



BAMBOOTOPIA × Bandung

Individual Research
Individual design project

Type of project: Education
Time: 2016, 09 (Master graduation project)
period: 2*16 weeks
Location: Bandung, Indonesia

Cigondewah used to be a peaceful rural village near Bandung, Indonesia. With the rapid expansion of Bandung City as well as thriving industry, especially textile industry, Cigondewah is involved in a major transformation into a pre-urban industrial community. In this process, due to inadequate investment in infrastructure and extensive growth of industry area, living conditions in the village have gradually decayed since 1990s. Industrial pollution, squeezey living area, unwise use of water are some of the most exemplary delimas.

The expanding factories and emmerging immigrant workers, which is the consequence of unstopable trend of industrialization, make problems even worse.

The task is to understand the problem from a "flow" point of view, and to come up with a spatial solution based on flow research in order to help Cigondewah become a integrated while livable part of the new urban area.

POLLUTION THREATS

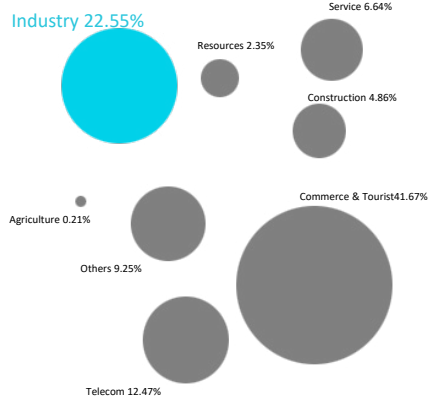
Textile making is one of the most pollutive industry in the world. In Cigondewah, violating industry expansion has already caused considerable impact on people's life. Surface water system is directly influenced, so that people no longer use river water for daily use nor recreation, however, they still irrigate food crops with polluted water, which might lead to food safety crisis in much bigger range.

Almost all water use in Cigondewah, including those for industrial purpose, rely on ground water. Overextracting groundwater will cause severe geological disaster in the future.

SHRINKING GREEN

Apart from water crisis, which is quite strange for such a wet region, violate industrialization keeps biting up precious green space in the village.

Over the past 13 years, two thirds of all green space, most of which is rice field are replaced by big factory plants or high-density housing for workers. Part of leftover fields are already purchased by textile factory owners, which means further invasion of the factory.

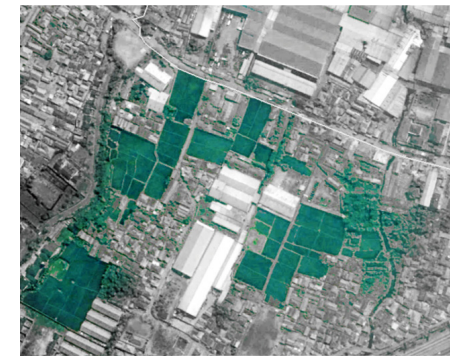
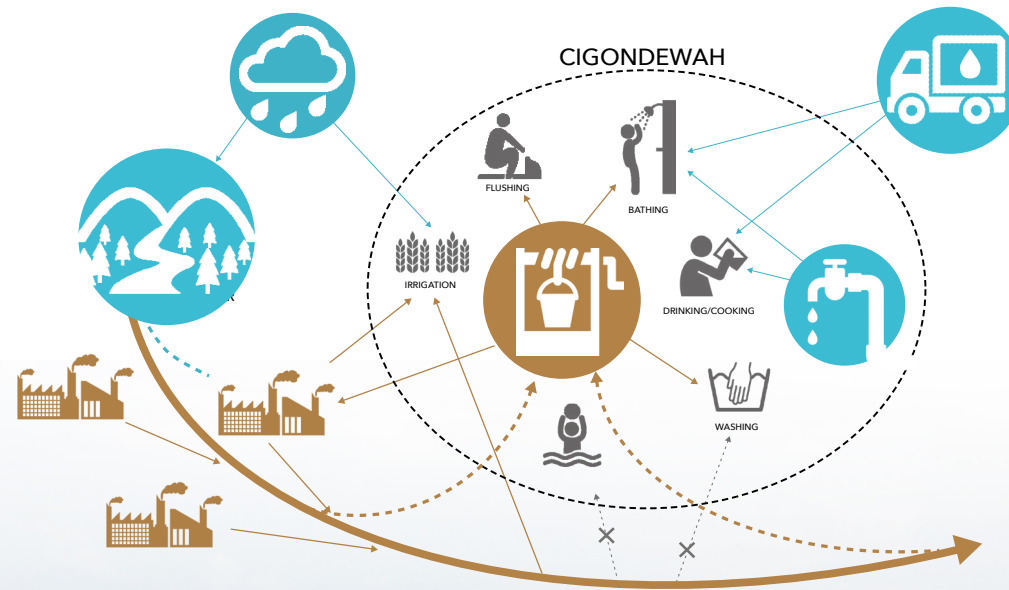


RISING INDUSTRIAL CITY

In 2012, Industry contributed to 22.55% of the total GDP of Bandung, while agriculture only accounted for 0.21%. In 2013, Cigondewah was listed as a new textile industry center in official documents. Industrialization is still the direction that Cigondewah is pursuing in present development.

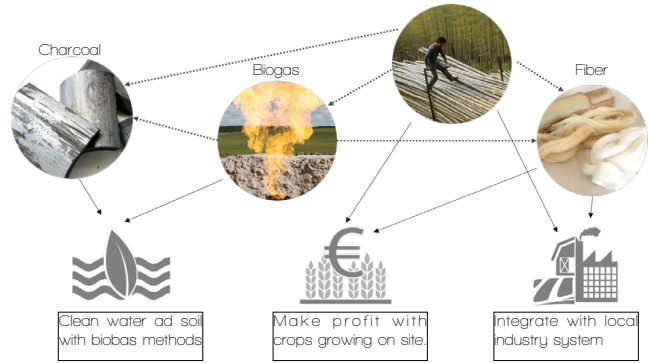
ANSWER LIES IN THE FIELD

Fields in the village is not only some residents' source of income, but also a crucial element when it comes to comforts of human settlements, spatial quality as well as local identity. There could be a way in which factories and fields can coexist with each other, and there is so much more that fields can do than merely producing rice.



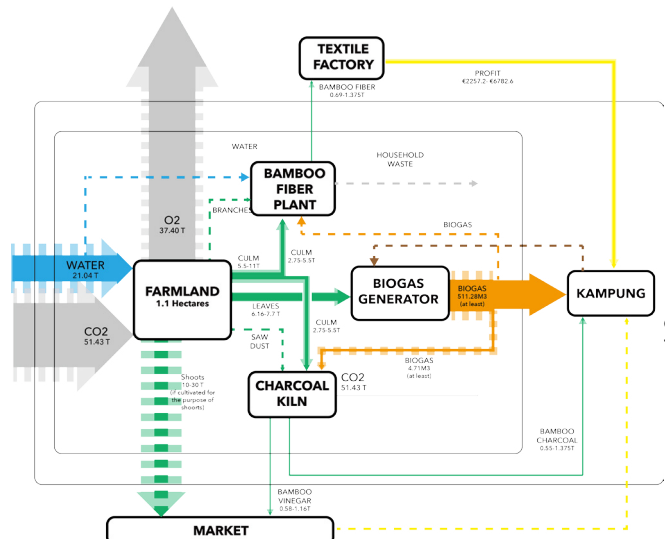
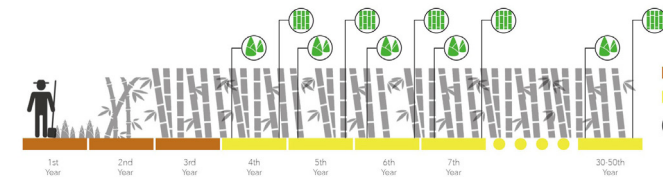
BAMBOO BASED INDUSTRIES

I come up with a industry system based on bamboo plantation. Bamboo fiber, high-performance natural fiber for textile. Bamboo charcoal, biobased water purification material. Bamboo leaf biogas, clean, cheap and renewable energy source.



RELIABLE BIOMASS RESOURCE

I pictured a future in which bamboos are planted on the fields instead of rice. Bamboo is a common source of biomass in tropical regions. Once taken appropriate care, a bamboo plantation can keep producing steady amount of biomass (culms, leaves and shoots) every year for 30-50 years without intensive maintenance like rice fields. Labors will be set free from rural work.

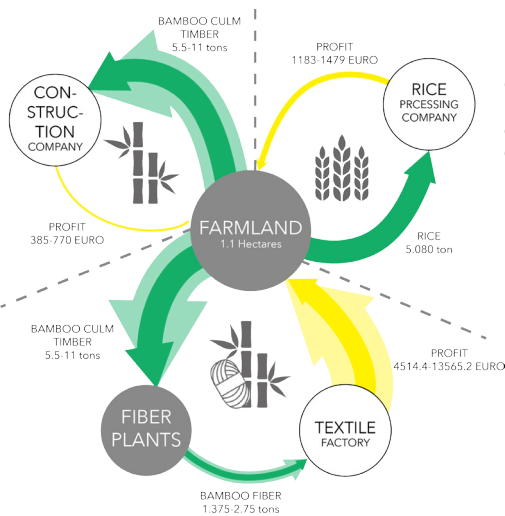


PROFITABILITY

Pressing bamboo into fiber will observably increase the profitability of the fields. In worst year, profit made from bamboo fiber is three times as much as that of best year's rice production. However bamboo as raw material makes little profit.

SELF-SUSTAINED

Based on flow calculation, this industrial system, once properly run, can sustain itself without much energy or material input. energy produced from fallen bamboo leaves can fully feed the demand of charcoal and fiber making process. With the help of biologic purification agency, water can be easily reused.

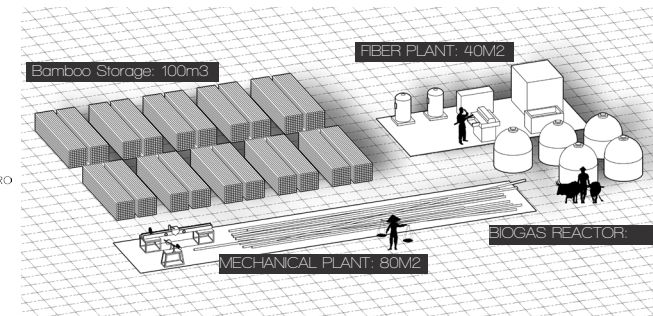


PRODUCE ON SITE

Given the size of the field, bamboo harvested, if arranged wisely, is able to be process on site without occupying too much space.

MICROCIRCULATION

In the new village, factory bridges factory, village as well as natural resources. Factories and fields coexist without sacrifice economic benefit.



MECHANICAL PLANT

Bamboo culms are transported into the mechanical plant through a ramp. In the plant, bamboos are cut and split into 1-meter strips and laid on central material shelf to air dry.

After harvest season, bamboos can be mechanically treated within a few weeks. In rest of the year, this space will serve as public space with lovely view of the bamboo forest.

FIBER PLANT

Fiber plant is placed on the opposite side to mechanical plant with material shelf standing inbetween.

FLUID ROOF

Differentiated spaces are covered by a fluid roof made of bamboo weft net and bamboo roof tiles.

The roof is shaped based on concerns. Roof surface can be made of bamboo frames underneath with a eave of at least 1 meter to prevent direct sunlight and rainfall. High slopes on top help strengthen natural ventilation by discharging redundant heat produced during production process. Roof shaped like a cone near the kiln helps preserving heat temporarily in order to help dry the final product quickly.

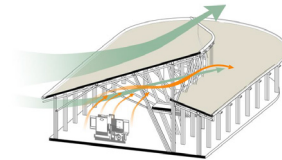
WALKWAY

A walkway is installed on top of the material shelf providing alternative route when the ground floor is too busy. What's more important, villagers can walk inside the building seeing people processing bamboo grown on their land. Clients or possible investors will also visit the building without interrupting production process.

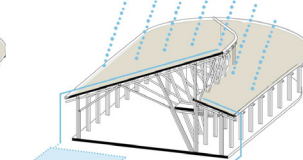
PUBLIC SPACES

Lounges, toilets and exhibition rooms are placed not only providing necessary comfort for workers, but also making the building a charming spot to gather and visit.

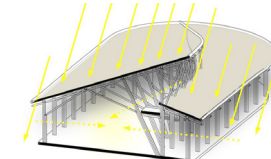
ENTRANCE LOUNGE



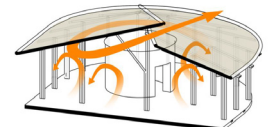
NATURAL VENTILATION



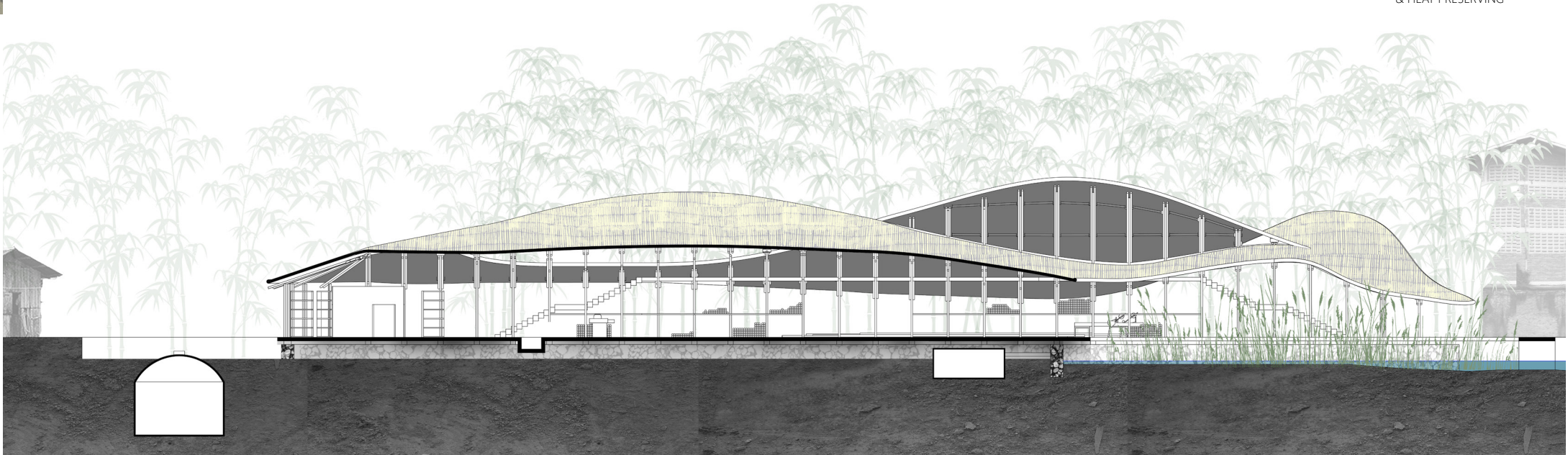
RAIN PREVENTION & WATER COLLECTION

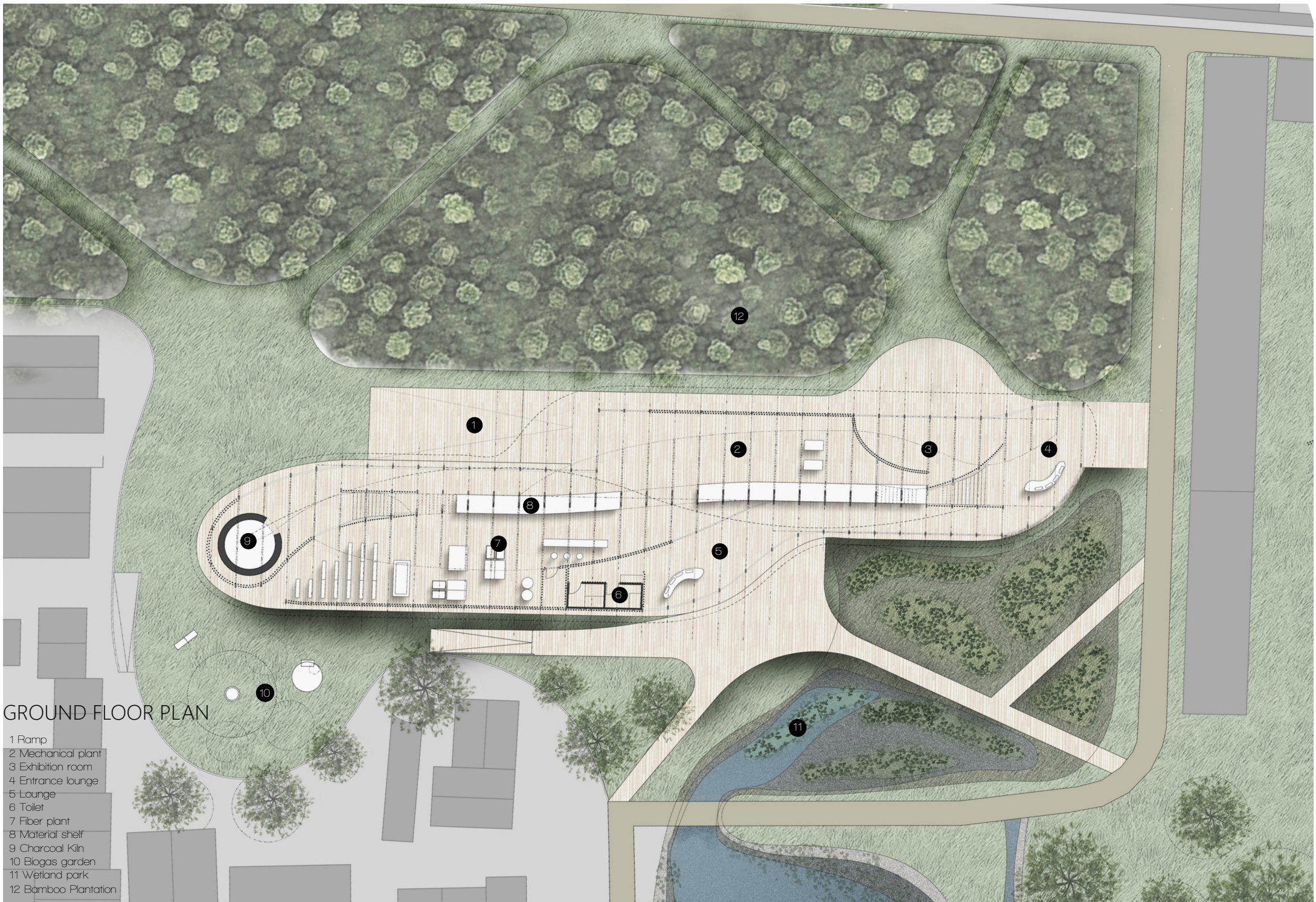


SUN SHADING



KILN AREA ROOF SHAPE & HEAT PRESERVING





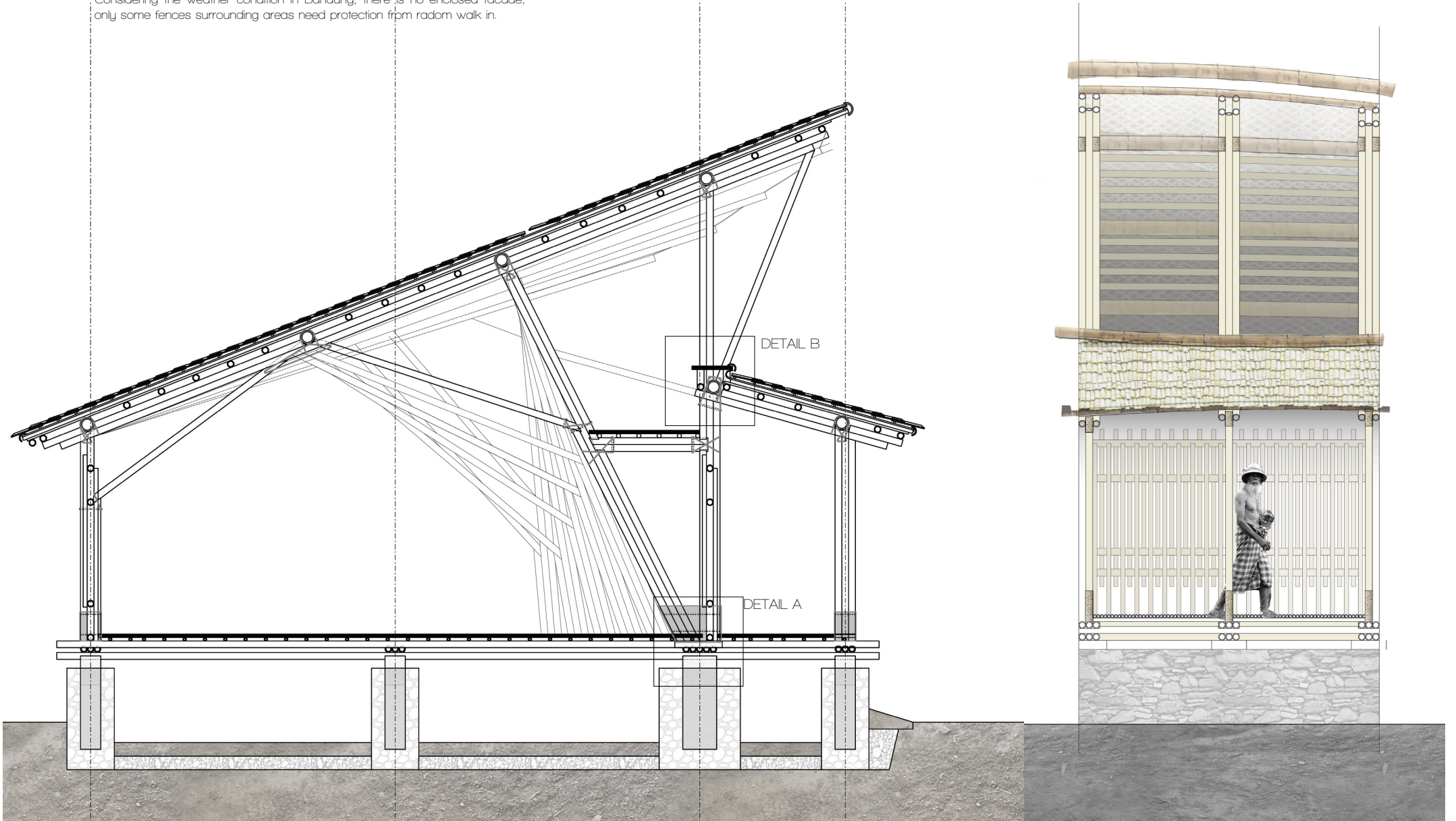
GROUND FLOOR PLAN

- 1 Ramp
- 2 Mechanical plant
- 3 Exhibition room
- 4 Entrance lounge
- 5 Lounge
- 6 Toilet
- 7 Fiber plant
- 8 Material shelf
- 9 Charcoal Kiln
- 10 Biogas garden
- 11 Wetland park
- 12 Bamboo Plantation

CROSS SECTION & ELEVATION FRAGMENT

Ground floor is lifted about 1 meter to prevent rainwater from flowing in. Spaces beneath the floor housing water and energy transporting system.

Considering the weather condition in Bandung, there is no enclosed facade, only some fences surrounding areas need protection from random walk in.

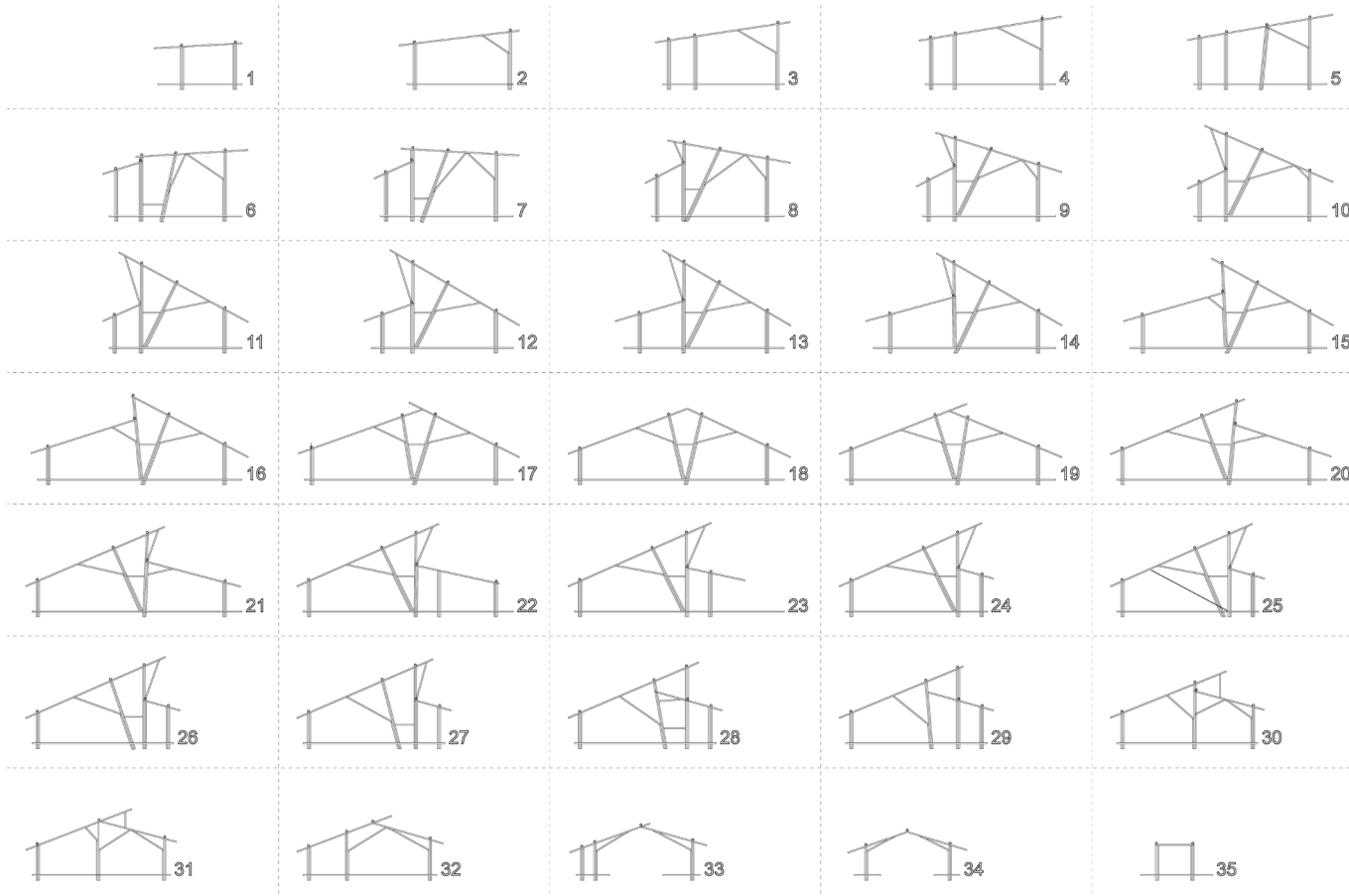


INSTALLATION

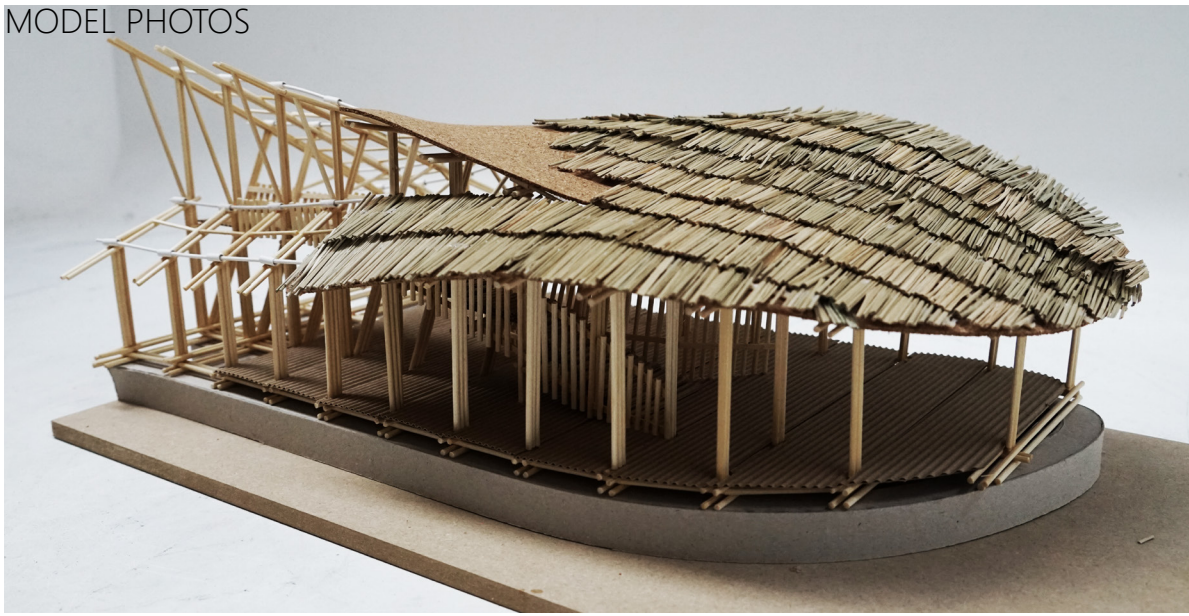
This factory is mainly fund, built and run by local residents. Thus, a simple, low-price building system is needed. Bamboo construction suits perfectly this requirement. Not only the skills and tools needed for construction can easily be

found in the village, nearly all materials can be grown on the earth where this village stands.

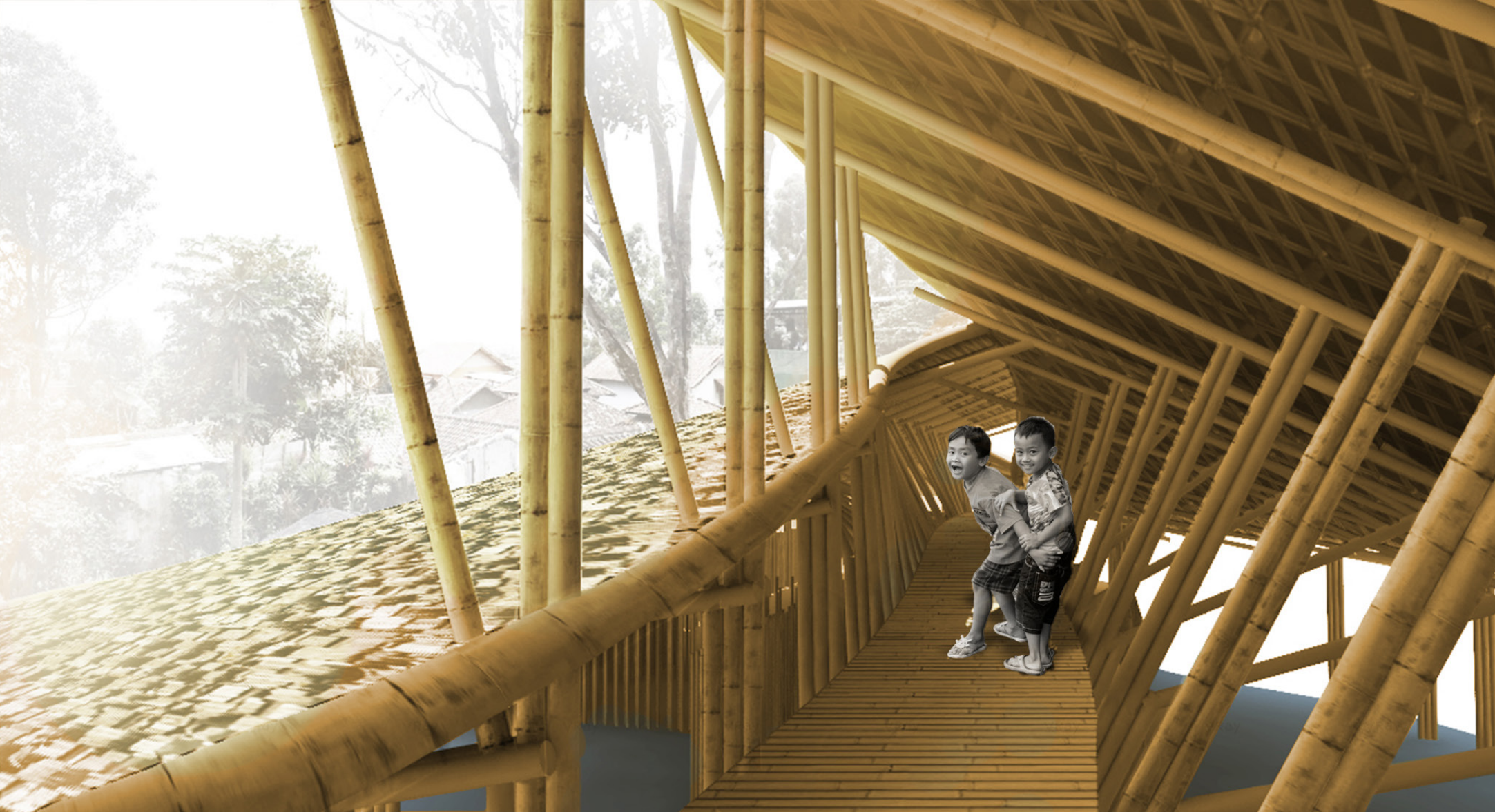
35 different hand-craft frames connected in a linear direction forms the serpentine shape with various interior space. The functional yet playful space is not easily achieved with mass production building system.



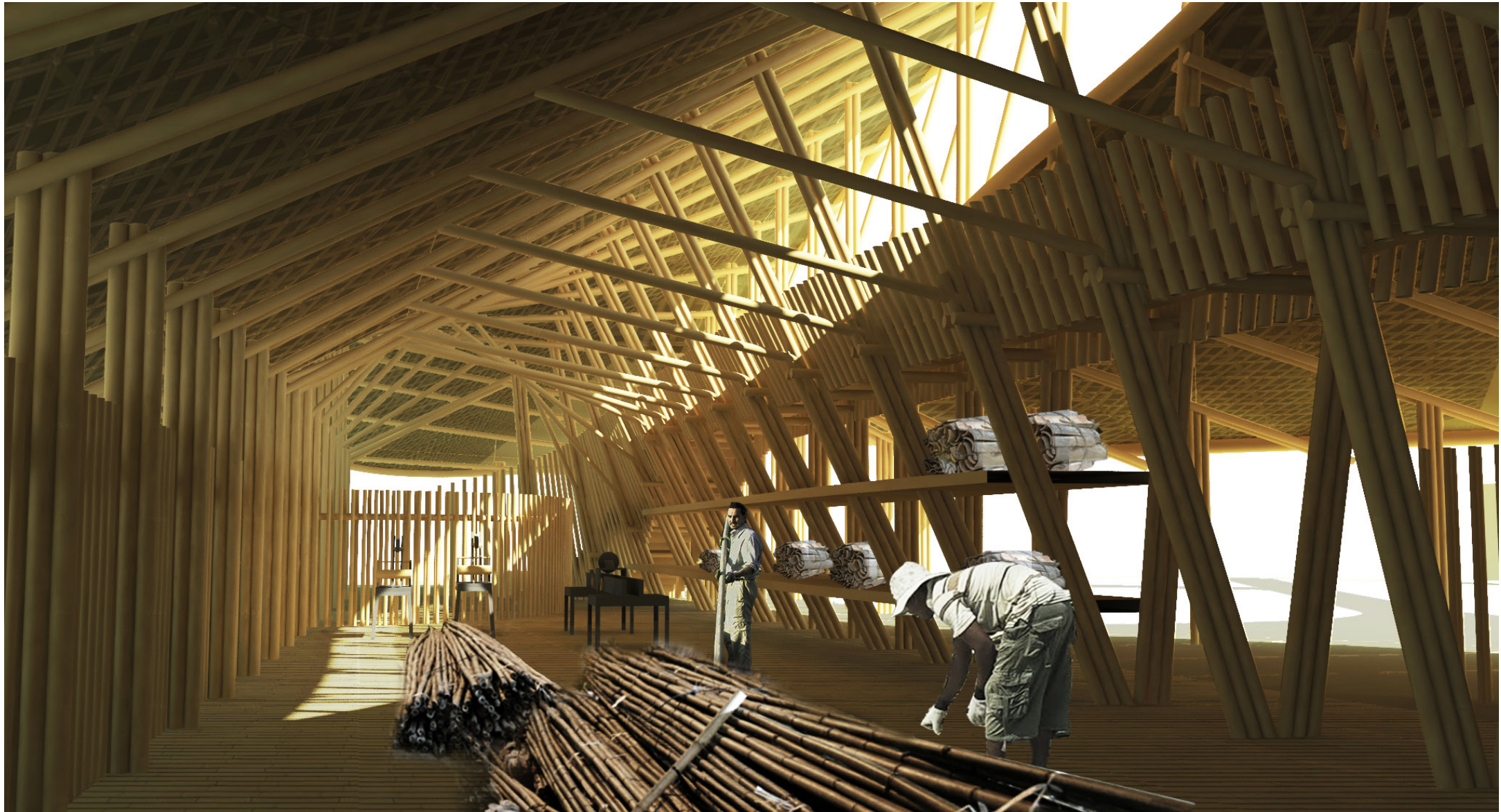
MODEL PHOTOS



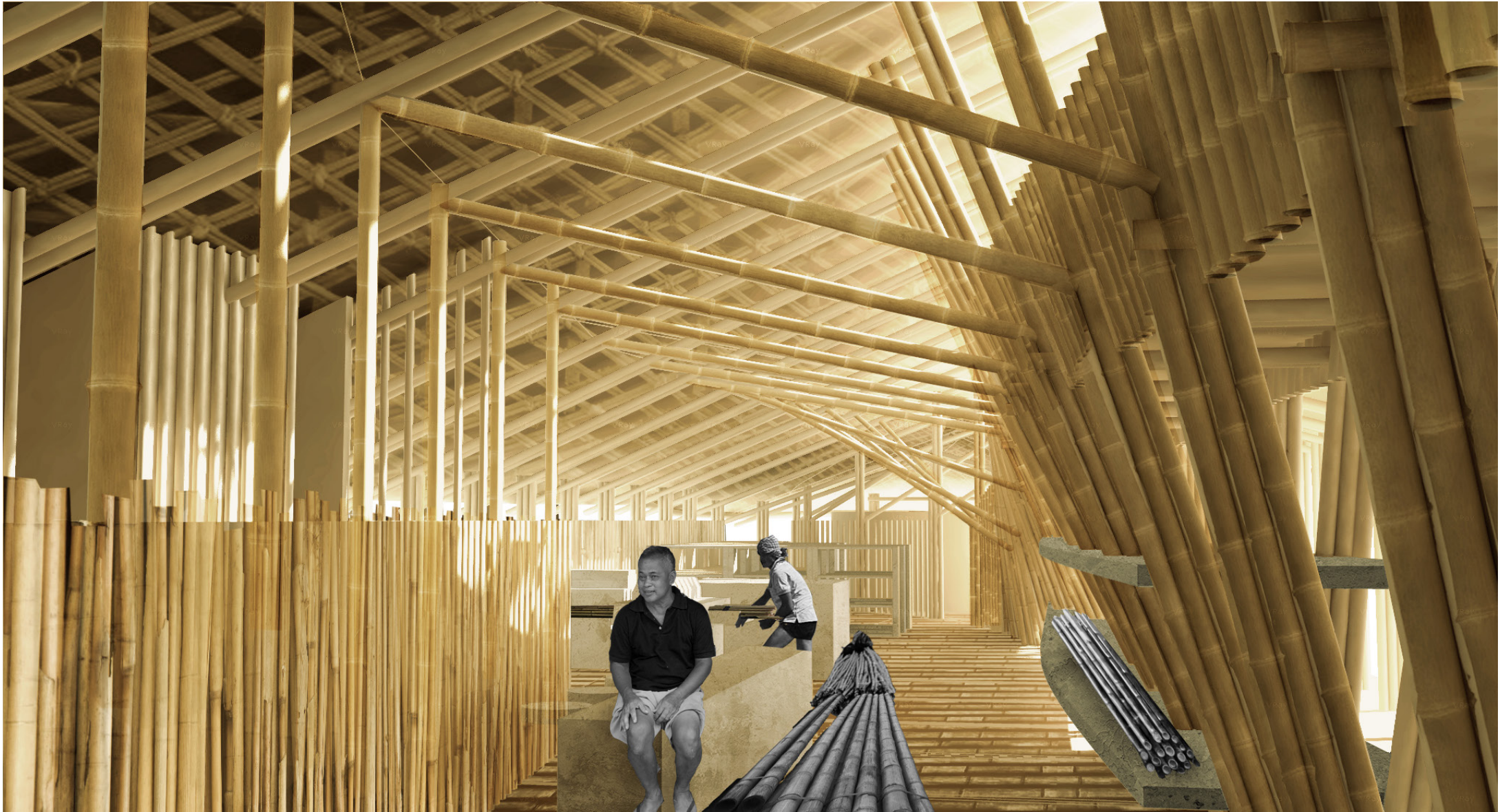
WALKWAY PERSPECTIVE

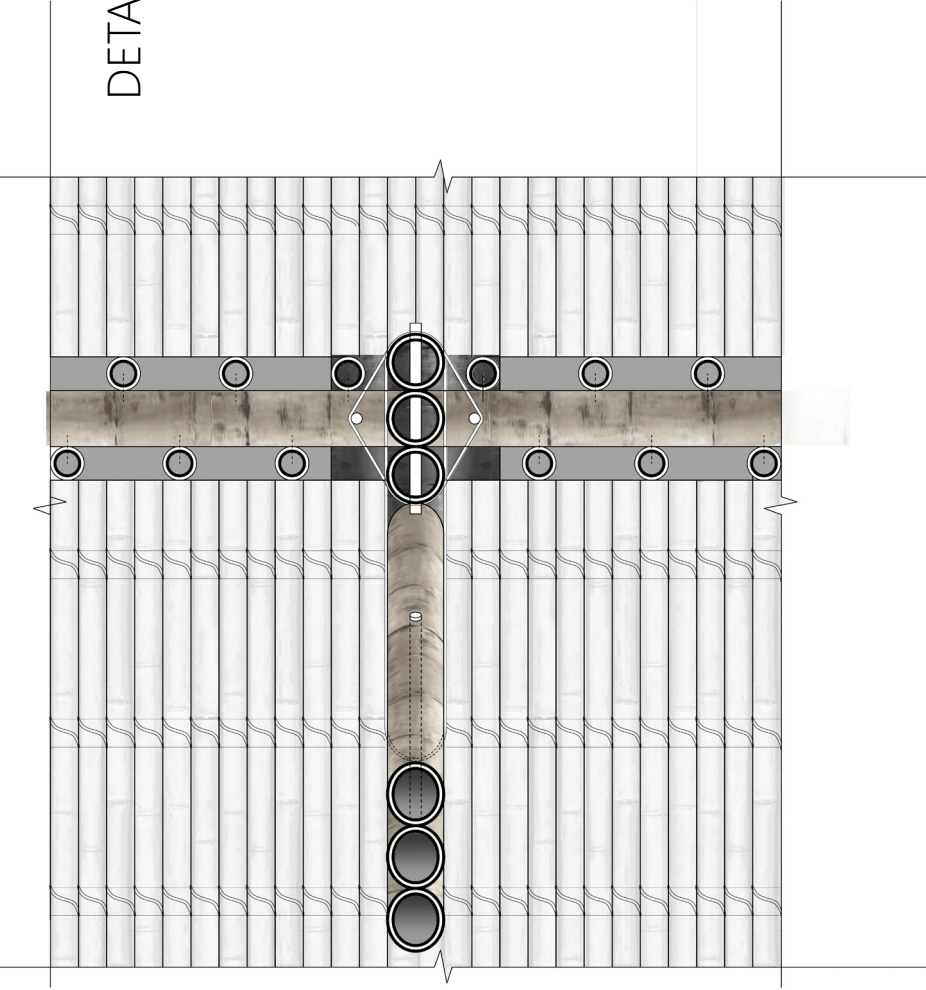
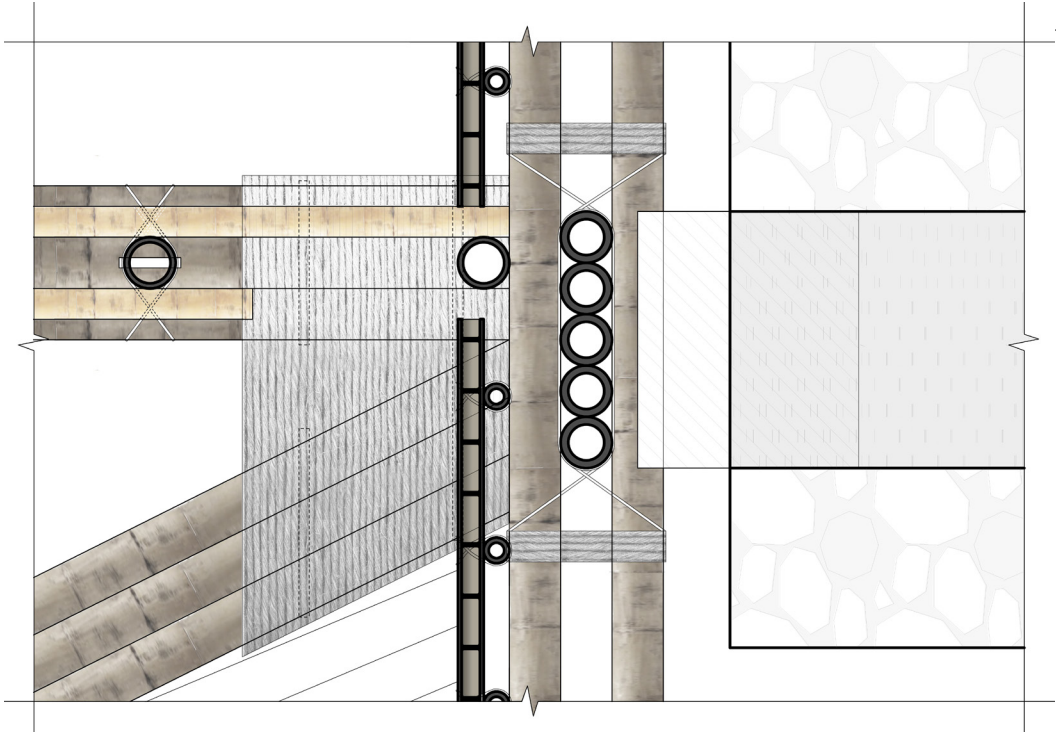
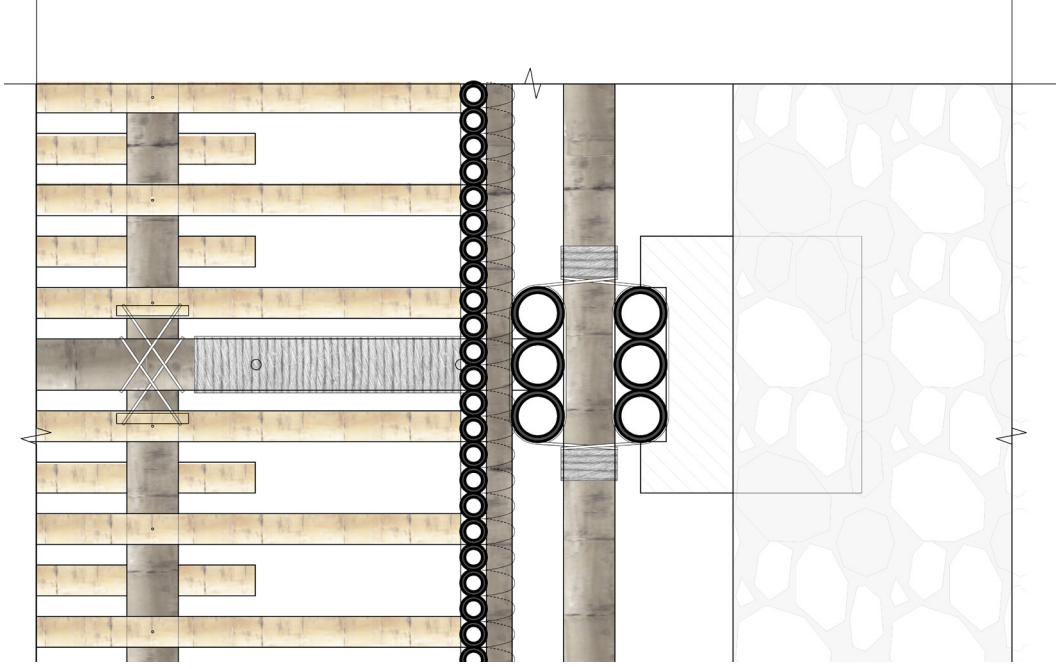


MECHANICAL PLANT PERSPECTIVE

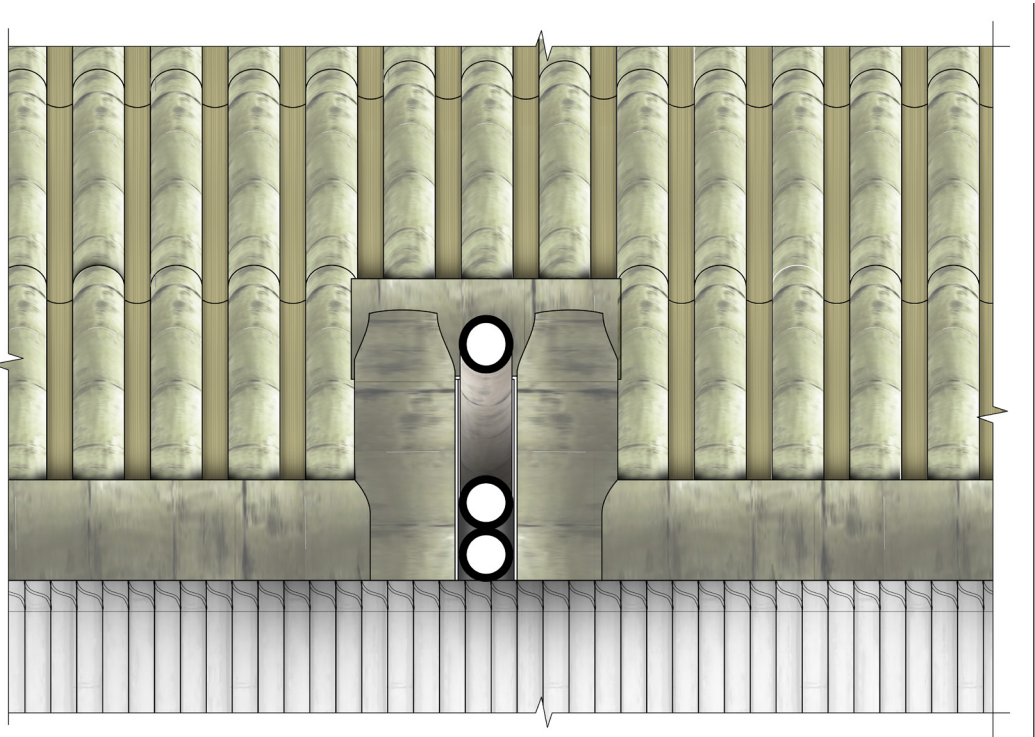
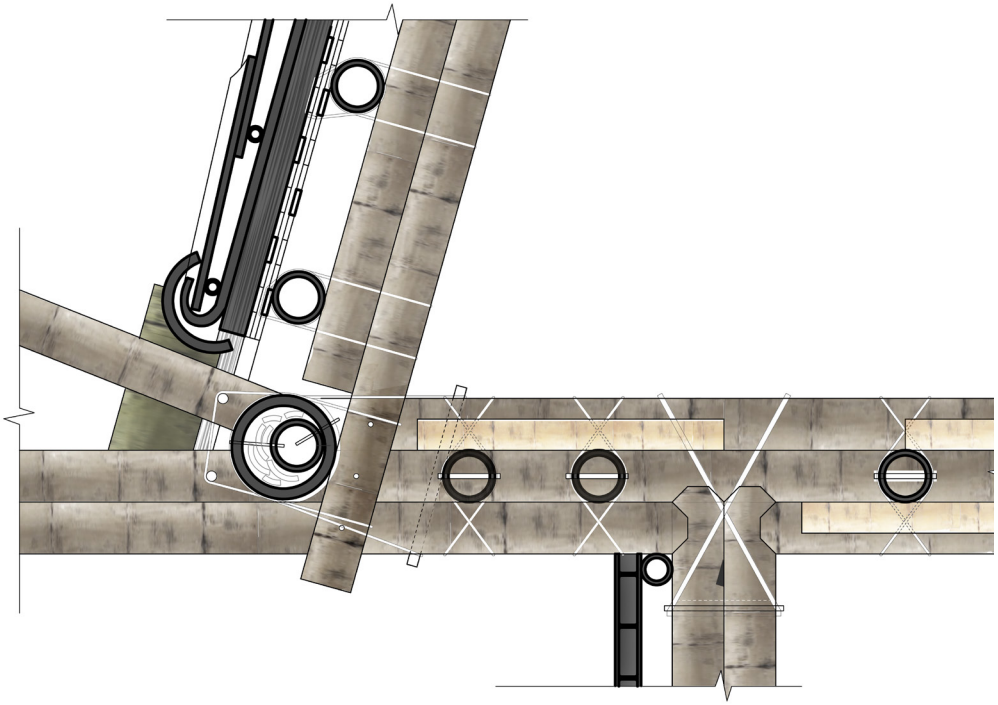
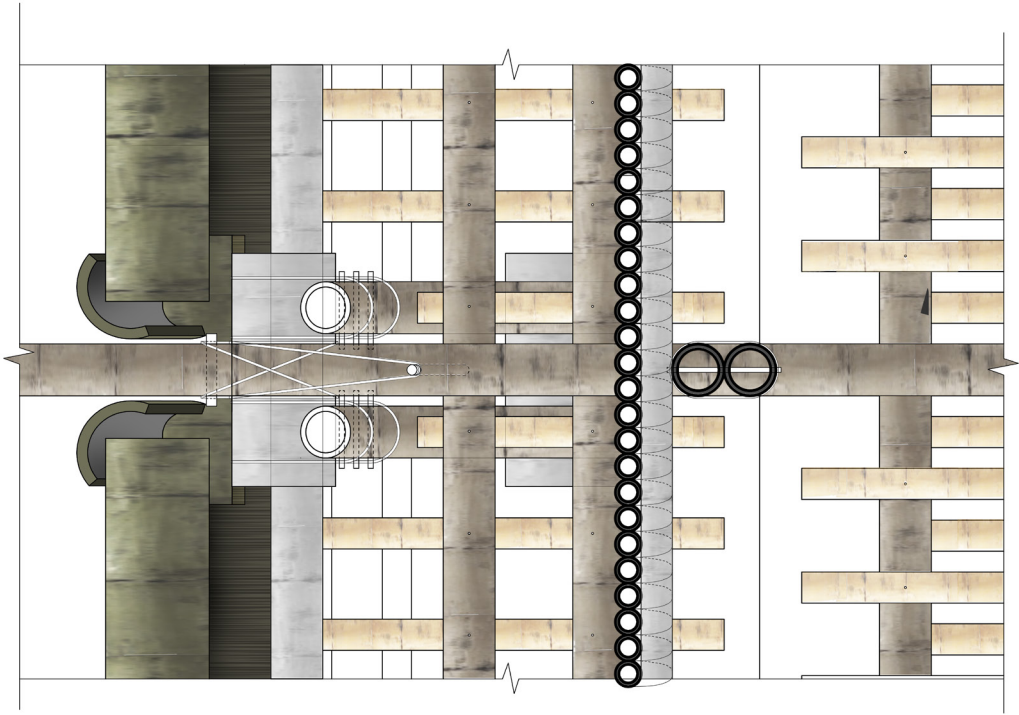


FIBER PLANT PERSPECTIVE





DETAIL A - FUNDATION



DETAIL B