Rise in the City Competition 2018
Maseru, Lesotho

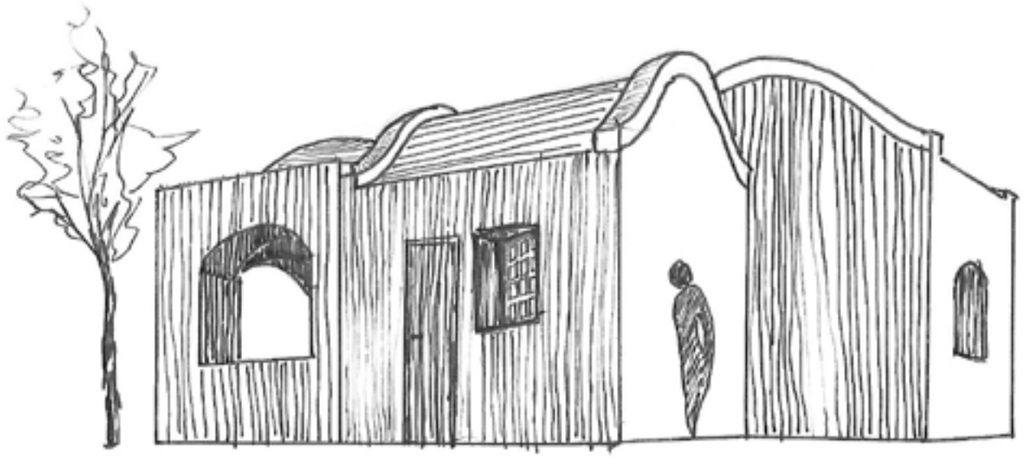
An Adobe Mud Brick Home

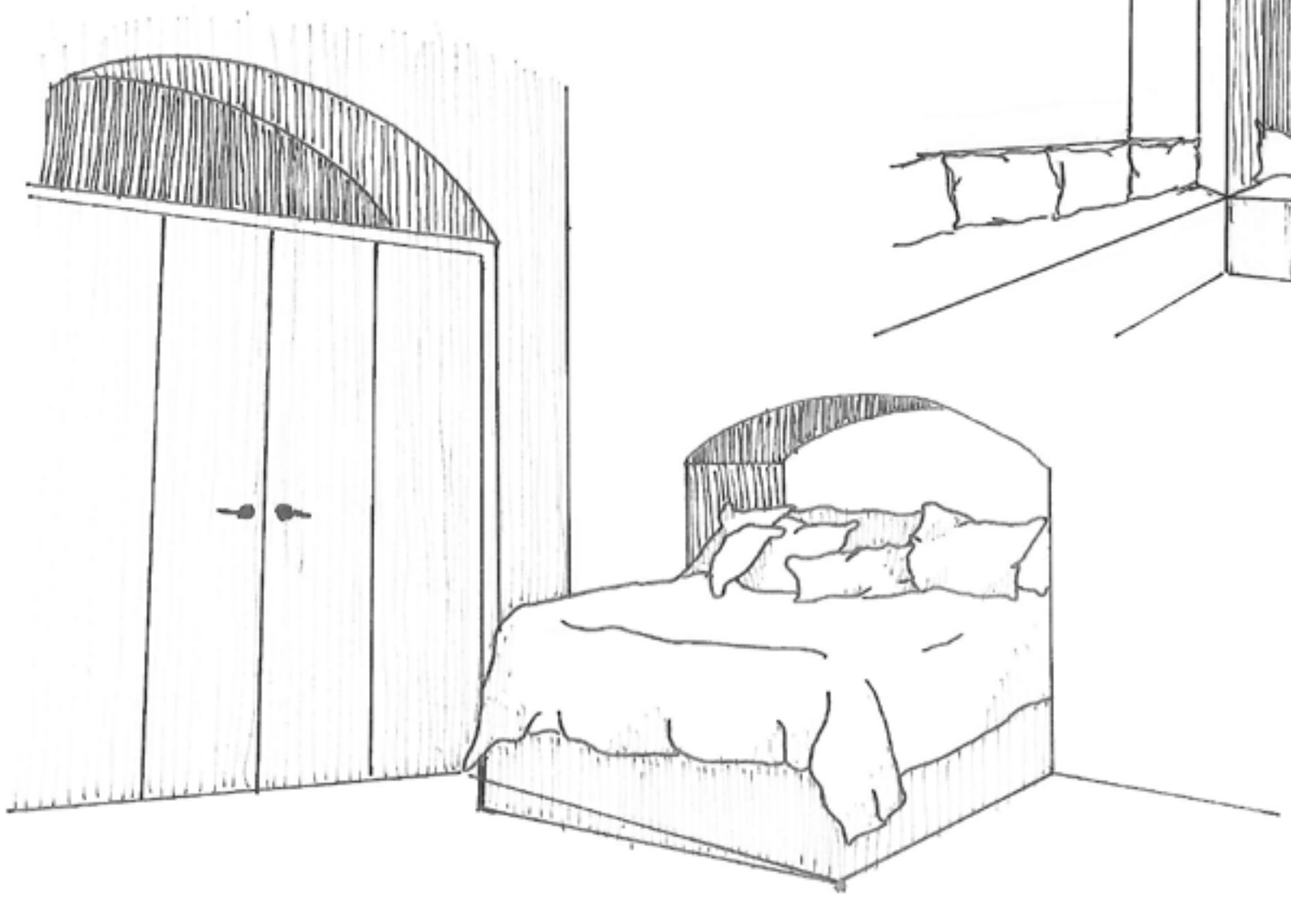
Project Description

The proposed design aims to minimize the cost spent on the materials by using traditional adobe mud bricks to create self-insulated homes that have partly built in furniture to minimize required space and bought furniture. The mud bricks are all made out of natural found materials and dried in the open air, leading them to be not only almost cost free and environmentally friendly but also easy to produce, allowing families to even build them themselves. The walls of this project are made to be thick to provide thermal and acoustic insulation and then niches were created in the walls to create comfortable and cozy spaces within the rooms and allow most of the furniture to be built into the walls. The niches then lead to items like seating only requiring cushions to be placed on the built seating structure rather than a couch to be bought. The arched shapes and domes within the design aim hold a sense of grandeur that would not be expected in such a small budget home to give the owners of the house a unique experience and a space that stands out. They serve both as structural and decorative elements and retain a smooth and natural shape rather than have sharp corners which cannot be found in traditional designs in Lesotho either.

In the hot summers the thick walls keep the house cool and the larger windows are positioned to face the west to allow the wind to reach the rooms and provide natural ventilation and cooling. The two main materials used – mud bricks for the construction and timber for the windows and doors- are both environmentally friendly in the fact that they do not emit large amounts of CO_2 as materials such as concrete do and they hold a regulated moisture levels, creating comfortable spaces within as long as they are used correctly.

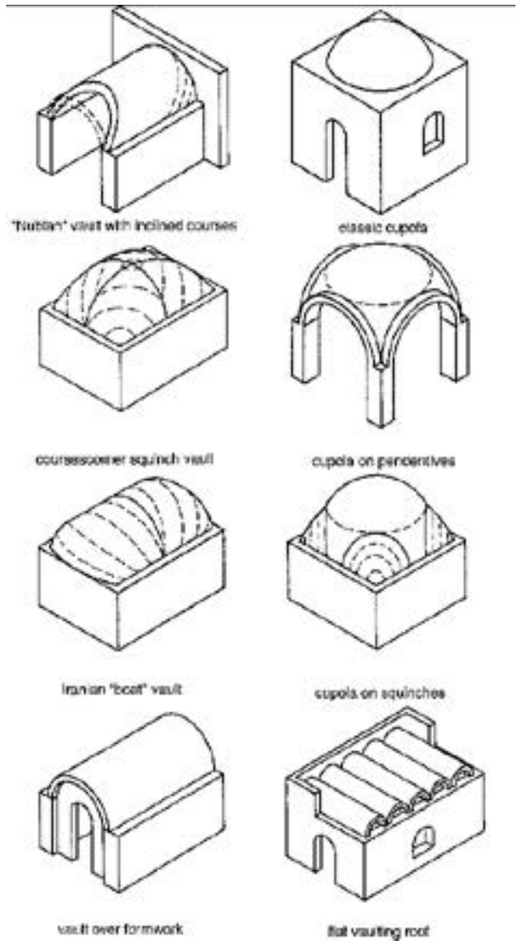
As there is an element of decentrification that needs to be considered in this housing project, proposed layouts of combinations of the proposal are included. The proposed two bedroom house can be combined with at least two more houses with a small courtyard to create a complex of houses that does not have to spread very wide. Upper floors can also easily be added onto the house later on, allowing not only families that are expanding to live together but also be able to build the structure on their own at a low cost.

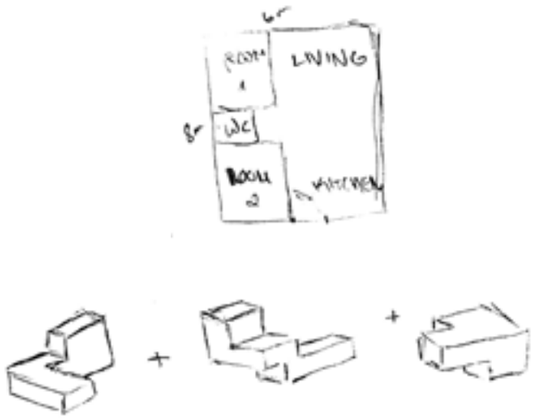




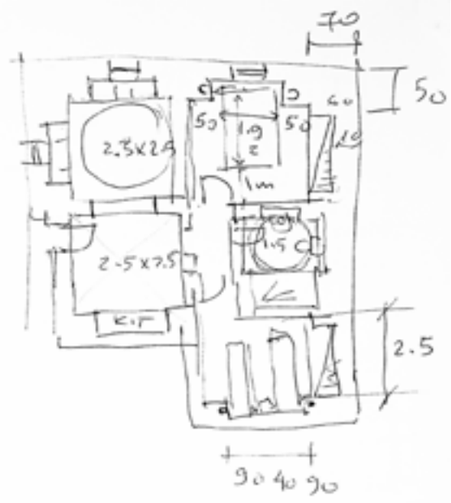
Precedent

This proposal is inspired by Hassan Fathy's style to create low cost housing that is sustainable both naturally and economically. He valued manual work and human effort and reduced the need for technology and machinery. Additionally the materials that he used were all available in his surroundings, which is why this proposal aims to use found earth, straw and stones to create a project with almost no cost for the material construction of the structure. Using such simple materials will not just create a low initial cost but also allow the inhabitants of the house to have the chance to contribute to their home and make changes of additions by themselves if they choose to do so for almost free.





The process of the layout and design began with structuring the required spaces around a "courtyard" space which finally lead to the building being L shaped. The biggest and the smallest spaces have domes to juxtapose them and the kitchen and bedrooms have vaults, creating a complex roof that allows for water to flow freely down the top, if it were to rain.



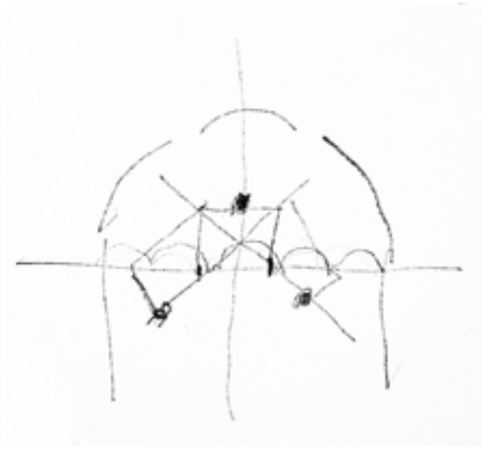
Low Cost Materials and Construction

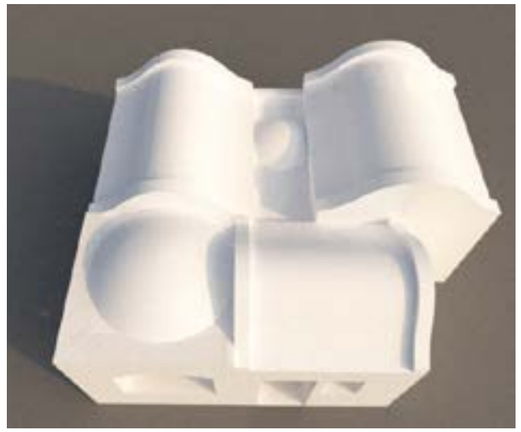
The adobe mud bricks do not have a standard size and this proposal has bricks with the dimensions of 245mm x 75mm x 120 mm to allow for the vaults and domes to be built. The labourers will have to build molds out of timber in these dimensions that will resemble a ladder and then a mixing area is prepared where water will soak in a mixing pit for 12 hours before starting. The bricks will be stabilized to make them water resistant to prevent leaks or damage to building after it is built. 6 to 12 percent of emulsion or Portland cement will create a fully stabilized brick and after the mixture is prepared and poured into the mold it is left to set. Lastly the bricks are left to dry in the sun until they are ready for construction.

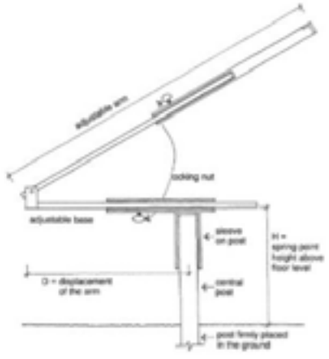
The roofs

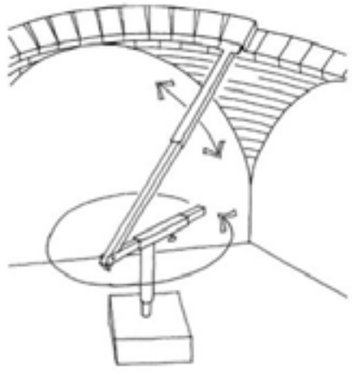
The domes are built by laying the bricks at a shallow angle at first and then as the structure moves higher it becomes more steep. The angle is measured with a “arm” which rotates from the center line and creates the guide to the angle of the bricks.

The vaults are built by drawing the vault on the wall by dividing it into five equal parts and then from the two middle points a square is drawn and in the middle point is the first median of the arch. To create the other two medians lines are drawin at a 45 degree angle as can be seen in the sketch below. The three arches that are drawn from these medians then become the arch of the vault. After it is drawn it is used to place the bricks in an angle to create the full vault.

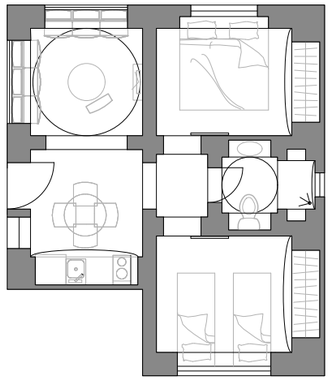








Upper floors are created by building the walls up, placing a wooden floor on top and filling the vaulted spaces with sand.

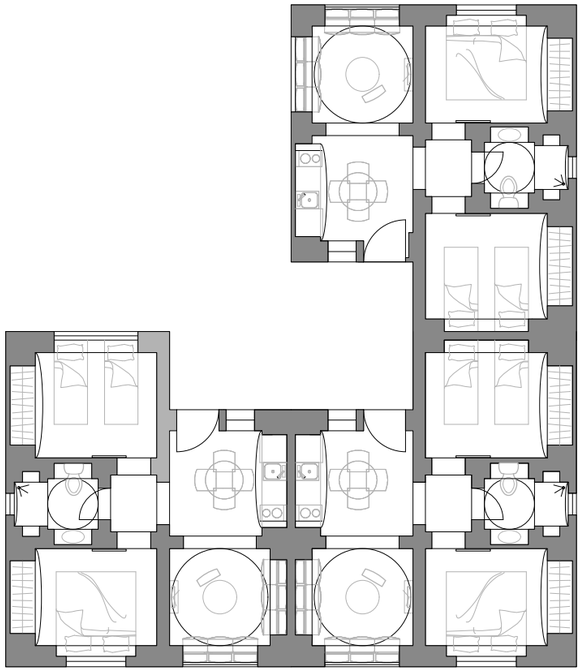


Single two bedroom house

The Housing Complex

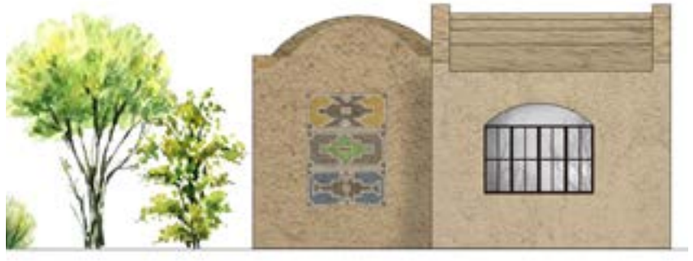
Various combinations of the two bedroom house were explored to create complexes and houses with a shared courtyard. There is always an aim to have an open shared space between the houses to create a community and invite interactions between neighbors. It also creates a safe space where children can go out to play and be close to home.

The possibility of creating upper floors is also available with a sand infill between the vaulted spaces and upper floor. This allows for further expansion without requiring more horizontal space.



Combination of three houses to create a small complex

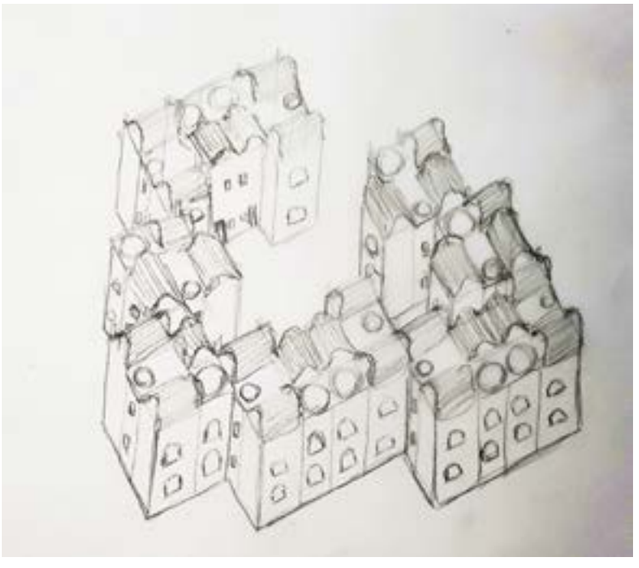
Combination of 10 houses to create a larger complex with a combined courtyard to create a community.



The Identity

To create a sense of identity for the homes, and following housing complex if it is expanded, the inhabitants will be encouraged to paint over the exterior walls to create an eye catching layout that can eventually become a symbol of the town, similar to the colorful houses in Burano, Italy.
It will also add a liveliness to the area and a positive atmosphere of pride and celebration of culture.

The sketch shows a complex of 20 houses in total with two floors and allows for a unique area to be created rather than having a stand alone home in an urban setting.



Test 3D of a single house placed in an urban setting of the city.

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The aim of this proposed design is to not only minimize the cost of initial construction but minimize the future cost of furniture, electricity and expansion. The design consists of stabilized adobe mud bricks, a traditional building medium that can be made out of almost completely found materials, creating an environmentally and economically sustainable home. People will be able to expand and add to their houses on their own and the exterior will be painted in colorful patterns to create a sense of identity and pride for the community living in the area.

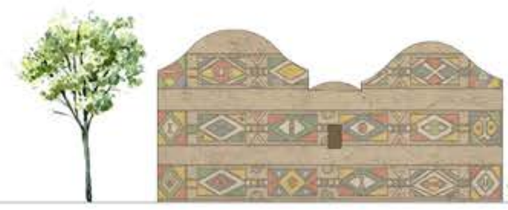
Element	Element Unit Cost	Element Quantity	Cost
Foundations			
City Build Stone for Stone foundation	R349 per cubic m	22.4 cubic meter	M7,752.79
Walls			
Adobe Mud Bricks Exterior Walls	-	21016 bricks (5254 bricks per layer)	-
Adobe Mud Bricks Interior Walls	-	3032 bricks (1516 bricks per layer)	-
Roofing			
Adobe Mud Bricks (Living Room Dome)	-	554 bricks	-
Adobe Mud Bricks (Bathroom Dome)	-	76 bricks	-
Adobe Mud Bricks (Master Bedroom Vault)	-	1005 bricks	-
Adobe Mud Bricks (Bedroom Vault)	-	1475 bricks	-
Adobe Mud Bricks (Kitchen Vault)	-	1222 bricks	-
Upper Vault Infil	-	736 bricks	-
PPC Cement to stabilize bricks	R55 per 50kg	3931 kg	M4,345
Brick Making Materials	M300		M300
External Doors and Windows			
Robmeg C1 Fx7 Left Hand Steel Window Frame	R435	1pc	M434.41
Robmeg F7 C2H LH P Window Frame	R400	5pc	M1,997.27
Builders Lotus Door Louvres Red Grandis	R325	1pc	M324.56
Internal Doors			
Builders Solid Door Hollow Core Townsend Door (813 x 2032mm)	R339	1pc	M338.54
Alglasico Aluminium Sliding door OX - Bronze (1800 x 2100mm)	R1899	2pc	M3792.82
Fittings			M499.22
Garnet Pillar Type Sink Mixer Tap	R499.90	1pc	M499.22
Franke Rondo Prep Bowl RDX61034 - 340mm diameter	R499.90	1pc	M499.22
CTM Coral White Front Flush Toilet Suite	R749.90	1 pc	M748.88
CTM ITD Eco-Vision 5 Function Shower Rose	R99.90	1pc	M99.76
CTM Coral Almond Wall Mounted Basin - 570 x 465mm	R329.90	1pc	M329.45
Flooring			
Kyra Grey Matt Ceramic Floor Tile - 350 x 350mm	R69.90 per sqm	48m2	M3,367.44
Electrical installations			
RADIANT JL20-W CEILING LIGHT 230V - CHEESE CAKE ROUND 200MM	R121.54	5 pc	M607.41
Allocated elecatrical budget			M5,000
Plumbing and mechanical installations			

Allocated plumbing budget			M5,000
Labour Cost			
Brick Making	M140/day per labourer	29,116 bricks 3 Labourers building 3000 bricks a day	M1,365
Construction	M140/day per labourer	29,116 bricks 3 Labourers building 3000 bricks a day	M4,077
Additional Labour requirements			M1,960
Total Cost			M43,337.99

3D Exterior View

1:100 East Facing Section through Bedrooms

1:100 North Facing Section through Bedroom and Living Room



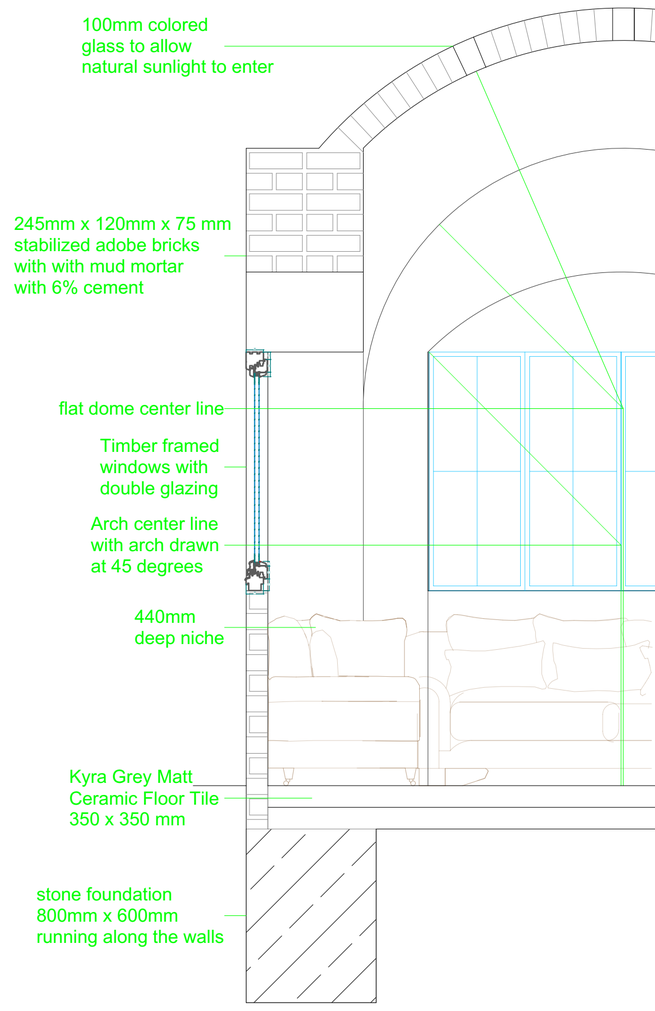
1:100 East Elevation

1:100 North Elevation

1:100 South Elevation

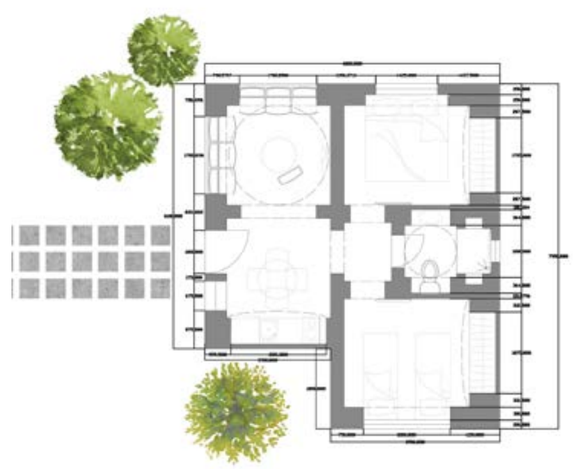
1:100 West Elevation

3D Interior View of Living Space



1:20 Detail Section through the Living Space

1:200 Site Plan with Plan of Suggested Housing Complex



1:100 Floor Plan