

PROFESSIONAL TRAINING REPORT

Submitted in partial fulfillment of the requirements for the award of
Master of Architecture degree in Sustainable Architecture

by

KAVYA MOHANDAS (40890008)



**SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF ARCHITECTURE**

SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC
JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

JAN 2022



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JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHEMMENCHERY, CHENNAI – 600119. TAMILNADU.

PHONE: 2450 1443/9941912481 INTERNET: www.sathyabama.ac.in

E-mail: archhod@sathyabama.ac.in



**SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF ARCHITECTURE
M. Arch (Sustainable Architecture)**

**PROFESSIONAL TRAINING PORTFOLIO (S89A PT)
JAN 2022**

Name of the Student : **KAVYAMOHANDAS**

Semester : **III**

Reg No. : **40890008**

Batch : **2020-2022**



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SCHOOL OF BUILDING AND ENVIRONMENT
DEPARTMENT OF ARCHITECTURE
M. Arch (Sustainable Architecture)

BONAFIDE CERTIFICATE

This is to certify that the professional training (S89A PT) is the work of **KAVYA MOHANDAS (40890008)** who had undergone training in **DESHA BY SATHYA CONSULTANTS** and has been monitored by the continuous assessment during

Dec 2021 to Jan 2022.

DR. DEVYANI GANGOPADHYAY

DEAN,

School of Building and
Environment

Department of Architecture

Submitted for Viva voce Examination held on 07/02/2022

Internal Examiner

External Examiner



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DECLARATION

I KAVYA MOHANDAS (40890008) hereby declare that the Professional Training Report (01/12/2021 to 06/01/2022) done by me under the guidance of **Ar. SATHYA PRAKASH VARANASHI** is submitted in partial fulfillment of the requirements for the completion of practical training session.

PLACE : **ADYANADKA, KARNATAKA**

DATE : **06/01/2022**

SIGNATURE OF CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to Board of Management of **SATHYABAMA** for their kind encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. Devyani Gangopadhyay**, Dean and Head of Department, School of building and Environment, Dept. of architecture for providing me necessary support and details at the right time during the progressive training session.

I sincerely thank **Ar. Sathya Prakash Varanashi**, Principal Architect, Sathya Consultants for giving me this valuable opportunity to be part of a dream team.

I would like to express my overwhelming gratitude to **Ar. Keran Rajakumar** for his valuable guidance, effort, passion, constant encouragement, understanding and kindness which paved way for the the successful completion of my project work.

My sincere thanks to **Ar. Sheetal Amraotkar**, Professional Training Coordinator for her motivation and guidance.

My overwhelming gratitude and love to **My Mannine Makkalu**, for being the best colleagues,
Ar. Keran Rajakumar, Ar. Raja Praveen, Ar. Aadarsh Sidharth, Ar. Rosa Alexander, Ar. Vanditha, Ar. Utkarsha Patil, Ar. Shruthi, Ar. Sushmitha, Geethanjali, Satheesh, Sachin, and Chintu. Thank you all for the valuable time spent and learnt together.

I would also like to thank **Dr. Ashwini, Dr. Krishnamurthy, Partha Varanashi**, Varanashi Organic Farms, for the amazing staying and learning experience.

I can't thank enough all the **plants, animals and workers** of Varanashi Organic Farms for teaching me valuable things in this period of time here.

Finally, I would like to thank my **parents and friends** for supporting me throughout this journey.

JOINING LETTER

SATHYA CONSULTANTS

ECO FRIENDLY ARCHITECTURE, SUSTAINABLE
URBAN DESIGN AND CONSERVATION

166, KATHRIGUPPE WATER TANK ROAD
4TH CROSS, 4TH BLOCK, 3RD STAGE
BANASHANKARI, BANGALORE - 560085
Ph : 080 - 26794220, 26797854
sathyaconsult@gmail.com (Off.)



Ref No. 109/3812

December 10th, 2021

To,

The Head of the Department,

Sathyabama Institute of Science and Technology,

Rajiv Gandhi Salai, Jeppiaar Nagar,

Chennai 0 600 119, Tamil Nadu.

Dear Sir/Madam,

I am happy to confirm Ms. Kavya Mohandas (40890008), a master's student at Sathyabama Institute of Science and Technology to work with us as an intern for a period of 4 weeks from December 01st to January 06th 2022. I wish her a happy and learning time.

Yours Sincerely,

Sathya Prakash Varanashi

Principal Architect.

SATHYA CONSULTANTS
Architects • Planners • Urban Design
and Conservation

166, Kathriguppe Water Tank Road,
4th Cross, 4th Block, 3rd Stage,
Banashankari 3rd Stage,
BANGALORE-560085 Ph: 6794220

WEEKLY REPORT



SATHYABAMA
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DEPARTMENT OF ARCHITECTURE

M. Arch (Building management)

Continuous Assessment Report for Professional training

(Continuous progress report of the trainee architect/Project Manager for the period of 30 working days in the office to be submitted to HOD by the Trainee attending the training session)

1. Name of the office / organization : DESHA BY SATHYA CONSULTANTS
2. Address & Contact Number : #166, KATHRIGUPPE WATER TANK ROAD 4TH CROSS, 4TH BLOCK, 3RD PHASE, BANASHANKARI 3RD STAGE, BENGALURU, KARNATAKA 560085
3. Name of the student : KAVYA MOHANDAS
4. Duration : 01/12/2021 to 06/01/2022
5. Total No. of days : 30 days

* Note: Kindly grade the student as per his/her overall performance in the office during the assessment month; which will be converted to the allotted 200 marks by the department.

Description of works	Excellent	Good	Fair	Poor	NA
Understanding of office culture and methodology	✓				
Active Participation in the Project activities	✓				
Documentation and tracking of project	✓				
Presentation Skills developed		✓			
Understanding of construction details & techniques	✓				
Participation and contribution in project meetings					✓
Understanding of codes and standards	✓				
Schedule preparation & tracking activities		✓			
Preparation / Management of drawings	✓				
Learning / Application of software in Projects					✓
Preparation of concept for projects		✓			
Site Management / Discussion with clients					✓

Overall Grading*

A

(A - 8.0, B - 7.0, C - 6.0, D - 5.5, E - 5.0, F - <5)

6. Any other Remarks: Nil

D. Kavya Kavya
Jan 6/22
AN KARAN RAJA KUMAR
(Project Architect)

Signature of the Head of
the Office Organization
(With Seal)

SATHYA CONSULTANT:
Architecture, Interiors, Urban Design
& Conservation
166, Kathriguppe Water Tank Road
4th Cross, 4th Block, 3rd Phase
Banashankari 3rd Stage,
BENGALURU - 560085

WORK DIARY

DATE	PROJECT NAME	WORK DONE	DATE	PROJECT NAME	WORK DONE
01/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Studying the site and project.	18/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing
02/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Helping passing the mud	20/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing
03/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Shifting mud in KMT to the site and packing wattle and daub of	21/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing
04/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping mud and packing wattle and daub1B	22/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing
06/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing wattle and daub	23/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Weaving
07/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Glass bottle breaking	24/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Weaving
08/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping and packing	27/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Weaving
09/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping and packing	28/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping
10/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping	29/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping
11/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing	30/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping
13/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing	31/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing
14/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping	03/01/2022	VARANASHI MUD COTTAGE, ADYANADKA	Packing
15/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Stamping	04/01/2022	VARANASHI MUD COTTAGE, ADYANADKA	Packing
16/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing and plaster making	05/01/2022	VARANASHI MUD COTTAGE, ADYANADKA	Packing
17/12/2021	VARANASHI MUD COTTAGE, ADYANADKA	Packing	06/01/2022	VARANASHI MUD COTTAGE, ADYANADKA	Packing

3.2.22

Chief Architect Signature:

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 & Conservation
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 Banashankari, 1st Stage,
 Bangalore 560075
 Office seal.

Consolidated Certificate (Experience)

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Ref No. 109/3819

January 20th, 2022

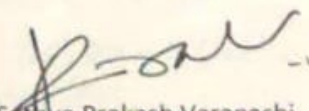
TO WHOM IT MAY CONCERN

Kavya Mohandas, from Sathyabama Institute of Science and Technology, Chennai, Reg. No. 40890008, showed a lot of interest in joining our build to learn internship program by DESHA Forum a unit of Sathya Consultants, at Varanashi Organic Farms in Adyanadka, Karnataka. Kavya joined us on December 1st 2021 and completed the stipulated Masters internship on January 6th 2022.

Initial month went by to study how our firm approached eco-friendly architecture, what are the alternative ideas we advise and how innovative construction techniques can lead to both ecological and economical designs evolving from direct site conditions, local material and practices, often dealing with constraints which only being at site can teach her.

Later after getting adjusted to community living, Kavya got comfortable communicating with her peers and native labourers, and started developing hands-on construction. Over the next few weeks she learnt how to season and prepare bamboo for construction, mud preparation and storing, upcycling waste materials and material management. Kavya developed the skill of mud wall building quickly and can construct it now without supervision and with clean interest and concentration towards the same. She has learnt complete construction of wattle and daub with different wall junctions and fixtures in the wall ensuring quality work. Also has insights of some alternative techniques of roofing. Since it is an on-site working environment Kavya got more exposure on hands-on building and few detail drafting works. Kavya became an integral part of the natural building community at the venue, living amidst nature and trying to lead a nature conscious living and most importantly healthy lifestyle practices. She has become a stronger person both physically and ideology wise.

We wish her a happy future and hope she takes natural building as her steps further into the construction and architecture fraternity.


Sathya Prakash Varanashi

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About

DESHA

by



SATHYA CONSULTANTS

DESHA is a unit of SATHYA CONSULTANTS dealing with low-cost hands-on sustainable projects. The platform is abundant to various form of eco sensitive, cost effective and sustainable architecture materials, techniques and innovations.

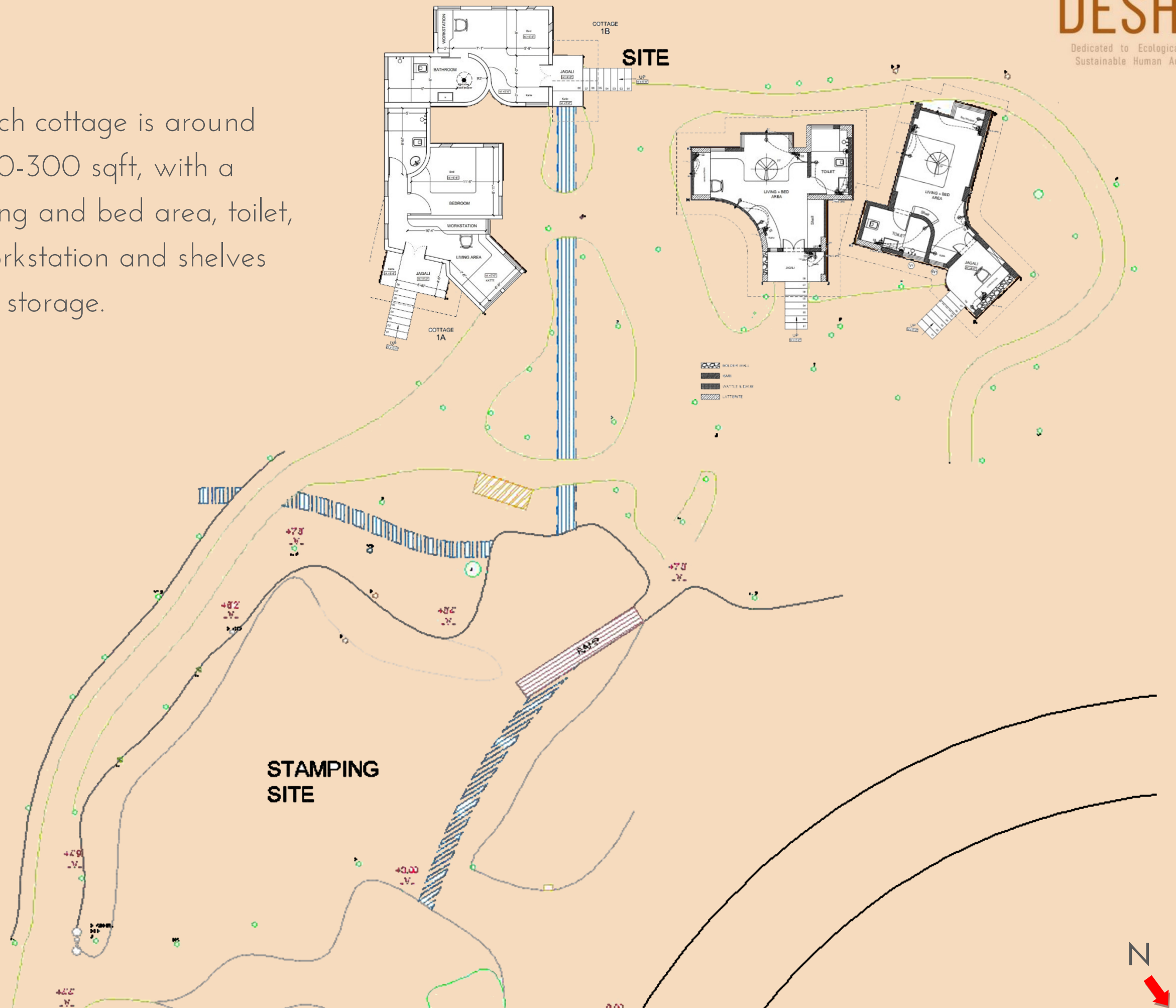
About the project

It's a 4-cottage holistic and organic retreat project at Varanashi Organic Farms which extends for about 100 Acres over two properties.

The cottages are planned organically along the site, maintaining and protecting the contours and existing vegetation around it.

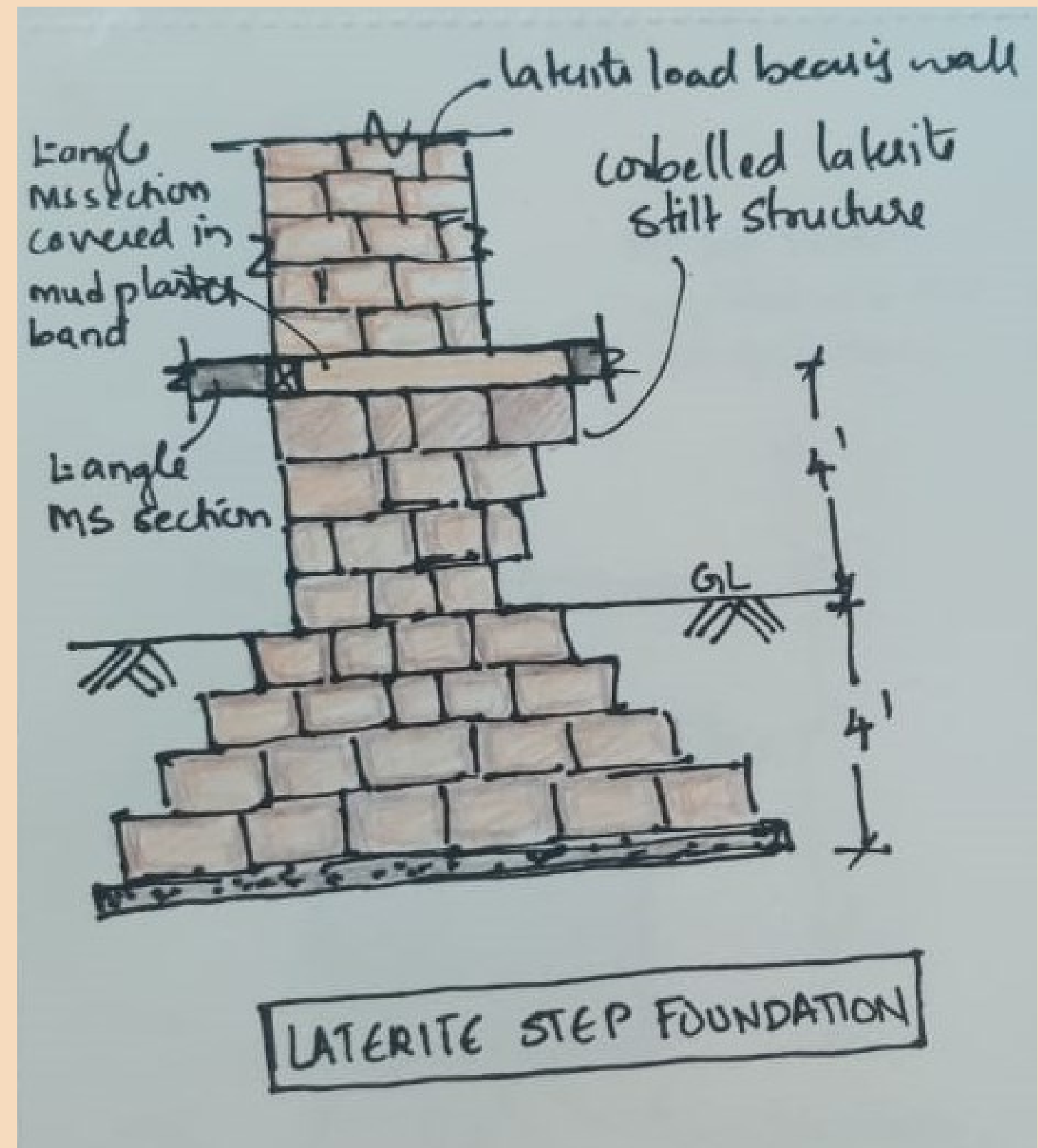
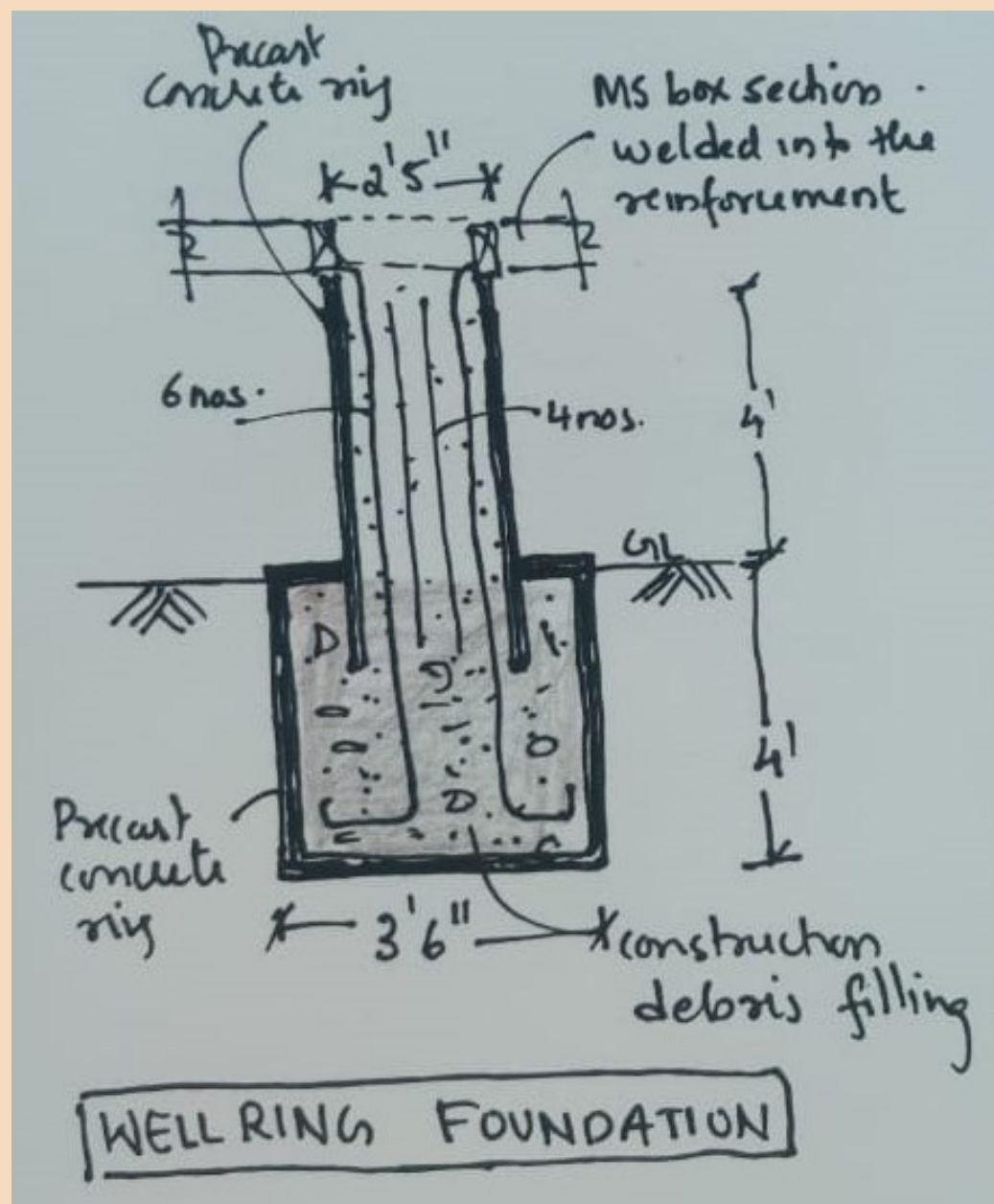


Each cottage is around 250-300 sqft, with a living and bed area, toilet, workstation and shelves for storage.



Foundation

Laterite step foundation takes the major role along with precast ring-well foundation in between, both going 4 feet below the ground.



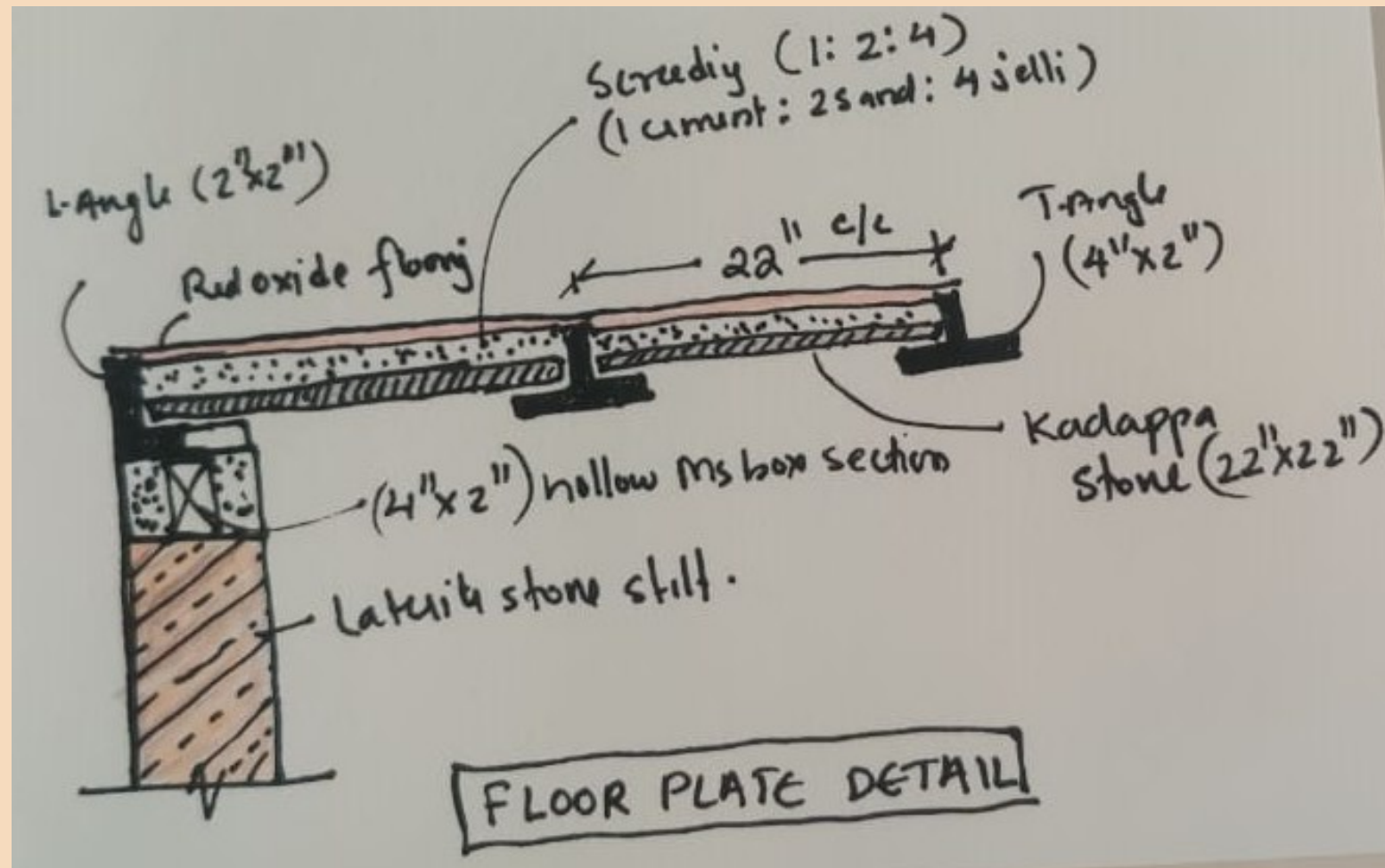
Plinth and stilt structure

The cottages are placed 4 feet above the ground on corbelled laterite stilts and well ring stilts allowing free movement for the animals and plants to grow.



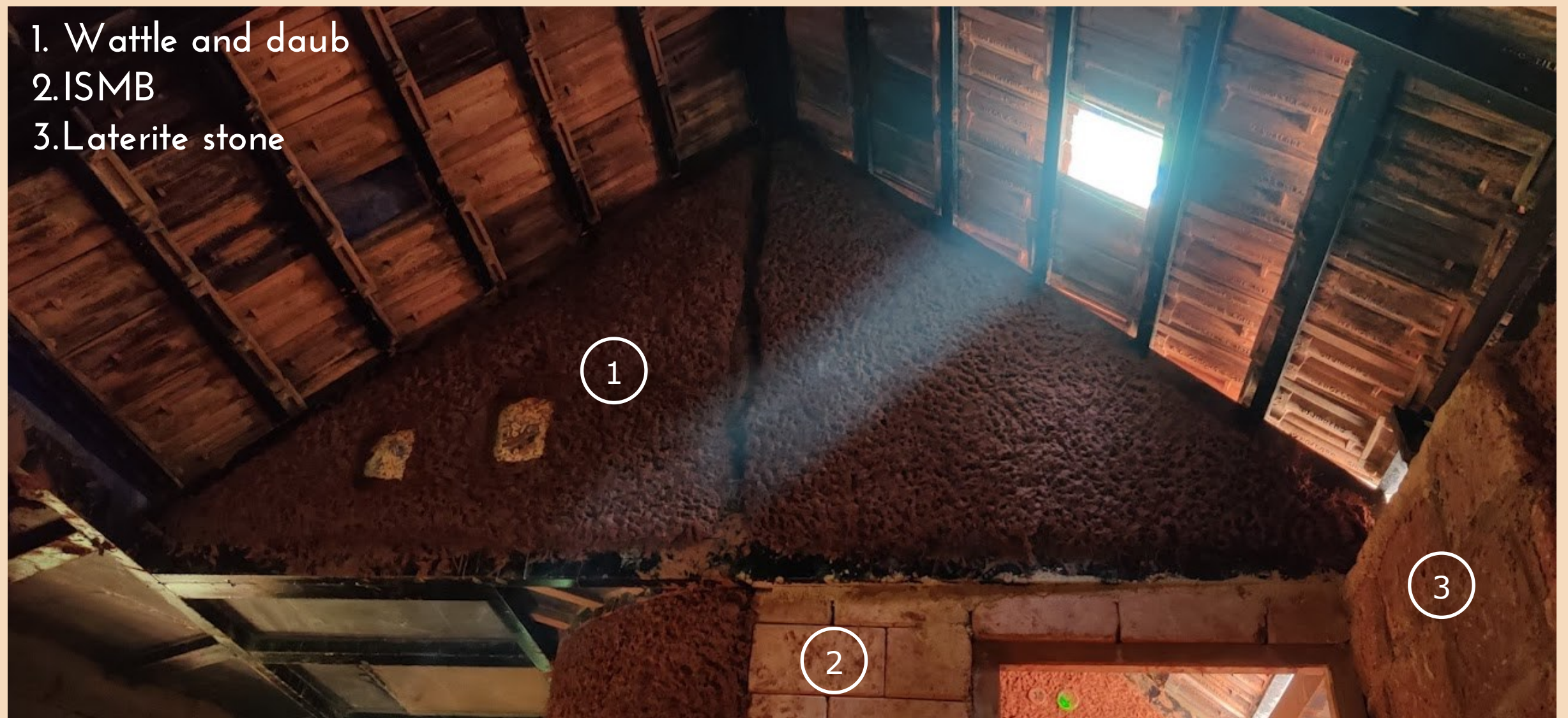
Floor plate

Kadappa stones rest on L and T angles supported by steel members in between.



Superstructure

Super structure is a load bearing structure of laterite stone, ISMB, and wattle and daub walls with reclaimed Mangalore tile sloping roof windows and door frames.



Wall

Laterite wall

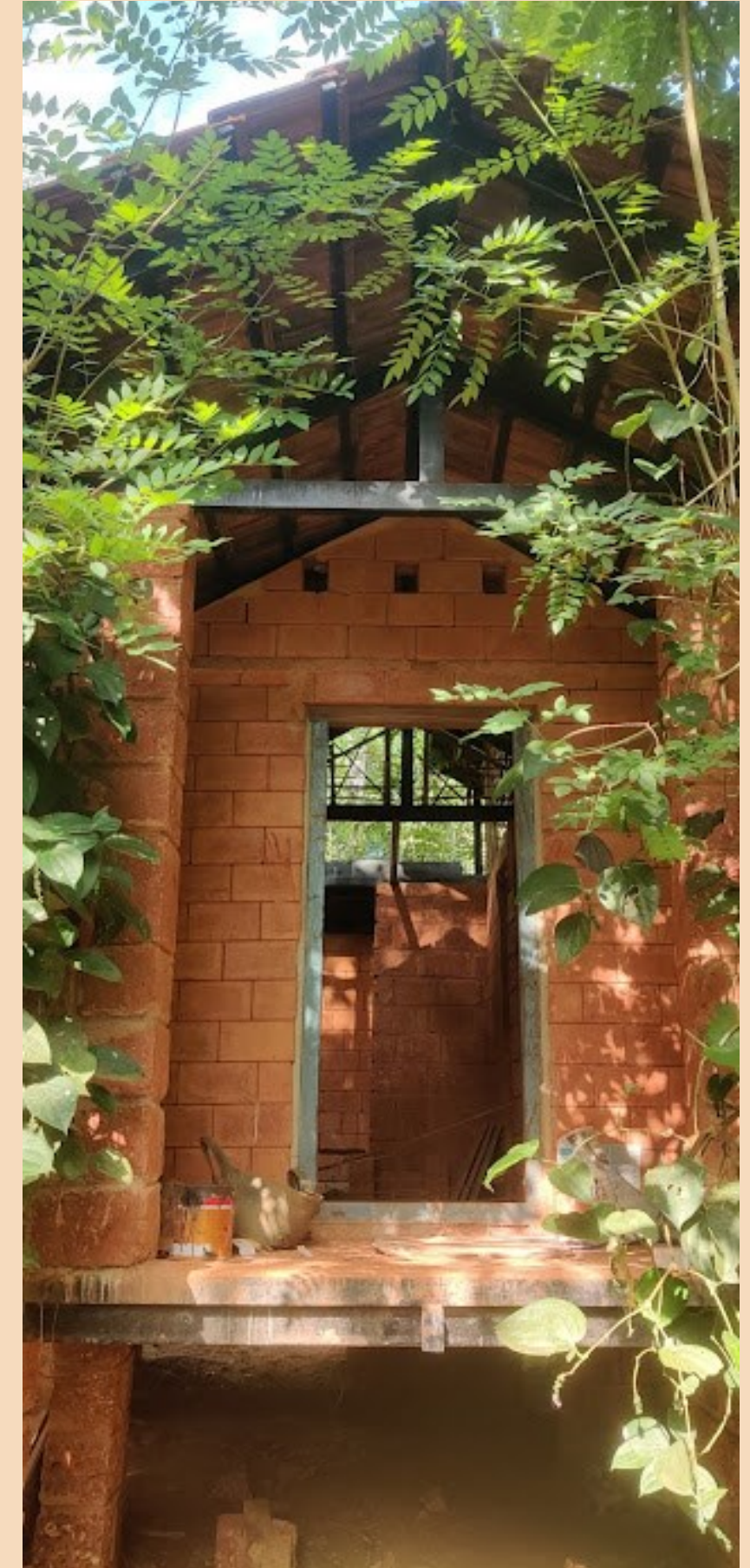
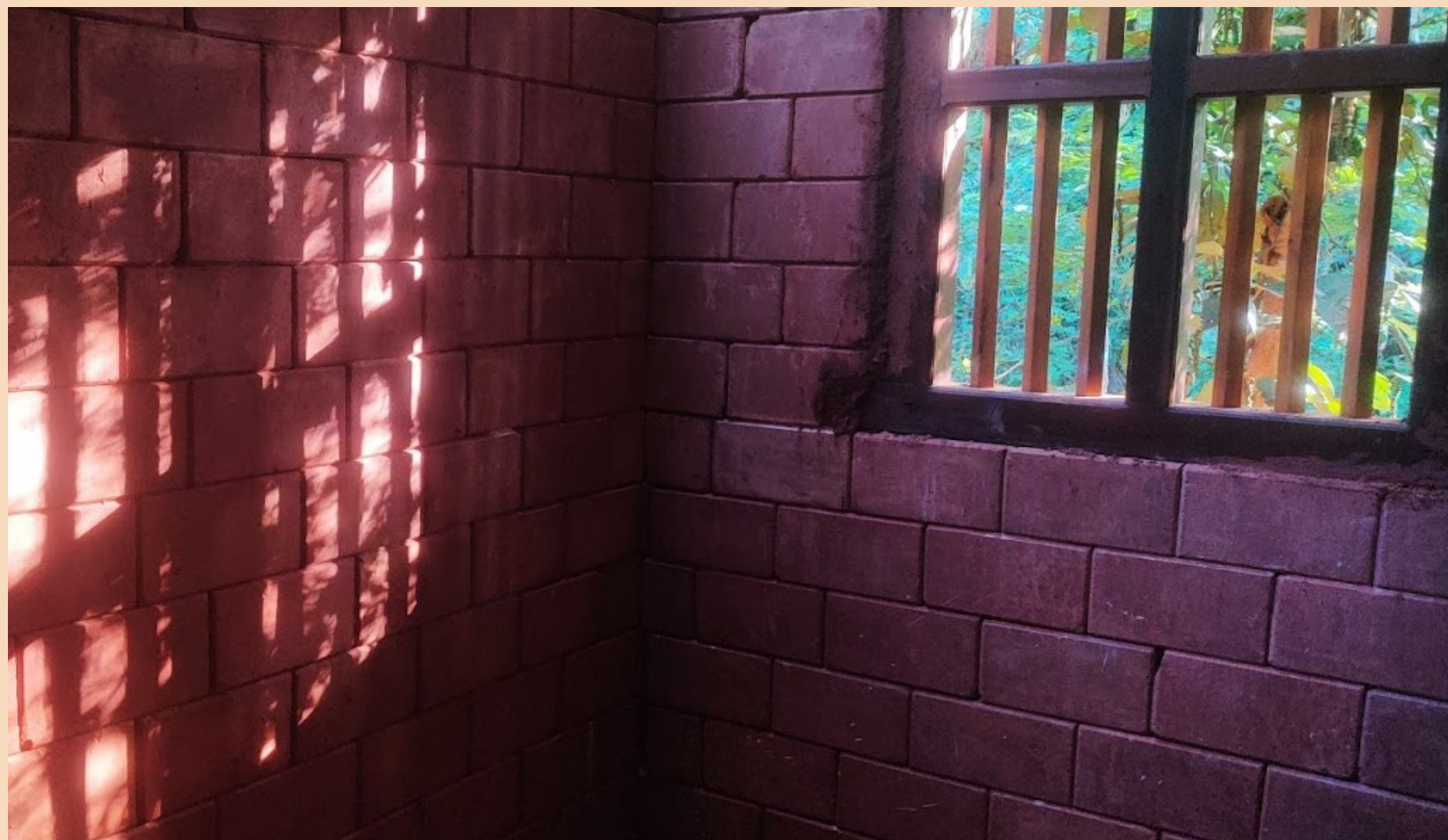
1'x8"x8" Laterite stone walls are the load bearing wall throughout the structures.



Wall

ISMB

1'x6"x6" Interlocking stabilized mud bricks cover up the rest of the structure and forms the partition wall.



Wall

Wattle and daub

Wattle and daub cover up the above area over the laterite and ISMB walls till the roof structure and few portions of the walls.

Wattle and daub is a composite building technique that consists of a woven lattice (the 'wattle') (here: bamboo reinforcement) which is daubed with a sticky filler material (here: mud mix).



Reinforcement (Wattle)

Bamboo

In order to minimize the cracking and decay of the bamboo reinforcement, and to maximize the life of the wattle, bamboo is chemically treated by soaking it in boric borax for several days.

Other ways to cure bamboo is by natural methods, involving heat or saltwater. Without proper seasoning of the bamboo, the material is vulnerable to fungus and insects. Also, the poles often crack because of fluctuations in temperature and humidity that can occur seasonally.

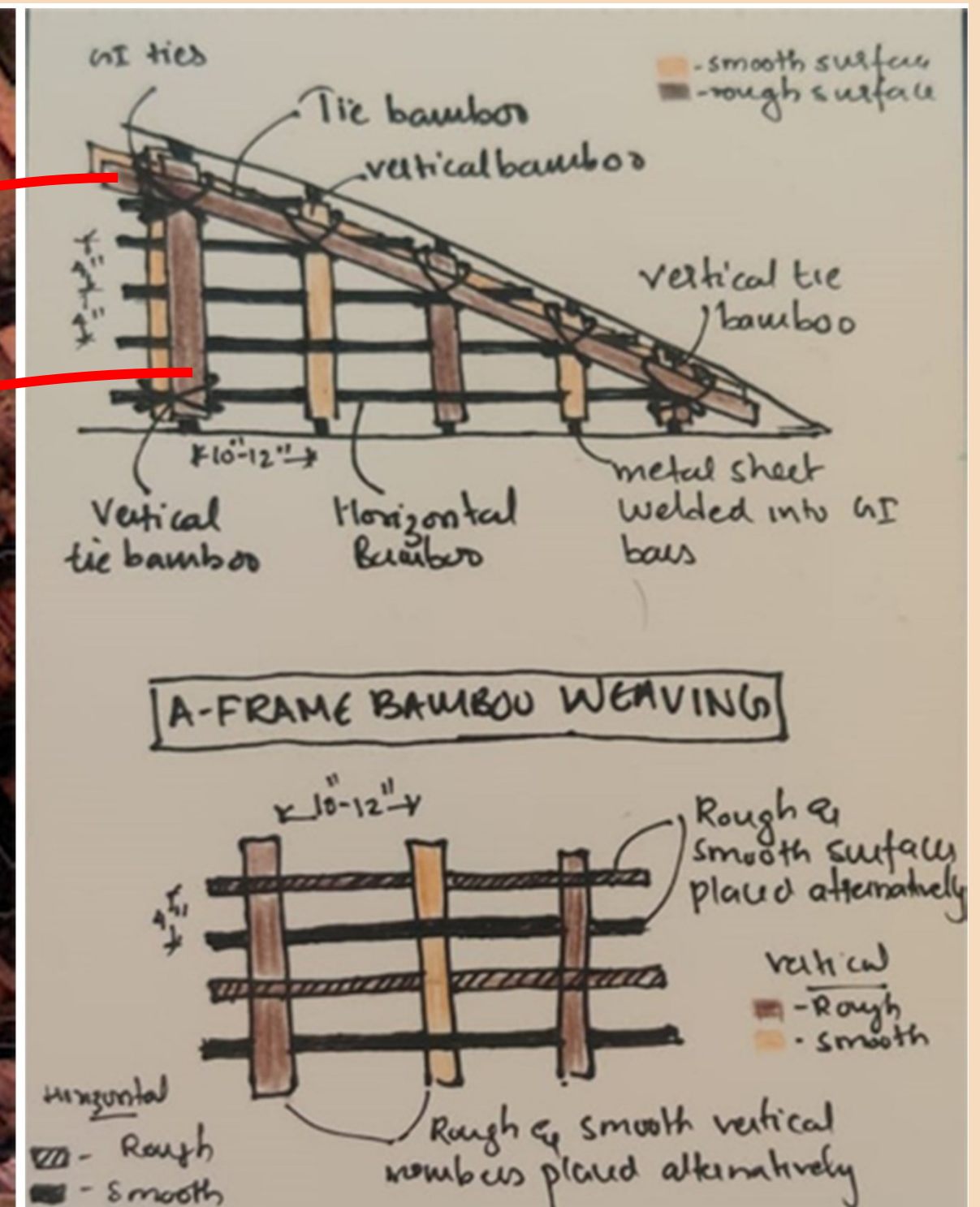
A pre-mixed powder blend of boric acid and borax, in a 1:1.5 ratio is spread in water and bamboo is soaked in for a week. It's sun dried for a week and stored in shade.



There are three parts in bamboo reinforcement. Tie bamboo, Vertical and Horizontal members.

1.5"-2" wide bamboo is used for the tie beams and vertical members.

Horizontal members have width less than 1"



Bamboo weaving pattern

There are different weaving patterns depending on the complexity of the frames.

Vertical members are placed at a distance of 10" to 1' spacing and horizontal members at a distance of 4"

Rough and smooth side are placed alternatively in both vertical and horizontal members allowing friction to hold it together.

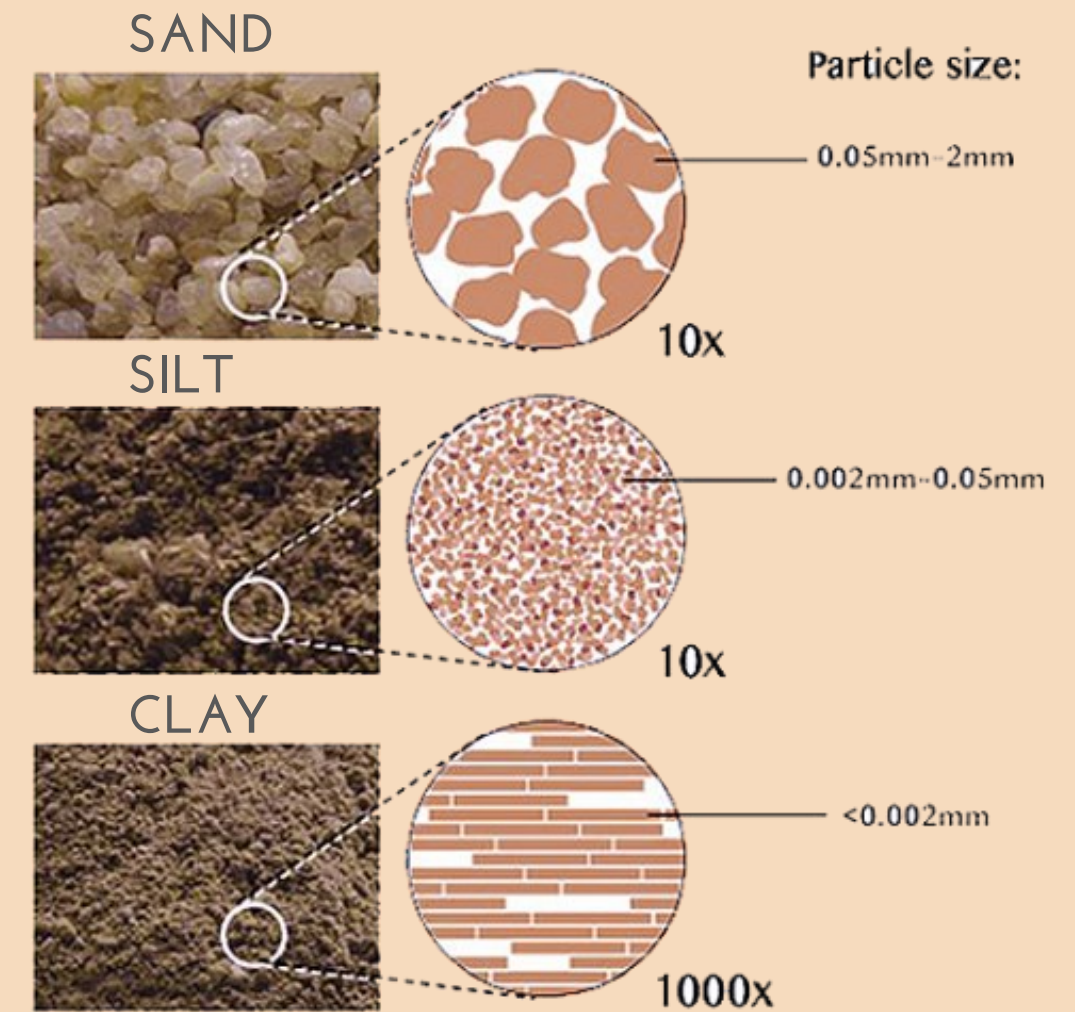
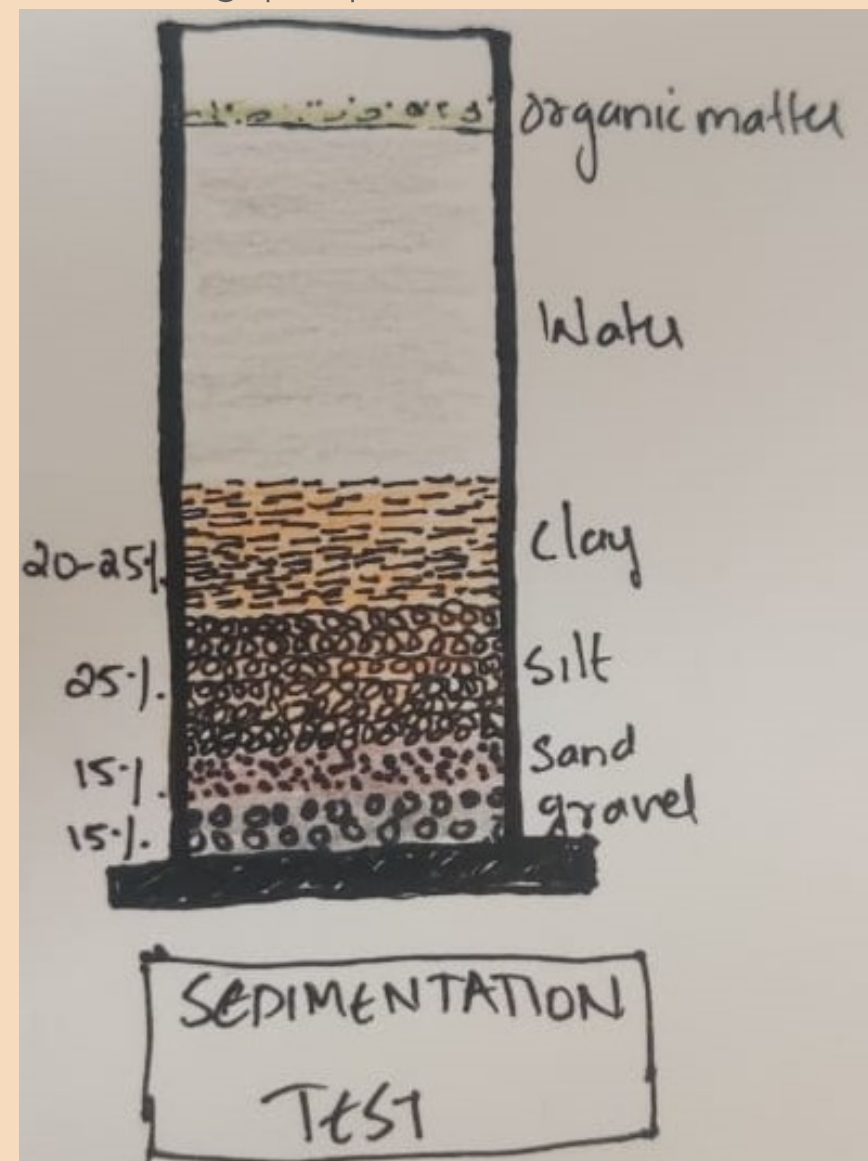


Daub

Mud

Any type of soil has the following content and the proportion of each determines the property of the soil.

A good mix of soil for construction has the following proportion of elements.



Sedimentation test

100g of soil is mixed in 1l of water and shaken vigorously until mixed well and kept overnight.

CLAY - 20-25%
 SILT - 25%
 SAND - 15%
 GRAVEL - 15%

On-site quick test

Cigar test

Soiled mixed with water is rolled into form a cigar shape.

If the roll breaks at 4" length, it's a good mix.

If it breaks before reaching 4" length, it has more silt content.

If it stays beyond 4" without breaking, then it has more clay content.



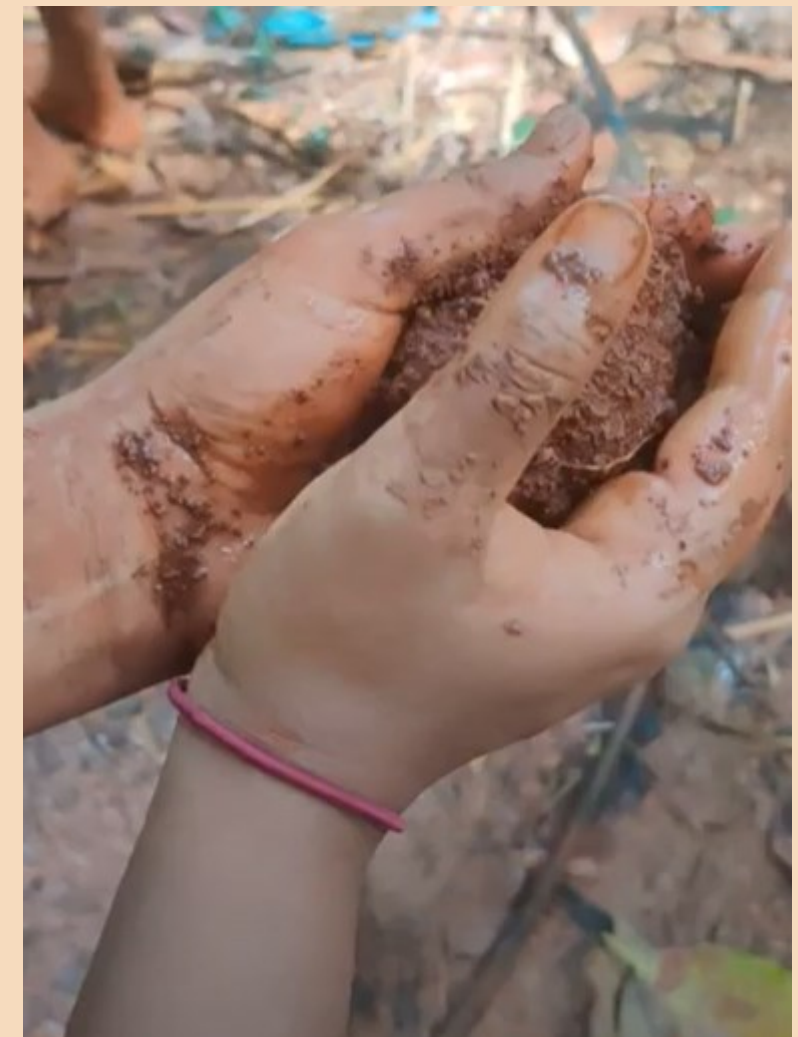
Drop test

Soil mixed with water is made into a lump and dropped to the ground from shoulder height.

If there are minimal cracks, it's a good mix.

If there are a lot of cracks, it has more silt content.

If there's no crack at all, it has more clay content.



Hand wash test

Mix soil with water and spread across the hands and wash off.

If it washes off too soon, it has more silt. If it sticks to the hand and takes a lot of effort to wash off, then it has more clay. If it sticks to the hand but washes off, it's a good mix.

The selected desired mud is stamped and mixed with baked and powdered sea shell lime in the ratio of 1:10 (1lime:10sand) for stabilization and kept for fermenting for 1 week.

After 1 week the desired amount of mud mix is taken and stamped and mixed with coir to make the daub.



1:1 ratio of the mud mix is mixed with the coir.



Desired quantity of
mud is taken



One butte of coir is
evenly spread over
the mud in 2-3
rounds.



After every 5-6 rounds of adding coir and stamping the mud is turned over until the desired texture and consistency is achieved.





The prepared mud is daubed into the bamboo wattle and pressed into it leaving hole like impression. This process is called packing. This helps the mud to dry faster by allowing air through it and hold the mix together strong.



The mud is packed to a thickness of 1.5"-2" on either side from the center of the wattle. A max height of 2' is packed in a day.

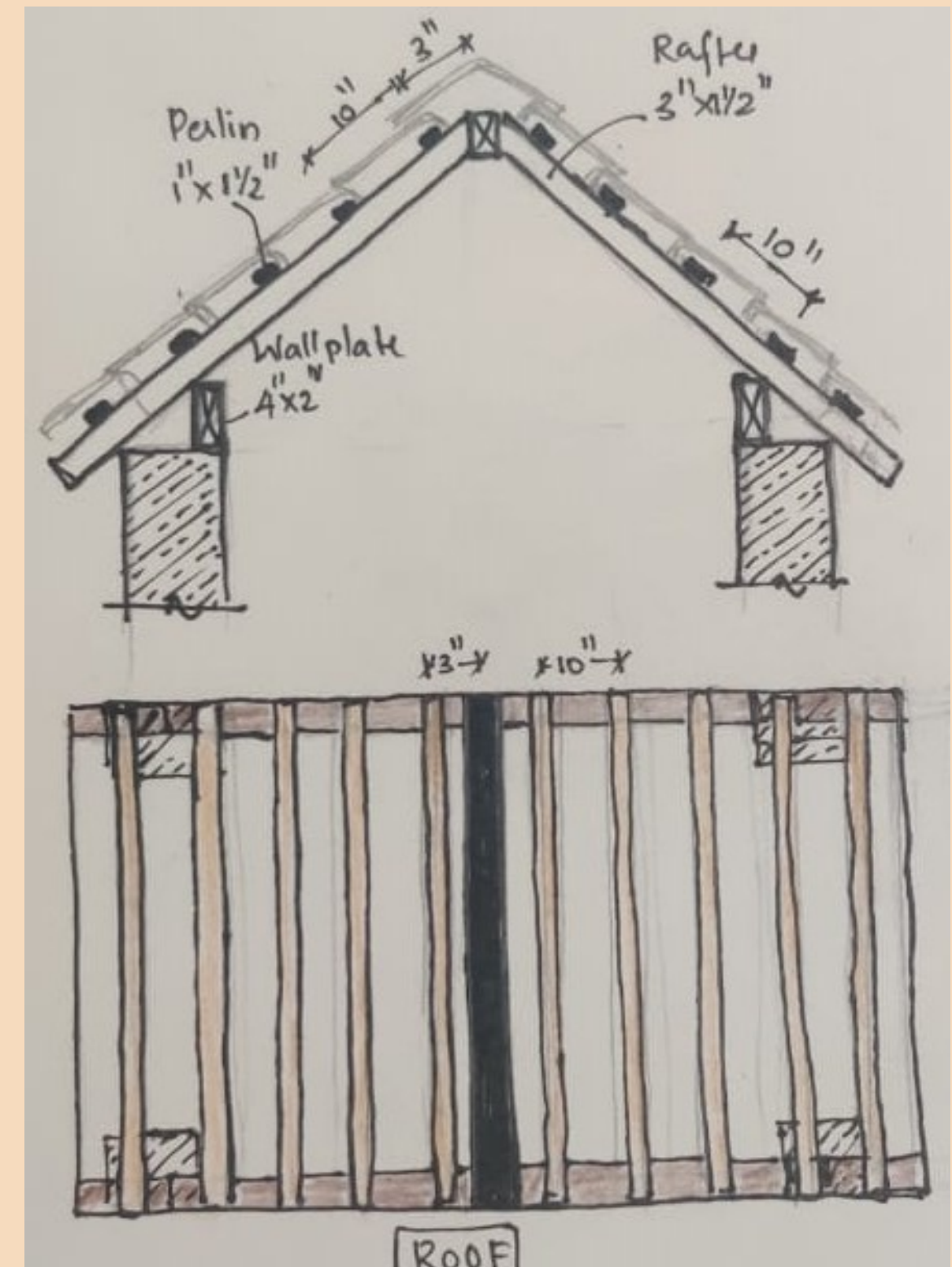
Patching and scraping is done where desired thickness is not attained.

It takes almost 1 year for the wall to dry fully.



Roof

Roof fabrication is done in GI box sections with reclaimed Mangalore tiles. Clear glass tiles are used in some places for natural light.



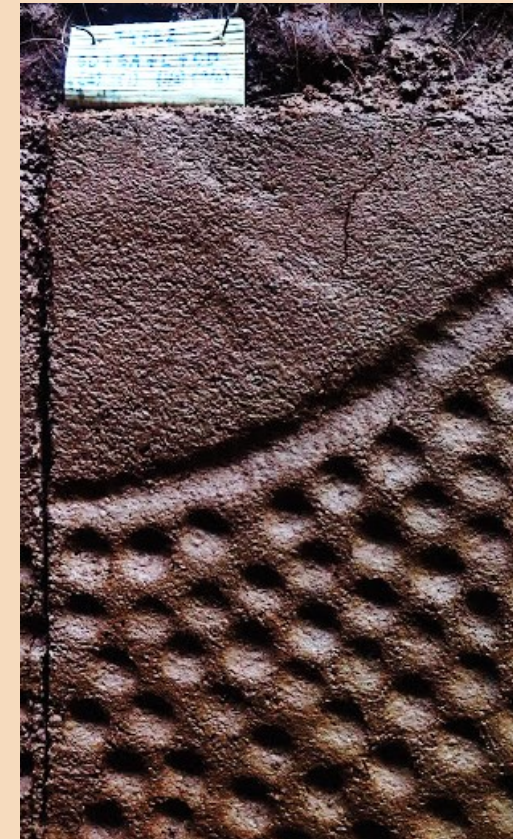
Plaster



2soil+1/2sand+1/2cd



2soil+1sand+3/4cd+1/2lime



1 1/2soil+1sand+1/2rha+1/2lime



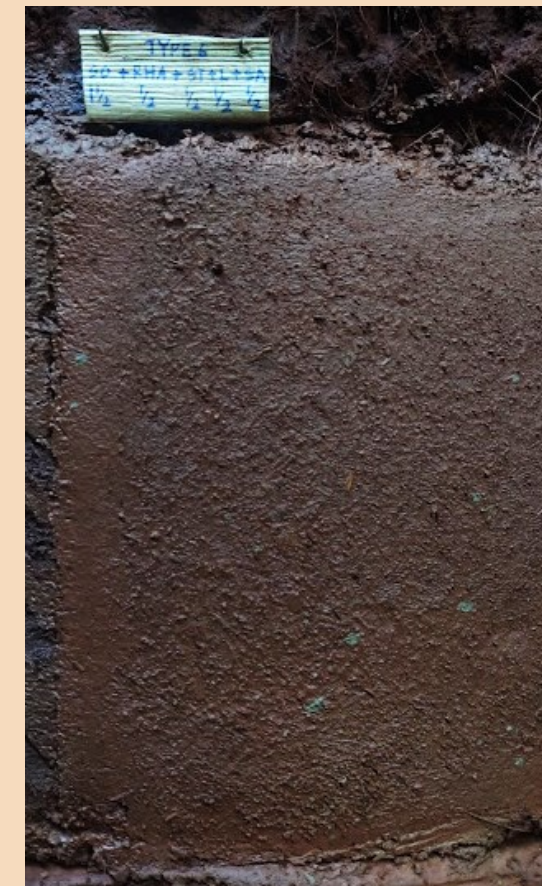
1 1/2soil+1/2sand+1/2cd+1/2rha



1soil+1sand+1rha+1/4lime



1 1/2soil+1/2sand+1/2rha+1/2straw



$\frac{1}{6}$ soil+1sand+ $\frac{3}{4}$ lime



$\frac{1}{2}$ sand+ $\frac{1}{2}$ lime+1rha



1soil+1sand+ $\frac{1}{3}$ lime+ $\frac{1}{2}$ rh+ $\frac{1}{2}$ cd



1soil+1sand+ $\frac{1}{3}$ lime+ $\frac{1}{4}$ rh+ $\frac{1}{2}$ straw



Tools

Tools used for mud mixing and packing and wall sculptures.

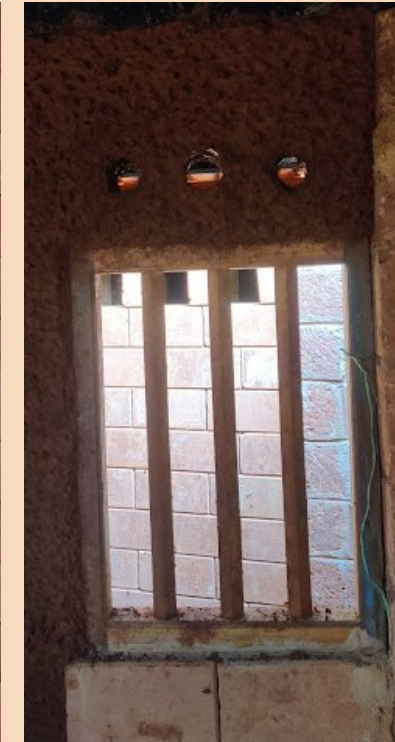
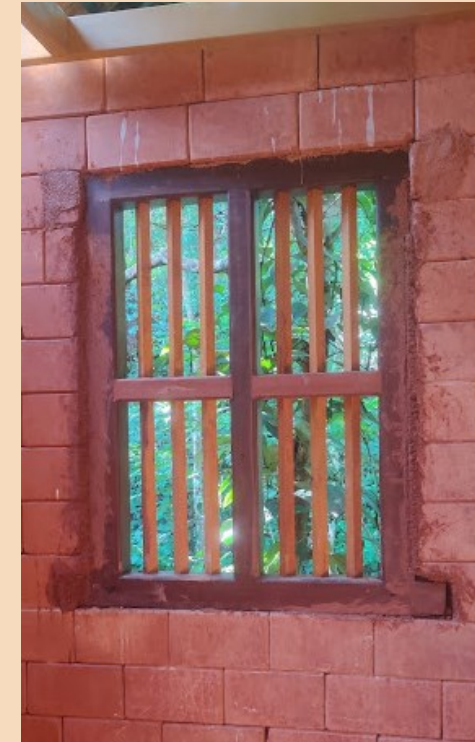


Tools used for bamboo splitting and weaving



Joinery

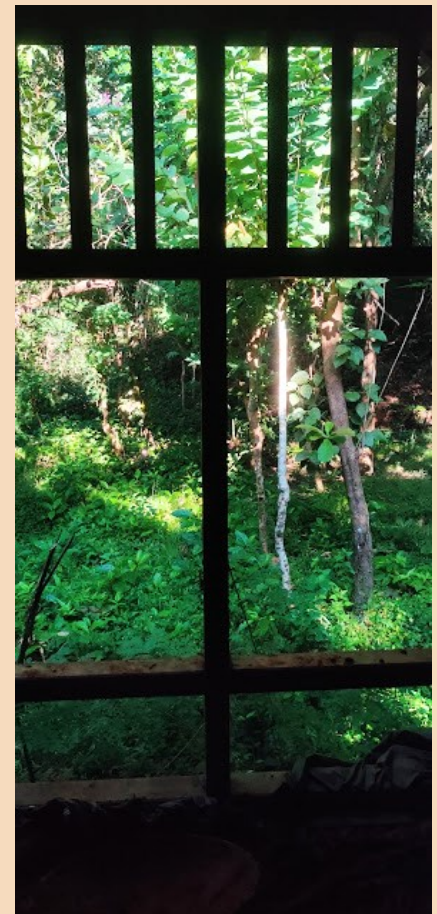
Windows



Reclaimed windows are welded into GI frames above the lintel level.

Windows on the GL are drilled into the walls.





Filler glass on walls and frames



Glasses are either kept fully or cut using fire and taped together and kept inside the walls to attain desired design.