



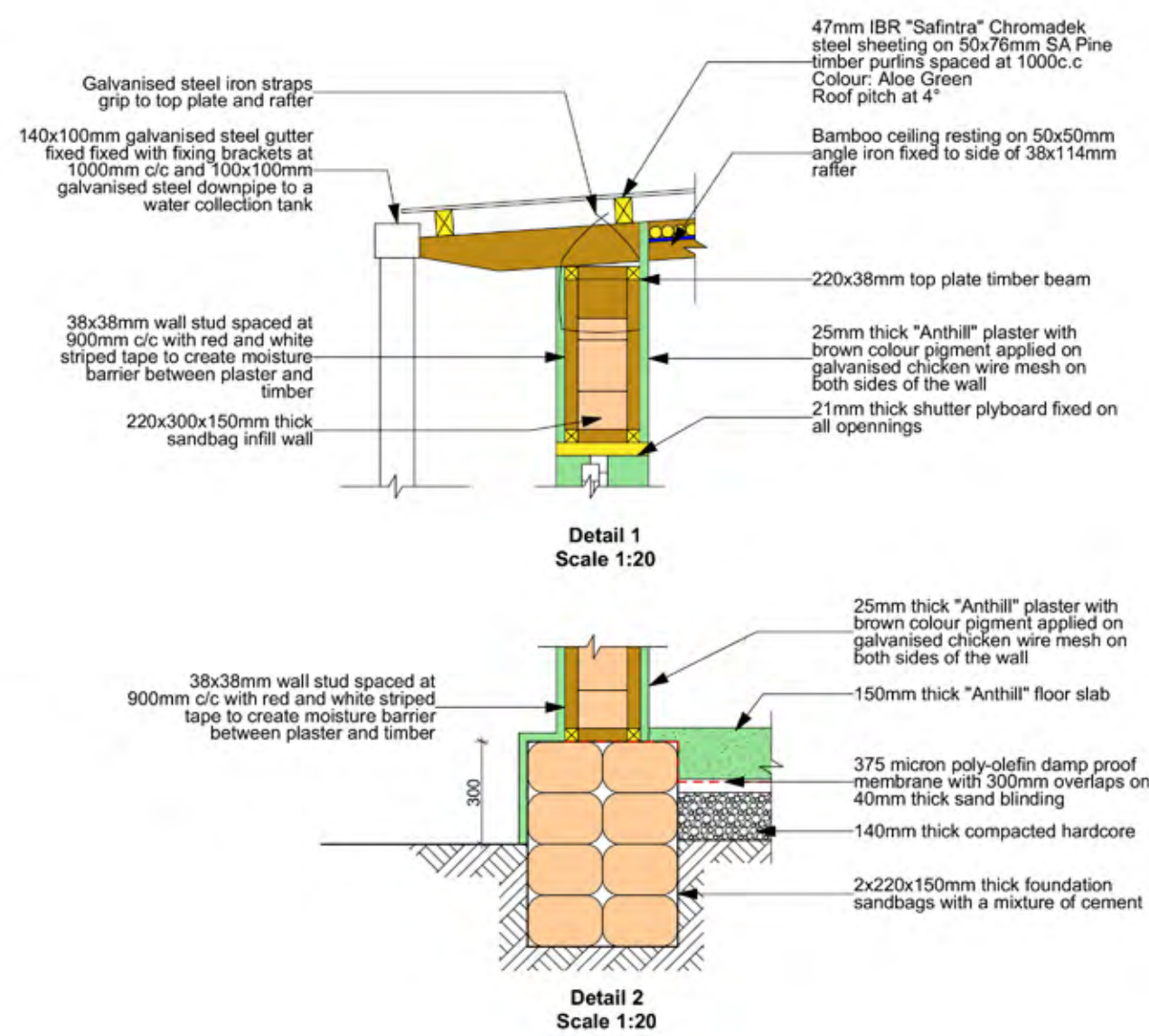
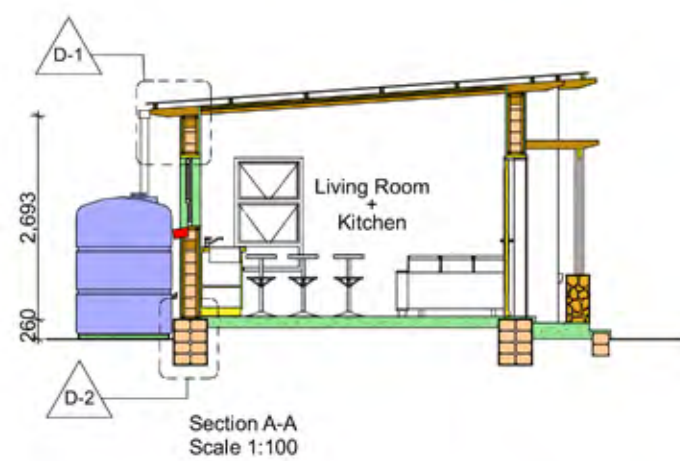
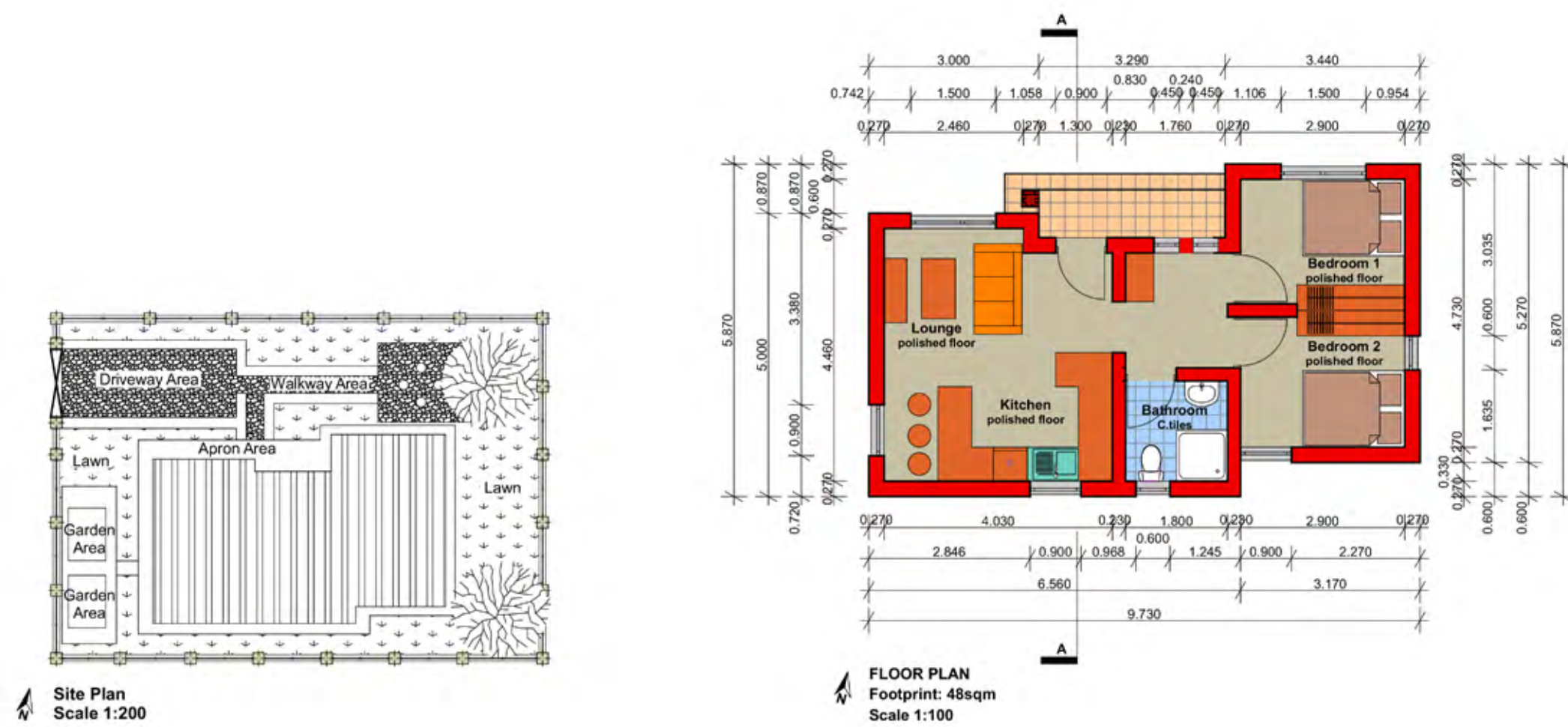
LOW COST HOUSING

Building with sand bags

Thandi
Mokoma

AD IN
ARCHITECTURAL
TECHNOLOGY

PRELIMINARY DESIGNS



Project Description

This project focuses on the immense need of low cost houses that will not only be sustainable but also carry the cultural identity of Lesotho and Basotho. Lesotho is facing a challenge of increasing urban migration, climate change, limited accessible land due to its topography and scarcity of resources.

A large number of Basotho population according to the National Housing Policy earn under M1000.00 per month hence making it difficult to own a decent home that will also accommodate the rapidly changing climate in the country.

The challenge then boils up to coming up with a residential house that can accommodate a small household in a 48sqm footprint. It should have two bedrooms, living and eating area and a bathroom with a total building cost of M5000.00 including basic electricity and connection to sewage or septic tank.

Site selection

The site is located in Maseru West, a very decent area which houses the State house and some well-known international schools like Machabeng College. The area is mostly very quiet during the day and busy around morning hours and knock off from schools. Although there was no particular plot number given, I came across a vacant plot which is along the Lancers road in Maseru West.



Facilities close to the site include:

- Police station
- Pre-school
- University
- Recreational centre

Site plan

There is an immediate access into the site from the Lancers road of Maseru West. The yard is fenced using "grade3" mud bricks and pallets. The landscape design for this particular building is simple and welcoming with vivid walkways from the gate leading to the entrance of the building and another heading straight to an outdoor sitting area made out of tree logs. It has more greenery since the site already has grass, along the fencing are fruit trees, shade trees, indigenous plants like the Spiral Aloe and seasonal flowers. The walkways are paved using sandstone which is easily found and highly used in Lesotho.



Apricot trees



Spiral Aloe



Pallets to be used for fencing



Sandstone used for paving walkways



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DESIGN NARRATIVE

THE DESIGN BRIEF.

- Housing unit that is sustainable.
- Uses locally sourced materials.
- Should be approximately 48sqm.
- Budget cost should be below R50,000
- Has a cultural relevance.

ACCOMODATION SCHEDULE.

- 2 bedrooms
- Living room
- Eating area
- Bathroom

Lesotho with its high rate of unemployment and high rate of immigration from the highlands to the lowlands (Maseru) its capital city has become overcrowded and it is quickly running out of land, again due to the methods of building mostly used, most families cannot afford houses more especially because **a high percentage of Lesotho's working population earning** very much below M5, 000 per month. With that being said, it is a mammoth responsibility for the local government and built environment professionals to come up with solutions to house every individual with an affordable, low cost house that can accommodate an average family with an adjoining salary of M50,000 per anum. This also makes sustainability and energy-efficiency the primary goal considering the fluctuating weather conditions of Lesotho.

I hope the design, materials and methodologies I bring forth will be beneficial to the challenge faced in Lesotho.

CLIMATE CONDITIONS.

Problem

Lesotho has a temperature climate with hot summers that can reach up to 30 degrees Celsius and cold winters that can go as low as -7 degrees Celsius in Maseru its capital district.

Solution

In regard to the sun study in Lesotho, the summer sun rises around 05:05am From the East and sets at 18:30pm West while the winter sun rises at 06:35am in the East and sets at 17:35pm West hence why it would make sense to have the house facing North but slightly to the North East, that will give the rooms in the front façade more hours to enjoy the natural light and absorb as much warmth possible. On that note of natural lighting, the majority of openings will be located in the Northern elevation for enjoying the views and making it easy to spot the entrance to the house.

In addition, the appropriate material selection can help with warming and cooling of buildings like, how Basotho culturally used to build their houses using sandstone, cow dung and mud for plastering walls and thatching grass for roofing. But due to modernization, the use of bricks and blocks have dominated the

build environment but the issue with this is that it is cost. Now there are different or new methods of building developing like building with gabion walls, steel, mud bricks, ramming earth and many other building technologies. My design however favors use of energy efficient, cheap and quick method of building which relies on the use of Eco Beam system and sand bags.

Sand bags have good qualities for flood protection, sound absorption, high thermal mass, fire resistance, and vapor permeable, easily sourced everywhere and also very cheap.



COST EFFECTIVENESS

The sand bag house reduces costs in various sections of construction like:

- Does not require skilled labor.
- Saves on construction time.
- Saves on expensive building materials.

THE DESIGN

Space arrangement.

The 2 bedroomed house is within the constraints of 48sqm with an accommodation schedule of an entry foyer, open plan living room and kitchen, and a transitional space from the public space to the private space, bathroom and 2 bedrooms. Due to the small footprint, some of the partitioning structures of the rooms will be actual build wardrobes.

Proposed floor plan.



The location selection for this particular project is in Maseru West Maseru Lesotho. After weighing all construction methods and design solution that could benefit Basotho and meet the design brief, using sand bags and Eco beams seemed fitting.

In the culture of Basotho, we are brought up in big families and have a place to play and grow vegetation. But with the scarcity of land and considering that we were limited to 48sqm, and of the tight budget this was a true challenge. When trying to come up with a suitable space arrangement, I decided to have an open plan for the kitchen and living area to also create more interactions between the people living in the house and guests. The living area enjoys the most sunlight and views. Again the building has an emphasis on the entrance.

The transitional space divides the private space from the public space and gives privacy to the family members. The bathroom is not vividly seen and allows less or no smell to reach the other rooms because again of the space in the traditional space. The main bedroom is smaller but can still accommodate a double bed and acceptable movement within the room and also faces the entrance to the site so that parents can check **movement coming in and going out while the children's bedroom is bigger** to accommodate a maximum of 2 bunk beds or a double bed considering the number of children.

Elevations and sections.

The elevations will be plastered over the chicken wire mesh and cultural artworks of Basotho will be made on selected parts of the plastered wall of exterior elevations. The roof I have selected is a flat roof of less than 4 degrees pitch using IBR roof sheeting. And on openings, use of steel frames is ideal to reduce costs.

INSPIRATION



The simplicity of the house from the rectangle plan to the roof.



The pattern on the house is inspired by the Basotho blanket.

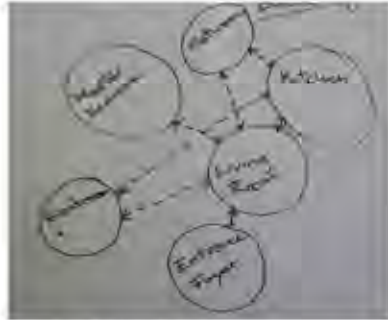
DESIGN DESCRIPTIVE

The project required a design that will accommodate a low income class family with a footprint not larger than 48 square metres. The brief itself was telling me that this type of design will not work with the usual construction methods. My research drove me to a conventional way of building with sandbags. Now my entire design will be driven by Sustainability and Humanity, and this means that the house does not only have to be a habitable shelter but should have a positive physiological effect on its household and also be aesthetically pleasing.

PRELIMINARY DESIGNS

Conceptualizing

Space arrangement and connection of rooms



first draft



final layout



FLOOR PLAN
FOOTPRINT: 48 SQM

The two bedroom house consists of an open plan kitchen and eating area, entry foyer, one wet area, transitional space and two bedrooms.

Direct connection
Indirect connection



The proposed floor is made by taking soil from an Anthill and mixing it with water. Natural materials have good thermal properties and an Anthill amongst others. And it is also a good bonding agent. The first stage when trying to come up with that floor finish is to firstly lay the anthill soil on top of the DPM and sprinkle water over the soil then compact it until the surface is completely hard and then the final stage is to polish the harden surface with stones to give out a smooth shiny floor surface.



Sand bags used like building blocks they are stacked to create a wall infill between timber columns.



Chicken wire mesh used to hold the plaster when rendering the interior and exterior of the building to cover the sand bags and make the house look welcoming.

Sustainability Strategy of the Project

Economical sustainability

- All of the materials used are locally found.
- The building does not need skilled labour to build.
- Naturally warms and cools its self.

Environmental sustainability

- Large openings: to reduce the use of lighting.
- Water harvesting: for watering the plants.
- Building materials: all friendly to the environment.

Social sustainability

- By letting the community build the houses, we would be bringing unity to the people.
- It should be taken as part of the school's curriculum to help children to grow up knowing how to work together .
- Creates jobs.

**AFFORDABLE HOUSING DEVELOPMENT
PROJECT AT MASERU WEST, URBAN**

**PRELIMINARY BUDGET ESTIMATE OF
CONSTRUCTION COST**

Bills of Quantities trades		
Earthworks		334.80
Framework		3915.3
Walls		9772.12
Waterproofing		473.24
Roof complete		5860.19
Carpentry and Joinery		2346.83
Ironmonery		1090.00
Electrical Instillation		5294.14
Plumbing and Drainage		7992.57
Glazing		5689.17
Plastering		4470
Hot water heating system		2001.6
TOTAL	M	49715.2
Gross Floor Area		48 m2