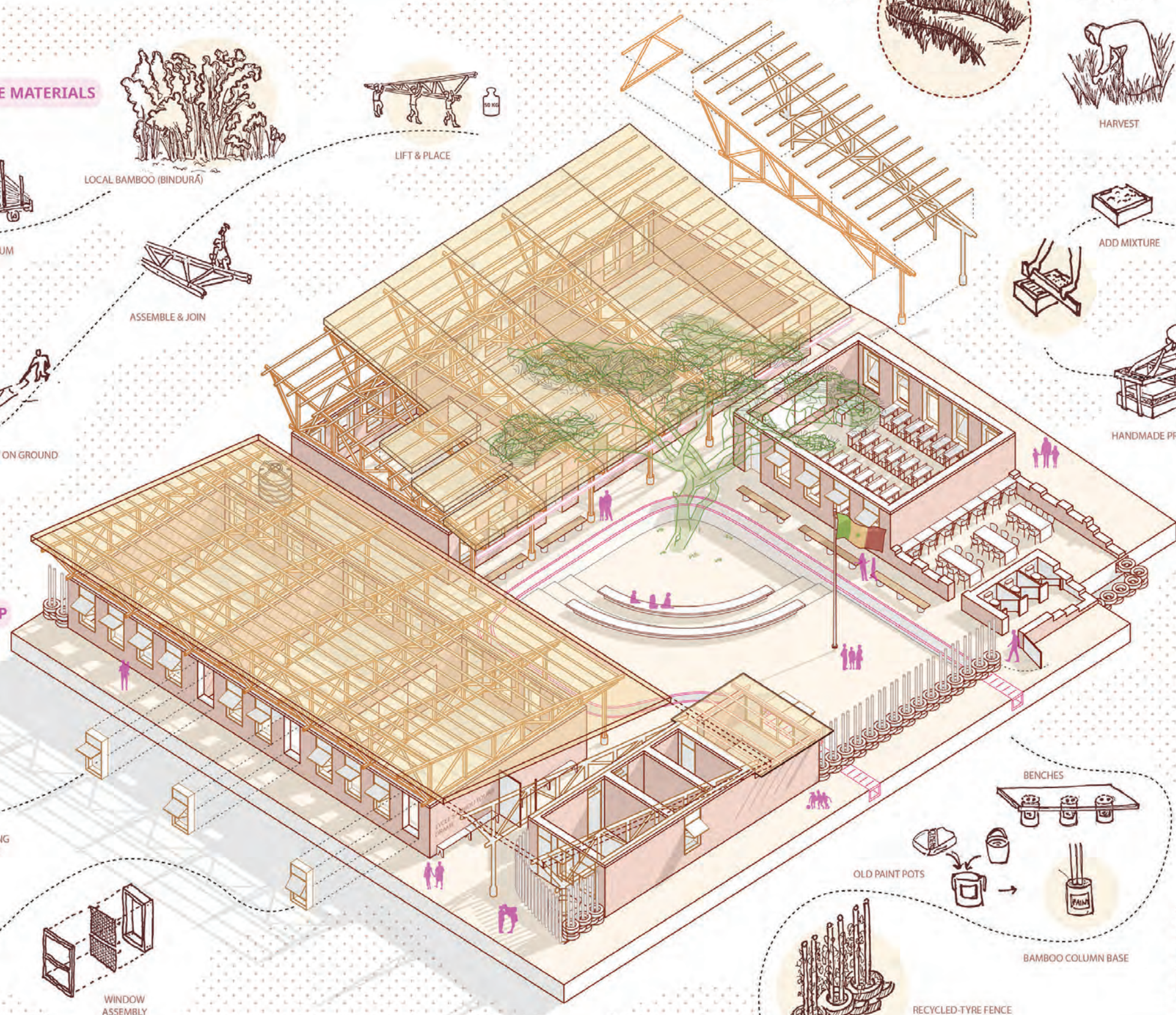
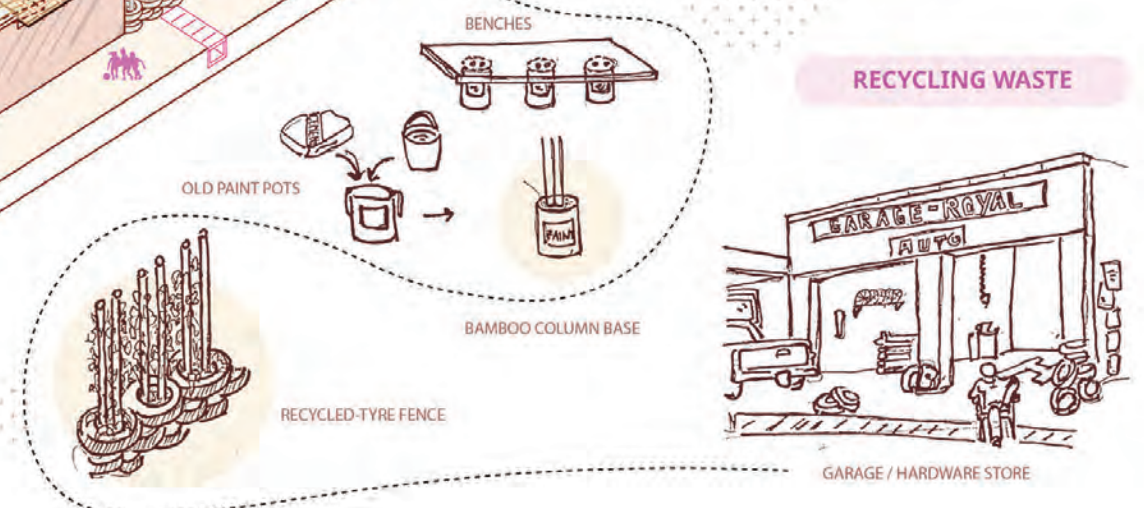
SUPPORT LOCAL CRAFTSMANSHIP



MAKING TYPHA BRICKS



RECYCLING WASTE



LET'S BUILD MY SCHOOL !

WHAT YOU'LL NEED

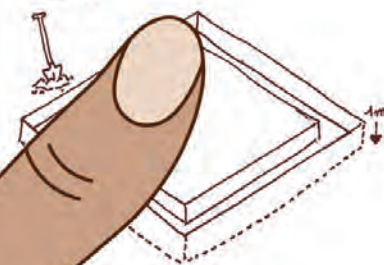
MATERIALS



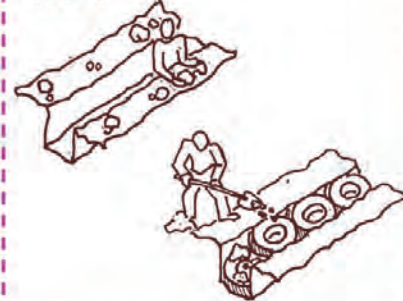
TOOLS



FOUNDATION STEP 1



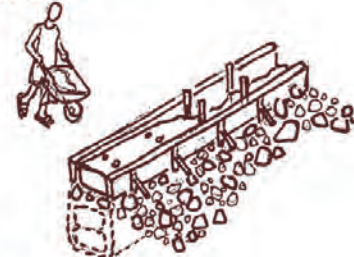
STEP 2



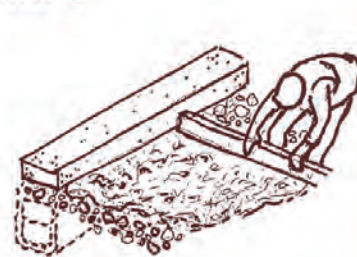
STEP 3



FLOORING STEP 4



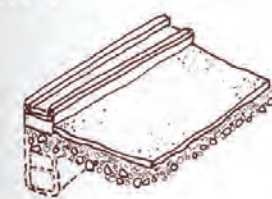
STEP 5



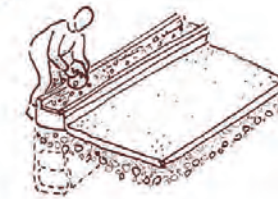
STEP 6



WALL ASSEMBLY STEP 7



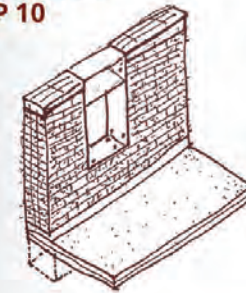
STEP 8



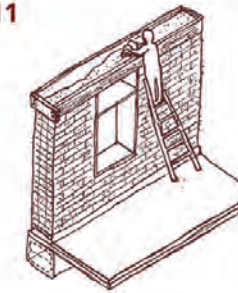
STEP 9



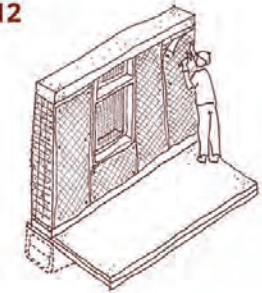
OPENINGS STEP 10



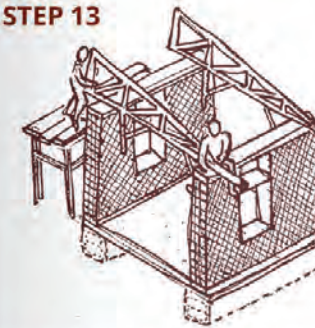
STEP 11



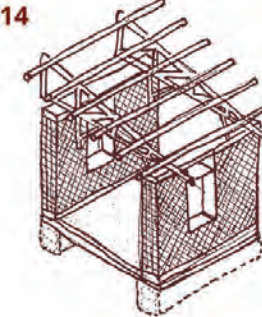
STEP 12



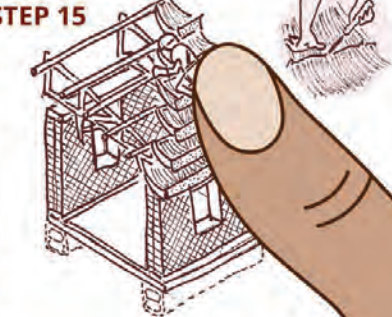
ROOF STEP 13



STEP 14



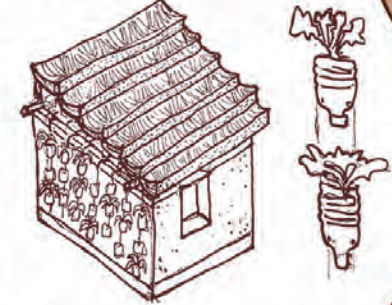
STEP 15



FINISHES STEP 16



STEP 17



From flooring to the roof, Typha is transformed and associated with recycled materials (tires, plastic bottles, paint buckets, etc.) and locally sourced sustainable materials (Bindura bamboo, sand, laterite clay, fine and coarse aggregate.) The booklet will be ultimately handed to the community of Marsassoum as a construction guide from their own projects.



Nyumbani, A Housing Typology for Tanzanian Families.

Getamock, Karatu District, Tanzania.

Accommodating a family of 15 members, *Nyumbani* fits within a €15000 budget, is easy to build, and conscious of its environment. This housing typology uses all the surrounding resources available to create an integrated, high-quality living space for the Jorejick family, all the while setting an example for future housing developments to improve Tanzania's rural housing quality.

Nature, culture, and architecture. Those are some of the keywords behind the design inspiration for this project. Minimalist in its approach, the intent was to create a house that blends with the environment while being resolutely modern. The project's key features are outdoor gathering spaces, the use of locally sourced materials, low-tech construction techniques required to build the house, and a harmonious transition between interior and exterior spaces, due to the integration of permeable wooden partitions.

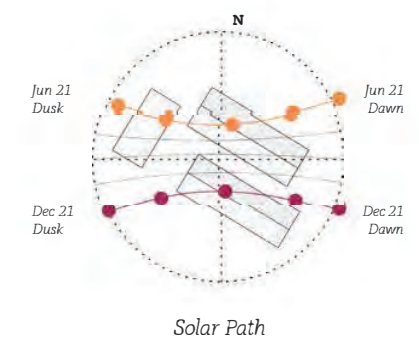
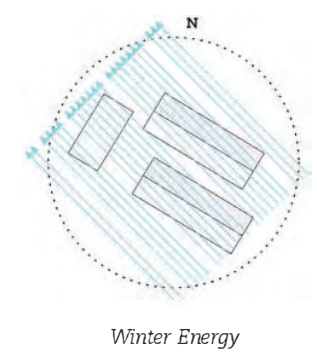
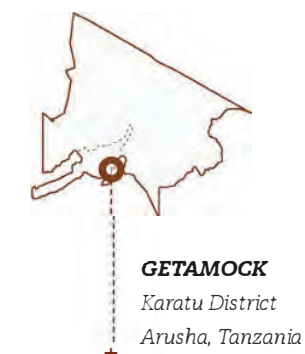
Project Category
Humanitarian Single-Family Housing

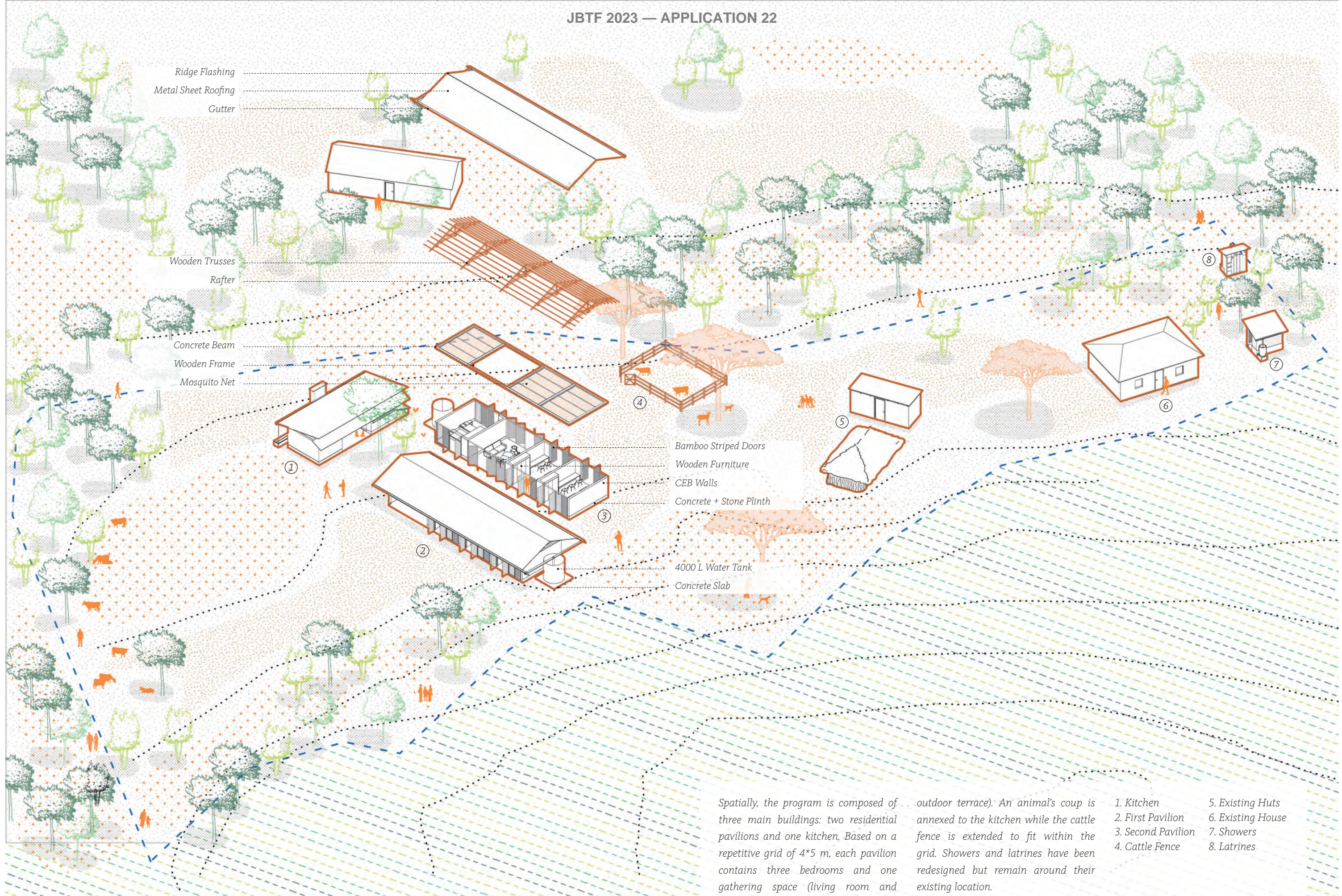
Area of Focus
*Sustainability
Low-Tech Construction
Budget: €15,000*

Collaborative Project (Duo)/ Research and Competition



- _ Access to the Neighbor's Houses
- _ Main Access
- _ Cattle Path
- _ Cattle Pasture
- _ Phase 1: Pavilion 1, Latrines @ Showers
- _ Phase 2: Kitchen, Animals Coup
- _ Phase 3: Pavilion 2, Cattle Fence Extension





Ridge Flashing
Metal Sheet Roofing
Gutter

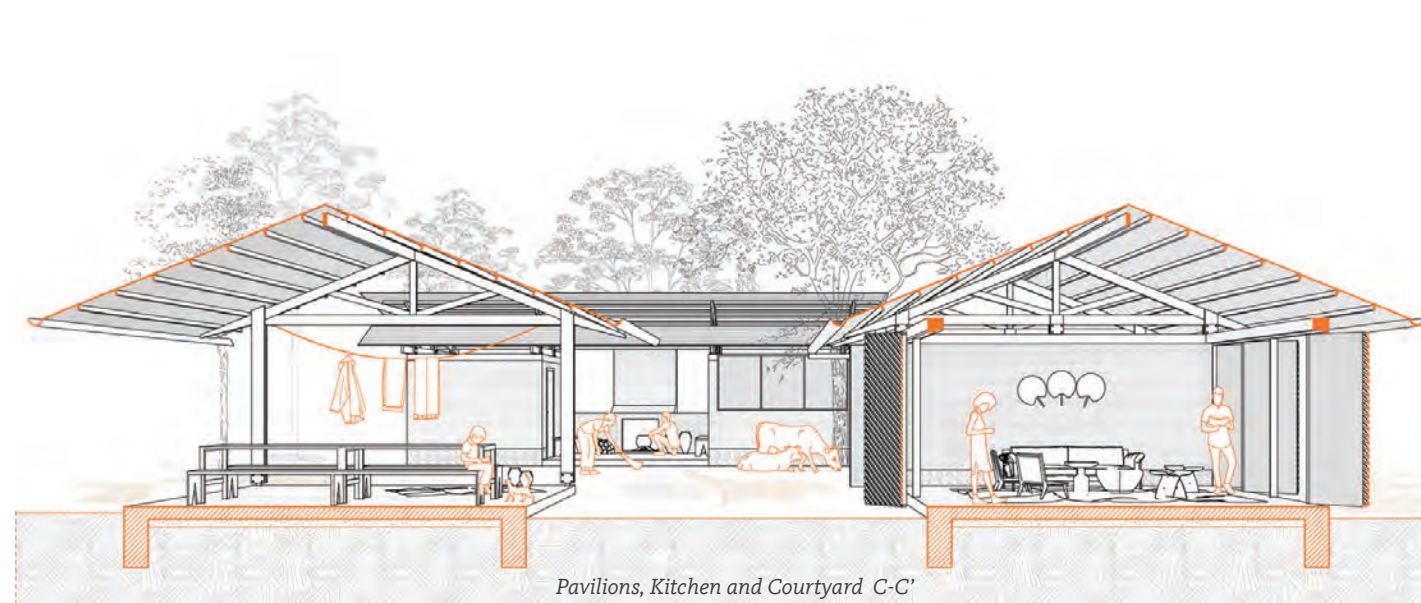
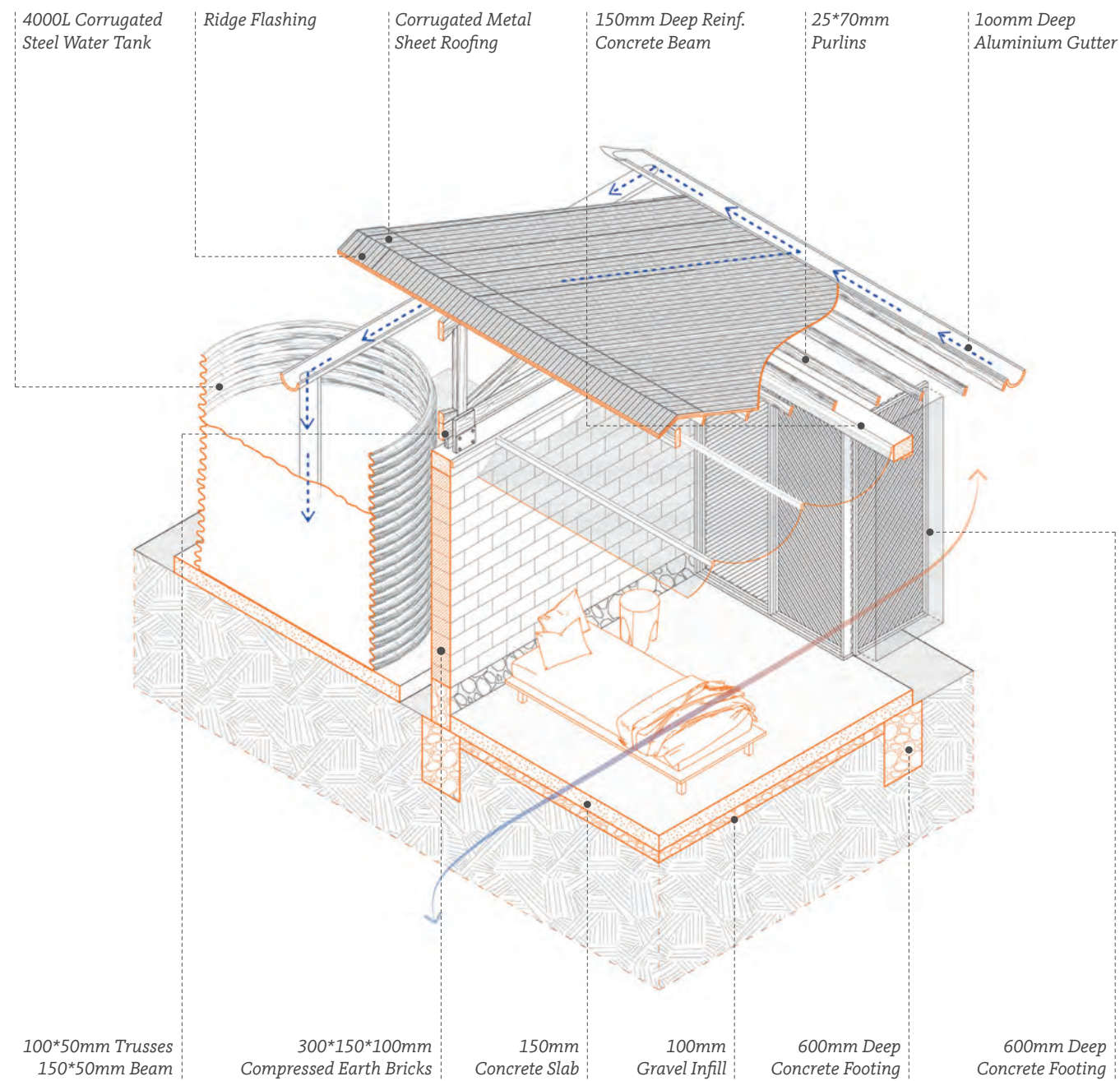
Wooden Trusses
Rafter

Concrete Beam
Wooden Frame
Mosquito Net

Bamboo Striped Doors
Wooden Furniture
CEB Walls
Concrete + Stone Plinth
4000 L Water Tank
Concrete Slab

Spatially, the program is composed of three main buildings: two residential pavilions and one kitchen. Based on a repetitive grid of 4*5 m, each pavilion contains three bedrooms and one gathering space (living room and outdoor terrace). An animal's coup is annexed to the kitchen while the cattle fence is extended to fit within the grid. Showers and latrines have been redesigned but remain around their existing location.

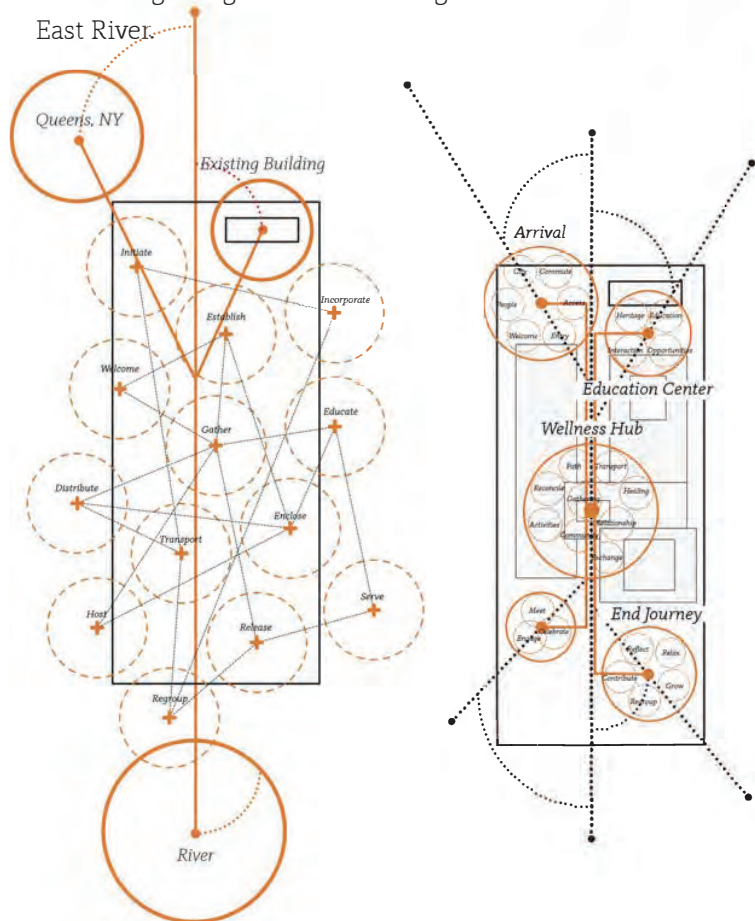
1. Kitchen
2. First Pavilion
3. Second Pavilion
4. Cattle Fence
5. Existing Huts
6. Existing House
7. Showers
8. Latrines



Biophilic Diversity.

Queens, New York, USA.

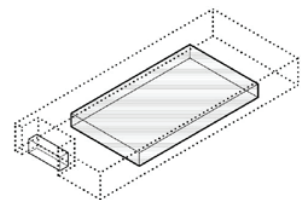
Biophilic Diversity aims to establish a new community standard by introducing timber as the primary building material for large-scale construction, exemplified by this project in Queens, NY. An experientially, nature-inspired path is integrated within the site to connect the city to the river. The ground level provides porosity at the street level while simultaneously segmenting the upper floors for semi-private to private functions. In addition to being fully integrated within the existing Queens network of culture, entertainment, leisure, and commercial activities, we further propose opportunities to enhance connectivity between residents and their neighbors. Indoor-outdoor spatial compositions frame embedded nature, public spaces, and a boardwalk connecting neighborhoods along the East River.



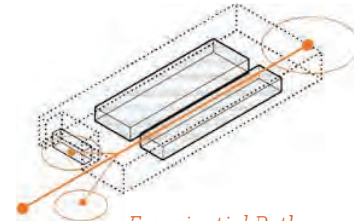
Connection between the city and East River

Project Category
 Educational
 Wellness/ Sports
 Social Housing
 Public Spaces

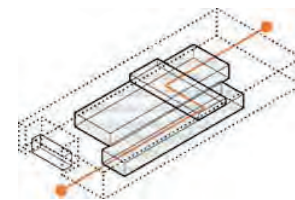
Area of Focus
 Timber Construction
 Biophilic Design Strategies



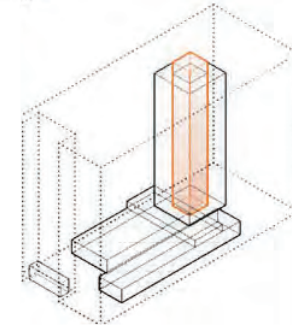
Footprint



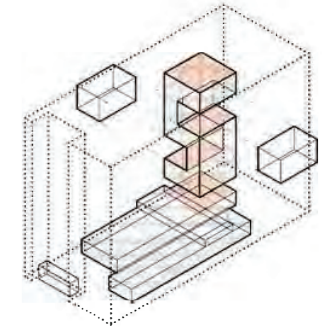
Experiential Path



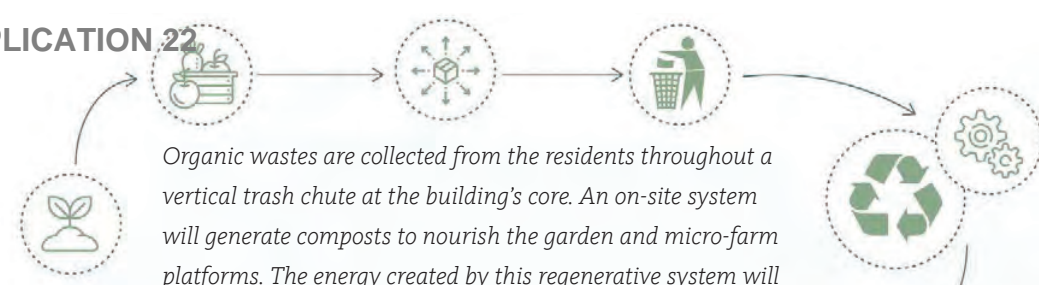
Connectivity



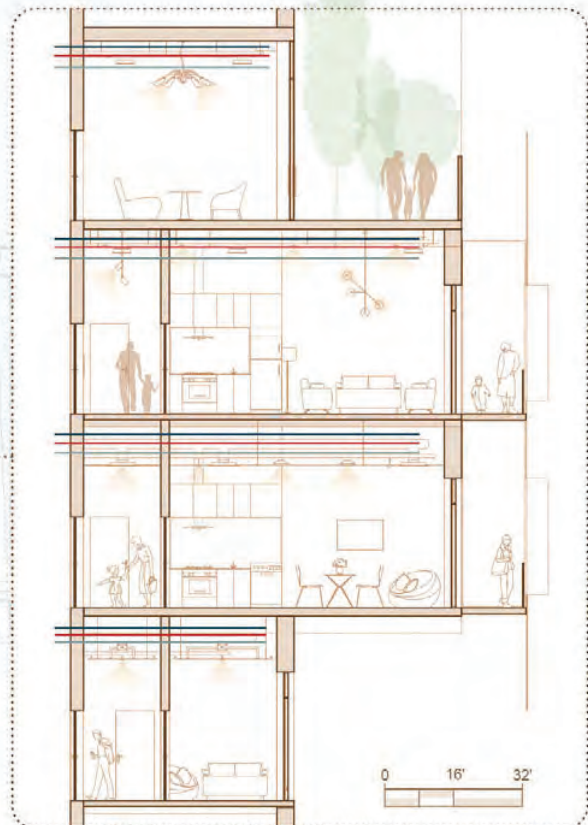
Residential Stacking



Integration of Nature



- MAINTENANCE ACCES _ 22F
- SKY GARDEN _ 21F
- TYPICAL FLOOR B _ 18F-20F
- TYPICAL FLOOR D _ 14F-17F
- GYM _ 13F
- TYPICAL FLOOR B _ 11F,12F
- TYPICAL FLOOR C _ 8F-10F
- CO-WORKING SPACE _ 7F
- TYPICAL FLOOR B _ 5F,6F
- TYPICAL FLOOR A _ 3F,4F
- COMMUNITY LOUNGE _ 2F
- GROUND FLOOR
- BOARDWALK _ -8'

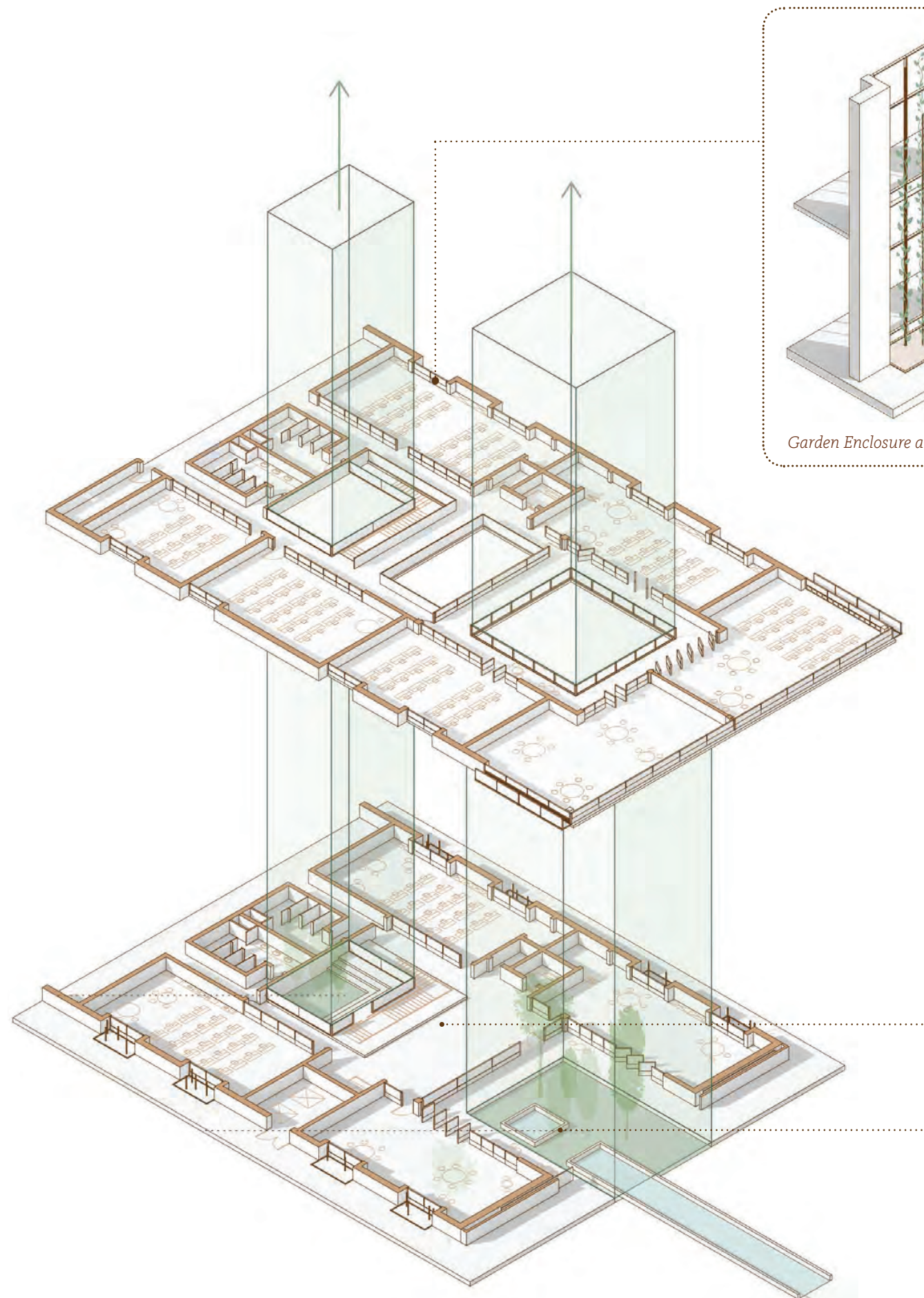


WELLNESS GARDEN

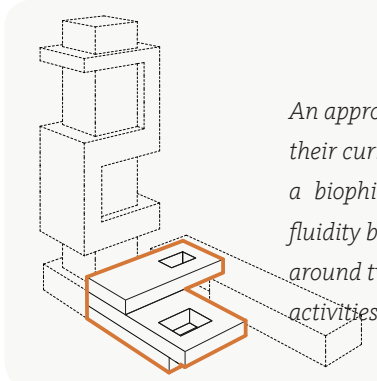
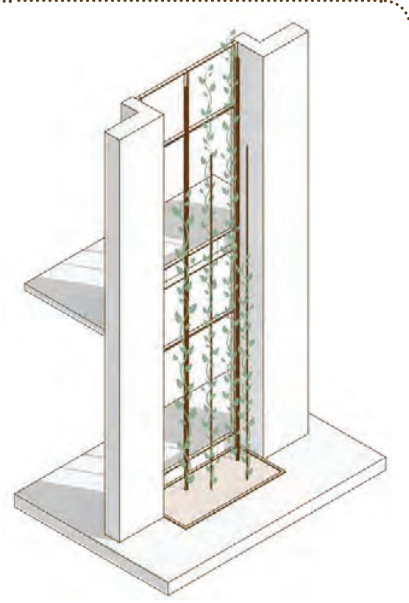
- CITRUS**
Decreases anxiety, ease depression, improve cognitive performance
- ROSEMARY**
Improves alertness
- LAVENDER**
Relaxes the mind, induce sleep
- PEPPERMINT**
Fight fatigue
- VANILLA**
Uplifts mood, ease depression

MICRO-FARMING





Garden Enclosure at the Windows



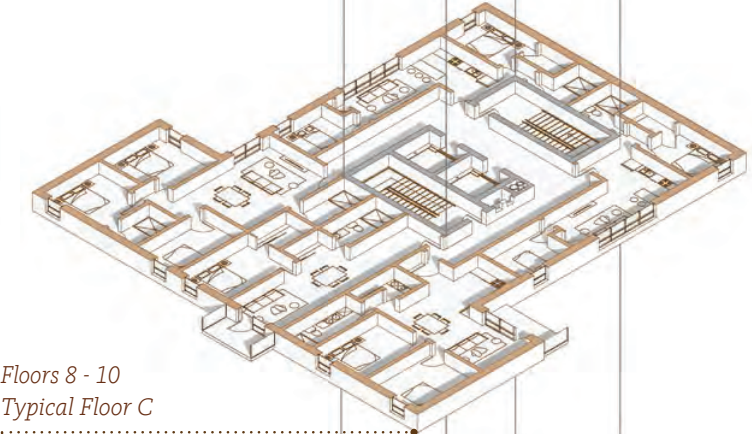
Phase I: Childhood Education Center

An appropriate learning environment for children must be designed to match their curiosity, energy, and interests. The childhood education center provides a biophilic learning environment for the children of Queens, offering a fluidity between the indoor and outdoor spaces. The classrooms are organized around two courtyards to engage students in healthy and interactive learning activities while introducing them to nature at an early age.

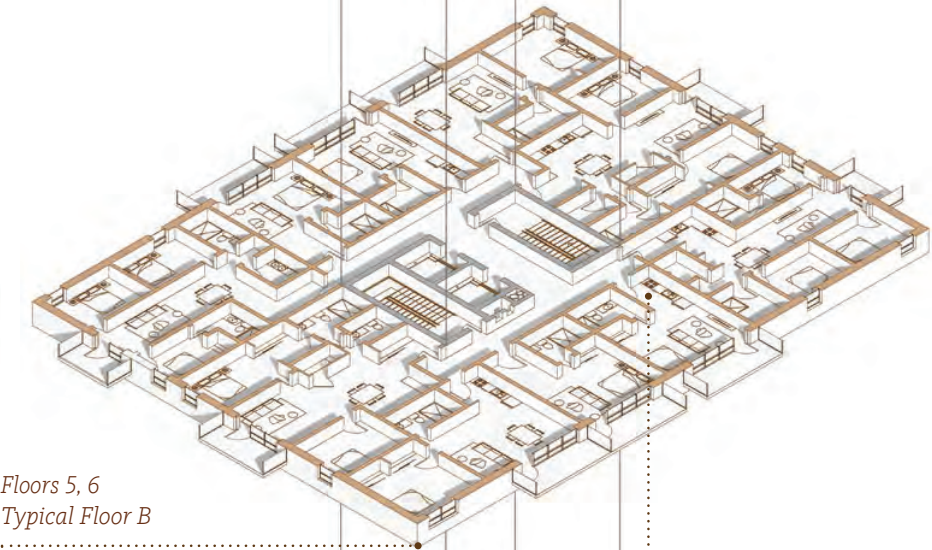




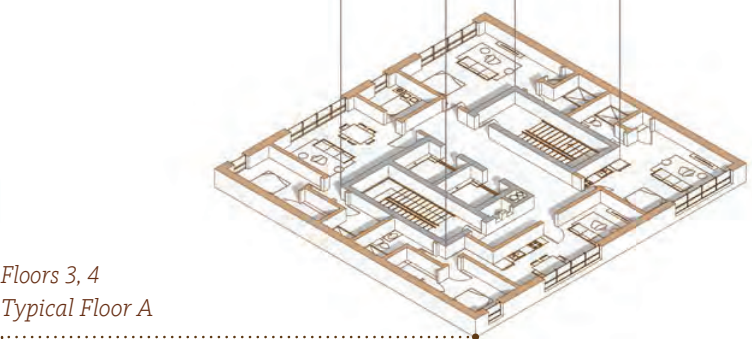
Floors 14 - 17
Typical Floor D



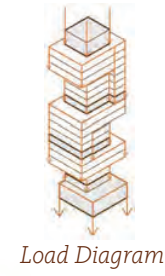
Floors 8 - 10
Typical Floor C



Floors 5, 6
Typical Floor B



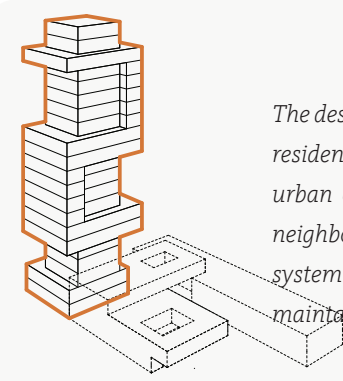
Floors 3, 4
Typical Floor A



Load Diagram

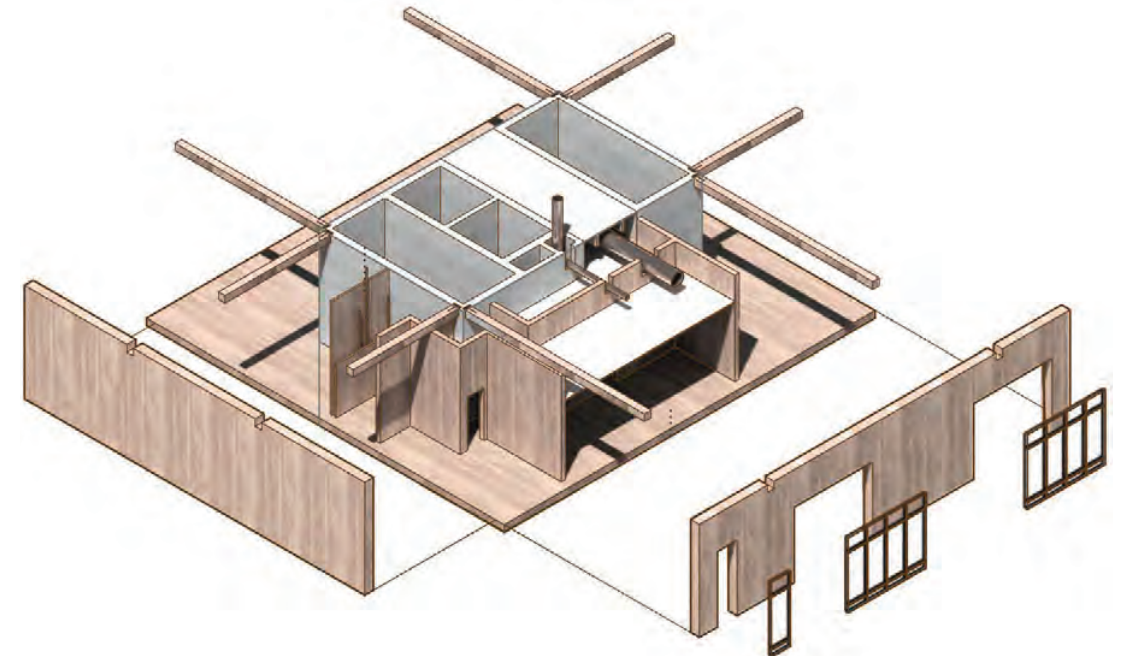


Concrete Core



Phase III: Mix-Used Residential Tower

The design of the tower is motivated by an idea of togetherness. It hosts various residential units and enhanced biophilic activities essential to the active urban community of Queens. The building's vertical greening extends the neighborhood's verdant to the tower's units and social areas. A regenerative system that transforms organic waste into compost engages the residents in maintaining their green spaces.



The residential floors' structural assembly includes: CLT panel partitions, exposed CLT panel floor and ceiling, precast concrete core, plumbing and mechanical equipment, and floor to ceiling energy-saving windows.

