LIFE Red Sea Project

Ababda Housing Activity Project

OCTOBER 2007

This publication was produced for review by the United States Agency for International Development. It was prepared by Chemonics International.

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CONTENTS

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLE

FIGURES

TABLE

ACRONYMS AND ABBREVIATIONS

CDC	Community Design Collaborative
cm	Centimeter
EEAA	Egyptian Environmental Affairs Agency
km^2	square kilometers
KVA	Kilovolt Ampere
LIFE	Livelihood and Income from the Environment (project)
LRS	LIFE Red Sea Project
m	Meters
MW	Megawatt
NGO	Non-governmental Organization
PVC	Polyvinyl Chloride
RO	Reverse Osmosis
RSG	Red Sea Governorate
SFO	Single Family Occupancy
SRO	Single Resident Occupancy
SRS	Southern Red Sea (region)
SWM	Solid Waste Management
TDA	Tourism Development Authority
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USAID	United States Agency for International Development
WGNP	Wadi Gemal Nation Park

EXECUTIVE SUMMARY

The Ababda, living in the southeast of Egypt, are divided into nomadic, semi-settled, and settled tribes. The nomadic tribes have a pastoral lifestyle, herding goats, sheep, and camels and collecting indigenous plants for food and/or trade. Tribes that have settled on the coast fish for a living. Drought and government policies encouraging nomadic tribes to settle in one place have introduced new sources for livelihoods, such as working for the government and for mining activities in the region.

Currently, the Ababda in Egypt live in two types of communities: those at the seaside, such as Marsa Alam, Abu Ghusun, Hamata, Humira, Berenice, Ras Banas, and Shalateen; and those in the mountains, such as Abraq, Al-Alaqi, Gebel Elba, Halayeb, El-Sheikh el-Shazli, Hafafit, Wadi el-Geimal, and Wadi Abbad. Government policies and development plans aim to make this region one of the most distinctive tourist destination in Egypt include relocating the indigenous peoples living in the coastal villages to other suitable areas, leaving their settlements free for investors in mega-tourist projects. Consequently, the Ababda are living in light structures that will be easy to remove if they are forced to move. These settlements lack eve minimum standards of amenities and infrastructure.

PROJECT OBJECTIVES

The aim of the Ababda Housing Activity Project, carried out in three pilot communities—northern Wadi Gemal Nation Park (WGNP), Hamata, and El-Sheikh el-Shazli—is to improve the housing conditions of the Ababda within the framework of enhancing the security of their livelihood and integrating them into the development of the region.

PROJECT PHASES

The project is divided into two phases:

1. To develop a participatory methodology to assess the local residents' current housing conditions, determine their needs, and create opportunities for them to enhance their livelihoods by providing options for improved housing.
2. To prepare detailed design documents to upgrade settlement layouts and housing units and complementary facilities based on the assessment and development of housing guidelines.

Using a participatory methodology approach, the project team accomplished the assessment of the housing conditions of the three targeted communities as well as the evaluation of the failures of the previous efforts to settle communities by the government in Hamata and El-Sheikh el-Shazli villages. The process and results of this assessment are documented in two reports: "Ababda Housing Assessment" and "Methodology and Guidelines of Housing Assessment."

The "Ababda Housing Assessment" documents the assessment that was carried out during a 7-day site visit to the three targeted communities and other neighboring communities, such as Abu Ghusun, Abu Hamamid, Humaira, and Shalateen. The assessment covered:

- The history of the selected settlements, their population, socio-economic aspects, site layout and clustering, complementary facilities and infrastructure, housing types, and materials and technologies of construction.
- The modifications made by the residents to the functional layout of the government-built units to suit their traditional lifestyle.
- Residents' problems and housing needs.

1. INTRODUCTION

1.1 THE ABABDA

The Ababda are a major subgroup of the Beja tribe. The Beja are traditionally pastoral people who have inhabited the southern part of Egypt along the Red Sea since Pharaonic times. They speak different languages and the majority is Muslim. The Ababda occupy the southeastern corner of Egypt, from Aswan on the Nile to the Red Sea and northward to the Qena–Qusseir Road. A recent census indicates that around 200,000 Beja live in Egypt, 142,000 of whom are Ababda, speaking Arabic and considering themselves to be Arab, while retaining their Beja lifestyle and customs.

Like other Beja tribes, the Ababda divides themselves into clans; each clan is an extended family. Clans are divided into large lineages and sub-lineages, with each line led by a sheikh with authority based on approval of the group.

Some groups of the Ababda are more nomadic than others. Nomadic Ababda live a pastoral life based on herding. They raise goats, sheep, donkeys, and camels and are known as the best camel traders in the Red Sea area. They live in a hemispherical or rectangular tents made of wooden frames covered with straw mats and carry few possessions. The more sedentary Ababda build permanent huts with more furnishing and work as free fishermen or as employees in mining, the governmental sectors, and eco-tourism. Figure 1 gives an idea of the Ababda people.

In the last decade, the Red Sea region has become one of Egypt's major tourist attractions and it is expected that Eastern Desert tourism will increase in the future. However, little of current tourism revenues reach local people, and locals are not integrated in the large-scale tourism establishments because they lack the capabilities and skills needed.

However, eco-tourism offers opportunities for direct involvement by the local communities.

Residents feel threatened by planned development of the area—they fear their land rights are being challenged by foreigners and their customary pursuits of fishing; hunting, herding, and collecting indigenous plants will be cut off.

Figure 1 The Ababda

1.2 THE SOUTHERN RED SEA (SRS) REGION

The Eastern Desert occupies almost a quarter of the area of present day Egypt. It extends from the Nile Valley in the west to the Red Sea–Gulf of Suez–Suez Canal in the east, and from Lake

Manzala on the Mediterranean in the north to Egypt's border with Sudan in the south. Its area is approximately 222,000 square kilometers (km^2).

Topography

The Eastern Desert is divided vertically—from north to south—into three parallel strips of different topographic features:

- The Red Sea coast
- The Red Sea mountains, with peaks rising to about 3,000 feet above sea level
- The desert between the Red Sea mountains and the Nile.

Each offers different opportunities and imposes certain limits on their inhabitants.

Horizontally, the Eastern Desert is divided by the Qena–Quseir Road into two parts. The northern part extends from the southern Sinai to the Wadi Hammamat (the Arabian Desert) and the southern part from Quseir to Egypt's southern borders (the Nubian Desert) where the Ababda settled hundred of years ago. The Red Sea mountains have a complex of irregular, sharply cut valleys (*wadis*) that extend westward toward the Nile and are natural drainage for rare rainfall. The *wadis* are concentrated in the southern part of the Eastern Desert and are useful as routes from east to west, for trading and transportation (see Figure 2).

Figure 2 Map of the Southern Red Sea Region

The Eastern Desert has been occupied on a fairly permanent basis by nomadic tribes, who used the meager plant and animal resources to support their economy. The desert is still occupied today by decreasing numbers of nomads. Other desert occupants are only present temporarily for specific activities like mining and quarrying.

Government

The Eastern Desert is administratively governed by the Red Sea Governorate (RSG), which is classified as a frontier governorate with 13 administrative units and its capital at Hurghada City.

Climate

The climate of the region is arid with high temperatures and little rainfall. Consequently, it has poor soil and a thin layer of vegetation (grassland), which is unsuitable for cultivation. The region is, however, distinguished by its unique flora and fauna (see Figure 3).

Figure 3 Flora and Fauna of the Southern Red Sea Region

Resources

The importance of the Eastern Desert lays in its wealth of mineral resources, including metal and stone such as marble, granite, sandstone, and gold. At present, there are more than 200 mines and 600 quarries in the region. As a result, around 10,000 workers are employed in mines and quarries in the Eastern Desert.

The Eastern Desert and the Red Sea coast are popular among tourists because of its wealth of historical sites and monuments, its floral and fauna, and its coastal resorts, such as Hurghada and Marsa Alam.

Population

The RSG has some of the lowest population densities in Egypt, with only 191,923 people inhabiting an area of 71 km^2.

Socio-economic Systems

Originally, the Ababda were a herding society; their livelihood was based on animal husbandry and mobility. Nomadic communities still keep sheep, goats, and camels. Ownership of camels indicates the social, economic, and political status of a man. The Ababda settled on the coast earn their livelihoods based on fishing using small boats and nets, selling fish to merchants in other communities such as Quseir and Wadi el-Gemal. They also produce charcoal, collect medicinal plants, and pursue farming, where the land allows. Some work as guides to safari caravans through the Nubian Desert and up to the Nile Valley. With the development of the mining industry, others found employment as consultants for the metals and stones.

Gender Roles

Women are responsible to raise the children, cook, make carpets, utensils and jewelry both for use in the home and sale to the tourist trade, collect firewood and water, and herd goats and sheep close to the settlement. Men, however, are responsible for herding camels because they need to move over long distances. Men are responsible for milking and slaughtering animals.

Ababda Settlements in SRS Region

In the mountains, the Ababda originally lived in caves, which provided protection from summer heat and winter cold. At lower elevations, they built temporary structures in areas away from flood courses, wells, and vehicle routes. Few structures are usually found in the same settlement, which is home to one extended family. The distance between settlements is normally not less than 20 km.

More recently, due to extended drought and the need to find sources of fixed incomes, the Ababda have settled on the coast, working as employees in mines and government agencies, and living in wood huts.

Settlement of the Tribes

The concept of settling the nomadic tribes began at the time of Muhammad Ali and has continued ever since. In the 1990s, the RSG began to employ a comprehensive method to develop and settle the nomads by building five villages that included social and health care facilities along the Red Sea coast and in the *wadis*, as follows:

- El-Shalateen City on the border between Egypt and Sudan
- Hamata and Berenice villages, 110 km south of Marsa Alam
- El-Sheikh el-Shazli village, 150 km south of Marsa Alam
- Um Howaytat village in the desert between Qena and Quseir
- Marsa Alam city, 133 km south of Quseir.

Each village has a school, a clinic, a city or village council, and number of residential units. The governorate built roads, and is responsible for delivering potable water and food to these villages,. Currently, Ababda communities in the SRS region are divided into seaside communities and mountain communities.

1.3 LIFE RED SEA PROJECT

The Egyptian part of the Eastern Desert is one of the major tourist attractions in Egypt. Early development in the northern zone of the Red Sea, including Hurghada and Safaga, rarely took into consideration the well-being and livelihoods of the indigenous people and their current and future basic needs.

Over the past decade, the southern parts of the Red Sea, including Marsa Alam, Hamata, and El-Shalateen, attracted the attention of both investors and travelers due to their virgin nature and wealth of natural and cultural assets, which include the marine environment with its treasure of coral reefs, various fish species, mangrove stands (Figure 4), and seagrass meadows, Al-Qusseir fortress, the Ababada museum (Figure 5), the Roman ruins (Figure 6), the mountains, the dry river courses, the fossil beds, and the unique desert flora and fauna. In order to ensure that the fate of the northern Red Sea coast does not reoccur in the south, the Egyptian government, represented by the RSG, the Tourism Development Authority (TDA), and the Egyptian Environmental Affairs Agency (EEAA), partnering with the United States Agency for International Development (USAID), have initiated the Livelihood and Income from the Environment (LIFE) Project, to ensure more sustainable development in the region. The project's goals are the promotion of sustainable, natural and cultural tourism, the conservation and management of the natural and cultural assets of the area, and supporting SRS inhabitants by engaging them in economic, social and cultural benefits generated through tourism-based activities.

Figure 4 Mangroves of the Southern Red Sea Region

Figure 5 The Ababda Museum

One of the main programs of the LIFE Red Sea Project (LRS) is to support sustainable economic growth in the SRS area. Among the program's accomplishments in the region are assisting the EEAA declare the protection of 14 new islands in the Red Sea, enrollment of 25 students from local communities in a 3-year tourism program in the German Tourism School at El-Gouna, subsequently leading to guaranteed job opportunities in 5-star hotels in the area, the engagement of 77 women in producing handicrafts, hiring 22 local residents in permanent jobs in Wadi el-Gemal Protectorate in Hamata, completing the design of a house reef management system that will enable hotels in the Red Sea to establish reef protection programs, providing financial support to the operations of the Wadi el-Gemal Rangers, and supplying the rangers with monitoring and field equipment. Among the project's initiatives of concern to residents of the SRS region is the Ababda Housing Activity Project.

Figure 6 Historic Ruins in the Southern Red Sea Region

1.4 ABABDA HOUSING ACTIVITY PROJECT

The main aim of the Ababda Housing Activity Project is to enhance the livelihood security of Ababda households by improving their housing conditions. LIFE selected three targeted communities in the SRS region: the small community at the northern entrance of WGNP, Hamata village, and El-Sheikh el-Shazli village. Those communities are different in terms of the length of time they have been settled, the type of settlement—seasonal or permanent, the degree to which the Ababda residents are integrated with the surrounding community, and the principal sources of livelihood—jobs, businesses, and trades.

1.5 PROJECT OBJECTIVES

The objectives of the project are to:

- Enhance the residents' living conditions by improving their dwellings and the aesthetic quality of the area as a future tourist destination, which could generate income for residents
- Produce design guidelines that will be state of the art for addressing housing and livelihood improvement in other Ababda communities beyond the scope of this project.

The project is focused on improving the quality of existing housing and providing a prototype house for both coastal and mountain Ababda settlements to be implemented in the future development of the region. Simultaneously, local materials and construction techniques will be used as well as new construction techniques taught.

1.6 PROJECT TEAM

The project team is comprised of individuals specialized in planning, architecture, and community development represented by Community Design Collaborative (CDC) and one member with long experience working with Ababda communities. CDC's team includes one woman and a socio-economic specialist to conduct interviews and group discussions with the Ababda residents.

1.7 METHODOLOGY

The participatory methodology implemented by the CDC team combined interviews and group discussions with members of targeted communities and those in neighboring ones while observing local tribal customs. During site visits, project team explored the environmental and cultural settings at each site, documenting and photographing key features, visiting significant locations, and conducting meetings with stakeholders who assisted in identifying the concerns of the residents. After that, the CDC team consolidated and analyzed the information to determine the housing needs of the selected communities in particular and the Ababda people in the SRS region in general.

1.8 REPORT CONTENTS

This report displays the findings of the survey carried out to assess the housing condition of the Ababda people living in the three communities under consideration. The findings are divided into two sections. The first section presents the assessment of each settlement covering history, location, site layout, housing clustering, amenities, and infrastructure. The second section covers an assessment of the housing units, which includes housing typology, functional layouts, and materials and techniques of construction. The assessment of dwellings includes previous experience with government housing. The final section is a summary of current and future housing needs of the Ababda in Egypt.

2. FINDINGS OF THE ASSESSMENT

Hamata village is a seaside community where people live mainly on fishing and herding; El-Sheikh el-Shazli village is a mountain community, located in a *wadi*, and people mainly live on herding and donations offered by non-governmental organizations (NGOs) and individuals. The community at the northern entrance of WGNP was originally a seaside community and has been relocated to the west of the coastal road.

LRS selected three forms of communities: the primitive community represented in the community north of WGNP, the settled seaside community represented in Hamata village, and the settled *wadi* (remote) community represented in El-Sheikh el-Shazli Village.

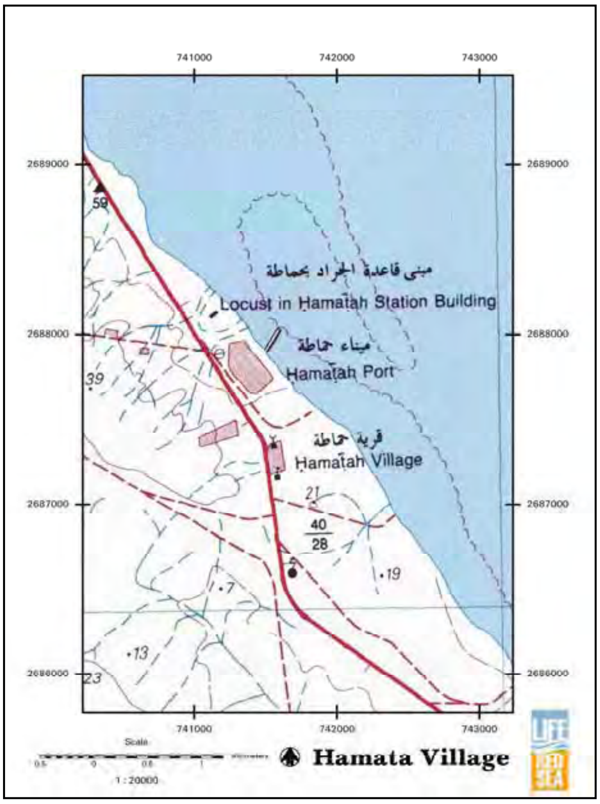
This chapter documents the findings of the assessment that was carried out during a 7-day site visit with the objective of assessing the housing conditions of the Ababda population living in those communities. The first part of the assessment includes information on the site layout, clustering, amenities, and infrastructure; the second part presents the results of the evaluation carried out on the indigenous housing units and those supplied by the government.

2.1 SEASIDE COMMUNITIES—HAMATA VILLAGE

Location

Hamata is a coastal village 110 km south of Marsa Alam City (Figure 7). It is administratively under Marsa Alam City. Hamata village consists of about 300 inhabitants representing 70 families. It has an old port with a station where dive and fishing boats leave for the most remote diving destinations, the islands of Zabargad and Rocky, between Marsa Alam north and Wadi Lahmi south, and an old jetty where local fishermen depart for fishing.

Figure 7 Location of Hamata Village



Community History

From 1935 until 1945, a German-owned company was based in Hamata at El-Zabargad Mountain. Then in 1940, the Greeks arrived in the area and worked at the talc mine located at Qualaan. It was in 1945 that the area began to be called 'Hamata,' a name that was invented by Nicole Otinger Dengaros, the Greek geologist, after the name of the red trees known as 'Hamat' found in Gebel Hamata.

Settlement in Hamata began in the 1960s, when Ababda nomads started to leave the mountains to participate in the mining activities of Abu Ghusun. Until 1968, El-Giranab was the only Ababda clan settling down and in control of Hamata. In the 1970s, the government built concrete houses to settle the Ababda tribes permanently. In the

1980s, the Ababda, who were living between the village and the desert, moved to the government houses, and responding to the drought, which began in 1996, the Ababda fully settled in the village. At present beside the El-Giranab clan, El-Kirgab, Balalab, Fehidab, and Ragabab inhabit the area. Most of the villagers are from the El-Kirgab clan. In 2003, tourist boats started to arrive at Hamata.

Site Analysis

The existing Hamata community is divided by the coastal road into two parts. On the east side of the road, there are the housing units built by the government in the 1970s (Figure 8), which are now in poor condition, supplemented by service facilities, such as the village council building, a community development center, a school, a hospital, a mosque, buildings associated with the marina, the water desalination and the diesel generator rooms, shops, cafeterias, and trucks transporting groceries and potable water from Edfu twice a week.

Huts spread along the west side of the road accommodate the expansion of the village and a large percentage of the indigenous residents. Out of the 70 households in Hamata, 50 live in the government houses and 20 live in self-built shacks. In the government complex, the Ababda inhabit nearly 30 houses and the remaining 10 belong to employees working in the village or the mining and quarrying activities.1 Although Hamata village is considered one of the important urbanized communities in the region, its types of residences are in bad physical condition, do not offer minimum standards for living, and are considered inadequate for the residents.

Figure 8 Hamata, Panoramic View of Government Units, East of the Coastal Road

Figure 9 Hamata, Huts, West side of Coastal Road

Housing Clustering

The government-built housing is an example of permanent housing offered without ownership by the government. It is composed of 20 square units arranged in three double-loaded rows parallel to the seashore. The distance between each two rows is 3–3.5 meters (m) and functions as a secondary road. Each unit has four attached single-family houses. On both sides of the complex lay the village's amenities. All the buildings are 1-story in height except the mosque's minaret and other service buildings adjacent to the marina.

The huts and shacks on the west side of the coastal road are examples of self-assembled, traditional, permanent dwellings built by the Ababda since the time they began to live in permanent communities. Each six or eight huts belongs to one extended family and is arranged in a C-shaped cluster (see Figures 10 and 11). To satisfy daily needs and to create new income sources, some of these shacks have commercial uses, such as an ironing shop, prayer area, woodworking shop, small supermarkets, cafeterias, fishmongers, brick makers, and construction materials.

Figure 10 Hamata Housing Clusters

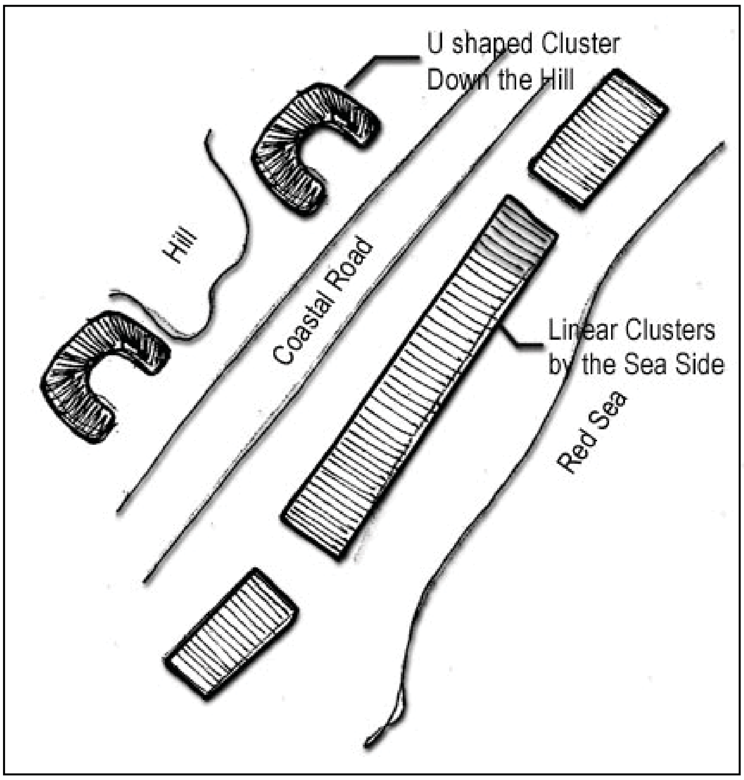


Figure 11 Cluster of Huts, West of the Coastal Road

[1] LIFE, 2006, Hamata Existing Condition Report, 24.

Village Infrastructure

- Water—Hamata village has a desalination plant with the capacity to generate 100 tons of clean water that serve Hamata and 12 surrounding settlements: Abu Ghusun, Abu Ghusun (5 km), Abu Ghusun (12 km), Al-Ra'ada, Arab Saleh, Satayeh, Um Haytham el-Gadidah, Um Haytham el-Qadima, Al-Gal'an, Wadi Lahmi, Al-Manazik, and Ras Benas.

  The water is distributed by four 7-ton delivery trucks run by the Hamata village council unit. However, only two trucks are working, which is not enough to serve all the settlements regularly. These settlements store the water in 30-ton cement tanks or 300-ton iron tanks. In addition, every dwelling is equipped with a 1-ton plastic tank. The current average water consumption rate is estimated 10 liters\day\person.

  The LRS project has assessed the water source, quality, and distribution system and concluded that:

  - The reverse osmosis (RO) plant is operating well
  - The drinking water of Hamata was found to be within accepted limits according to Egyptian specifications for potable water, with a slightly increased pH value and the presence of many colony-forming bacteria. However, the main problem is in the tanks of the delivery trucks, which lack cleaning and maintenance as they contain a lot of rust that was apparent in the sample taken from one of the trucks currently in operation.
  - Increasing the number of delivery trucks with a capacity 7 tons from four trucks to six trucks would increase the average per person share of water from 10 to 25 liters\day\person.

  The LRS project procured two 7-ton trucks; each is provided with stainless steel tanks to ensure the quality of the water. The project has recommended using new technologies for cleaning and maintaining storage tanks and new methods for maintaining the delivery trucks.

- **Electricity**—Hamata village is supplied with electricity derived from two power generators that work alternately and provide power for the village only for a few hours each day. The generator building is in bad condition (no windows and exposed to humidity and dust). In response, the LRS project is supplying the village with two 125 Kilovolt Ampere (KVA) diesel generators and building a new generator room to supply the village with electric current 24 hours/day.
- **Sewage System**—Disposal of domestic wastewater disposal is by using septic tanks and primitive trenches that are locally constructed and need periodic evacuation and cleaning (once every 2 months), which is costly. Moreover, the wastewater leaks towards the sea due to the natural topography of the village, and will gradually pollute the sea and the surrounding environment.

- **Road Network**—The government-built compound is connected to the coastal road by a poor road network composed of one main paved road, 5m wide, running through the center of the complex, and a secondary network of narrow (3–3.5m wide) unpaved roads threading through the housing units.
- **Solid Waste**—There is no solid waste collection service provided in Hamata village. The residents, along with the Hamata marina and adjacent hotels and resorts, dump their daily waste in an unfenced waste ground. Local women recover organic matter to feed their livestock and any valuable non-organics to sell to small traders. The remaining waste is subjected to regular burning that will gradually pollute the area.[2] Currently, the LRS project is beginning to implement a community-based solid waste management system, teaching the residents how to sort waste and separate the organics and inorganics.

Village Amenities

- **Mosque**—During the Friday prayer, the mosque of Hamata serves Hamata village and the adjacent shacks. In addition, there are some shacks on the west side of the road that serve as informal mosques.
- **School**—Hamata has one school providing basic primary and preparatory education. It is a 1-storey concrete building, with five elementary and two preparatory classrooms. It serves about 47 students currently. The LRS project is renovating the school building and the adjacent restroom facility, constructing a fence around the school property, developing a playground and constructing a training center for teaching crafts and marketing skills. Construction and renovation work should be completed by the end of summer 2007.
- **Health Unit**—The facility is sufficient for the current population; however, it cannot function properly because it lacks medical equipment, support services, and professional staff. In severe conditions, people go to the hospital in Marsa Alam.
- **Government Buildings**—There are two governmental offices in Hamata: the Municipality Office, which manages municipal activities and issues related to public services and infrastructure, and the Locust Combating Center, which is responsible for monitoring the invasion of locusts from the south of Egypt and giving early warnings. The buildings are both in bad condition and need immediate restoration.

2.2 WADI COMMUNITIES—EL-SHEIKH EL-SHAZLI VILLAGE

Location

El-Sheikh el-Shazli village, the second community under consideration, has a unique character due to an important seasonal event. A festival (*moulid*) is celebrated there in the last month of the Islamic calendar (*Mouldi Sedi el-Shazli*, in honor of a 13th century Sufi leader). The village is located 145km southwest of Marsa Alam, and is one of the urban centers in the SRS region. It is one of the administrative units of Marsa Alam district. El-Sheikh el-Shazli village has a population of about 1,500; however, this number increases during festivals to an astounding 1 million.

Community History

In the mid 13th century, El-Sheikh Abu el-Hassan el-Shazli died and was buried in Wadi Humaythera in the southeastern desert of Egypt. Since then, the mausoleum of El-Sheikh el-Shazli has been a religious destination for locals and Sufi visitors. Several restorations and expansions were done for El-Shazli Shrine. In 1966, the Egyptian Ministry of Religious

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2 LIFE, "Hamata Existing Condition Report," 2006.

Endowments (Waqf) built a mosque and a caravansary near the shrine. In 1972, the Egyptian Presidency donated new, lavishly ornamented maqsura for the shrine, and again in 1975, the Egyptian Ministry of Waqf restored the shrine and expanded the mosque. At the same time, the governorate built about 18 dwelling units for the settlement of nomadic tribes arranged in linear rows, currently recognized as the Old Village (El-Qariya el-Qadima).

In 1981, a Sufi woman named Zakeyya Badawi ordered the construction of a huge plaza near the shrine as a nucleus for the development of the area. In 1982, the RSG ordered the construction of a village for religious tourism to be called El-Sheikh el-Shazli village, and they built 18 housing units, also grouped in a linear cluster and known as the White Village (El-Qariya el-Bayadha). Figure 12 shows an aerial view of the village layout.

Figure 12 Aerial View of EL-Sheikh el-Shazli Village

Because of the drought that hit the region in 1996, the settlement of the Ababda increased. As a consequence, in 1998 the RSG ordered the construction of 20 additional dwelling units grouped in a linear cluster known as the Red Village *(El-Qariya el-Hamra)*. All these were built on flat land away from flood paths from the surrounding mountains. The name of each village is derived from the color of its exterior finish. Currently, about 50 families are living in El-Sheikh el-Shazli village. Figures 13, 14, and 15 show the three housing groups.

Figure 13 The Old Village

Figure 14 **The White Village**

Figure 15 **The Red Village**

Housing Clustering

El-Sheikh el-Shazli mausoleum stands in the center of commercial activities and at the back lays the residential zone (Figure 16). The three residential villages built by the government were shaped in a linear cluster and arranged parallel to each other in a row (Figure 17).

Village Infrastructure

- **Water**—The main source for the water is two huge trucks with trailers, one of a 25 ton capacity comes from Marsa Alam, and the other is of 40 ton capacity come form Hurghada. In addition the ministry of irrigation dug a well that produces 120 tons/day, but it needs a desalination unit which costs LE250,000. The village portion of water is about 800 tons, which is enough for local residents, but insufficient during festivals.

Figure 16 **El-Shazli Village Urban Zoning**

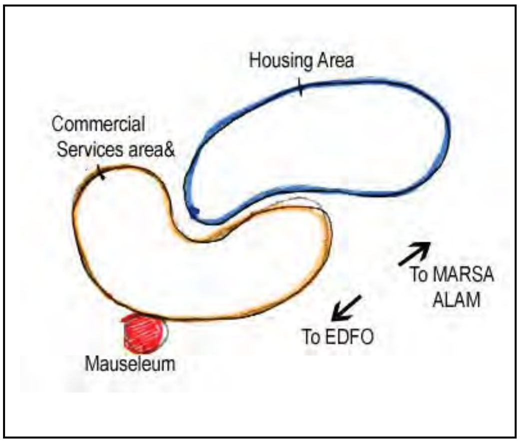
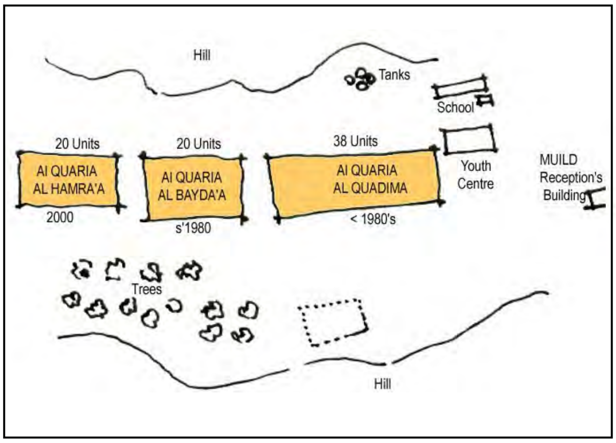


Figure 17 **El-Shazli Village, Housing Clusters**



The village has five 1,400-ton water storage tanks. Some are not working, others need maintenance and the pipes between these tanks are in very bad condition. In addition, the water pump that pumps the water to them is not working.

The water goes to individual houses in 7-ton trucks, and the people use 1-ton storage tanks, made either of steel or polyvinyl chloride (PVC). The latter is now widely used, replacing steel tanks.[3]

- **Electricity**—Electricity is supplied by three 500 megawatt (MW) diesel generators. Two are in small concrete rooms and the third is outside. One of these generators is not working and needs replacement or complete rehabilitation; as well, rooms need to be extended to accommodate the third generator. El-Sheikh el-Shazli and other similar villages suffer a shortage of diesel fuel—in Sheikh el-Shazli this means electricity for 12 instead of 24 hours a day.[4]
- **Sewage System**—the village as a whole has no wastewater system. However, some dwellings use a sort of septic tank and primitive trenches that are locally constructed and need periodic evacuation and cleaning (once every 2 months), which is costly. This system needs to be improved. Those living in huts do not have any system in place. This problem is currently under consideration since, during festivals, the amount of wastewater increases and creates severe environmental problems.[5]
- **Road Network**—El-Sheikh el-Shazli settlement lacks a road network and transport system that connect it to the regional highways and surrounding communities.
- **Solid Waste**—There is no waste collection service provided in El-Shazli village although it is considered one of the main villages and generates a huge amount of solid waste, especially during the *moulid*. In view of that, El-Sheikh el-Shazli village is in immediate need of a solid waste management system. The LRS project is supporting the establishment and/or operation of several solid waste management (SWM) facilities. These will be used to collect, sort, and recycle materials.[6]

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[3] LIFE, "Present Condition for El-Sheikh el-Shazli Village," 20-22.
[4] *Ibid*, 22-24.
[5] *Ibid*, 24.
6 LIFE, "Programmatic Environmental Assessment," 48-49.

Village Amenities

- El-Shazli Shrine is the main mosque of the area; however, adjacent to it there is a new mosque under construction, designed by Dr. Omar Farouk and sponsored by the NGO, Al-Hamedeya Al-Shazeliya. The shrine zone (Figure 18) is surrounded by a mausoleum, plaza, reception hall, ablutions building, and a Locust Combating Center and city council building. Figure 19 shows aspects of the village during the *moulid*.
- On the northern side of the residential zone there is a primary school, nursery, women's craft center, youth center, reception building for the festival, and a health unit that needs renovation. On the main road, there is a newly constructed police station.[7]

Figure 18 Exterior and Interior of El-Shazli Mausoleum

Socio-Economic Aspects

More than 90 percent of El-Sheikh el-Shazli's population works in animal husbandry, usually goats and sheep. About 20 percent raise camels. Four types of trade activities are found in the villages: grocery shops; cafeterias; squatter traders who sell desert herbs, incense, and charcoal during festivals; and mini truck vehicles. Some women produce handicrafts, but they face the problem of expensive raw materials and lack of markets. Other employment opportunities in El-Sheikh el-Shazli village are seasonal, with limited contracts.

However, the village has other, more regular, sources of income that meets a significant portion of the needs of the residents, such as charity donations offered by NGOs, Sufi sects, and individuals. The major donor is the Hamedeya Al-Shazeliya NGO. Other potential source of income is the *nozoor* box. *Nozoor* is a kind of offering in return for the fulfillment of a wish or prayer. The local authorities plan to establish a fund for the development of the village by placing three donation boxes in the mosque of El-Sheikh el-Shazly, Sheikha Zakeyya, and El-Sheikh Ali.[8]

Fifty-four percent of the population of the Marsa Alam district is illiterate, and El-Sheikh el-Shazli village has the highest illiteracy rate of the district. Eighty-five percent of the population of the village cannot read or write.

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[7] LIFE, "Present Condition for El-Sheikh el-Shazli Village," 13-19.
[8] *Ibid*, 27-29.

Figure 19 El-Shazli Village during the *Moulid*

2.3 SETTLEMENT NORTHERN WADI EL-GEMAL NATIONAL PARK (WGNP)

Location

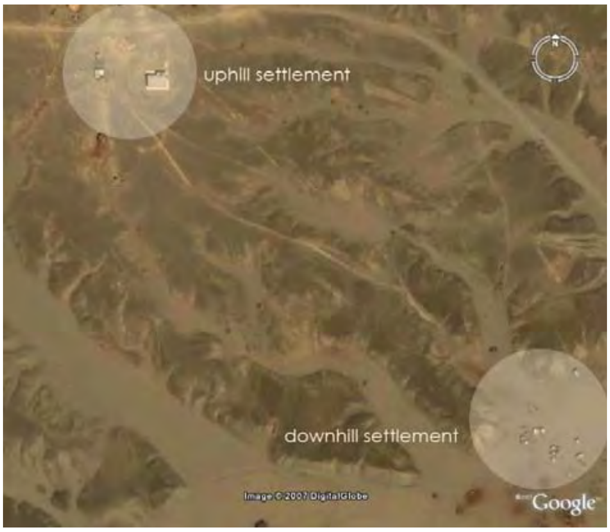
Wadi el-Gemal opens towards the sea and extends inland about 85 km. The *wadi* is large, with an average rainfall of 46 million cubic meters (m^3) per year. The sides of the *wadi*, which are granite and metamorphic rocks, trap the water, allowing for vegetation to grow, creating a unique environment. Wadi el-Gemal is considered by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to be a world cultural heritage site.

The community of Northern WGNP is divided into two temporary settlements, one uphill, which is out of this project's scope, and the other downhill. The downhill community consists of seven scattered housing units for two extended Ababda families of the Gerijab clan. Due to the tourist development presently taking place, these families were relocated twice, moving them from the seashore towards the west. The location may be closer than their former home to their work, which is fishing; however, it is risky since it is near a flood path. An aerial view of the communities is given in Figure 20.

Housing Clustering

The downhill settlement was built by the residents themselves, receiving some materials used from nearby tourist developments, e.g. Shams Alam. Two of the units are traditional temporary Ababda housing known as El-Khaysha. The others are wooden huts, built of recycled wood from shipwrecks or compressed wood brought from neighboring cities, such as Marsa Alam. The Khayshas and huts are arranged so entrances face the coastal road. Entrances never face each other and the distance between units must not be less than 5–10m. A back zone is dedicated to animals and on the southern side of the site is the camel area.

Figure 20 Satellite Map of Settlements



The two Northern WGNP Settlements

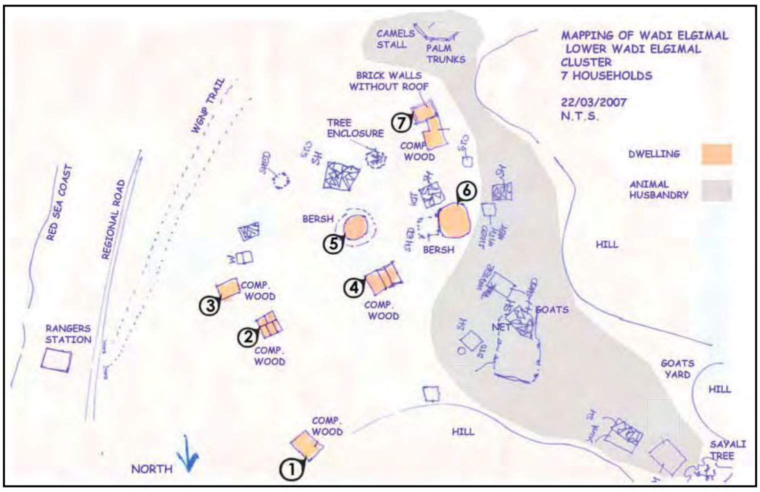
The downhill settlement

Village Infrastructure and Amenities

While the uphill settlement has some amenities, such as a one classroom, potable water tanks, and electricity taken from the Shams Alam Hotel, the downhill settlement does not have any amenities or infrastructure. Because it is a protected heritage area, the government prohibits building both infrastructure and amenities. Figure 21 shows the settlement and Figure 22 provides a site analysis.

Figure 21 Northern WGNP Downhill Settlement

Figure 22 Site Analysis



2.5 HOUSING ASSESSMENT

Sites observations conducted on the targeted communities revealed that Ababda tribes have two categories of housing: temporary and permanent. The differences in the form and construction of the units may arise from traditional customs, access to usable materials, and the influence of neighbors. Figure 23 shows the typical types of buildings in the settlement.

Figure 23 Typical Ababda Structures

The occupancy of these dwellings is of two types: a Single Resident Occupancy (SRO) and/or a Single Family Occupancy (SFO). Family size varies from a couple to a family of 5–6 persons. Polygamy is rare. Among Ababda social traditions is, that when a girl first marries, she lives with her own extended family for a year in a newly-built house and then she chooses to either to stay with her own family or move to her husband's clan. The average family size in the district of Marsa Alam is 3.94 persons per family, which is less than the average—4.56 persons per family—at the governorate level.

Temporary or Portable Housing

The traditional Ababda portable dwelling is called *El-Khaysha*, which literally means a piece of sackcloth. It is a box-like tent, sometimes with low pitched roof (Figure 24). It is a wooden frame structure made of dry Acacia branches, covered with mats from outside and strips of cloth from inside. The mats could be made of either plant stems or palm leaves. The mats are secured either with cord or fishing net bound around the whole structure. The floor is made of leveled earth, covered with straw or plastic mats. The open weave of the mats and cloth permits air circulation. Access to *El-Khaysha* is formed by rolling up the lower end of the inner and outer skins of the structure. The door (when possible) will be oriented to the East, but changes to follow prevailing winds. The height of the unit varies between 1.5–2.5m.

- **Functional Layout**—*El-Khaysha* are single-celled dwellings, almost rectangular in plan, divided into two zones, one for sleeping and living, one for cooking (see Figure 25). The kitchen is usually located at the back edge and curtains used to separate the spaces. The owner's artifacts and possessions are packed and hung from the interior building skeleton around the sides (Figure 26). Customarily, this is SRO, with the sleeping/living and cooking indoors with a bathroom area outside the unit.

Figure 24 El-Khaysha Architectural Form

Figure 25 Functional Areas, Sleeping, and Kitchen Zones in *El-Khaysha*

Figure 26 Interior Structure and Storage of Possessions within *El-Khaysha*

Each *Khaysha* is, in effect, a room, and several *Khaysha*s arranged in a yard bordered by a fence constitutes a complete dwelling. For example, in the Northern WGNP community, there is a *Khaysha* built as a nursery for the pregnant mother to stay in during her last months of pregnancy, away from direct contact with her children. All dwellings are oriented to face the coastal road. To provide privacy, the dwellings are scattered about 5–10m apart.

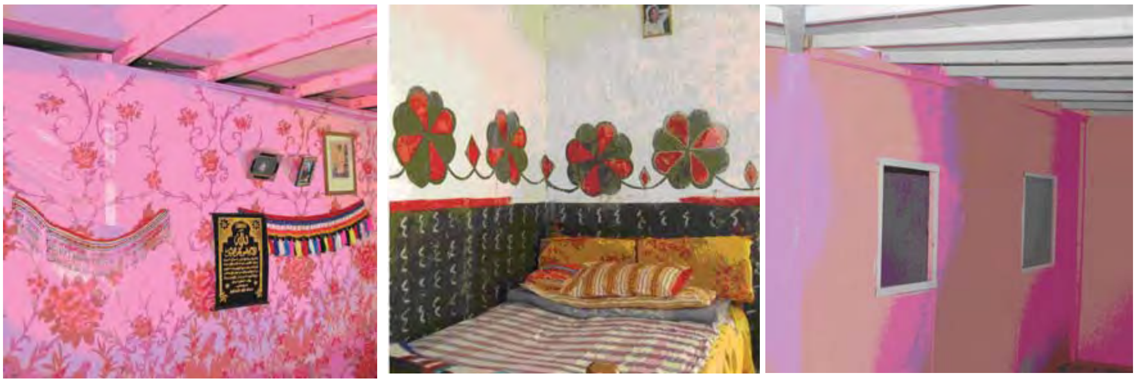
Permanent Housing

The hut is the common permanent Ababda dwelling. The hut is a multi-celled dwelling consisted of different spaces linked together in various arrangements. Its form and structure vary according to the availability of construction materials and the financial ability and social status of the owner. In general, the hut has a quadrangle form, and the roofs of the spaces are either flat or slightly pitched, which may indicate a roof with status such as that given to newlyweds or the head of the family and his wife. There are three types of huts: wooden, masonry, and hybrid, depending on the material used to build the walls.

- **Wooden Huts**—The wooden hut is a skeleton composed of posts (10×10 centimeters [cm]) and beams (10×10 or 25×10 cm), walled by compressed wooden boards (120×240 cm) and roofed either with wooden boards and/or corrugated aluminum sheets (Figure 27. Like *El-Khaysha*, the floor is made of leveled earth covered with straw or plastic mats, but a change of level between interior and exterior is marked by a plinth. The interior walls are skinned either with compressed wooden board or pieces of decorated textiles; a technique that reduces the need for internal finishes (Figure 28). Openings are cut out of the wooden walls and wooden doors and windows are fixed.

Figure 27 **Ababda Wooden Huts**

Figure 28 **Interior Finishes in Huts**



- **Masonry Hut**—Due to tourist development that is taking place in the region, locals began to build more durable structures using brick and/or stone (Figure 29). Masonry huts appeared—brick or stone walls bearing structural roofs of either wooden boards or corrugated aluminum sheets. Although the masonry huts are more expensive, they are favored by residents because they are more durable and show family status and welfare.

Figure 29 Brick Hut under Construction

- **Hybrid Style Hut**—This style evolved with the need to add to existing buildings. Due to the limited range of raw materials for construction, and the lack of knowledge about the natural resources available in the region for construction, the Ababda began to recycle whatever materials might prove useful (Figure 30). A storage location easily accessible to all is chosen, and, in line with personal technical knowledge, categories of recyclable materials suitable for construction are saved until enough are accumulated to build the extension. Among these recyclable materials are bricks and stones, used timber from shipwrecks in seaside communities, old straw, cans, and barrels. As a result, wooden huts with attached brick rooms are common, as are huts with walls of both wood from shipwrecks and flattened barrels (Figure 31).

Figure 30 Storing Recyclable Materials

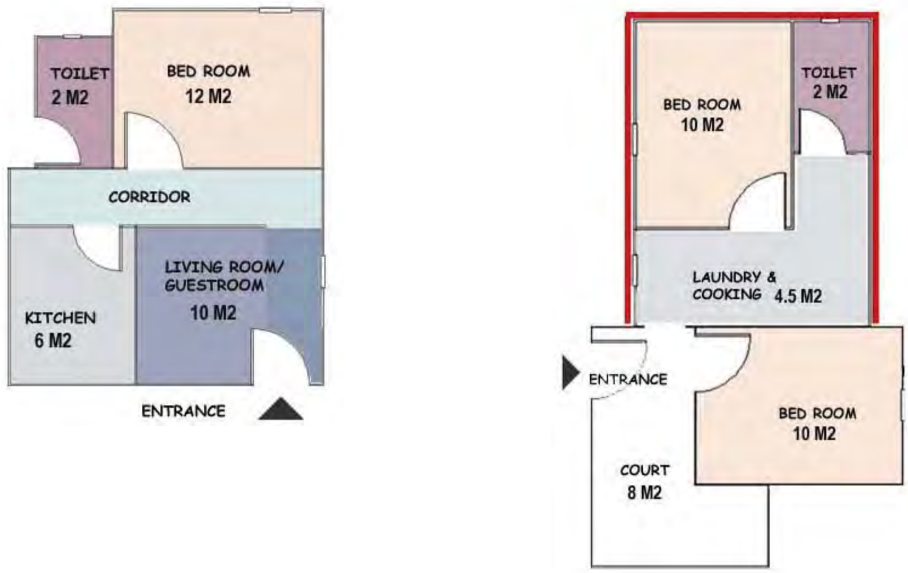
Figure 31 Hybrid Style Huts

- **Functional Layout of Huts**—The size of huts is based on family size and financial ability. Functional layout may vary, but interiors are generally divided into private zones (bedrooms and toilets) and public zones (kitchen, laundry area, living space, and guest room with a private entrance), as shown in Figure 32. An internal courtyard or the corridor is the core of the hut and the focus of its life. These work as reception and recreation areas, and are usually oriented in a north–northeast direction. The kitchen may be a separate annex or be located in the courtyard. Bedrooms and a court are the first built, with other spaces added later. The master bedroom may be distinguished by use of a pitched roof. Estimates of common area size are summarized in Table 1.

Table 1 Estimated Size of Spaces in Ababda Huts

Space	Area
Bedroom	8–12 m^2
Kitchen (a separate annex)	6–8 m^2
Toilet (an annex)	2–2.5 m^2
Courtyard (like bedroom)	6–12 m^2

Figure 32 Functional Layouts of 1- and 2-Bedroom Huts



Government-built Housing for Resettlement

- **Hamata Village**—In Hamata village, each single-family dwelling consists of two bedrooms and a toilet adjacent to each other, an open internal courtyard, and a surrounding fence 1.80m high specifying the boundary. The area of a single-family dwelling is approximately 225m², including the courtyard, which is about half the area. These are stone wall structures roofed with asbestos sheets, a recognized and banned health hazard.
- **El-Sheikh el-Shazli Village**—The housing in *El-Qariya el-Qadima* is similar to that of Hamata, with two bedrooms and a toilet and an internal courtyard. The typical unit in *El-Qariya El-Bayadha* has three bedrooms, a kitchen area, a toilet, and an open courtyard. Housing in *El-Qariya el-Hamra* usually has two rooms, a kitchen area, a toilet, and an open courtyard. However, unlike Hamata village, dwelling units in those villages are semi-detached, except in *El-Qariya el-Hamra*, where every four units are joined together in one block.

  All homes are 1-story high, built of brick with flat concrete roofs, except for *El-Qariya el-Hamra*, where vaulted roofs were used. The introduction of the vault as a roofing structure is a technique imported from the Nile Valley. It provides great thermal and ventilation qualities in summer; however, its openings need to be sealed in the winter to block cold winds. Construction of vaulted roofs require technical skills imported from the Nile Valley, which is costly.

  Masonry buildings made of brick, stone, or concrete block are durable forms of construction. However, quality workmanship, which is not widely available locally means craftsmen need to be brought from the Nile Valley, or training programs supported by the governorate. Transporting brick and concrete from Marsa Alam or Edfu is also expensive.

Problems with Resettlement Housing

Traditionally, Ababda houses are in a continuous state of evolution and alteration, with new sections being added to meet changing family needs.

In Hamata Village, the single-family dwelling unit built by the government in the 1970s were not satisfying family needs or traditional values. As a consequence, each family began to modify the original function of spaces and to add new functional spaces within the open internal courtyard to meet their needs and in accordance with materials and money available (Figures 33 and 34).

Among the functional spaces added are kitchens, bedrooms, living room, a guest rooms with private entrances, area for laundry, shaded recreational areas, and wood or tin fences. Area of spaces may vary between 8m^2 and 12 m^2, but the actual dimensions and configuration will depend on each unit's condition and space requirements.

Figure 33 Functional Layout of Resettlement Housing following Modifications

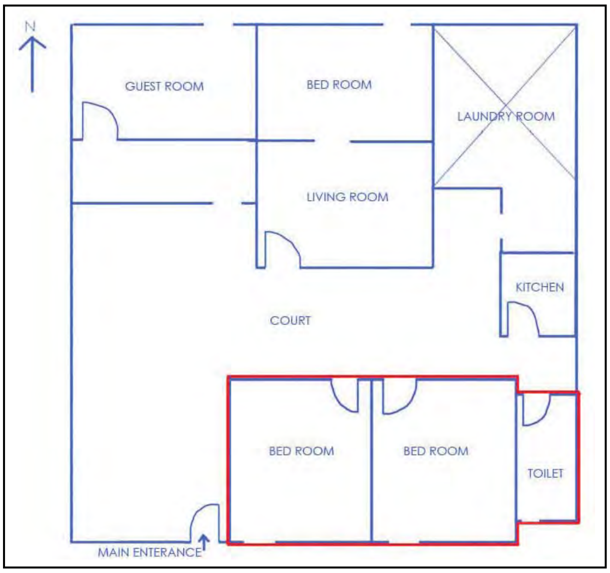


Figure 34 Typical Attached Resettlement Housing following Modification

Ababda tribes are sustainable communities. Their food is derived from the animals they breed; their possessions—bags, rugs, and camel saddles, among other things—are made of goat hair, sheep wool, and animal skin, which they spin, stitch and weave. Therefore, an animal shelter is an essential space for the lives of the Ababda, and it is missing in these government-built resettlement units. Over time, each family has added an animal shelter within the domain of their dwelling, located to the east side of the complex.

The toilet attached to each dwelling unit lacks a proper sewage system. Every two units share one septic tank that is connected to a trench. Unpleasant odors can pervade internal courtyards and houses. The residents have closed these toilets, preferring to toilet outside the house.

Ababda nomads appreciate privacy and isolation and prefer their dwellings to be separated from each other by a distance of up to 20km, a value which is not achieved in the resettlement housing units, where two units share one wall and the internal courtyards of four units are joined. Therefore, some residents carved out courtyards outside their houses. Moreover, they built new entrances for their buildings to break the visual continuity with the outside and to achieve privacy for their internal courtyard.

Since the internal courtyard is an activity area for both children and adults and a reception area for guests, residents planted trees for shade and to protect them from the summer heat.

Generally, these added spaces have been built using wood and/or brick walls and roofed with wood boards and/or palm leaves mats (Figure 35).

Figure 35 Wooden Gabled Roof Covered with Mats or Wood Boards

El-Sheikh El-Shazli Village

As in Hamata, the Ababda of El-Sheikh el-Shazli Village have made modifications to their houses to satisfy their needs. Shade was provided in the open courtyards, separate guest rooms have been added, and some houses have separate entrances for men and women. Figure 36 shows how trunks and branches of the Acacia tree are used to provide shade, and Figure 37 shows some of the modifications families have made to their houses.

Figure 36 Shade Added within Internal Courtyards

Figure 37 Additions and Modifications within Courtyards

Laundry Area Guest Room Barn

3. SUMMARY OF HOUSING NEEDS

The purpose of this project is to provide local residents options for improved their housing to enhance the security of their livelihoods and to avoid the decline that occurred in the previous government-sponsored housing scheme. The reasons for this failure include:

- Lack of community participation in the project
- Poor construction quality
- Poor amenities and infrastructure
- Housing design did not take into account the needs, lifestyles, and traditions of the people that were expected to use the housing.

As a consequence, people were not satisfied with those houses. They modified them to suit their needs, even while maintaining their traditional either hut or a guest house in other place.

3.1 CHALLENGES

No community is isolated from its larger context. These include natural environment, climate, government policies, conventions, demographic factors, livelihood options, tourism, and mega-projects. There are advantages and disadvantages contained in each of these for the Ababda of the SRS region, and they can be used by Ababda communities to improve their well-being.

Community sustainability is measured by its ability to cope with, adapt to, and shape circumstances and change. The introduction of tourist development projects and mining activities, government policies, and severe climate in the SRS region are the main challenges that affect the lifestyle and economic habits of the Ababda.

Housing is part of a lifestyle not just a building. Buildings alone cannot improve the well-being of their residents. However, adequate infrastructure (electricity, water, and sewerage) and care for the natural environment will improve life. Also necessary are policies and programs that provide adequate employment, social life, and access to the funds necessary to provide appropriate housing for one's family.

The housing needs of the three communities are categorized into two parts:

1. Identifying needs in the larger context of housing
2. Requirements of housing design and physical product.

3.2 CONTEXTUAL HOUSING NEEDS

- **Land/Home Ownership—**Residents are reluctant to invest in secure and permanent housing when they live in a constant fear of expulsion because of policies and development. Economic and political pressures may lead to deterioration of construction practices because people are tempted to use inferior, recyclable materials and primitive construction techniques. They need to be able to buy or lease land. By securing land division and tenure rights, people can own and invest in their houses. Land is part of the cultural identity of indigenous communities.
- **Settlement Domain—**It is important to identify the domain of a settlement in order to have a clear idea about the required area for an extended-family community. There are different ways that could be used: the surrounding hills, the animal barns, and the extent of each family's dwelling.

- **Settlement Location and Livelihood Security—**RSG policy in Hamata village is to evacuate locals from the east of the road to the west and designate the area east of the road for tourism in order to generate jobs and upgrade the area. However, this is will make access to the sea exclusive to the private sector and prevent the locals from fishing, one of their main livelihood sources. Solving the problem of access to fishing for the residents is a high priority. The Ababda are a self-sustained community; they are producers of crafts and livestock, and they have indigenous knowledge of the surrounding natural environment. Therefore, locations of their settlements should be adjacent to tourist or mining projects to provide them the opportunity to sell their products.
- **Settlement Infrastructure and Economic Opportunities**—Adjacency of the settlement to main roads is crucial to allow residents to start their own business that could be integrated within tourism and generate funds for housing. There could be opportunities for cafeterias, coffee shops, and sale of desert safaris adjacent to the main road in Hamata village. However, the lack of RSG support in providing official work permits and infrastructure such as sufficient electricity and water hinder the delivery of regular services. Moreover, the lack of a road network and a means of transportation to connect the settlements to the highway network makes seeking economic opportunities difficult.
- **Settlement Amenities**—The three selected communities lack the educational amenities that prepare youth to participate in the prestigious tourist projects as alternative economic opportunities by improving their language and communication skills and increasing their cultural awareness. Communal open places for socializing, relaxation, and recreation are missing in the village.
- **Settlement Land Use—**Integrating commercial and economic activities within housing areas is contrary to tradition and robs people of the privacy they prefer. Clear separation among the different land uses is recommended, remembering that commercial activities must have direct access to the main roads.
- **Settlement Clustering—**The Ababda prefer to live in small groups of four or five families. The buildings of each family's compound should be arranged in a C-shaped cluster. Accordingly, lay-out of new settlements must reflect traditional Ababda settlements.
- **Climate Control**—The Ababda endure extremes of heat and cold. Maximum enhancement of the natural ventilation depends on the orientation of houses at the earliest design stage. Mitigation of summer heat and winter cold must be a priority, and the potential for passive renewable energy production considered.

3.3 HOUSING DESIGN AND PHYSICAL PRODUCTS NEEDS

- **Design Flexibility**—A greater variety of styles of housing reflects the specific needs of different groups. A house that can accommodate a variety of household types, lifestyles, and functions does not require remodeling as happened in the government-built resettlement units. Open building methods, such as post-and-beam framing, lend themselves most easily to adaptation.
- **Dwelling Domain—**Each Ababda household should have permanent structures for living and temporary structures for other activities. These structures should be combined in one zone called the dwelling domain. Since Ababda lifestyle is based on free movement, the demarcation of the dwelling domain should be of light structure.
- **Functional Layout**—Ababda housing should follow certain patterns in which the floor plan and functional layout should be derived from the traditional temporary home and more contemporary hut but should also incorporate facilities appropriate for urban life.

- **Healthy Housing**—Most Ababda housing has no access to safe potable water or to other basic services for healthy living such as electricity, sewerage, and solid waste disposal.
- **Construction Materials—**Although the Ababda are distinguished by their ability to use recyclable materials in the construction of their dwelling, they lack the knowledge of how to use the natural materials they have, such as the native stone. They need to have access to training in the construction techniques used in the Nile Valley and to search for methods to integrate these techniques with their sustainable way of construction to build 'green' houses made of recyclable materials.
- **Housing Physical Characteristics**—Seeking privacy, height of windows should be above the sight lines of passersby. Environmentally, the size and position of windows in housing are important parameters to achieve maximum circulation and climate control. Colors of huts and tents are usually tones of blue and brown, the colors of the sky and the desert.

4. CONCLUSIONS

The main objectives of this assessment were:

1. To address the particular housing needs of the Ababda living in the SRS region in order to overcome the housing problems experienced throughout the years
2. To identify the design key elements of traditional house and indigenous construction techniques that might be preserved and utilized in the new housing development
3. To prepare guidelines to assist the design, construction and maintenance of Ababda housing.

Previous housing did not meet Ababda livelihood and cultural needs. It is badly built and does not meet national or local building codes and regulations. Housing for the Ababda will be designed and constructed for long-term function and to support healthy living practices. Good housing design would diminish the costs of adapting and modifying dwellings afterwards. These findings, together with the design guidelines, are a source for everybody involved in providing housing for the indigenous people—governments, NGOs, developers, community councils, architects, and housing owners.

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LIFE Red Sea Project

Ababda Housing Activity Project: Methodology and Guidelines for Housing Assessment

OCTOBER 2007

This publication was produced for review by the United States Agency for International Development. It was prepared by Chemonics International.

LIFE Red Sea Project

Ababda Housing Activity Project: Methodology and Guidelines for Housing Assessment

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

CDC	Community Design Collaborative
cm	Centimeter
EEAA	Egyptian Environmental Affairs Agency
km^2	square kilometers
LIFE	Livelihood and Income from the Environment (project)
LRS	LIFE Red Sea Project
m	Meters
MW	Megawatt
NGO	Non-governmental Organization
PVC	Polyvinyl Chloride
RSG	Red Sea Governorate
SFO	Single Family Occupancy
SRO	Single Resident Occupancy
SRS	Southern Red Sea (region)
SWM	Solid Waste Management
TDA	Tourism Development Authority
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USAID	United States Agency for International Development
WGNP	Wadi el-Gemal National Park

EXECUTIVE SUMMARY

Ababda tribes living in the Southern Red Sea (SRS) region of Egypt, like most nomadic tribes in the Arab World, have suffered from major changes in their social and economic lifestyles, particularly following new government policies that focus on developing the coastal area of the Eastern Desert as a major tourist destination in Egypt. The Ababda have traditionally followed a pastoral lifestyle in which their livelihood was based on herding camels and goats. With changing times, they began searching for more permanent living conditions and higher incomes by taking jobs in the government and private sectors. While external factors have affected the economic lifestyle of the Ababda, they retain the cultural traditions and values that shape the patterns of life in their housing.

Most research done on such tribal communities has been historical, geographical, anthropological, and/or sociological, but infrequently on urban planning for village structure and housing of tribal communities. Hence, one of the objectives of the Ababda Housing Activity Project, an initiative of the Livelihoods and Income From the Environment (LIFE)– Red Sea Project (LRS) in Egypt, is to increase knowledge about tribal housing through the assessment that was done on the housing of the Ababda. This report, "Methodology and Guidelines of Housing Assessment," documents the participatory methodology that was used during the assessment, which enabled the architect to understand the lifestyle of the tribal community.

The assessment was carried out in three steps:

1. Identify basic research issues
2. Collect data about these topics
3. Classify, code and interpret collected data

The topics of the assessment are divided into three main subject matters:

1. Community Identification includes social structure, demography, boundaries and socio-economic aspects.
2. Settlement Planning comprises geographic location, layout, social services and infrastructure.
3. Family's Dwelling covers the functional layout, the key architectural features and structure of the housing unit.

A qualitative participatory research method was employed during this assessment. It took a multi-faceted approach, focusing on collecting data about the communities in context and interpreting this data with the assistance of local residents. During the classification and interpretation process, relationships between the data and the objectives of the project were clarified and prioritized, and the design problems identified.

1. INTRODUCTION

The Ababda Housing Activity project is divided into two phases. The first is an assessment of housing needs tied to household livelihood strategies to be conducted in three different communities (northern Wadi el-Gemal National Park [WGNP], Hamata, and El-Sheikh el-Shazli). The second is a generative design activity whereby detailed designs for housing layout and units in each of the three communities will be developed.

The intent of this report is to document the research process aiming to outline a methodology and guidelines for assessing settlement layout and housing needs in the context of improving livelihoods in order to first, identify and explain social and economic patterns that appear to apply to the majority of Ababda communities; second, identify dwelling prototypes throughout a community's life; third, clarify and evaluate sources that stimulate design ideas; and fourth, make the conclusion of this research applicable to other Ababda communities and contexts.

The main objective of the Ababda Housing Activity Project is to define how the layout and design of the housing of the indigenous people living in the SRS region may affect their livelihoods, the cost and quality of the end product, and how the housing development process could be integrated with the future development of the region. The project team reviewed relevant literature to compile a body of knowledge that would be divided into three groups.

The first group of questions addressed the following topics:

- How were these communities developed?
- What is the boundary of a community?
- What are the demographic changes that occurred in the region in the last 2 decades?
- What are the social, economic, and cultural contexts for each community?
- What are the political and legal frameworks that affect settlement development?

The second group of queries was concerned with analyzing the settlement layout:

- What are the criteria for site selection?
- What are the physical components and structures of a settlement?
- What are the social and economic services provided for each community?
- What infrastructure is provided for the community?

The third group focused on analyzing housing units, exploring the following issues:

- What are the housing types built by residents?
- What is the boundary of a dwelling unit?
- What are the different types of spaces within a dwelling?
- What are the materials used for construction, and their sources (natural and/ or commercial)?
- What are the construction techniques known by locals?
- What are the amenities provided for each type of house?
- How could sustainability be identified in Ababda dwellings?

- What are the characteristics of such houses that would enable them to be harmonized with the overall character of the region if any?

Providing low-cost housing is one of the Red Sea Governorate's (RSG) direct measures to develop the Ababda tribes and integrate them within the larger development plans for the region. Therefore, studying and analyzing the traditional dwelling of the Ababda is a crucial task in the research phase of the project. This assessment is one of the few that focused on the housing of indigenous people.

2. METHODOLOGY

2.1 OVERVIEW

The method devised for this project was multi-faceted qualitative research focusing on studying communities in their natural settings and interpreting phenomena according to the meaning local residents bring to them. Qualitative research methods require collecting data from a variety of sources. The following activities were undertaken:

Literature Review

Before starting the assessment, it was important to understand the communities and determine their housing needs. A preliminary literature review was undertaken to:

1. Assess to what extent the housing of indigenous people was discussed in literature
2. Evaluate how housing design might influence livelihood generation
3. Set and classify assessment queries
4. Verify the information collected during the fieldwork.

Literatures reviewed included the qualitative and quantitative surveys undertaken by LRS and other institutions on the households of the three targeted communities.

Site Visits

A 7-day fast track reconnaissance trip was conducted to visit the three targeted and other adjacent communities, such as Arab Saleh, El-Shalateen, and Abu Ghusun to become familiar with their natural and cultural diversity and determine the overall needs of inhabitants.

Workshops

Before beginning the assessment a 1-day workshop was held between the Community Design Collaborative (CDC) and the LRS teams to specify assessment objectives and strategies. After the assessment, another 1-day workshop was conducted to present and discuss the findings of the assessment and share initial conclusions. Several qualitative tactics were used for the data collection.

2.2 DATA COLLECTION TACTICS

Throughout the assessment a multi-faceted approach was used; a variety of data collection tools and investigators cross-checked data and interpretations in order to reach credibility. Table 1 specifies the different data collection tactics used.

Table 1 Data Sources

Tactics	Interactive	Non-Interactive
Interviews	Formal structured interviews, Semi-structured interviews, Informal interviews, Key Informants, e.g. tribal Sheikh, head of village council, etc.	
Focus groups	Discussions conducted with participants in a small groups, Team helped construct the right questions	

Tactics	Interactive	Non-Interactive
Observation	Team observation, Locals observation	Chronicles, Field notes
Surveys	Physical Inventory of houses, artifacts, and buildings	Photographs, Sketches, and Artifact interpretation
Literature review		Archival Interpretation (books and reports)

2.3 GUIDE TO COLLECTING DATA

Step 1—To determine how to improve the housing of these indigenous people, the CDC team developed three groups of questions that would be asked of different groups of interviewees using a variety of data collection techniques, as outlined in the Introduction. These were:

1. Identify community history, development, boundaries, demography, and socio-economic aspects
2. Gather information about settlement site selection, urban planning, social amenities, infrastructure, and economic potential
3. Understand the different styles of indigenous housing, architectural features, and materials and techniques of construction.

Step 2—Data collection techniques were divided into two groups: interactive and non-interactive. The interactive techniques required dealing with interviewees. For each set of questions, the CDC team set criteria to choose the group to be interviewed, either a homogeneous or a heterogeneous group. Homogeneous groups were people of the same social profile; heterogeneous groups were from different social profiles (age, gender, education, and profession). For both types of groups, it was useful to make a table in which interviewees' data was documented, which facilitated categorization of the interviewees (see Table 2).

Table 2 Sample Table Used to Categorize Interviewees

Settlement—Hamata Village				
	Age	Gender	Education	Profession
Interviewee 1				
Interviewee 2				
Interviewee 2				

Step 3—To gather information about the first topic (community's history, development, boundary, demography and socio-economic aspects), the CDC team conducted structured interviews and focus group discussions with homogeneous groups, such as RSG, community municipal leaders, and people responsible for other programs, projects, and services provided for the various community in the region. Next, informal or semi-structured interviews were held with heterogeneous group of local residents—especially men—to understand how they think and feel about issues such as community boundaries and the socio-economic aspects of the community, in order to bridge the gap between decision makers and residents. It was significant for CDC to make a comparative analysis between residents' definition of a community's boundary and that of the government.

Informal and semi-structured interviews were very useful with heterogeneous group of people, because they freely expressed their degree of satisfaction about their community and houses, while focus group discussions were conducted with people who had official information on various communal issues (see Figure 1).

Figure 1 Informal Interviews with Local Residents

Step 4—The second group of queries required both interactive and non-interactive data collection techniques. The CDC team continued interviewing groups of officials and residents to collect information about the criteria for a settlement's site, urban planning, social amenities, infrastructure, and economic potential, and documented both their own and residents' observations about the settlement. All oral information and observations were documented by taking notes and using tape recorders. At the same time, another CDC group was making a physical inventory of the settlement's buildings and houses, making sketches, and taking photographs.

Creating data tables was a useful tool to organize and collect data in a systematic way, which later facilitated the identification and reporting process. Table 3 shows the criteria for the selection of a settlement's site.

Table 3 Recording Criteria for Selection of a Settlement's Site

Hamata Village		
Criteria		
		Evaluation
Criterion 1		
Criterion 2		
Criterion 3		

Hamata Village	
Criteria	
Evaluation	
stated by authorities	✓
stated by locals	✗
CDC team observation	☑

Tables 4 and 5 were used to document the availability of amenities and infrastructure in each community. They were a quick method of evaluating the degree of development of each community.

Table 4 Community Amenities

	Hamata	El-Sheikh el-Shazli	North WGNP
Mosque			
Village Council			
Elementary School			
Primary School			
Secondary School			
Health Unit			
Craft Center			
Gov Building 1			
Gov Building 2			
Evaluation	→	Exists, in good condition	
	←	Exists, in bad condition	
	↓	Does not exist	
	↗	Under construction	
General Notes			

Table 5 Community Infrastructure

	Hamata	El-Sheikh el-Shazli	North WGNP
Potable water			
Electricity			
Sewage system			
Solid waste system			
Road network			
Evaluation	→	Exists, in good condition	
	←	Exists, in bad condition	
	↓	Does not exist	
	↗	Under development	

General Notes	

It was also useful to make a comparative analysis between the problems found as a result of not having certain facilities or infrastructure, especially those that affected residents' livelihood security, and the benefits that would reach the community when such a facility—such as a solid waste management system—was available (see Table 6).

Table 6 Comparative Analysis of Amenities and Infrastructure Systems

Hamata Village	
Facility: Solid Waste Management System	
Problems	**Benefits**

Step 5—one of the objectives of this project was to identify the architecture of the Ababda housing, to study the use of the spaces and identify the spaces that are used as a livelihood source, such as animal barns, and be able to recognize trends in housing construction. The CDC team made a picture dictionary and index of housing styles and documented the architectural features of each style, which included roof forms, windows, doors (especially front doors), decorative features, if any, and materials and construction techniques.

During this step, CDC divided into two groups; one responsible to conduct the interactive data collection, such as participating in family and community activities—sitting in the community center or guest room (*madyafa*) and drinking traditional coffee, baking bread within the house domain, conducting friendly conversations with female members of the house—and observing the different types of houses and the activities of the family members within the house. This open-mode of data gathering helped to explore the characteristics of the indigenous dwellings. Figures 2 depicts the team interacting with the local residents.

Figure 2 Interacting with the Ababda Residents

Baking traditional bread (*gourass*) under ashes

Preparing coffee in a *gabana*

Project team eating traditional bread

Project team join local residents for coffee

The other group was responsible for the non-interactive techniques, such as sketching zoning diagrams (functional layouts) of the different house types and taking photos to create a picture dictionary and index of housing styles, features, and materials of constructions.

Since Ababda live in sustainable communities and build their houses from available recycled materials, the CDC team inventoried the different materials of construction, status as either raw or recycled, source, and cost as shown in Figure 7.

Table 7 Inventory of Materials of Construction in Ababda Housing

Material	Status	Source	Cost	Notes
Fabric				
Timber				
Brick				
Stone				
Barrels				
Status Evaluation		♻	Recycled material	
		✪	Raw material	

Step 6—As a last step of the data collection process, a second review of the literature was made to verify and categorized the gathered data.

2.4 OBSTACLES

Time Constrains

Time dedicated for community visits was limited to only 7 days, and had include interviews with residents, with government employees, and with members of village councils.

Broader Issues

Most of the discussion with locals focused on their struggles concerning broader issues, such as land rights and economic empowerment.

As a result of these difficulties, the project team tried to piece together information in order to develop a real picture of the status of Ababda housing in the SRS region, and a concise explanation about their short- and long-term needs.

2.5 DATA CLASSIFICATION AND DISPLAY

The data collected during site visits has been analyzed, categorized, and coded into various topics and sub-topics as illustrated in Table 8, then displayed in the form of matrices, graphs, diagrams, and tables, and discussed with project stakeholders. The first workshop conducted to present and discuss the findings of the housing assessment was held on 23 April, 2007 and aimed to interpret these findings into design criteria.

Table 8 Data Coding

Topic	Sub-topic
Community	Identification Structure Demographic Information Boundary Values and Beliefs Livelihood Strategies Gender Roles
Context	Natural Socio-Economic Political and Legal
Settlement	Location Components Layout
Dwellings	Typology Physical Attributes Functional Layout Building Materials Construction Techniques
Dwellers	Satisfaction New Housing Concept

3. HOUSING ASSESSMENT GOALS AND STRATEGIES

In the current housing programs, the focus is on houses (the physical structure) rather than on housing (the ground of the social and economic life). Homes are seen merely as a physical asset, not as places for work, learning, and communication. The aim of this project is to deliver pilot housing prototypes that will improve the social and economic status of local communities and to eliminate the failure factors in the dwellings previously designed and built by the government to encourage the traditionally nomadic Ababda to settle in one place. These models will be developed with the participation of both community and stakeholders.

4. GUIDELINES FOR ASSESSMENT

4.1 SELECTED COMMUNITIES

The targeted communities in this project were selected on the basis that first, they belong to the area where the LRS Project is undertaking other community-based initiatives; second, they all are located in the same political, economic, and cultural contexts of the SRS region, which is an attractive destination for tourist development projects; third, they represent examples of the various communities living in SRS region: permanent communities located either near the seashore or in a *wadi*, or temporary communities, usually located in a *wadi*.

The community at the northern side of WGNP is a small fishing settlement located adjacent to the Wadi el-Gemal area—a world cultural heritage site distinguished by its marvelous natural and cultural treasures. The main income of the people is from fishing in season and herding goats and sheep for the rest of the time. Most of the yield of the fisheries and herds is used for trading with the nearby village of Abu Ghusun. Also among the traditional activities of the locals is hunting wildlife, such as gazelle and ibex, which is currently banned since the establishment of the national park and passage of wildlife protection laws. Other activities such as tour guiding and ranger support also provide employment.

Hamata village is on the coast, located 110 km south of Marsa Alam, which has many tourist facilities. Most of the population works in fishing, but a few have herds and others work in tourism.

El-Sheikh el-Shazli village is in the mountains and is distinguished by its cultural character. It is home to the Sheikh el-Shazli festival (*moulid*), which generates income for the residents.

Through participatory observation; literature review before, during, and after the assessment; and consulting archival documents and demographic statistics, the following issues were identified for each community:

- Geographic location
- Demography, including total population, number of households, and number of persons per household
- Livelihood strategies of the population according to the location, infrastructure, and social services provided
- Distinguishing social and cultural characteristics that generate sources of income; e.g. the Sheikh el-Shazli *moulid*.
- External political and economic policies of the government that influence short- and long-term needs of the community and its future development and growth.

4.2 SETTLEMENT ASSESSMENT

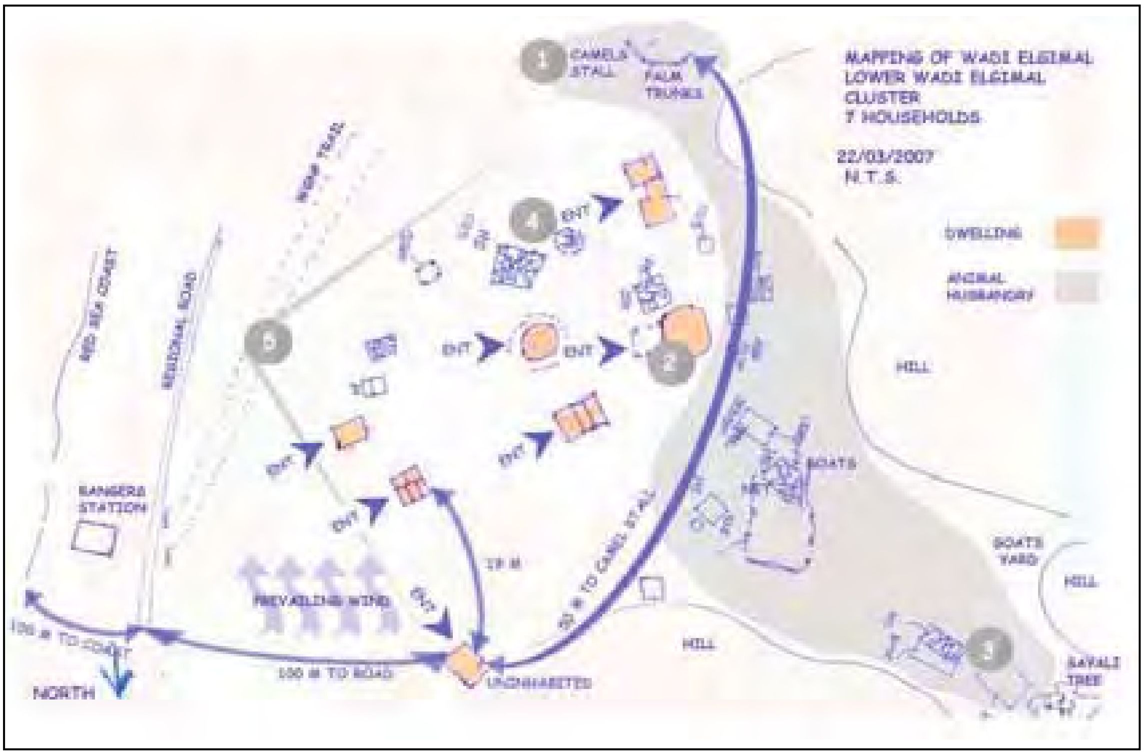
It was decided that each settlement layout should be evaluated according to the following criteria:

- **Location**—as a fixed orientation, the location of each settlement was referenced to Marsa Alam city

- **Site Boundaries**—the features that demarcate site boundaries: roads, barns, and/or social services were identified
- **Social Services**—communal services, such as community a center, schools, hospitals, government buildings, and public open recreation spaces were surveyed and indicated on sketched maps
- **Economic Services**—how the location of the settlement affects access to various income sources was a crucial topic to be explored with residents and all sources of economic activities available in each settlement were surveyed
- **Infrastructure**—the nature and standards of infrastructures were observed and photographically documented, including access roads, peripheral and feeder roads, and road networks connecting villages; sewage systems; domestic water networks; and solid waste management systems
- **Housing Clusters**—these were observed and evaluated to understand adherence to an expansion pattern for the extended family (clan) and privacy as a traditional value
- **Housing Domain**—this was studied to note the limit of spaces dedicated to outdoor activities
- **Orientation**—orientation of the dwelling in relation to the direction of prevailing winds and the house's access to the main road was studied.

Layout characteristics were observed, sketched, photographed, and described. This method ensured that each site was analyzed and documented in the same way. Figure 3 shows one of the sketches done for one community.

Figure 3 Analytical Sketch Map of the Community at North WGNP



4.2 DWELLINGS ASSESSMENT

Records were made of the different types of housing. These included:

- **Ababda Traditional Dwellings**—The project team was seeking to identify the practical qualities and meaning of the Ababda traditional house in its original context and in the present day. To accomplish this, the team studied houses in the selected and neighboring communities representing two types of housing:
  - The traditional *khaysha* or *beit berch* (temporary dwelling)
  - The traditional hut (permanent dwelling)

  For the most part, the team observed the physical features of the house, and sometimes team members, interacting with family and community, moved through the spaces in and around the houses, observing the furnishings and possessions, wrote field notes, sketched the house's functional layout, and took photos to keep detailed records of the appearance and finishes of the exterior and interior of the various types of housing. Figures 4 shows the interiors and exteriors of these two types of housing.

Figure 4 Ababda Housing, Shalateen Village

A well-designed and preserved wooden hut

Khaysha or *berch* constructed within a wooden fence

Project team visiting inside a wooden hut

Interior of a *khaysha* or *berch*

- **Government Housing**—Little is known about the long-term results of the *tawteen* housing units, built by the government specifically to settle the nomadic tribes. Several questions were addressed throughout the assessment for the different *tawteen* dwellings located in Hamata and El-Sheikh el-Shazli villages to identify the failure factors in these dwellings.

- Are they satisfying to residents?
- In what way are they successful/a failure?
- What factors lay behind their success or failure?
- How effective are they in increasing livelihood security and reducing vulnerability to external shock, such as severe climatic conditions and drought?
- What modifications have residents made to *tawteen* housing to satisfy their needs?
- What should be done to make housing for indigenous people more effective?

- **Housing Construction Costs**—Construction costs were assessed to determine and categorize housing affordability and residents' financial abilities. Cost data has been collected from owners during which information about availability and sources of materials and labors have been collected.
- **Housing Quality**—Structure, types of construction materials, ventilation, conditions of sanitary facilities, availability of potable water, and interior and exterior finishes were all evaluated, documented, and photographed.

5. HOUSING AND INCOME GENERATION

5.1 CONSTRUCTION TECHNOLOGY

There has been a lot of emphasis on settling nomadic peoples, and the government has provided housing without considering affordability, cultural acceptability, or indigenous knowledge of construction techniques. Indigenous building knowledge and practices is nearly universally devalued by governments and developers—and sometimes by locals themselves, who prefer modern buildings as a symbol of development.

Local building technology is valuable in terms of livelihoods because it uses local skills and labor. Brick or stone load-bearing wall construction requires importing construction technologies and labor from the Nile Valley. This marginalization of local skills and technologies increase the residents' vulnerability to risks: modifying and repairing houses using new and unfamiliar technologies is difficult. Tenants revert to traditional building methods, and the result is often an unattractive hybrid structure.

The team was concerned about surveying indigenous construction technologies suitable for revival to be utilized in any new housing program. Opportunities to train locals in new technological methods are also possibilities. Both cases may create new livelihood opportunities.

5.2 HOUSE DESIGN

Participatory group discussions were held with residents to explore the spaces and facilities needed in houses to generate income, such as space for agricultural implements; a place to keep sheep, goats, and camels; and the need for a domestic water supply.

6. CONCLUSION

This assessment focused on exploring three communities as case studies within their actual contexts. The assessment findings were analyzed and categorized into themes applicable in other communities. They are:

- The economic, social, and cultural aspects of the traditional Ababda community
- The multifaceted dynamics that led the traditional community to adopt and adapt an urban lifestyle
- The physical extent of the community's adoption and/or adaptation
- The indigenous people's understanding of their home and community in relation to the larger context
- The principles of indigenous housing architecture
- The influence of direct exposure to external factors such as economic and political policies.

During the assessment, the project team used both study of documents and reports and field observation. The second phase of the project will be to design housing prototypes to be assessed using a participatory methodology with community members.[1]

[1] For the findings of the assessment, refer to D01: *Ababda Housing Assessment* report.

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LIFE Red Sea Project

ABABDA HOUSING ACTIVITY: PLANNING AND DESIGN GUIDELINES

DECEMBER 2007

This publication was produced for review by the United States Agency for International Development. It was prepared by Chemonics International.

LIFE Red Sea Project

Ababda Housing Activity: Planning and Design Guidelines

TABLE OF CONTENTS

FIGURES

ACRONYMS AND ABBREVIATIONS

˚C	Centigrade
cm^3	cubic centimeters
km	kilometers
km^2	square kilometers
m^3	cubic meters
mm	millimeters

INTRODUCTION

This report consists of planning guidelines for the Ababda community in the Red Sea Region and design guidelines aimed to satisfy Ababda housing needs. The planning and design guidelines examine inherent settlement formation/housing know-how utilized by the Ababda community. The report focuses on organization pattern, domains, settlement formation criteria. It also delves into explaining the social, economic, and urban conditions behind the existing patterns. It then suggests the appropriate guideline o be recommended for future planners, organizations, and private sector developers when addressing Ababda community settlements.

The study concludes with the most relevant guidelines concerning different planning and design issues.

PLANNING GUIDELINES

SITE LOCATION CRITERIA

Remote Location

The Ababda were originally a nomadic tribe, and preferred to settle in uninhabited areas, far from towns and cities and close to virgin nature. The still select locations near the sea, the mountains, and the desert for their settlements. Figure 1 shows the location of some Ababda settlements highlighted in yellow. The monochrome map depicts the Ababda's nomadic realm, stretching from north of Al-Quseir to Halayeab on the Egyptian–Sudanese border in the south and from the eastern shores of the Red Sea in the east to the eastern bank of the River Nile in the west.

Figure 1 Routes Linking Various Ababda Settlements

Access to Water

Drought and scarcity of other resources led the Ababda to adjust their settlement site selection criteria to have access to water and services. Some settlements are now near villages served by regional roads.

The Ababda prefer to keep some distance between their homes and the source of their water (a well), to preserve the water from over-utilization and to keep dangerous animals at bay. In this way, they achieve resource sustainability. In settlements where there is no water well, water storage tanks are positioned close to access roads, but are not at a great distance from the dwellings.

Figure 2 The Ababda Domain

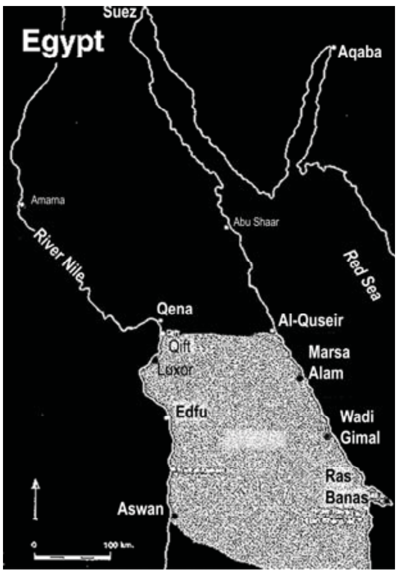


Figure 3 shows the Abou Hamamid settlement's collective water tank storage area and how far it is from the houses. Collective water tanks facilitate easy access for the water supply truck.

Access to Transport Routes

The Ababda often settle near crossroads because such a location provides accessibility to services, transport routes, and exposure of their own commercial activities for marketing of goods. Figure 4 shows the commercial center of Shalateen, built near regional road access.

The distance between the houses and the water tanks ranges between 20–30 meters (m). Distance between a settlement's edge and a natural water source ranges between 0.5–1 kilometer (km).

Figure 3 Collective Water Tank Area at Abou Hamamid

Figure 4 Satellite Image of the Commercial Center of Shalateen

Near Shrines

Religious sites encourage people to settle close by because of spiritual and religious affiliations. In addition, many of the religious sites in Egypt are host to annual celebrations or *moulids*, which provide economic opportunities for residents as thousands of pilgrims gather, and which may mean the government supplies services that might otherwise not be available. Figure 5 shows Sheikh el-Shazli village, where thousands come each year to celebrate the *moulid* of the Sheikh.

Figure 5 Sheikh el-Shazli Village, Site of an Important Annual *Moulid*

Near Foothills

The Ababda prefer to settle near the foothills because they provide privacy as well as protection from sandstorms and strong winds. Foothills also provide a sense of intimacy in the wide desert. Houses along regional roads represent a common settling pattern, off the flood path or local water sheds. Figure 6 shows ancillary structures between two hills at Wadi el-Gemal. Figure 7 shows the relationship between the cluster of buildings, the road, and the hill.

The distance between the hills and the house should not be less than 20–30 meters.

Figure 6 Relationship of Foothills and Buildings at Wadi el-Gemal

Figure 7 Relationships between Foothills, Buildings, and Access Road

Off Flood Paths

Although the Ababda prefer to settle near foothills, they keep their distances from water resources such as wells and flood paths.

Figure 8 again shows the Wadi el-Gemal settlement, pointing out where the Ababda locate their homes in relation to the flood path. Figure 9 shows a similar settlement in the Southern Red Sea, with a different configuration of flood paths.

Avoid interrupting the flood path direction by keeping a clear distance of not less than 50 meters in all directions.

Away from Roads

When the Ababda settle near a road, they prefer not to be exposed to passing vehicles to provide privacy and protection from noise. They will look for a site that balances both the need for access and the need for seclusion.

Keep a distance not less than 100 meters from the road.

Figure 8 shows how far from the road Wadi el-Gemal settlement is located (highlighted in red); Figure 9 shows another settlement near Shalatin, where the houses are 100–150 meters away from the road.

Figure 8 Wadi el-Gemal Settlement in Relation to Access Road

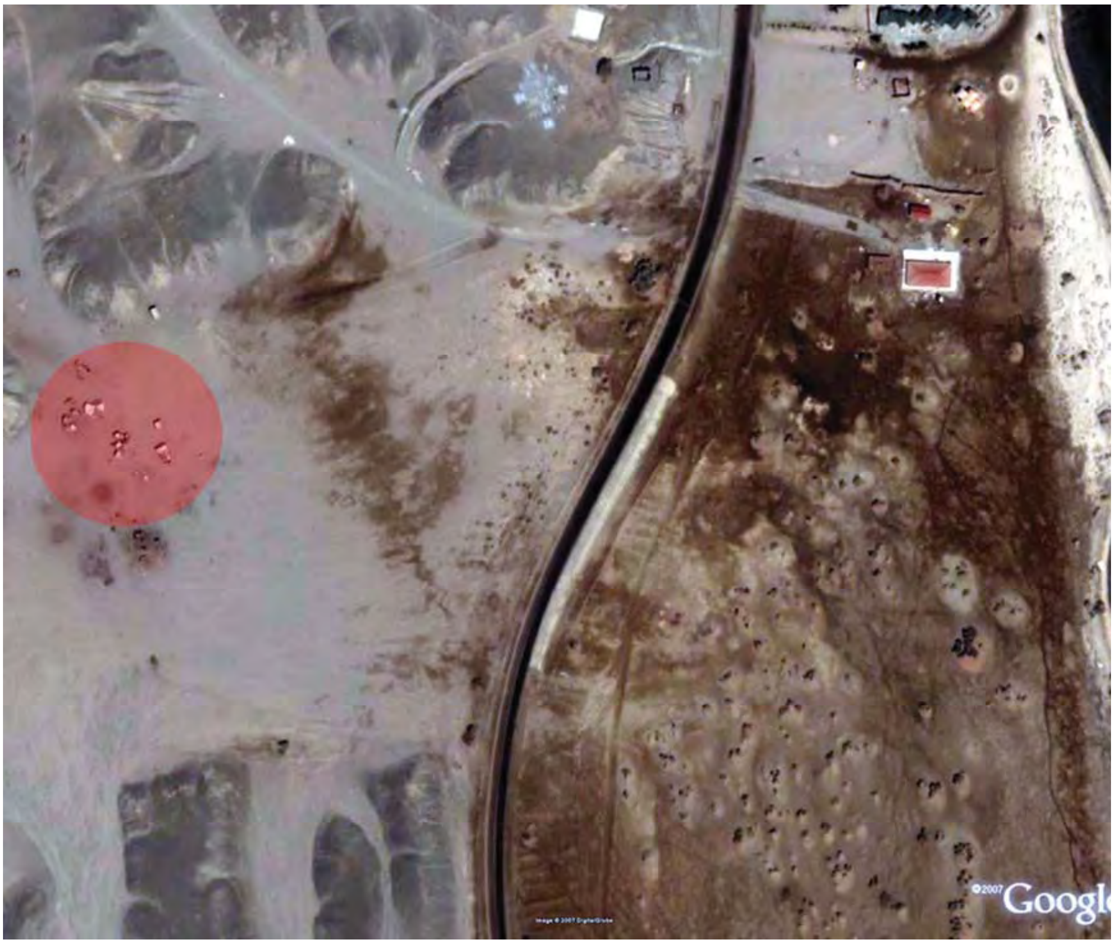


Figure 9 Settlement near Shalatin

Distance between Settlements

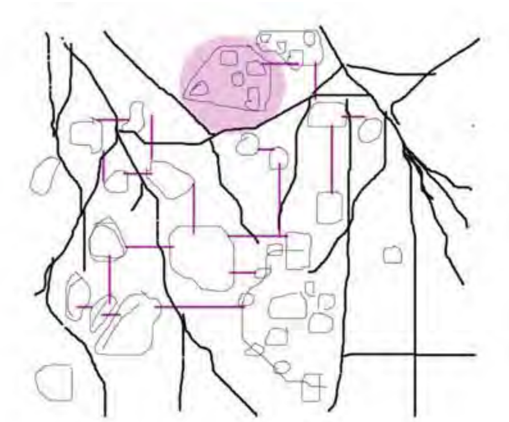
The nature of the desert allows the Ababda to spread over vast expanses, resulting in a tendency not to build their houses close to each other. The distances between houses in one settlement will be based on the growth of the family, water availability, and the nature of local economic activities.

Distances between settlements can be 20 kilometers in mountain settlements (one family unit) to just several meters in the more settled communities spreading along regional roads and shorelines. Figure 10 examines three different spatial relationships and distances:

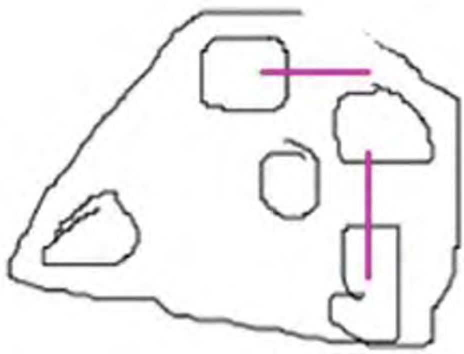
1. The distances between settlements (A) range between 5–10 kilometers
2. The distances between families (B) range from 20–30 meters
3. The distances between members of the same family (C) range between 5–10 meters.

Figure 10 Spatial Relationships and Distances in Ababda Communities

(A) Distances between houses



(B) Access routes between houses



(C) Distances between family members

HOUSING CLUSTERS

RELATIONSHIP TO FOOTHILLS

By default, the chosen site for a settlement is close to foothills (Figures 11, 12, and 13). The form of the foothills provides psychological assurance as well as a sense of enclosure in the middle of the desert, offering shelter and protection from harsh weather conditions.

Figure 11 Abou-Hamamid Settlement

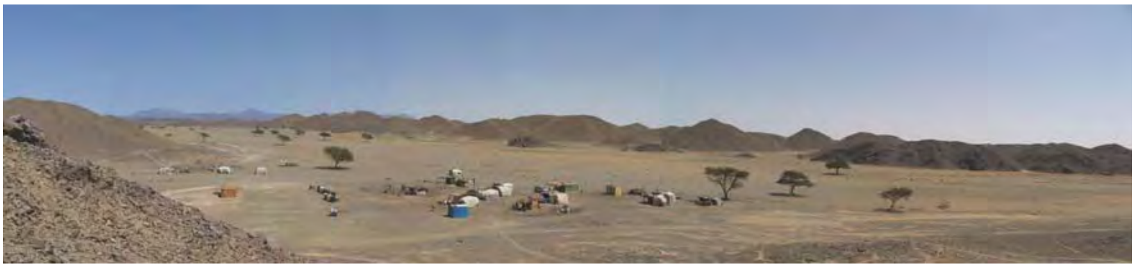


Figure 12 Wadi el-Gemal Settlement

Figure 13 Wadi el-Gemal Settlement

RELATIONSHIP TO THE SEA

Housing groups, or clusters, vary from one place to another in relation to a number of variables. In a coastline settlement, the sea is the major element that will influence clustering organization. Figure 14 shows a coastline in Sinai, where the sea has formed the coast, rendering it in forms of positive finger shapes into the sea and negative delta shaped fjords into the land.

Figure 14 Clustering in Coastal Settlement

Maximize sea view and accessibility by utilizing Vee or linear cluster shapes perpendicular to the coastline.

Figure 15 shows a group of houses developed perpendicular to the sea. This pattern of development maximizes the exposure to desirable sea views and accessibility to the sea.

Figure 15 Perpendicular Clustering in Seaside Settlement

Figure 16 shows a bad example of development on a site close to the sea. People have to walk in front of groups of house to reach the access to the sea. Sea views are poor for many houses and accessibility potential for future extensions is diminished.

Figure 16 Example of Poor Clustering along the Coast

ZONING

Avoid mixing activities. The Ababda prefer to separate their barns from housing because of the odor of animals. One collective barn zone would be sufficient for 6–7 families and could hold all the sheep for the households in subdivided barn spaces. The distance between houses and barn varies from 15–25 m and barn orientation should not be in the direction of the prevailing wind.

Camel stalls are separated from the housing by 50–60 m, although the Ababda often set their camels loose to graze. The diameter of an area for camel stalls could vary between 20–30 m, and they would be located at the edge of the settlement.

Figure 17 shows the position of goat barns (highlighted in green) and camel stalls (highlighted in red) in relationship to housing clusters (yellow).

Figure 17 Location of Goat Barns and Camel Stalls

Goat barn

Camel stalls

CLUSTER SHAPES

Housing clusters need not have a particular shape. They will appear as undefined and may follow different and varied forms. All those varieties of forms and shapes are generated from two basic organizations: circular and linear. All other forms are hybrids between those basic two forms.

Figure 18 shows clusters that follow a circular shape; a vee-shape; and linear housing clusters.

The circular shape is more widespread in settlements in the desert. The linear shape is more convenient where roads occur in an urban environment. Variations occur to meet the settlement's needs.

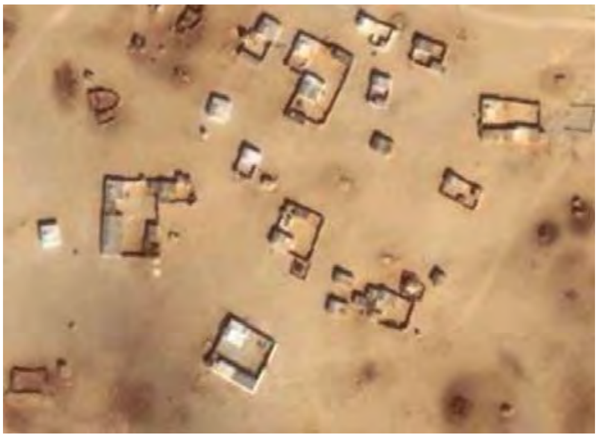
HOUSING CLUSTER HIERARCHY

There is a hierarchy of spaces in the clustered houses. Each cluster of houses is grouped around a space, the size of which varies according to family size and the family's position in the tribe. The central space is near the oldest house or the key person in the settlement. Other, smaller, spaces are created by smaller groups. Figure 19 shows two quite different sized spaces.

Figure 18 Cluster Shapes



Circular shaped clusters



Vee-shaped cluster

Linear cluster

Figure 19 Housing Clusters around Different Size Spaces

The first photo (A) shows a group of houses centered around a space.

The second photo (B) shows four houses grouped around a smaller space than the space in cluster A.

A

B

There is no one definite cluster center. Housing for a large extended family could consist of 7–10 houses around a central space between 50–60 m^2. A smaller extended family might require 3–4 houses around a central space 20–25 m^2.

LAYOUT

The area of the house, with its annexes, ranges from 50–60 square meters (m^2). Houses are separated by at least 5–10 m. Four houses in a cluster will have a space of about 30–40 m^2 between them.

The governing principle of separation between housing clusters should be accessibility, right of way, and adequate distribution and sustainability of resources. Principles of separating distances between clusters are proportionate to separation distances between dwellings, magnified by scale.

Figure 20 Layout of Clusters to Provide Access

Four houses with their annexes

Separation within a housing cluster

GROWTH PATTERN

These figures show two types of growth.

Figure 21 Growth Patterns

From the center towards the hills

From the hills towards the center

HOUSING

DOMAIN ELEMENTS

There are several elements related to everyday functions that define the domain of a house: shed, storage facility, barn, water tank, tires, and trees.

Figure 22 shows a piece of land (land tenure demarcation) defined by stones forming a rectangular shape.

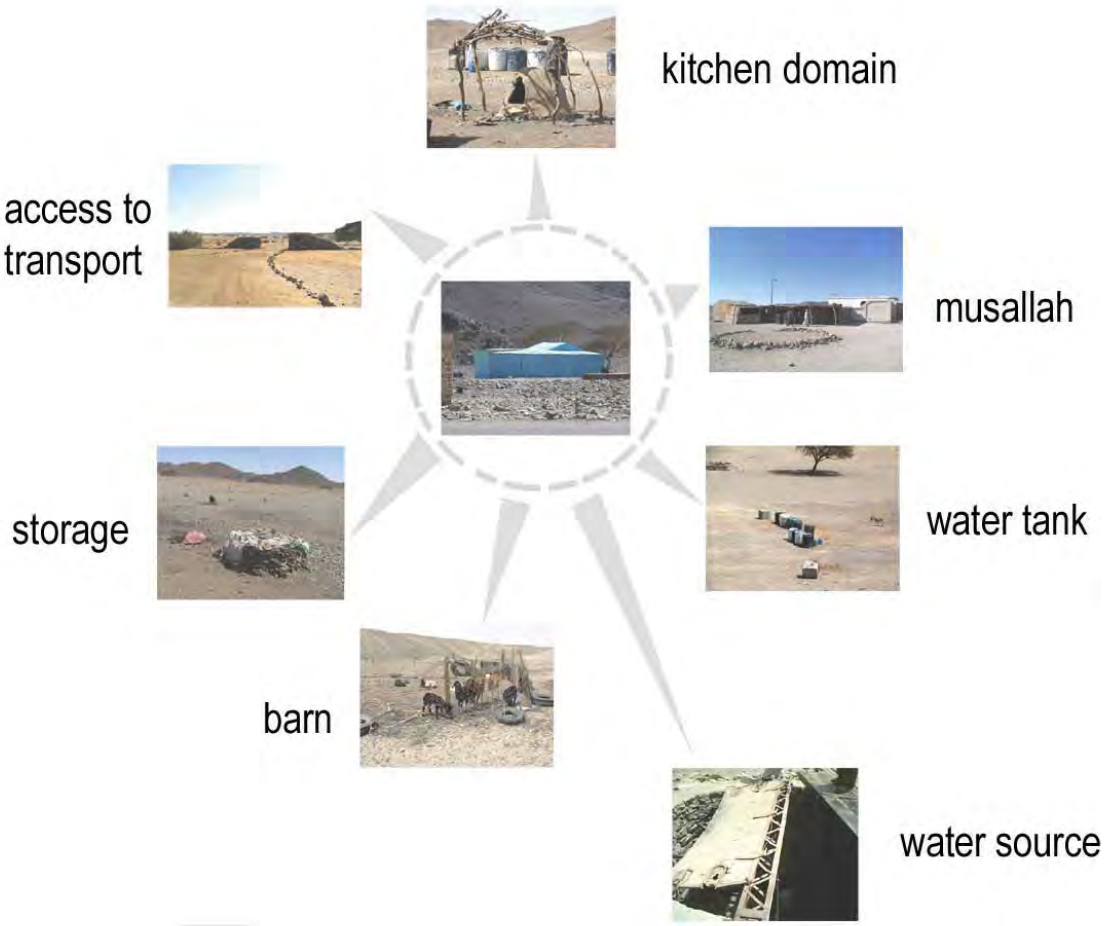
Figure 22 Land Ownership Defined by Stone Border

Figure 23 shows a domain of a *bresh*, in the background, defined by acacia branches in a circular shape.

Figure 23 Domain Defined by Acacia Branches

Figure 24 demonstrates the interrelations between the dwelling and its domain-defining elements.

Figure 24 Elements of a Domain



GROWTH PHASES

The Ababda dwelling undergoes transformations or phases through its lifespan. It begins as one room, perhaps surrounded by a storage facility, water tank, animal barn, yard, and outdoor kitchen. In stages, it begins to expand to accommodate children and domestic functions such as enclosed kitchen space or an interior court.

Building begins with the core unit, which expands with the addition of annexes. Another house will be built at a certain set-off distance. Gradually each dwelling domain defines spatial set-offs, creating passages, access points, and communal spaces. This growth pattern cannot be achieved with attached units and predefined grid planning.

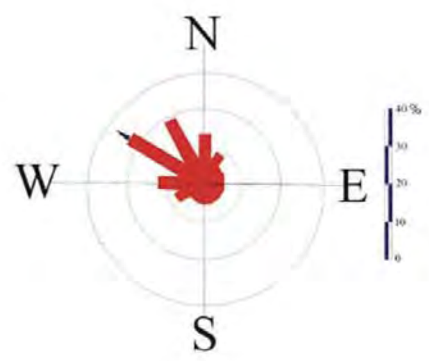
Keep the periphery of the house free for future expansion

ORIENTATION

The Ababda prefer their entrances to face east, dating far back to the days when they roamed the desert with their *bersh*, a straw mat, and acacia branch dwelling. The sole *bersh* opening was the entrance, facing east and admitting the first light of sunrise. Main spaces between dwellings face east as well, and this is where social interactions take place.

Figure 25 shows a wind rose depicting the prevailing winds in the South Red Sea region, where El-Shalateen is located. The three satellite photos show the orientation of Ababda housing in various clusters in Shalateen.

Figure 25 Orientation of Shalateen Settlements



Prevailing winds in the SRS region

Houses at Shalateen

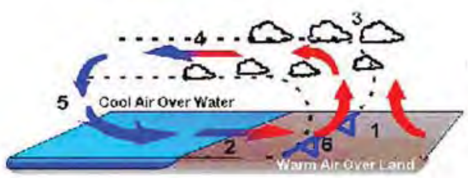
Houses at Shalateen

Houses at Shalateen

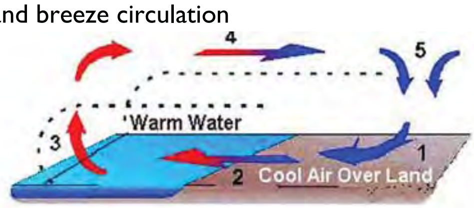
The entrance of the house, like the *bersh*, should be oriented to the east and the rest of the house oriented to a favorable wind. When building near the coastline, orientation should benefit from the cool breezes generated by the sea in daytime and by land at night.

Figure 26 Air Circulation Patterns

Sea breeze circulation



Land breeze circulation



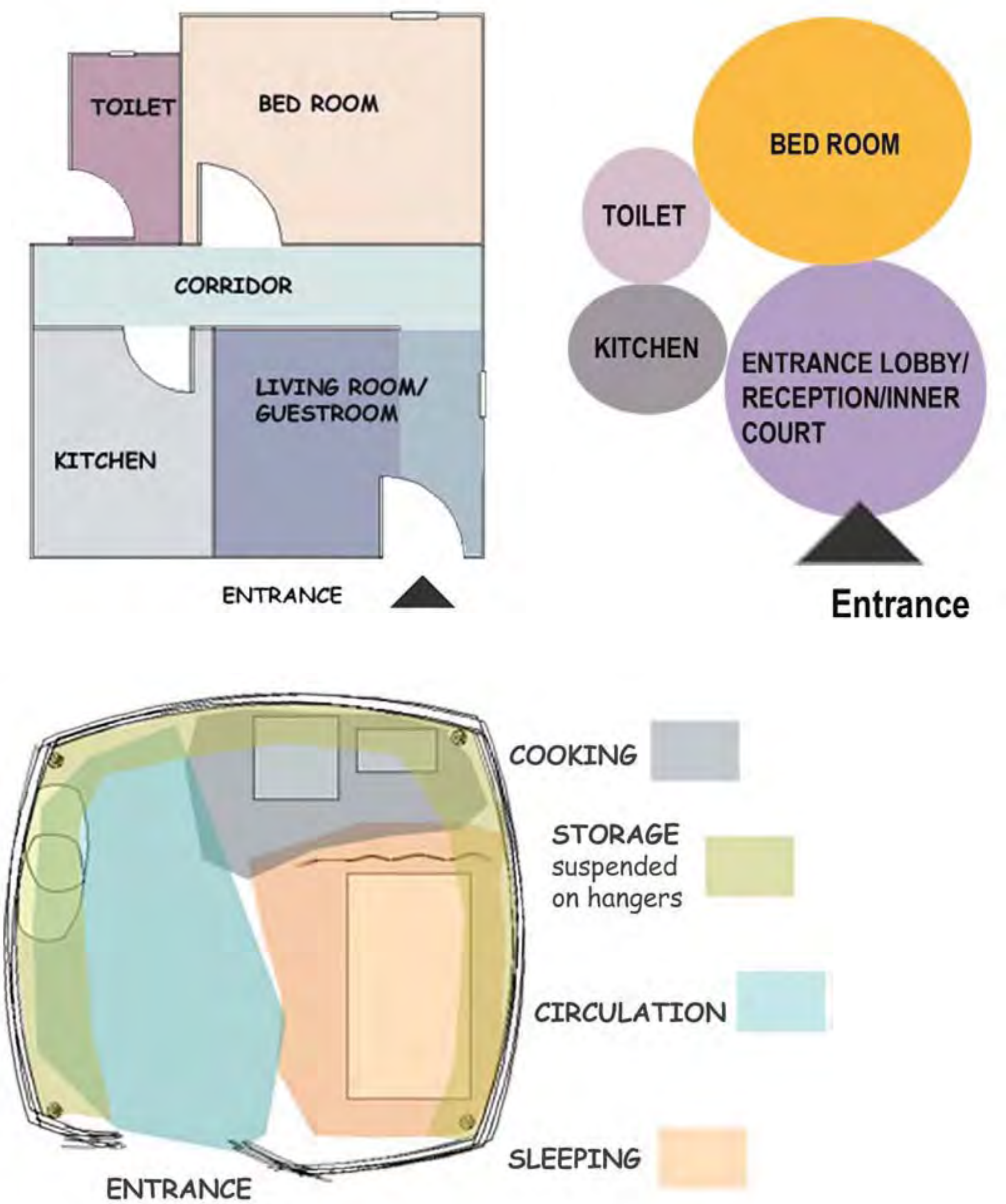
ARCHITECTURE

Main elements of an Ababda house are clear in the typical shack structure: main bedroom, inner court/reception, toilet unit, and kitchen.

The typical Ababda house is built in stages, depending on the financial capability of the homeowner. The first stage consists of the main bedroom and a court directly accessible through the entrance, a toilet annex is added, followed by a kitchen extension, then a bedroom for children. Entrances usually face east, but may also face the road access to the settlement.

Figure 27 shows the core elements of an Ababda dwelling's primary units.

Figure 27 Arrangement of Rooms



ADDED ELEMENTS

A typical Ababda house, over time, will add a barn, a hearth/oven, a storage facility, coops for domestic poultry, and a water tank. The positioning of extension units of an Ababda dwelling is:

- Barns—The barn is always located away from the core of the house some 5–7 m and occasionally as much as 10 m, opposite the prevailing wind direction to prevent odors from entering the dwelling proper.
- Water tanks—These are usually placed in an inner court, if it exists, built of metal or steel or prefabricated plastic containers. In government housing, these were raised 7 m above ground level. Plastic 1 cubic meter (m^3) containers are placed under a shed structure built of acacia branches and cloth to protect them. Water tanks are usually located on the periphery of the house's domain, where they can be reached by a water truck.
- Hearth/oven—The most suitable place or the oven is in the indoor or courtyard kitchen. An oven may sometimes be placed as a separate unit on the periphery, some 3 m away.
- Storage unit—Storage units are usually low, 60–80 cm high, and made of stone. They will be situated half the walking distance between the dwelling and the barn.

Figure 28 shows the annexes that are often added first to a basic Ababda house, and Figure 29 gives a plan for a proposed dwelling prototype.

Figure 28 Dwelling Unit Annexes

Water tank steel structure added to the backyard of a house

Annex shed for water tanks

Brick oven added to the house domain area

Figure 29 A Proposed Dwelling Prototype

1. Master bedroom
2. Extra bedrooms
3. Guest room/sitting room ("madyafa")
4. Kitchen
5. Toilet space (open air courtyard)
6. Shaded inner court
7. Storage area

HOUSE LAYOUT

Each community has specific design requirements. Houses must be adaptable to successfully accommodate inhabitants for a lifetime.

In Egypt's Southern Red Sea region, in the early hours, solar radiation is more comfortable and beneficial to the human body than at noon or in the afternoon. Accordingly, openings facing east should have larger surfaces than openings facing west. (Figure 30, part A)

The most favorable wind comes from the north. On coast, houses can take advantage of the sea–land breeze phenomenon (part B).

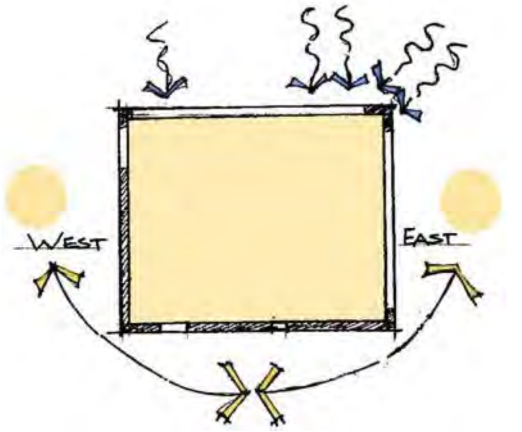
Bathrooms and kitchens—a source of odors—should be located to the south, and if necessary linked to the house via a lobby to prevent undesired odors from entering the house (part C).

1. Kitchens and bathrooms must be located in the south part of the house.

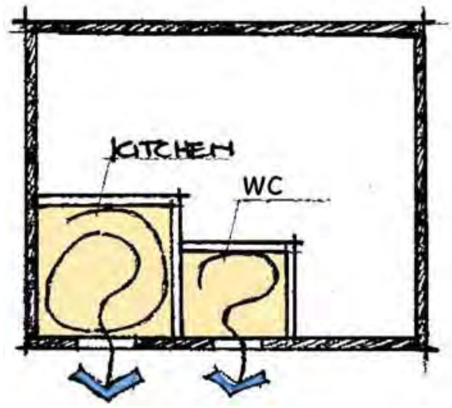
2. Bedrooms and living spaces require direct sunlight and fresh air. The preferred location for these rooms is to the northeast of the house.

Bedrooms are best positioned in the north and east, in order to receive adequate hours of sunlight and proper ventilation (part C). Living rooms, as bedrooms, need proper lighting and ventilation. They should be situated in an intermediate zone between the entrance and the inner dwelling rooms (part D)

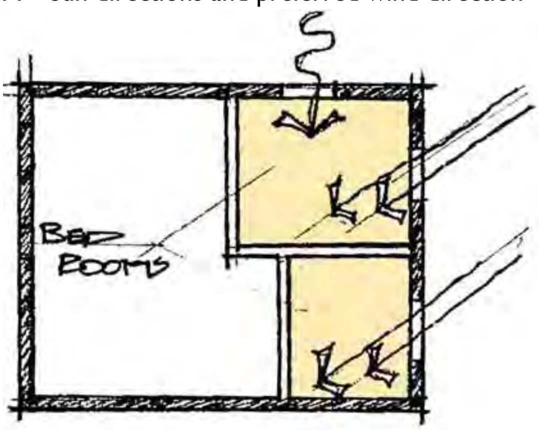
Figure 30 Room Orientation



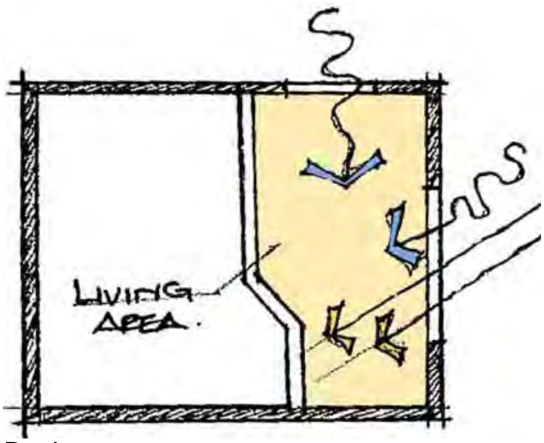
A – Sun directions and preferred wind direction



B – Kitchen and bathroom preferred location



C – Bedrooms



D – Living space

COLORS

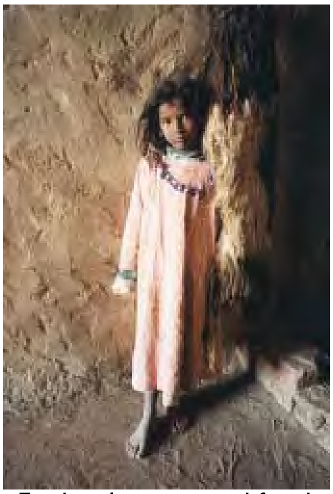
The Ababda use the colors found in the Eastern Desert in general and in Wadi el-Gemal in particular: sky blue, beige for the sandy earth, brownish black for the mountains, and blue-green (or turquoise) in the coastal areas. The colors are reflected in both building material and applied finishes, as shown in Figure 31.

1. **Designers should use a color palette that reflects local tradition and the surrounding environment.**
2. **Natural timber and reeds should be utilized as building materials, since they provides a beautiful range of colors.**
3. **The wide range of the color blue could be used in painting and plastering.**

Figure 31 Color Palette of the Ababda

The colors of the mountain range on the horizon, the scattered hills , and the *wadi* floor in the foreground range from beige on the ground to brown on the hills. The sky adds an intense blue.

The coastal color palette includes yellow sand, green mangroves, blue-green (turquoise) sea, and sky blue



Earth colors are used for the interior of a house

The variety of colors found in traditional bersh dwellings are a product of cultural background and building tradition

The blue color an influence from the sky

Natural color palette of timber/reeds

VOCABULARY

The Southern Red Sea region possesses richness in vocabulary with regard to culture, nature, and history, but all this variety is limited by scarcity of resources and environmental conditions. Limited resources constrain alternatives in building materials and construction systems, as well as stimulating improvisation and creativity. Wooden rafters, shipwreck lumber, recycled formwork timber, and acacia branches are the most widespread building materials.

The region sometimes has heavy rain and flash floods, which led to use of pitched roof construction to drain roofs.

Houses are built to a single storey due to a lack of sophisticated structural and building systems to support multiple stories and availability of land.

Figure 32 illustrates the Ababda building vocabulary.

1. Use of pitched roofs is widespread in the region, and can be built with available local knowledge and labor.

2. The design and construction of housing units should include the use of sustainable timber building material, since it is clearly a feature of the architectural character of the region.

3. Positioning of openings should provide privacy and not exceed the normal height of 1–1.2 m above ground level. Sizes usually are within the range of .6 × .6 m ± 10 percent.

Figure 32 Vocabulary of Ababda Architecture

Pitched roof are used as a global roofing system for all dwellings at El-Shalateen

Acacia branches are among the main construction materials throughout the region

House constructed of shipwreck and recycled timber, another common type of construction material/technique (El-Shalateen)

Note size of opening within a pitched roof in a timber house at Sheikh el-Shazli

CLIMATE

ORIENTATION

Orientation of buildings have impact on thermal comfort inside the building and thermal performance of the building envelope. Maximizing the north and south facades surface exposure and placing window and door openings on these walls will protect the interior from heat extremes. East and west facades should have a minimum surface exposure (1:2) to provide self-shading

1. The longest wall in the house should face north or south, maximizing the amount of daytime shading.

2. Wall height should be calculated depending on the court area and dimensions.

3. Court proportions should average 1:2 with the long wall.

VENTILATION

Keep building forms narrow in section, allowing bilateral access to light and ventilation. Allow hot summer winds to channel around the building while allowing nighttime cool air to penetrate the building.

LANDSCAPING

Landscaping is one of the most important elements in house design, especially in hot, arid climates such as the Eastern Desert. Trees and plants have will refresh the air and provide adequate shade. A line of trees and plants should be provided all around the house after studying wind direction and house orientation.

The need for landscaping as a housing development component creates job opportunities for specialists; promotes design with nature and contributes to a healthy, beautiful, sustainable environment; and initiates a relationship between man and nature within the designed community.

1. Green areas should be located in front of the house.

2. Trees should be located near openings in order to filter the incoming air.

3. Staggering house masses creates alcoves where air movement could be enhanced.

4. In those corners where circular air movement is generated, trees or ground plants should be provided. They will act as barriers against sand and dust and upgrade the air quality.

STRUCTURE AND MATERIALS

MATERIALS

Materials	Corals	Slates	Clay	Coral-Clay	Timber
Use	Walls, foundations	Walls, fences	Walls, roofs	Walls	Piles for foundations, flooring, roofs, walls, fences, doors, windows
Availability	Available in sufficient quantities along the coastal strip between the shore and the mountains in the SRS region	Available in sufficient quantities	Available in *wadis* resulting from sedimentation from floods	Available in sufficient quantities	Available in small quantities, usually purchased from Alexandria or the nearest city (Marsa Alam or Hurghada)
Cost	Low	Low	Low	Low	High
Skills required	Masonry	Medium	Low	Low to medium	Medium
Suitability for climate	Any climate	Red Sea climate	Hot, dry climate	Red Sea climate	Any climate
Durability	Good	Good	Medium	Medium	Good (requires regular maintenance)

STRUCTURE

Foundation

Footings (shown in Figure 33, part A) should be deep enough to reach good, solid soil free from disturbance, at an average depth ranging from 50–100 cm below ground level. They should rise above ground level and the base should be wide enough to permit a 60° angle of load distribution; average footing width is 30–60 cm. Foundation walls should be thicker than the walls they support, and 20–50 cm above ground.

Foundations can be made from any one of several materials with different qualities:

Reinforced concrete	Very good, earthquake-resistant construction
Cement blocks	Poor to good
Stones and mortar	Medium to good
Kiln-fired bricks	Medium
Stabilized rammed earth	Good for arid regions

Walls

Walls should absorb heat during 9–12 hours of solar radiation and then emit the heat to the house interior through the night, maintaining thermal comfort inside the building at all times.

The absorption of solar heat can be greatly reduced by reflective wall surfaces. The ground adjacent to the building should be shaded to avoid reflection of solar radiation onto walls. Insulation on the outside of the building skin assists in reflecting solar heat. Typical solid walls

(Figure 33, part B and Figure 34) are made of stone, earth, kiln-fired clay bricks, or fossilized coral.

Double walls may be made of soil, brick, or stone on the inside; of any relatively thick and hard, durable material on the outside.

Figure 33 Proposed Footing/Wall Configuration

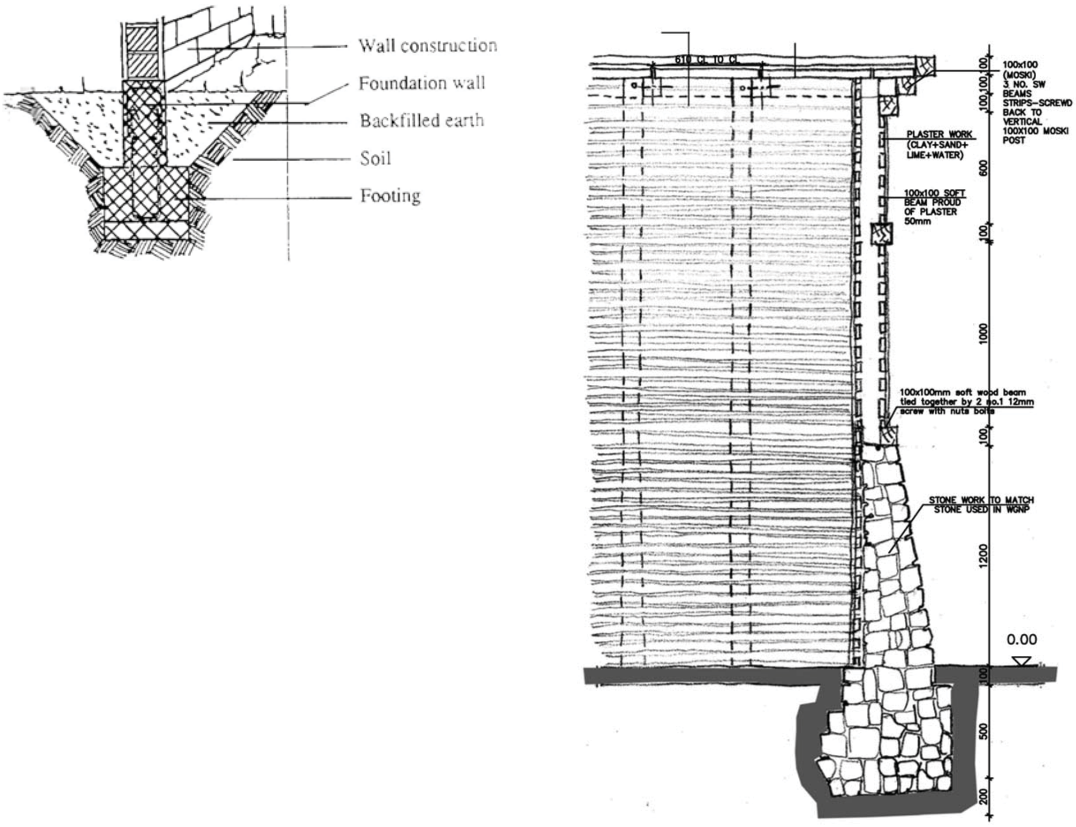
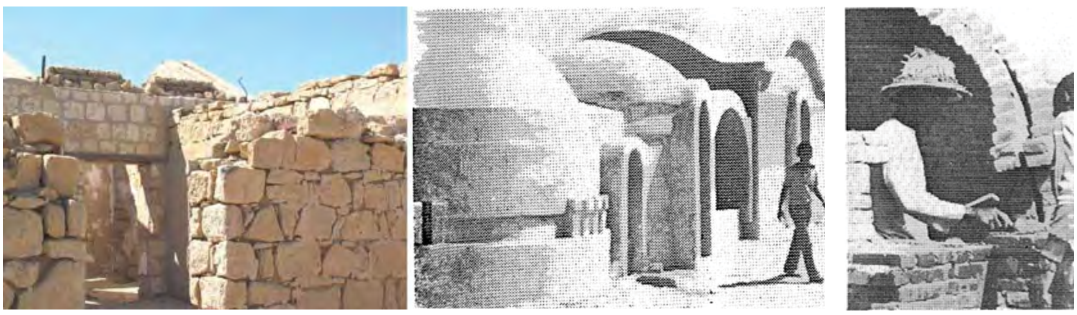


Figure 34 Wall Construction Types and Materials



Fossilized coral stone construction (Hamata Village, on the coast)

Solid wall and cavity wall construction in two projects in Amauriania *(Photos courtesy of D. Deriaz)*

Adobe (green or unbaked clay brick) construction (El-Shalateen)

Protective Measures

In general, good materials and workmanship are the principal protective measures. Design should permit easy access to vulnerable parts for regular inspection and maintenance.

- Fire—Maintain a good distance between buildings in the direction of the prevailing wind to avoid spreading fire from one house to another. Combustible materials stored in and around the house should be shielded from fire sources by means of non-combustible materials—bricks, glass, or stone.
- Sand and dust—Vegetation around the house can greatly reduce the amount of flying sand and dust. Narrow zigzag streets with high walls have a similar effect. Projecting components and cavities should be avoided on outer walls to prevent accumulation of sand and dust. Surfaces should be smooth and resistant to abrasion.
- Wind—Building sites should preferably be at higher levels, sufficiently distant from the seashore. Foundations should be generously dimensioned and wide at the base. Stability is increased by division of the floor plan into smaller rooms. Walls should be of robust construction and adequate thickness, well tied to foundation and roof.
- Earthquakes—Building sites should not be on or close to hillsides to avoid landslides and should not be too close to the sea to avoid tsunami dangers. Building on watercourses should be avoided. Roofs must be fixed to a building frame or to independent supports structurally separated from the walls or adjacent structures. Building form must be simple; complicated forms are possible if subdivided into independent simple components. Walls should be relatively light. Conventional masonry structures require a strong continuous beam on top of the walls to prevent them from falling apart. Openings should be small but not less than 50 cm in both directions. Roofs should be as light as possible, with high tensile strength (e.g., reinforced concrete), or flexible members firmly tied to supporting structure.

Roofs

Low-pitched roofs cost less and require less wall construction material and less roofing material. The minimum roof slope should be 30°. Wide overhangs are beneficial for shading and protection against rain. Roofs surrounding an inner open court should slope inwards for better indoor climate control and to facilitate rainwater collection.

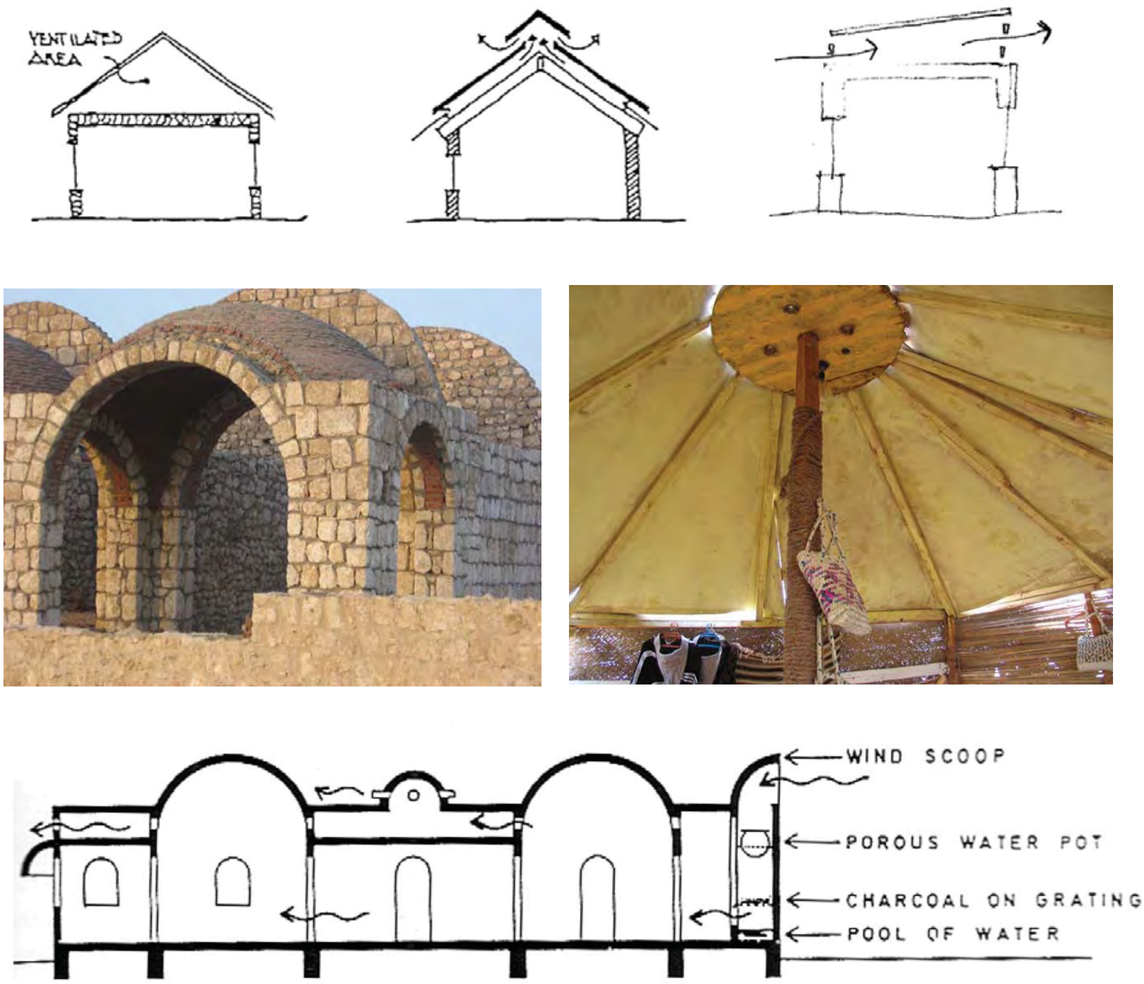
Curved roofs include domes, vaults, and shell structures. Masonry vaults and domes are likely to collapse in earthquakes, while concrete shell structures will not.

Tensile roofs, using a system of membranes on cables or ropes can cover wide spans while maintaining economic efficiency, but possess poor aerodynamic qualities; therefore, they are used for temporary structures.

Double-layered roofs (with sufficient air space to dissipate heat on the upper surfaces of each layer or designed to reflect heat) can be of lightweight or of low thermal capacity materials, with the outer layer consisting of insulation.

Wind catchers are advantageous to redirect higher-level breezes into the building.

Figure 35 Examples of Ventilated Roofs



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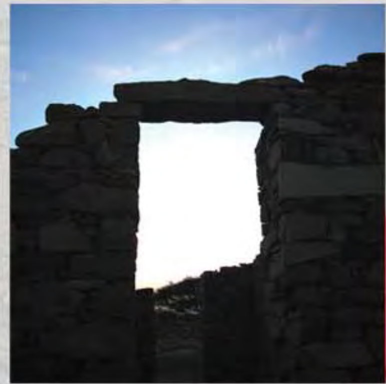
Abdelhalim CDC
Community Design Collaborative Ltd

ABABDA HOUSING ACTIVITY
LIFE-RED SEA EGYPT

ABABDA HOUSING ACTIVITY

D3.1: DETAILED DESIGN DOCUMENTS

REPORT



SITE NO.1 NORTHERN ENTRANCE TO WGNP

TABLE OF CONTENTS

The report consists of 8 sections:

see Annix no_1

3.1.2 FIRST FINDINGS WORKSHOP: CDC OFFICE, CAIRO 23/04/2007

The workshop is an integral part of the Housing Assessment Report commissioned by the client (LRS) aimed at sharing informaiton on findings from site reconnaissaince trip by the CDC Reconnaissance team (CDC Project team, CDC Local Consultant and LRS Community and Infrastructure Planner). The trip was underta n at the initial stage of the project from 22 to 28 March 2007. The trip included site vists to the wider context study area including the 3 target sites at WGNP Northern Entrance, Hamata and Sheikh Shazli settlement.

Session No. 1:

At the 1st session of the Workshop, the CDC team presented e findings in a matrix analysis format grouping data under general issues, and site specific issues. As depicted in Fig. 04,1
In the course of the 1st session the CDC team received feed ck from the client on the content and analysis of information.The discussions went through the motives for settlement formation, land tenure mechanisms, approach of the client to policies adopted by the Red Sea Governorate, the TDA and the National P otectorates Authority as well as history of the settled community and how it relocated because of landuse designation for tourist developments by the TDA twice before settling down in site No.1 coming from locations on the sea shore where its members were living off fishery. One aim out of the brain storming session was to conclude a ational behind the settling initiative with its intricate intra-relations between the different settler-households.

SITE/SETTING /CLUSTERING	SOCIO-ECONOMIC ASPECTS			CULTURAL/ SYMBOLIC	DWELLING UNIT		
	FAMILY/TRIBE/CLAN	GENDER	ECONOMIC ACTIVITIES		ARCHITECTURE	STURCTURE	MATERIAL

Fig. 04, 1:
The matrix analysis format used to classify data gathered for the assignment

2nd Session:

The second session was dedicated to the presentation of CDC Local Consultant Architect, who developed a proposal for a prototype unit for site No.1. A discussion was carried out, explaining the rational of the prototype design. As the discussions developed a concept of land tenure/domain notion emerged and was labeled *"Zimam"* the Arabic word engulfing the 2 notions.
Along with the Zimam concept a gradual evolution of the prototype dwelling was put forward described as nucleous dwelling, with its initiation left to the dwelling owner to determine, bearing in mind the local community's own gradual development of it's dwelling and the settlement-in correspondence- as a by-product.

Fig. 04, 1
1st Session, the findings matrix as a presentation tool

Fig.04, 2

Fig.04, 3

Fig.04, 4

Figs.04, 3-5 depicting the concept of zimam throughout the wider context study area

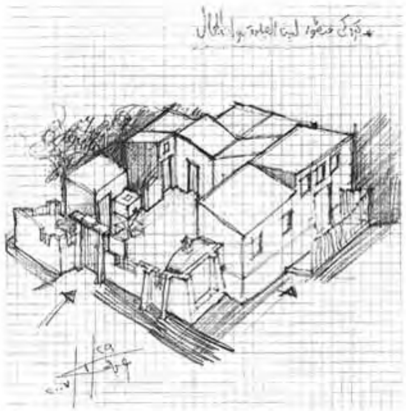


Fig.04, 5 CDC Local architect model proposal of a fully developed dwelling

Fig.04, 6 A brain-storming session discussing CDC local consultant Proposal for the dwelling prototype at site No.1

3.1.2 FIRST FINDINGS WORKSHOP: CDC OFFICE, CAIRO 23/04/2007

According to the site mapping done by the Local Consultant architect the Wadi Arear settlment is a compound of two inhabitant families under the clans of Kerigab and Grigab sub clans of the same Ababda tribes.
The first extended family enclosure is that of Abdulatti where the clusterd dwellings are :

1- The first built old bersh in the clustre center
2- Two compressed wooden shacks of the two descendent sons
3- The latest built structure of the family offsprings made of compressed wood and having a brick annex as a bed room and a toilet extension

The second family with 3 dwelling units all of compressed wood built in the time span of two generations increment where each of the dwelling unit has an annex of a barn or a bersh structure. The avarege number of family members is five the father, the mother and an average of three children per one family.

Fig 05,1 Bersh structure first built

Fig 05,2 Compressed wooden shack

Fig 05,3 Brick extension,built lately

Figs.05, 4* 4 deriving rational behind settlement form and setting its growth directions

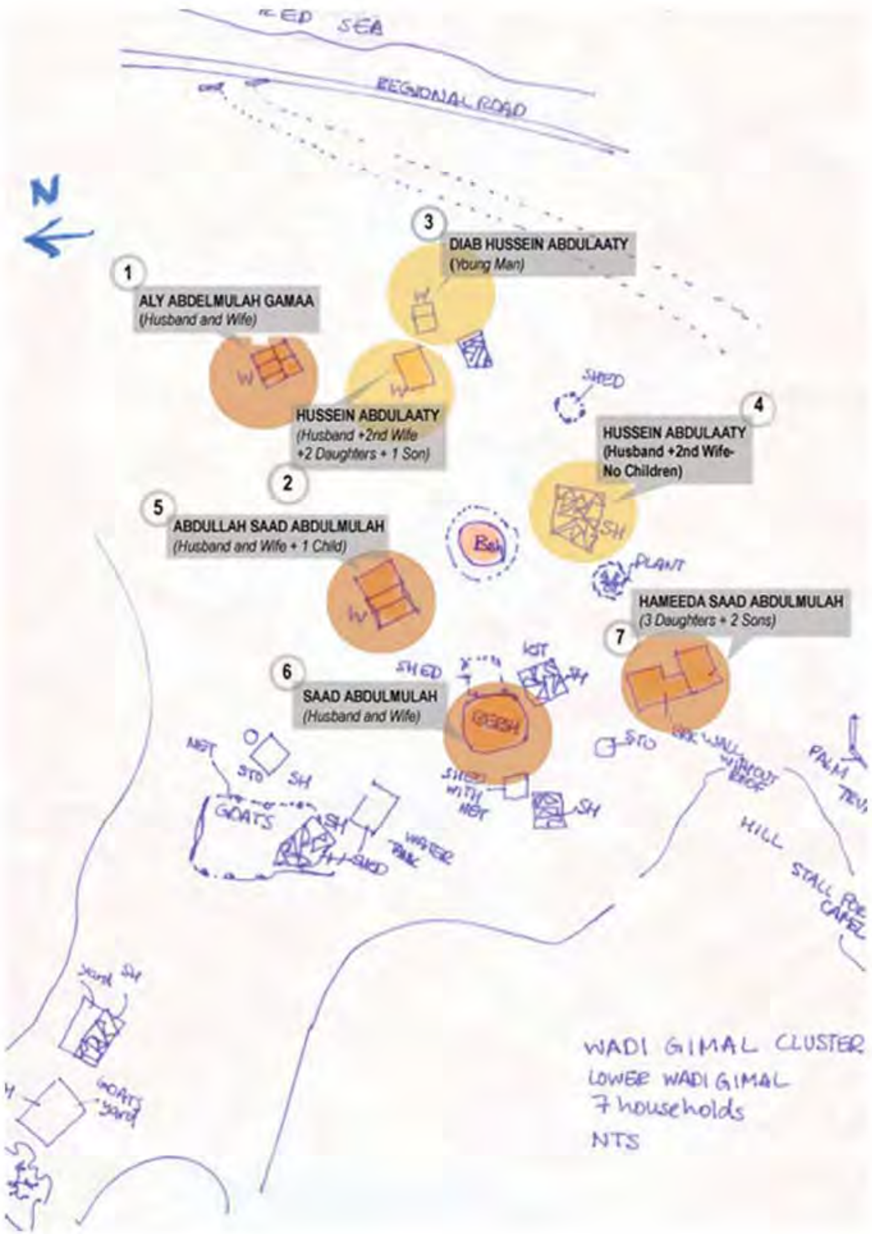


Fig 05,5 Local consultant architect site survey

3.1.3 SECOND WORKSHOP: Design Development for Site No.1 Dwelling Prototype
CDC OFFICE, CAIRO 14/05/2007

With the preceding workshop concluding with defenitions of Zimam, laying d wn features of a core /domain radual evolution dwelling prototype, CDC Local Consultant Architect carried out a site visit accompanied by the deputy chief of LRS . The purpose of the visit was to acquire quantative information on the existing dwellings and relations governing members of the settlement. In the course of the visit CDC Loacl Consultant and the client held a meeting with the community memebers to present features of a model for the proposed dwelling prototyp .The meeting was minuted and s outcome presented by CDC Local Architect at the 2nd workshop at CDC office in Cairo, attended by the project team and chaired by CDC principal.
The site mapping document that Eng. Abdelhamid acquired from CDC team was utilized by the Local Architect to record inhabitants of each dwelling with household size and relation to neighboring dwellings.
At the workshop the information was overlayed with the site topography map and rational behind setteleme formation was gradually extracted.
The team then focused on the dwelling design itself, starting with the fu ctions. The general layout fo the dwelling proved to be well studied, the use of improvised structure systems and appropriate materials such as coral stones and clay from the site together with formwork timber as the main sturctural support material was considered a sound strategy. Still, one major concern was the sanitation unit for the dwelling. According to the latest site visit, the community members expressed disinterest in the issue, and prefered keeping human waste out of the dwelling. Still DC expressed the need for an option of a sanitation zone, annexed to the dwelling but isolated visually and cor doned off in a way to prevent unpleasant odors from penetrating the dwell ng proper.

Thus the dwelling rototype was considered in a new hierarchal zoning order:
1-The dwelling mass comprising the main rooms (residential private space)
2-The inner open residential space as an intermediate zone between the guest room madyafa a semi-private space and the rest of the dwelling
3-The added extension named ziadah or surplus, which is meant to provide the isolated area to dispose of human waste


Fig. 06, 1 CDC Principle sketching analysis during the workshop


Fig. 06,2


Fig. 06,3


Fig.06, 5 the satelite image used at the workshop to study site topography/settlement form

Fig. 06, 7 Dwelling Components and zonging as developed during the course of the workshop

3.1.4 DEFINING FEATURES OF THE URBAN SETTLEMENT'S DOMAIN

THE SETTLEMENT DOMAIN

As the hills surround the site it creates an enclosed boundary giving the domain its form and craeting a valley due to natural conditions suitable for settlement and living conditions .
At the same time it defines the settlement's domain more precisely.

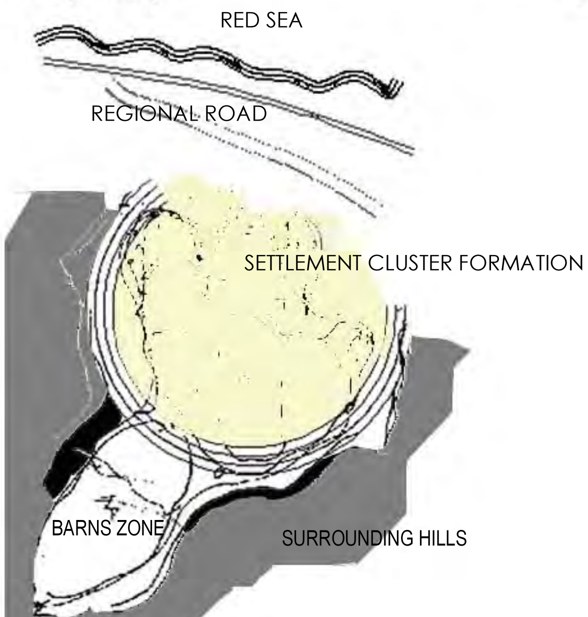


Fig 07,1

ZONING AREAS

As a result of the morphology , wind and flood path direction the nomads (Ababda community of settlers defined tow zones:
The first zone is the settlement zone which occupies the valley, the second is the animal barn zone which is enclosed in the hill away from the prevailing wind.

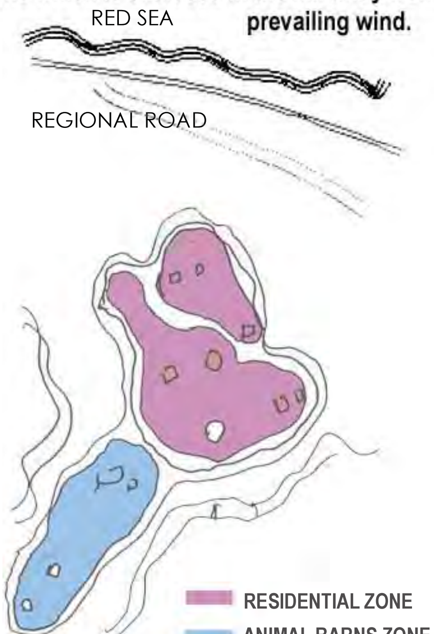


Fig 07,2

FUNCTIONAL SOCIAL ZONING

The sketch shows the center of the settlement ,the first family domain and the second family domain, while the barns area lies at the end corner of the settlement.
N.B.: Each domain contains 3-4 dwellings of the same family (family and extended family).

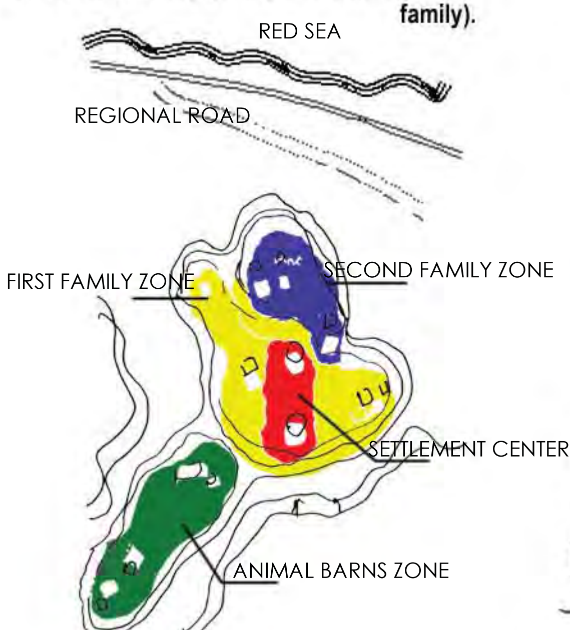


Fig 07,3

PATTRENS OF GROWTH

The sketch shows the expected growth of each family domain,its direction and the expected domain form in the future growth.

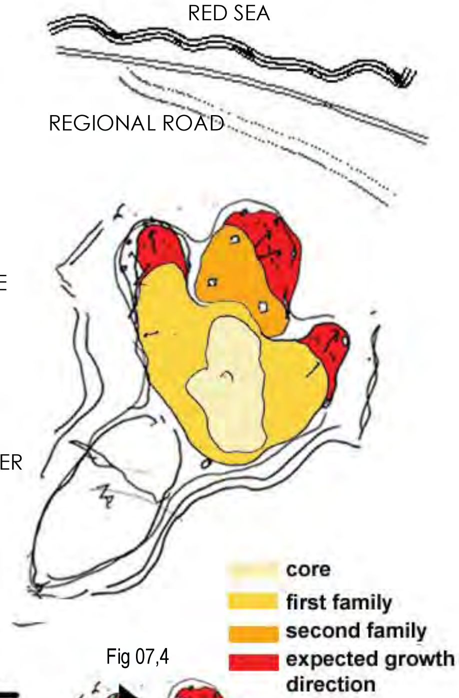


Fig 07,4

Fig 07,5 THE SETTLEMENT ENCLOSED BY THE HILLS , FACING THE REGIONAL ROAD AND FORMING A U-SHAPED CLUSTER FOLLOWING THE NATURAL FEATURES OF THE SITE. AS WELL THE BARNS LIE AT THE BACK OF THE SETTLEMENT.

Fig 07,6 BARNS COLLECTIVE AREA AT THE CLUSTER EDGE

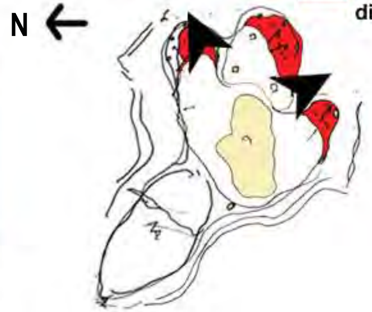


Fig 07,7 TENDENCY OF SETTLMENT GROWTH DIRECTION IS EAST WORDS

1- SITE ANALYSIS

NATURAL ELEMENTS (TOPOGRAPHY-THE HILLS)

The hill as a factor that affects the organizational pattren and acts as a boundary for the settlement's urban growth forming its direction.
Normally the settlers sherlter in the enclaves of the foot hill of the mountains.
In this site the hills and their embracing form encouraged the settlement of the small Ababda community.
Among the advantages of the hill are provision of privacy and favourable environmental condittions.

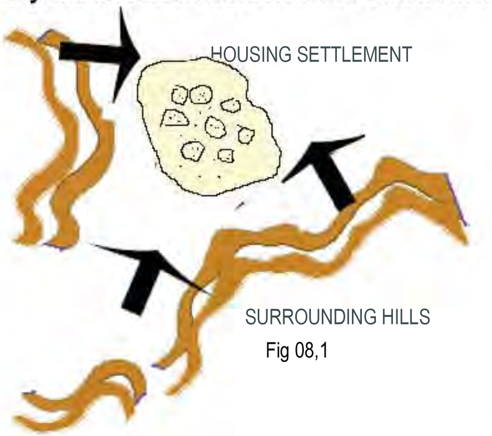


Fig 08,1

NATURAL FACTORS (WIND DIRECTION)

The wind direction in the valley influences the orientation of the house (Bersh)to maximize the exposure as well as it defines the location of the animal barns and the settlement zone.

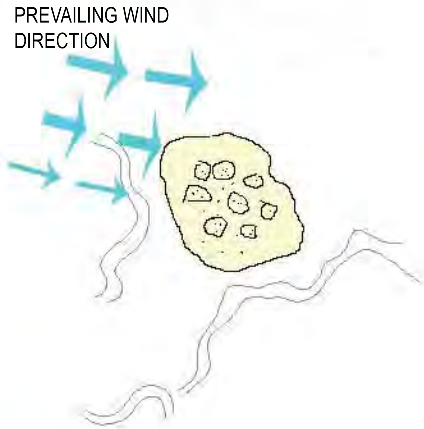


Fig 08,2

Fig 08,3 WIND MOVMENT AND CIRCULATION OF VENTILATION AROUND DWELLINGS DOWN HILL THAT ACTS AS A BARRIER FOR SAND LADEN WIND

NATURAL FACTORS (STORM WATER DRAINAGE)

Usually the Ababda triebesmen settle away from the flood paths. Among site choice considerations are shelter from flood paths.

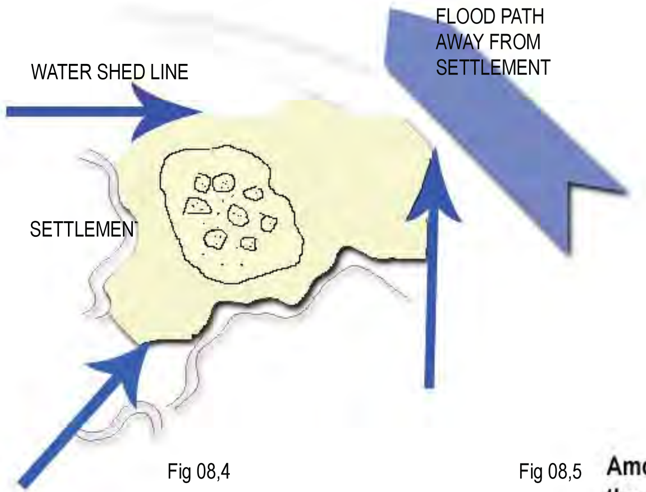


Fig 08,4

URBAN FACTORS (THE COASTAL ROAD)

The road represents the access to urban life.
Economically it supports essential needs as water,food and services.
The road acts also as a major border for the settlement .

Fig 08,5

Among the major site considerations, for the samll group of households, was the access to the sea, since one of their livelihood resources is fishing, in addition to some activities cooperating the WGNP rangers.

3.1.5 DEFINING FEATURES OF THE BUILDING ZONE

DEFINING THE DOMAIN

The Household Domain is one of the driving issues of site of Wadi Gimal Northern Entrance to the inhabitants family clusters domain and boundry. It represents a notion of boundary as well as a land tenure demarkation for each family.

The dwelling domain and its location is determined according to a number of variables such a :

1- Natural Aspects:
- **Land Characteris ics (Flat- Dry)**
- **Air Quality and favorable Wind D rection**

2- Physical Aspects:
- **Water Tanks**
- **Barns**
- **Neighbouring Dwelling Locations**
- **Plantation (Palms & Trees)**

3- Social As ects:
- **Family Aspects (same family and tribe live in thge same settlement) Extended Family (Parents/ Offsprin**

The typical Dwelling Domain is defined through local environment of Materials outlining the dwelling zone of the dwelling unit and the extension if it exists,where these materials represent a reflection of the Natural Environment,the Economic Activities and the Cultural Factors:

1- Stones (surrounding moun ain)
2- Ropes
3- Bricks
4- Tin and Wood Structures
- Cement Blocks
6- Fishing Net

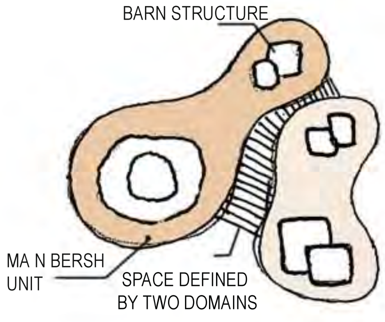


Fig 09,1 Bersh and Shack Structures in relation to the Barn owned by the family where they breed animals it marks the house zone incorporating Random Trails in between the Dwelling Domains.

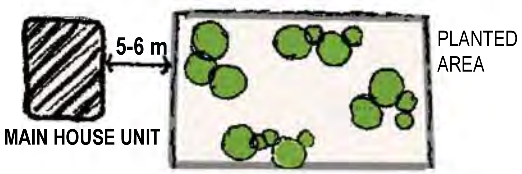


Fig 09,2 Land tenure as a consequence of developoment:
growing a palm grove necessitates shelter and protection from prying animals as well as declaration ofownershipthe fence plays both roles.

The dwelling domain boundary is defined through house extensions and utilities:

1-COURTS:
These spaces are added to the house and used as sitting areas for men,also the court in some area is used as a laundry space or a recreation area for children.
Some households use the court as a storage area for utensils and dry food brought from other towns.

2- KITCHENS:
Most of the houses in wadi gimal (bersh & wooden shacks) are composed of a main bedroom space and the kitchen is built as a seprate structure away from the main dwelling unit at a distance of approx. 3 to 5 meters.

3- FUTURE EXTENSIONS:
The houses made up of one room as the core space need to develop according to family needs as another bedroom and a toilet are usually added to the main space of the extended family house.

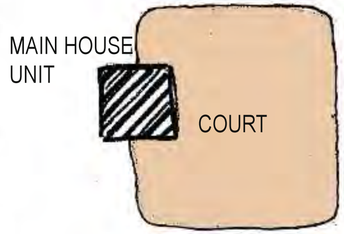


Fig09,5 The Court as an extension of the house within the land tenure of a single family

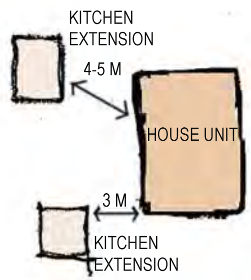


Fig 09,6The kitchen is built as a seprate structure away from the house but within the land tenure of one family

Fig 09,3 MARKING THE BERSH BORDERS BY FISHING NET AT SITE NO. 1, A MEANS OF PROTECTION FROM ANIMALS

Fig 09,4 PLANTATION DEFINED THROUGH TIN AND BRICK FENCE AS A LAND POSSESION DEMARKATION TOOL

Fig 09,7 LAND TENURE DEMARKATION THROUGH STONE FENCES BROUGHT FROM THE MOUNTAIN BY CAMELS

Fig 09,8 WATER TANKS DEMARKATE THE OUTER BOUNDARIES OF THE DWELLING DOMAIN
THE GROUP TOGETHER WITH THE SHED STRUCTURE FORM A LANDMARK FPR THE SETTLEMENT

D3. Detailed Design Documents

D3.1 Site 1: WGNP Northern Entrance

3.1.5 DEFINING FEATURES OF THE BUILDING ZONE

1- CLUSTER LEVEL

The dwellings' domains are usually related to the family or clan divisions of the Ababda tribe. in the northern enterance of wadi gimal the cluster form takes a v shaped curve facing the sea,where housing units of the same family are connected through a distinctive spatial relationship.

The Enterances of the dwelling unit never face each other they are all located at the north east direction so that the house enterance is from the seaside and facing the coastal road.

At the Center of the cluster lies the house of the the elderly father. It is a bersh structure with kitchen shack annex.

The Second house within the same cluster, the eldest son's house is made out of wooden structure and contains one room,kitchen,a living room and a toilet attached to the shack with a separate enterance.

The Third house that completes the 1st cluster is the second son's house made of a single wooden room and a Bersh extension that contains the following:
(1 TOILET+ 1LAUNDRY ROOM+1 BED ROOM)

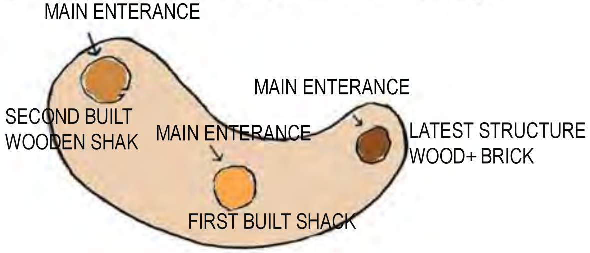


Fig 10,2 CHRONOLOGICAL DEVELOPMENT OF THE CLUSTER SHARED BY THE SAME FAMILY

Fig 10,1 THE ONE FAMILY DOMAIN CLUSTER HIGHLIGHTED TO DISTINGUISH FROM THE ERST OF THE CLUSTER.

2- DWELLING LEVEL

The House Domain depends on two main factors:

1- Economic Aspects:
As the house extension is done incrementally according to the family capability to finance building materials and skilled labor from Mar a Alam or Alquosir.

- Domestic Factors:
ccording to family needs of ctivity spaces to provide for essential everyday household spaces, i.e. toilet nd/or the laundry court or because of the soc l needs eg. the increase in family size and additional pace requirments.

T e house extension is directed way from the barn area and along the no mal settlement direction of growth faci g the coastal road and the sea shore.

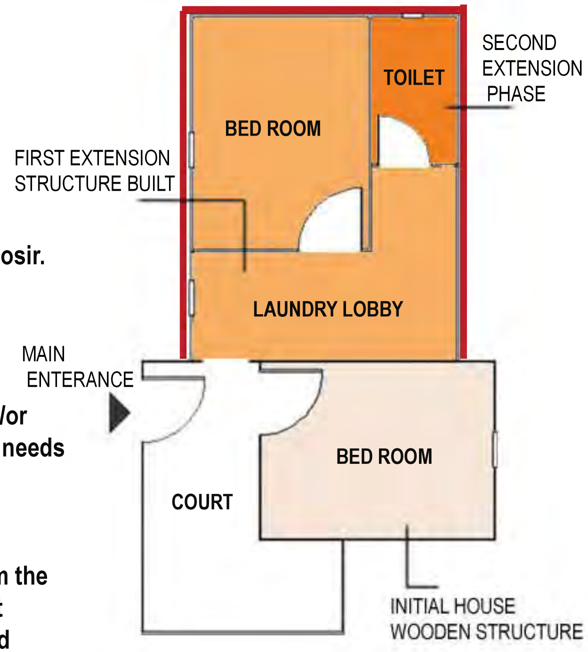


Fig 10,3 THE CORE HOUSE WAS MADE OF ONE BED ROOM WITH ENTERANCE COURT LOBBY

Fig 10,4 THE BRICK HOUSE EXTENSION CONNECTED TO THE OLD HOUSE UNIT OR THE CORE HOUSE (COMPRESSED WOOD)

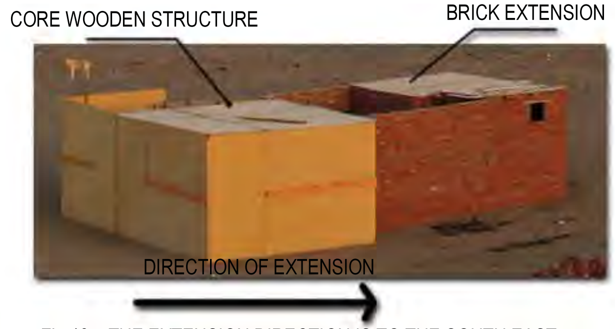


Fig 10,5 THE EXTENSION DIRECTION IS TO THE SOUTH EAST DIRECTION AWAY FROM THE BARNS AREA AND PARALLEL TO THE COAST

3.1.6 RATIONAL OF DWELLING DESIGN AND PHASING

1- SPATIAL DISTRIBUTION

The spatial distribution of the dwelling utilities is always related to the spatial use and the unit orientation,in the following example the limited area and spaces of the wooden shack controls the zoning of the house.
Bed room and guest room are located to the north direction subjected to the north west wind,the toilet and the kitchen are placed away from the wind direct on and adjacent to the bedroom to create direc accessability with the house main core (Lobby + Bed room)

Fig 11,1TYPICAL DWELING SHACK ZONING OF THE LOCALS (WGNE)

The house is usually accessed through an entrance lobby or a court used as a reception or recreation area for the house habitants and guests, the court is orienred to the north-north east direction and is directly adjusted to the entrance.the rest of the house utilitise are oriented north and north west forming thr core of the house.
The dwelling core might have the following spaces:
1- Court
2- Reception
3- Bed rooms
4- Guest rooms

he dwelling annex or appendesies are:
1- Toilets
2- Kitchens
3- Oven (fire zone)
4- Barns

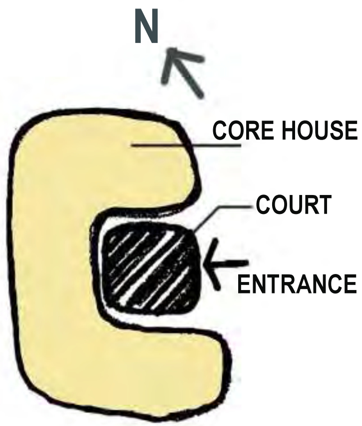


Fig 11,2 ENTRANCE,COURT AND CORE HOUSE INTERELATIONS AND DISTRIBUTION

2- SPATIAL AREAS

The ababda dwelling unit has no fixed dimensions or specific area for the whole dwelling zone,the diffirent zones areas ranges according to the spatial use and the financial affordability of the habitants . Ranges of the areas due spatial use varies as follows:

1- BED ROOMS:
Area range of 8-12 m2 made out of 2-3 compressed wooden boards each of 1.2*2.4 m2 rea.

2- KITCHENS:
Usually built as separate units a d of area variation in between 6-8 m2 for the single u it kitchen.

3- COURTS & GUEST ROOMS:
Are usually of the sam areas as the bed rooms and ranges from 6-12 m2.

4- TOILETS:
Are set as an annex of the main house u it with areas of about 2-2.5 m2 (1.2*1.7m) approximate y.

Fig 11,3SEPRATE KITCHEN UNIT OF COMPRESSED WOOD BOARDS

Fig11,4 THE AREAS OF DWELLING UTILITIES RANGE IN WADI AREAR

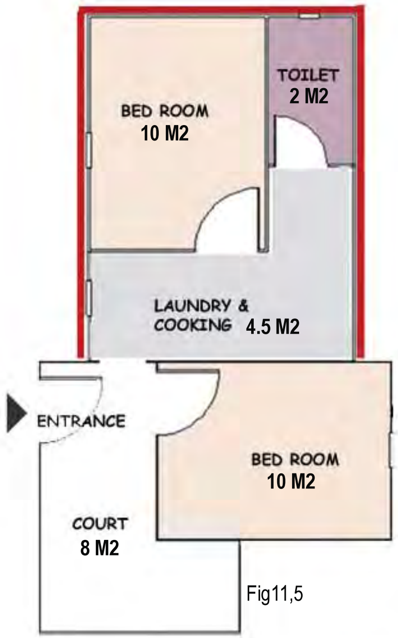


Fig11,5

D3. Detailed Design Documents
D3.1 Site 1: WGNP Northern Entrance
3.1.5 DEFINING FEATURES OF THE BUILDING ZONE

3- OPENINGS

Windows are used as a vital element in the architecture models of both the governmental and the self built dwellings,in order to allow natural ventilation by the sea breeze and the north west prevailing wind where all the openings are directed to the north or east directions.
Windows designed at the settlement of Wadi Arear are all charectrised by thge following:

1 Narrow windows so as not to allow sand lande wind
2- High window sills (1.2-1.5 meters high)
3 Made of soft and light wooden boards so that they are easily adjusted and maintained by locals.

Doors in these areas are usually designed narrow of about 70-80 cm width as they are fixed lately after the house is furnished they are made of compressed wood boards with metal hings joining the wooden sheets together.

1- Doors rae not placed adjacent or directly facing each other to achieve privacy.
2- Doors are all o one unit (entrences,bedrooms and kitchens)
while toilets door is a little narrow(50-60)c width

Fig 12,1 NARROW AND SMALL OPENINGS FOR THE TOILET SPACE

fig 12,2 COMPRESSED WOOD WINDOW OPENED 60 CM AWAY FROM THE ROOF

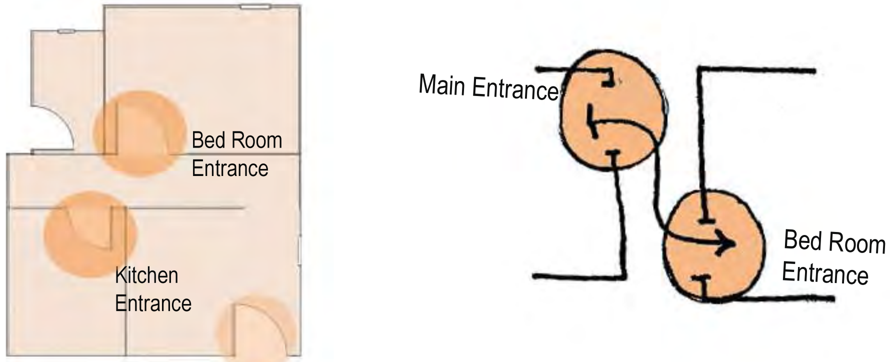


Fig 12,5 DOOR OPENINGS ARE BROKEN AND NOT DIRECTLY FACING EACH OTHER SO AS TO MAINTAIN PRIVECY TO THE HOUSE SPACES ESPECIALLY THOSE FOR WOMEN

Fig 12,7 COMPRESSED WOOD DOOR OPENING

Fig 12,8 BRICK EXTENSION DOORS (BED ROOM +TOILET)

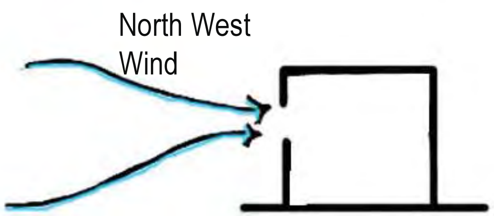


Fig 12,3 WINDOWS ARE ALL DIRECTED TO THE PREVEILING NORTH WEST FAVORABLE WIND

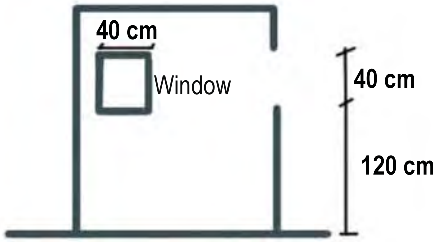


Fig 12,4 WINDOWS ARE NARROW AND HIGH TO ASSURE PRIVECY AND PROTECT THE SPACES FROM SAND LANDEN WIND

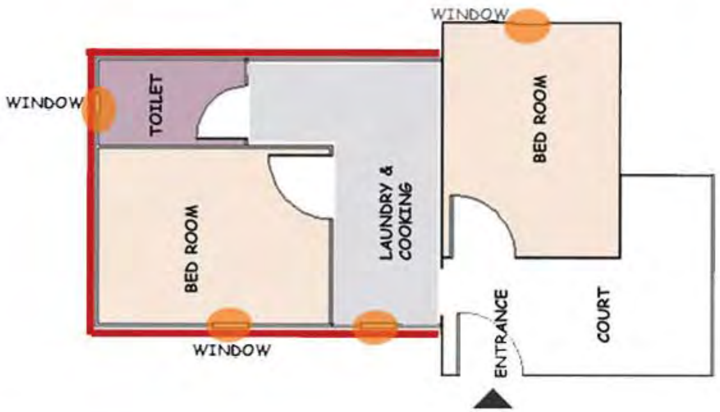


Fig 12,9 WINDOWS ARE ORIENTED TO THE NORTH WEST (PREVAILING WIND) OR EAST (SEA BREEZE)

D3. Detailed Design Documents

D3.1 Site 1: WGNP Northern Entrance

3.1.5 DEFINING FEATURES OF THE BUILDING ZONE

4- COLOR PALLETTE- EXTERIOR &INTERIOR SURFACES

Fig 13,1 BERSH/SHACK EXTERIOR

Fig13,2 COMPRESSED TIMBER KIOSK

Fig 13,3 COMPRESSED WOOD KIOSK EXTERIOR

Fig 13,4 COMPRESSED WOOD/TIMBER KIOSK

Fig 13,5 BERSH EXTERIOR COLOURS

Fig 13,6 BERSH INTERIOR COLOURS

Fig 13,7 COMPRESSED WOOD KIOSK EXTERIOR

Fig13,8 BERSH EXTERIOR

Fig 13,9 COMPRESSED TIMBER INTERIOR

Fig 13,10 BERSH INTERIOR

Fig 13,11TIMBER/BRICK KIOSK INTERIOR COLOURS

Fig 13,12 TIMBER/BRICK KIOSK EXTERIOR COLOURS

5- FLOORING

Fig 13,13 NATURAL GROUND OF MILD SAND (BED ROOM)

Fig 13,14 GRAVEL GROUND COVERED AND A STRAW MAT MADE BY LOCALS

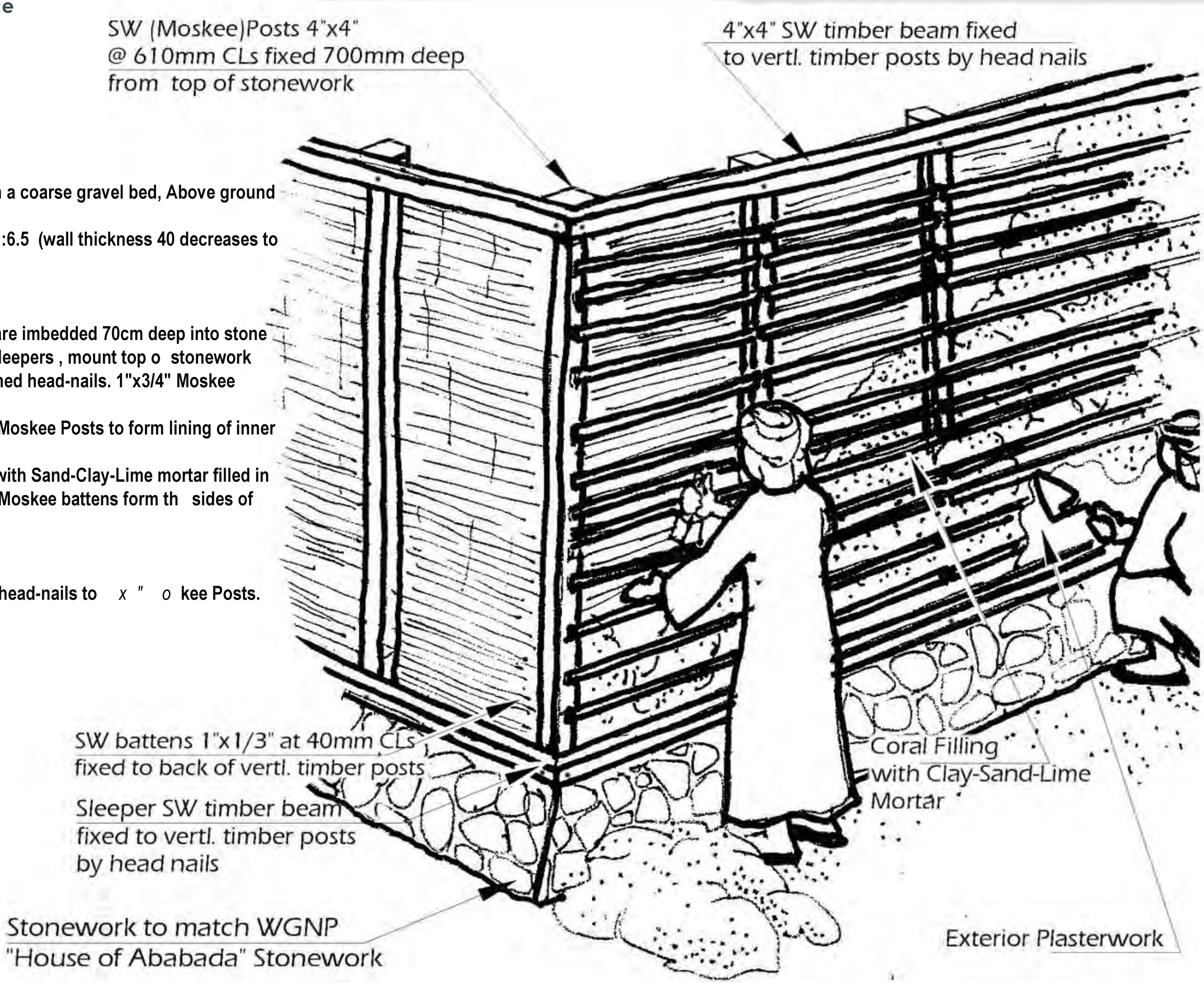
Fig 13,15 SAND GROUND COVERED FOR TOILET SPACE

6-Constructinon method:

Foundations:
Laid 50cm below zero level into ground on a coarse gravel bed, Above ground the foundation wall slopes
back towards the structure with gradient 1:6.5 (wall thickness 40 decreases to 20 cm).

Walls:
4"x4" Vertical S *t Wood osts* Moskee) are imbedded 70cm deep into stone masonry work. Horizontal 4"x4" Moskee sleepers , mount top o stonework and are fixed to vrtl. Moskee posts by primed head-nails. 1"x3/4" Moskee batt *s*
are xed to outer and inner faces of 4"x4"Moskee Posts to form lining of inner and outer wall face.
Wall infill constitutes *oral tone*w rk with Sand-Clay-Lime mortar filled in manually on stages while inner and outer Moskee battens form th sides of the wall infill.

Roofs:
4x4" Moskee 61cm CL/CL beams fixed by head-nails to *x " o* kee Posts.
1" Laminated Plywood Boards
are laid on top of Mosk *eams*
*oncr*e e-Lime Mixture is poured
between Boards to fill joints.
A layer of Lime-sand screed is spread
on top o Plywood Boards
to receive Concrete Screed.
1" layer of Concrete Screed is
spread as final Roof Fin *h*



3.1.6 RATIONAL OF DWELLING PHASING

The Ababda typical house is built increment due to certain conditions related to the financial afordability of the dwelling owner.
The house core is originally made of the main bed room and a court directly accessible to the entrance, then a toilet annex is set to the house and according to the financial stage a kitchen is added and may be a bed room as well.

House Development Phases :
1- Main Bed Room / Court
2- Kitchen Annex
3- Second Bed Roo
4- Toilet Annex
5- Guest Room

House development according to buil ing structure and material:
1- Bersh Shack
2- Compressed Wooden Unit
3- Compres ed Wood Annex
4- Brick Extension

As shown in fig15,1 the house core was built of compressed wood and contained a bed room and a court then an extension was added including first another bed room and a laundry court finally a toilet unit was annexed to the dwelling.
The extension was built using brick and wooden roofs.

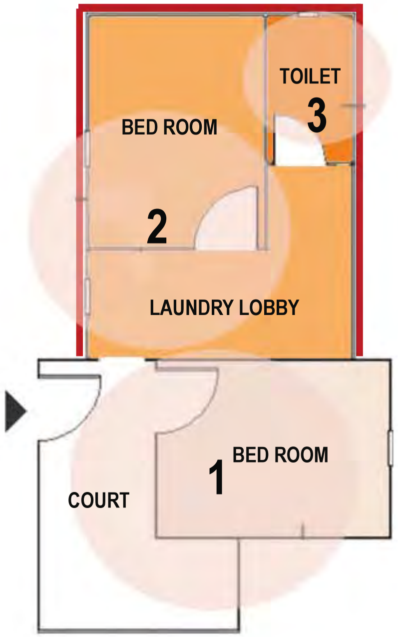


Fig 15,1PHASES OF THE HOUSE BUILDING DEVELOPMENT

1 HOUSE CORE (COMPRESSED WOOD)

2 FIRST BRICK EXTENSION

3 LAST BRICK EXTENSION

Fig15,3 shows an example of the development of a wooden kiosk that was originally built as a roofed court used a sitting room and a guest room,with the main bed room of the newly married couple. Then an extension of a wooden kitchen was added and finally a toilet was built as an annex accessible from outside of the house.

The corridor was lenghthend to join the extension to the house core first built.

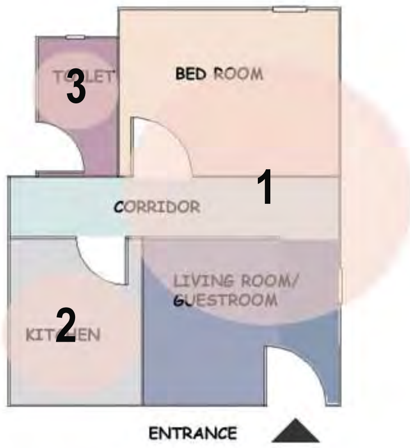


Fig 15,2

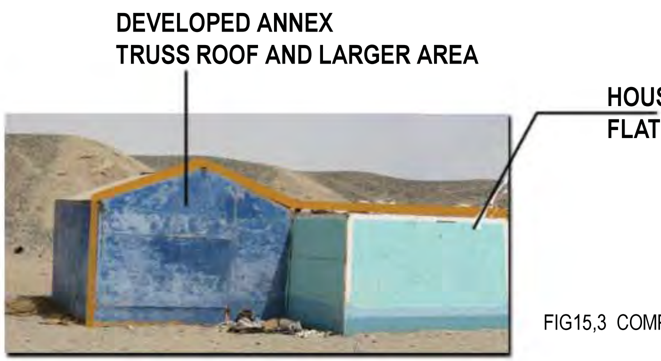


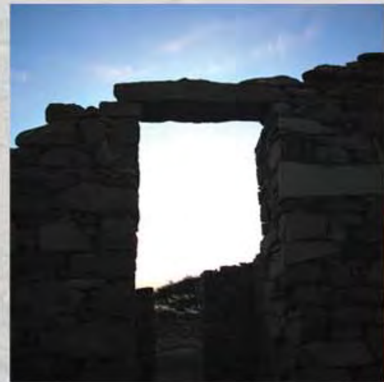
FIG15,3 COMPRESSED WOOD PHASING

FIG15,4 COMPRESSED WOOD AND BRICK EXTENSION DEVELOPMENT PHASE

Abdelhalim CDC
Community Design Collaborative Ltd

ABABDA HOUSING ACTIVITY
LIFE-RED SEA EGYPT

DESIGN DOCUMENTS



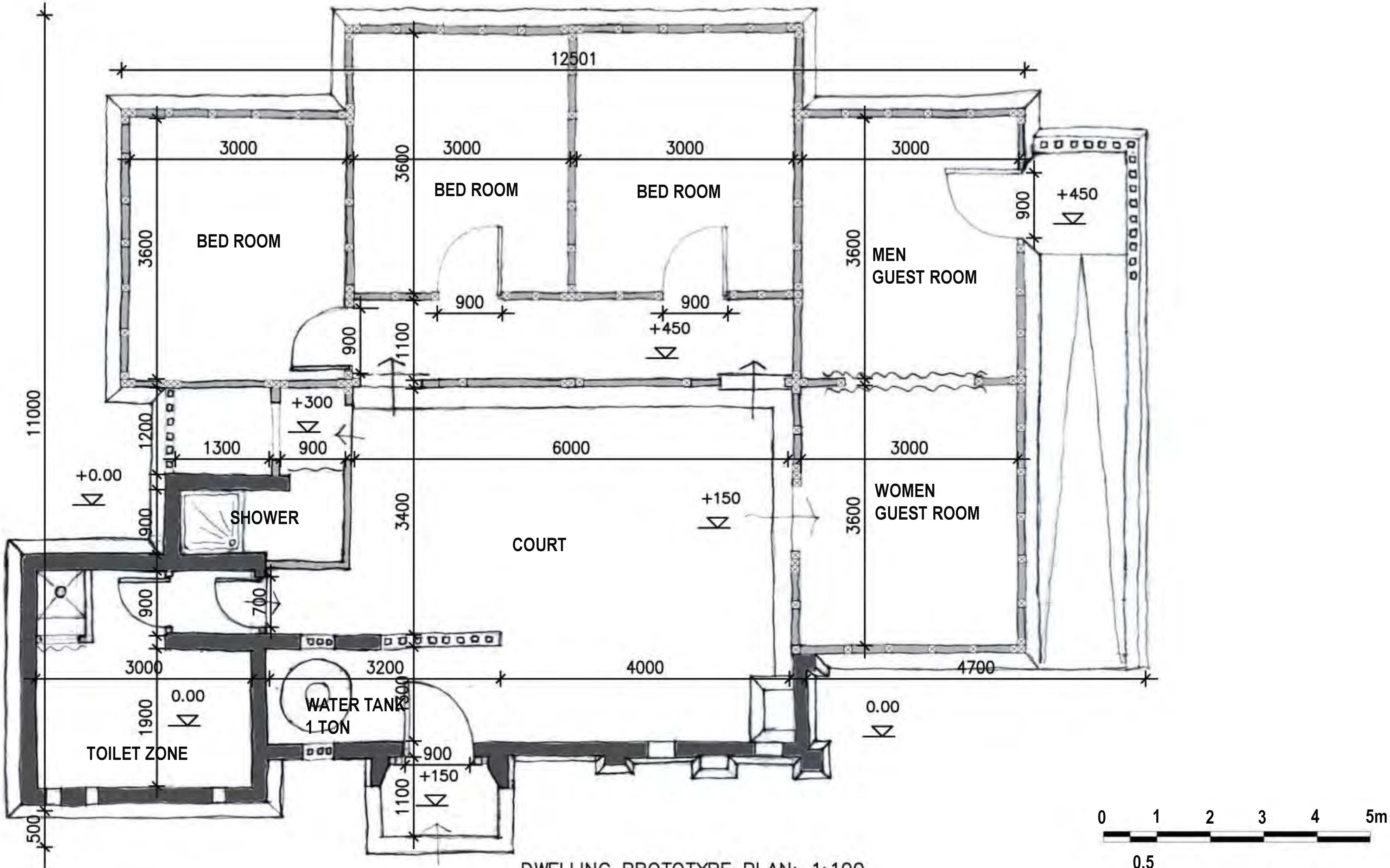
SITE NO.1 NORTHERN ENTRANCE TO WGNP

LIST OF DRAWINGS

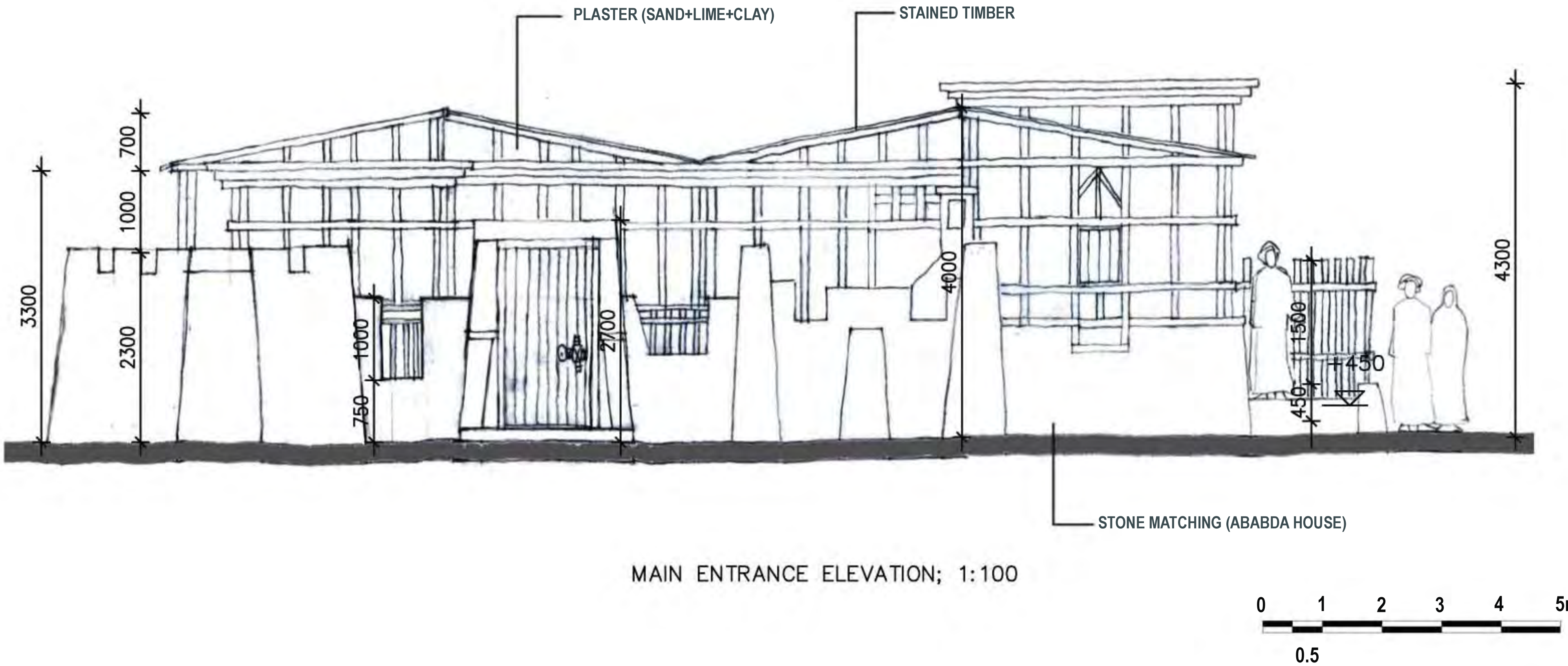
The Supplements contain the following Drawings:

Detailed Design Dcouments
D 3.1, Site No.1 : WGNP Northern Entrance
Design Concept Brief

This concept brief aims at describing the process followed to achieve a design model for a dwelling prototype at Wadi el Gemal National Park-North Entrance settlement. The settlement consists of 7 Ababda households currently living in self-built inadequate housing units.
To arrive at an assessment of the local community's housing needs a study area familiarization process was carried out comprising: site visits, photographic surveys, informal interviews, literature reviews concerning: Ababda history and social development, as well as research into definitions of Ababda related scoico-economic grouping terminology: Ababda of the Sea or "Asphalti" and Ababda of the mountains, all in it's context.
A step further, an analysis of settlement history, morphology and social structure was carried out. Analysis of dwelling zones ranging from private/intimate to private open space to semi private-guest reception space to outer dwelling zone with ancillary elements.
From surveys and interviews, daily functions/activities/interactions were recognized and incorporated into a space program corresponding to family size and expansion possibilities. Climate studies, orientation analysis, current building configuration in terms of structure and building materials as well as finishes were thoroughly examined.
A concept was developed concentrating the dwelling functions around a central open air courtyard. A workshop was carried out by the client and the local architect to get local community feedback on preliminary design with respect to dwelling size and spatial configuration. This phased community involvement strategy aims at enabling the community to participate in shaping it's own built dwelling and built environment. It establishes a stakeholder relation with the client-donor rather than a negative beneficiary relation i.e. an enablement rather than a charity relationship.
The designer was conscious of the applied building techniques- widespread among the Ababda communities in general and in Wadi el Gemal settlement in particular. As a result arose the choice of timber/stone construction to emulate the already established compressed wood board construction. In addition the vision was developed incorporating the community's participation in the building process, namely members of the community acquiring building materials from it's natural resources and community participation as low-skilled labor in the dwelling construction.
A later workshop organized by the client, consultant and local architect, was aimed at demonstrating the developed design to a representative group of the local community. The community's feedback was positive and among all their enthusiasm towards participation in the building process was encouraging.
The design was developed using 3-d models to facilitate communication with all stakeholders and this report was generated to comprehensively describe the participatory approach to community development adopted by the project team.
The construction phase should be initiated with a mock-up construction event with community participation and essential feedback as the dwelling prototype emerges. Dwelling unit by dwelling unit the dwelling inhabitants would participate in the construction process and have their say in shaping their dwelling as construction proceeds. This process should give back to the community the right to shape it's own built environment, furthermore it makes them responsible for it.

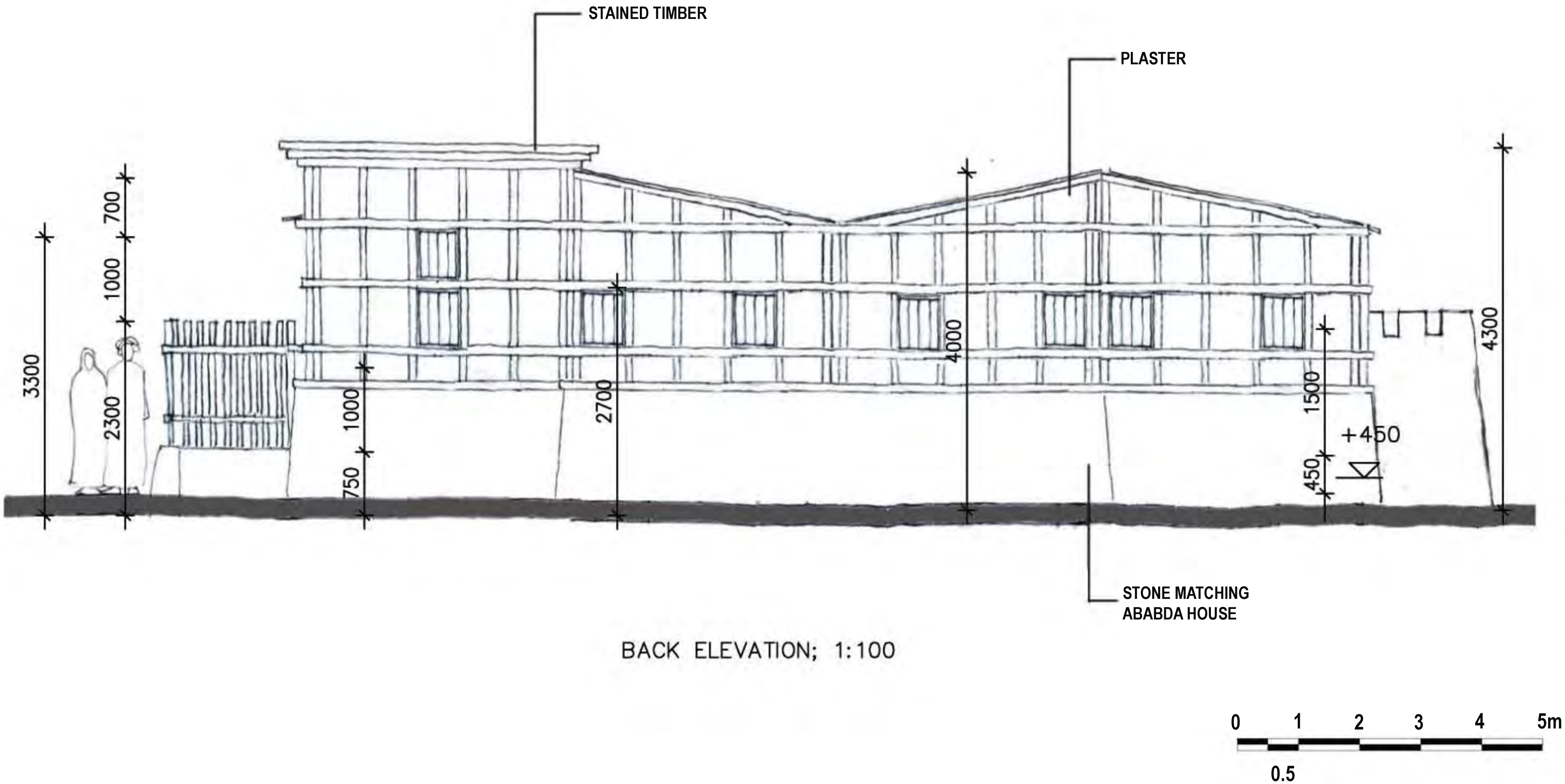


DWELLING PROTOTYPE PLAN; 1:100

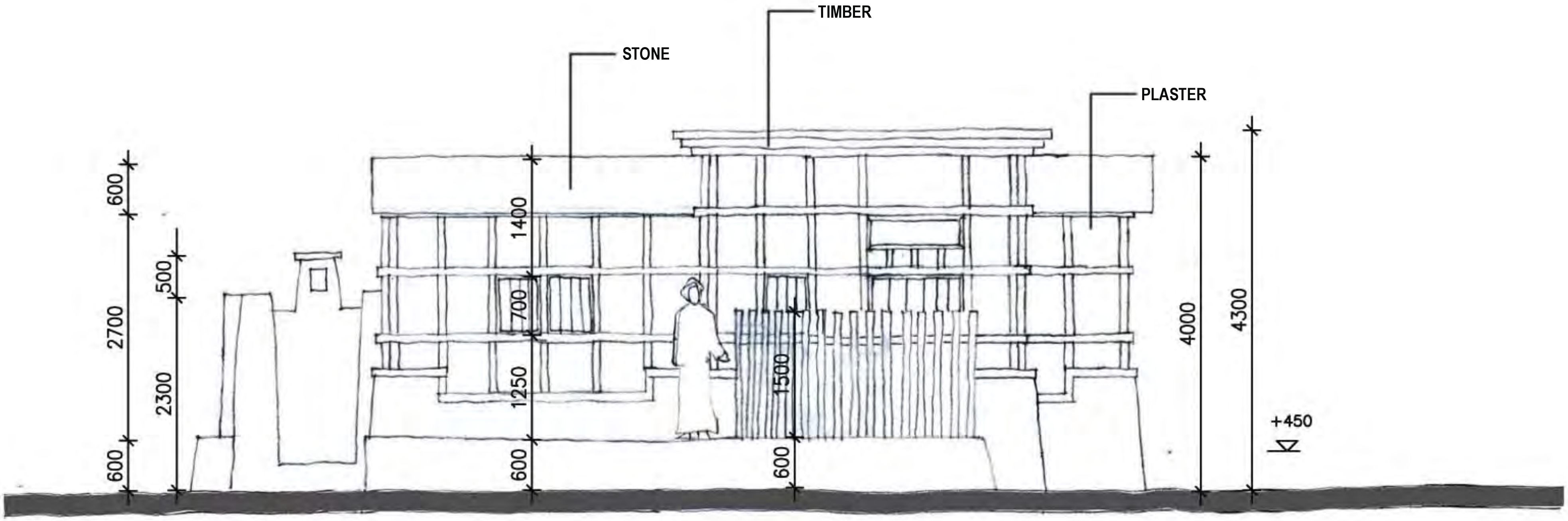


MAIN ENTRANCE ELEVATION; 1:100

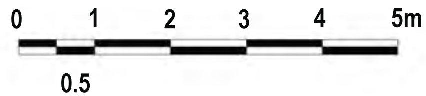
DWG-21



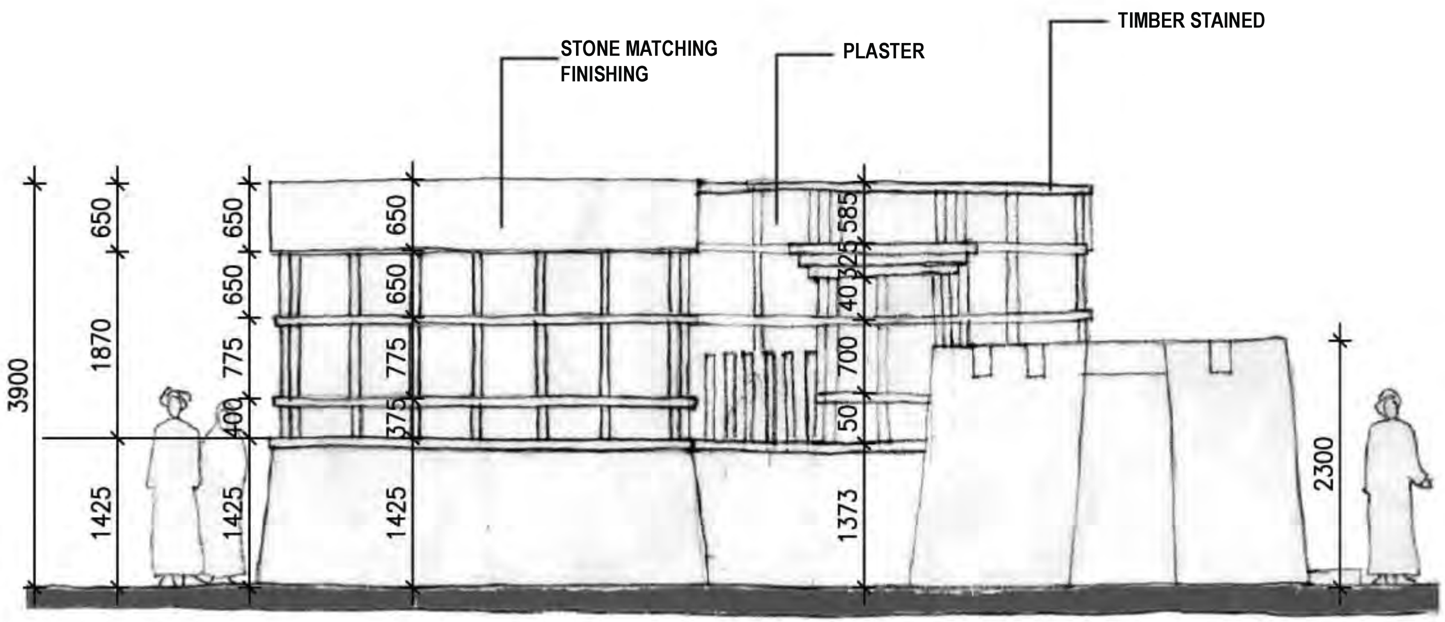
BACK ELEVATION; 1:100



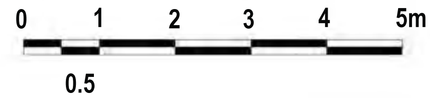
SIDE ELEVATION; 1:100

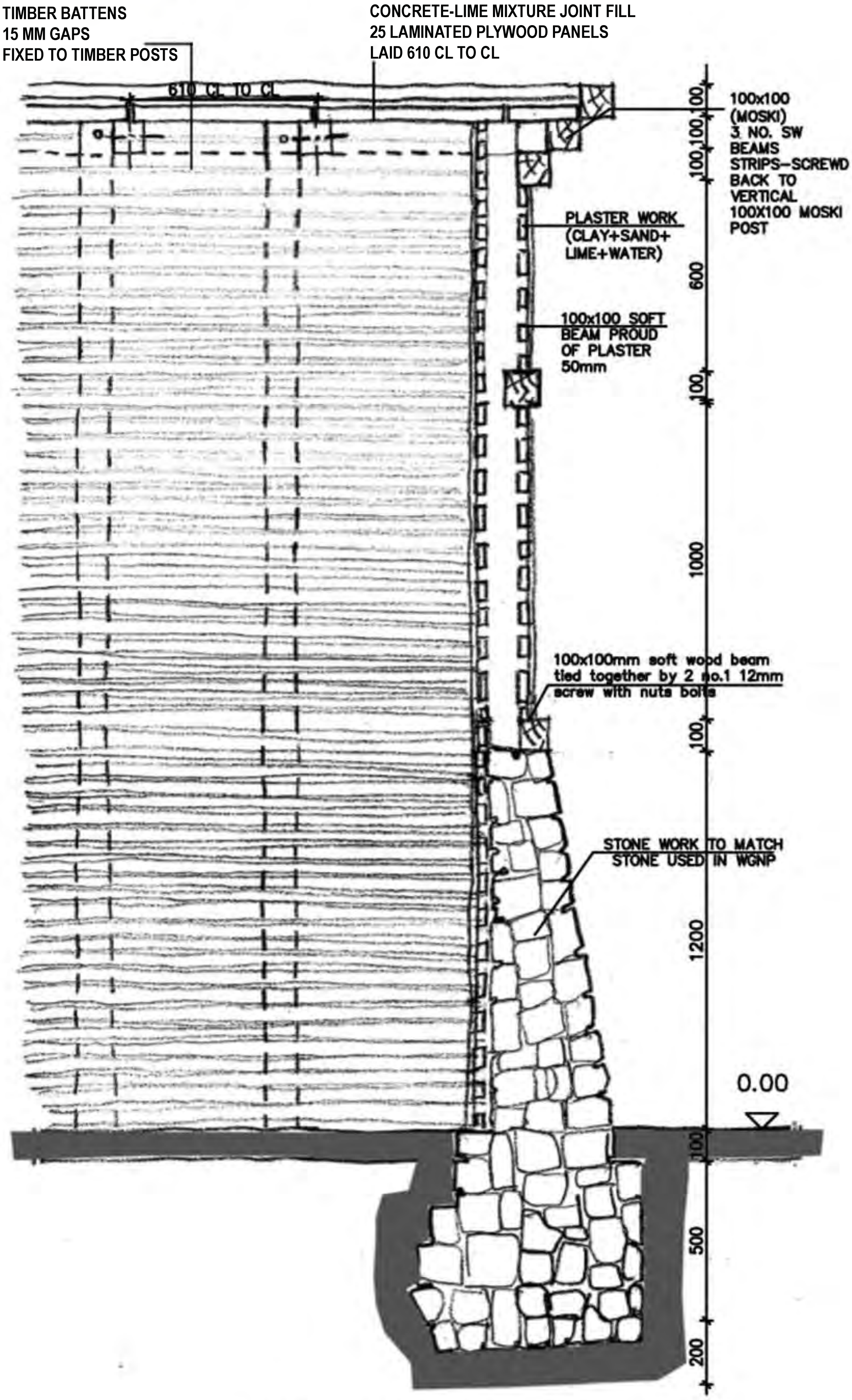


DWG-23



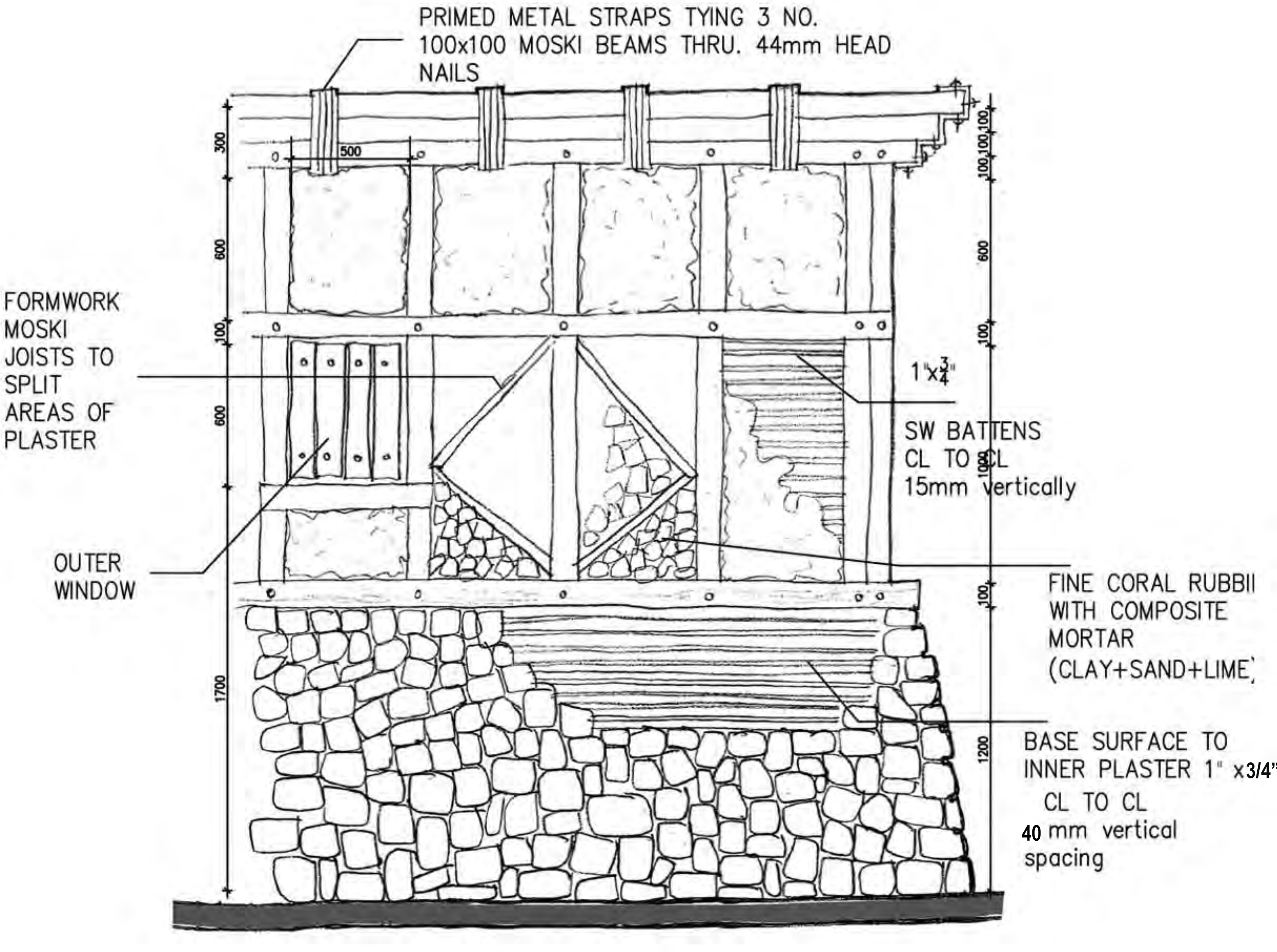
SIDE ELEVATION; 1:100





EXTERNAL WALL SECTION; 1:20

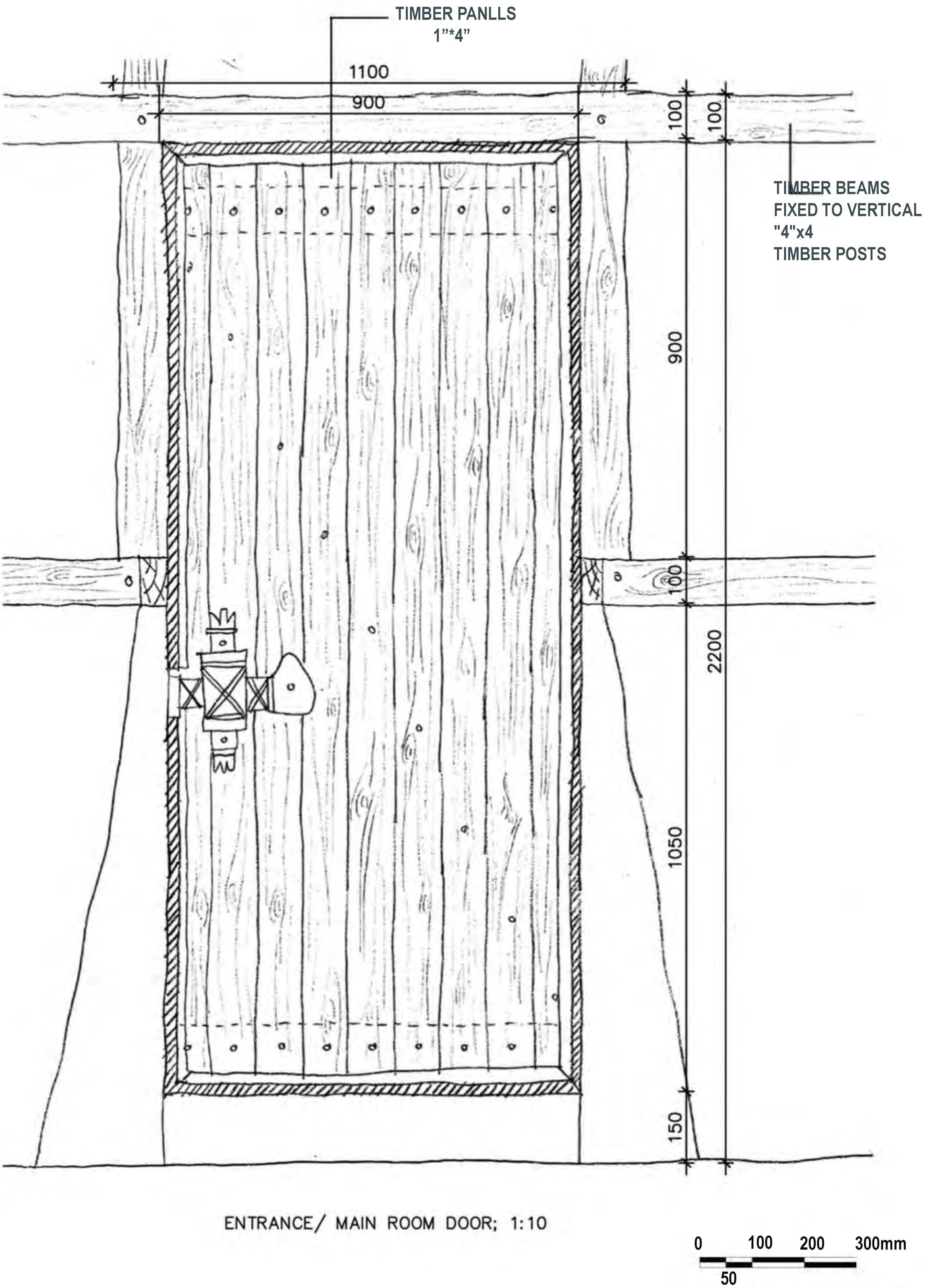
DWG-25



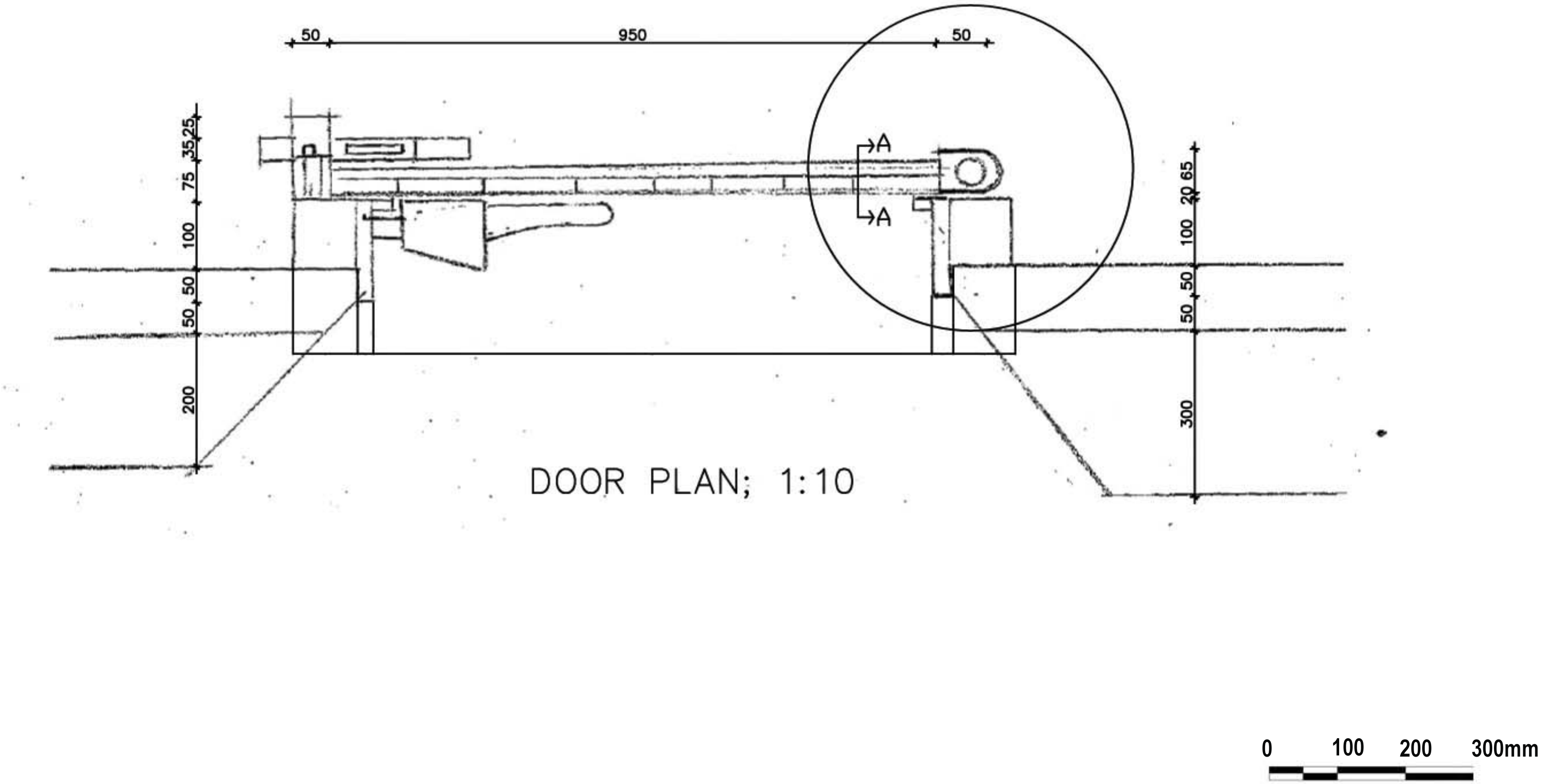
EXTERNAL ELEVATION WALL DETAIL; 1:20

0 5 10 40 60mm

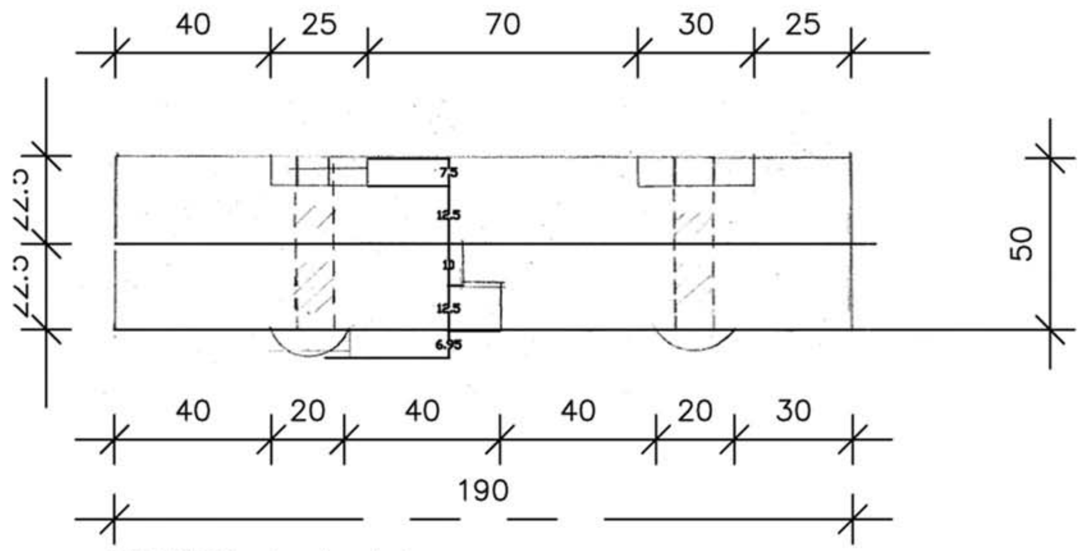
DWG-26



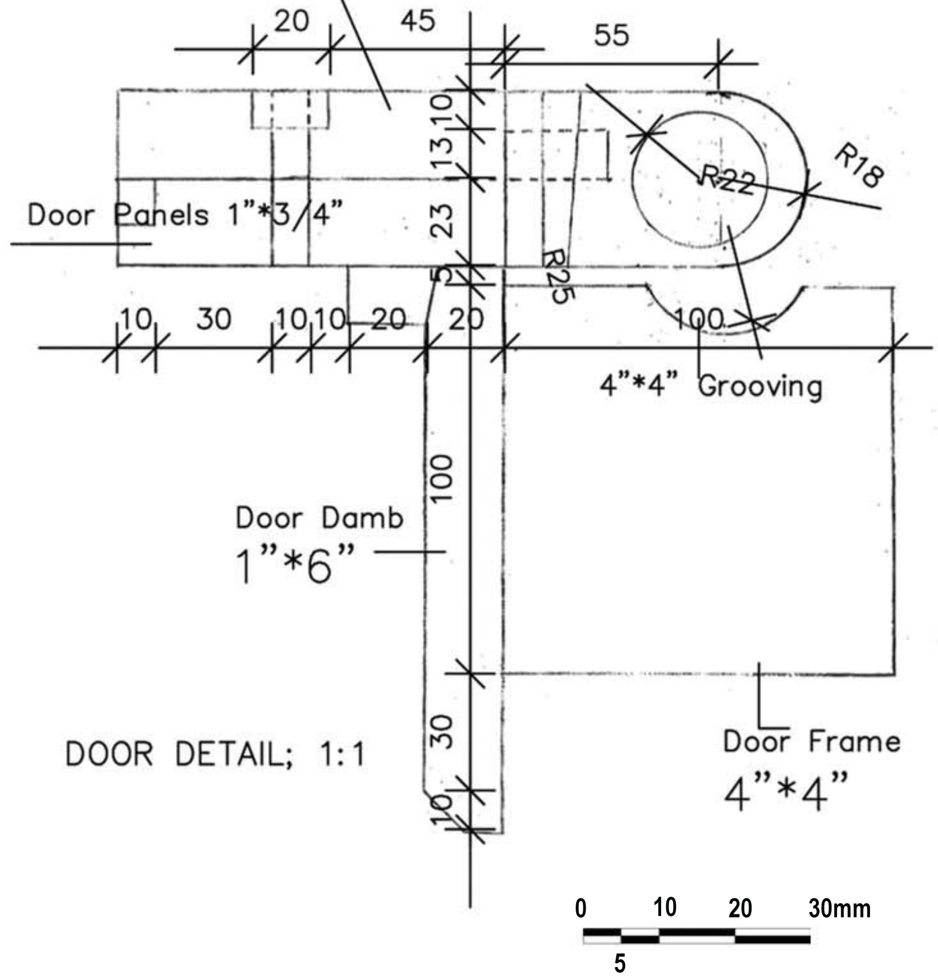
ENTRANCE/ MAIN ROOM DOOR; 1:10


50
950
50
35 25
75
100
50
50
200
A
A
20 65
100
50
50
300
DOOR PLAN; 1:10
0
100
200
300mm

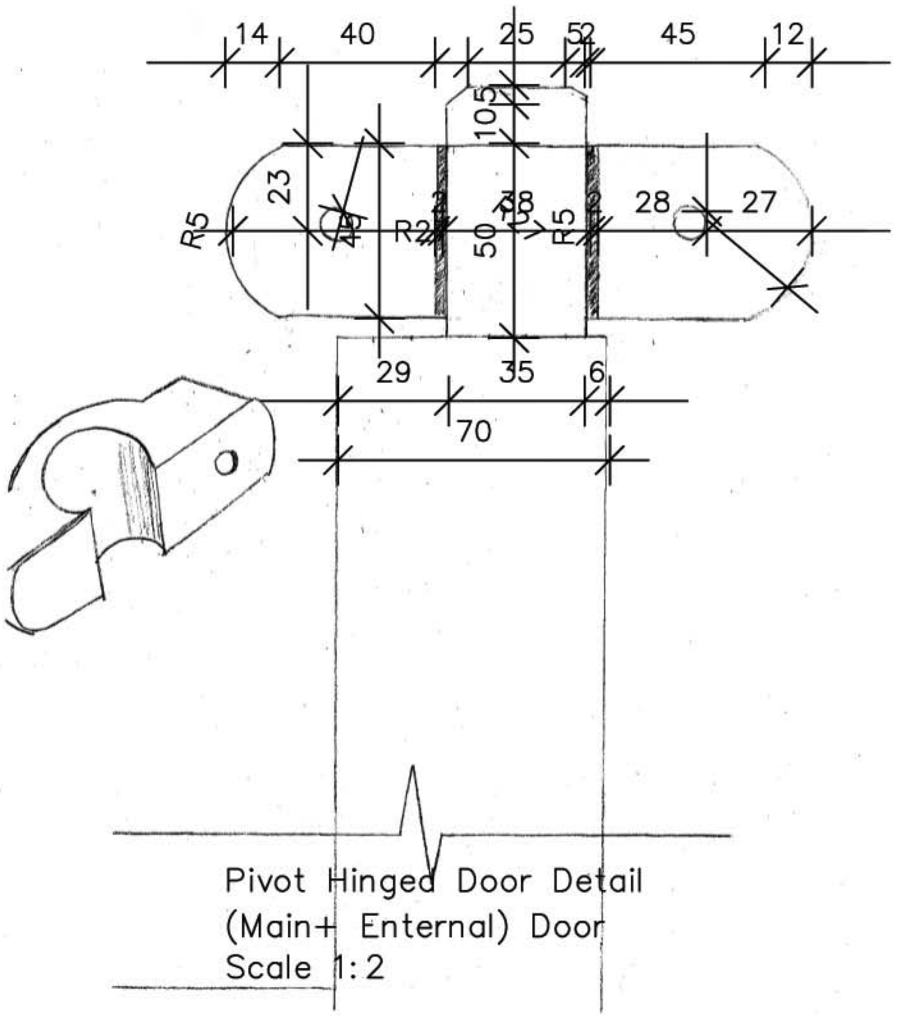
DWG-28



SECTION A–A; 1:1

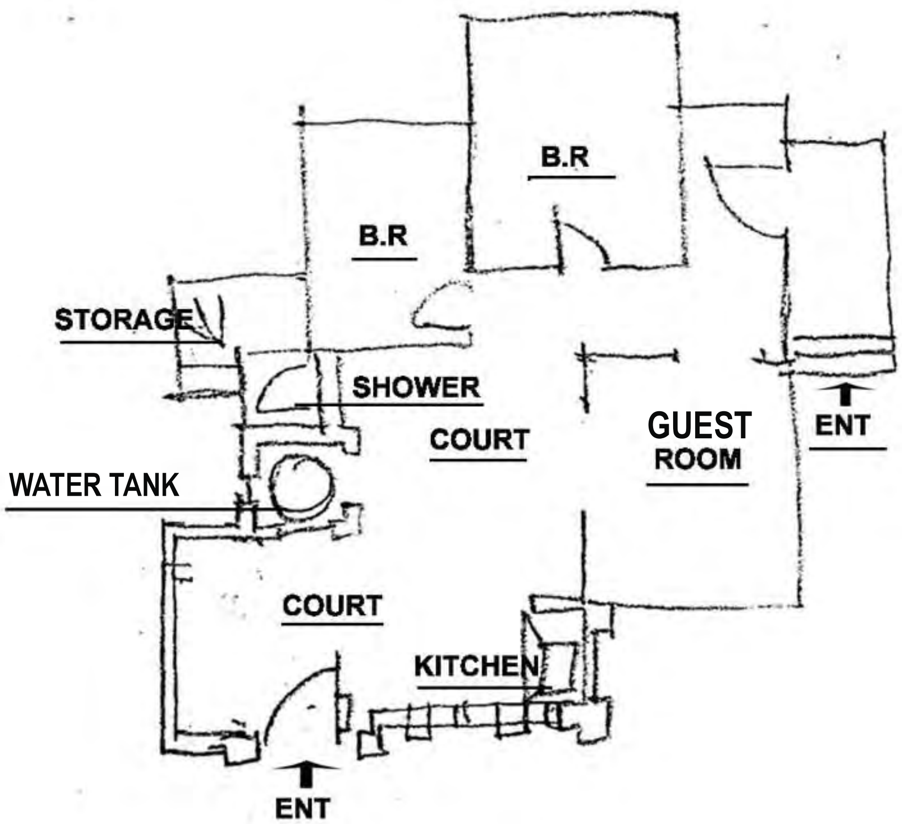


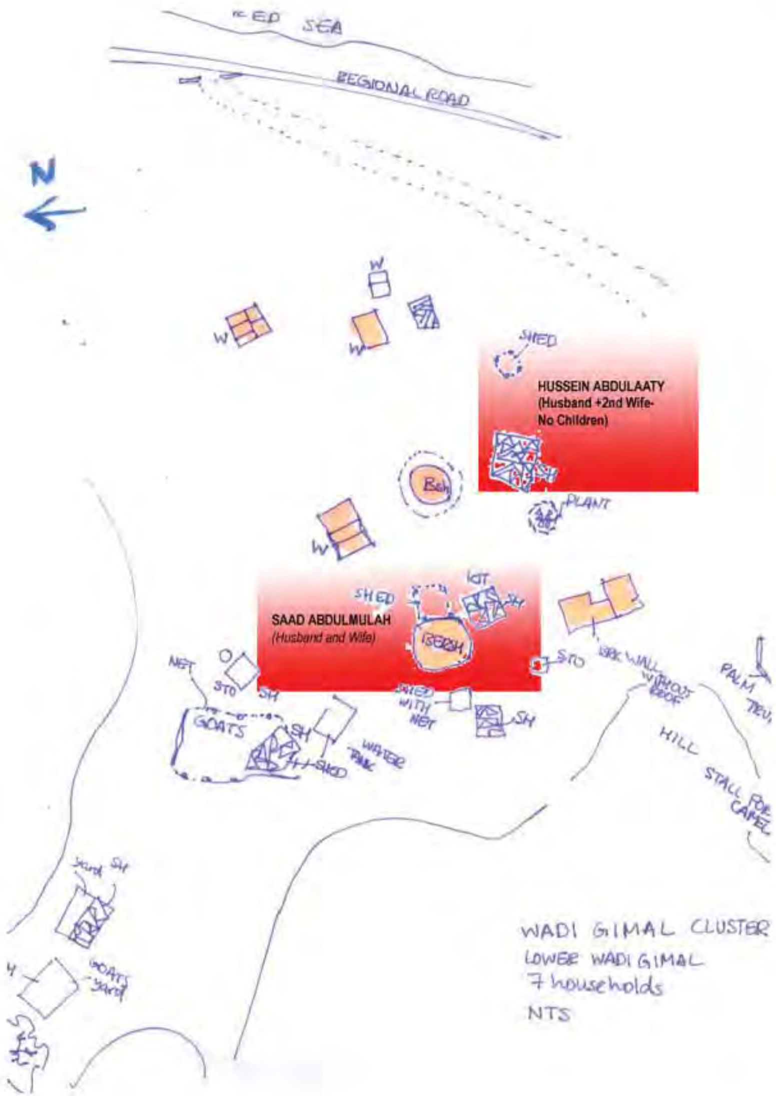
DOOR DETAIL; 1:1



Pivot Hinged Door Detail
(Main+ Enternal) Door
Scale 1:2

DWG-30

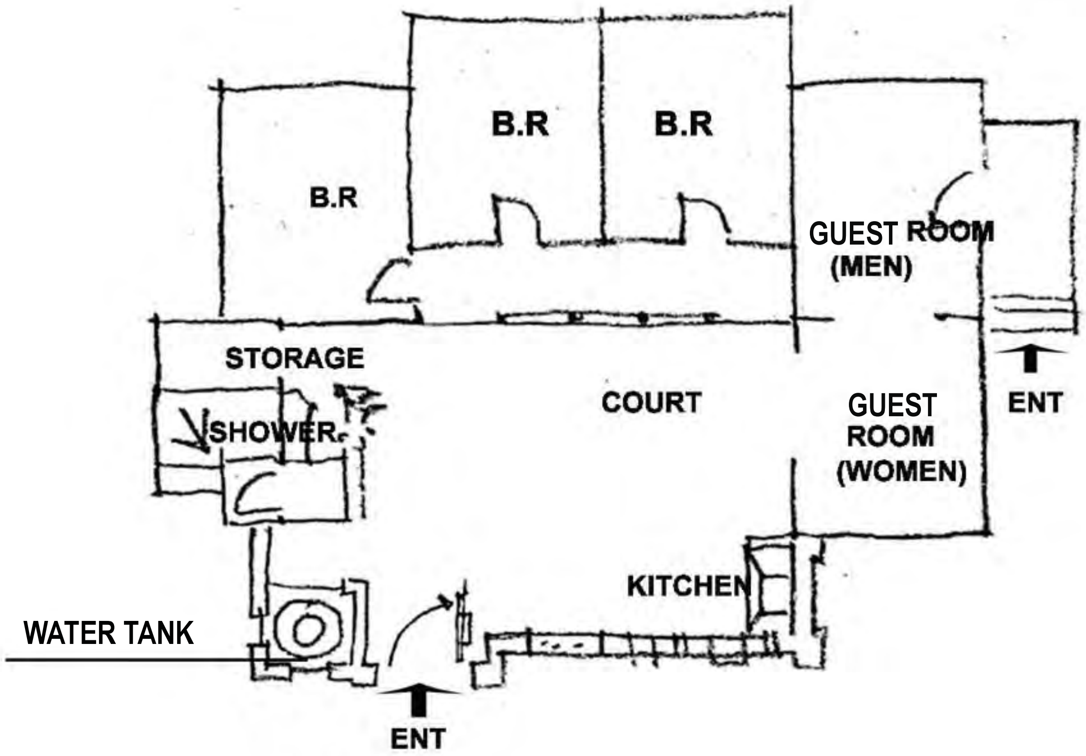


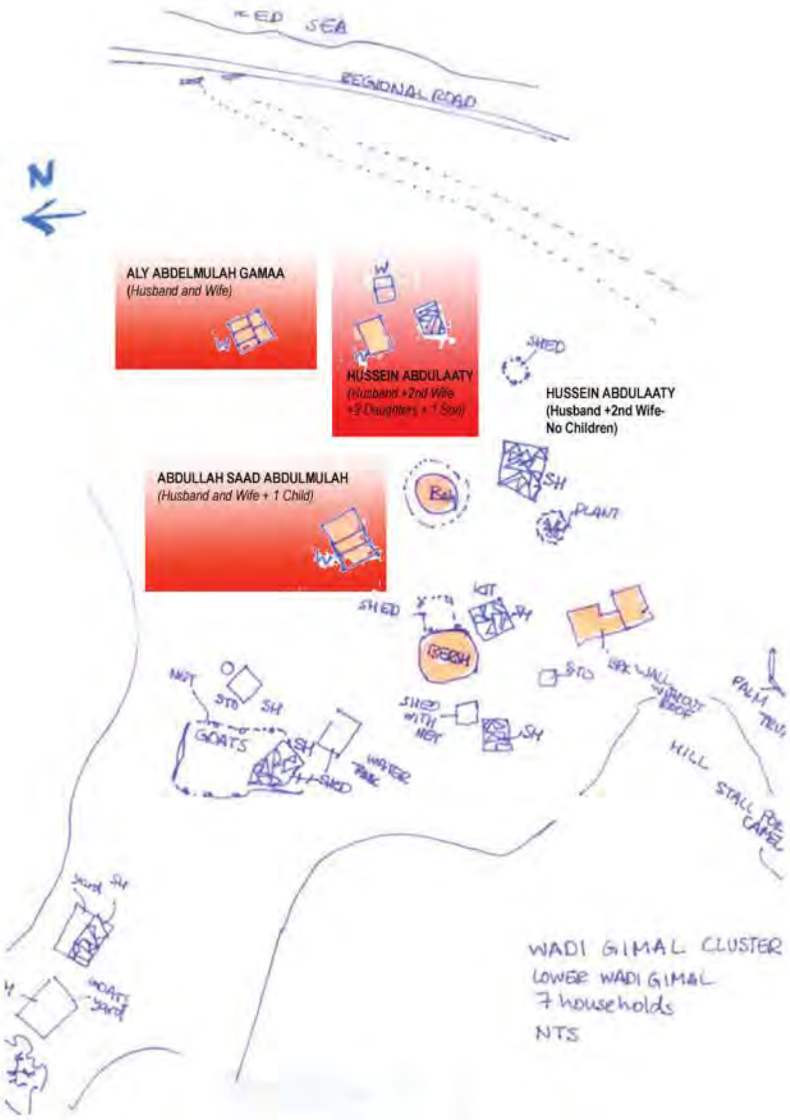


* A small ptototype

* Designed for the second wife of Hussein Abdelaaty + Grandfather and grandmother "Saad Abdelmawlas"

PROTOTYPE VARIATION (ALT.2)

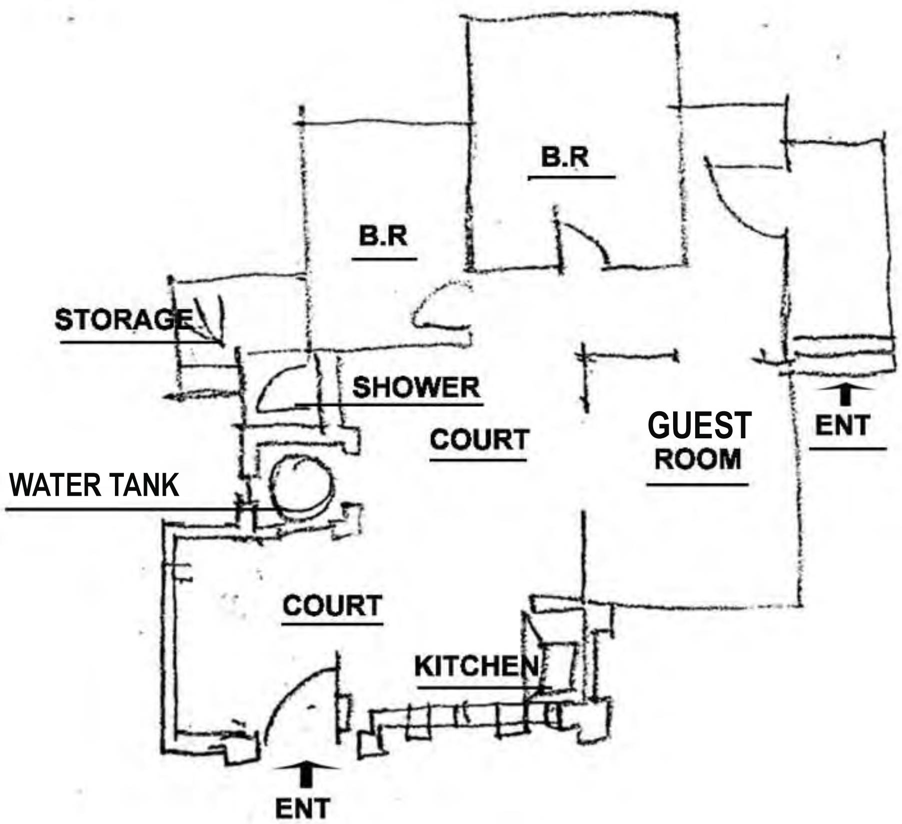


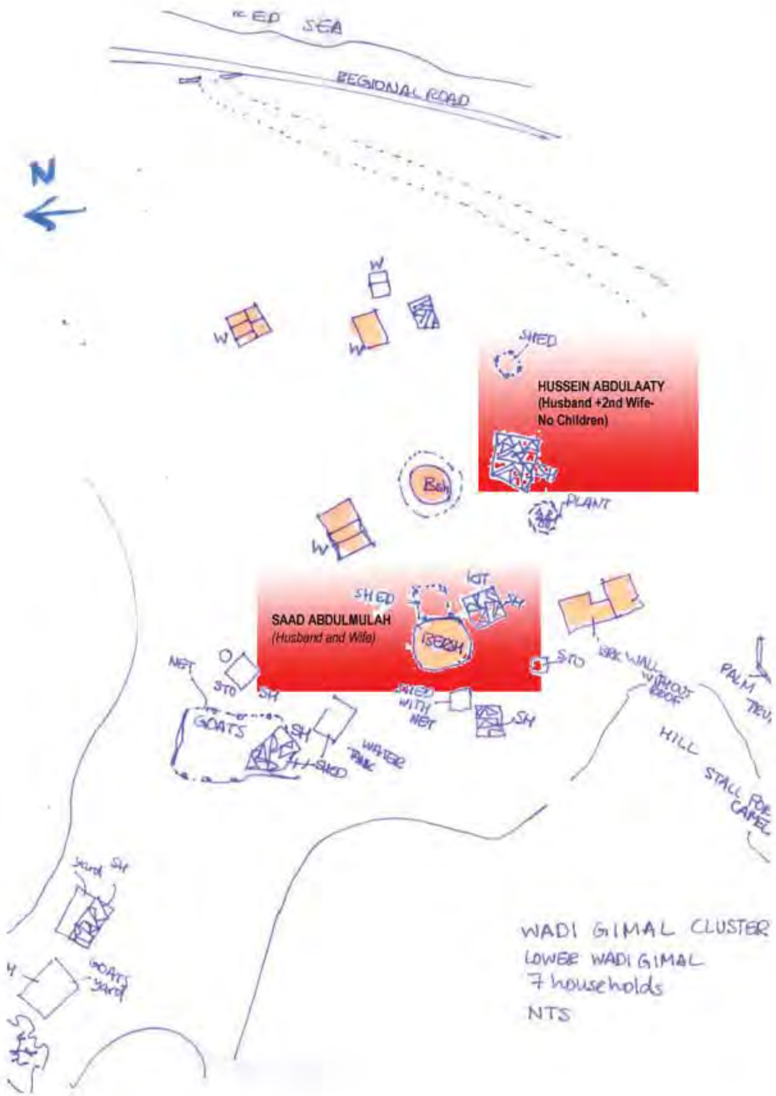


* The proposed prototype for the unit

* Designed for Hussein Abdelatty , Abdallah Saad Abdelmawla & Aly Abdeelmawla

* The prototype is without finishing , only roof and timber post for the walls





* A small ptototype

* Designed for the second wife of Hussein Abdelaaty + Grandfather and grandmother "Saad Abdelmawlas"

Abdelhalim CDC
Community Design Collaborative Ltd

ABABDA HOUSING ACTIVITY
LIFE-RED SEA EGYPT

ABABDA HOUSING ACTIVITY

D3.2: DETAILED DESIGN DOCUMENTS

REPORT

SITE NO.2 HAMATA VILLAGE

TABLE OF CONTENTS

The report consists of the following sections:

3.2.1 BACKGROUND AND PURPOSE OF REPORT

Hamtavillage is located 120 km to the south of Marsa Alam city (RSG),the site is a compound composed of a Governmental Housing Complex forming linear strips parallel to the Coastal Road and the Coast line and consisting of approx. 50 units in addition to Government Local Council Unit, a Basic Education School, Teachers' Lodging quarters, a Clinic and a Mosque.
The site is considered one of the most served areas where commercial services (shops and cafes) are available, a Desalination Plant as well as foods supply and potable fresha water trucks from Edfu twice per week. The site is divided by the Coastal Road into 3 compounds two of which lie to west of the coastal road on the hillside.
The largest compound is the one on the Sea Side housing approx. 60 to 70 families in governmental units and local dwelling units.The other two compounds are to the west of the coastal road on the hillside with the northern one containing approx. 6 families and the other four familiesl, the latter two settlements residential units are totally built by the locals from compressed wood, tin or bricks. The majority fo the Service and Governmental buildings lie within the sea side settlement.

The hillside settlement follows an enclosed U shape Cluster form. In total 6- 8 dwelling units lie in the west with entrances directed towards the coastline.

1 HAMATA MOSQUE
2 HAMATA CLINIC
3 TEACHERS RESIDENCE
4 HAMATA SCHOOL
5 LOCAL COUNCIL UNIT
6 BARN-SHACKS
7 OLD GENERATOR ROOM

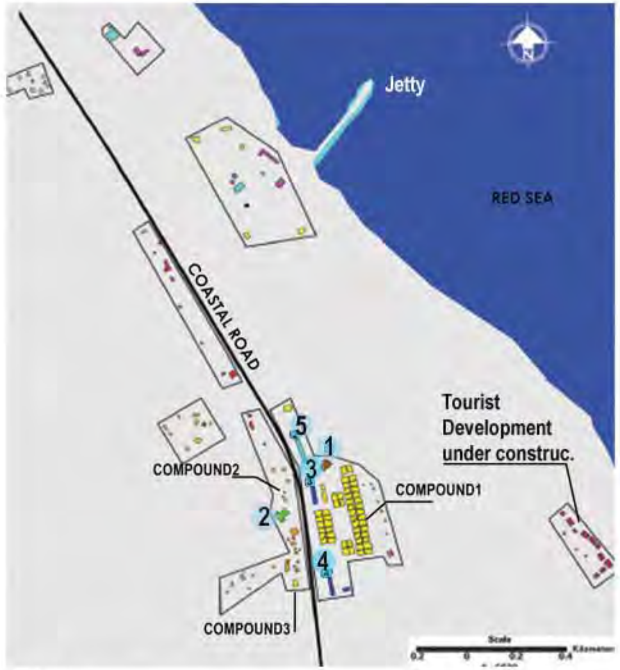


Fig. 03, 1
MAPPING OF *HAMATA*
Source: Hamata Report

Fig. 03, 2
OVERVIEW OF *HAMATA.*
From the hills west of the road

3.2.2 DEFINING FEATURES OF URBAN SETTLEMENT

1- SITE ANALYSIS

Physical Condition

The physical characteristics of a settelement is classified into two groups of elements, the first group describes the natural elements and the second describes man-made elements.

a) Natural Elements

1-Wadi Floor: The Wadis (valleys) are the natural drainage systems that carry the discharge flood water from the mountain top to the coastline. On average These Wadis flood every 7 years. Despite the scarcity of water and the aridity of the region a lot of species have adapted to live in those harsh condition including human beings.

2- Flora: The diversity of flora in the region is evident in many species, The most dominant are the "Sayali" tree (Acacia) where ground water is its main source of life and the mangrove which is dense at the shore line north and south Hamata town. In Hamata you find a wide range of vegetation types that could be found in the region near Hamata village on the coastal plain and also in the mountain range.

3- Fauna: Fauna associated with this region vary from Gazzel, reptiles, wild asses, camels, goats. hyrax,..., and many kinds of birds. Most of the afore-mentioned use the mountain range to hide, however, they come to the shoreline occasionally for different purposes (water, mangrove, ... and Acacia trees). One of the local population main activities is herding sheep & goats in the geographical domain ranging from the shore line bordering Hamata village to the deep range reaching the mountains to the west.

4- Coral reef: The coral reef in the Red Sea is a continuous plateau of fringe reef that runs parallel to the shore line with a distance ranging from less than 10 meters up to 250 meters. This plateau is interrupted at the Wadis areas where the flood makes an opening in the shoreline that creates a natural anchorage. These natural anchorage points have become prime locations for establishment of old towns that have evolved along the years to become the current village .

IDENTIFYING DISTINCT ZONES

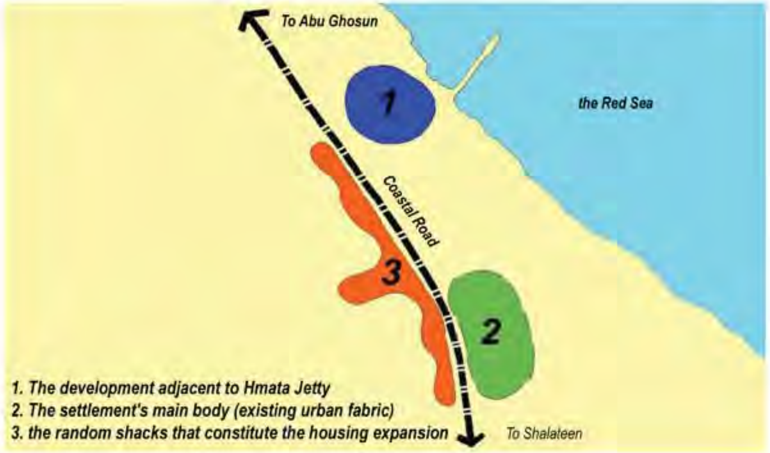
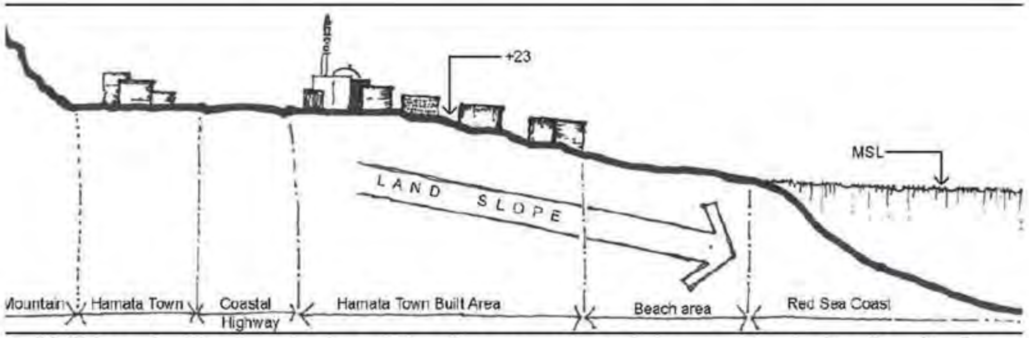


Fig.04,1: The man-made elements consist of the urban form (housing and other buildings), The infrastructure and services in the village
Source : Egypt LIFE Red Sea Project Hamata Existing Condition Report (Profile)



Fig,04,2 Conceptual Cross section through the village perpendicular to the coast showing the slope direction
Source : Egypt LIFE Red Sea Project Hamata Existing Condition Report (Profile)

Fig.,04,3: General view of Hamata village from the hillside west of the coastal road.

3.2.2
DEFINING FEATURES OF URBAN SETTLEMENT

2-Growth Direction

-Urban Form :

The urban form is a description of the village's built form, providing an overview of the existing status. This form analysis includes building heights, conditions, structure and land use patterns.

-Building Condition:

Most of the buildings in the village are in medium or bad physical condition. Buildings in good physical condition are tourist resort units under construction owned by an investor located to the south east of the village (near the coast line).

The "Tawteen" (Gverntl. housing units)buildings are in a very bad condition (located east of the highway), together with sporadic shacks whithin and around the village, east and west of the road,which require immediate restoration as they does not provide adequate shelter for the residents in addition to having a hazardous roofing material (Asbestos) which is banned worldwide for its carcenogenic qualities in addition to overheating in the warm summer climate.

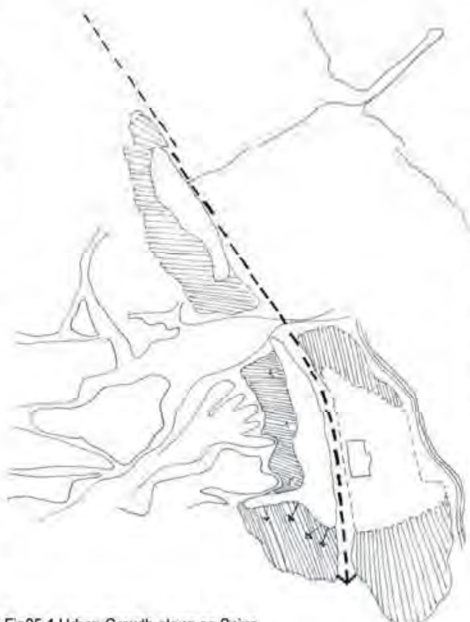


Fig05,1 Urban Growth along as Spine.

Fig05.2 Housing compound (Seaside Tawteen housing) represents a major feature of the Urban Fabric of Hamata.

IDENTIFIYNG "BUILDING" ZONES

Man-Made Elements

Man-made elements could be classified in three groups among the following geographic areas:

1. The development adjacent to Hamata jetty, which consists of a few buildings that provide services related to the jetty, protectorate rangers outpost and the locust monitoring & combatting unit. The condition of the buildings is satisfactory and maintenance is the responsibility of the various functional bodies located there.
2. The existing urban fabric, comprising the public service buildings and government housing units east of the road. Most structures are single storey buildings, mostly a deteriorated condition.
3. The huts and shacks that spread out west of the highway are mostly make-shift structures and their materials and construction systems do not promote comfortable living conditions. They accommodate the expansion of the village population as well as a large percentage of the service facilities (e.g. grocery shops/cafeterias/coffee shops...etc.)

Fig05.3 Urban Growth Direction

The school attracts a lot of attention from the local community, The Red sea Governorate and Education Ministry. The School Renovation project is being executed by LIFE RED SEA at the moment.

General Note

To benefit from previous studies carried out in the same study area,
Information has been extracted from previous studies and incorporated into the team's own analysis.
Sources are quoted where appropriate .

3.2.3 DEFINING FEATURES OF THE DWELLING ZONE

1- DWELLING EXTENSION

The extended house domain in Hamata is usually defined through the barn annex added by locals, that is mostly 3-4 meters away from the dwelling in the hill side settlement yet the same measurement is more than 10-15 meters at the sea side cluster, tor the benefit of distancing the barn away from the direction of favorable wind. Still the barns benefit from sea breezes.
The barn remains part of the dwelling domain and a notion of land tenure and possession.
In cases of localy built shacks the barn is added as an extension to the house core (bedroom + court) and is directly adjacent to the house court from the outside to provide accessability. That annex is usually built using tin/compressed wood boards or ship wreck.
Land Tenure is not acknowledged by the Local Council and can only be formulated and recognized by members of the same community living together.
A minimum of 7-10 meters set back distance is left between dwelling units (shacks) on the west side of the road providing privacy and ability for future extension due to increase in family size.

Fig06,2
The barn annex and its relation with the dwelling unit

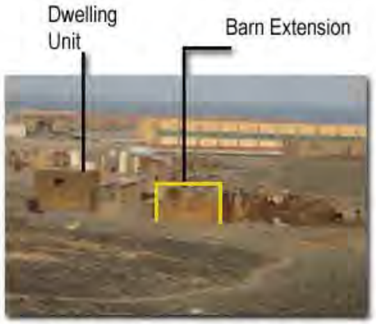


Fig06,1 House Domain may be defined by the Barn Annex possesed by the owners of the dwelling unit.

Fig06,3 Annex barn and toilet unit added to the house core

Development Phases of a dwelling unit are usually divided into the following stages:

1- Construction of the house core consisting of main rooms (2 rooms) and an open court
2-Construciton of a kitchen and/or toilet- extension
3- Adding a living or guest room

Fig06,4 Development Phases

Fig06,5 External annexes added by locals at the hillside area.

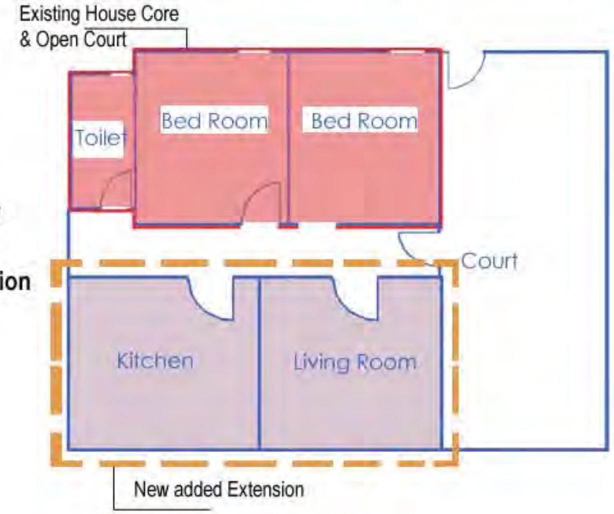


Fig06,6 Living spaces added to the main house core (Governmental Model).

Fig06,7 Kitchen ,Compressed Wood Annex an addition inside the governmental unit core.

3.2.3 DEFINING FEATURES OF THE DWELLING ZONE

3- OPENINGS

The settlement of Hamata is a sea-side housing community. This fact is reflected in the architectural elements of the housing model.

Doors:
Doors are mainly wooden made by locals from ship wrecks, recycled formwork timber or wooden planks brought from Marsa Alam or Alquseir.Doors are narrow of standard dimensions (2.2*08 m) arches are commenly used by locals either flat (with timber lintels)or curved made out of bricks and usually used to separate living spaces, guest rooms, laundry zones and internal courts from other housing activity zones.
Doors are fixed to brick walls by metal bolts and made either of wooden planks or compressed wood boards. The door threshold is made out of bricks and usually measures around 12 cm in height.

Windows:
Window sills are relatively low (0.7-0.9 m) resulting in greater surface area to avail of maximum ventilation and exposure to sea breeze,the windows are oriented to the east and north east thus facing the sea direction.


Fig.07,4: Compressed Wood door leading into the living space


Fig.07,5: Governmental unit bedroom door

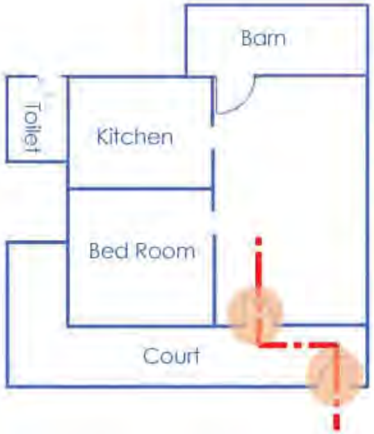


Fig07,1 staggered arrangement of entrance doors breaking visual continuity iwt haoutside to guarantee privacy for the inbhabitants


Fig.07,2 seperating the guest reception/living space from the internal private zone of bedrooms. An interior design intervention corresponding to user needs


Fig07,3 Timber lintel leading to a corridor into the laundry zone.

Arches constructed in 120mm brickwork walls.

The shack dwellings on the other side of the road are compact with openings oriented towards the north west prevailing wind , w Wihile the openings to the south and south west directions are narrow to avoid the sand laden wind coming from the desert and moun-tain areas.
New windows installed by locals are acquired from joinery shops in Marsa Alam, while on the other side west of the road at the hill side area the openings are made very small (40*40cm) to maximum (70*70 cm) to avoid the sandy wind.
The roof is pitched and supported by a truss or inclined Softwood beams .

Building Material and Structure systems:

Buildings in the village are either built using RC (Reinforced Concrete) structural systems (post & lintel) as in the case of the government buildings, the school, the mosque and some buildings associated with the marina (i.e. the water desalination and the diesel generators room) .
Apart from that , the shacks are built of diffrenet combinations of materials, mainly steel sheets and compressed wood boards and reed mats.
The "Tawteen" buildings are built of wall-bearing stone Blockwork with roofs made out of coruugated asbestos sheets.

Building Heights:
All the buildings are one-storey in the village (except the mosque minaret and another


Fig07,6 Truss supporting roof opened to avail of light and ventilation


Fig.07,7: Double leaf window fixed to a blockwork extension (governmental housing unit)


Fig.07,8: Typical window type (local houses)


Fig.07,9: Hill side window with openings relatively smaller to avoid sandy winds & undesirable hot air.

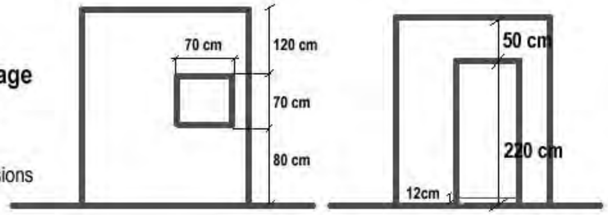


Fig07,10 Openings Dimensions

3.2.3 DEFINING FEATURES OF THE DWELLING ZONE
4- COLOR SCHEME,FINISHES, TEXTURE AND MATERIALS


Fig. 08,1: FlattenedBarrel Metal sheets used in construction


Fig. 08,2: Tree trunks used as columns in a timber post and lintel structure


Fig. 08,3: sample of reed screens & metal sheets


Fig. 08,4: Straw mats (Bersh) used for covering


Fig. 08,5: Pitched roofs composed of wooden boards


Fig. 08,6: sample of straw mats


Fig. 08,7: Pitched roofs with compressed boards' covering


Fig. 08,8: Render for Exterior of compressed wood Communal Madyafa


Fig 08,9 Bricks used in construction


Fig. 08,10: Render Sample


Fig. 08,11: Rough Wall Sample


Fig. 08,12: wall treatment with ornaments and contrasting colors


Fig. 08,13: Sample of interior plaster

5- FLOORING


Fig. 08,14: Concrete screed as a bedroom flooring
Notice the bright rough plaster finish for walls


Fig. 08,15: Leveled soil used in indoor courts


Fig. 08,16: Concrete screed used for flooring in a bedroom


Fig. 08,16: sample concrete screed flooring


Fig. 08,17: Sand flooging in internal courts

3.2.4 GOVERNMENTAL UNIT CRITIQUE ANALYSIS

Layout Arrangement :

Chriticized by locals as inconvenient:

The early 80s' housing prototype in Hamata was designed as a two-bed room & a toilet unit (basic core-house) with all elements open to an open-air court. Unsuitability of interrelationships between spaces caused the locals to build self- constructed extensions, as the existing units share 1 to 2 party walls (low party wall approx 1.8 m high) in the courtyard with no sense of privacy. Every two households share a WC trench system with no odor seperator inbetween, which caused the inhabitants to omit the use of the WC unit.

No proper consideration for local requirements: Dwelling units lack designated kitchen zones and corresponding laundry zones, and no provision of shaded spaces in the courts and living areas, nor does it provide hospitality spaces like Guest Rooms(Madyafa).

Below standard construction materials:

The roofing system in Hamata housing units is made out of Asbestos corrugated sheets, a material classified as toxic (carcenogenic). When reacting with water causes roof damage and holes permitting water into the unit spaces.

Future Extension Ability:

Dwelling units are enclosed by a walled court with no designated land tenure, accordingly no ability for future extensions as the family expands and no room for expansion is available.

Fig.09,1: Opening a doorway in the party wall, 2 neighbors agree to connect through each others' houses to counter the poor accessibility imposed by the housing layout

Fig.09,2: Residential Court of a Typical Housing Unit with minimal interventions by inhabitants (a family of five) due to Village Council Unit by-laws restrictions and shrortage of own finances

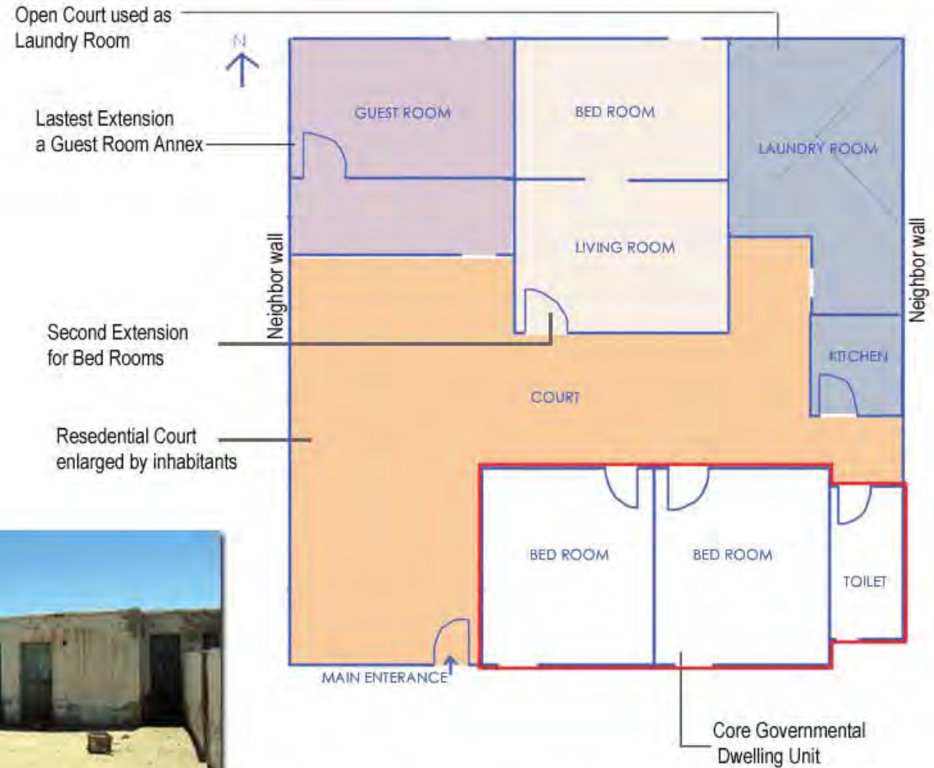


Fig.09,3: Governmental housing unit model with extensions made gradually by locals according to availability of own construction material and finances

Fig.09,4: A timber shed added by the inhabitants. An addition to the governt. core house unit.

Fig.09,5: A timber construction extension is added as a Guest Room in the court of the Governmental Model

Fig.09,6: A typical facade, with recycled brick stored in the foreground to be used when constructing extensions

3.2.4 GOVERNMENTAL HOUSING UNIT CRITIQUE ANALYSIS

Locals' Modification Requirments concerning the Governmental Housing Model:

1-General Cluster layout:

-The double loaded row housing layout creates access problems for inhabitants wishing to connect with the opposite side of the row houses. There is a need to provide for at least two access fronts for better connectivity.

2- Living Spaces:

- Need for kitchen spaces inside the core of the dwelling

- Space Provisions for future extensions (ability of the core house to accommodate extensions)

- Direct accessability from the dwelling unit to the barn and more than one entrance to dwelling. Madiafa with access to the front of the house

-Organization of communal space to host a communal madyafa and community celebrations.

3- Courts:

- Provision of shaded areas within courtyards

-Safeguarding privacy between neighbors

-Courtyard design to promote better thermal qualities and air circulation (ratio of shaded areas to exposed solar radiation areas)

4-Sanitation:

-Ommission of shared trench sanitation system and provision of healthier, odorless alternatives

-Provision of access hatch for intake feeding pipe of water tank

-Provision of suitable drainage systems within courtyards to allow for irrigation of a small garden enclosure.

5- Materials:

- Use of economic, local, user-friendly materials

- Ban on hazardous building materials e.g. asbestos roofing

- Choice of Materials and surface teratments to maximize the thermal quality of the whole dwelling

Fig.10,1: Alterations made by the locals to the governmental model represent the inhabitants' needs to compensate for missing functions as well as expansion space

Fig,10,2: To answer for spatial needs, the ResidentialCourt became the room for expansion as in the case of the kitchen extension highlighted in the photograph

Make-shift door to provide privacy for inhabitants

Wall puncture to allow for water intake from Water truck

Fig10,3

Fig.10,4: Typical governmental core-house model located at the Northern End of the cluster with extensions constructed by the unit inhabitants as an expression of their spatial requirements. In this rare case, availing of 3 seperate fronts each. It is evident the inhabitants made exceptional use of the frontage adavantage.

Fig10,5 Elev.1:
The Elevation demonstrates the gradual development of the original unit into the current variation of the core house. Notice the number of openings and the different materials and finishes used

Fig10,6 Elev.2:
Sea-facing elevation, with timber shed having climber plants, an additional access door is added. Building material is stored to start on another extension assingment.

Detailed Design Dcouments
D 3.2, Site No.2 : Hamata Village
Design Concept Brief

This concept brief aims at describing the process followed to achieve a design model for a dwelling prototype at Hamata village settlement. The settlement consists of approx. 60 Ababda households mostly fishermen families, currently living in “Tawteen” government sedentriazation units, which lay in inadequate- near derlict condition.

To arrive at an assessment of the local community’s housing needs a study area familiarization research was carried out comprising: site visits, photographic surveys, informal interviews, focus group discussions, literature reviews concerning: Ababda history and social development, as well as research into definitions of Ababda related scoico-economic grouping terminology: Ababda of the Sea or “Asphalti” as in the case with Hamata village settlement and Ababda of the mountains(Sheikh Shazli prototype), each in it’s context.

A step further, an analysis of settlement history, morphology and social structure was carried out: analysis of dwelling zones ranging from private/intimate to private open space to semi private-guest reception space to outer dwelling zone with ancillary elements.

From surveys and interviews, daily functions/activities/interactions were recognized and incorporated into a space program corresponding to family size and expansion possibilities. Climate studies, orientation analysis, current building configuration in terms of structure, openings, building materials as well as finishes were thoroughly examined.

A concept was developed concentrating the dwelling functions around a central open air courtyard, a preliminary design with respect to dwelling size and spatial configuration.

The designer was conscious of the applied building techniques- widespread among the Ababda communities in general and in Hamata village settlement in particular. As a result arose the choice of combining brick or stone-wall bearing construction with improvised recycled metal barrels roofing . The techniques would be probed on site with the community at a workshop outside the scope of this report, the purpose of which is to avail of the community’s feedback on dwelling unit design (spatial programming and configuration), and to what extent the building technique proposed would suit their housing needs and participation capabilities.

The construction phase should be initiated with a mock-up construction event with community participation and essential feedback as the dwelling prototype emerges. Dwelling unit by dwelling unit the dwelling inhabitants would participate in the construction process and have their say in shaping their dwelling as construction proceeds. This process should give back to the community the right to shape it’s own built environment, furthermore it makes them responsible for it.

Abdelhalim CDC

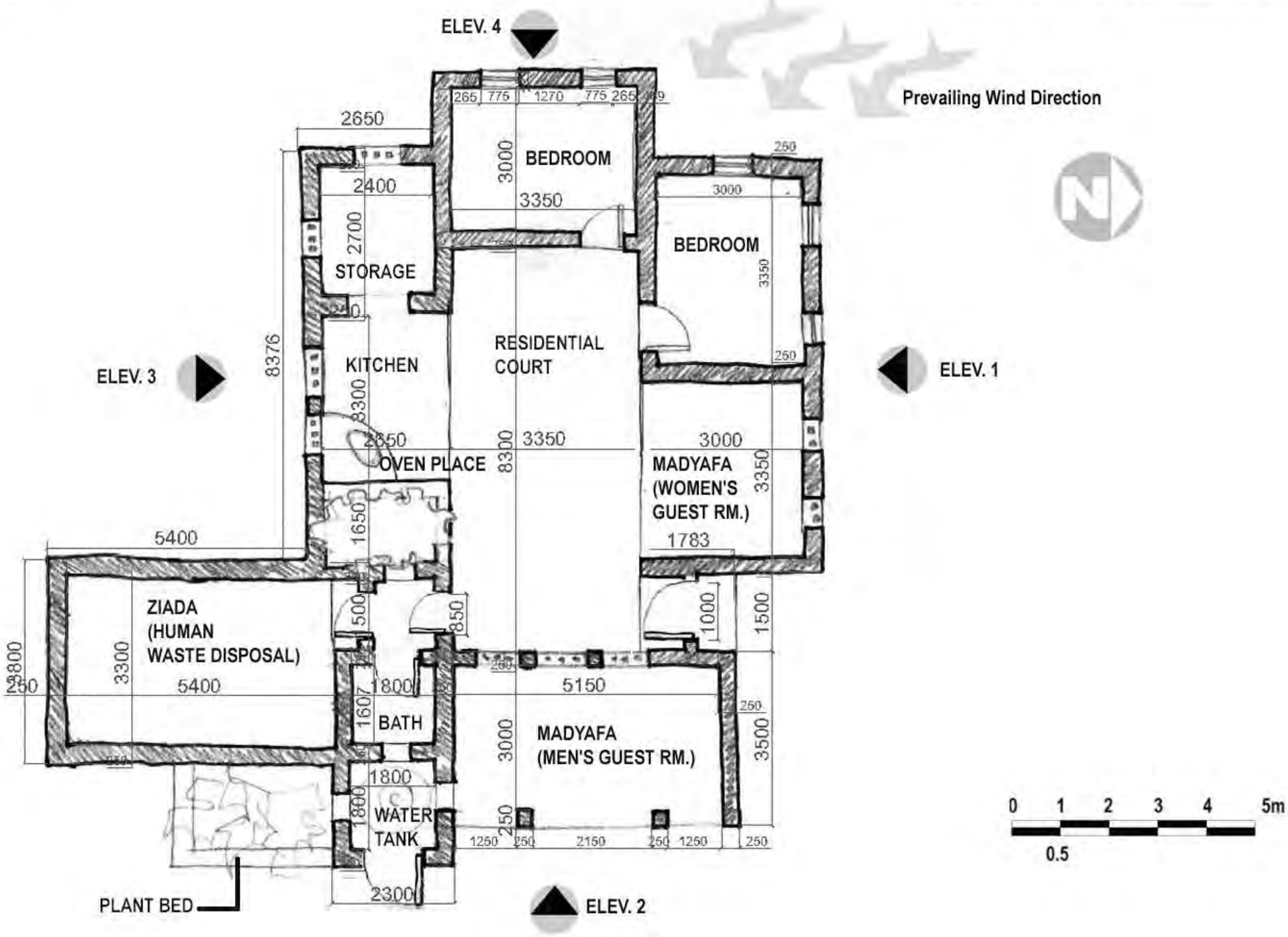
Community Design Collaborative Ltd

ABABDA HOUSING ACTIVITY

LIFE-RED SEA EGYPT

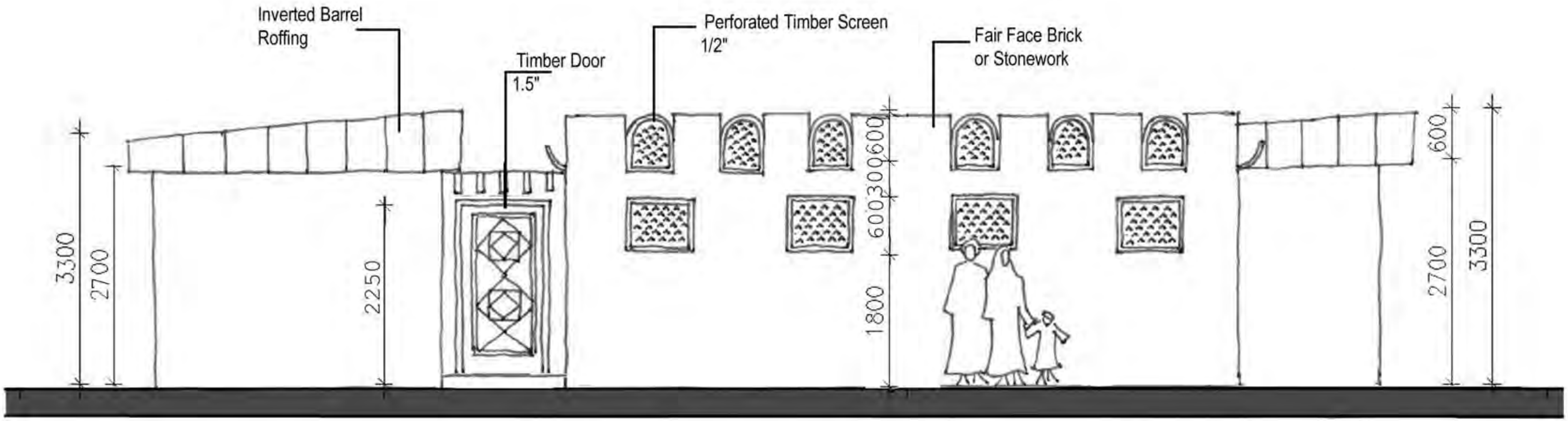
DESIGN DOCUMENTS

SITE NO.2 HAMATA VILLAGE

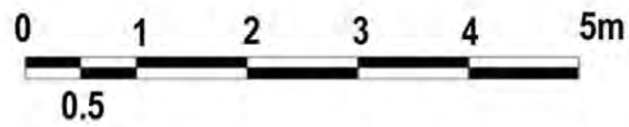

ELEV. 4
Prevailing Wind Direction
BEDROOM
BEDROOM
STORAGE
KITCHEN
RESIDENTIAL COURT
OVEN PLACE
MADYAFA (WOMEN'S GUEST RM.)
ZIADA (HUMAN WASTE DISPOSAL)
BATH
MADYAFA (MEN'S GUEST RM.)
WATER TANK
PLANT BED
ELEV. 3
ELEV. 1
ELEV. 2
2650
2400
2700
3000
3350
8376
8300
2650
3350
3000
1783
5400
3800
3300
5400
5150
1650
1800
1607
1800
1800
2300
3500
1500
1000
850
500
1250
250
2150
250
1250
250
0 1 2 3 4 5m
0.5

MADYAFA ELEVATION (RENDERED ELEVATION)

DWG-02



ELEVATION NO.1 (MAIN ELEVATION)



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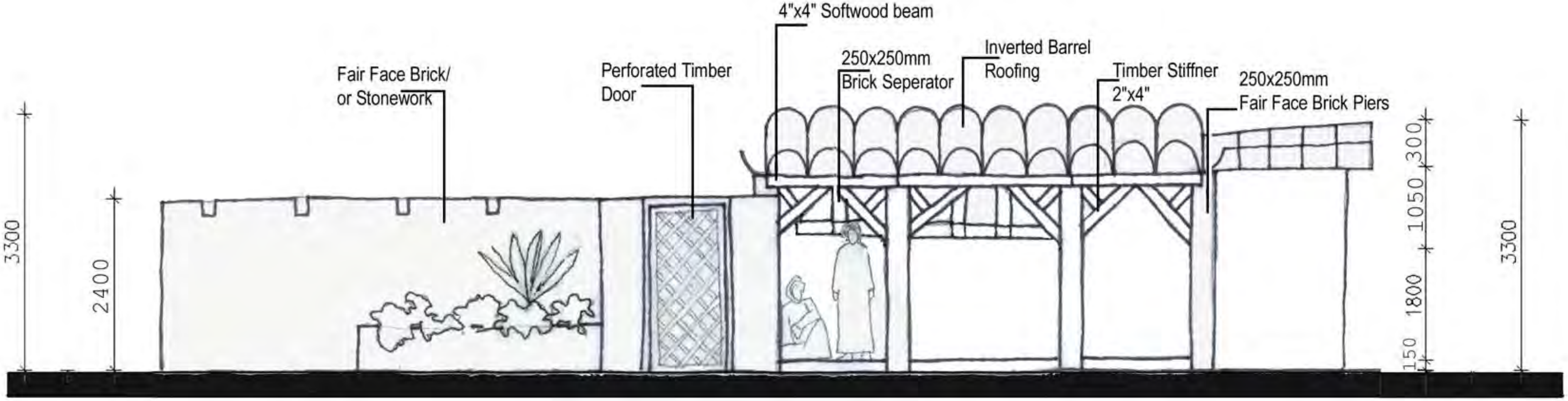
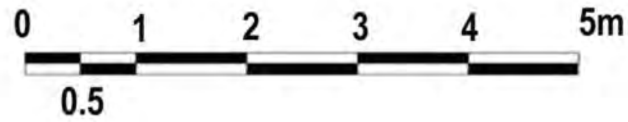
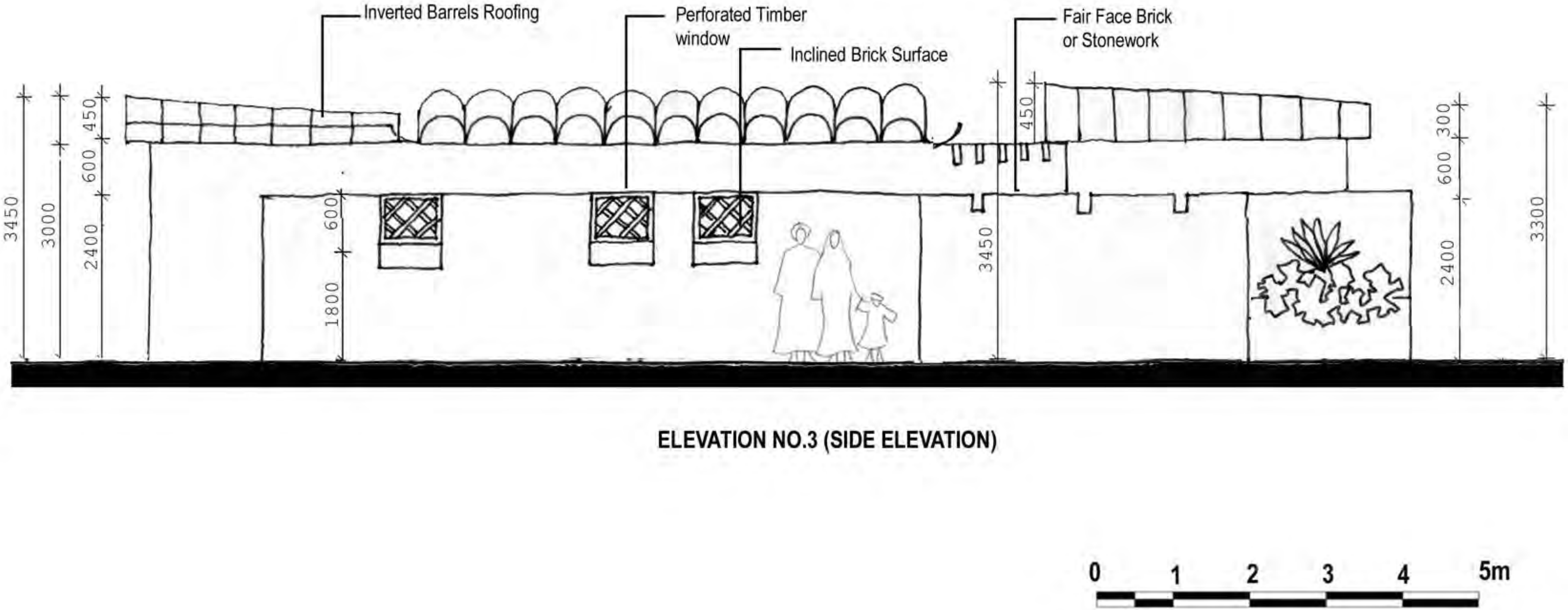


ELEVATION NO.2 (MADYAFA ELEVATION)



DWG-04



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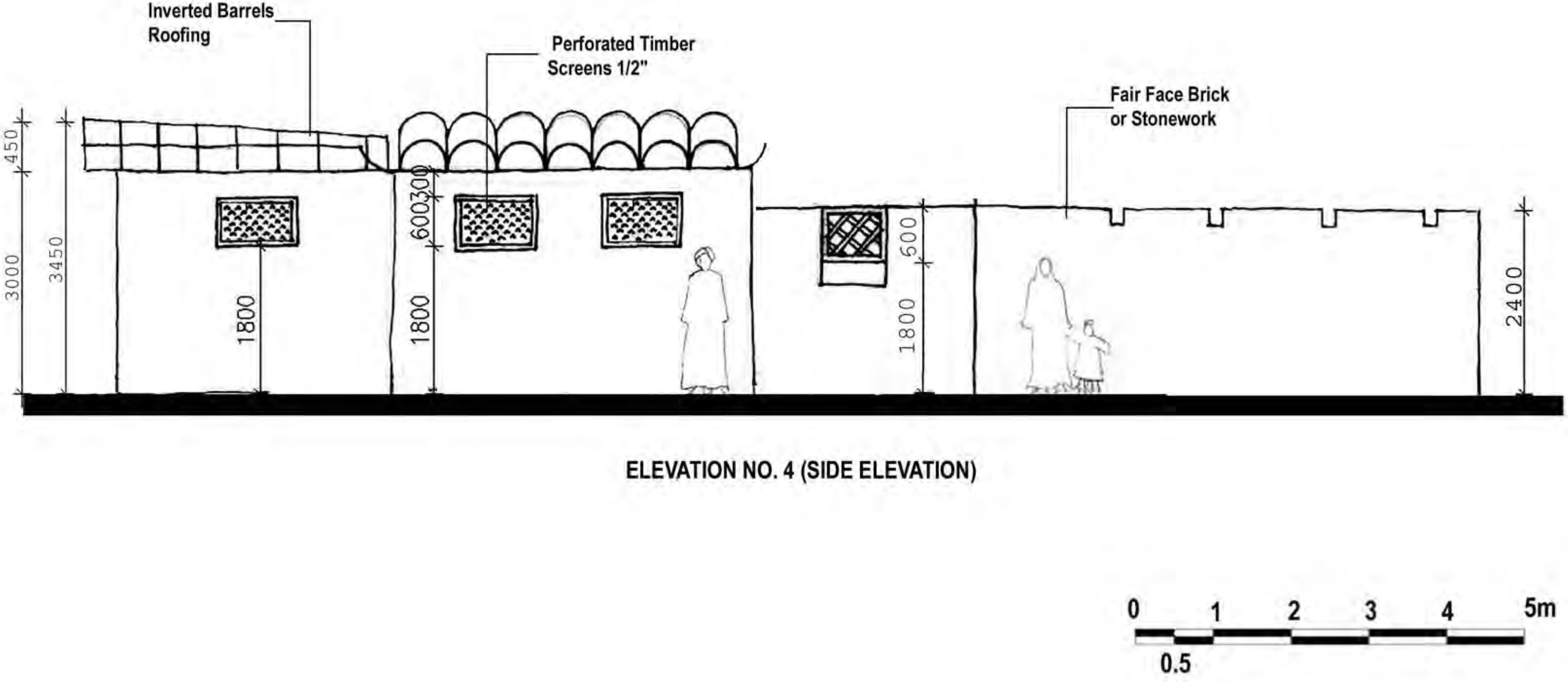
DWG-05



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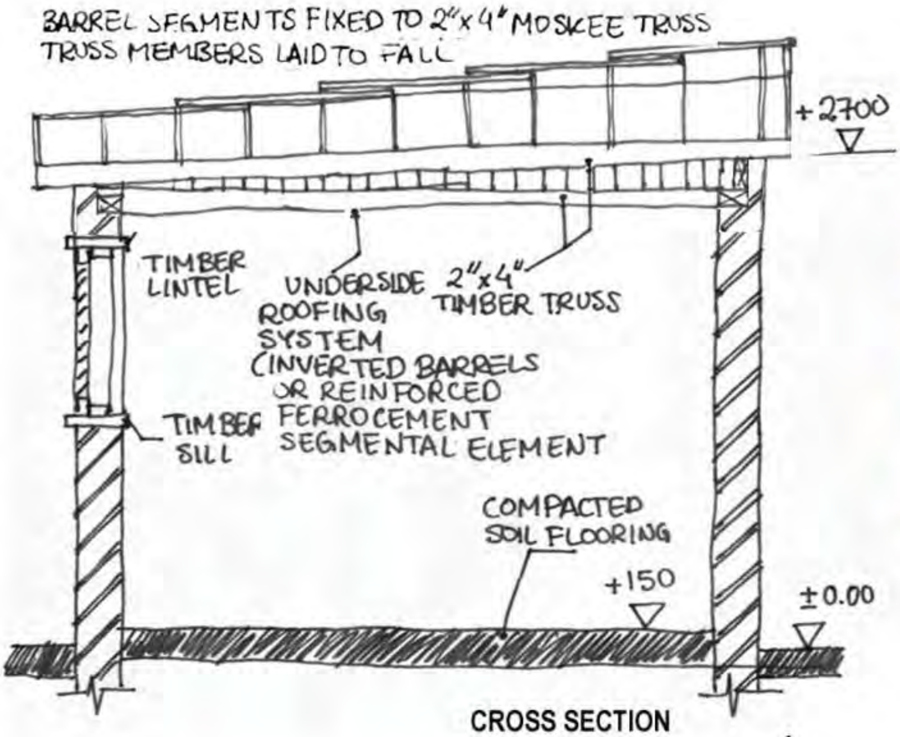
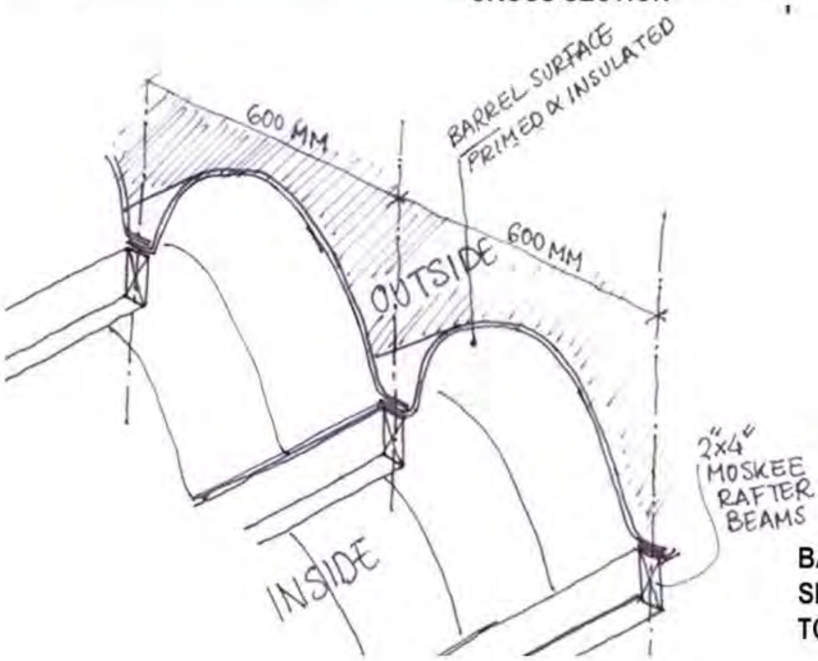
DWG-06

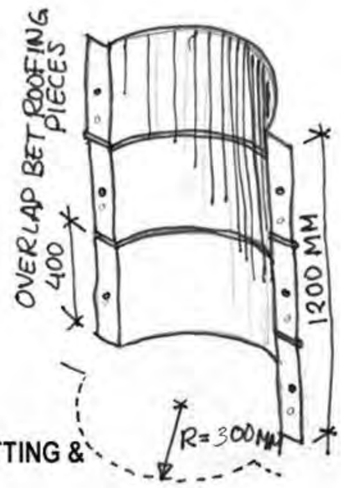
ROOFING SYSTEM



CROSS SECTION

REUSE OF WASTE BARRELS

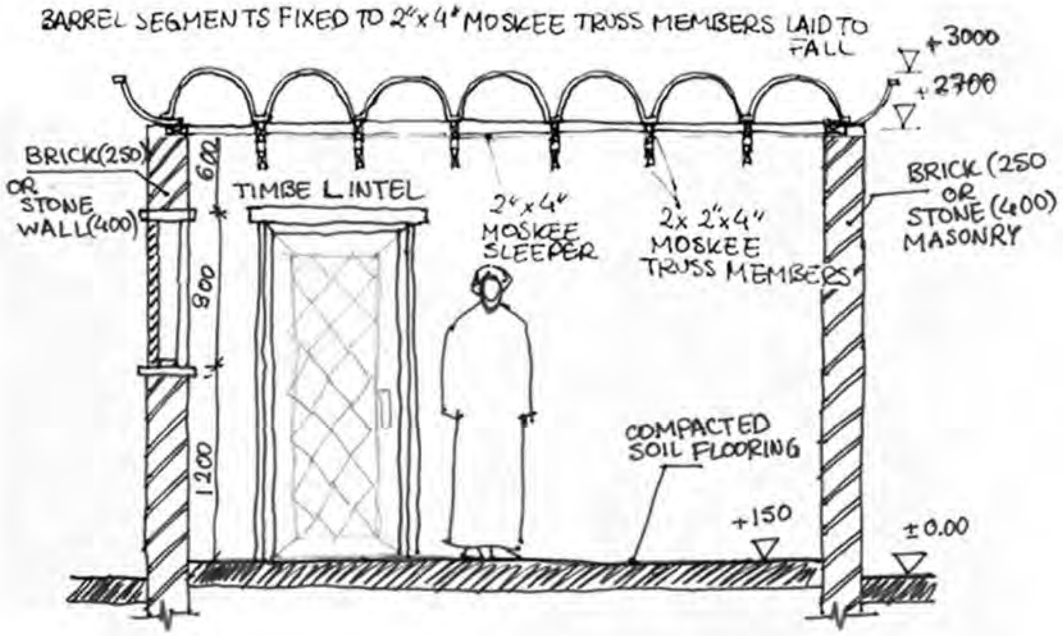




BARREL CUTTING & SHAPING
TO FORM ROOFING ELEMENT

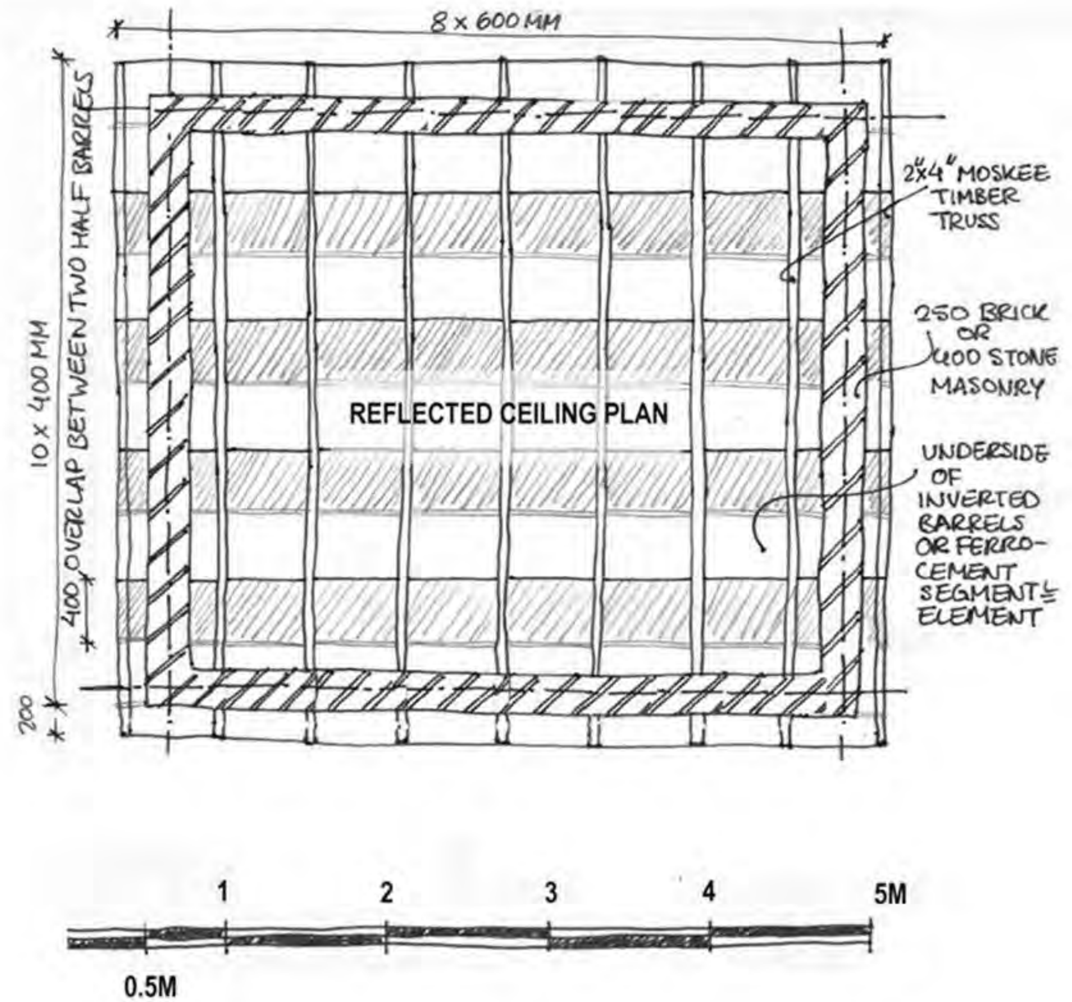
1 2 3 4 5M
0.5M

WALL SECTION

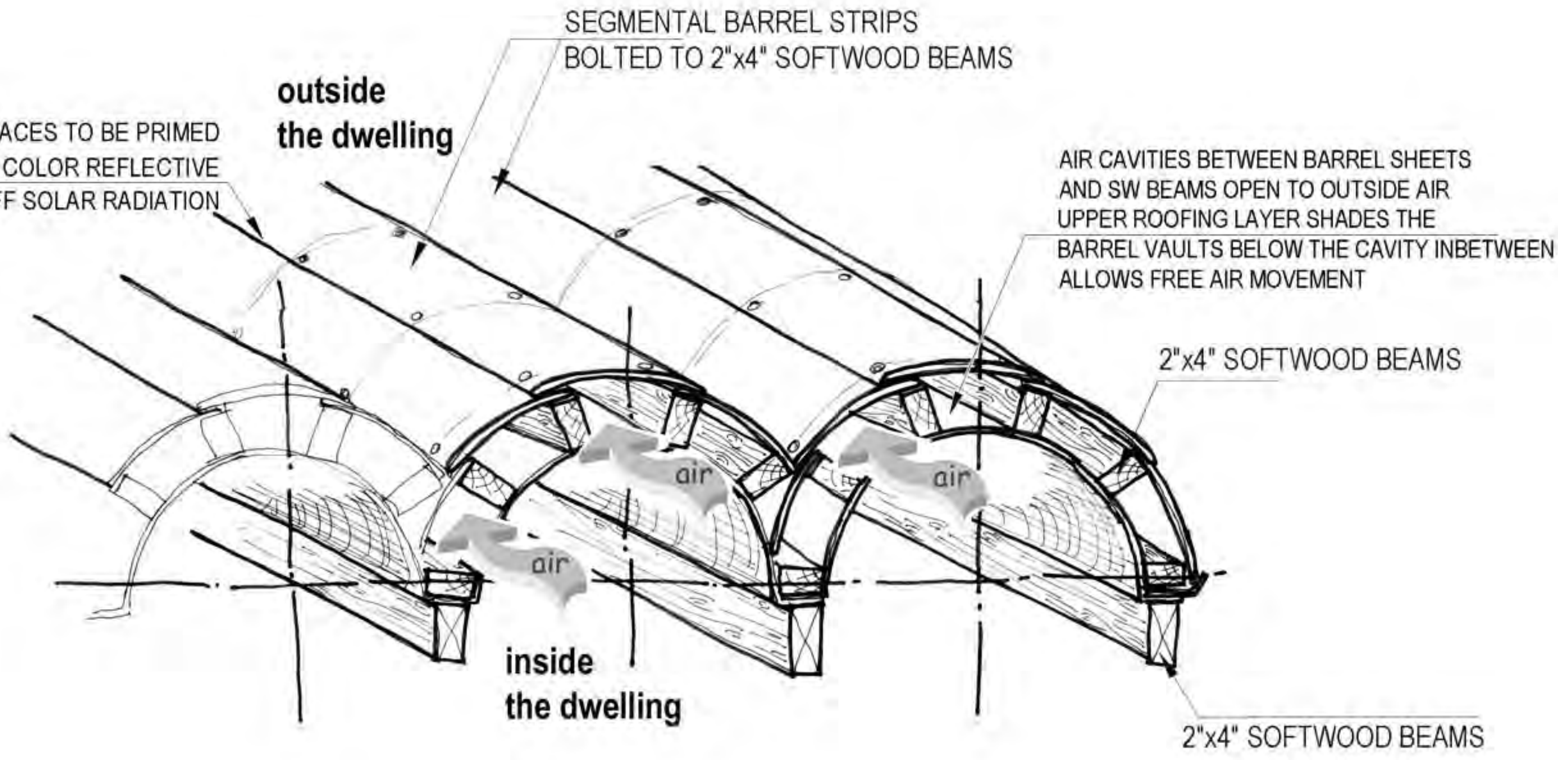


LONGITUDINAL SECTION

DETAILED PLAN (REFLECTED CEILING)



DWG-08



Conceptual Thermal Insulation System

DWG-09

Abdelhalim CDC
Community Design Collaborative Ltd

ABABDA HOUSING ACTIVITY
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ABABDA HOUSING ACTIVITY

D3.3: DETAILED DESIGN DOCUMENTS

REPORT

SITE NO.3 SHEIKH SHAZLI

TABLE OF CONTENTS
The report consists of the following sections:

Detailed Design Dcouments
D 3.3, Site No.3 : Sheikh Shazli Village

3.3.1 Background and History:

1-Location:

Sheikh Shazli settlement is located some 152 km south-east of Marsa Alam city. It is linked to Marsa Alam by an asphalt road that leads at Sidi Salem junction west to Edfu, and south to Sheik Shazli.

2-History:

The settlement of the Sage "Sheikh Shazli" was spun around his tomb in the 14th century when Aboul-Hassan Al-Shazli, a renowned Sufi Scholar (Arif Bel'Lah) died on his way to perform the pilgrimage to Mecca. A mausoleum was erected to mark his grave. Along the years and following the same tradition, acknowledging the piety of deceased religious persons, a series of holy men's (Awleya'ullah) tombs (maqams) were gradually erected along the road from Marsa Alam leading to Sheikh Shazli settlement such as: "Sidi Salem", "Umm Ghannam"as well as "Haja Zakeyya" & "Aly Alsherif", the last two lying within the village's boundary.

The Maqam of Sheikh Shazli, and his disciples of follower saints form one of the most phenomenal poles of spiritual attractions on the regional level... one that offers a unique and possible exemplary opportunity for a cultural base for planning and development.

These latent saints' tombs become a pole for attracting flocks of affectionate disciples "Murideen" who celebrate various saints' birthdays "Moulids" with the climax event being the celebration of Sheikh Shazli' Moulid which coincides with the days of pilgrimage.

Wider Context Area Map

From left to right, Moulid Sidi Malek celebrathions at Sidi Malek near Marsa Alam, Sidi Salem shrine on the road from Marsa Alam to Sheikh Sahzli and shrine of Umm Ghannam on the road from Sidi Salem to Sheikh Shazli, a trail of "Saints' shrines"

3- The Community:

At Sheikh Shazli three distinct communities co-exist, each along its core (nucleus):

3.1- The shrine community of keepers **(nucleus: Sheikh Shazli shrine "maqam") administrating, maintaining and guarding the premises while not belonging to any specific order or ethnic group with the Sheikh Shazli Shrine Complex as its nucleus.**

To this keepers' community scores of merchants, entertainers, vendors, and other service provider groups join during the Moulid, to form the back-bone of the support services for the event.

3.2-The Sufi orders' communities(Turuq Sufeyyah)**(nucleus: Saha)**

Facilities latent at a very low activity/occupancy rate all year long, rendered active and vibrant when mobilizing for hosting Moulid visitor members of same order.

Fig. 03, 1

Sheikh Shazli Complex outside Moulid Period

Fig.03, 2

Sheikh Shazli Complex as envisaged by the Sufi order in charge of the shrine, currently extensions under construction

Fig.03, 3

Sheikh Shazli Complex in the Moulid mode

3.3-The Local inhabitants (settled Ababda tribesmen)
**(nucleus: nomadic tribal structure "Ogada ,Omranab and other Ababda clans"
settled in government housing: (qarya gadima/qarya beida/ qarya Hamra)**
Sheikh Shazli area was a part of the Ababda nomadic roaming domain. Due to harsh drought conditions and scarcity of rainfall and water resources, some Ababda clans chose the site of Sheikh Shazli to settle down, encouraged by government political initiatives (Sedentrization of nomads policy).
The Ababda themselves, become hosts of kinsmen arriving to participate and witness the Moulid, by offering lodging and water.

4- Area's periodic life span:

a- latent state almost all year round with capacity of functions at the low end with the village's own population estimated at 1500 inhabitants
b- expanding to a peak during the Moulid period with a human flux of around 250-400 thousand visitors from all over Egypt and abroad.

5- Moulid Participant's spiritual/recreational journey
"a break from every-day mundane life":
members of the Sufi Orders flock to their nucleus "Saha" which unfolds to become a community only during the Sheikh Shazli Moulid event.
A Moulid visitor has the Moulid journey/experience (almost nearing a pilgrimage experience) as an interval break from his conventional every-day mundane life into a spiritual/recreational peak for himself, sharing it with his entire household /neighbors/sufi order packing all their belongings/supplies/sacrificial animals "odheyah"/new clothing, forming a caravan (mobile community) joining other caravans to participate in the Moulid "fiesting event" that includes the following activities:
-social interaction among the Moulid community, chanting (Inshad Diny), dancing, -Dhikr , commercial interaction/shopping activities, -lunapark for children, charity activities, -fiesting for the senses: foods/drinks/scents/colours/lights...etc.

The Procession of the Moulid "Zaffah", Some 250,000 people attended from all over Egypt and abroad

6- The Area's Spiritual Character "a final destination on a spiritual trail":
The settlement of Sheikh Shazli was spun around his tomb in the 14th century when Aboul-Hassan Al-Shazli, a renowned Sufi Scholar (Arif Bel'Lah) died on his way to perform the pilgrimage to Mecca.
A mausoleum was erected to mark his grave.Along the years and following the same tradition, acknowledging the piety of deceased religious persons, a series of holy men's tombs (maqams) were gradually erected along the road from Marsa Alam leading to Sheikh Shazli such as: "Sidi Salem", "Umm Ghannam" as well as "Haja Zakeyya" & "Aly Alsherif", the last two lying within the village's boundary. The Maqam of Sheikh Shazli, and his disciples of follower saints form one of the most phenomenal poles of spiritual attractions on the regional level... one that offers a unique and possible exemplary opportunity for a cultural base for planning and development.

7-The Local inhabitants (settled Ababda tribesmen)

(nucleus: nomadic tribal structure "Ogada , Omranab and other Ababda clans"
settled in government housing : (Qarya Qadima / Qarya Beida / Qarya Hamra as well as the nearby settlement of Abou-Hamamid, approx. 17km south of Sheikh Shazli village)

The Ababda at Sheikh Shazli still hold to their tribal traditions and have many of their nomadic livelihood activities still present. They breed their livestock of goats nearby in constructed tin or make-shift wooden shacks. Many of them have their original homes located elswhere in wadis between the mountains as in the case with the Omranab clan, many members of which still live in their bersh tents at Abou-Hamamid. The Ababda at Sheikh Shazli live in Tawteen homes and rely on government services: rations of condensor water, sewage trucks that empty their sanitation trenches periodically and generators that supply rationed electricity at night time.

The Sufi orders as well provide services for the Ababda tribesmen in form of donations.

Pictures from left to right:
- -A Sufi Order Saha
- -A Sufi Order Saha with ancillary buildings including a pigeon tower, a clear import from the Nile Valley reflecting the background of some inhabitants
- -3 Ababda people living in the Whtie Village
- -Informal Ababda Housing "Bersh Dwelling" among "Official Goverment Housing" of Qarya Qadima "the Old Villag"

11-An "intact settlement"
"Abou-Hamamid a satelite settlement of Sheikh Shazli

The significance of the Abou-Hamamid settlement model, is the authentic state in which the settlement is preserved, the setting of the settlement in a valley to the mountain side and off the flood path. The organization of dwellings in rows according to kinship and relation to inhabitants of the next dwelling, the orientation of the dwelling with the entrance porch facing east and the make of the dwelling using dry Acacia branches as the main supporting structure, and layers of patched cloth as the internal and external skin of the dwelling. the water storage arrangement is a communal one, to facilitate the government's water truck off-loading the settlement's water ration. Compressed wood construction is not much widespread at Abou-Hamamid, which proves the community's self-sufficiency and improvisation skills.

A Typical Ababda-Omranab Dwelling at Abou-Hamamid


Dwelling Exterior


Dwelling Interior


The settlement at Abou-Hamamid inhabited by "Omranab" Ababda tribesmen, some 17 km to the north-west of Sheikh Shazli Settlement. Many living there have designated "tawteen" housing units at Sheikh Shazli and travel daily back and forth for their daily livelihood activities. In this valley they also face scarcity of water, having only one salty well providing water for their animals. The inhabitants rely on the local council of Sheikh Shazli's truck supplies of potable water for their drinking and domestic uses.

Fig. 32,1:.*SHEIKH SHAZLI* satelite image, depicting three main settlements and the mausoleum complex.
Source: LIFE Red Sea

Fig.32,2,3,4: Residential villages from east to west (in reverse chronological order)

3.3.2 FEATURES OF THE URBAN SETTLEMENT

Fig04,1: Sheikh Shazli village main urabn zoning

The main urban features of the village of Sheikh Shazli , where the "Moulid" event area is clearly positioned far to the west while the residential compound of locals is right to the east along the regional road. Sahas or lodging plazas for shrine visitors lie closer to the shrine domain. The growth direction is towards the west where the last built housing compound (alhamra village) lies at the west of Shazli village away from the mausoleum and closer to the village entrance from the regional road.
On the other hand the mausoleum area is surrounded by commercial activities and some governmental services buildings, which serve both the local community and visitors during the Moulid event and .


Fig 04, 02: Maqsoura of Sheikh Shazli Mausoleum where his coffin lies

Fig04,3: The main Regional Road connecting Sheikh Shazli with other communities in the Red Sea Region

The regional road connecting sheikh shazly and Marsa Alam (270 km) away is the only connection between the coastal road and Idfu in the Nile valley and Sheikh Shazli village, but a new road links the village to Aswan as well.
The road network presents an important factor affecting the urban form of the settlement and a constraint of the concentric urban growth.

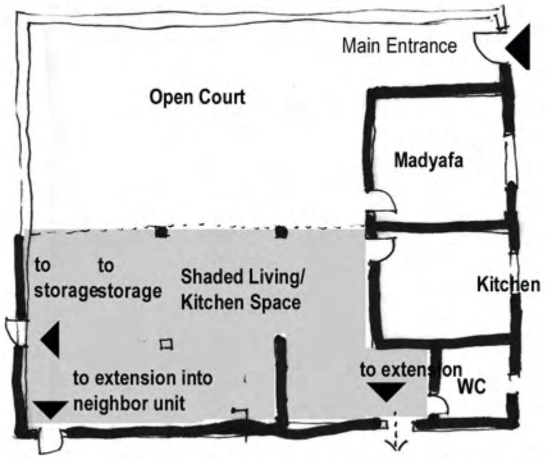
Fig04,4: Urban Growth Potential

3.3.3 GOVERNMENTAL DWELLING MODEL
1- AL-QARYA AL-QADIMA (THE OLD VILLAGE)

Fig.10,01:
The layout of Al-Qarya Al--Qadima consiting of semi-detached housing units each 2 forming a streetblock. Each pair of columns is split in 2 by a secondary street. A main street runs between each 2 pairs and from east to west run secondary streets seperating each row from the following one.
The colored image reflects light blue masses, which indicate additional structures added as extensions by the inhabitants.

The Old village (Al-Qarya Al-Qadima), built in 1982 is one of the oldest governmental trials to provide proper shelter for Sheikh Shazly inhabitans. The units are made of wall bearing bricwork, and an RC roof. The old village contains 20 dwelling units. It was built within the vicinity of Sheikh Shazli mausoleum and close to Sheikh Shalzy visitors rest houses. The village lies opposite to the water tanks and near the governmental services(School,Kindergarten and the Women's Loom). The village's layout demonstrates the inhabitants' tendancy to extend into the courtyard within their premises as well as outside the dwelling's walls. Extensions answer fot the need to have additional living space and provide for ancillary services such as the animal barn and water tank storage.

Fig.10,02: Al-Qarya Alqadima panoramic view taken form the Southern hills of Sheikh Shazli Village



Figs. 10, 3,4,5,6 from left to right: a dwelling plan(the mayor's house) / view of internal court converted into an outdoor living space / an Acacia shed within a courtyard / an attempt to demarkate land tenure refused by the local council unit

3.3.3 GOVERNMENTAL DWELLING MODEL
2- Al-Qarya Al-Beida (The White Village)

The Bayda village built in the late 80s is one of the governmental dwelling models at Sheikh Shazli settlement. The compound is composed of 20 units each 2 are attached together sharing one party wall.

the dwelling unit elements are :

1- Two Bed Rooms
2- WC with Floor Unit
3- Kitchen Unit
4- Reception
5- Outer Court

The model provides no direct accessability to the outer barn ancillary structure and offers no ability for future extensions

The open air court is circumscribed by a brick wall measuring approx. 1.6 meters in height.

All the units are painted in white, and are constructed using a post and lintel RC system.

The house utilities are convenient, where the court provides a shaded d seating area in addition for laundry space, the reception is used as a living room and the kitchen as a storage room as well.

Fig. 11,01:
Satelite Image of Al-Qarya Al-Beida Orientation of the units is random, more formalistic than functional. The ratio of open spaces to built-up area within each unit nears the optimum, still it does not provide for housing needs, making inhabitants resort to building extensions in the streets as shown in Figs. 11, 05 & 06

Fig. 11, 02: Al-Qarya Al-Beida view from the southern hills of Sheikh Shazli settlement

Fig.11, 03: Plan of a typical dwelling unit

Fig.11, 04: The Mayafa Sketch Plan

Fig.11, 05: The Madayfa extension abutting the courtyard wall, with Musalla area in the foreground

Fig.11, 06: The house of the bride (Beit El-Aroussa) Extension built in the street

3.3.3 GOVERNMENTAL DWELLING MODEL

3- Al-HAMRA VILLAGE

Al-Hamra village at Sheihk Shazli village's western end was built in the 90s and was the last government housing compound built in there, the name of the village (Red Village) is due to the fact that the top of it's dwellings are painted red. the village possesses a distinct skyline, due to the use of vaults which maximizing natural air flow into the unit.Openings are positioned high to provide both privacy and let fresh air into the dwelling unit.

Al-Hamra dwelling unit main elements are:

1- Main Bed Room
2- Madyafa
3- Kitchen- Toilet area

All opened to a court where locals use it as a sitting area and a laundry zone building extension structures on the sandy ground flooring.

The outer court is used as men madyafa where localy made shade structures are built and used as sitting areas while women use the house core (bed room or living room) as guest rooms and sitting areas for women

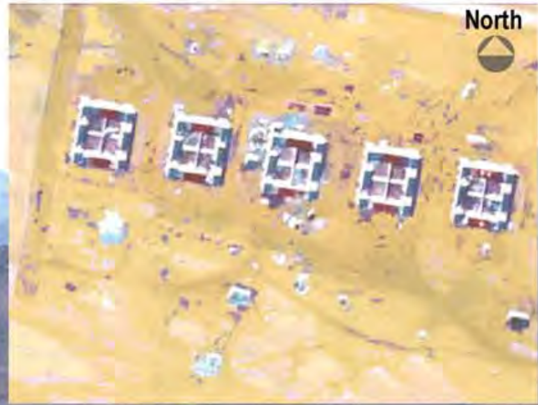


Fig. 12,02: Al-Hamra Village, manipulated color satellite image curtesy of LIFE Red Sea.
The image demonstrates a street block cluster-government housing, where each 4 housing units are joined together forming a stree block where each unit shares party courtyard walls wiht 2 neighbors. The street block could be replicated in rows and columns especially on the south-ern and western borders.

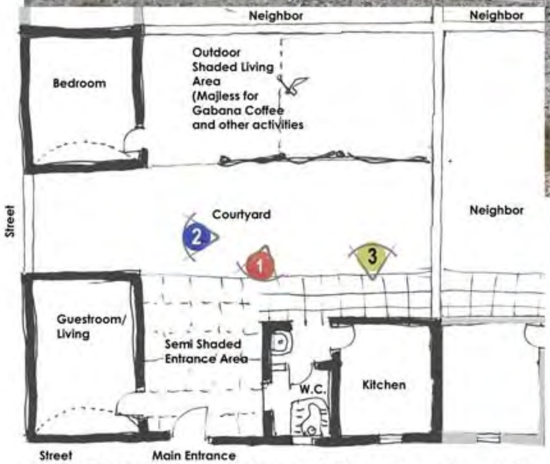


Fig. 12,03:Plan of Al-Hamra Village housing unit

Fig. 12,04

Fig. 12,05

Fig. 12,06

3.3.5 DEFINING FEATURES OF THE DWELLING ZONE

3- COLOR PALLETTE- EXTERIOR &INTERIOR SURFACES

Fig 13,1 Outer skin of Bersh dwelling made of patches of cloth

Fig 13,2 Inner skin of Bersh dwelling made of patches of cloth while roof support structure is left with it's natural wood finish Acacia appearance

Fig 13,3 Courtyard shed at Al-Qarya Al-Qadima shed material is left with its natural wood appearance

Fig. 13,4 Al-Qarya Al-Hamra a bi-color plaster palette is applied to Exterior of dwelling

Fig 13,4 Compressed Wood Dwelling exterior, natural surface as well as paint finishes

Fig 13,5 Compressed Wood Dwelling Interior

Fig 13,6 Courtyard shed at Al-Qarya Al-Qadima shed material is left with its natural wood/straw appearance

Fig 13,7 Al-Qarya Al-Beida (White Village) White render to exterior and gray plaster to periphery

Fig 13,8 Bedroom within White Village compound, walls are lined with a see-through textured fabric

Fig 13,9 Madyafa at the White Village, assembled of re-cycled wood planks, left to it's natural aged appearance

Exterior Finishes | Interior Finishes | Floor Finishes

Cloth

Natural Wood/Cloth

Compacted/levled Soil (courtyard)

Paint

Paint

Woven Carpet (Cleem) bedroom/living room

Plaster

Fabric Lining

Cement Tiles indoors-govrnt. housing

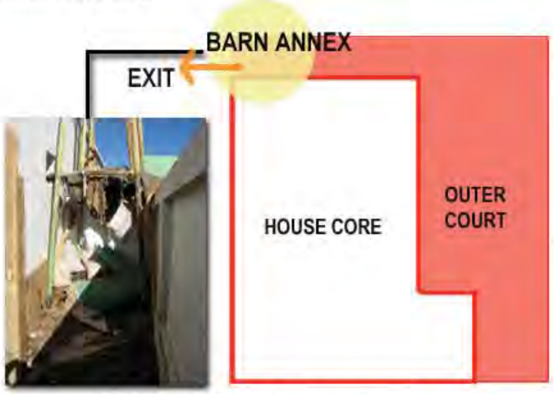
Fig. 13,10 Finishes applied to different surfaces indoor and outdoor

1- SPATIAL DISTRIBUTION & EXTENSIONS-Government Housing

Sheikh Shazli settlement is unique for:
-it's setting in a valley off the flood path,
-the harsh desert climate with prevailing high temperatures in the summer and arid cold nights in the winter.
When we chronologically trace the development of both-community needs and housing unit evolution since the late 70s till now we can observe:

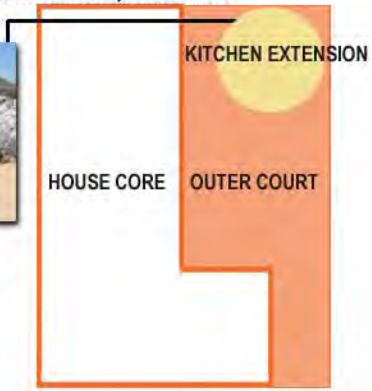
1- Courts are a new element in the dwelling unit intorduced by government housing schemes. Inhabitants have reconfigured the courtyards, to be used as extended living spaces (especially for women), to be used as laundry space, children's dorms and alternative bedroom space in warm summer nights.
2- When Dwellings lack seperate kitchen spaces, the inhabitants build an annex made of wood construction either in the corner of the courtyard (governmental models) or 2-3 meters away from the dwelling unit.
3- Barns are essential elements of the dwelling unit either built as an independent unit away from the house (wood or tin structure) or added as an annex to the governmental unit's outer walls.
4- For extended families a bersh dwelling annex is erected in the court or directly outside the housing unit and used as extra bed space for men.

* The barn annex is usually built to the south east of the dwelling away from the prevailing wind direction(north west) and the kitchen unit as well to keep unpleasant odors away from the house .



Al-Beida village external court and the barn annex is positioned with direct accessability to the outside

External kitchen unit added to the governmental dwelling unit by inhabitants



Inhabitant's response to their built environment: Opening doorways to the barn annex on the street outside (1) and a doorway into a shared space with the neighbor (2).
To maximize the benefit of shading, the user of the unit sealed off a portion of the fence wall to prevent solar radiation from penetrating the shaded space (3).

2- OPENINGS

Harsh Weather Conditions at Sheikh Shazli area influenced the configuration of openings as follws:

1- Narrow and small openings to minimize exposure to sand and hot air
2- High sills to provide privacy
3- Opposing openings for natural cross ventilation

Doors are all wooden and of standard heights. They are mostly commissioned by locals and added to the governmental housing models.

Vault openings provide excellent air-conditioning in summer but inhabitants block them in winter with blankets to keep the cold out.

kitchen window dimensions

Typical wooden entrance door at Al-Qarya Al-Beida (White Village)

external court door-a modification to the original design by the inhabitants

typical bedroom window

toilet window high sill

Detailed Design Dcouments
D 3.3, Site No.3 : Sheikh Shazli
Design Concept Brief

This concept brief aims at describing the process followed to achieve a design model for a dwelling prototype at Sheikh Shazli village settlement. The settlement consists of approx. 80 Ababda households currently living in “Tawteen” government sedentriazation units, which range in quality and appropriateness in relation to the Ababda housing needs.
To arrive at an assessment of the local community’s housing needs, a study area familiarization process was carried out comprising: site visits, photographic surveys, informal interviews, literature reviews concerning: Ababda history and social development, as well as research into definitions of Ababda related scoico-economic grouping terminology: Ababda of the Sea or “Asphalti” as in the case with Hamata village settlement and Ababda of the mountains(Sheikh Shazli prototype), each in it’s context.
A step further, an analysis of settlement history, morphology and social structure was carried out: analysis of dwelling zones ranging from private/intimate to private open space to semi private-guest reception space to outer dwelling zone with ancillary elements.
From surveys and interviews, daily functions/activities/interactions were recognized and incorporated into a space program corresponding to family size and expansion possibilities. Climate studies, orientation analysis, current building configuration in terms of structure, openings, building materials as well as finishes were thoroughly examined.
A design concept was developed concentrating the dwelling functions around a central open air courtyard, a preliminary design with respect to dwelling size and spatial configuration.
The designer was conscious of the applied building techniques- widespread among the Ababda communities in general and in Sheikh Shazli village settlement in particular. As a result arose the choice of combining brick or stone-wall bearing construction with timber construction “Hogan” roofing . The techniques would be probed at a workshop outside the scope of this report, the purpose of which is to avail of the community’s feedback on dwelling unit design (spatial programming and configuration) and to assess to what extent the building technique proposed would suit their housing needs and participaiton capabilities.
The construction phase should be initiated with a mock-up construction event with community participation and essential feedback as the dwelling prototype emerges. Dwelling unit by dwelling unit the dwelling inhabitants would participate in the construction process and have their say in shaping their dwelling as construction proceeds. This process should give back to the community the right to shape it’s own built environment, furthermore it makes them responsible for it.

Abdelhalim CDC
Community Design Collaborative Ltd

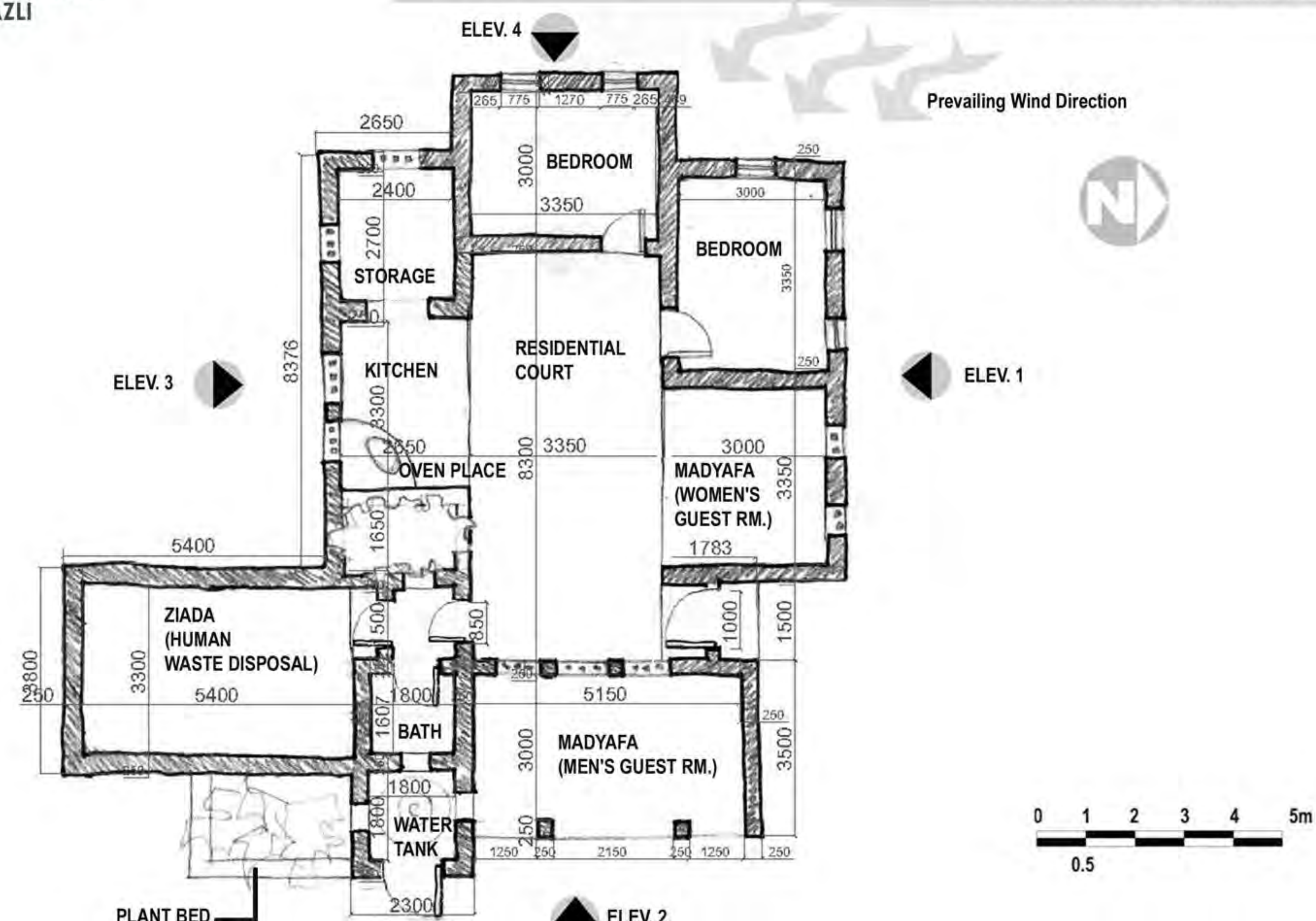
ABABDA HOUSING ACTIVITY
LIFE-RED SEA EGYPT

DESIGN DOCUMENTS

SITE NO.3 SHEIKH SHAZLI

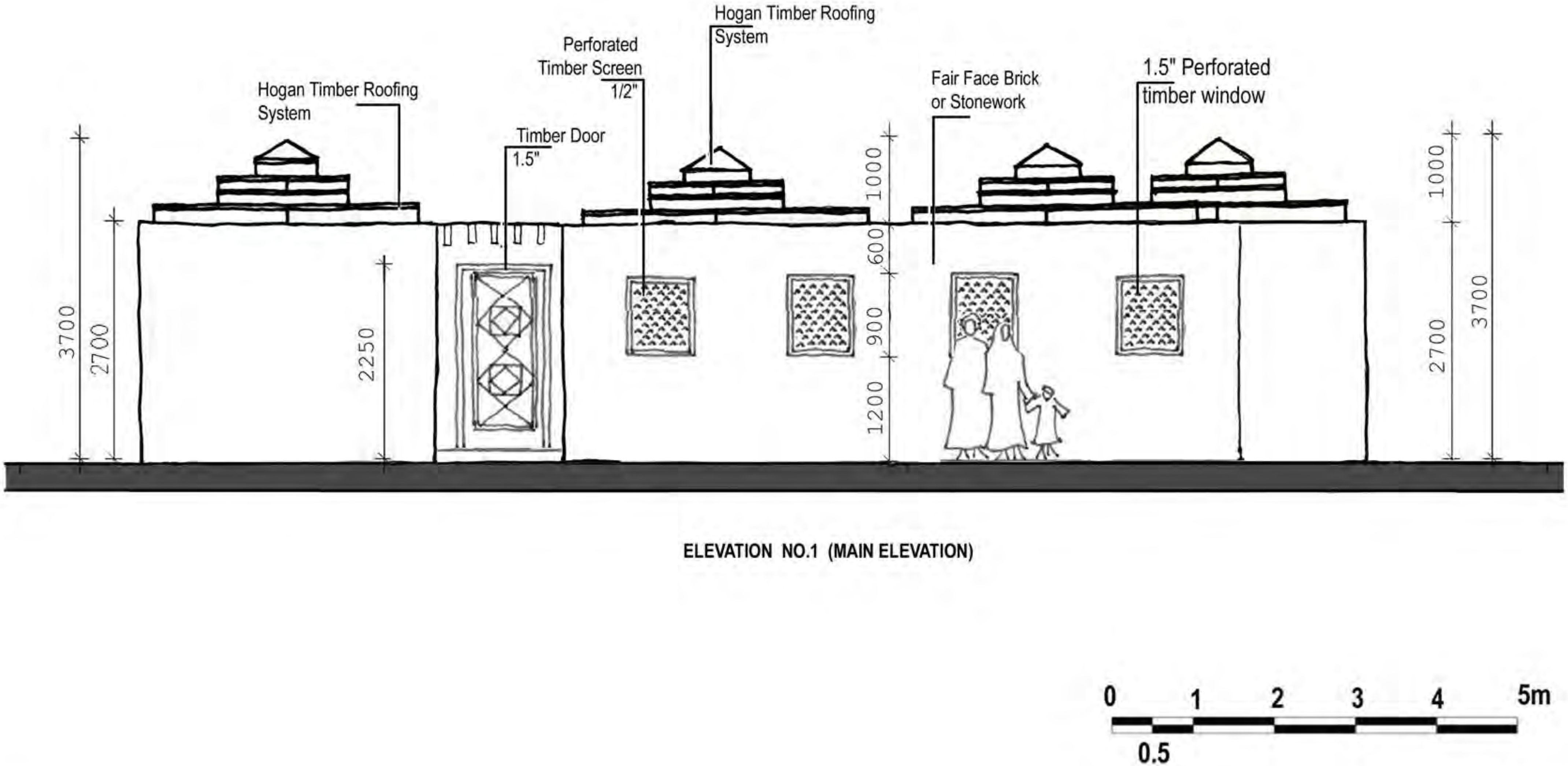
MADYAFA ELEVATION (RENDERED ELEVATION)

DWG-00



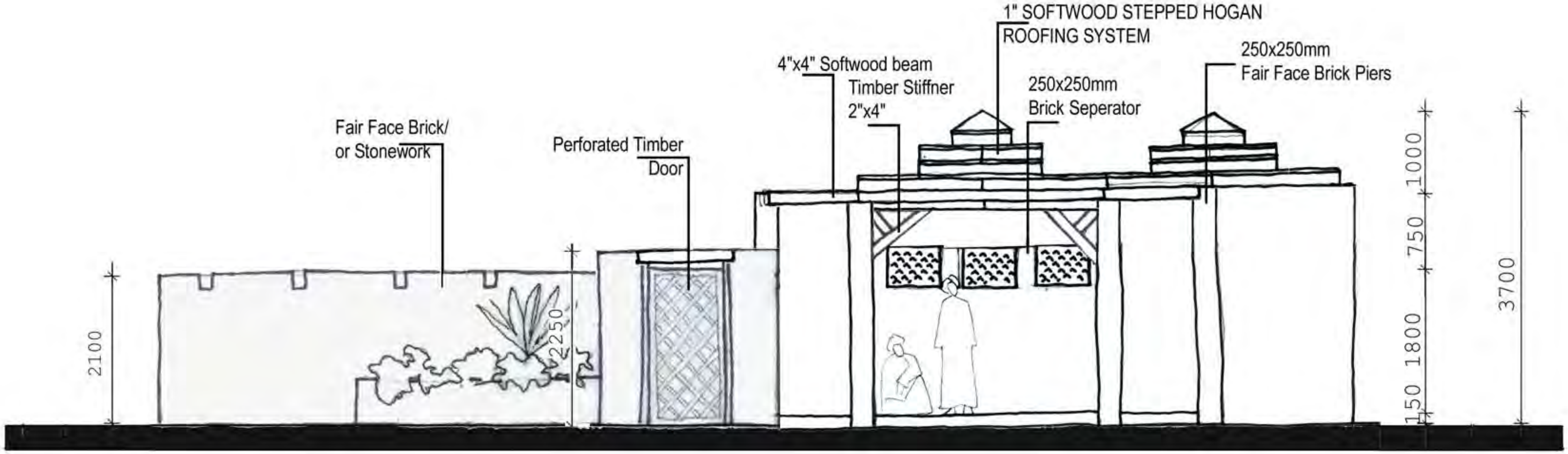
DWELLING UNIT PLAN

DWG-01



ELEVATION NO.1 (MAIN ELEVATION)

DWG-02



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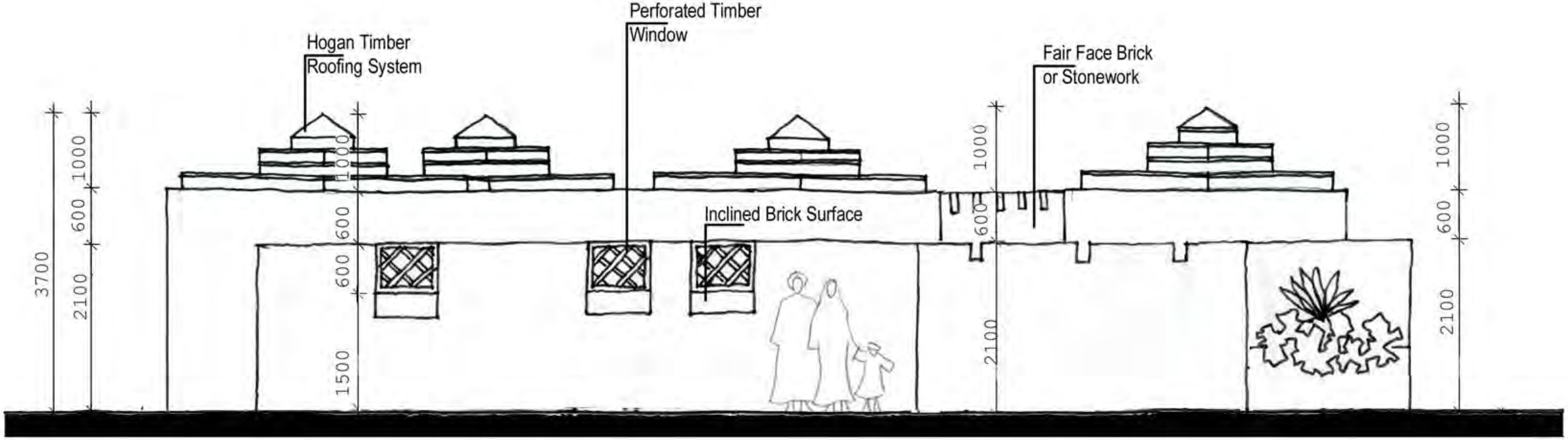

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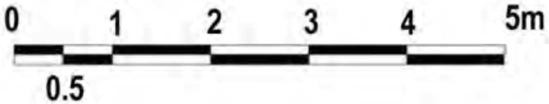
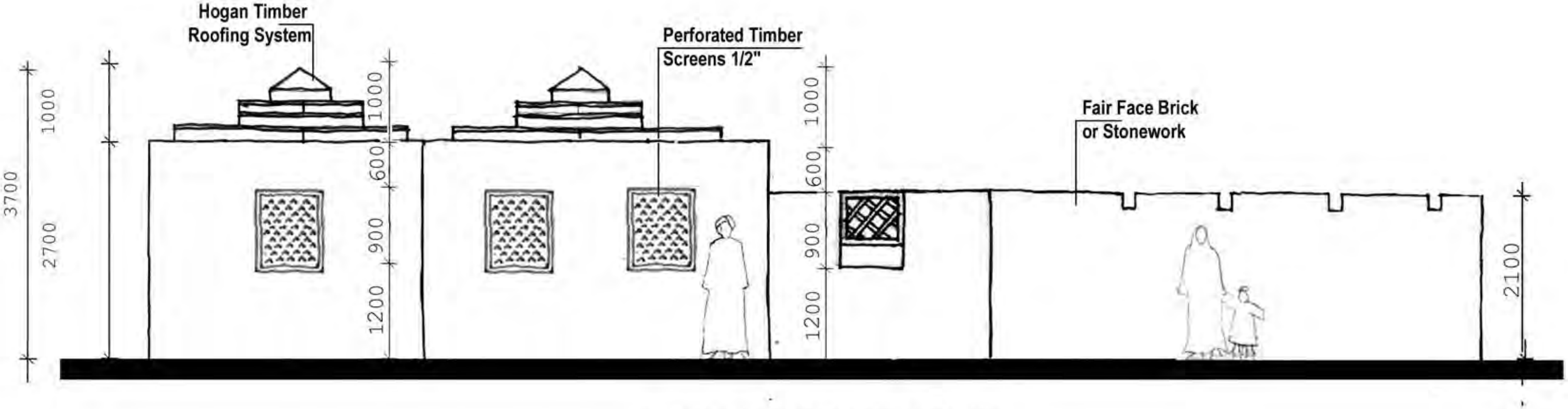


DWG-04



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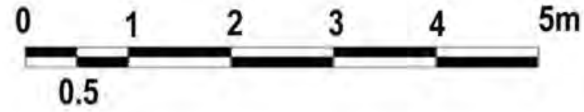
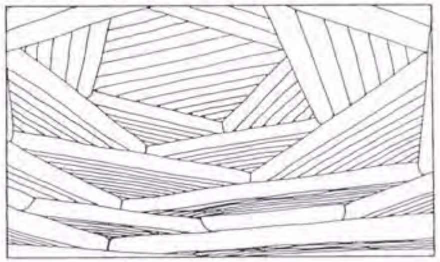
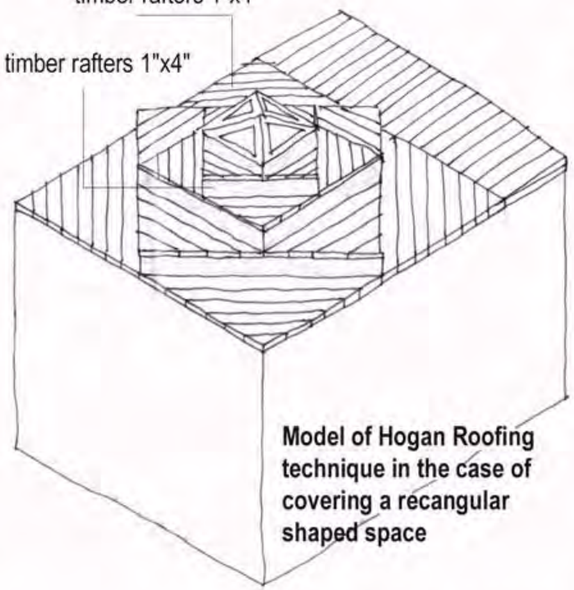


Proposed Construction Techniques:

Hogan Roofing system utilizing tmber poles offset on top of each other at a 45 degrees angles in Arizona, U.S.A.
Source: "Dwellings-the house across the world" by Paul Oliver.
University of Texas Press

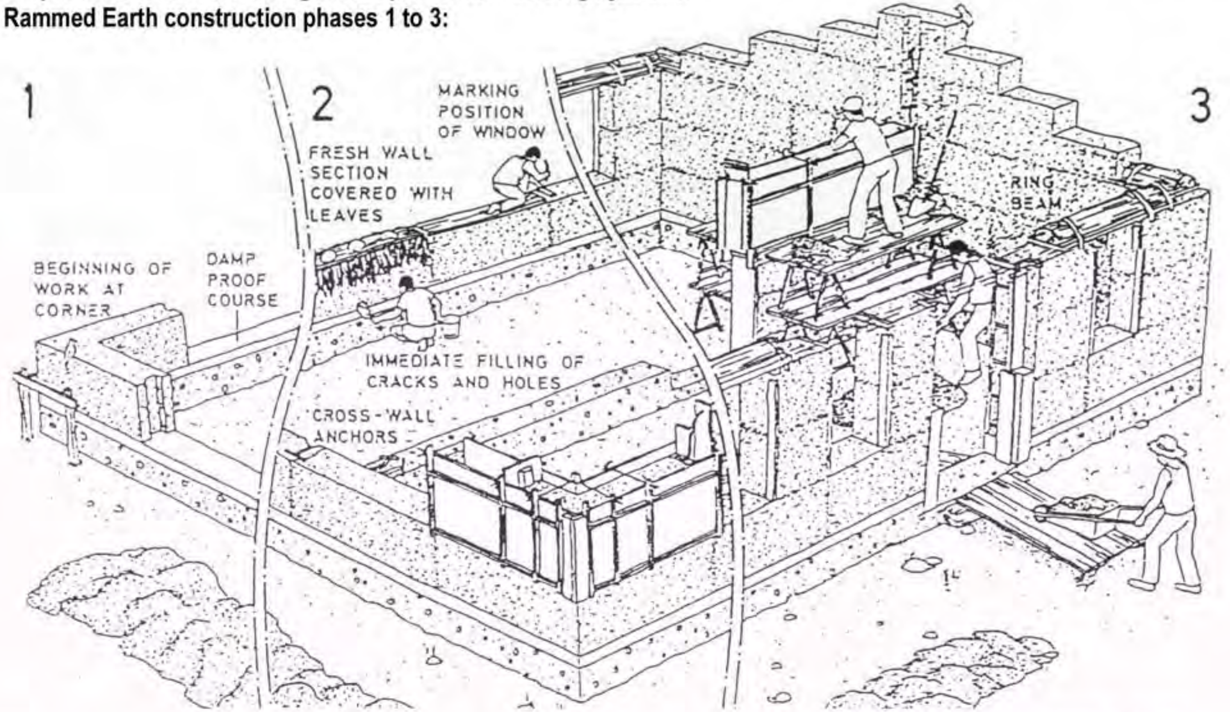


Hogan Roofing Technique, various configs for various forms



Model of Hogan Roofing technique in the case of covering a recangular shaped space

Proposed alternative building technique for wall-bearing systems:
Rammed Earth construction phases 1 to 3:



Rammed Earht Construction Phases,
Source: Appropriate Building Material-
A Catalogue of Potential Solutions
by Roland Stulz & Kiran Mukerji

Traditional Rammed Earht Construction in Morocco, Source
"The Rammed Earth House, David Easton, Chelsea Green Publishing Company"

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LIFE RED SEA PROJECT

ABABDA HOUSING
ALTERNATIVES FOR BUILDING SERVICES

September 2007
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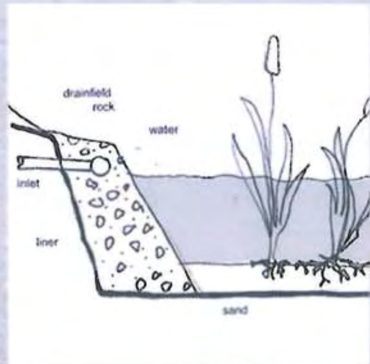
Abdelhalim CDC
Community Design Collaborative Ltd

ABABDA HOUSING ACTIVITY
LIFE-RED SEA EGYPT

ABABDA HOUSING ACTIVITY
(ALTERNATIVES FOR BUILDING SERVICES)
APPENDIX 1



D3. Detailed Design Documents
D3.4 Alternatives for Building Services

TABLE OF CONTENTS
The report consists of the following sections:

Detailed Design Dcouments
D 3.4, Building Services
Alternatives for appropriate Energy, Water Supply and Sanitation

This section is complementary to the Deliverable No.3 of the Ababda Housing Activity initiated by LIFE Red Sea Project.
Delvierable No.3 consists of detailed design documents for Wadi el Gemal, Hamata and Sheikh Shazli sites.
This concept brief aims at examining options for water, energy supply and sanitation systems. Housing projects in hot arid climates with scarce water resources face the challenge of provision of services in efficiency, envrionmental soundness with economical viability, in short "sustainable resource management".
A research was conducted to examine options most applicable to conditions in the SRS region in general and in the 3 target communities in particular.

Potable Water:

As far as water resources are concerned the document will briefly refer to best practices for management of storage and handling, since the water resources are managed and owned by the local councils, which in their turn apply government policies and rationing. In most Ababda settlements the community relies on a ration of desalinated water provided free of charge by local councils.
Additional rations of potable fresh water are purchased by locals from the Nile Valley through a commercial fleet of water trucks. By default domestic water uses are very value conscious and to a certain degree water use is optimized with a tendency towards recycling, (i.e. use of grey water for watering domestic plants…etc.)

Trucked (hauled) water:
Remote locations, or those that do not have easy access to a reliable drinking water source, may have to rely on drinking water hauled to the site. Hauled water to be used as a drinking water supply must meet the Guidelines for Egyptian Standards Specification's Drinking Water Quality. The original source of the hauled water should be a water system, whose treatment provides a disinfection residual before being delivered to the truck.
Contamination issues with trucked water may arise as a result of the increased handling of the water and storage within a reservoir tank at the point where the water is dropped off. Testing the quality of trucked water should include sampling at the filling point. Water in the truck should be sampled once per day. The sanitary condition of the transportation equipment is very important. The tank or container used to carry potable water and pumps, hoses and other equipment used in the supply or delivery of the potable water should be maintained and operated in a clean and sanitary condition and must be free of contaminants. The tank/container must not be used to transport other materials likely to contaminate that water (e.g., milk), and must not have been used previously to transport a noxious, hazardous or toxic substance.
The container should be constructed of materials that meet Egyptian Starndards for Drinking Water Additives (Unintentional Additives - Drinking Water System Components - Health Effects), and should allow easy access for cleaning. The tank/container used to transport the water should be disinfected on at least a weekly basis. When the container is filled or emptied, precautions must be in place to prevent backflow or backsiphonage (e.g., through an air gap or double-check valve assembly).
The outlet connections at filling points must be constructed and protected so that contaminants cannot enter the water supply and so their nozzles are kept free dust during sand storms. These inlets should be closed except when filling or cleaning the tank.
Receiving tanks or cisterns should also be maintained in a clean and sanitary condition and should not be used for any other purpose. Receiving tanks or cisterns must be cleaned and disinfected before they are put into use, and when the system or any of its parts are dismantled for repair, maintenance or replacement. Cisterns should be monitored for bacteriological parameters at least 4 times per year.
A disinfection residual of at least 1.0 mg/L of total chlorine or 0.2 mg/L free chlorine must be present in the water at the time of delivery. The quantity of free chlorine residual should be measured once per day, in a water sample collected at the outlet of the tank truck.
All data should be recorded in a register containing the data and results of the measurements and the name of the person who took them.. Lining of internal tank, cistern or reservoir
should be of anti-bacterial material and with properties to counter limescale build-up. Ceramic tiles are widely used as well as aggregate polymer Reinforced Concrete, each enable a periodical thorough maintneance and cleaning of the water tank. Stand-alone fiber glass or polypropelene tanks are wide spread but have low storage capacities and are used for domestinc water storage.

Detailed Design Dcouments
D 3.4, Building Services
Alternatives for appropriate Energy, Water Supply and Sanitation

Eco-sanitation:

Environmentally sound sanitation systems vary in forms but rely on 2 basic principles:
Dry sanitation and wet sanitation. The 1st type relies on composting the human waste, the latter relies on water to convey the waste onto a septic tank or to the main sewer network.
In hot arid regions where scarcity of water is a main concern, the 1st option(dry sanitation) is more widespread. Currently locals mostly rely on the open vast desert to dispose of their human waste, thus employing the high temperature and solar radiation and vastness of the desert to dispose of the solid waste. The principle of dry eco-sanitation is very simple and relies on raising the level of the WC above a pit or a container (e.g. a barrel) and having a compost aiding substance as charcoal ash or wood debris as an odor preventer. When the container is filled, it's components are emptied into another container and left for a certain period of time long enough for the bacteria within the solid waste to react and turn it into compost. The compost would help fertilize any area of domestic vegetation or could be sold to nearby plant nurseries or institutes with large vegetation/landscape areas.


Fig. 02, 01
A WC facility using grey water for WC flushing, notice the sludge tank below the raised WC platform


Fig. 02, 02
WC unit using grey water for WC flushing


Fig. 02, 03
A traditional WC sludge chamber at Al-Qara Oasis in the Western Egyptian Desert, periodically emptied by locals, each WC use, waste is separated from the next by a layer of charcoal ash


Fig. 02, 04
Dry WC unit, notice the wood debris to the side, sprinkled after each use instead of flushing

Detailed Design Dcouments
D 3.4, Building Services
Alternatives for appropriate Energy, Water Supply and Sanitation

BIOGAS:

Anaerobic digesters compost (or "digest") organic waste in a machine that limits access to oxygen (hence the "anaerobic" part), encouraging the generation of methane and carbon dioxide by microbes in the waste. This digester gas (which also comes contaminated with hydrogen sulfide) is then burned as fuel to make electricity. Digesters aren't widely used yet, but tend to be used for sewage sludge at sewage treatment plants and for animal waste on farms. Digesting manure doesn't avoid the need to apply that manure as fertilizer, since the manure still exists and has to go somewhere (it doesn't magically disappear and turn into energy). Digesters are only marginally effective at reducing problems with odors, pathogens and greenhouse gas emissions from animal waste or sewage sludge, but they are incapable of making any chemical contaminants in the wastes go away.

Digesters aren't emissions-free. They are known to emit nitrogen and sulfur oxides, particulate matter, carbon monoxide and ammonia. Living next to a digester could be unpleasant, particularly if located in a residential neighborhood or if the facility would be large -- attracting manure-hauling trucks from around the region. Some proposals for digesters have been fought off by community opposition. Large anaerobic digesters are used to make factory farms more viable. Consequently, advocates of small family farms and of sustainable agriculture see digesters as a Trojan horse that pretends to solve a waste management problem while enabling factory farms to invade the community.

Following is an abstract text describing a prototype design guide for Biogas Digesters designed for small households in farmer communities (relying on solid waste from human and animal waste)(curtsey of ECHO, Charlie Forst, published 2002, refer to www.echonet.org)

DESCRIPTION

The biogas digester discribed in the following paragraphs consists of a container to hold the slurry, a 'scrubber' to reduce the carbon dioxide (CO_2) andsulphur dioxide (SO_2) content in the biogas, and a storage container to hold the gas.

Figure 03,01. Inclined biogas digester.

Three 200-L drums are welded together to make the biogas digester. The lid and bottom of the middle drum are removed to accommodate slurry flow through the three drums. The bottom of the upper drum and the top of the lowerdrum has also been removed before welding.

A 2" (5.1 cm) valve is installed at the bottom of the inclined barrels in order to drain expended slurry. A 2" (5.1 cm) pipe curving upwards above the topmost point of the inclined barrels is installed for charging the manure slurry.

A ½"(1.25 cm) pipe or hose is installed at the topmost point of the inclined drums to conduct the biogas to the gas scrubber.

Figure 03, 02. The biogas scrubber.

The biogas scrubber consists of a 20-gallon (80 liter) drum filled with about 15 gallons (60 liters) of water. Biogas from the digester is piped into a low connection on the drum. It bubbles up through the water to reduce the CO_2 and SO_2content of the biogas. The gas is then piped off at a top connection to a storage container.

Figure 03, 03. The storage container.

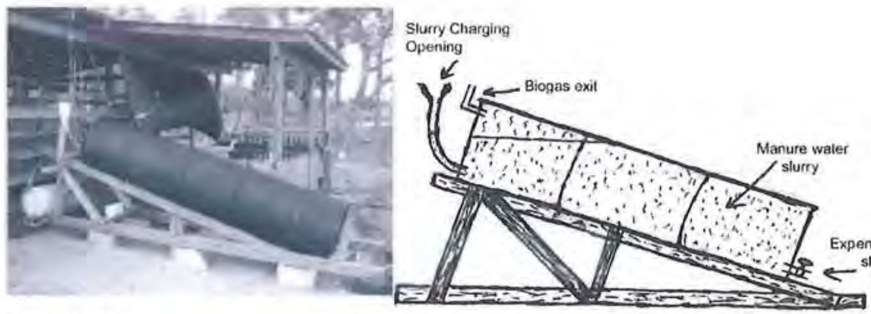


Fig. 03, 01
Inclined biogas digester

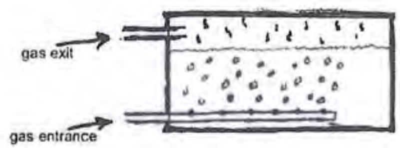


Fig. 03, 02
Inclined biogas scrubber

Fig. 03, 03
The bladder type storage container

Detailed Design Dcouments
D 3.4. Building Services
Alternatives for appropriate Energy, Water Supply and Sanitation

The storage container may be a bladder type (as shown, or a series of tractor inner tubes) or a flotation container (see figure 03, 04). A bladder type should use rubberized fabric or vinyl sheeting of approximately .45 ml thickness.
Figure 03, 04. Flotation type storage tank.
Figure 03, 05. Gas from the storage container can be used in salvaged gas stove burners or any similar affordable device. Gas may also be used in any common pressure lamp after its fuel orifice has been modified.

SOME DETAILS ABOUT THE DIGESTER
The type at hand is an inclined plane continuous flow digester. Organic material that is entered into the upper end of the digester exits the lower end. When fed 2% of its volume per day, the process takes about 50 days for a volume to pass through. During this process, about 50% of the carbon in the material is converted into methane and carbon dioxide. This digester will convert about 1400 pounds (635 kg) of cow manure into about 1400 cubic feet (39.64 m³) of gas in 50 days, or about 750 liters per day, when the temperature ranges between 65 to 90°F. (18-32°C)
A carbon to nitrogen ratio of between 20/1 and 40/1 should be maintained. Carbon greater than 40/1 quickly digests all of the nitrogen and the process slows or stops. Nitrogen greater than 20/1 consumes the carbons and the excess escapes as ammonia.
Cow manure has an average C/N ratio of 25/1. When diluted 2 pounds with 1 quart of water, it becomes slurry with about 20% solids. This is an ideal mix with which to charge the digester. When fed about 5 gallons of slurry per day, this digester can be expected to produce about 27 cubic feet (0.76m³) of gas per day. A family of 4 to 6 would need about 35 cubic feet(1 m³) of gas in order to cook three meals. The digester described in this technical note has been sized for demonstration in order to explain the technique.
Two cows or ten pigs should furnish enough manure to maintain operation of this digester (In the case of Ababda community, sheep or goats and in rare cases camels would be a substitute and means should be tested to arrive at quantities of manure needed).
The most efficient use of the biogas is for cooking. Cooking efficiency is about 33% compared to about 3% efficiency for lighting. The effluent is an anaerobically digested compost. It is odorless. It should be mixed 2/1 or 3/1 with water and used as a fertilizer. It dries readily and can be pulverized and stored for later use as a dry fertilizer. Any organic material can be anaerobically digested. Cow manure is an ideal substrate because of its average C/N ratio.

Manure from monogastrics tends to have greater undegraded fiber content, which digests at a much slower rate and digests much less completely. Leaves and other crop substrates may digest tolerably well, butfrom personal experience a greater quantity of CO2 is produced in proportion to methane.
Pretreatment is not recommended when initially starting a digester nor when subsequently charging it. However, when starting a new digester, digestion may be greatly speeded when making about five gallons of slurry and letting it begin fermenting aerobically before adding it to the newly charged digester.
If, after the digester has been producing for a while, it slows production, it is advised to valve off some effluent and reenter it at the charging entrance. This action will tend to buffer the slurry inside the digester and production should soon resume. If proper C/N ratios are maintained with proper slurry viscosities, this continuous flow digester should operate indefinitely, providing that it is regularly charged.
The use of a scrubber (ref. fig 03, 02); however, the affinity that CO2 has for water increases the caloric value of the biogas for ordinary uses without the need for lime neutralization.
A natural gas burner orifice works well for cooking, but experimenting with different orifices and air mixtures is advised. This Technical Note focuses on bladder gas storage. Other storage possibilities are the fixed dome type or the flotation tank type.It is advised to use the flotation tank. Most literature on biogas digesters and storage of the gas will dwell on the different merits of the respective systems.

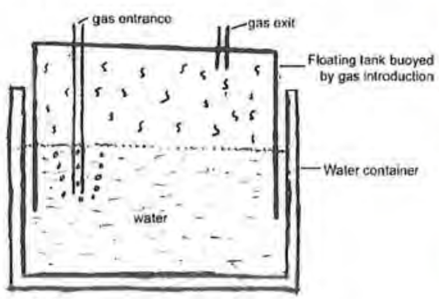


Fig. 03, 04
Floatation type storage tank


Fig. 03, 05
Modified appliances from natural to biogas

Detailed Design Dcouments
D 3.4, Building Services
Alternatives for appropriate Energy, Water Supply and Sanitation

Constructed wetlands

Constructed wetlands are generally built on uplands and outside floodplains or floodways in order to avoid damage to natural wetlands and other aquatic resources. Wetlands are frequently constructed by excavating, backfilling, grading, diking and installing water control structures to establish desired hydraulic flow patterns. If the site has highly permeable soils, an impervious, compacted clay liner is usually installed and the original soil placed over the liner. Wetland vegetation is then planted or allowed to establish naturally. Designing and building wetlands to treat wastewater is not a new concept. As many as 5,000 constructed wetlands have been built in Europe and about 1,000 are currently in operation in the United States. Constructed treatment wetlands, in some cases involving the maintenance of important wetland habitat, have become particularly popular in the Southwest, where the arid climate makes the wetland habitat supported by these projects an especially precious resource.

If planned and maintained properly, treatment wetlands can provide wastewater treatment and also promote water reuse, wildlife habitat, and public use benefits. Potentially harmful environmental impacts, such as the alteration of natural hydrology, introduction of invasive species and the disruption of natural plant and animal communities can be avoided by following proper planning, design, construction and operating techniques. The following guidelines can help ensure a successful project:

- Construct treatment wetlands, as a rule, on uplands and outside floodplains in order to avoid damage to natural wetlands and other aquatic resources, unless pretreated effluent can be used to restore degraded systems.
- Consider the role of treatment wetlands within the watershed (e.g., potential water quality impacts, surrounding land uses and relation to local wildlife corridors).
- Closely examine site-specific factors, such as soil suitability, hydrology, vegetation, and presence of endangered species or critical habitat, when determining an appropriate location for the project in order to avoid unintended consequences, such as bioaccumulation or destruction of critical habitat.
- Use water control measures that will allow easy response to changes in water quantity,quality, depth and flow.
- Create and follow a long-term management plan that includes regular inspections, monitoring and maintenance.

A constructed wetland system (CWS) pretreats wastewater by filtration, settling, and bacterial decomposition in a natural-looking lined marsh (Figure 06, 01). Constructed wetland systems have been used worldwide with good results, but performance levels decrease in cold climates during winter.

A properly operating constructed wetland should produce an effluent with less than 30 mg/liter BOD (biochemical oxygen demand, a measure of organic material), less than 25 mg/liter TSS (total suspended solids), and less than 10,000 cfu/100mL fecal coliform bacteria, an indicator of viruses and pathogens.

Since wastewater leaves a constructed wetland as high-quality effluent, the soil in the trench or mound soil treatment system may be better able to accept it, and the system should last longer. Soil treatment systems receiving pretreated wastewater could be downsized to reduce the total area required. The cleaner wastewater makes wetlands useful for sites that have been compacted, cut, or filled.

The two most popular CWS design types in Minnesota for individual sewage treatment are the surface flow (SF), (Figures 2 and 3), also called free-water system, and the subsurface flow (SSF) system (Figure 4). Both of these are horizontal flow systems where wastewater enters at one end of a lined excavation and exits from the other end.

The SF system is usually a basin or channel surrounded by a barrier of ponded wastewater and soil to support the growth of rooted emergent vegetation.

The two types of SF wetlands are shown in Figures 2 and 3. The open-water wetland in Figure 2 has a small layer of sand to root the plants while the hydroponic wetland in Figure 3 does not. SF wetlands are better suited for large community systems in milder climates for several reasons: the system can be fenced to prevent public contact, mosquito habitat is not a major issue, freezing is unlikely, and the amount of gravel is minimal, therefore lowering cost.

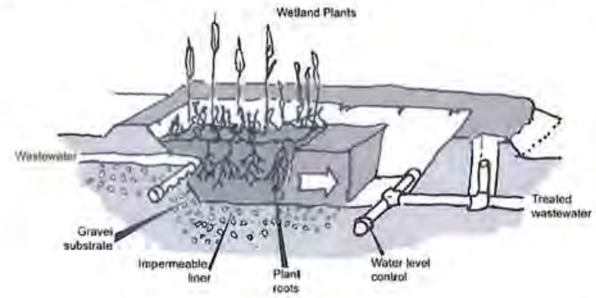


Fig. 05, 01
Composition of a constructed wetland

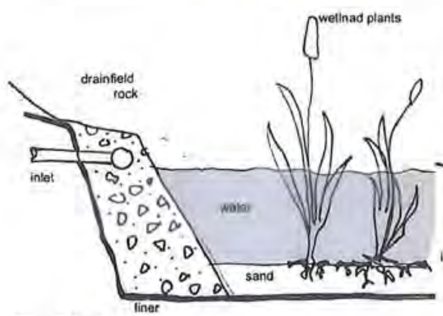


Fig. 06, 01
Open water SF wetland

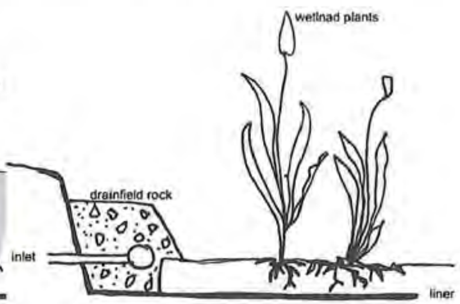


Fig. 06, 02
Subsurface flow constructed wetland

In the SSF system, the water level is maintained below the surface of the gravel substrate by a stand-pipe structure at the discharge end of the cel,l which minimizes the risk of exposure to people and animals and greatly reduces mosquito breeding. The SSF is the most common constructed wetland system used for small flows (less than 10,000 gallons [37.85 m^3] per day in Minnesota-U.S.A.) and is often used for individual homes, small clusters of houses, or resorts.
Solids are removed by physical filtration and settling within the gravel/root hair matrix.
Organic matter may also be removed by these physical processes, but is ultimately removed through biodegradation. Biological treatment may be anaerobic (as in a septic tank where very little or no oxygen is present in the wastewater); or aerobic, with oxygen supplied by both diffusion from the atmosphere at the surface of the beds (much lower in SSF than SF systems) and by "leaking" of oxygen from the roots of cattails, bulrushes, reeds, and other emergent aquatic plants.
Aerobic treatment processes are faster than anaerobic processes, but oxygen is limited within the wetland. Some designers include an active aeration component to fully break down the BOD and nitrify the ammonium present in the septic tank effluent to nitrate-nitrogen.
Constructed wetlands have four parts: the liner, distribution media, plants, and underdrain system. The liner keeps the wastewater in and groundwater out of the system. Although the liner can be made from a number of materials, 30 mil polyvinyl chloride (PVC) is the most common and the most reliable (Figure 06, 03).

The distribution medium at the inlet is usually coarse drainfield rock that is 0.75 to 2.5 inches in diameter. This first part of the distribution system spreads the wastewater across the width of the wetland.
Both gravity and pressure distribution can be used to spread the wastewater evenly over the system. The media in the filter is pea gravel that is 0.375 to 0.75 inch in diameter. The depth of the pea gravel varies from 18 to 24 inches.
Plants growing in the cell are often cattails, but other species include bulrushes, reeds, and sedges. Flora must grow and flourish in the system for it to operate at maximum efficiency.
The underdrain system at the end of the wetland is a slotted 4-inch pipe covered with drainfield rock. The underdrain moves the treated effluent out of the wetland and keeps the effluent level below the surface of the gravel.This prevents the effluent from coming into contact with people and keeps mosquitoes from breeding in the wetland. It also keeps the water level high enough to sustain plant growth.

Designing Wetland Systems
Subsurface flow systems, as the name implies, are constructed so the effluent moves through the medium below the surface. These systems require more space than surface flow systems, but can add treatment area. They also have fewer odor problems and are less prone to freezing (although they need freeze prevention management, particularly during winters with subnormal snowfall). SSF systems are generally more expensive to build than SF systems because of the cost of transporting materials, but are often recommended for their relative simplicity and established performance record throughout the world.
Freezing may be minimized by deepening the bed, which increases the cost and decreases performance if much of the waste water can then move through the system without contacting the root zone.

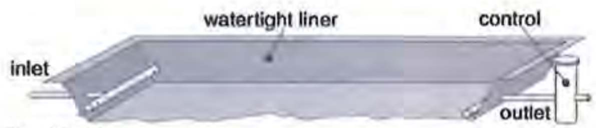


Fig. 06, 03
Wetland controls and liner

Detailed Design Dcouments
D 3.4, Building Services
Alternatives for appropriate Energy, Water Supply and Sanitation

The size of the system depends on the level of treatment desired balanced against the wastewater strength. Wetlands should be sized in cold climates for a minimum detention time of 10-13 days to ensure high quality effluent.
For SSF wetlands, the rock medium must be included in calculations for the system size.
A 30% porosity ratio takes the rock volume into account, increasing the system volume necessary for adequate retention time. The length should be two to three times larger than the width to ensure that the wastewater is not flowing too quickly through the system.

Placement
The system should be located on the contour with drainage directed away from the system. Surface water inflow can cause overloading problems. A barrier to sediment, such as rock landscaping or sod, is needed to minimize erosion and wetland cell problems.

Final Disposal of Wastewater
Wastewater from the CWS must be routed to the subsoil for final treatment. This route may take the form of an additional unlined seepage cell or a standard set of drainfield trenches or a drip distribution system.

System Classification
The size and design of a soil treatment system for wetland effluent has not yet been established, although it could be smaller than conventional soil treatment systems for similar flows using septic tank effluent.
Two types of final treatment systems are shown in Figure 07, 01.

Operation and Maintenance
All the routine operation and maintenance practices suggested for any onsite treatment system apply to wetlands.
Constructed wetlands require more maintenance than conventional septic-tank-drainfield systems. A maintenance contract is strongly recommended. Depending on the local governmental unit requirements and the recommendations of the manufacturer, The system may require quarterly to yearly maintenance. Maintenance includes inspecting all components and cleaning and repairing the system when needed.
Visual inspection of the effluent is required and often a lab analysis is necessary. The pump and electrical dosing unit must be inspected annually. Plants should be inspected and, if a good stand does not exist, replanted. Consider introducing a different species mix.

The flow meter and timer should be checked to ensure the right amount of effluent is being applied to the system. Water must be present at all times or the system will dry out, killing the plants and bacteria that treat the waste. Large flows (caused by excessive wastewater flows or by natural events such as torrential rains) can impair treatment by washing pathogens and nutrients through the media. They can lead to short-or long-term reduction in the ability of the system to provide treatment.
The quality of the wastewater that goes out of the septic tank and into the wetland (influent) affects system operation. Toxic chemicals can harm or kill plants and bacteria in the wetland, with serious consequences. In commercial applications, plugging the media with solids, organic matter, or grease may be a problem. Higher strength influents to the CWS may also decrease its performance and the influent should be carefully monitored before design stage.
Daily running costs for a wetland are based on the operation of a small submersible pump and average less than a dollar per month for an individual home.
Overall operational costs of $200-$500 per year includes pumping, repairs, maintenance, and electricity.
In the SSF system, the water level is maintained below the surface of the gravel substrate by a stand-pipe structure at the discharge end of the cell which minimizes the risk of exposure to people and animals and greatly reduces mosquito breeding. The SSF is the most common constructed wetland system used for small flows (less than 10,000 gallons [37.85 m^3] per day in Minnesota) and is often used for individual homes, small clusters of houses, or resorts.

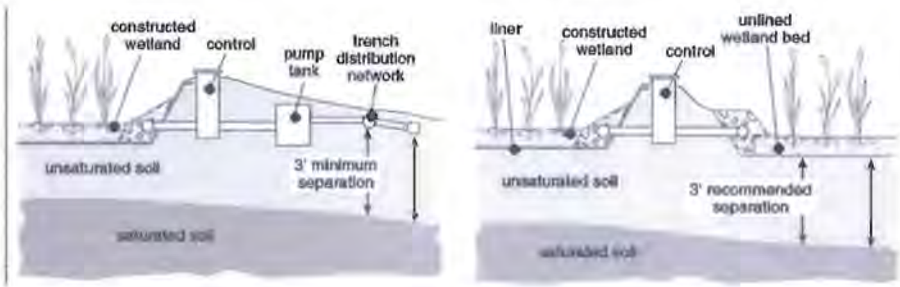


Fig. 07, 01
A trenched system and unlined wetland bed for final treatment

Photo-voltaic system for electricity supply:

Simply put, PV systems are like any other electrical power generating systems, just the equipment used is different than that used for conventional electromechanical generating systems. However, the principles of operation and interfacing with other electrical systems remain the same, and are guided by a well-established body of electrical codes and standards.
Although a PV array produces power when exposed to sunlight, a number of other components are required to properly conduct, control, convert, distribute, and store the energy produced by the array.
Depending on the functional and operational requirements of the system, the specific components required, may include major components such as a DC-AC power inverter, battery bank system and battery controller, auxiliary energy sources and sometimes the specified electrical load (appliances). In addition, an assortment of balance of system (BOS) hardware, including wiring, overcurrent, surge protection and disconnect devices, and other power processing equipment. Figure 08, 01 show a basic diagram of a photovoltaic system and the relationship of individual components.

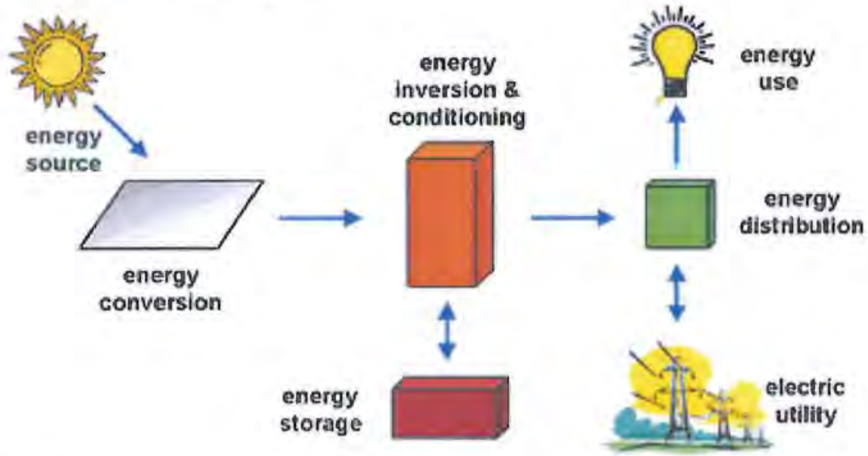


Fig. 08, 01
A photovoltaic system connected to the different components

The need for batteries

Batteries are often used in PV systems for the purpose of storing energy produced by the PV array during the day, and to supply it to electrical loads as needed (during the night and periods of cloudy weather).
Other reasons for which batteries are used in PV systems are to operate the PV array near its maximum power point, to power electrical loads at stable voltages, and to supply surge currents to electrical loads and inverters.
In most cases, a battery charge controller is used in those systems to protect the battery from overcharge and overdischarge.
Regardless of size, a typical silicon PV cell produces about 0.5 – 0.6 volt DC under open-circuit, no-load conditions. The current (and power) output of a PV cell depends on its efficiency and size (surface area), and is proportional the intensity of sunlight striking the surface of the cell. For example, under peak sunlight conditions a typical commercial PV cell with a surface area of 160 cm^2 (~25 in^2) will produce about 2 watts peak power.
If the sunlight intensity where 40 percent of peak, this cell would produce about 0.8 watts.

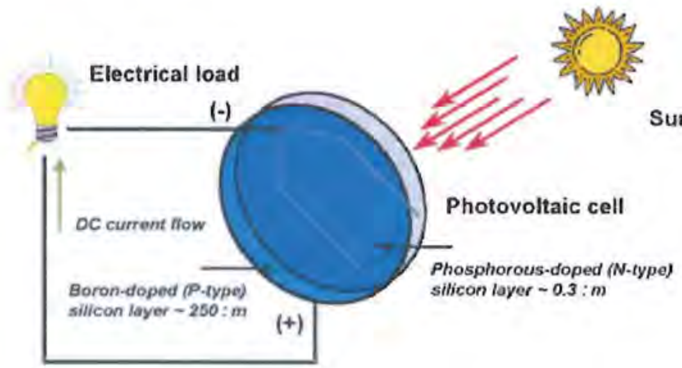


Fig. 08, 02
Operation principle of a PV cell

Placement and orientation

Photovoltaic modules can be placed on almost any building surface which receives sunshine for most of the day. Roofs are the usual location for PV systems on houses, but photovoltaic modules can also be placed on facades, conservatory or atrium roofs, sun shades, etc.
The surface on which the PV array is mounted should receive as much light as possible. The more light the solar array receives the more electricity will be generated.
The three issues which affect how much light a surface receives are:

1. Orientation: Due south is the best possible orientation. If the PV is to be mounted on a vertical fa ade the orientation should preferably be between South East and South West.
If the PV is to be mounted at a tilt a wider range of orientations will still give a reasonable energy yield. North facing orientations should be avoided.

2. Tilt: A tilted array will receive more light than a vertical array. Any angle between vertical and 15 off horizontal can be used. A minimum tilt of 15 off horizontal is recommended to allow the rain to wash dust off the array. The optimal tilt angle is 30 - 60 for a south facing array in Europe. Shallower tilt angles are better for east or west facing arrays.

3. Shadowing: Shadows cast by tall trees and neighbouring buildings must also be considered. Even minor shading can result in significant loss of energy. If shading is unavoidable, the system designer can advise on how to minimize the effect of shade on the amount of electricity produced.

The area required for mounting a PV array depends on the output power desired and the type of module used. An area of around 8 m2 will be required to mount an array with a rated power output of 1kW,
if monocrystalline modules are used (the most efficient modules type). If multicrystalline modules are used an area of around 10 m will be required for a 1kWp system and if amorphous modules are used an area of about 20 m will be required. These areas can be scaled up or down depending on the output power desired. 1 - 3 kWp is a typical power output for a domestic system, although smaller or larger systems can be installed.

There are various ways in which a PV array can be mounted on a building. The various options offer different appearances and vary in cost. The most common way of mounting an array on a house is to place it on the roof either with modules mounted in a frame above the existing roof tiles or integrated into the roof. If the array is to be integrated into the roof PV roof tiles may be used instead of modules.
PV arrays can also be mounted on flat roofs, on walls, in conservatory roofs, on sun shades or on other structures such as pergolas or car parking bays.
PV roofs do not usually require planning permission unless the building is listed or in a conservation area. However you should call your council to check on local policy.

Range of electricity supplied by a PV system

A system with a PV array tilted towards the south would generate approximately 750/1500kWh/year per kWp installed (in Europe). So a typical 2 kWp system (around 20 m of multicrystalline modules) would generate around 1500/3000 kWh per year.
Output will be reduced by shade or non-optimal orientations or tilt angles.

Cost of a system

A typical price for a grid connected, building integrated PV system is between Euro 6 and Euro 7 per Wp, this works out at Euro 12,000 - Euro 14,000 for a 2 kWp system for a house.(the quoted cost estimates have to be tested against the market prices available)

There are a number of factors that will influence the cost of a system:

-Whether or not the system is being installed while the building is being built or as a retro-fit to an existing building. If the system is being installed on a new building some savings may be made, e.g. the number of roof tiles that need to be purchased could be reduced.

-The number of PV systems being installed at a time. A house builder installing systems on a group of houses can expect a price nearer the bottom of the quoted range than an individual householder.

The size of the system being installed, a larger system may be cheaper per kWp while a small system may be more expensive.

-How difficult or easy it is to access the area where the PV system is being installed. The typical price quoted applies to installation on a typical house roof, if the roof is a complicated shape or requires complicated scaffolding costs will be higher.

-The module type used will significantly impact on the costs. The typical price quoted is based on standard modules, tile type systems are somewhat more expensive. The most expensive systems use semi-transparent glass modules in facades or conservatory roofs.

PV Cells, Modules, & Arrays

Photovoltaic cells are connected electrically in series and/or parallel circuits to produce higher voltages, currents and power levels. Photovoltaic modules consist of PV cell circuits sealed in an environmentally protective laminate, and are the fundamental building block of PV systems. Photovoltaic panels include one or more PV modules assembled as a pre-wired, field-installable unit. A photovoltaic array is the complete power-generating unit, consisting of any number of PV modules and panels.

Photovoltaic cells, modules, panels and arrays.

The performance of PV modules and arrays are generally rated according to their maximum DC power output (watts) under Standard Test Conditions (STC). Standard Test Conditions are defined by a module (cell) operating temperature of 25 C (77 F), and incident solar irradiance level of 1000 W/m2 and under Air Mass 1.5 spectral distribution. Since these conditions are not always typical of how PV modules and arrays operate in the field, actual performance is usually 85 to 90 percent of the STC rating.
Today's photovoltaic modules are extremely safe and reliable products, with minimal failure rates and projected service lifetimes of 20 to 30 years. Most major manufacturers offer warranties of twenty or more years for maintaining a high percentage of initial rated power output.

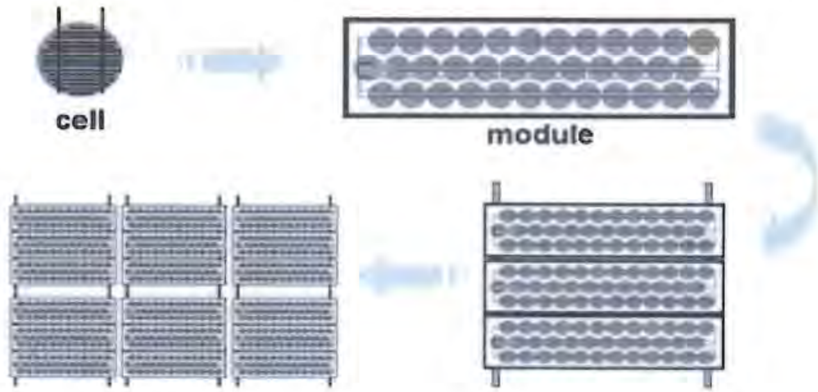


Fig. 10,01 demonstrates the build up of a PV array from a cell to a module to a panel to an array

Types of PV Systems

Photovoltaic power systems are generally classified according to their functional and operational requirements, their component configurations, and how the equipment is connected to other power sources and electrical loads. The two principle classifications are grid-connected or utility-interactive systems and stand-alone systems. Photovoltaic systems can be designed to provide DC and/or AC power service, can operate interconnected with or independent of the utility grid, and can be connected with other energy sources and energy storage systems.1.7.1 Grid-Connected (Utility-Interactive) PV Systems.
Grid-connected or utility-interactive PV systems are designed to operate in parallel with and interconnected with the electric utility grid. The primary component in grid-connected PV systems is the inverter, or power conditioning unit (PCU). The PCU converts the DC power produced by the PV array into AC power consistent with the voltage and power quality requirements of the utility grid, and automatically stops supplying power to the grid when the utility grid is not energized.

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D 3.4, Building Services
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A bi-directional interface is made between the PV system AC output circuits and the electric utility network, typically at an on-site distribution panel or service entrance. This allows the AC power produced by the PV system to either supply on-site electrical loads, or to back feed the grid when the PV system output is greater than the on-site load demand. At night and during other periods when the electrical loads are greater than the PV system output, the balance of power required by the loads is received from the electric utility This safety feature is required in all grid-connected PV systems, and ensures that the PV system will not continue to operate and feed back onto the utility grid when the grid is down for service or repair.

Stand-alone PV systems are designed to operate independent of the electric utility grid, and are generally designed and sized to supply certain DC and/or AC electrical loads. These types of systems may be powered by a PV array only, or may use wind, an engine-generator or utility power as an auxiliary power source in what is called a PV-hybrid system. The simplest type of stand-alone PV system is a direct-coupled system, where the DC output of a PV module or array is directly connected to a DC load (Figure 5). Since there is no electrical energy storage (batteries) in direct-coupled systems, the load only operates during sunlight hours, making these designs suitable for common applications such as ventilation fans, water pumps, and small circulation pumps for solar thermal water heating systems. Matching the impedance of the electrical load to the maximum power output of the PV array is a critical part of designing well-performing direct-coupled system. For certain loads such as positive-displacement water pumps, a type of electronic DC-DC converter, called a maximum power point tracker (MPPT) is used between the array and load to help better utilize the available array maximum power output.

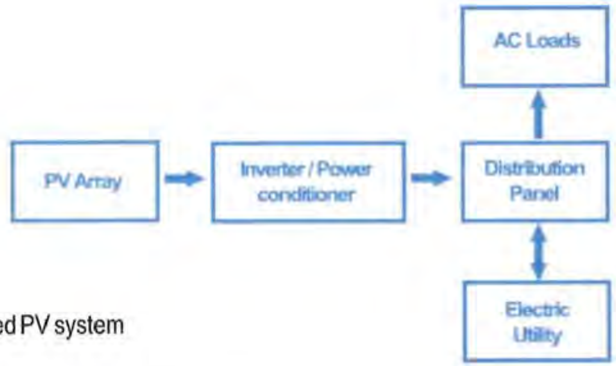

Fig. 11,01
diagram of a grid connected PV system

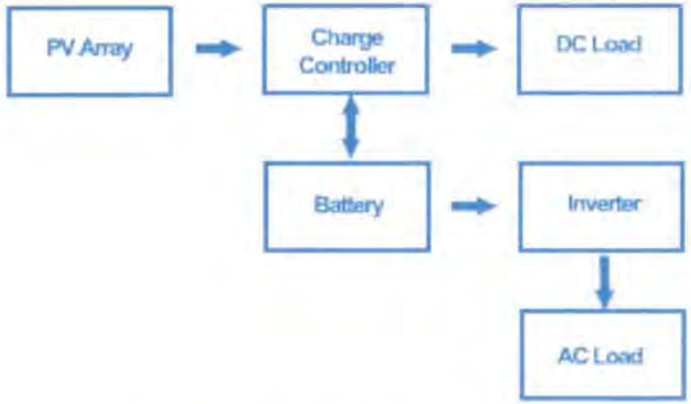

Fig. 11,02 A typical stand alone PV system

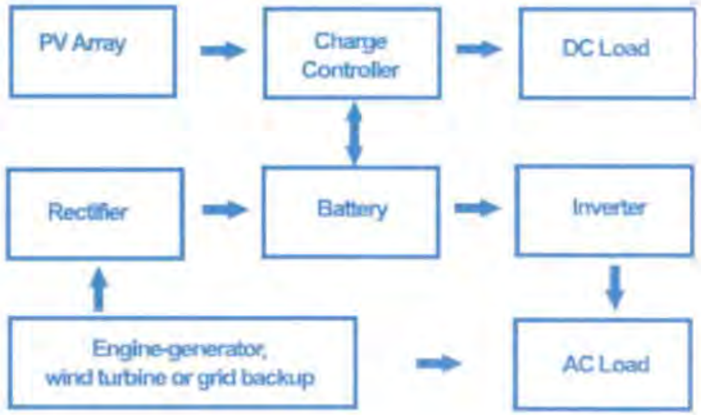

Fig. 11,03 A hybrid PV system

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Merits of Photovoltaic systems:

Installing domestic solar photovoltaic (PV) system results in generating private owned electricity from the free and inexhaustible energy of the sun. A photovoltaic system never needs refuelling, emits no pollution, and can be expected to operate for over 30 years while requiring minimal maintenance. A typical PV system on a house roof could prevent over 34 tonnes of greenhouse gas emissions during its lifetime.
Today photovoltaic systems are recognized by governments, environmental organizations and commercial organizations as a technology with the potential to supply a significant part of the worlds energy needs in a sustainable and renewable manner. Major energy trading organizations have set up large photovoltaic manufacturing plants and environmental organizations such as Greenpeace strongly support the use of solar energy.
Installing a photovoltaic system is one of the ways householders and other building owners can contribute towards a sustainable future for everyone.
With global climate change threatening all our futures, we need to switch to clean, renewable forms of energy and electricity production. Solar electric panels can generate electricity that is free from pollution, fuelled by the natural resource of the sun, which is free, abundant and inexhaustible. Greenpeace strongly supports solar energy.'

The key benefits of a solar roof are:
- Private owned clean power source that helps reduce global warming
- Reduces electricity bills, since daylight is free of charge
- Increases the value of properties
- Extremely low maintenance, with a long functional lifetime of 30 years or more
- Silent in operation
- Increases awareness of electricity use and encourages more energy efficient behaviour

A PV cell consists of two or more thin layers of semi-conducting material, most commonly silicon. When the silicon is exposed to light, electrical charges are generated and this can be conducted away by metal contacts as direct current (DC). The electrical output from a single cell is small, so multiple cells are connected together and encapsulated (usually behind glass) to form a module (sometimes referred to as a "panel"). The PV module is the principle building block of a PV system and any number of modules can be connected together to give the desired electrical output.

PV equipment has no moving parts and as a result requires minimal maintenance. It generates electricity without producing emissions of greenhouse or any other gases, and its operation is virtually silent. These pages contain information on what PV power is used for, types of PV cell, and a typical system configuration.
PV systems supply electricity to many applications, ranging from systems supplying power to city buildings (which are also connected to the normal local electricity network) to systems supplying power to garden lights or to remote telecom relay stations.
The main area of interest today is grid connect PV systems. These systems are connected to the local electricity network. This means that during the day, the electricity generated by the PV system can either be used immediately (which is normal for systems installed on offices and other commercial buildings), or can be sold to one of the electricity supply companies (which is more common for domestic systems where the occupier may be out during the day). In the evening, when the solar system is unable to provide the electricity required, power can be bought back from the network. In effect, the grid is acting as an energy storage system, which means the PV system does not need to include battery storage.
Grid connect PV systems are often integrated into buildings. PV technology is ideally suited to use on buildings, providing pollution and noise-free electricity without using extra space. The use of photovoltaics on buildings has grown substantially in the UK over the last few years, with many impressive examples already in operation.
PV systems can be incorporated into buildings in various ways. Sloping rooftops are an ideal site, where modules can simply be mounted using frames. Photovoltaic systems can also be incorporated into the actual building fabric, for example PV roof tiles are now available which can be fitted as would standard tiles. In addition, PV can also be incorporated as building facades, canopies and sky lights amongst many other applications. This is a rapidly growing market in the UK and throughout Europe and it is mainly this type of system which the UK Photovoltaic Demonstration Programme provides funding for.
Stand-alone photovoltaic systems have been used for many years in the UK to supply electricity to applications where grid power supplies are unavailable or difficult to connect to. Examples include monitoring stations, radio repeater stations, telephone kiosks and street lighting. There s also a substantial market for PV technology in the leisure industry, with battery chargers for boats and caravans, as well as for powering garden equipment such as solar fountains. These systems normally use batteries to store the power, if larger amounts of electricity are required they can be combined with another source of power - a biomass generator, a wind turbine or diesel generator to form a hybrid power supply system.