

# low cost design strategies and communication



**WORKSHOP** for archi-students  
respect, adaptation, sustainability, community, affordability  
flexibility, quality, commitment  
4/2016



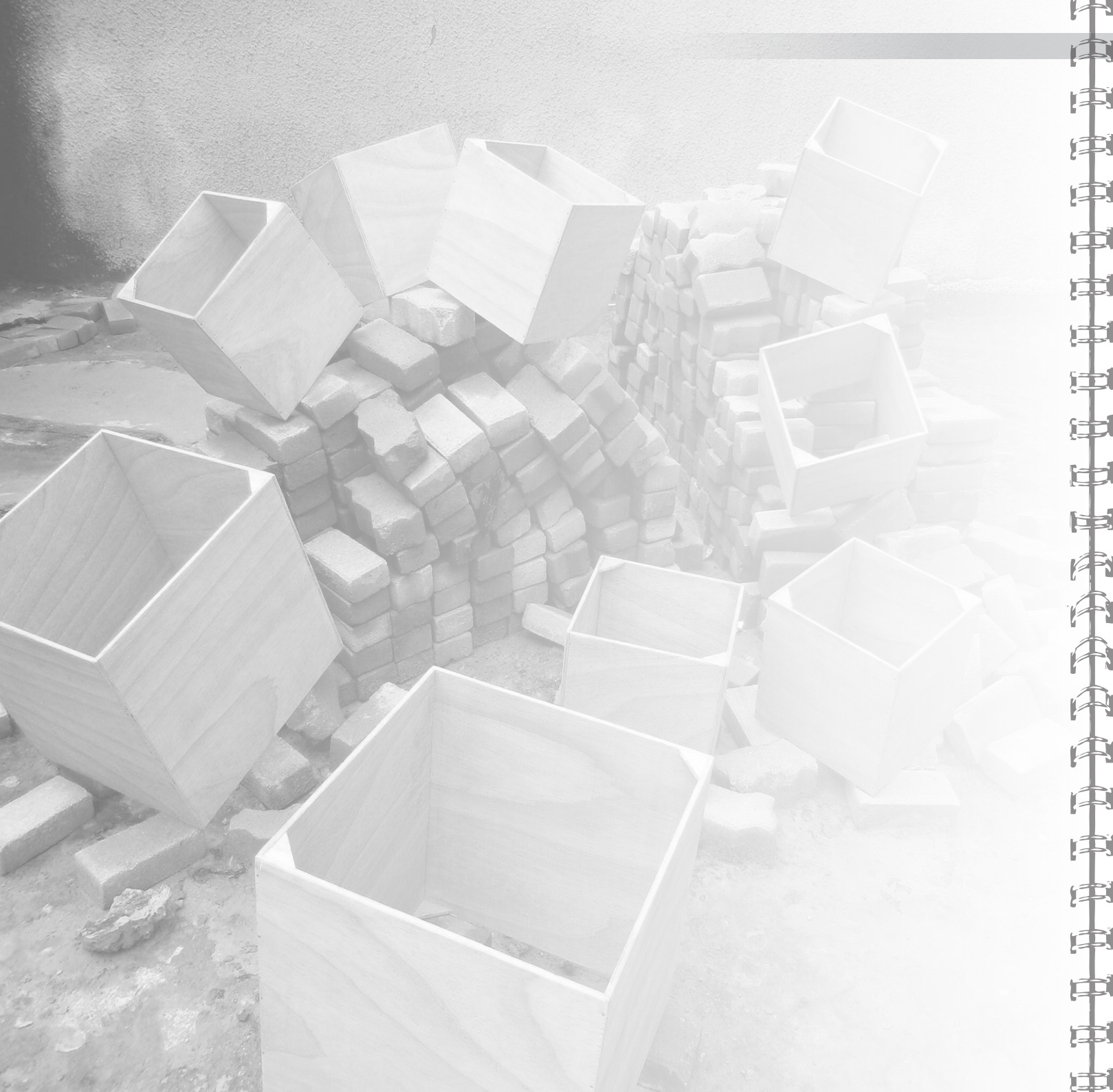


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The workshop “Low Cost Design Strategies and Communication” is continuation of successful workshop long-term collaboration between The Ethiopian Institute of Technology in Mekelle, School of Architecture and Urban Planning and architectural studio Jakub Cigler Architekti - JCA. Exactly with its division for sustainable architecture within human commitment unlimitedJCA.

One of the goals of unlimitedJCA is to support architectural education and urban public space through various workshops and trainings. The collaboration started in 2013 and since that time we have merged skills and capacities to organise student workshops regularly. The goal is to enable students think out of the box, find alternatives and be comfortable with design in real conditions.

Particular objectives are to support creativity, innovation and the emergence of dynamic low-cost design and sustainable design sectors, to transform the existing potential in a decent and appropriate way, to question the roles of actors and to review its distribution, to evaluate the accessibility and availability of the design, to find ways how to perceive, understand and deal with local wealth and people's needs, how to activate remoted areas, hidden spots, how to attract the people to care about it, how to think progressively and SUSTAINABLY, how to contribute to the DEVELOPMENT, how to respond to the aspiration of people...

All this with regards how to use local, primary and secondary materials - how to recycle and regenerate materials, how to make the users feel the ownership of the site, how to find focal points of public attention.





The Ethiopian Institute of Technology in Mekelle is part of The Mekelle University that has short but complex history. The city of Mekelle is situated in northwestern Tigray region, in the region rich in cultural and architectural heritage. The Institute offers various programmes – architecture and urban planning among them.

The contact initiation intended to diversify inputs for the architectural research led with other partners. When got known each other we have decided to cooperate directly on academic level.

In 2013, there was a 7week long workshop called “Think globally, act locally” for a hundred of 4<sup>th</sup> year architecture students. The workshop aimed to find sustainable ways how to design schools and educational buildings, how to contribute to the development....

In 2014, there were two workshops on public space focused on “forgotten” aspects of open spaces in condominiums and concerned product design of condominium furniture...

Year 2015 was devoted to the development of workshop content in the field of project implementation and heritage preservation

In 2016, the diversification of the workshop portfolio continues with the course about Low Cost Design Strategies.



Reflecting on the sustainability of worldwide architecture and the good quality design accessibility has brought Jakub Cigler Architekti, a.s., to found unlimitedJCA, new department of the studio. Considering that architecture and design itself is more than a drawing we say that if design works, it promotes development. The inspiring environment is the background for the progress. When the basic needs are fulfilled, people search for the motivation and further stimulus.

The globalization has brought indifference to sites, traditions, cultures and to the effect on people's lives. Many designs ignore the climate and local particularities, which creates the worldwide energy problem. The architecture doesn't have any common language, it shouldn't be simplified, and in contrary it should consider each project individually with respect to vernacular aspects.

It brings us to

- ::: to assist to identify **S U S T A I N A B L E** architectural principles
- ::: to assist to create a friendly **P U B L I C** space for everybody
- ::: to raise public **A W A R E N E S S** about public space, architecture and design
- ::: to interconnect humanitarian, academic and private sector – multi-stakeholder **P A R T N E R S H I P**
- ::: multi-disciplinary **E X C H A N G E** between architects and other professionals and stakeholders
- ::: to promote **N E W** technologies and ideas in architectural design while **R E S P E C T I N G** the specificity of a community
- ::: to promote architectural **E D U C A T I O N** and to facilitate exchange among architects, students and teachers of architecture worldwide
- ::: to promote **P R E S E R V A T I O N** of the international architectural and cultural **H E R I T A G E**



The workshop is demand-driven project based on identification of needs of the faculty. It is a complement of the course **Arch 5422 Low-cost strategies in design** for 5th year students in the Program B.Sc. in Architecture

Course Objectives & Competences to be acquired:  
The aim of the course is to teach and train lowcost strategies in design. Students shall be able to adopt low-cost strategies in their design projects based on international and Ethiopian expert knowledge. Special consideration is given to the field of low cost design in rural areas because School of Architecture and Urban Planning in Mekelle participates in international research programme on rural communities and their development

The workshop is an intensive and playful approach to explore the issue of the lowcost design, to explore how architectural tools can be used to shape public interest.

The workshop itself was considered like a block course during the spring semester as a major workload of the course “Arch 5422 - Lowcost strategies in design” of the spring semester of the academic year 2015/2016. It was part of the mandatory curricula for all students of 5th year of bachelor program.



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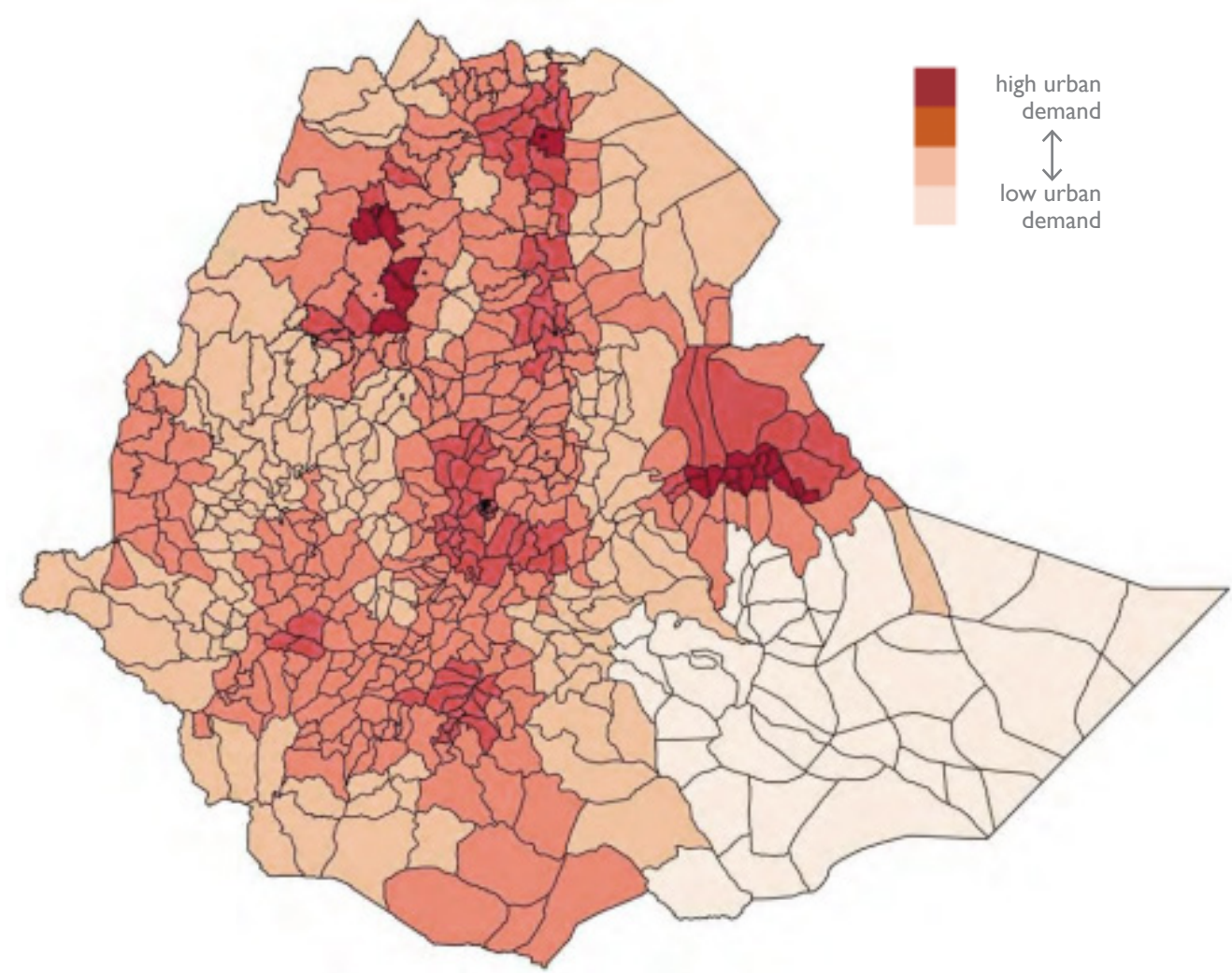


In today's interconnected world, the local identity and cultural heritage is the key aspect of the community confidence and social development, however the challenge is still time and money. The aim of the workshop is to teach and train lowcost strategies in design. Students shall be able to adopt low-cost strategies in their design projects based on international and Ethiopian expert knowledge. Special consideration was given to the field of low cost design in rural area and community involvement.

In workshop "Low Cost Design and Communication", we led a discussion about implications of all formal and informal ideas and stakeholders in a design intervention.

The course put special emphasis to Ethiopian rural context cost minimization, affordability, replicability, material selection, flexibility, effective construction technologies. The world is convinced that no development can be sustainable without a strong and valid design component.

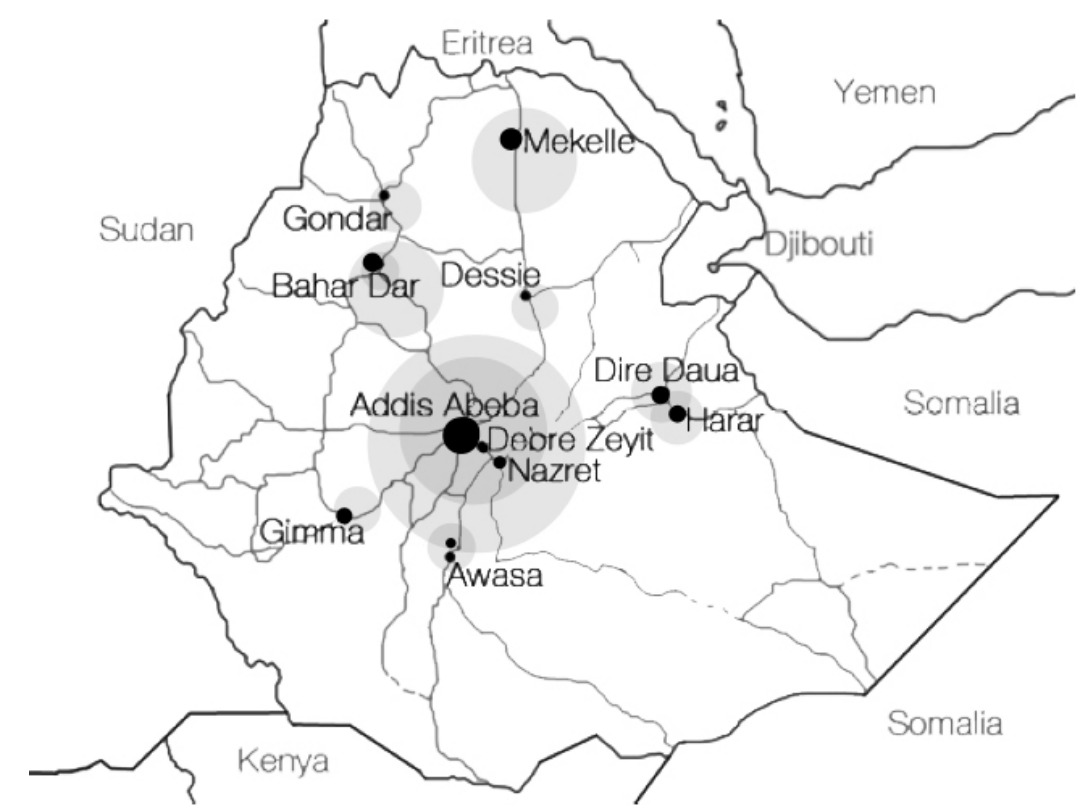




\* Composite map of 35 weighted datasets showing areas where URBAN DEMAND and physical suitability is high  
Source: *Unlocking the Power of Ethiopia's Cities*  
A report by Ethiopia's New Climate Economy Partnership, 02/2015

# POWER OF THE CITIES IN ETHIOPIA

## BASED ON NEW CLIMATE ECONOMY



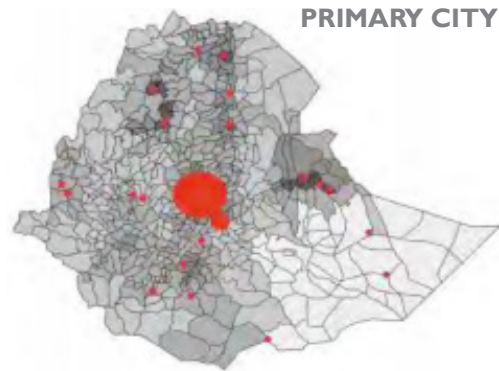
Ethiopia was under-urbanized, even by African standards. Special attention concerns communities with 2,000 to 5,000 people, because they are primarily extensions of rural villages without urban or administrative functions. Ethiopia's relative lack of urbanization is the result of the country's history of agricultural self-sufficiency, which has reinforced rural peasant life.

Urbanization:  
urban population: 17% of total population (2011)  
rate of urbanization: 3.57% annual rate of change (2010-15 est.)  
Source: CIA World Factbook updated on June 30, 2015



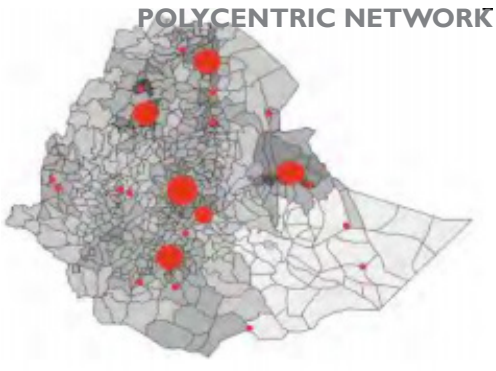
ALTERNATIVE SCENARIOS IN ETHIOPIA

SPATIAL GROWTH MEETS  
ECONOMY



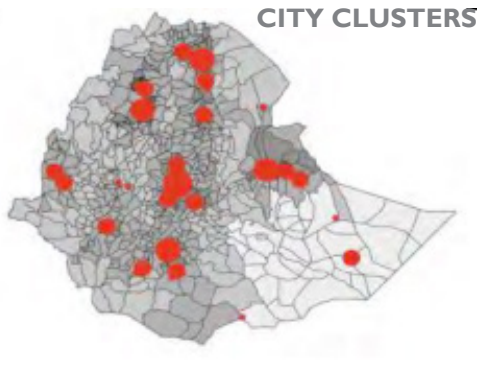
Addis Ababa continues to grow into a dynamic, multi-functional and cosmopolitan megacity. The GTP is still delivered but largely driven by industry and services based in Addis Ababa, as well as foreign investment directed into the city and special economic zones surrounding it. Addis Ababa is seen as an international city and an attractive place to do business. It delivers all the national political and administrative functions and is home to internationally renowned universities and education. There is a high level of pull migration from rural Ethiopia into Addis Ababa and regional income disparities become more pronounced.

Source: *Unlocking the Power of Ethiopia's Cities*  
A report by Ethiopia's New Climate Economy Partnership, 02/2015



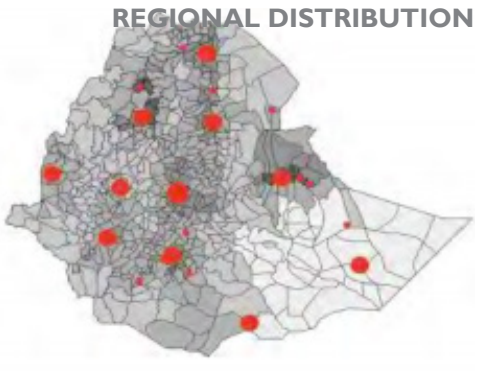
A network of regional secondary cities emerges to support Addis Ababa. Addis Ababa retains national political and administrative duties and remains the largest urban area in the country, but the other cities appear as dynamic and growing cities on the international scene. These cities are relatively diverse - some more focused on a specific sector or industry - but all drive a substantial portion of the country's GTP and economic growth. These cities build a strong domestic market in Ethiopia and encourage broader development across the country. SMEs and microenterprises become more engaged and active in these cities and urban-rural linkages are strong.

Source: *Unlocking the Power of Ethiopia's Cities*  
A report by Ethiopia's New Climate Economy Partnership, 02/2015



Large and dynamic metropolitan areas develop in two clusters: one in central Ethiopia around Addis Ababa and one in the north of the country. The Addis Ababa cluster is more service focused, e.g. finance and banking services, IT and communication services. This cluster also retains national, political and administrative functions within Addis Ababa and is seen as the more international hub. The northern cluster is more industry intensive, focused on natural resource extractive industries and processing for export trade growth. Transport infrastructure in the regional areas around these hubs is good and the two clusters are connected by reliable and quick rail and road networks.

Source: *Unlocking the Power of Ethiopia's Cities*  
A report by Ethiopia's New Climate Economy Partnership, 02/2015



Addis Ababa devolves greater power to the regions and regional capitals take on many of the urban functions that Addis Ababa formerly held. Political and administrative functions are delivered by regional cities and industrial and service activity can be found in all these cities. Operating relatively independently of each other, there is limited specialisation with all cities performing similar functions. Economic growth is relatively well balanced throughout Ethiopia, although there are missed opportunities to drive stronger economic growth through specialisation, innovation and economies of scale. SMEs and microenterprises are enabled, but larger foreign investors and companies struggle to take root in these smaller cities.

Source: *Unlocking the Power of Ethiopia's Cities*  
A report by Ethiopia's New Climate Economy Partnership, 02/2015





wheelchair in Kibru hospital  
Hawassa, SNNPR, Ethiopia



residence in Addis Abeba  
arch. Koffi et Diabaté



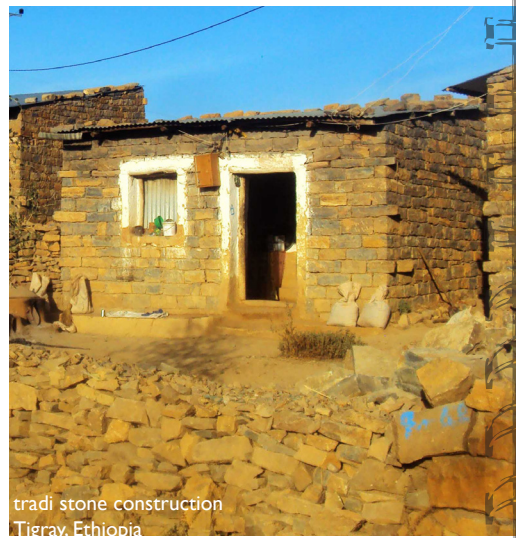
vegetation in Vietnam  
doan than ha arch



windmills  
Ashegoda, Ethiopia



condominium construction  
Addis Abeba, Ethiopia



tradi stone construction  
Tigray, Ethiopia



agricultural seed bank  
Hawassa, Ethiopia



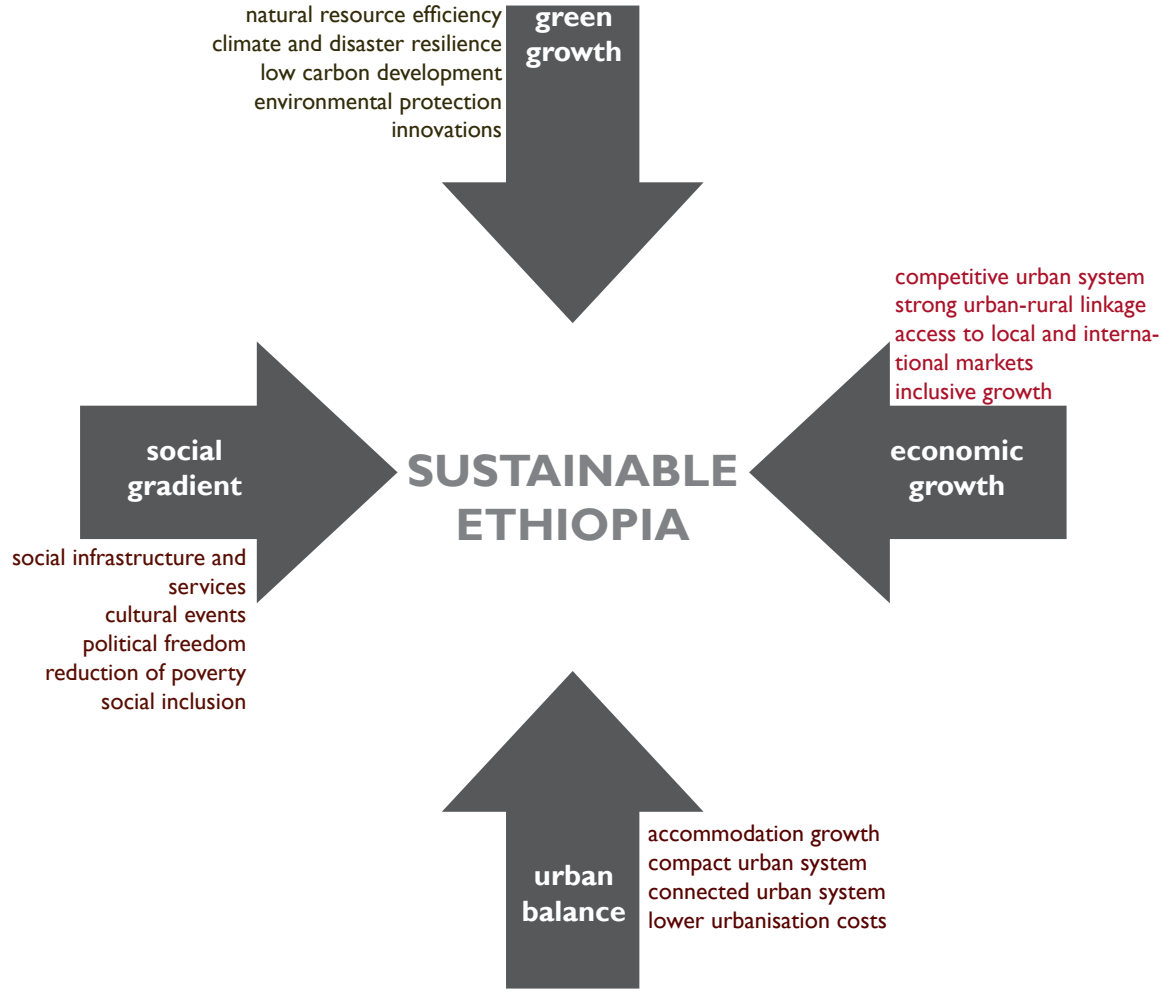
bamboo construction innovation  
Bursa, Sidama, Ethiopia



tradi school in Mohone  
Tigray, Ethiopia

# LOW COST AND SUSTAINABILITY

## MAIN FACTORS



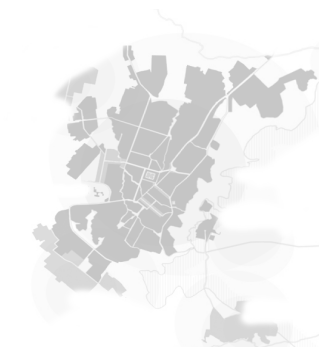




INNOVATION  
DEVELOPMENT  
SUSTAINABILITY  
IMPROVEMENT

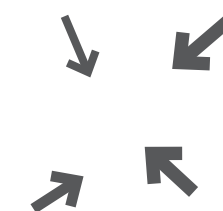


TO CREATE EQUIPMENT, FACILITIES  
AND INFRASTRUCTURE  
FOR SUSTAINABLE COMMUNITIES



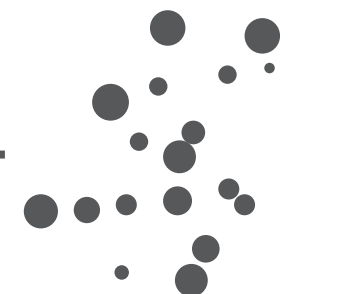
urban/rural  
tissue

+



development  
of  
accessibility

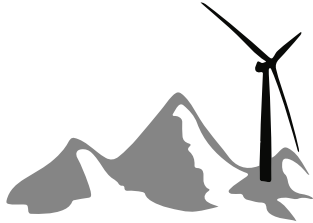
+



INFRASTRUCTURE  
AND  
EQUIPEMENT

SWMS |SUSTAINABLE WATER MANAGEMENT SYSTEM|  
EASIER LIFE.

SUSTAINABLE WATER MANAGEMENT SYSTEM



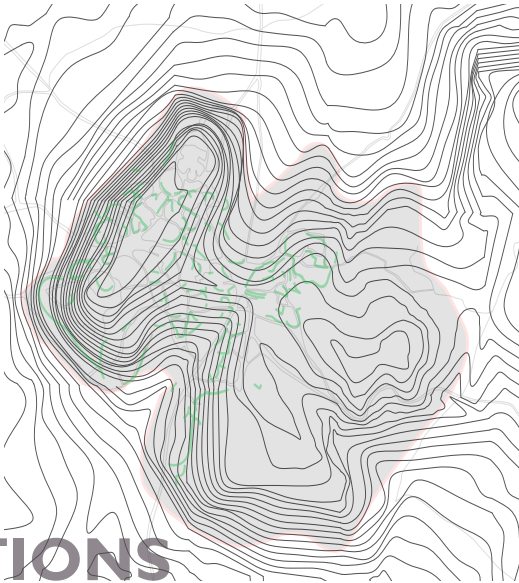
The Project is aimed at the Gamra-meseret region of Endarta, northern Mekelle. The site has huge resource constraint and the local residents have difficulty getting water (40 L per residence). the amount of water required seems small but the distance the women go and the amount of hills and cliffs they have to cross makes it a big issue in there life.

This project aims to give them an “Easier life” by providing water distribution for the entire region and also provide the community with work opportunity and additional income besides farming..



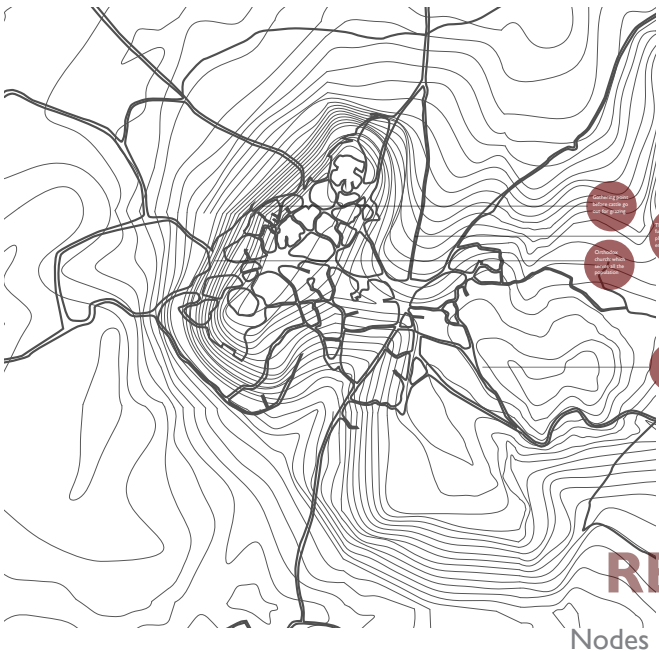


OUTSKIRTS

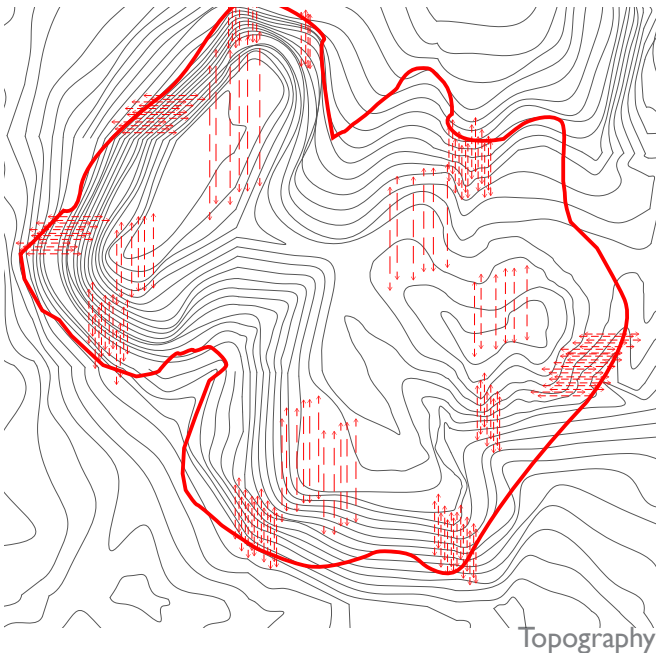


CRITICAL LOCATIONS

LOCAL CONDITIONS  
APPROPRIATE LOCATION



1896  
RESIDENTS

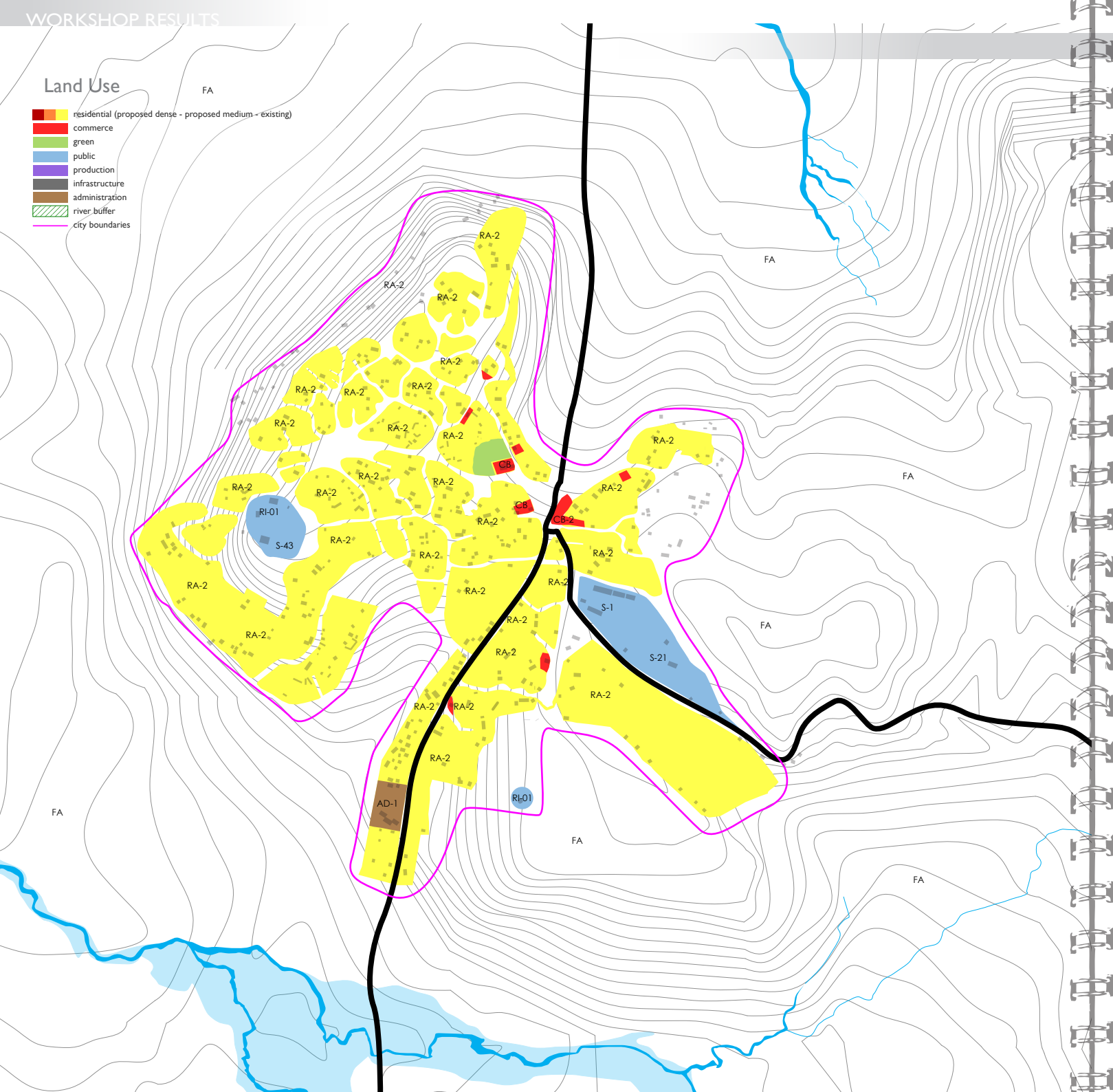


DRAINAGE  
DIRECTION

FINDINGS  
The village has an advantage of high winds which can be used as a source of alternative energy as the village has electric power. And the villagers have settled on the hillside which has left the flat lands for agriculture. The high grounds have high points and low points with a difference of 20 meters.

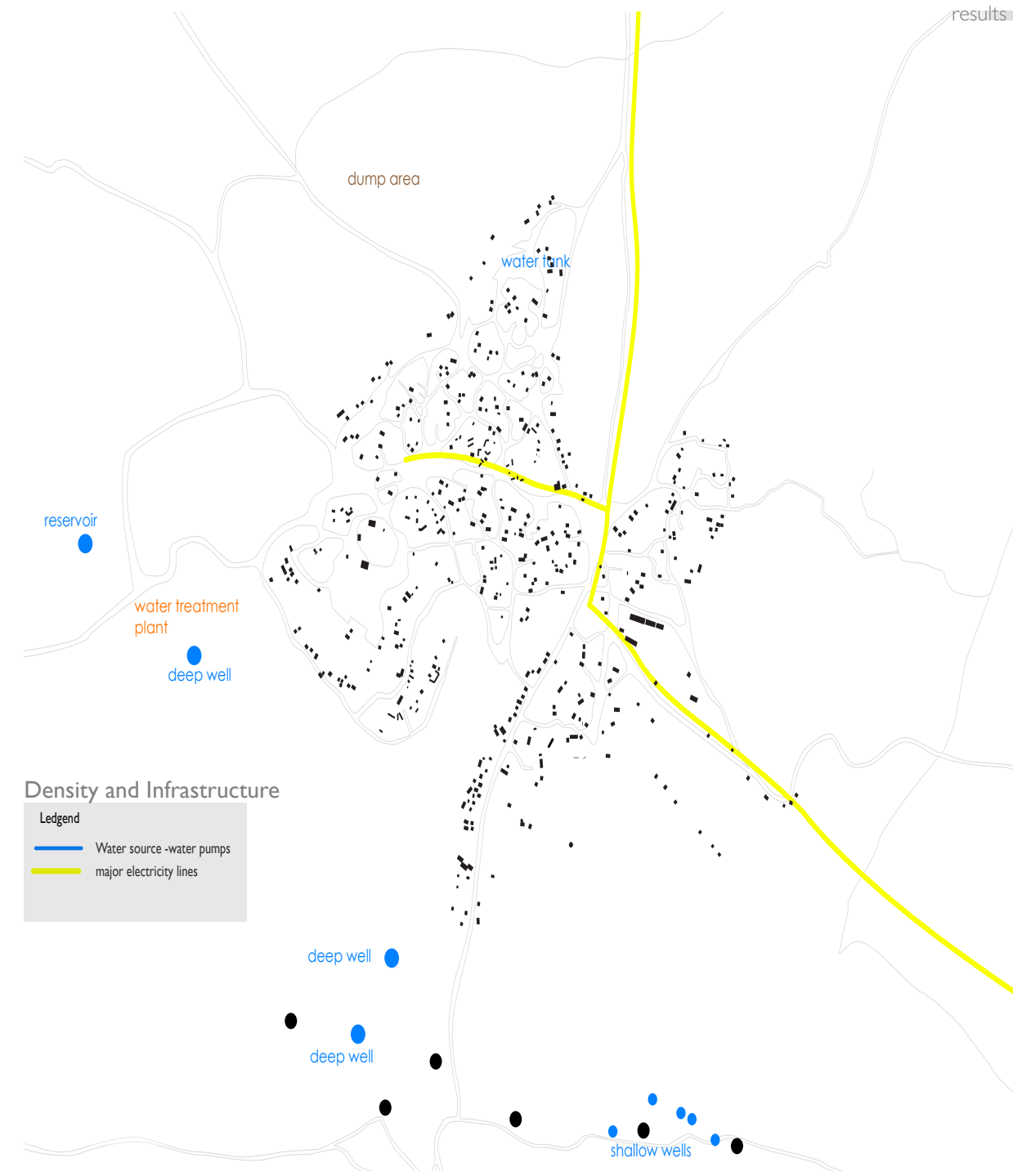
Land Use

- residential (proposed dense - proposed medium - existing)
- commerce
- green
- public
- production
- infrastructure
- administration
- river buffer
- city boundaries



# LOCAL CONDITIONS

results







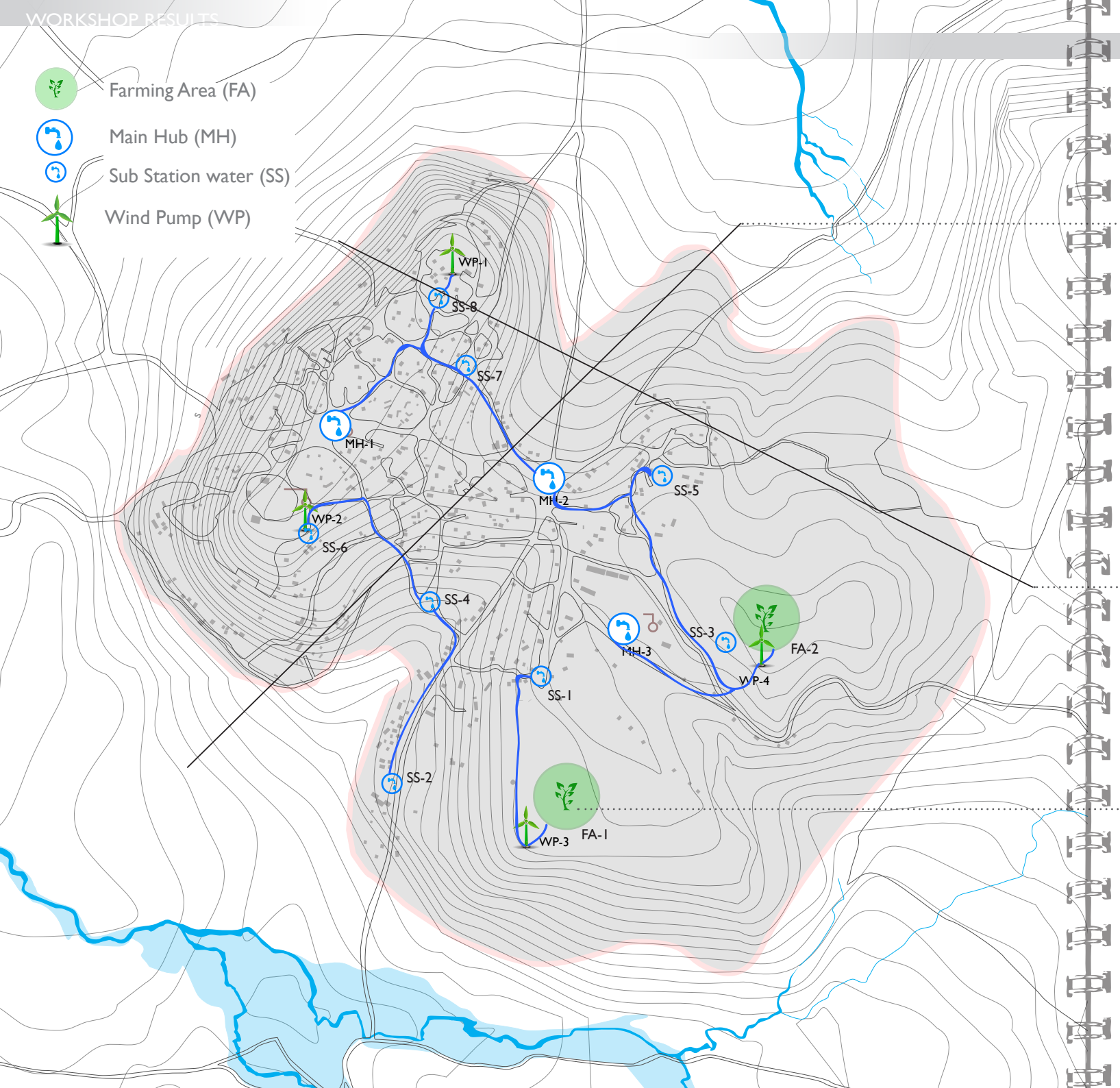
Density and Infrastructure

Ledgend

- Water source - water pumps
- major electricity lines



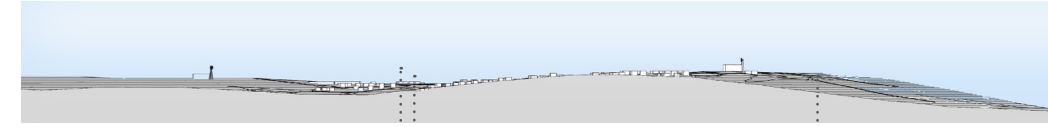
-  Farming Area (FA)
-  Main Hub (MH)
-  Sub Station water (SS)
-  Wind Pump (WP)



## PROPOSAL FOR THE SWMS DISTRIBUTION

# SUSTAINABLE WATER MANAGEMENT SYSTEM

SECTION I

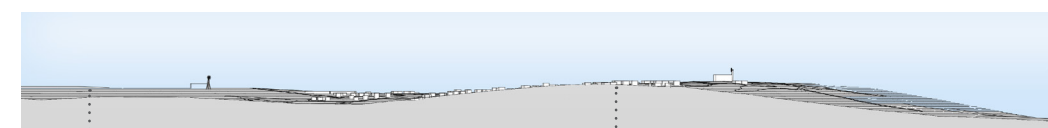


WATER PUMP II

CHURCH

WATER PUMP I

SECTION II



WATER PUMP IV

WATER PUMP III

### PROPOSALS LOGIC

As one of the major problems is water allocation, taking into consideration the wind available and the availability of ground water we have proposed wind powered water pumps on four key locations, with their own water reservoir which distributes to sub stations and main hubs. At the main hubs there is different activities related to the specific site.



### GOAL

-Making life easier for the residence one step at a time.

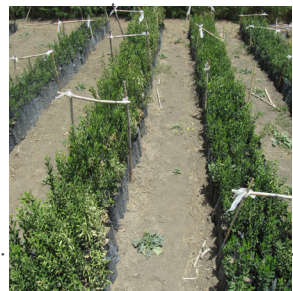
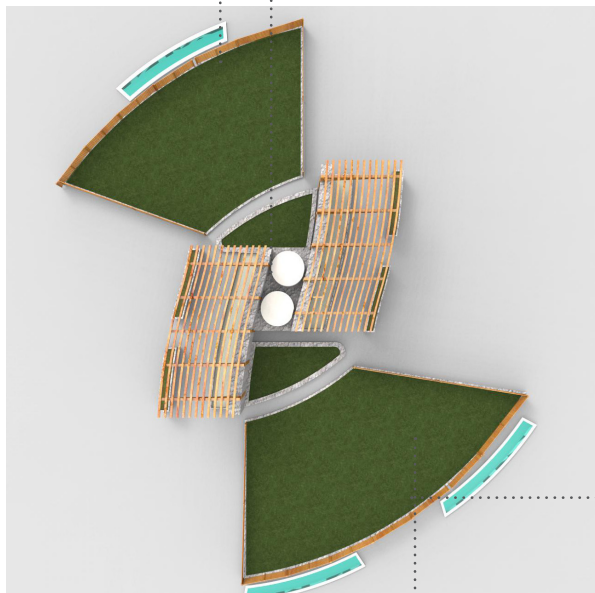




water filling area



cattle's drinking well



vegetable garden, recycled water from the waste of the cattle's



## SOCIAL ASPECT OF THE WATER PUMP

### THE COMMUNITY

#### COMMUNITY GATHERING SPACE

ekub, edir....

This community pumps have their own benefit on the society to gain the need of the people. Technology alone cannot provide access to clean water, as social factors such as behavior, health, and culture can work either in concert or against even the best designed implementation strategies.

Which is they always meet there and create their own social combination through the getting together and having the cultural activity like ekub, edir.....other things .We try to accomplish the water distribution through hundred communities in five way of distribution that means we try to divide for 500 dwelling in five.

The people can socially interact each other when there is fetching water and feeding the cattle of water also when there is a farm supplied with the west of the water and the income of the fertile foods for the people's uses on the one pump

SOCIETY

INTERACTION  
COMMUNITY

FRUITFUL

GREEN

PROPER  
WATER  
DISTRIBUTION

#### USES OF THE WATER PUMP

Better water distribution allows avoiding presence of stagnant water or west water, where insects carrying the diseases can be present. Better water distribution can also bring no need for the women or children for carrying water, this allows more free time to dedicate to better activities, as childcare, animal rising or vegetable gardening.

The community water supply designs are holistic, so to meet all the basics needs of the people, expandable, in view of community growth with access to the community improved water supply, and upgradeable, in view of a socio- economic growth and a need of later upgrading.

#### DESIGNING MATERIALS

The material we used is simple and available on the village to create a simple way to have different types of purpose and the material we used are wood and Stone

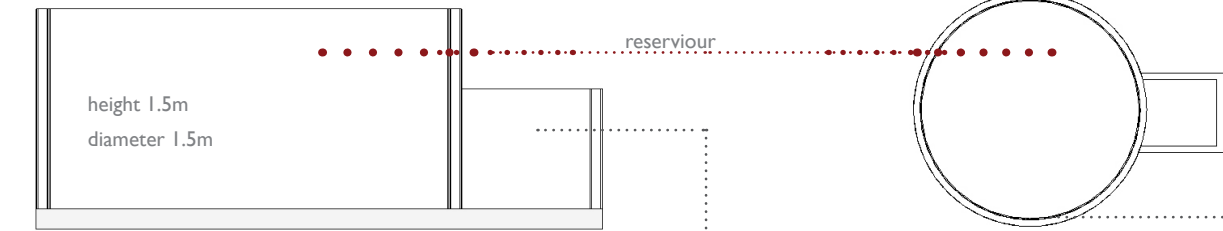
These materials are found easily in the area .Woods for the shade and for the fence Stone for the for partition ,for the cattle' drinking and to support the tap



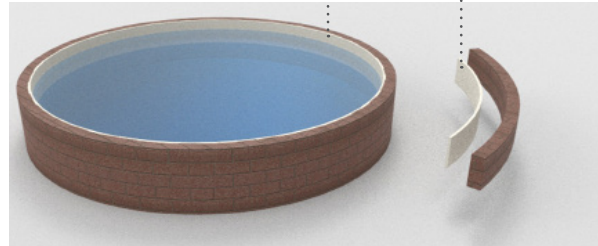


sample made brick

the cast



interlocking bricks



cement plaster

# SOIL BRICK RESERVOIR WELL...

EASY AND LOW COST

## ISSB

SUITABLE  
FOR THE ENVIRON-  
MENT

## SAMPLE

## EFFICIENT MATE- RIAL

### INTERLOCKING STABILIZED SOIL BRICKS

The ISSB technology mostly uses soil with just a little cement and lime to make bricks. The materials are mixed and put into a specially designed brick press machine. Since the bricks interlock in both the vertical and horizontal directions, less mortar is needed between them during the building. Therefore, it is a lot cheaper to use ISSBs. Because ISSBs are cured in the sun, the need for fuel wood is eliminated, helping curb deforestation rates.

### ENVIRONMENTAL

The Reservoir well being constructed with ISSB, the residents will enjoy twice as much they used fetch water with 3 major wells of each 11,000 liters of storing capacity.

### FINANCIAL

The total cost of the Reservoir well with ISSB is 30%-40% cheaper than building with fired bricks because far less mortar is required, and bricks can be made on site so transportation costs are minimized. Once this is constructed, the knowledge can be passed and adopted to other constructions as schools, housings, other facilities....

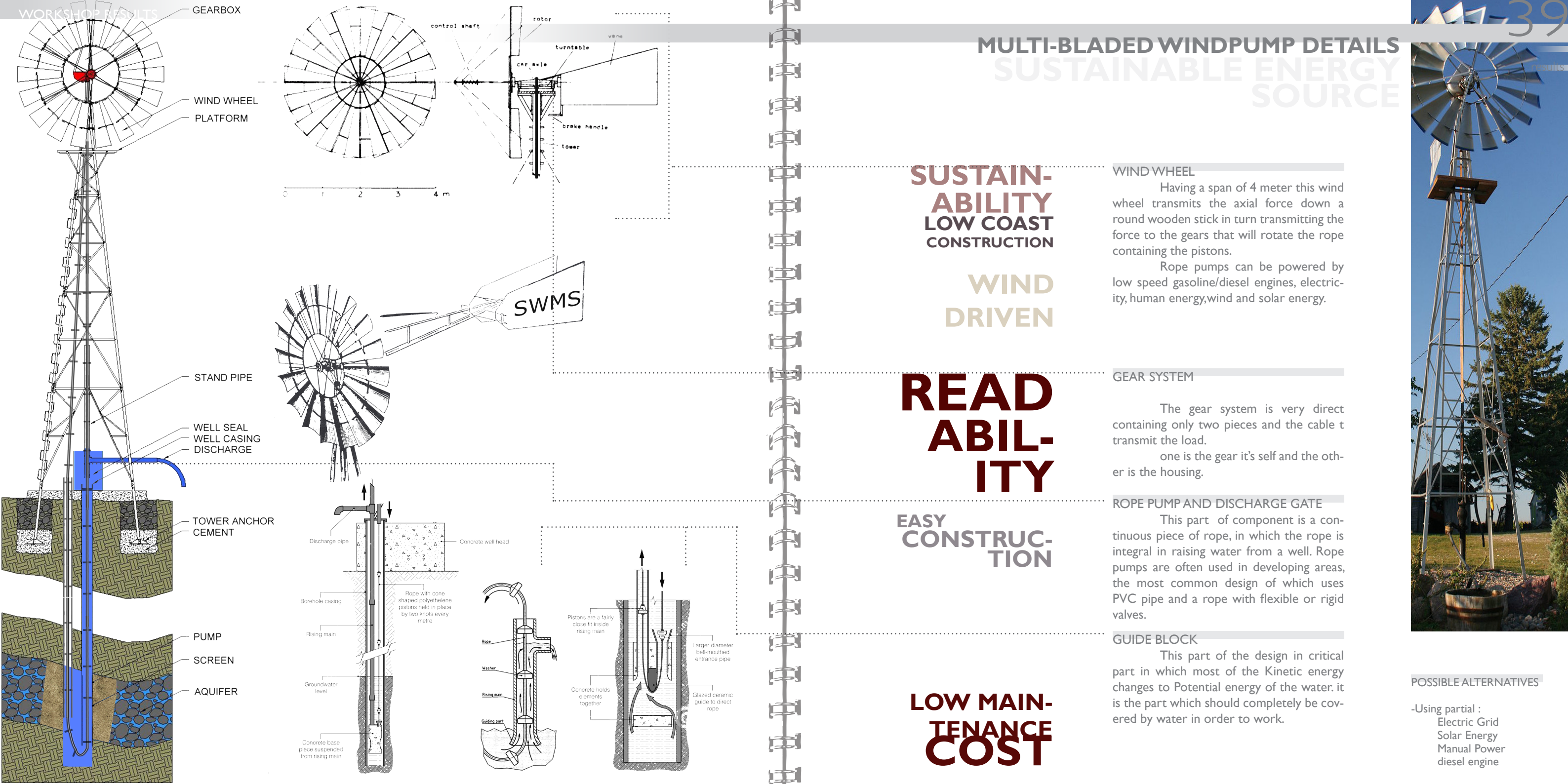
GROUND RESERVOIR



### POSSIBLE AFFILIATION OR NEW FUNCTIONS

Mixture of the brick might vary according to further study on the site and for the appropriate building type.





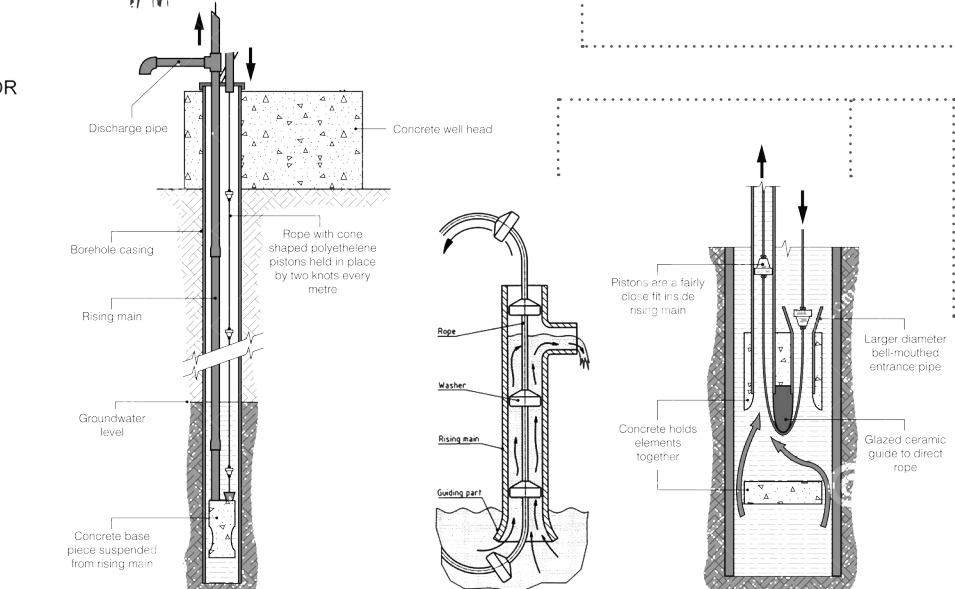
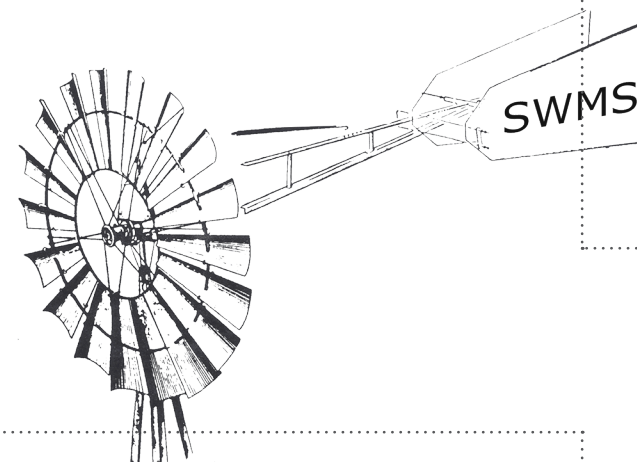
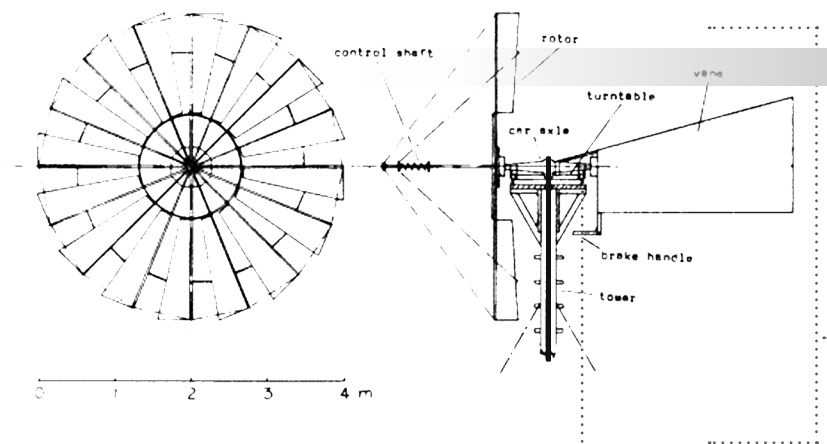
GEARBOX

WIND WHEEL  
PLATFORM

STAND PIPE  
WELL SEAL  
WELL CASING  
DISCHARGE

TOWER ANCHOR  
CEMENT

PUMP  
SCREEN  
AQUIFER



# MULTI-BLADED WINDPUMP DETAILS

## SUSTAINABLE ENERGY SOURCE

**SUSTAINABILITY**  
**LOW COST**  
**CONSTRUCTION**

**WIND**  
**DRIVEN**

**READABILITY**

**EASY**  
**CONSTRUCTION**

**LOW MAINTENANCE**  
**COST**

### WIND WHEEL

Having a span of 4 meter this wind wheel transmits the axial force down a round wooden stick in turn transmitting the force to the gears that will rotate the rope containing the pistons.

Rope pumps can be powered by low speed gasoline/diesel engines, electricity, human energy, wind and solar energy.

### GEAR SYSTEM

The gear system is very direct containing only two pieces and the cable transmit the load.

one is the gear it's self and the other is the housing.

### ROPE PUMP AND DISCHARGE GATE

This part of component is a continuous piece of rope, in which the rope is integral in raising water from a well. Rope pumps are often used in developing areas, the most common design of which uses PVC pipe and a rope with flexible or rigid valves.

### GUIDE BLOCK

This part of the design is critical part in which most of the Kinetic energy changes to Potential energy of the water. it is the part which should completely be covered by water in order to work.

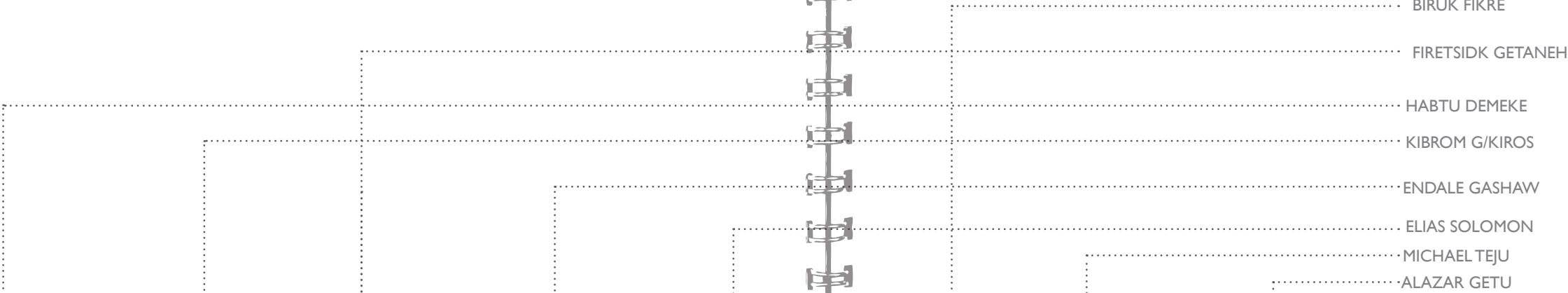


### POSSIBLE ALTERNATIVES

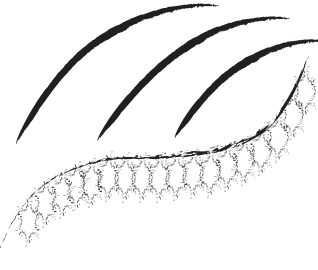
- Using partial :
  - Electric Grid
  - Solar Energy
  - Manual Power
  - diesel engine



MINI FACTORY  
SELF MADE SUFFICIENCY



MINI FACTORY



This project displays the major significance of introducing the concept of sustainability on the construction of honey extracting factory along the GAMRA site which is located on the preferal side of mekelle city. in order to achive a sustainable factory, we have taken some measure strategies and solutions. Most of them have been targeted on applying locally available materials for the the achievement of the goal



# SWOT ANALYSIS

GAMRA

## STRENGTH

- High degree of traditional honey production (honey extraction)
- Existence of ground water well (a shaft sunk below the ground)
- Full electrical supply
- Availability of local construction materials including shembeko, ground mud, stone, cactus, straw, animal hides
- High prevailing wind potential of energy production
- Availability and existence of open spaces.
- nearby rail line
- culturally integrated people



## WEAKNESS

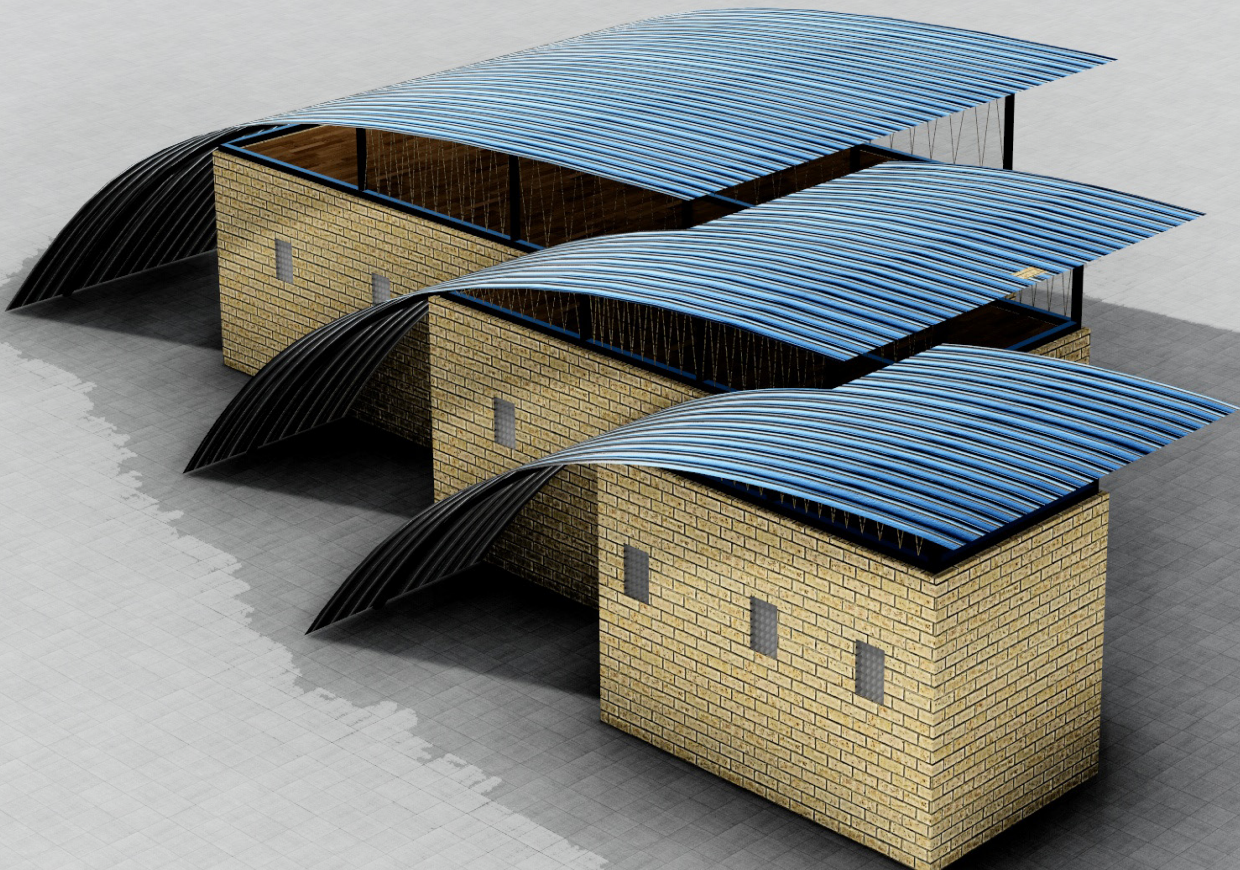
- No wind shielding of breaking material (site exposed for high velocity wind)
- The site is distant from the major road
- Distant water source
- tough topography

## OPPORTUNITY

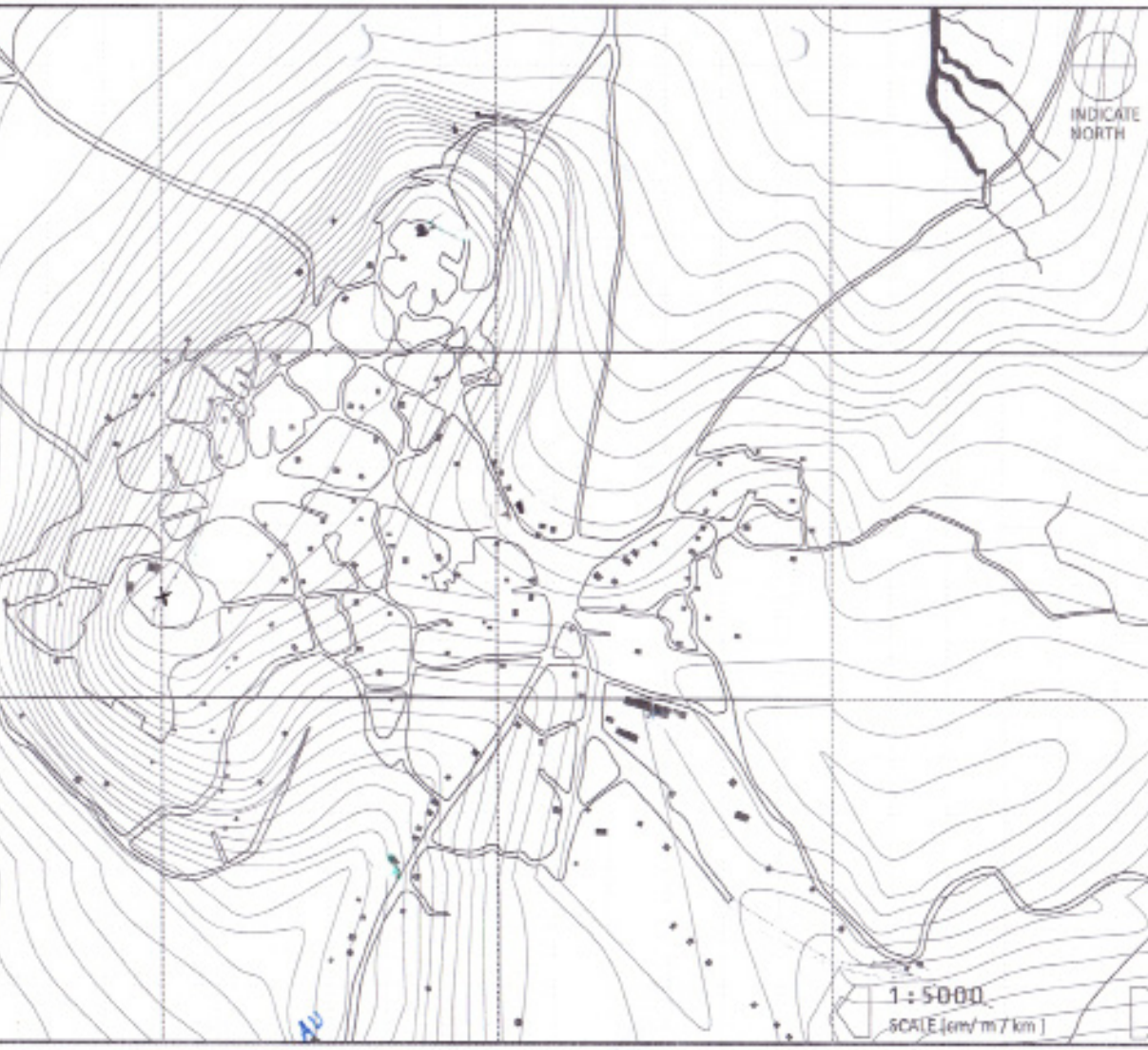
- High labors source and skilled man kind
- Free space

## THREAT

- Frequent famine







# SOCIO ECONOMIC ACTIVITIES

## CULTURAL CHARACTER

People here have a communal activities that has re-sulted them to develop a good relation among them

## SOCIO ECONOMIC PROFILE

The dominant religion in the town is Orthodox Christianity, which holds a 100 percentile. Which can show as a similar activity pattern of the residences during Sunday, holidays and fasting season.98.8% of the population are farmers, where the rest 1.2 % are categorized to service and commercial function, which cause a problem when there are conditions like drought.

There is lack of different job opportunities and school-ing opportunities as there is only an elementary school available, so the young people move to bigger cities or other countries to work.

## COMMERCIAL POTENTIAL

The area has different layers of commercial possibilities. Especially the Gamra residence where the demographic is turning out to be dominated with the elderly and kids (aged between 0-13) bringing economic means where the young adult or working force stays and contributes for economy of the town was vital. And also this was investigated and extracted from different opportunities of commerce as stated below. .

Since the existing and dominating way of life is agricul-tural. Mainly farming.As a result the first point is how to have advanced out puts from this agricultural products.

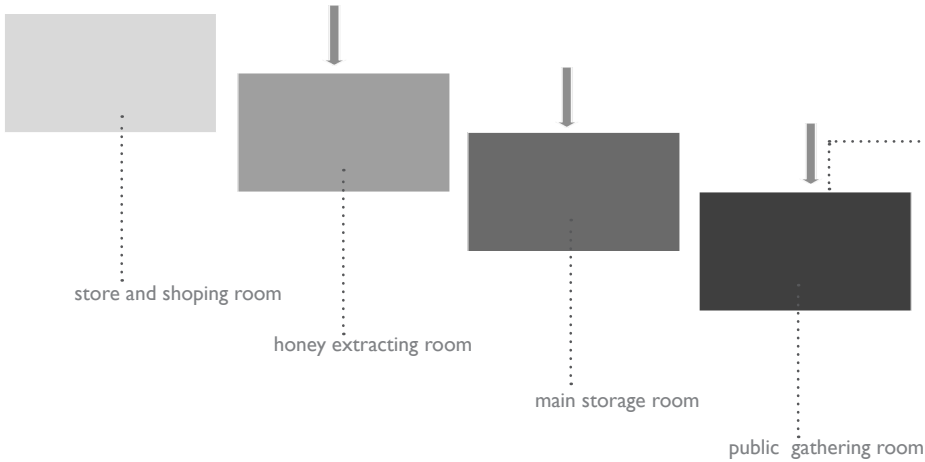
## MAJOR AGRICULTURAL ACTIVITIES OF THE SITE

- muesli bar
- dairy processing
- bakery
- honey processing
- construction and training facility

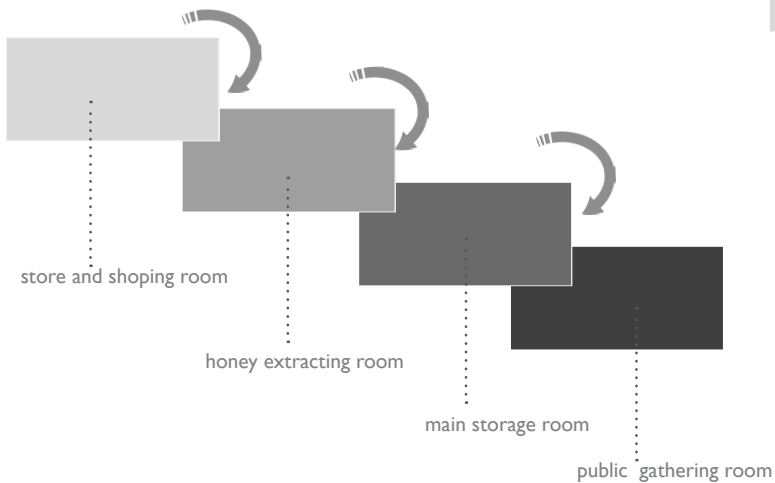
SIMPLE GEOMETRIC FORMS



DISPLACING THE FORMS



INTERLOCKING THE DISPLACED FORMS



FINAL FORMS



CLIMATIC ADDAPTATION

TO WITHSTAND WEATHER

results

SCREEING

PUBLIC GATHERING SPACE

this is located on the verge of the honey store house where employees gather and relax the fresh wind preveiling towards the site.here it is necessary to apply the loc-aly available animal hide so as to block and screen visual contact by half

HONEY EXTRACTING ROOM

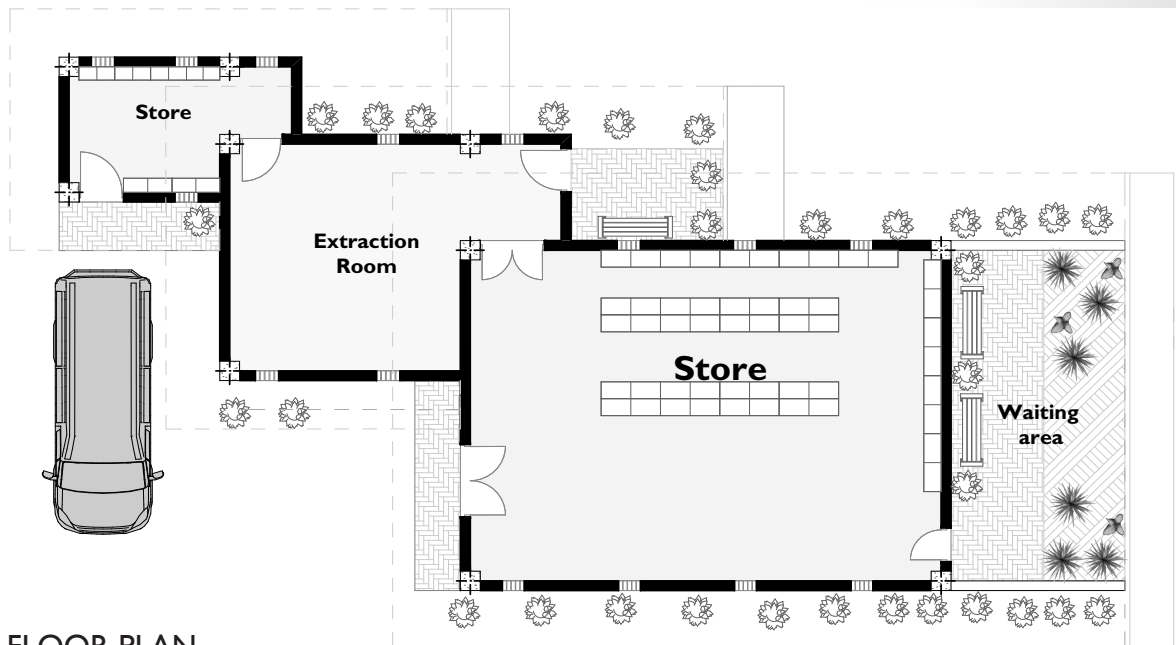
the main center where the gathered hon-ey is proccessed and purified for usge.the room having mechanical eqipments where employeers can use them manually to ex-tract honey from the wax

AVAILABLE WITH IN HAND

POSSIBLE AFFILIATION OR NEW FUNCTIONS

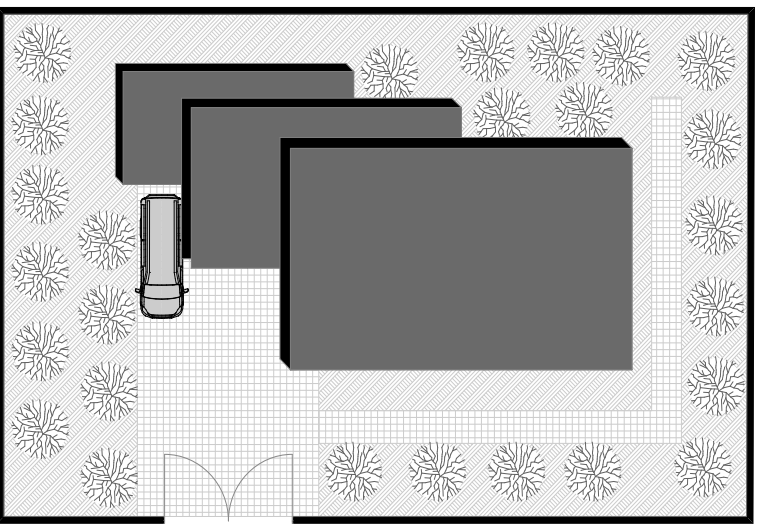
- HONEY EXTRACTION
- STORE
- SHOPING ROOM



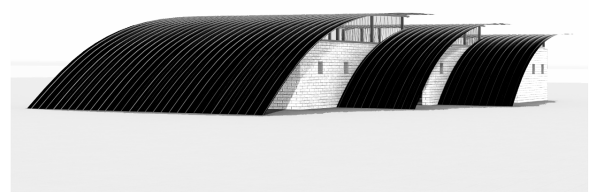
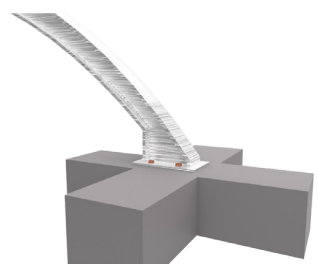
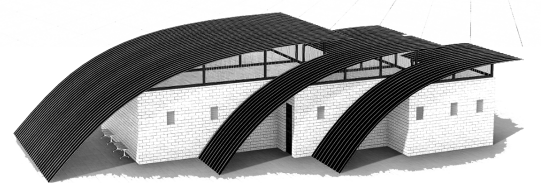
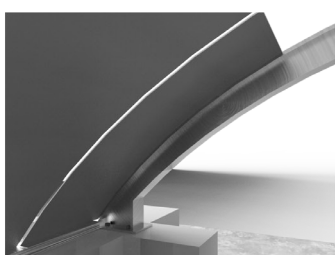
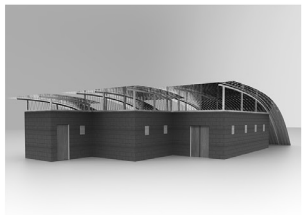
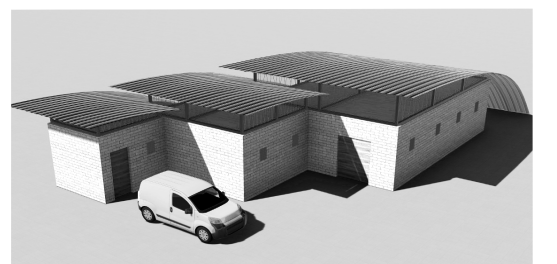
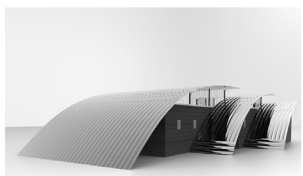
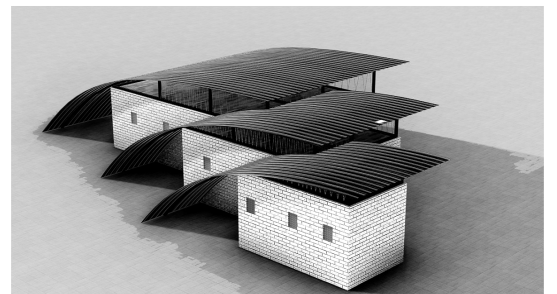
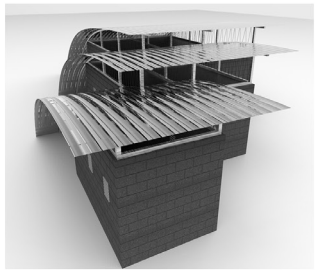


FLOOR PLAN

SITE PLAN



FLOOR PLANS AND PERISPECTIVES







THICK NESS AND DIMENSIONS

The thickness of walls made of mud brick ranges from 40 cm minimum to 60 cm maximum. In some rare cases, in certain countries, mud brick walls are 30 cm minimum, sometimes even exceptionally 20 cm, and up to 80 cm maximum. Such walls are usually limited in height, and in most cases are used for one floor only when wall thickness is under 30 cm. Nonetheless, it is possible to build walls up to a maximum height of 8-10 m high, on a wall base of an average 50 cm thick.

FINISHING

Mud brick doesn't resist atmospheric weathering well, and is very sensitive to humidity. Protecting this type of wall is therefore essential to withstand ageing : coating or rendering are reported in all the countries studied. The protecting materials are a rendering of earth or lime, or an earth coating covered with lime-wash. The composition of the finishing coating can vary. We find all the raw materials used in making brick: straw, gravel... Bare walls are scarce, and only reported for annex buildings or surrounding walls.

TOOLS

No specific tools have been reported by mud brick wall builders: traditional masonry tools are the only ones reported . For brick making however, the use of moulds enables the making of a series of homogeneous modules. Tools to level the bricks are sometimes used to squeeze and tighten the earth in the moulds. Extracting the earth is simply made with common tools: shovels, picks.

TRADES

In all the countries of the Mediterranean area, it is the mason who makes and lays mud brick. In rural areas, this technique is even sometimes implemented by the users themselves. In certain countries, the mason gets his material from a brick maker.

THERMAL AND ACOUSTIC PERFORMANCE

The thermal performance of mud bricks generally ranges from good to very good in the countries of the Mediterranean area. A mud brick wall's main quality is in the regulation of inside temperature, in a climate subject to great variations in temperature. A mud brick construction is built with great attention to the thickness and mass of the wall thus giving it high thermal qualities. This type of wall slows the penetration of heat during the day and retrocedes it usefully during the night. The acoustic performances, ranging from fair to very good, vary according to the density of the raw materials used.

AGEING PATHOLOGY

Linked to materials and climate conditions :The encountered pathology is directly linked to the high solubility of mud. Good maintenance of the outside coating is essential. When the coating deteriorates, mud masonry is directly exposed to the damage of rain waters, which leads to a quick deterioration of the pointing followed by crumbling of the bricks themselves .  
Linked to techniques : Generally speaking, no specific pathology linked to this technique has been reported. However, the quality of this kind of masonry depends on the attention brought to the making and laying of the modules.

MATERIALS AND CONSTRUCTION DETAILS  
CONSTRUCTION



SOLAR POWER

Solar system is one of the efficient renewable energies which are widely used in many types of equipment at present from small scale to large scale specially countries like Ethiopia which get 13 month of sunshine.

The solar power is nothing but the utilization of light obtained from the sun. this sysytem is one of suistainable architecture during this time .The solar panels are made up of photovoltaic cell which functions based on the photovoltaic effect (when the light falls on the materials, the electron in there reacts with the light and produce electricity in the form of voltage or current).The single photovoltaic cell can produce only feeble amount of electricity, so array of PV cells are connected for the production of more current.

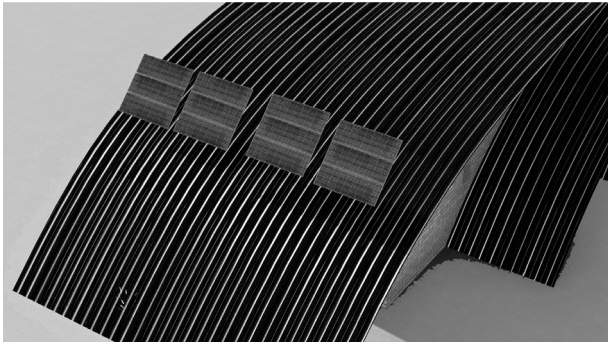
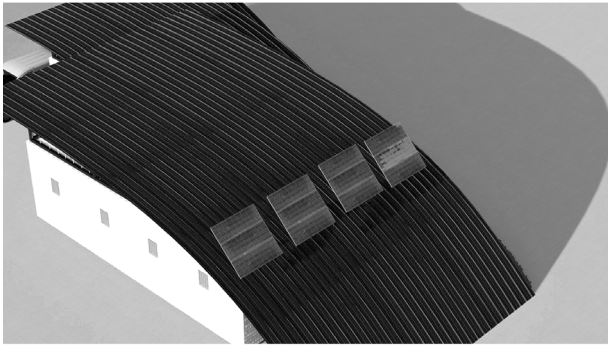
The inverters convert the direct current to alternative current. The direct current is unidirectional in nature (i.e.) the current flows in the single direction without any deviation. The current what we acquire though the sockets and plugs are AC and number of major equipments and machines are AC powered. Thus for the purpose of this honey extraction small industry usage the direct current get converted into alternative current.

The limited solar power produce enough of power required for this industry, when the power produced more than a limit. It gets redirected to utility meter which supplies power during the power offset and night when the sunlight is not available.

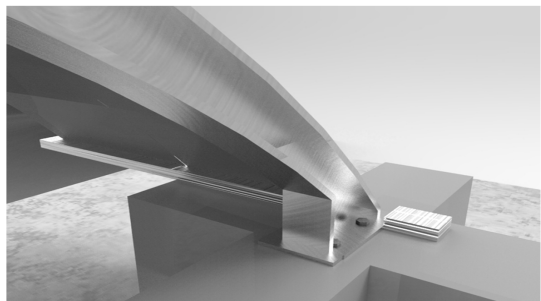
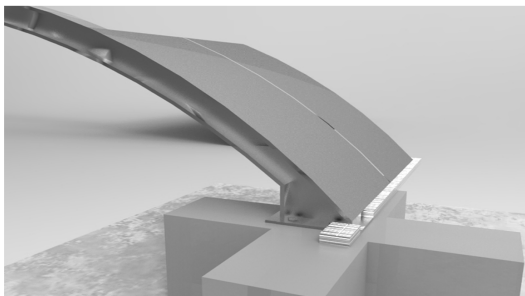
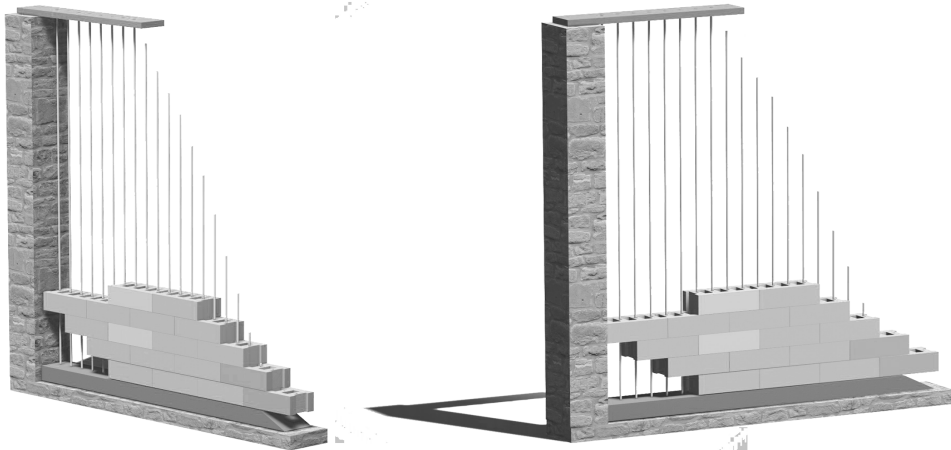
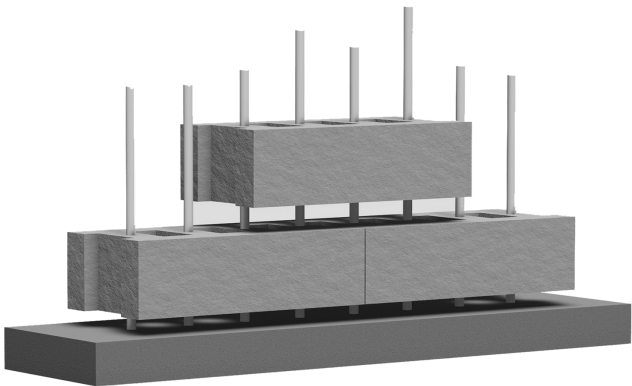
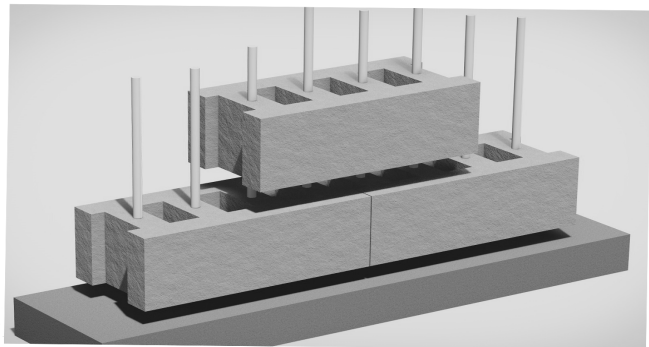
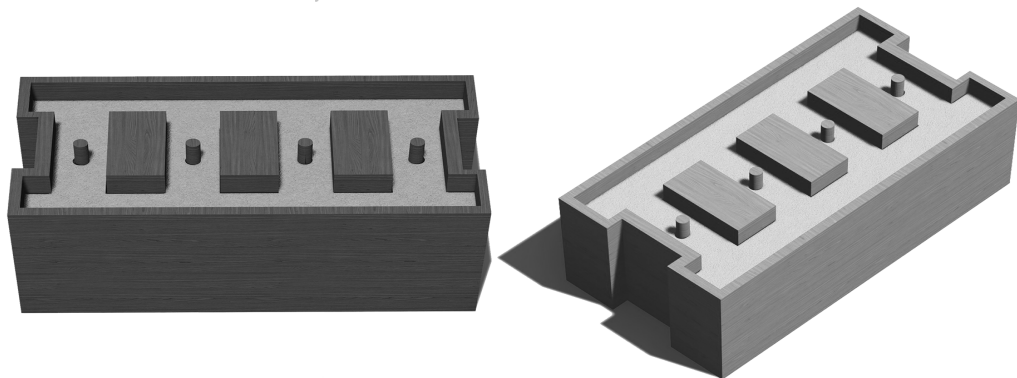
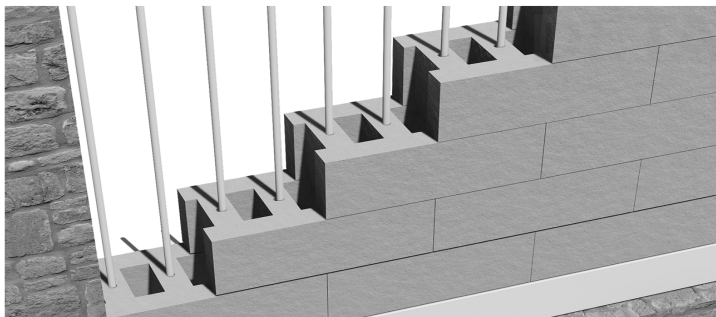
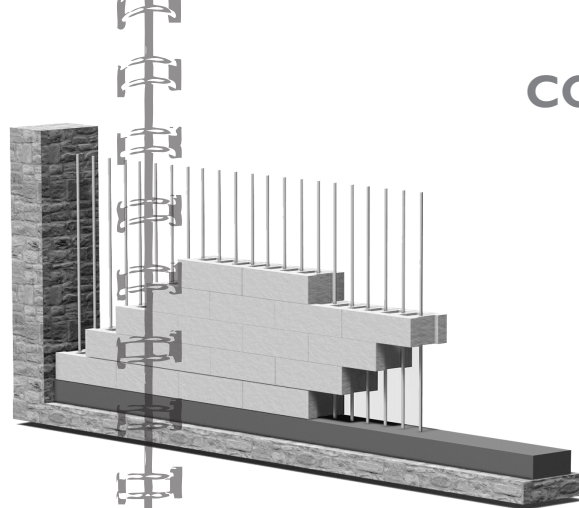
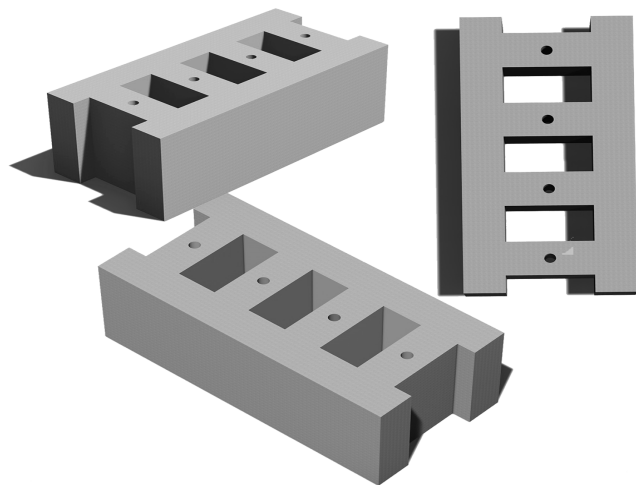


SOLAR POWER CONSERVATION  
TIGRAYIAN SATTELITE DISH

the solar is set on south east direction as we know Southern locations receive more direct sunlight than northern locations.  
We use this solar energy for electric bulb, extraction machine,refrigerater and so on. this need around 200kw energy. for this we have 12panels. and each panel makes 120 watt perday. and the solar energy use for this industry and the rest for the neghberhood. from this solar energy we will save around 300 kWh/month.









Nahom Girma

Million Gebre Yesus

Semhal Mehari

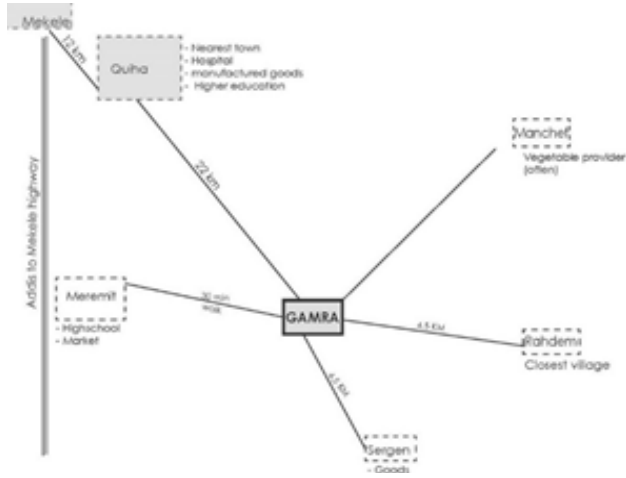
Rahwa Ephrem

Tsion TekleHaymanot

Selamawit Kidanemariam

Liya Yemane





INTRODUCTION

Gamra in Afar region is a city located in Ethiopia, about 491 km north of AddisAbaba and is located in the south eastern part of Tigray with population size of 1897. It is situated at 2100 above sea level.

**AIM/VISION**  
The aim of this project is to make better fitted community by addressing issues noticed from small scale residences to city level with a sustainable, available and interactive approach fit for their own distinctive traditions.

- HOW THEY CAN BE ADVANTAGED**
- Usage of local available materials while introducing modified services
  - Earn more money
  - Provides regular income: creates job opportunities
  - Improves quality and safety: Insurance of clean and treated product for local use
  - Community corporation in new business

- DEFINE LOW-COST?**  
Low cost can be considered to be the work we do after fantasy. Producing realistic and effective results with the best of what is available.
- Low cost- Available materials
- Local technology
- ☐ usage of local materials and wastes to facilitate a local business and living conditions. Among this available materials noticed in the rural area of gamra are:
  - ☐ Straw
  - ☐ Cactus
  - ☐ Stone
  - ☐ Dung
  - ☐ Eucalyptus
  - ☐ Soil etc.

COMMUNITY

OWNERSHIP

JOB CREATION

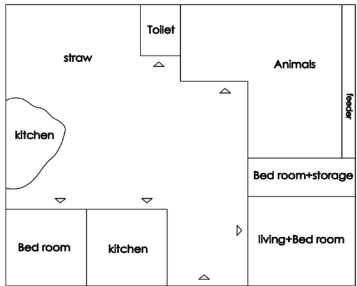
HYGIENE

SAFETY

SUSTAINABLE

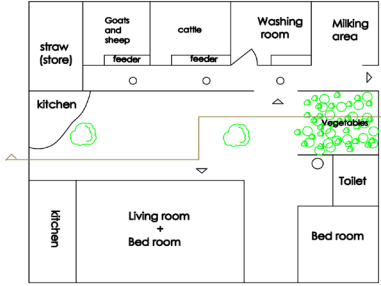
LOW COST

SMALL SCALE PROPOSAL



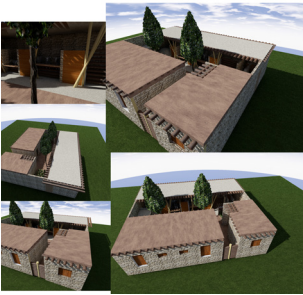
**Existing Floor plan**  
Area= 140sqm

As you can see the animals and the use the same access, which is very disturbing. In addition all the animals are gathered together which is not healthy for the animals and also the people. The functions are not classified everything is just done there.



**Modified Floor plan**  
Area=140 sqm

The animals and the functions are separately organized.



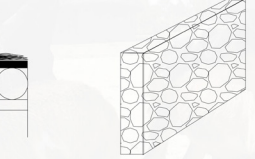
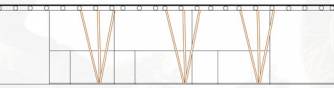
As you can see it on the picture, these are the traditional structure supporting system which are made out of timber. The wood is mostly an eucalyptus tree which is very common in gamra and other tigray areas. It is used as a column but mostly on the entrances also used to give an emphasis to the entrances. We use such type of supporting system for the animals because the animals area should be open not suffocating which will lead into different health problems. Therefore it has to stay open and ventilated.



The roof basically a hidmo type of roof, which is very common in tigray region. It is made up of - dry wood - straw - soil

- steps on making hidmo roof
- arrange the big dry woods in a grid framework.
  - add another grid of woods but smaller in size so it will protect it from rain and sun.
  - then apply the straw above
  - cover it with soil, cactuses may grow.

STRUCTURE + MATERIAL



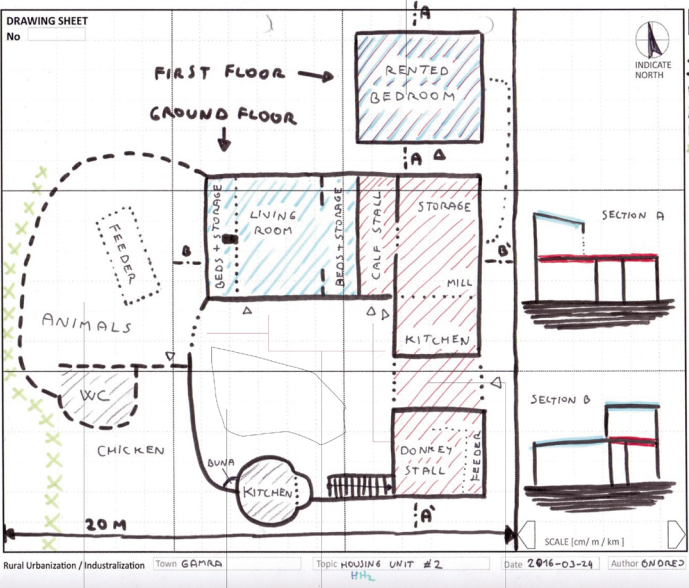
The partitions are normally made from stones with a mortar. But since we are providing this for animals we have to make sure that the animals won't bring any damage, so we used a mud mortar which is low cost, ecological and also available.

**Housing conditions**  
The housing conditions in gamra are of the typical tigran household where the construction is done with the local available material, mud, and a straw and eucalyptus based roofing. The construction techniques correspond to their economic background

**Why?**  
- modifications are proposed in the need to reply for the points: how it is affected by the animals and people living condition in the housing units are affected by animals living in the house with residents and can be seen that they have a huge effect on them. either it is by the hygiene, noise disturbance due to it not being classified enough.

- How can they access it?  
The barn used now in the town is located or attached to the residential with a very minimum area. So as far as accessibility is concerned, in the current condition the milk production is seen to be very close to home. Whether being close to home is advantageous or not depends mainly on waste disposal,

EXISTING PLAN



the rented room is in the first floor, consumes construction materials

the entrance and exit for the animals and humans is the same

creates pollution of hygiene since, their kitchen workplace and living condition is near each other & not separated

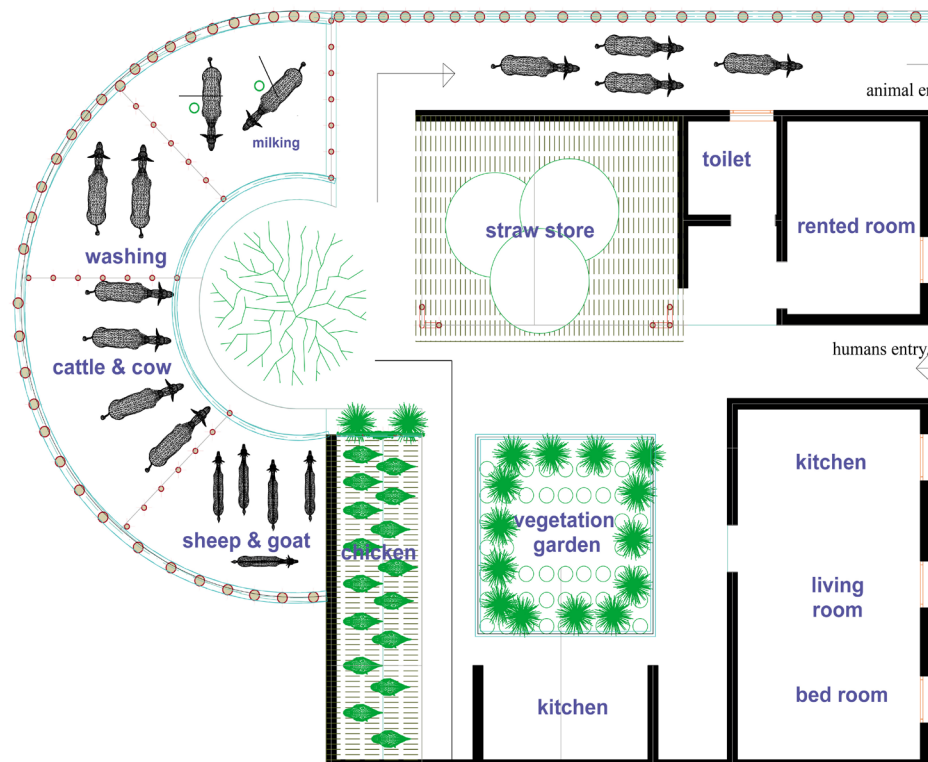
they have this open space / used only for access only

the animals are randomly puted there, they dont have their own section

MILK PRODUCTION

DAIRY CHAIN

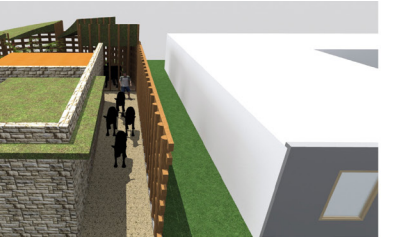
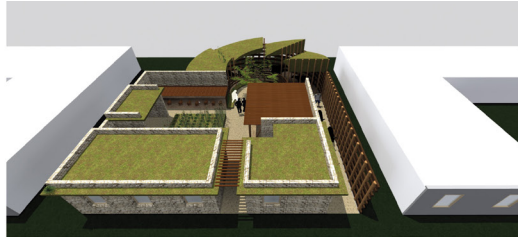
MODIFICATION PLAN



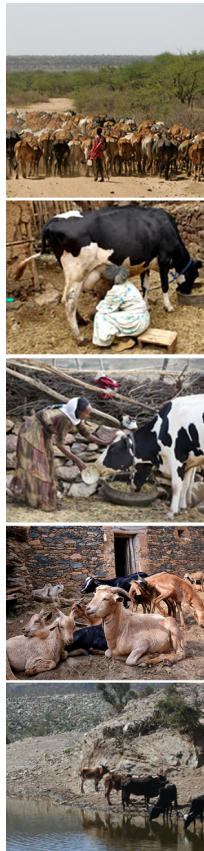
by separating the animals from the living area we can reduce the risk of getting polluted and we can easily manage the animals by their sections.

condition

vegetation garden - edible vegetables sustainable & low cost since they produce it themselves

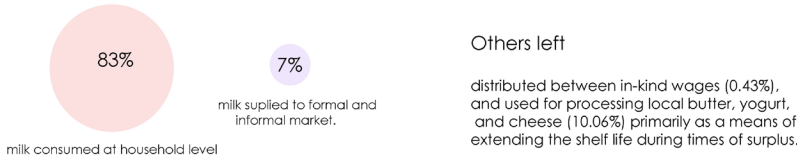






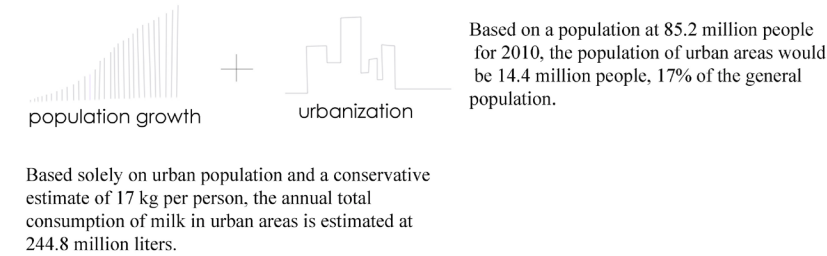
MILK PRODUCTION IN ETHIOPIA

Ethiopia generally has 49.2 million cattle, 46.8 million sheep and goats and 9 million pack animals. Productivity of the dairy herd is low with average milk yeild of 1.3lt - 1.5lt per day for an average lactation period of 180 - 210 days. Ethiopia consumes approximately 17 kg/capita.



In Gamra The demand for milk is mainly for fresh whole milk which is satisfied by own production or purchased from neighbors.

Ethiopian Milk cosumption goals in 2020

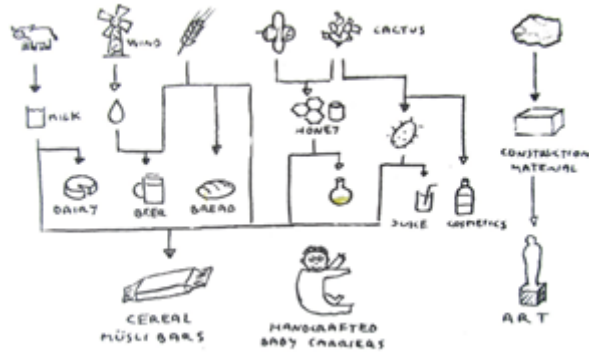


Based on population growth projections, if per capita consumption of milk and milk products **increases 5%** per year until 2020, the national consumption of milk would be 3.2 billion liters and the urban and peri-urban consumption would be **611 million** liters.

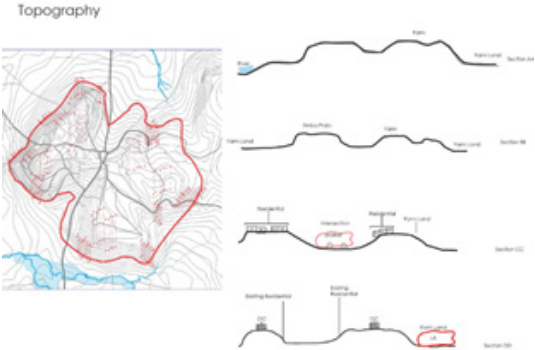
MILK PRODUCTION

DAIRY CHAIN

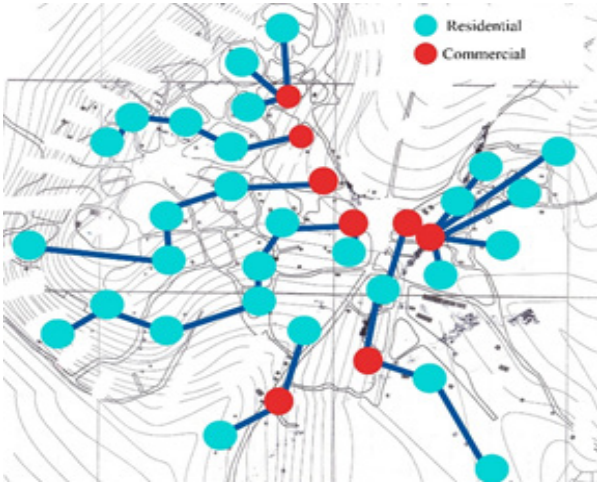
EXISTING CHAIN OF LOCAL PRODUCTS



EXISTING NEIGHBORHOODS



BUILDING LINKAGE FROM RESIDENCES TO COMMERCIAL



CONCLUSION

HOW JOB IS CREATED

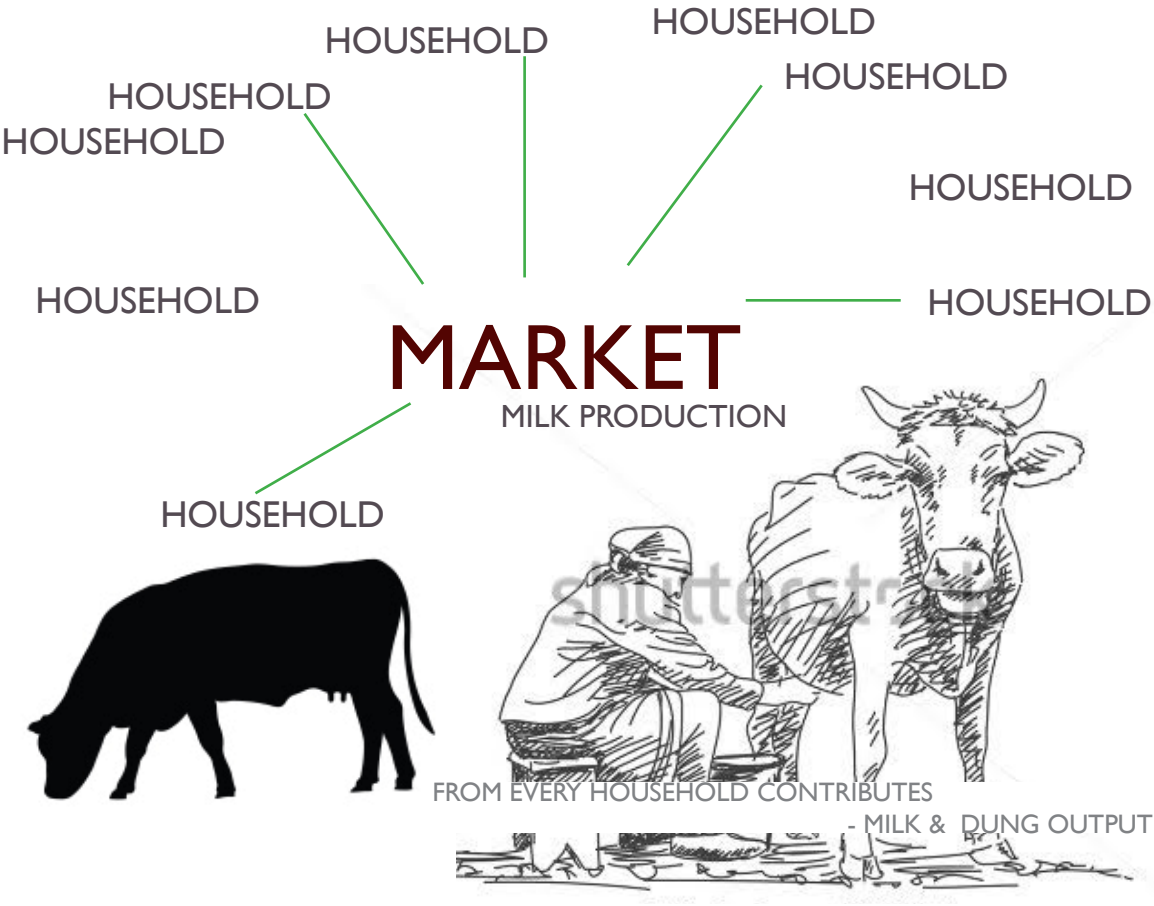
By following local topography and economic as a base and as an advantage it became possible to make a production line for the entire town to engage women and other jobless adolescents in the town with what was an already existing tradition as a business opportunity.

HOW SUSTAINABLE

Using of local available materials in a modified way made it both sustainable and affordable. Sustainability of the projects can be defined for this case in that the product are of local origins that building them is easier with some new technologies where the residents can learn and use in future uses and also can be maintained easily with available materials in a very long periods of time.

USER ATTRACTION

Based on the context the region has come accustomed to the aesthetical quality of this design can be considered as appealing for the user to satisfy and serve the local community.



INDUSTRY

LOW-COST AND RE-USE

THE NEED

As analyzed from their residential arrangement and their living background production of animal crops plays a very huge role in their living. So a better design and accommodating their need for a well-planned barn and an extended milk production is proposed.

PROCESS

How the milk is produced inside the household

COLLECTING

• Dairy cows are milked using local milking techniques. The raw milk is then collected either the available bucket made of stainless steel or glass. Where it will be sent to the industrial building to be cooled to about 40o F (4.4 oc).

PASTEURIZING

• To kill any bacteria

OTHER PRODUCTS

• The milks leftover from daily market and such are collected in a protected container to produce yoghurt.

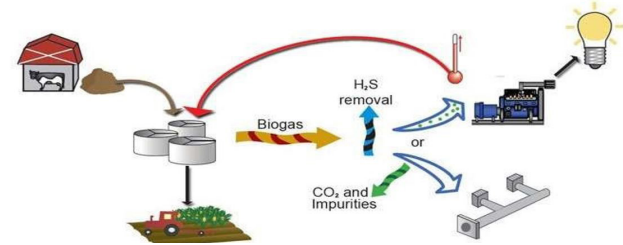
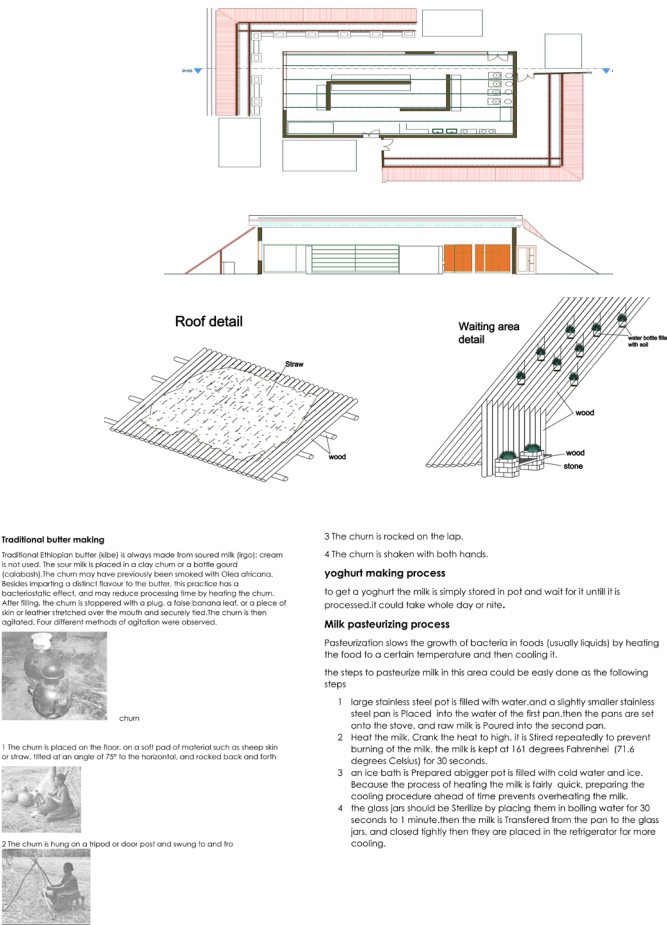
• And for the leftovers or based on need butter and other dairy products are derived from the yoghurt using traditional mechanisms called Churning, name driven from the material used.

CLEANING

• All inner surfaces of the process equipment and piping systems are cleaned once a day to ensure sanitary conditions.

FUEL PRODUCTION FROM BIO-GAS

Bio gas technology of producing fire are used in the pasteurizing process because there exists abundant disposal of animal dung in the household poultry.





LOWCOST CLINIC DESIGN  
A PLACE TO HEAL



Meketa Solomon

Eden Girma

Haben Lema

Tsion Alazar

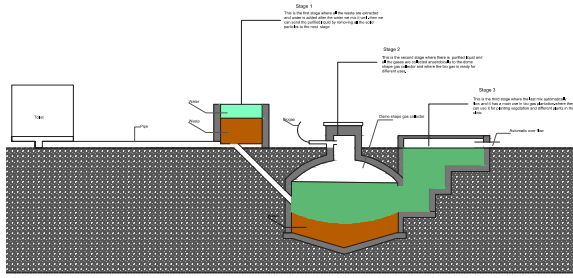
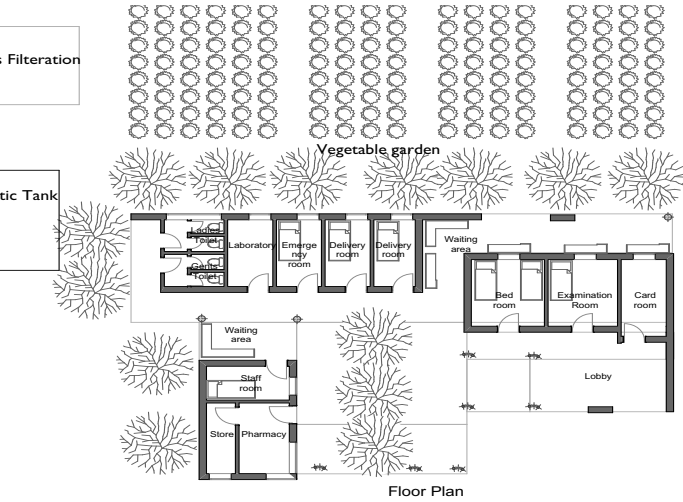
Tewedros Kassa

Elsabet Kassa

Hanan Ali

CLINIC DESIGN

This is a lowcost clinic design for Gemera, Tigray region, Ethiopia. The project's primary goal was to introduce new affordable and lowcost design ideas for the community. Traditional stone (Hidmo) houses are abundant in the site. But there are also other materials available which are not being used. There is clay everywhere. There are different plant types as cactus, eucalyptus...As we have experimented cactus fruits have juices which can be used as binding material while mixed with adobe and straw. So we tried to look for other available materials and we came up with an idea of using adobe and cactus fruits for the construction.



We use the bio gas system for the clinic instead of putting the waste from the toilet to better to use it for extra very useable and cost effective purpose. As when we think of the thing that first thing that comes to our mind is the bio gas system so prefer using it connected with the toilet and they can use as an electric power for the clinic like the lamp, any equipments which needs electricity in the laboratory, for generators, and for good vegetation in the site and even the vegetation have good for the landscape.

Stone clad both for aesthetic and Paper display

Adobe bricks

Cactus Fruit Juice

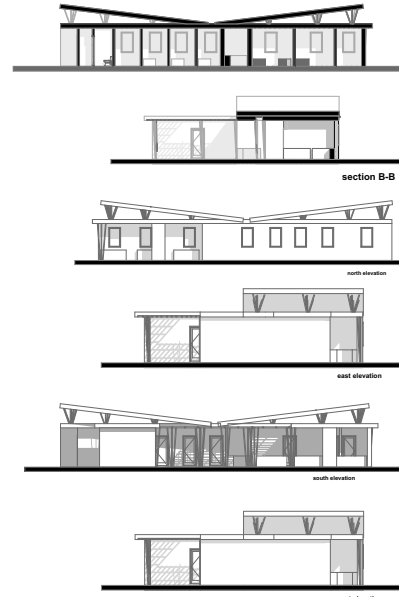
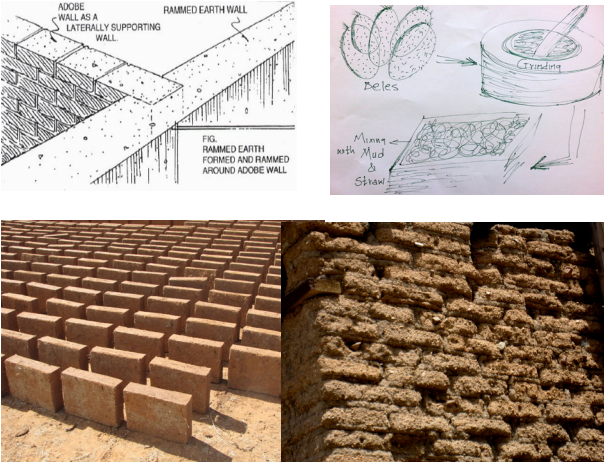
Straw

Cement Plaster

Dressed Stone

Aggregate

Floor Finish Material



# FUNCTION FROM ADOPTING THE SITE FOR COMMUNITY

CLEAN-NESS

NATURE

COMFORT

PRI-VA-CY

SAFETY

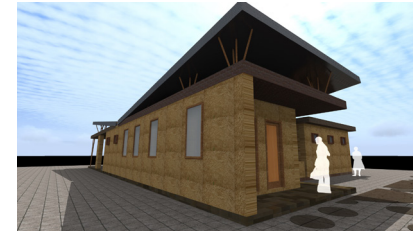
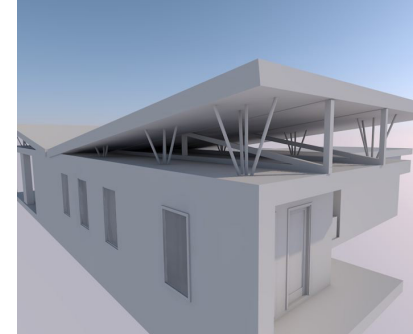
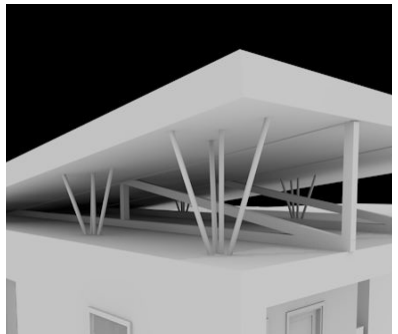
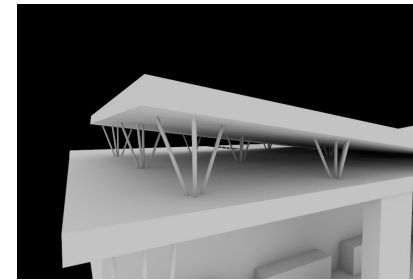
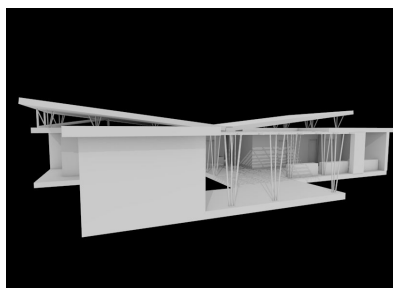
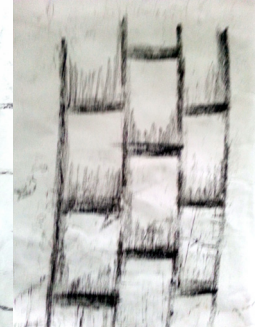
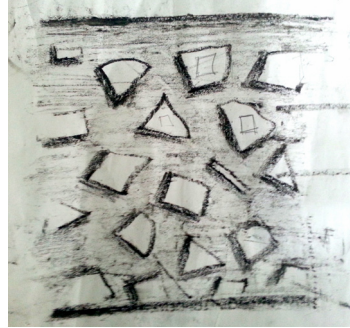
**CLINIC**  
Clinic for creating healthy community  
Clinic is a health care facility that is primarily devoted to the care of outpatients. Clinics can be privately operated or publicly managed.

**OPEN SPACES:**  
Well designed openspaces can be used as an outdoor gathering for giving health education for the community. There is also a vegetation garden on the backyard by using the biogas as a water source.

**MEDICAL CENTRE**  
The medical service area is where medical tasks take place and it should be easy to clean and to treat.



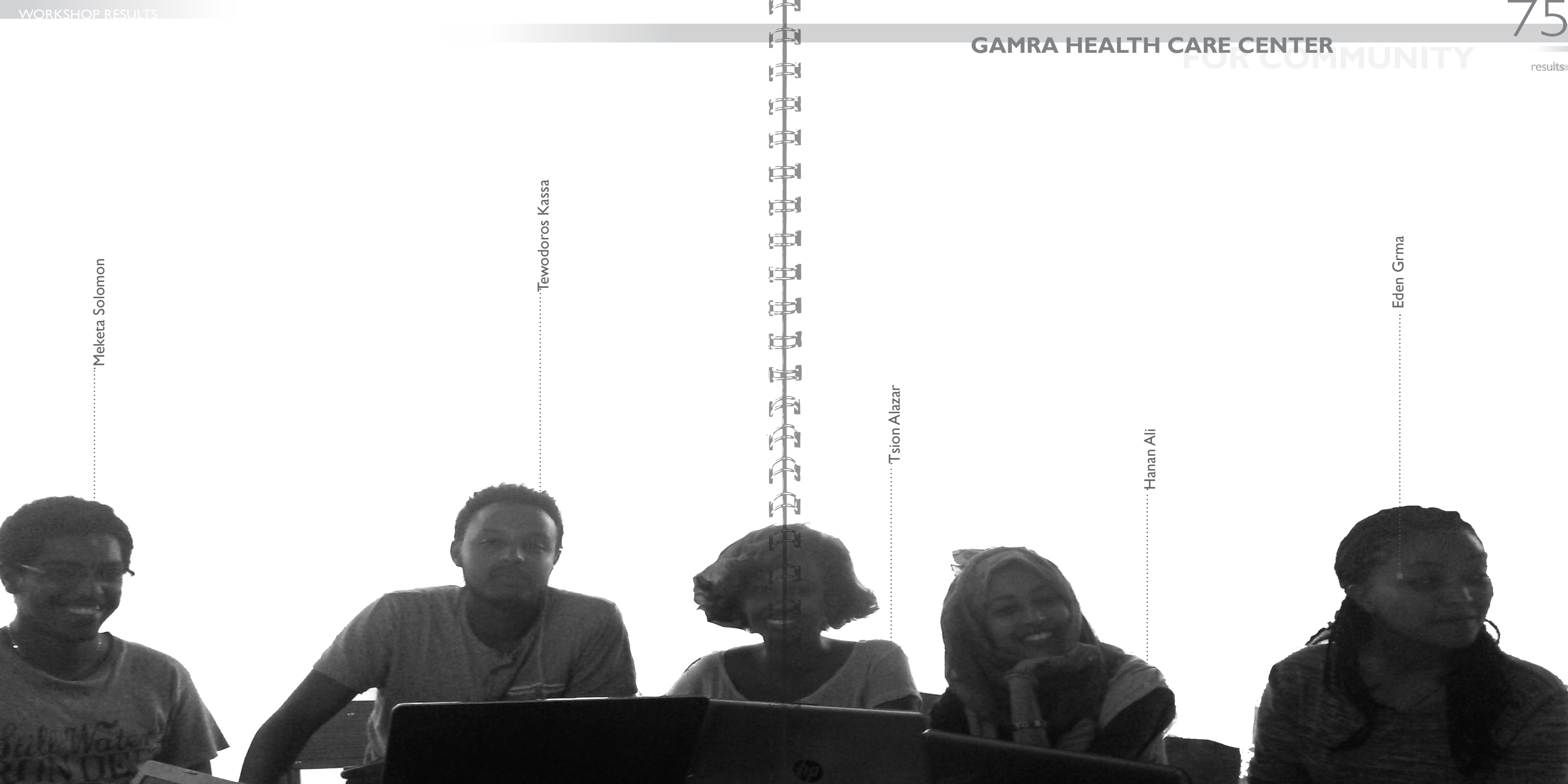
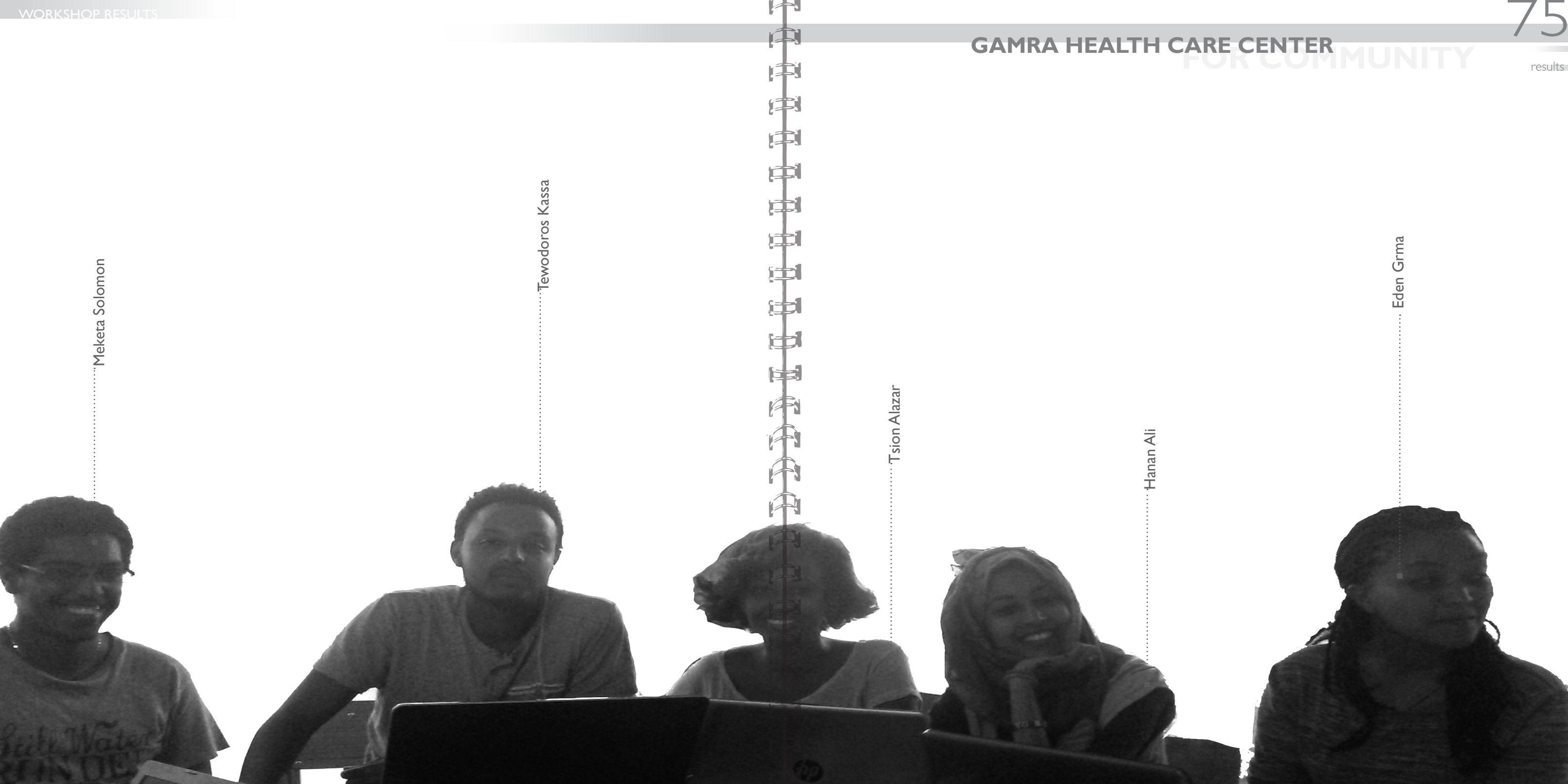




# COLLECTIVE SOLUTIONS! FOR COMMUNITY







Meketa Solomon

Tewodoros Kassa

Tsion Alazar

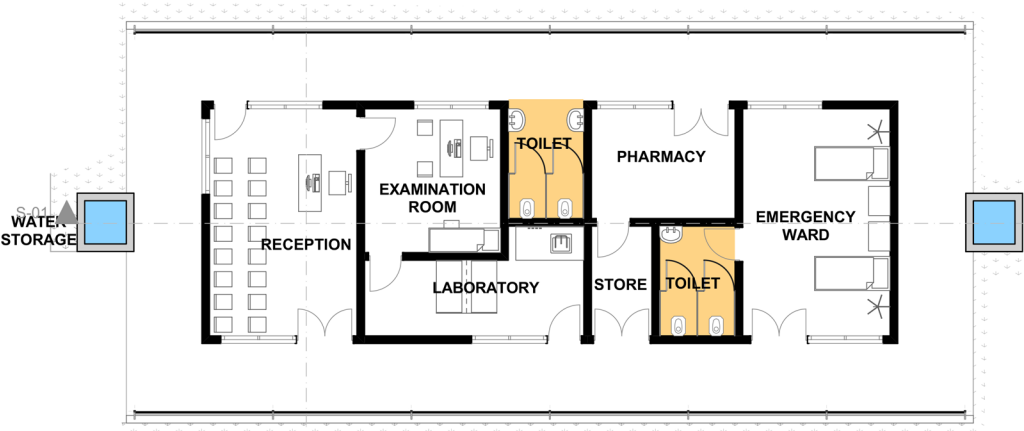
Hanan Ali

Eden Grma

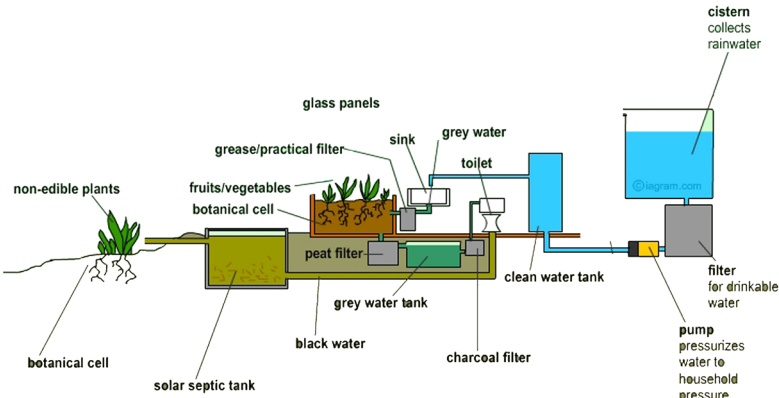
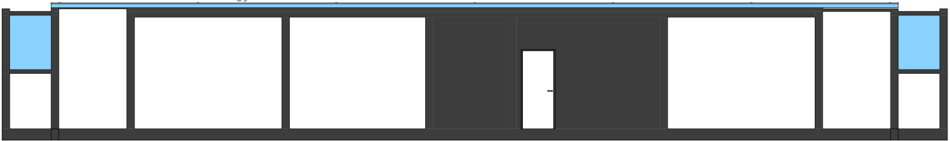


SELF SUSTAINING SYSTEM

The main idea behind this project is to produce a self sustaining low cost health care center with good quality.

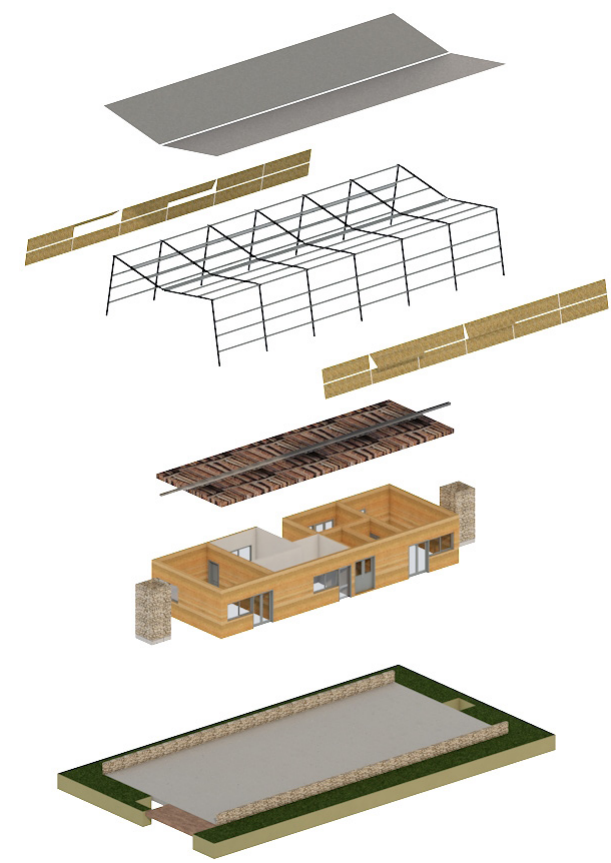


Rain water runs down the roof to the gutter then to the storage spaces

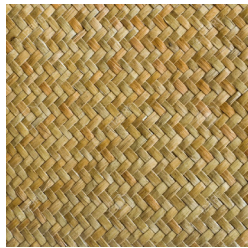


The project employs a sustainable water management practice which include rain water harvest. the roof funnels rain water to a cistern, which then pumps it to sinks when required. That used 'grey water'.is then pumped into the garden to water the plant. After being cleaned by the plants, the water is pumped up into the bathrooms for use in the toilets. After being flashed, the now 'black water' is pumped to the exterior garden to give nutrients to non-edible plants.

BUILDING MATERIALS



STONE  
stone is used for covering the water tankers, as evaporation prevention methods and as reinforcement for the truss system



HANDCRAFT WEAVE  
handcraft-weave-texture-natural wicker stock is used for the shade and wind braker.



CONCRETE  
the floor for the whole project consists of concrete tiles.



WOODEN ROOF  
the roof adaptes the local way of construction with the exclusion of the mud.

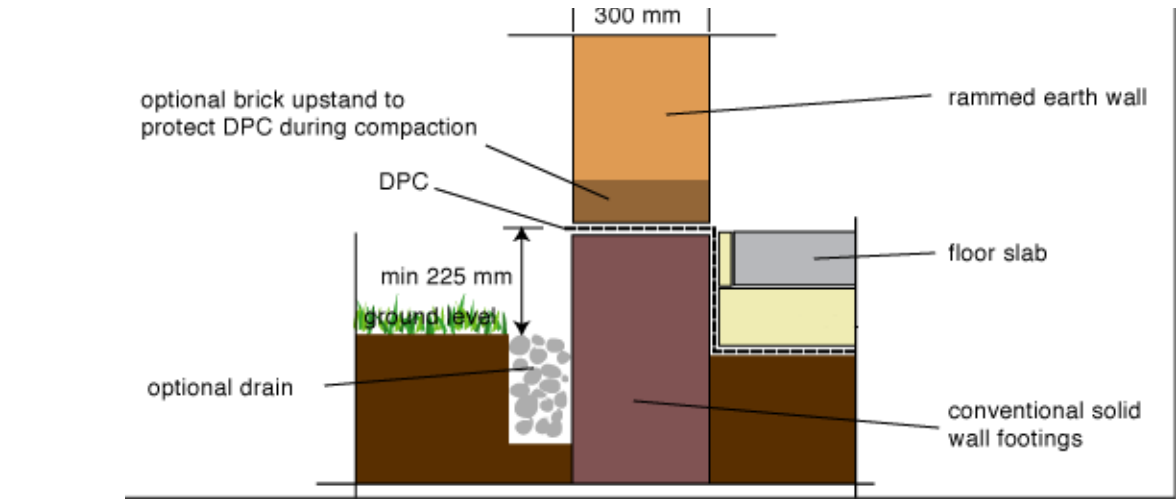
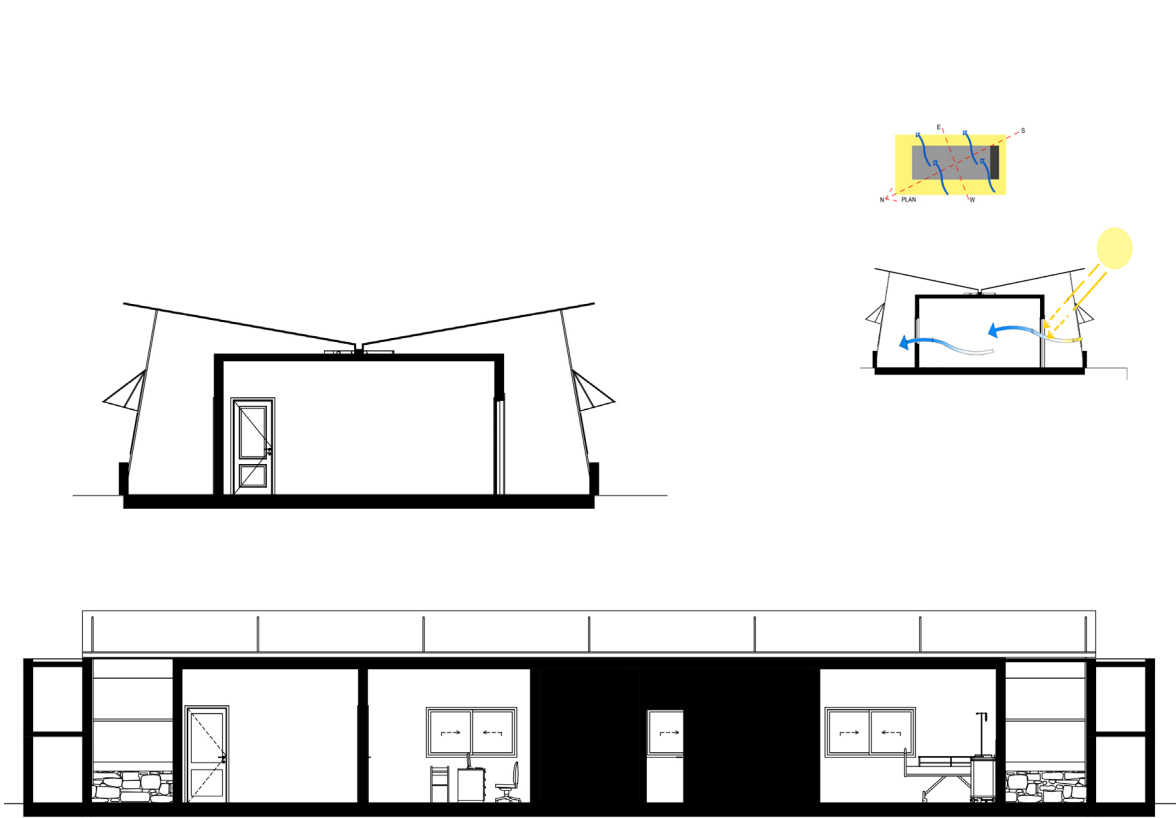


RAMMED EARTH  
for all the walls used in the buiding rammed earth is used, for the examination room and



STEEL  
steel is used for the structure of the roof.

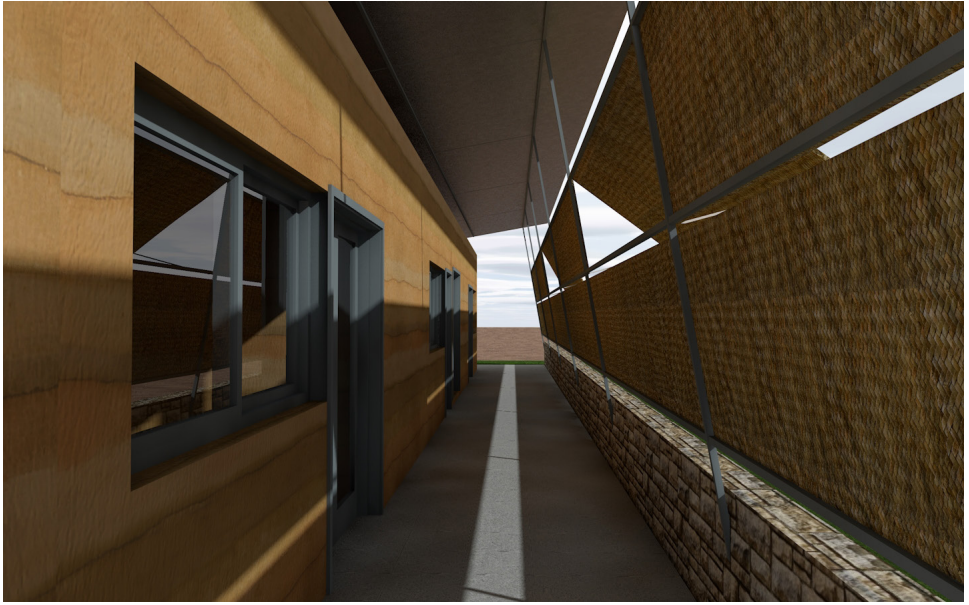
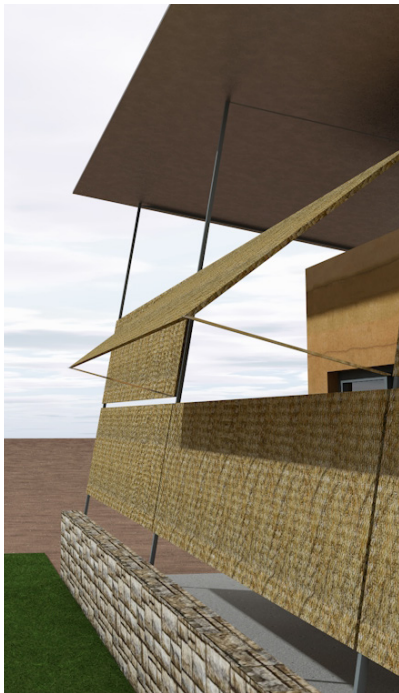
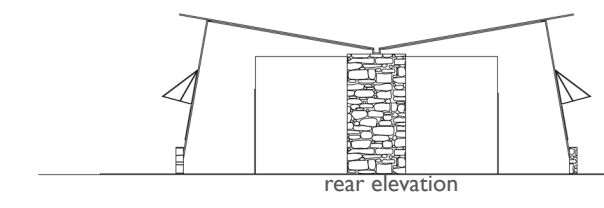
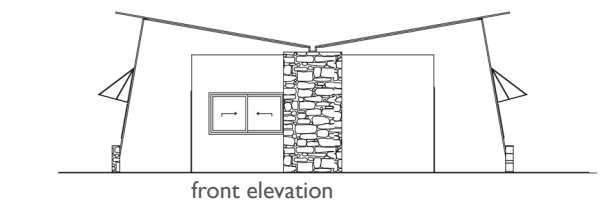
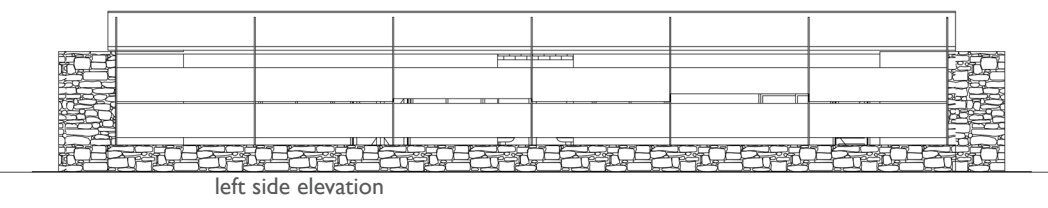
SECTION AND DETAILS





DETAILS!  
FOR COMMUNITY

results

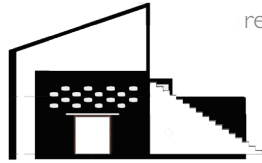


corridor

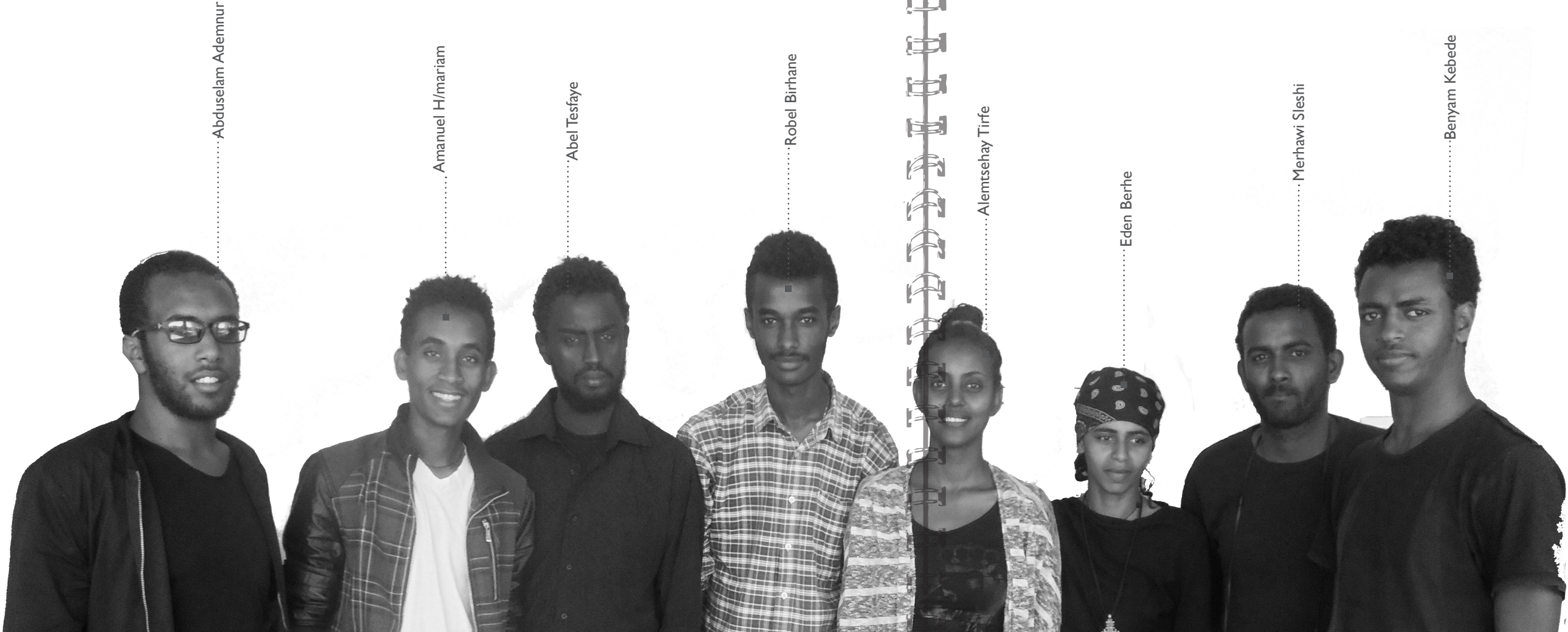
emergency ward



COMMUNITY CENTER



COMMUNITY CENTER



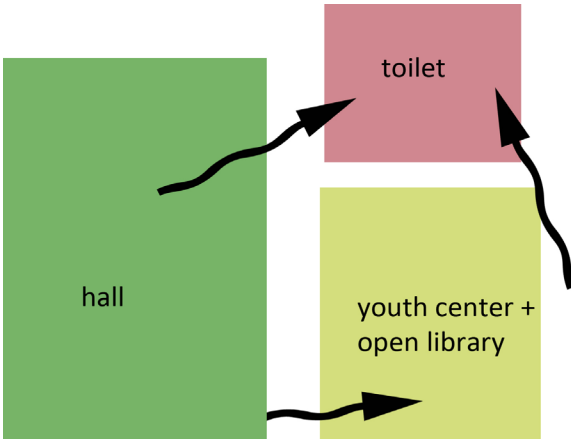
This project is about designing low cost building using materials which are found near and around the site. The building function are selected by analyzing programs that are necessary and important for the community.



SITE LOCATION



PROGRAM DEVELOPMENT



WHY THIS PROGRAM?

- to give information's,
- to increase community participation,
- to held different kind of assembles and meetings
- to increase community awareness in various areas,
- to easily communicate and educate the community
- to increase social interactions

WHO ARE OUR USERS?

The community center is owned by the government. the users are the communities which include all age ranges from children's to adults

PROGRAM DEVELOPMENT

Hall=48m2

Youth center+ mini open library = bi functional room =26m2

Toilet- both for man and women=12m2

Terrace open meeting area=48m2

FUNCTION

The hall is used for different kind of meetings whenever it is occupied there is other meeting area for another issue which is the terrace, when there is also a hot weather condition the terrace meeting space is a good choose

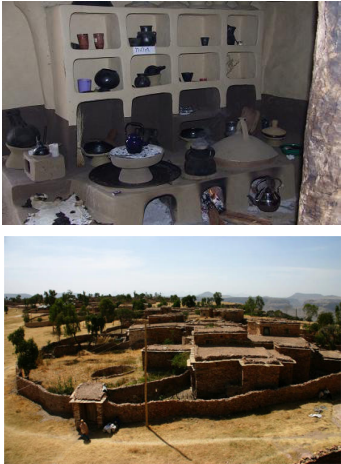
The youth center contain function like youth club and game area like to play traditional games and so on, and bi functional also have same books and magazines it is kind of open library



# CONCEPT DEVELOPMENT

## CONCEPT

We want to create a learning space to engage the community through knowledge and networking with the minimal amount of cost possible.As a result of that, we decided to aspire the housing/structure making process of that place in order,for us to achieve what we want to achieve; which we already stated above.We also did make the spaces complement each other. So, this way of space creation will give us the benefit of aligning different spaces, or different spaces that give different benefits to have the same purpose; which will be improving the life style of the community once and for all, through knowledge and community networking, with the available building materials and improved construction system.



# MATERIAL SELECTION



## MATERIAL SELECTION

The materials are selected based on the materials found near and around the site and traditional and site adaptive materials that peoples and the communities used the building type is called hidmo house.

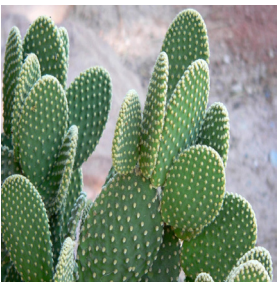
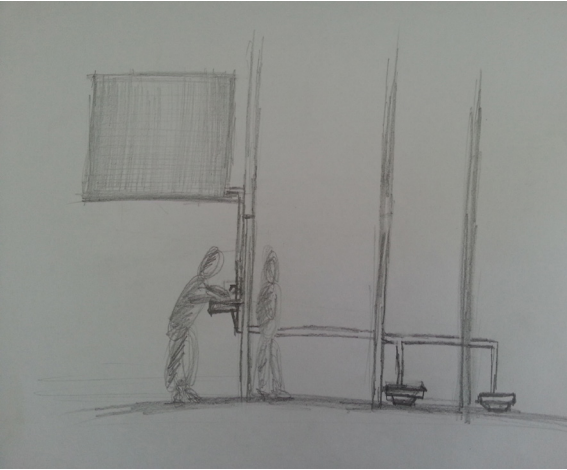
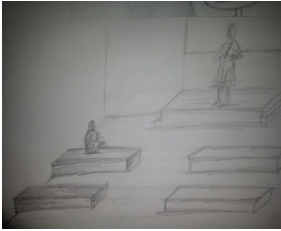
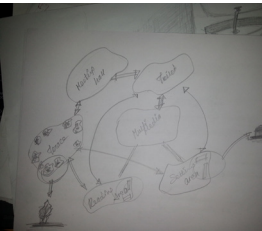
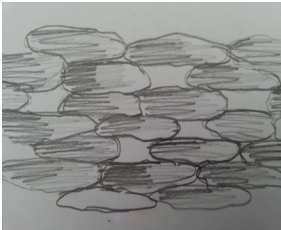
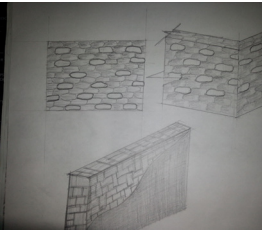
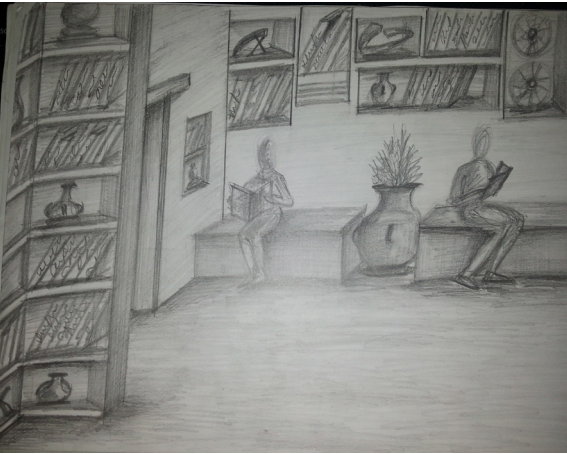
Materials based on

- Availability
- Ease of working
- Appearance
- Strength and stability
- Economy
- Durability

The building materials are -

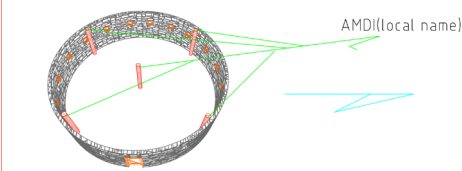
- Stone
- Mud
- Wood
- Straw



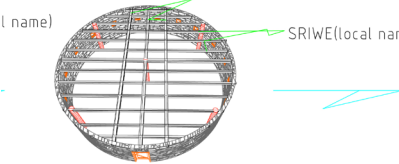


MATERIAL DETAIL

construction steps of HIDMO HOUSE

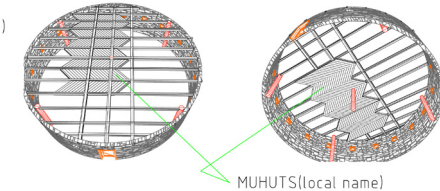


GADM((local name))  
SRIWE((local name))

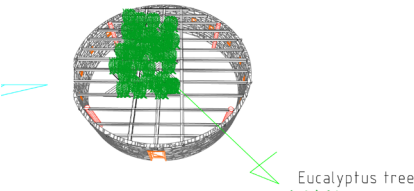


STEP 2

construction steps of HIDMO HOUSE



construction steps of HIDMO HOUSE



STEP 4 construction steps of HIDMO HOUSE

WALL

Material – stone  
UN coursed random rubble masonry  
Mortars- mud, animal dung, straw and cactus tree  
The wall or the house will not have windows  
instead we use small openings which are created  
intentionally by creating small gaps between the  
stones which uses as openings for natural light and  
ventilation

ROOF

Hidmo house roof detail  
Materials – wood, eucalyptus tree leaf, soil, and  
plastic  
Terrace roof detail – straw, wood, and plastic  
TOILET

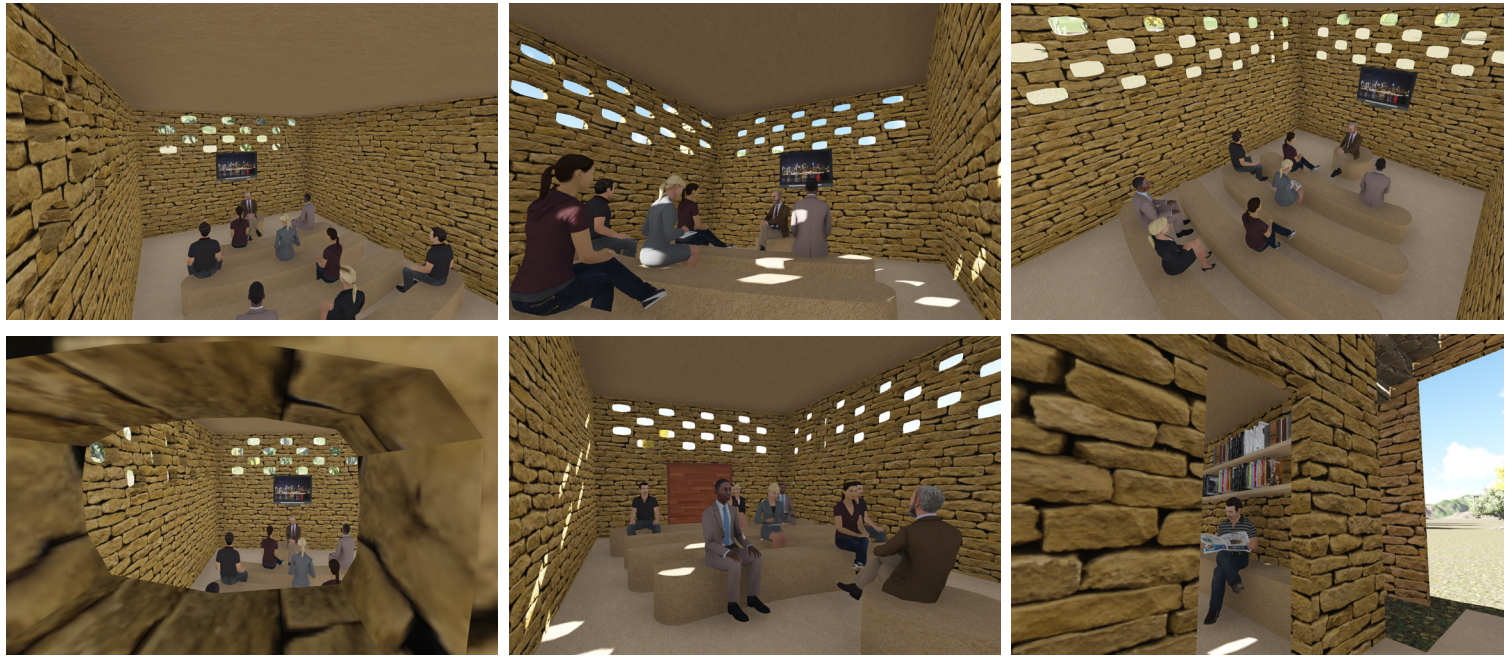
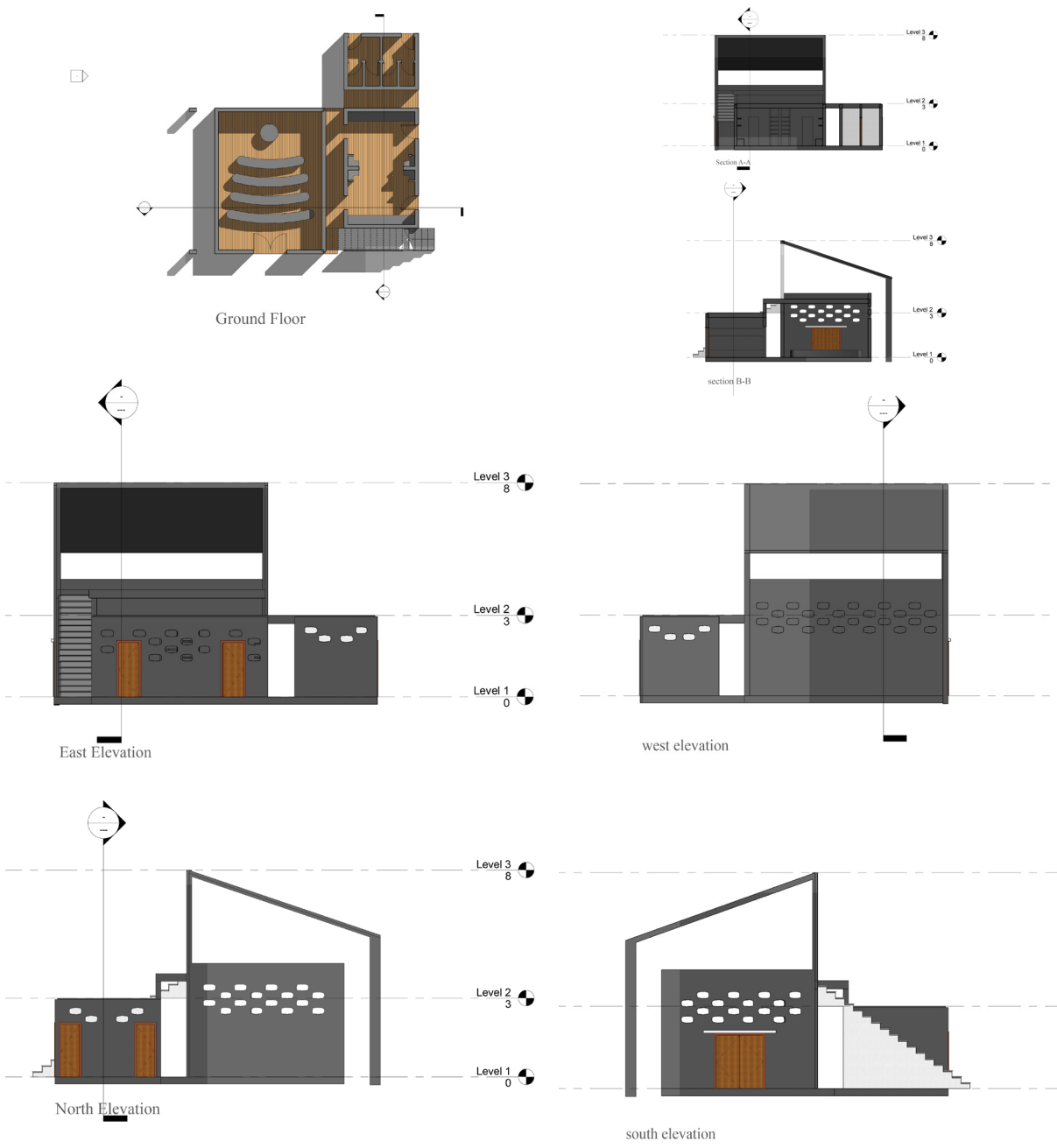
We design the toilet to flash out itself by the reused  
water (gray water) which came from the used hand  
washing water

ROOF PLANT

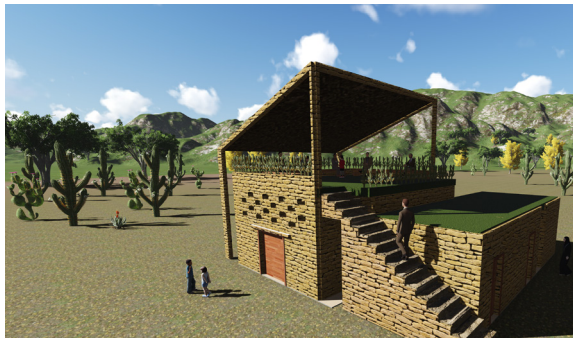
Cactus tree- local name  
Used as a boundary at the edge or at the ends of  
the terraces also we used it to integrate the green  
with the building



# PLANS AND ELEVATIONS







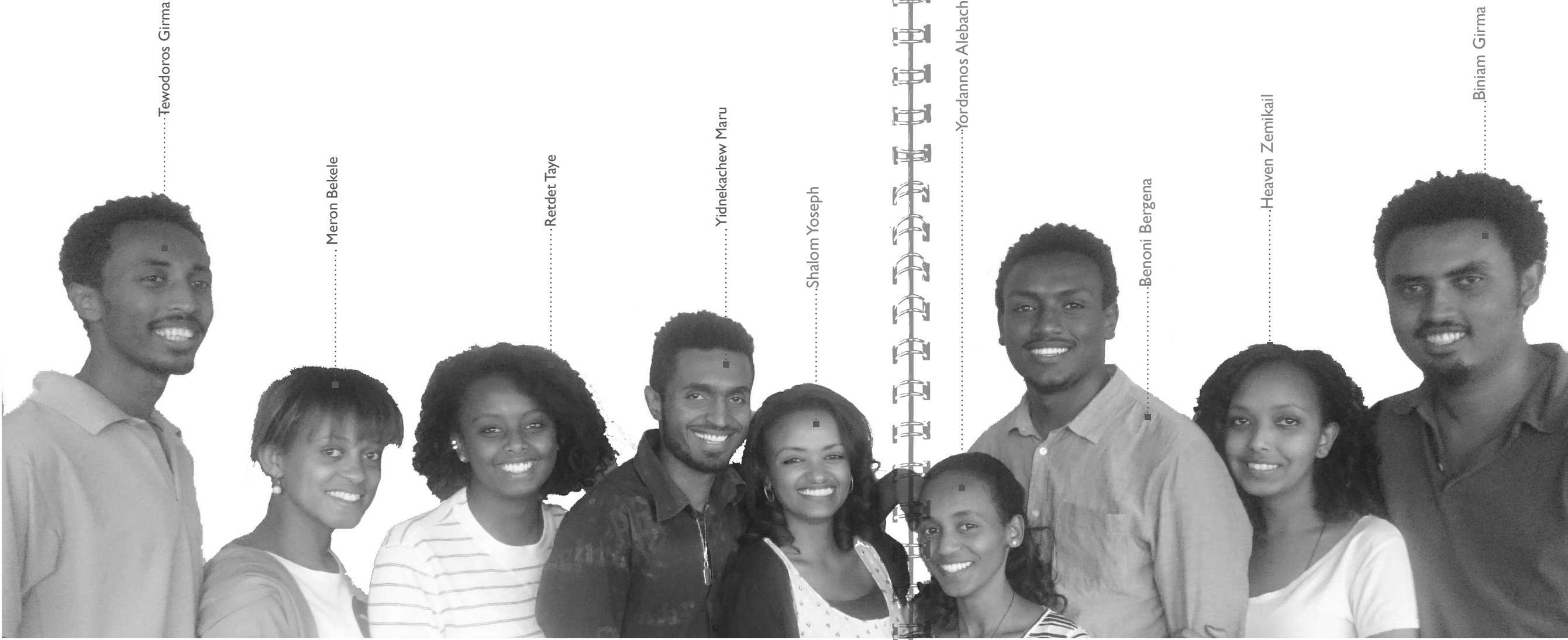


ECOLOGICAL SANITATION IN RURAL ALA'SA

SUSTAINABLE LANDMARK



It is self sufficient eco sustainable and low coast project. The project proposes a land mark to the Ala'sa village by providing a sitting area that serves as urban corridor connecting the Ecological sanitation sites. It provides fertilizer recycled from the Toilets and recycled water from the shower. Local materials are used to construct the structure and power (Electricity) source is provided from the energy generated from the processed product of the Toilet.



Tewodoros Girma

Meron Bekele

Retdet Taye

Yidnekachew Maru

Shalom Yoseph

Yordannos Alebachew

Benoni Bergena

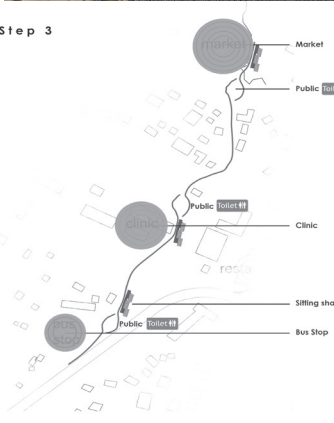
Heaven Zemikail

Biniam Girma





The site is known for a place of stone quarry and it is provided with facilities like market place, clinic and bus station. But there are no public or private toilets provided. People use their yard and this made the village very unsanitary. It is a very hot climate zone and none of the above infrastructures provides shade for their users or for the people passing by even though the people in the village have a trend of communing.



Scattered residential with main public service area in the village.

How to create connection between the public services

Connecting the three principal service place with stone made green corridors having sitting area with shades for the villagers



The concept is creating connection and land mark to the scattered villages and social services by proving toilets and stone made green corridors with shades for the community.

# ECOLOGICAL SANITATION IN RURAL ALA'SA

## SUSTAINABLE LANDMARK

### PROCESS

Periodically transfer contents of the toilet bucket to an outdoor compost pile. Cover it with a layer of dried leaves, or shredded brown pine straw, or dried grass clippings, or shredded paper. Use the same amount of covering material. This will keep the bad smell and trap the heat inside. The size for a single compost pile is 2m in diameter and 1m deep.

Carbon, nitrogen, water, heat, and oxygen are the main ingredients. As the tiny micro-organisms consume these nutrients they produce heat. Their carbon to nitrogen ratio is 30:1. Temperature should be between 32°C to 60°C and it must be maintained for at least three more days.

## TRANSPARENCY

Compost Pile Management and Oxygen Requirements

- Live Earth Worms
- Oxygen and Moisture
- Turning the Pile
- Finished Compost

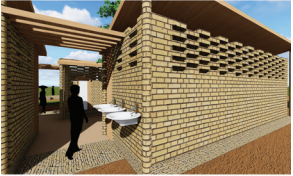
## LIVING OUTDOORS

Characteristics: uniform crumbly texture, a dark-brown color, and it has a pleasant slightly sweet aroma like fresh top soil.

### HORIZONTAL GREYWATER FILTER

The function of the horizontal greywater filter design is in principle the same as in the vertical sand filter but gravel is used as filter material. However, in this case the water is not flowing vertically through the filter but horizontally across vertical gravel and stone layers. In contrast to the vertical filter, the horizontal filter is filled with water up to the outlet. The basin can be built in the soil as long as the outflow pipe ends up above the ground.

## PUBLIC



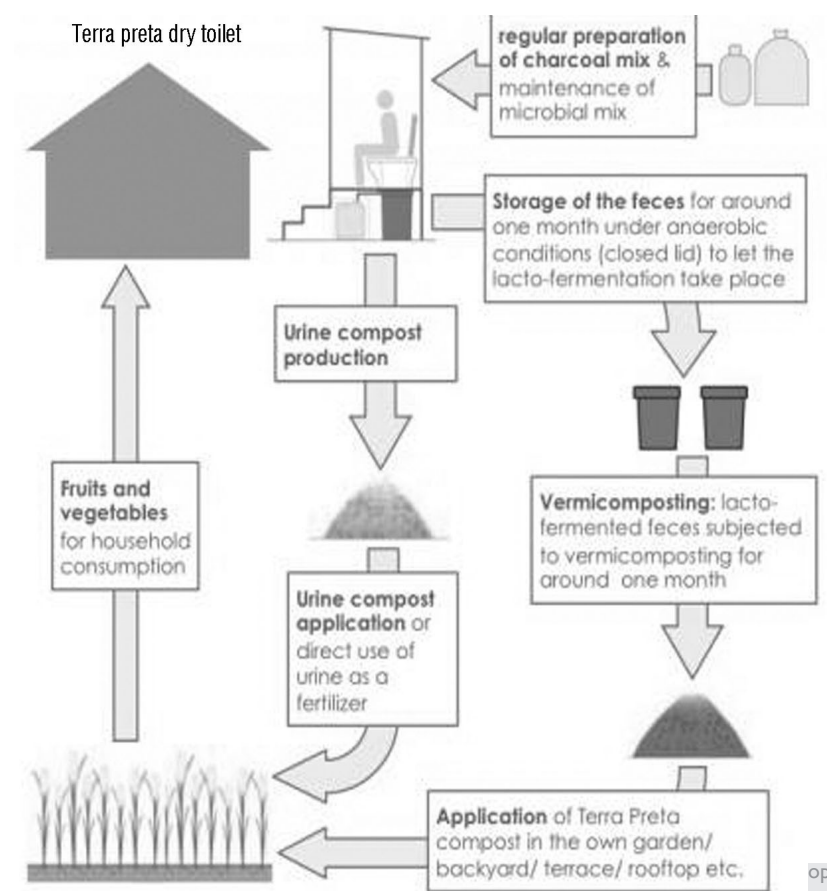
The stone quarry in the site could serve as a land mark. And the Sitting area is inspired from the communal culture of the village. Also the scarcity of an infrastructure is one of the derivations. Shades and toilets are in demand and creating a clean, sustainable green environment with a pleasant village is what motivated us.



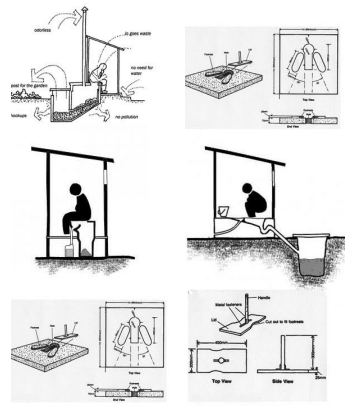
MASTER PLAN



ECOLOGICAL SANITATION IN RURAL ALA'SA



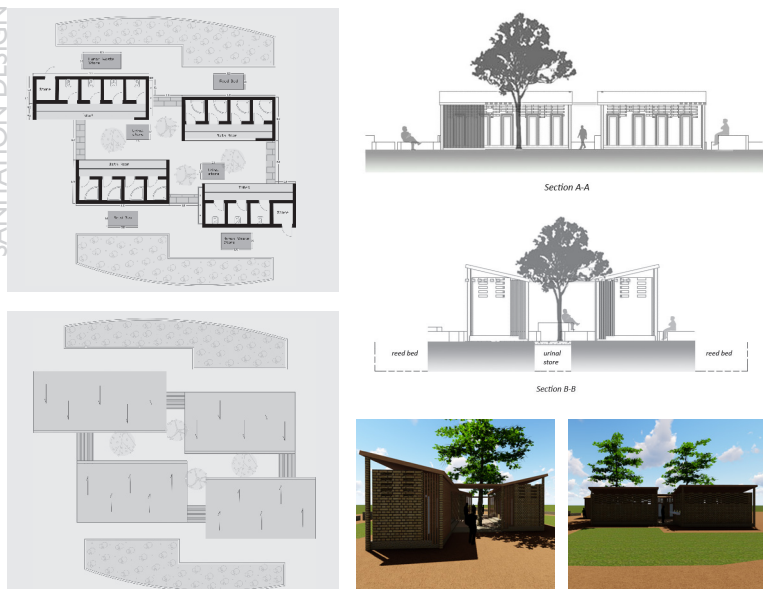
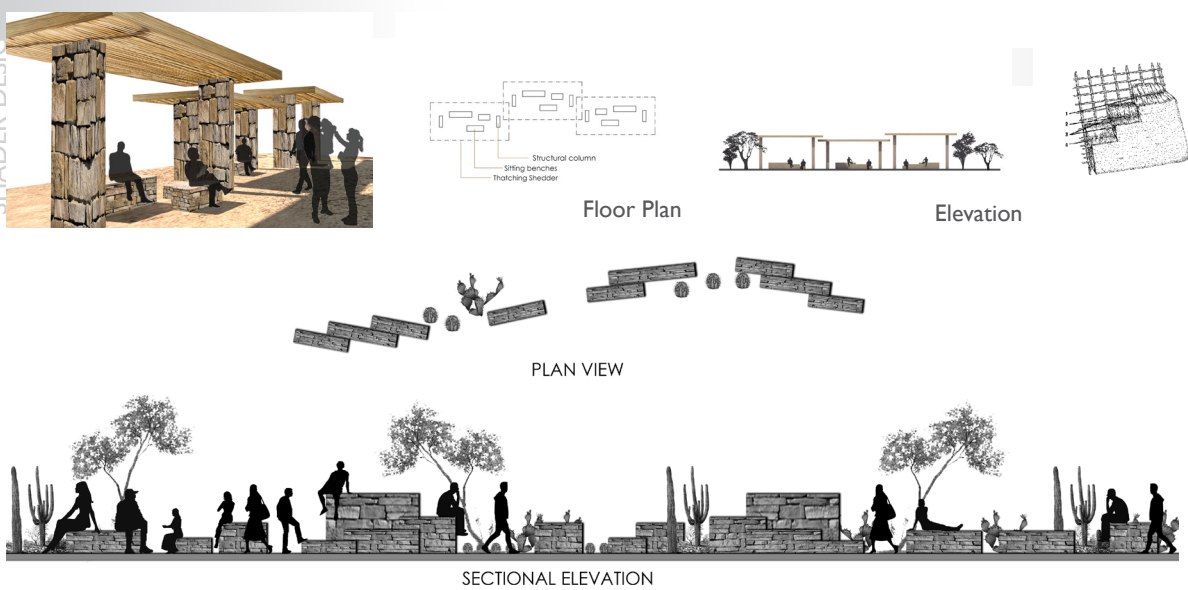
How it works



Low cost furniture proposals for toilet amenities

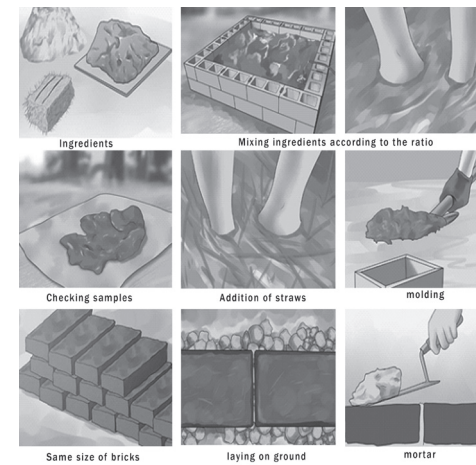






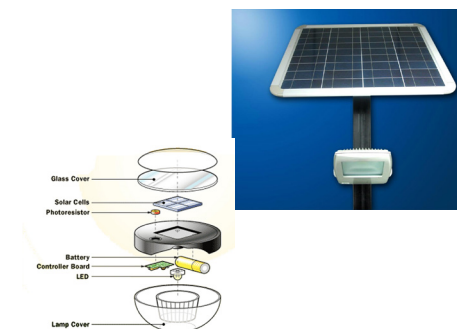
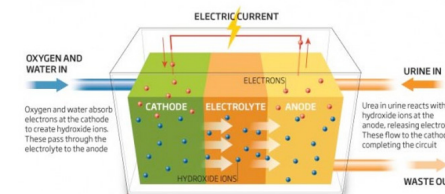
# ECOLOGICAL SANITATION IN RURAL ALA'SA

## SUSTAINABLE LANDMARK



Urine in, electricity out  
The urea in urine could be used to power fuel cells, turning an energy-draining waste product into an energy source

©NewScientist



### MUD BRICK FOR TOILET WALL

A form of architectural work, earth structures harmoniously coexist with the environment and are perfectly suitable for the tropics. In addition, most earth structures have been designed and constructed in line with the livelihoods of local inhabitants. Raw materials of adobe bricks which are subsequently used to construct earth structures are mostly natural materials, e.g. clay, sand and plant fibers, and can be acquired locally and inexpensively

### URINE POWERED GENERATOR

1. Urine is put into an electrolytic cell, which separates out the hydrogen.
2. The hydrogen enters a water filter for purification, which then gets pushed into a gas cylinder.
3. The gas cylinder pushes hydrogen into a cylinder of liquid borax, which is used to remove the moisture from the hydrogen.
4. This purified hydrogen gas is pushed into the generator.

SELF-CONTAINED SOLAR POWERed led lighting systems (off-grid) work by absorbing solar radiation in the Daytime, which is converted to electrical energy by Passing through the power converter. This energy Stored in a storage device. At night the controller allows the stored power to be released to illuminate The LEDs. It is safe to say that the solar power-LED Light combination is an optimum model for energy efficient.





LIQUID LIGHT

- Dagmawite Getaneh
- Keniko Deguma
- Kidist Deleegn
- Kibrom Alem
- Mahder Kibret
- Martha Kebede
- Mikias Wolde
- Rahwa Desta
- Semahegn W/Tsadik
- Wongel Awoke





ANALYSIS

DAIRY/BIO FUEL PRODUCTION

LOCATION

NATURE

STRENGTH

PRODUCT

INTRODUCTION

How can a project be low cost? Does it mean cheap?No way! Low cost means innovative solution that can transform the hidden potential to reality. It is interpretation of local techniques in modern language. It is participatory solution for the community for sustainable solution.

Gamra/meseret, south east tigray, is the site we select to work. The people won't to see the place being developed

LOCATION

South eastern tigray  
18970population  
34 km from mekelle

NATURE

There are 4 hilly mountains  
River  
Farming place

STRENGTH

The availability of ground water  
High quality stone availability  
Nearby water source (pump)  
Nearby rail line, Market place  
Greenery, River  
Honey product

MILK PRODUCT

Opportunity  
-Availability of stone:- for any construction purpose  
-Cactus:- for production of cosmetics uhu plastic materials and so on  
-Wind:- for power generation  
Market place:- for urbanizing the area  
Train station rail way





## ANALYSIS

### CHALLENGE

#### ASPECT

.....

### DAIRY FARM

Dairy farms grow their own feed, typically including corn, and hay. This is fed directly to the cows, or is stored as silage for use during the winter season. grains from local breweries.

Challenge

Light

Hilly: - will be a challenge for underground water to address to the top

General Aspect of the project

We try to design a milk production with supportive functions like biogas stations for the community. This will work where ever we got the cattle resource. So the scope of functionality for our system is unlimited with any construction material.

Dairy farming is a class of agriculture for long-term production of milk, which is processed (either on the farm or at a dairy plant, either of which may be called a dairy) for eventual sale of a dairy product.







NEED ASSESSMENT

DAIRY/BIO FUEL PRODUCTION

results

INDIVIDUAL

The area has different layers of commercial possibilities. Especially the Gamra residence where the demographic is turning out to be dominated with the elderly and kids (aged between 0-13) bringing economic means where the young adult or working force stays and contributes for economy of the town was vital.

INVENTORY

They want to have better job opportunities  
They want to get better services provided and better access to different infrastructures and market.

AGRICULTURE

The agricultural productivity of the majority of the community is dependent on the availability of water on the specific rainy season and because of the dramatic change

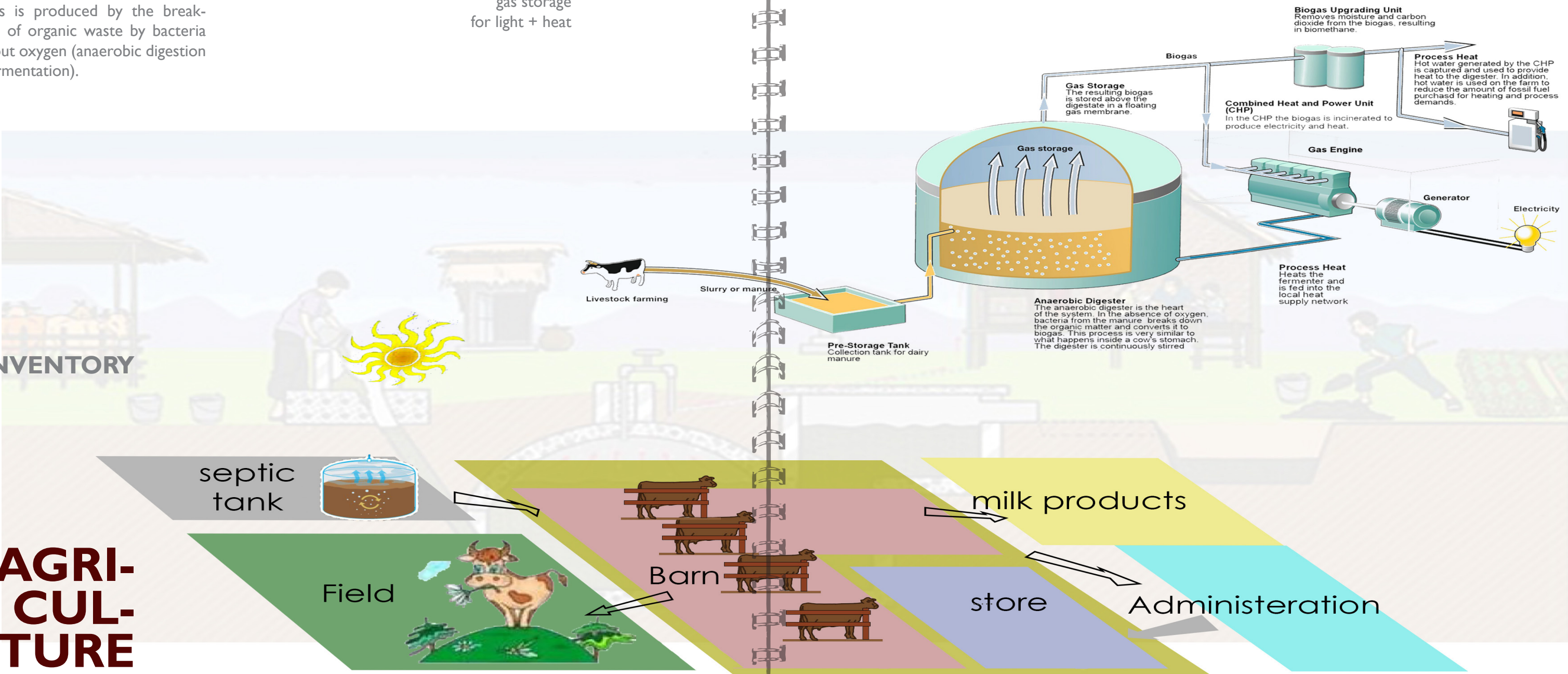
COMMUNITY

What is it Biogas used for?  
Biogas is a fuel used as an energy source for light, heat or movement  
How is it made?  
Biogas is produced by the break-down of organic waste by bacteria without oxygen (anaerobic digestion or fermentation).

Dairy production  
Animal manure storage  
Biogas production  
gas storage  
for light + heat

FUNCTIONAL DIAGRAM

DAIRY/BIO FUEL PRODUCTION



INVENTORY

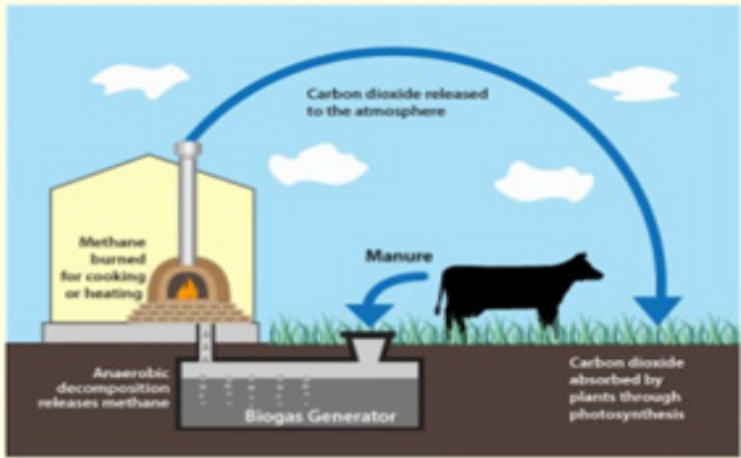
AGRI-  
CUL-  
TURE



# Biogas Steps

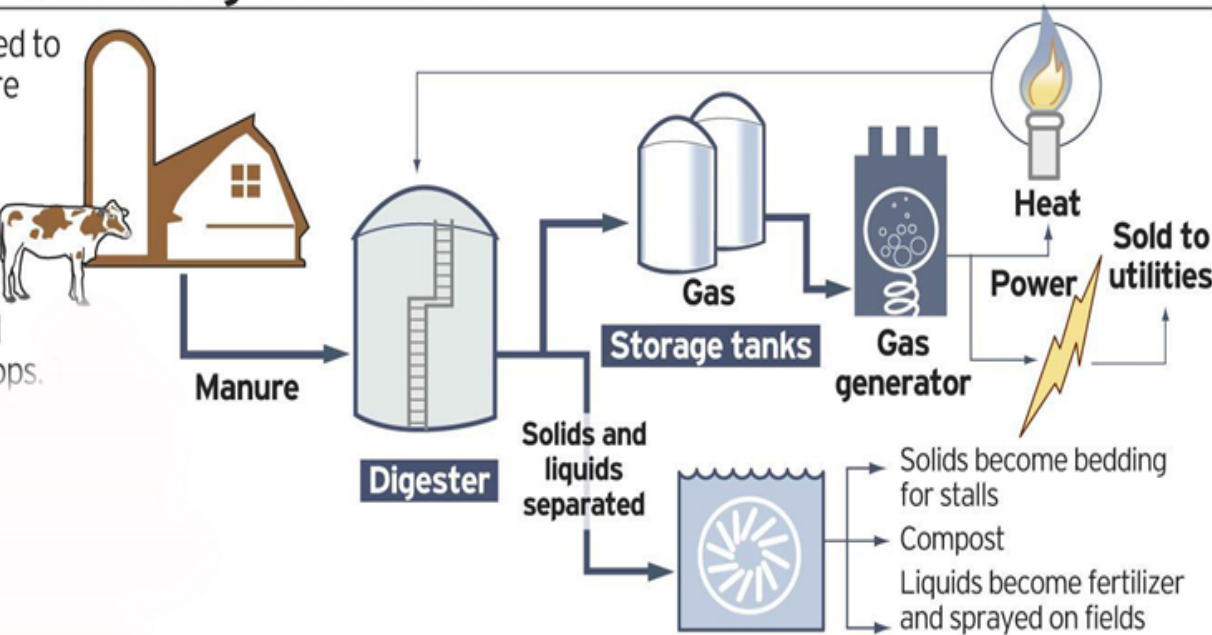
■ The biogas process is often divided into three steps:

- **Hydrolysis,**
- **acidogenesis and**
- **methanogenesis,**



## How an anaerobic digester works

Manure is routed to the tanks, where it's cooked, compressed and the gas collected. The system draws off liquid fertilizer for crops.

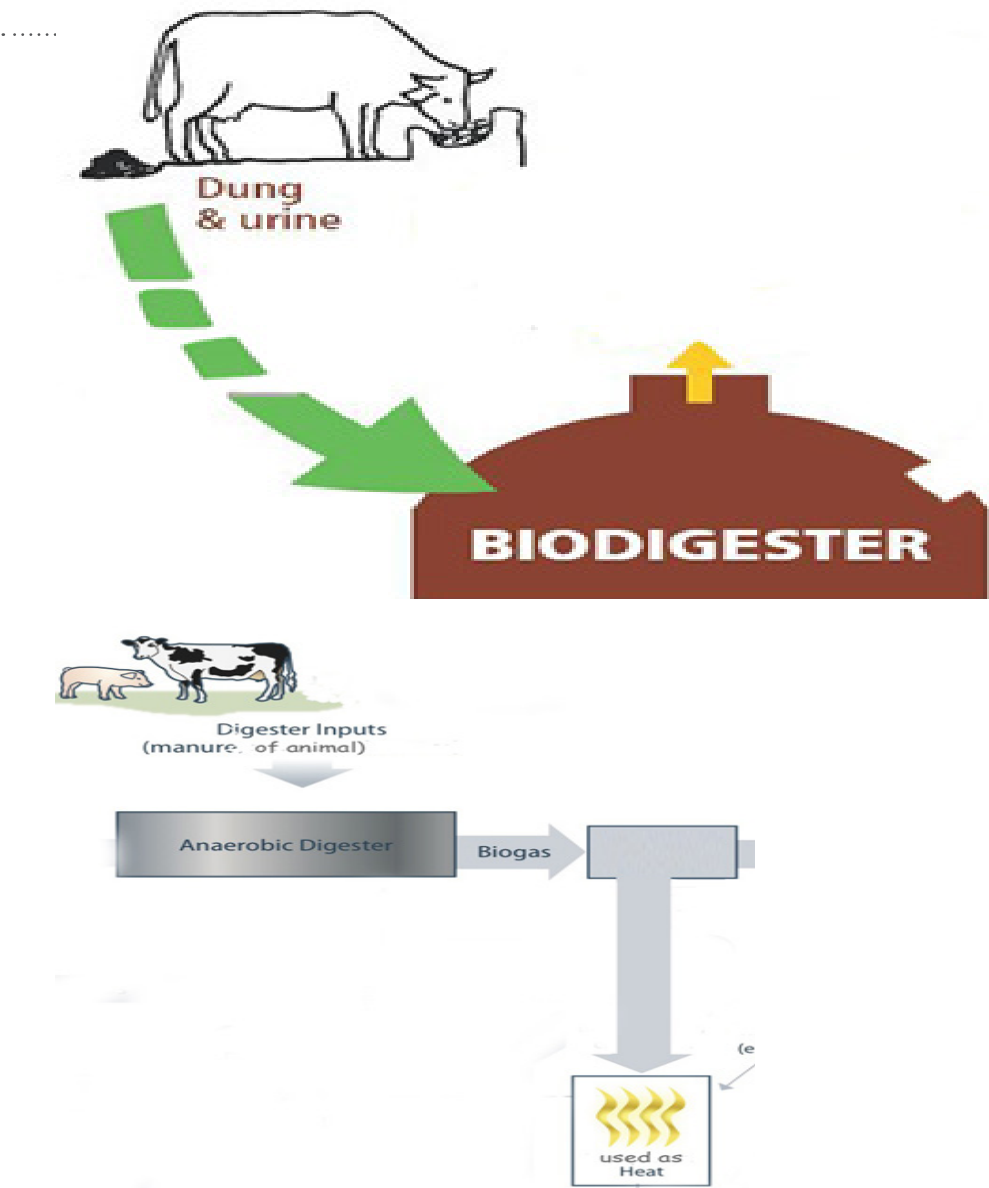


DAN AGUAYO/THE OREGONIAN

## FUNCTIONAL DIAGRAM

DAIRY/BIO FUEL PRODUCTION

## BIODIGESTER

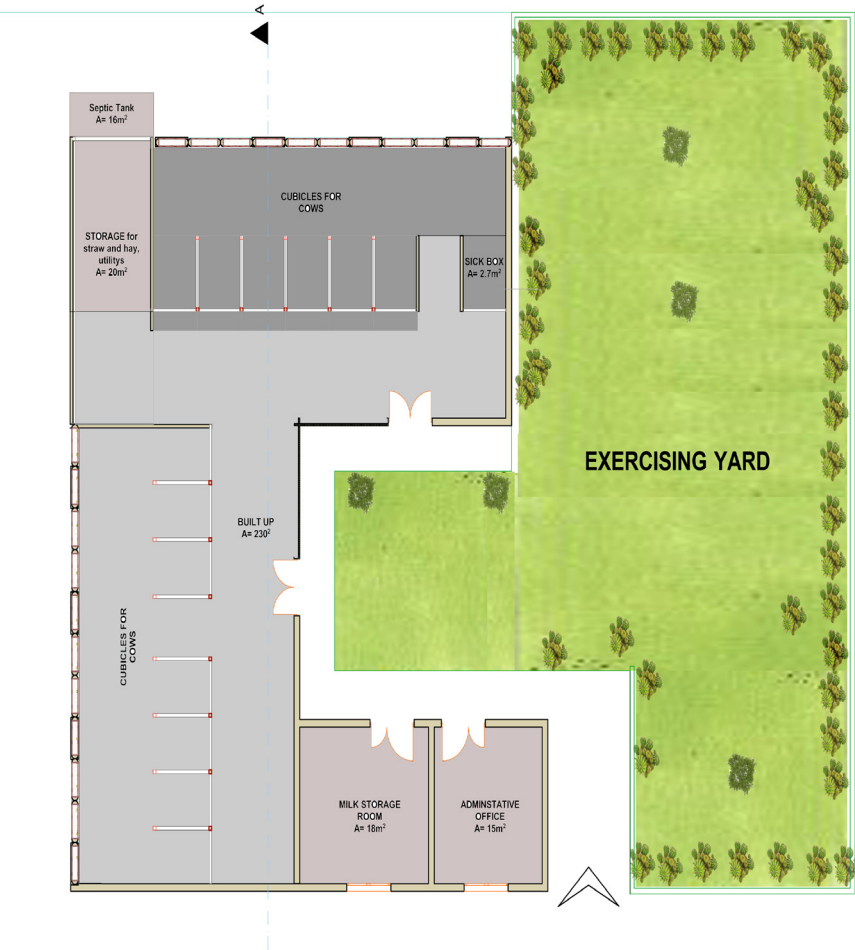




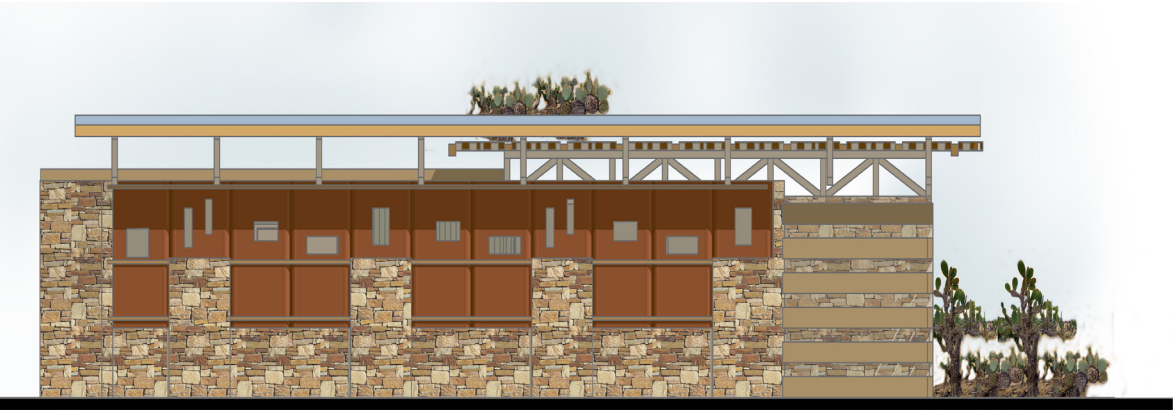
WEST ELEVATION



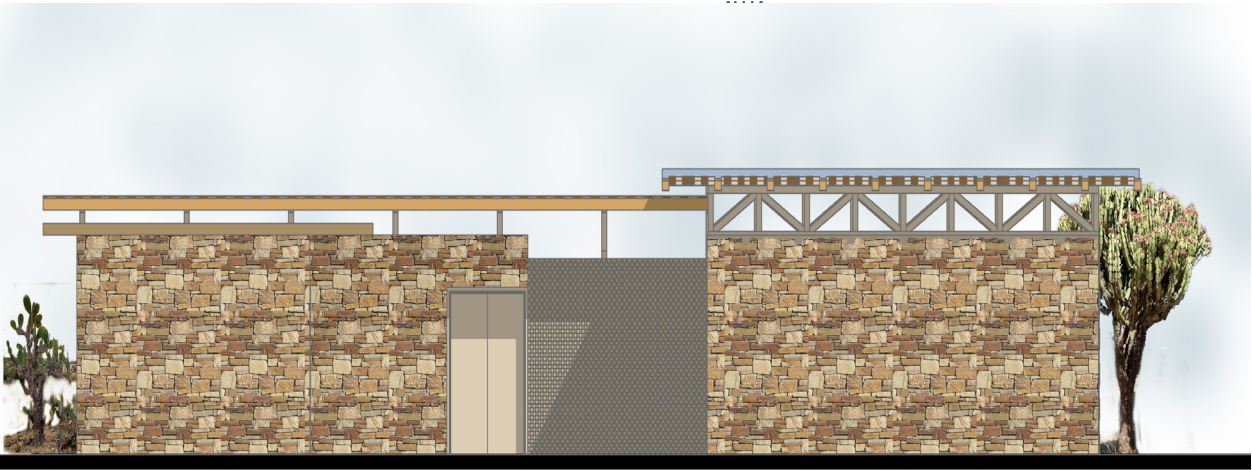
SECTION AA







NORTH ELEVATION

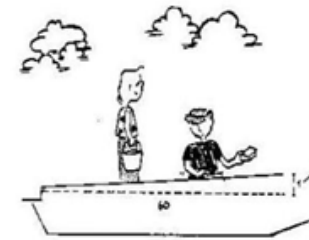


EAST ELEVATION

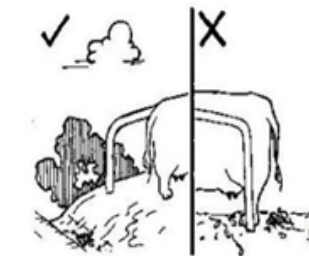
PRESENTATION DRAWING



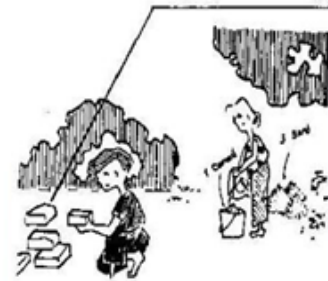
The floor is made of rubble and cement.



Make sure the site is sloping at least 1 in 60 (1.5 %) towards the gutter.



Make sure your floor has enough slope so that water and urine - do not pool - Flow away from your animal

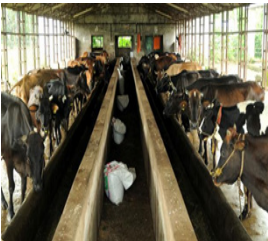
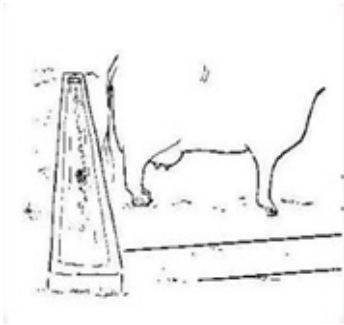


Lay down the rubble with the flat side up. Follow the slope. Mix 1 part of cement with 3 parts of sand and a little water. Pour the sand/cement mixture between the rubble and make a flat surface. Check the slope is still at least 1 in 60

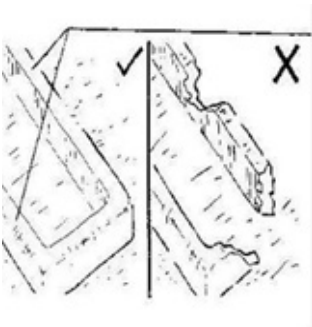
# THE GUTTER (ALSO CALLED DRAIN OR DUNG CHANNEL)



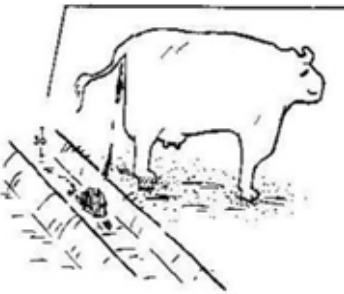
The gutter is made of rubble (or brick) and cement,



This makes sure the sides of the gutter are strong good maintenance of the floor



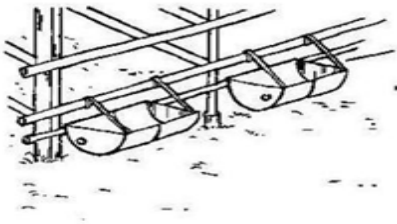
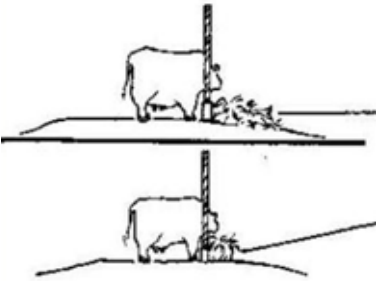
The gutter is easy to clean and carries urine and dung easily to a bio-gas digester  
The gutter can be about 15 cm deep, 40 cm wide with a slope of 1 in 40 (2.5 %).



## DETAILS

### THE FEEDER (ALSO CALLED THE MANGER)

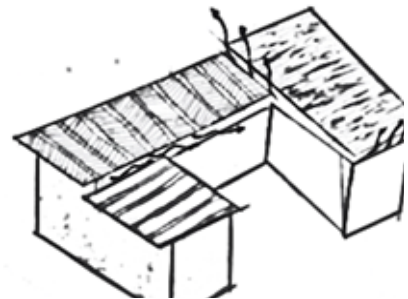
To prevent animals not picking up some of the feed and it is wasted we need a container for concentrates.



### ROOF



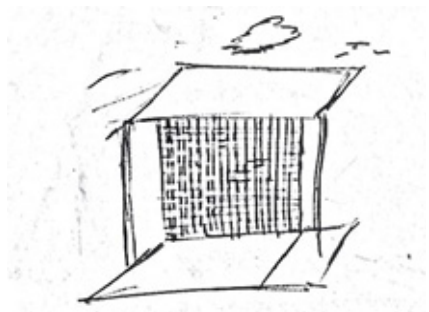
Depending on purchase cost maintenance and repair costs roof materials are wood and straw  
In tropical areas with little shade it can get moderate in the shed with a wooden roof



In addition we can keep the shed cooler and the wood from moister by laying mats, straw or leaves over the wood







In walls that are not exposed to wind are made of raffia

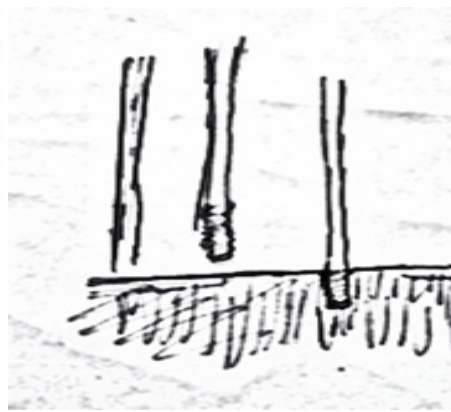


DETAILS



PILLARS AND POSTS

Pillars and posts within the shed is made of wood,



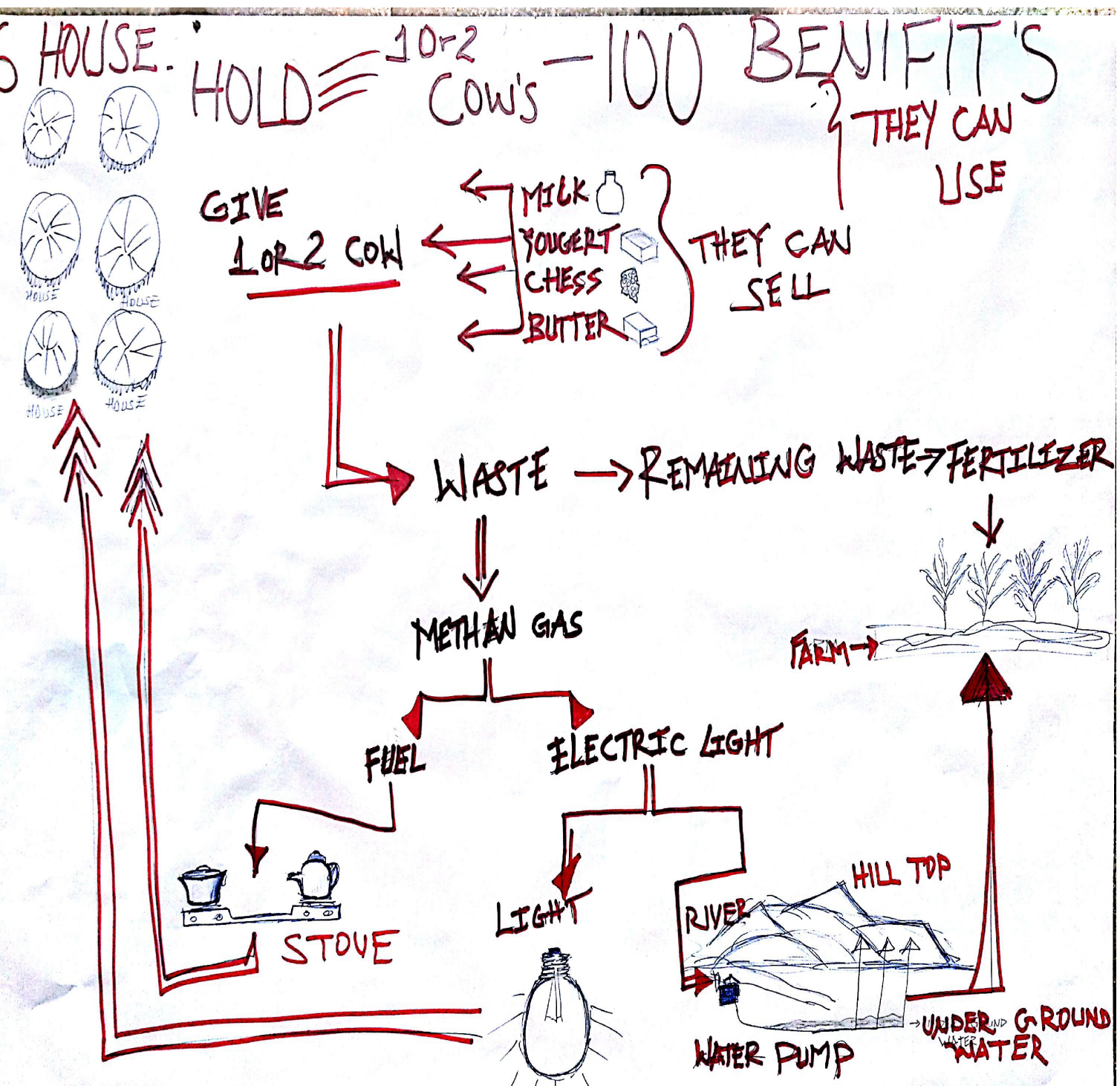
When wood is used, durability can be improved by having the bottom of the pillar covered by plastic bags and bury it down up to a height of about 30.0 cm.

SIDING WALLS



The wall is made of sand filled in ....., stone and wood.



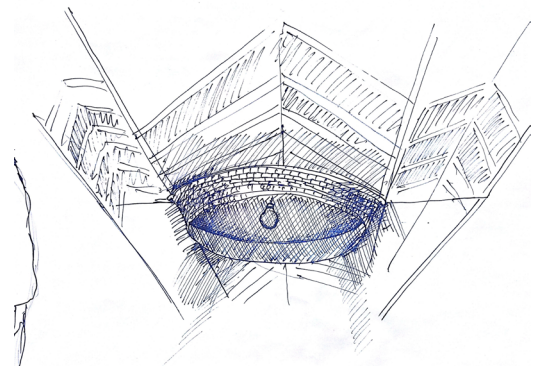
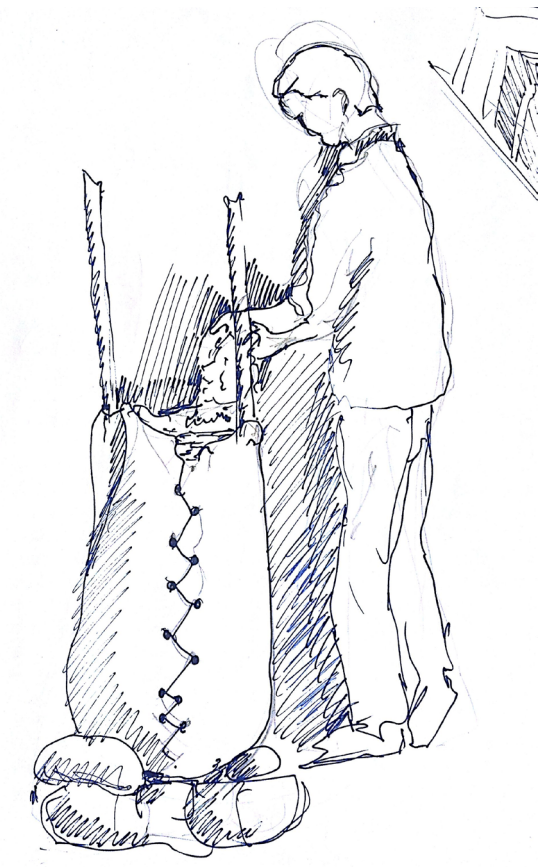


DETAILS

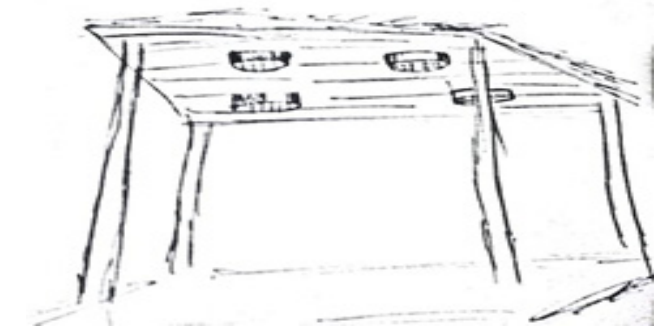
DAIRY/BIO FUEL PRODUCTION

results

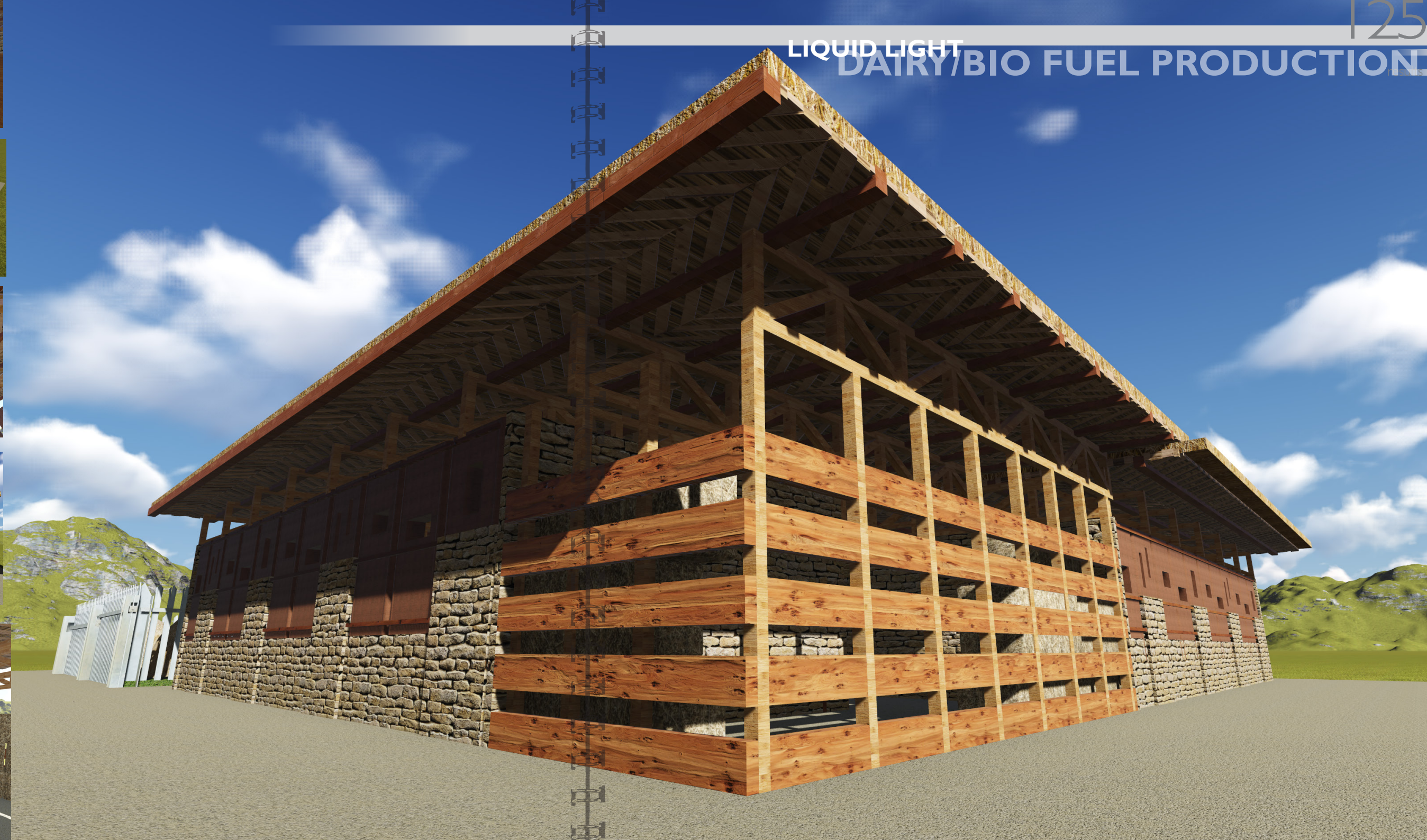
Wall Detail



Lighting detail

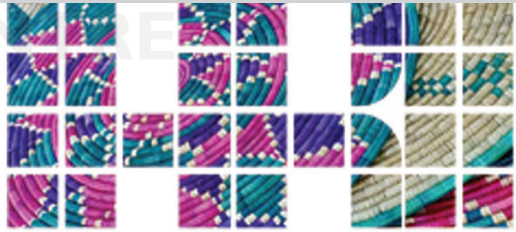








ART CENTRE



first we try to list all the potential we had in tigray rigion which are

- cactus
- housing issues
- stones
- art.....

and we choose art because despite of our diffrence in culture language.... it is the one thing that we had in common.

Ethiopian culture is rich with artistic expression and traditional handcraft skills. From precious religious artifacts to everyday utilitarian objects, the Ethiopian aesthetic reflects a culture endowed with a profound history and human ingenuity. Each culture pre-serves its identity through food, lan-guage, and colors and translates their distinct traditions into handcrafts unique to each culture.

so inorder to inhance this handcraft techniques we found it very important to design a low cost craft center which can be applied in to different place according to thier needs. so we propose 4 different craft centers which are

- Basketry center
- Pottery center
- Textiles center
- Carving center



MEMBERS

- NEBYOU GIZACHEV
- OLIYAD DEMIESSE
- TEDLA KEBEDE
- MINTESNOT ALEM
- MULUGETA FISHA
- METADEL TSEHAY
- MIKIYAS ALEMAYEHU
- FIKRESELAM TADESSE



BASKETRY



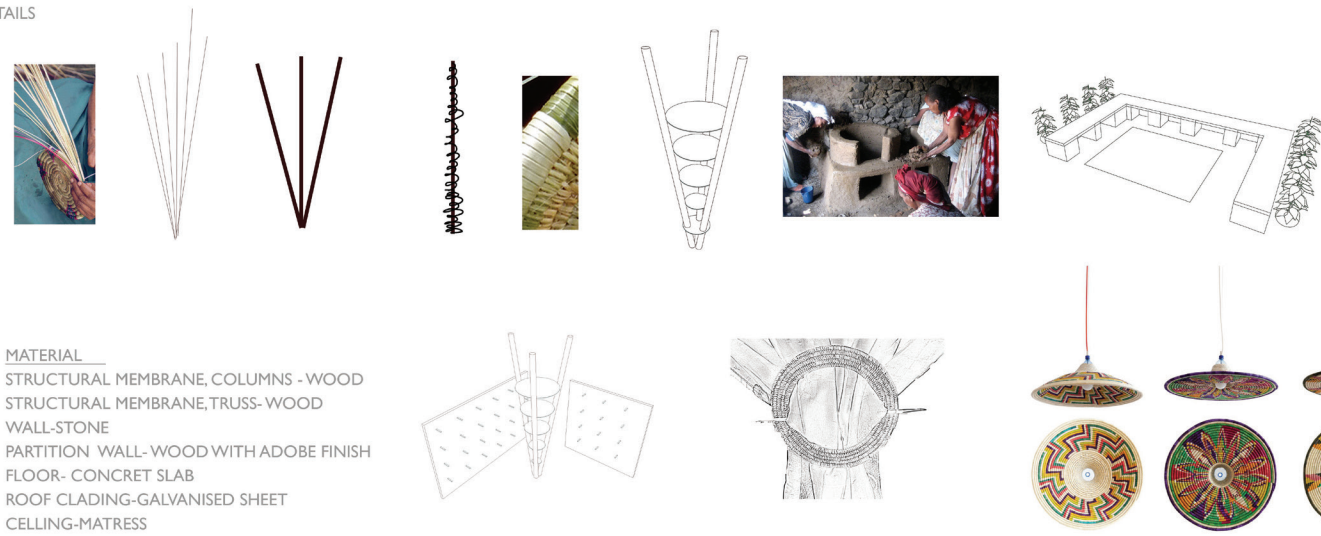
Basketry  
Baskets play a major role in Ethiopian culture and society and are seen as functional, decorative, and sacred items throughout the country

- MAIN PROGRAMS
- working area (teaching area)
  - display area
  - store
  - communal area

design approach  
main characters - done in groups/ social life-  
-they prefer an outdoor space-semi out door space  
if a certain society says we are good at basketry that means  
its also the low cost material for that specific site. so we de-  
cided to use some basketry products for this prototype.  
celing, facade, structural support cover.



DETAILS



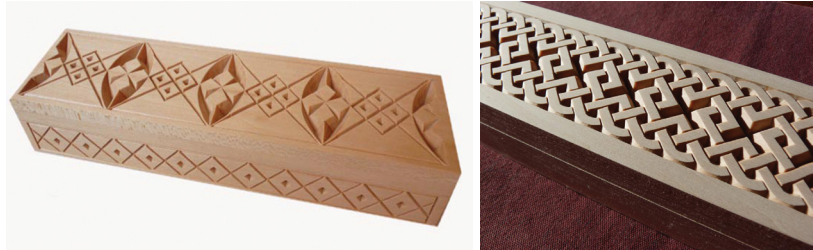
MATERIAL

- STRUCTURAL MEMBRANE, COLUMNS - WOOD
- STRUCTURAL MEMBRANE, TRUSS- WOOD
- WALL- STONE
- PARTITION WALL- WOOD WITH ADOBE FINISH
- FLOOR- CONCRET SLAB
- ROOF CLADING- GALVANISED SHEET
- CELLING- MATTRESS

ART CENTRE - BASKETRY







- MAIN PROGRAMS
- working area (teaching area)
  - display area
  - store
  - communal area



DESIGN APPROACH

main characters - the facade and display area made up of carced wood, which is common in Ethiopia carving.

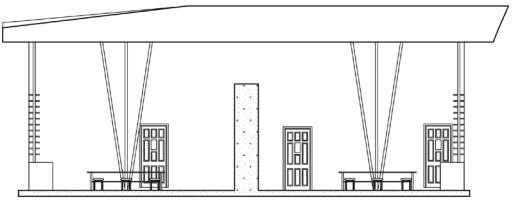
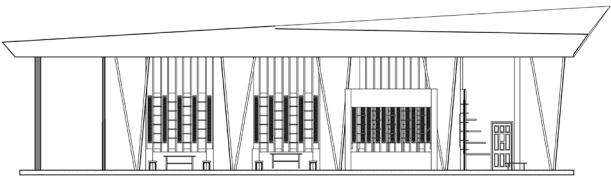
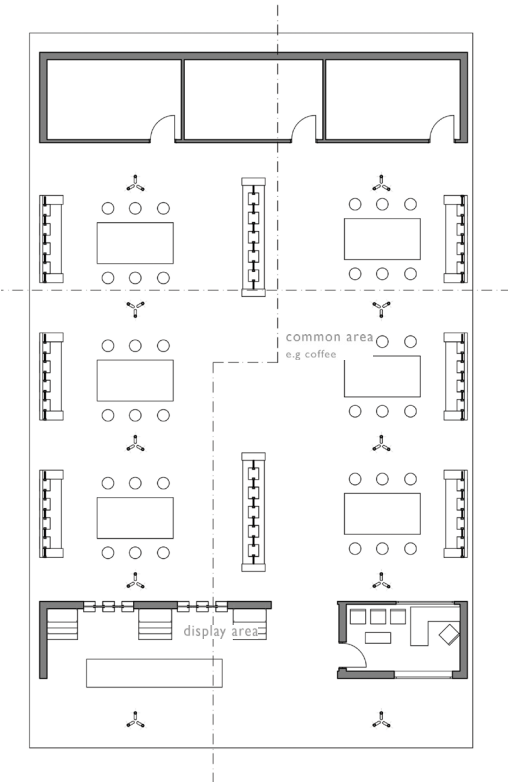
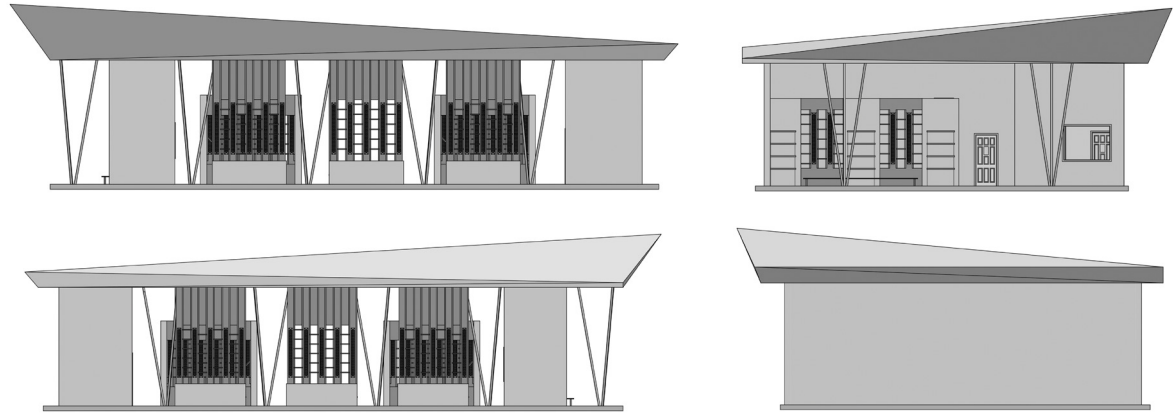
Carving

Ethiopian wood carvings, made from the once abundant trees, are the most well known carvings in the country. Wood has always been worked to fulfill the needs of daily Ethiopian life - spoons, dishes, beds, and chairs were all traditionally made from black-stained wood and often adorned with pearls of silver metal.

carvings made from cow horn are found in villages and still used in everyday life. The simplest horn carvings are plain and unadorned spoons and goblets used for drinking beer and liquor.

Folding wooden bookstands are also popular among both Christians and Muslims Ethiopians. Richly decorated, they are used for study and carrying holy books. Carved wooden statuary is not as highly developed in Ethiopia as it is in many other parts of Africa. The Konso tribe is well known, however, for its woodcarvings, called waka, that symbolize the achievements of an individual after death.

ART CENTRE - CARVING



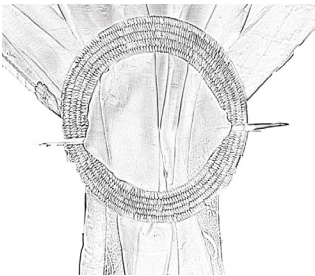




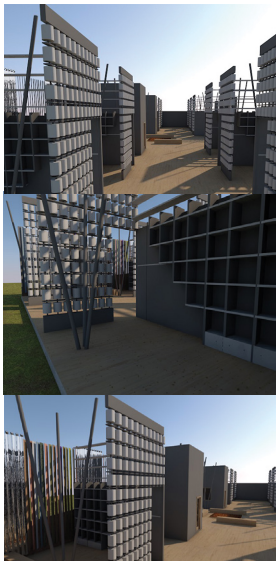
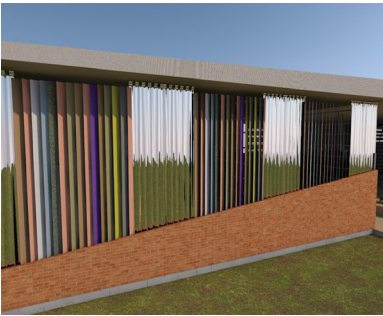
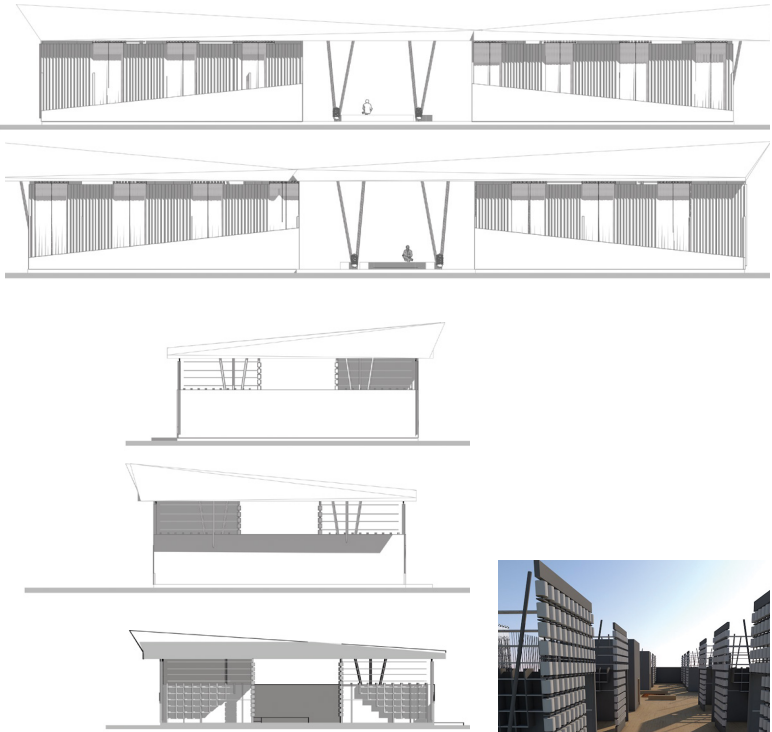
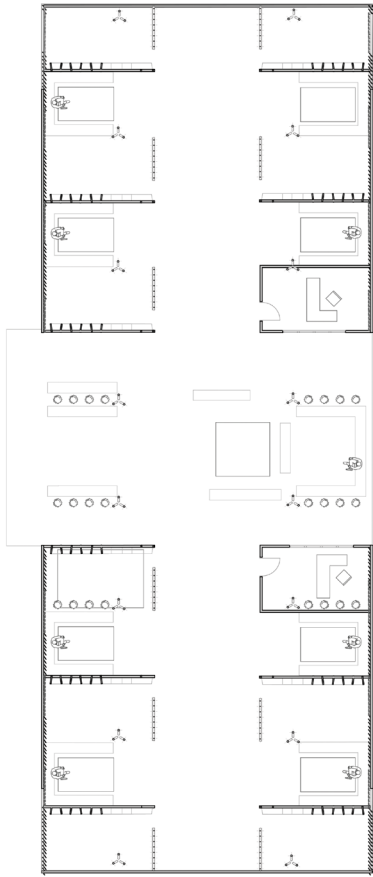
Traditional textiles in Ethiopia have centered on the country's reputation as a cradle of cotton. Cultivated and hand spun here for thousands of years, cotton has always occupied a central role in rural cultural life. Ethiopian women will grow or buy unrefined cotton, card it by hand and spin it with an inzirt. Women twist the inzirt, essentially a free standing spindle, in one hand while pulling the cotton in the other to make yarn. The inzirt is topped with a kesem which acts as a bobbin to spool the thread. The thread is then given to weavers who are traditionally male.



MATERIAL  
STRUCTURAL MEMBRANE, COLUMNS - WOOD  
STRUCTURAL MEMBRANE, TRUSS- WOOD  
WALL-STONE  
PARTITION WALL- WOOD WITH ADOBE FINISH  
FLOOR- CONCRET SLAB  
ROOF CLADING-GALVANISED SHEET  
CELLING-MATRESS



## ART CENTRE - TEXTILE CRAFT CENTRE







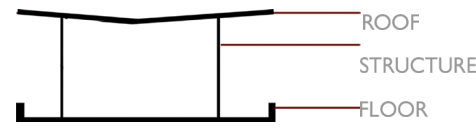
craft works, women totally dominate pottery making (from identification of clay mining sites, mining, transporting clay to manufacturing sites, preparing clay mineral, shaping vessels, drying, firing, post firing treatments and marketing) in the study region and therefore throughout the literature a potter refers to a woman

DESIGN APPROCH

main characters - done in groups/ social life-  
-they prefer an outdoor space-semi out door space  
if a certain society says we are good at basketry that means its also the low cost material for that specific site. so we decided to use some basketry products for this prototype.  
celing, facade, structural support cover.

MAIN PROGRAMS

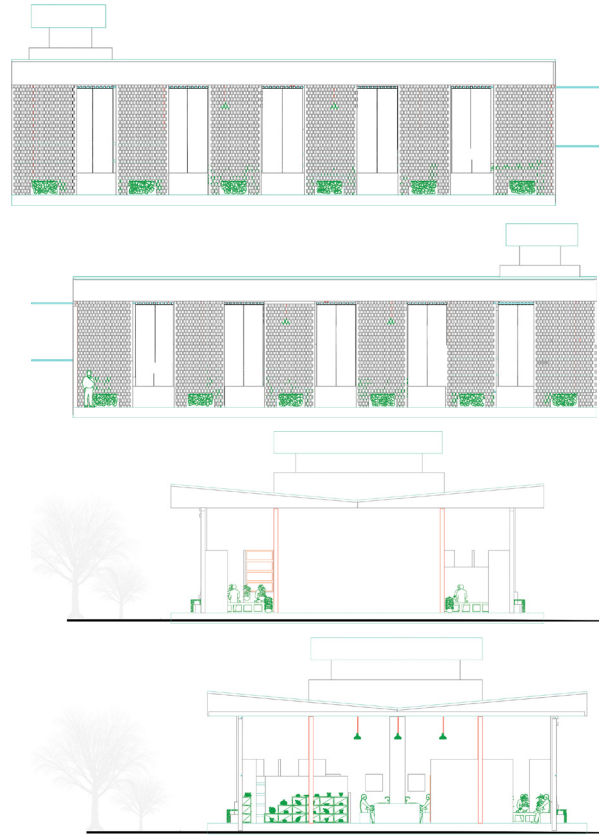
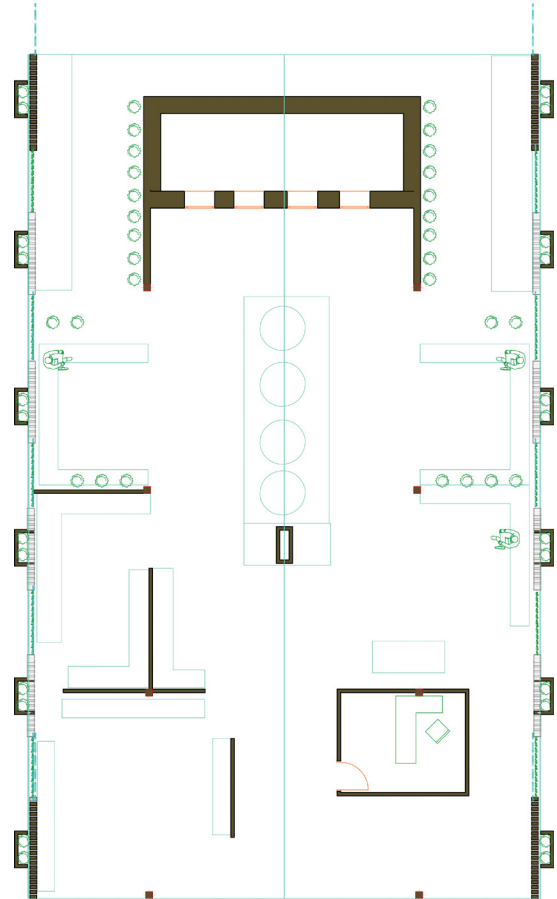
- working area (teaching area)
- display area
- store
- communal area



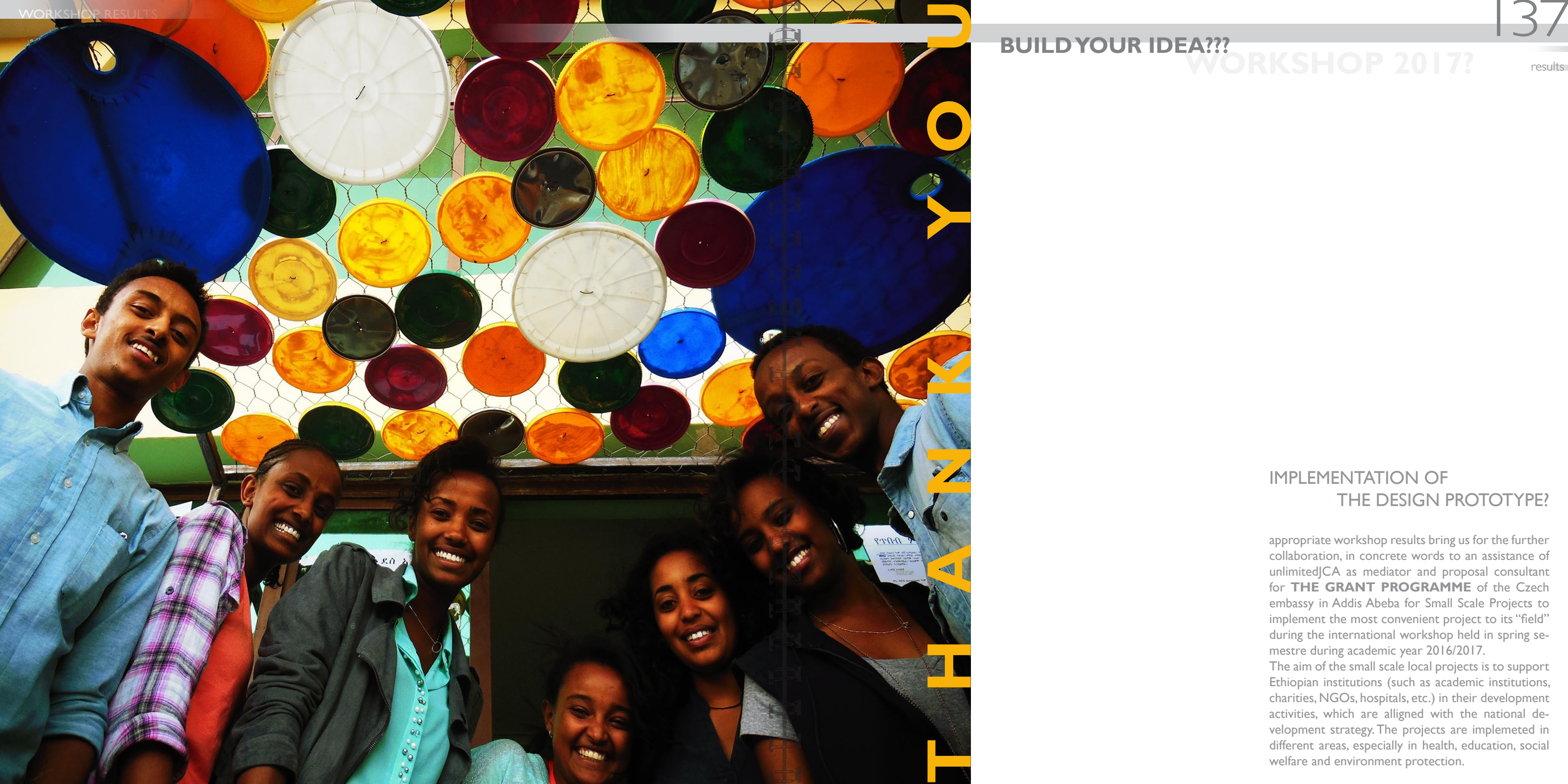
Abobe brick making is a simple technology: all one really requires is dirt, water, and a hole in the ground to mix the two--- with the "bricks" being formed by handy



ART CENTRE - POTTERY CRAFT CENTRE







## BUILD YOUR IDEA???

## WORKSHOP 2017?

### IMPLEMENTATION OF THE DESIGN PROTOTYPE?

appropriate workshop results bring us for the further collaboration, in concrete words to an assistance of unlimitedJCA as mediator and proposal consultant for **THE GRANT PROGRAMME** of the Czech embassy in Addis Abeba for Small Scale Projects to implement the most convenient project to its “field” during the international workshop held in spring semestre during academic year 2016/2017.

The aim of the small scale local projects is to support Ethiopian institutions (such as academic institutions, charities, NGOs, hospitals, etc.) in their development activities, which are alligned with the national development strategy. The projects are implemeted in different areas, especially in health, education, social welfare and environment protection.



INNOVATION SHOULD BE SIMPLE  
THE MORE COMPLICATED IT IS,  
THE MORE MISTAKES ARE MADE.



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