

INDIGENOUS ARCHITECTURE OF UNYZAH
AS BASE FOR FUTURE
TRADITIONAL AND LOW-COST HOUSING

by

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INTRODUCTION

At the present time, many people in the world are suffering because of a lack of adequate housing and an ignorance about the traditional architecture, especially in the Third World countries. In this study, research was concentrated on the indigenous architecture in Unyzah, Saudi Arabia, and the traditional architecture in similar environments. Many houses in Unyzah, as well as other places in Saudi Arabia and the developing countries, fall below an acceptable standard for maintaining the health and safety of the occupants. Very few improvements have been made in housing for long periods of time, because most architects and engineers have thought the indigenous houses did not need professional designs but should be replaced by Western style structures. This kind of thinking has overlooked the consequences that follow when the needs arising from climate and culture are ignored.

This study details some of the evolutionary processes of traditional architecture in Unyzah. Different architectural forms have evolved from different kinds of human settlements and these forms reflect its people's character as much as their language, dress and folklore. There are distinctive styles of architecture varying from one part of the world to another as a result of the imagination of the people and the demands of the environment.

Through a report of the author's findings, first in field research and then in academic research, this paper establishes the value of indigenous houses and recognizes them as an appropriate base for a solution to the housing design problems in Unyzah, a typical town in the Arabian Peninsula. The conclusions include a proposal for development of both the physical and cultural aspects of restoration of value and use of traditional architectural forms and techniques.

Chapter I

GENERAL BACKGROUND OF THE UNYZAH REGION

Location and History

Unyzah is located in the Quasseem region in the northcentral part of the Arabian Peninsula. It lies in the Southern Ar'Rimah Valley at 44 degrees east longitude and 26.2 degrees north latitude, and is situated at the intersection of the main highways between the capital, Riyadh to the southeast, Hayel to the north, and Madinah to the west (Figures 1 and 2). Located at an altitude of 700 meters, it is almost the highest spot in the Quasseem region. The town was built around an oasis, and it is surrounded by Athel, or tamarisk, trees (Figure 3). Many palm trees are interspersed among the tamarisk, which helps to cool the houses during hot times and to break the wind during sand storms.¹

The town is very old; the oasis is mentioned originally in history books and in ancient poems, some more than 1500 years old. This oasis, like neighboring oases, became the site for an agricultural village. Then Bedouin people came to settle in the village alongside the original inhabitants, and later it became a trade center where Bedouins and the villagers exchanged products. Gradually, the village grew into an urbanized city where agriculture and trade were the basis of people's lives, until other

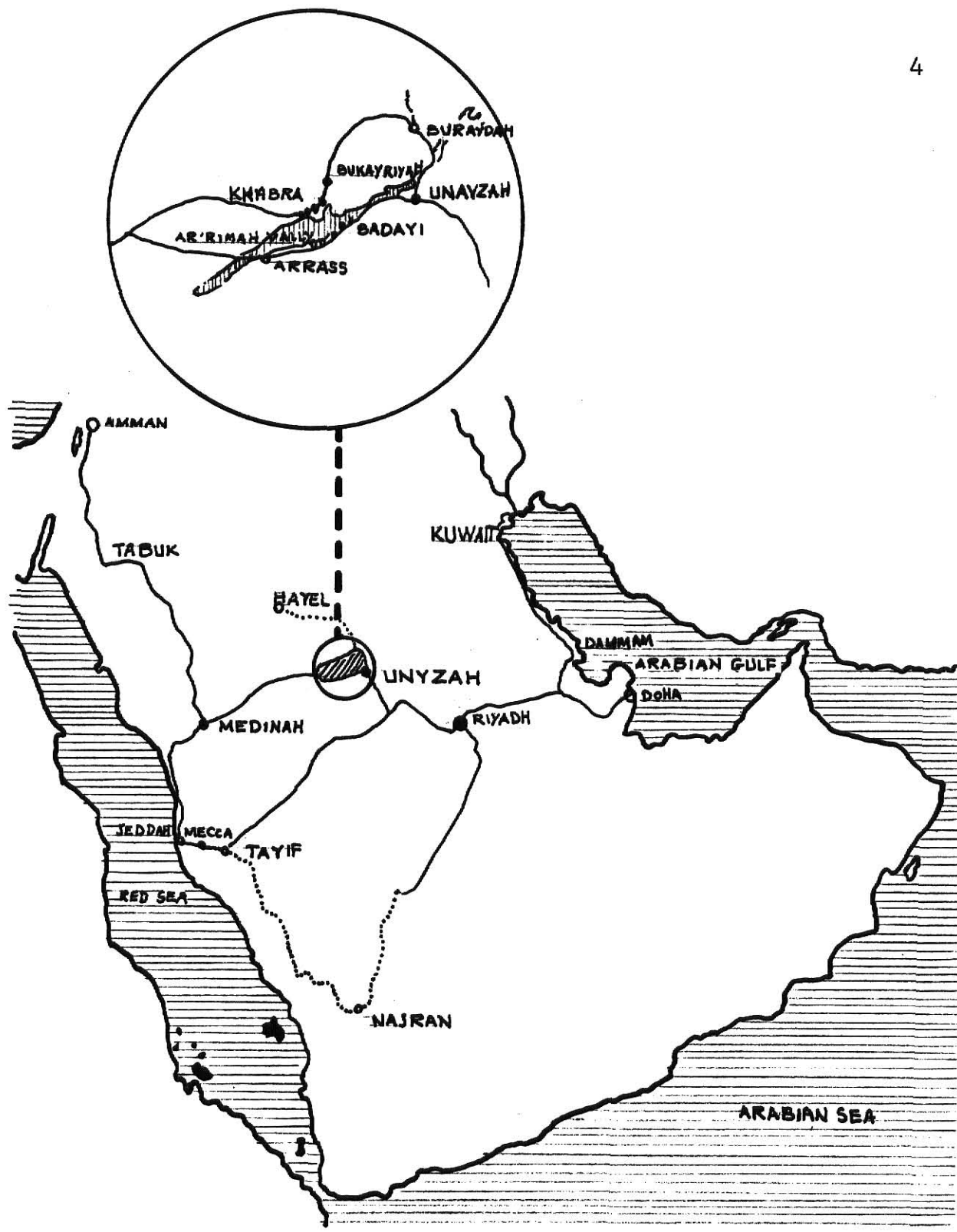


Figure 1. Unyazah is located in the Quaseem Region



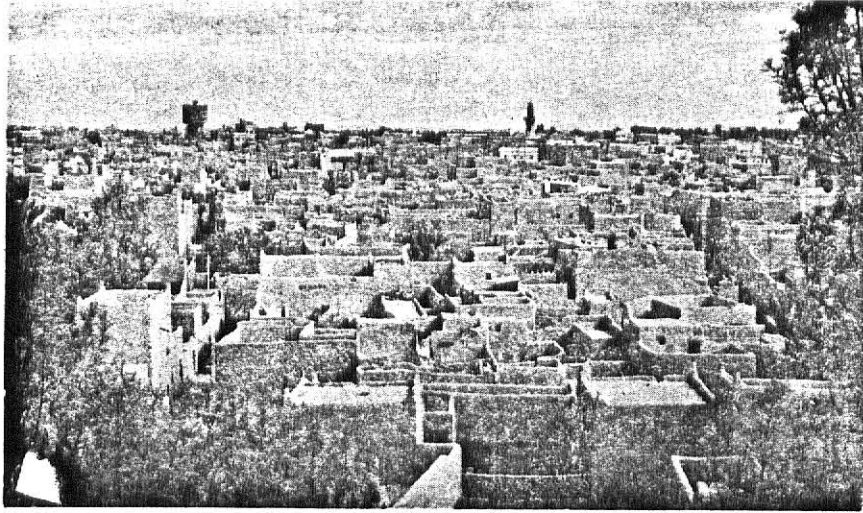


Figure 2. Overview of Unyzah

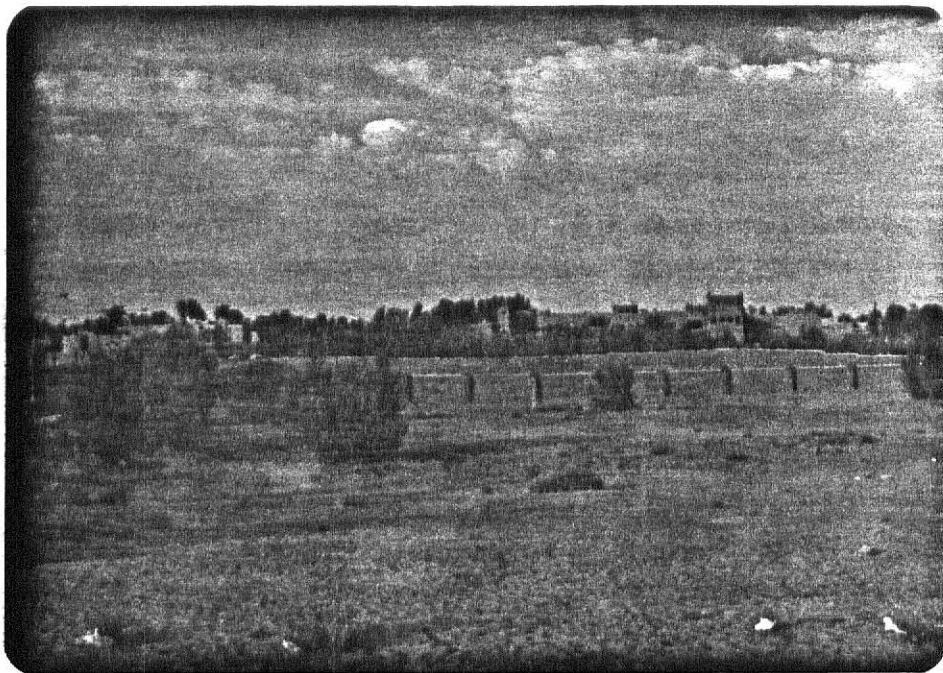


Figure 3. Tamarisk and palm trees help to protect the houses from the sun and wind.

economic development began to change social patterns and living standards. As a result of the economic impact of oil after World War II, new economic opportunity emerged for some individuals, opportunity which extended even to Unyzah's agricultural areas. Increases in the quantity and quality of all Unyzah's products led to commerce with large cities such as Dammam, Jiddah, Mecca, and Riyadh.

The Climate

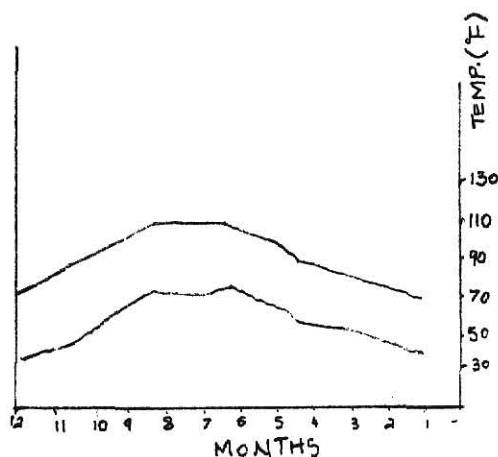
Unyzah's location in southwest Asia gives it a desert climate. Summers are hot and fairly dry with clear blue skies, cool nights and very bright stars. The average temperature during the summertime (which lasts about five months) is 95 degrees to 100 degrees F in the daytime and 68 to 70 degrees at night. The highest recorded temperature for the season is 112 degrees F and the lowest is 67 degrees F. The winter is dry and cold with an average low temperature of 37.6 degrees F and an average high of 66.8 degrees F. Spring and fall, together lasting about three months, have average temperatures of about 70 degrees F. Figure 4 shows the temperature ranges for a typical year.²

Winds in summer are from the northwest and in the winter from the northeast. Some local hot summer winds come from the southwest. However, the sand-laden wind which sometimes blows over the desert does not disturb Unyzah because it is protected by trees.

The annual precipitation is only about 12.5 cm, so an occa-

sional rain is one of the most important aspects of the desert climate. People become very excited when it rains and they congratulate each other. There is little rain during summer and winter, but the rainfall is neither predictable according to the seasons, nor is it evenly dispersed throughout the year. Consequently, the bulk of a year's precipitation may fall in a few days. Sometimes snowflakes even fall in the wintertime, and occasionally during a summer season, clouds gather unusually fast and cause a sudden rain. When it does not rain for a long time, people gather together and pray for rain and, according to the people in the town, the rainfall has seemed to increase in recent years.

Figure 4



Average Monthly Temperature
in a typical year

The Population

Population statistics in Saudi Arabia generally are not accurate because there has never been any formal census-taking program established. However, in the summer of 1962, the Status Office Agency conducted an informal study of Unyzah and the surrounding region, and produced the results found in the following table:

Table 1³

Population of Unyzah and Surrounding Area						
Nomads	Town Inhabitants	Sex		Popu- lation	Fami- lies	Houses
		F	M			
1) 3986	26,176	16,176	13,983	30,159	2,935	3,890
2) 607	22,848	13,068	10,387	23,455	2,317	3,225

1) Unyzah and vicinity
2) Unyzah only

From this study, and from other social and economic conditions evident in the country, we can make the following observations:

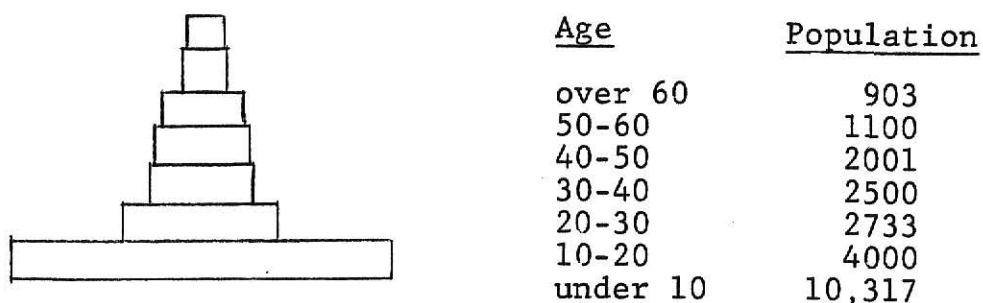
1. There are 29 percent more houses than families in Unyzah City. The main reasons for this difference are first, that some families own houses other than the one they occupy; second, some houses are vacant because they are not habitable; and third, this study was conducted in the summertime when some people were away on vacations.

2. The average family has approximately seven to nine members, and the total population of Unyzah and vicinity (30,159 in 1963) can be projected to approximately 35,000 today.

3. Women outnumber men in the town by 126 females to each 100 males. This imbalance is especially noticeable among older people where the difference in survival rates between males and females can be attributed in part to earlier tribal wars which took a heavy toll of men. Today many young males leave home to go to the larger cities, where there are better opportunities for employment or for higher education. Although they maintain ties with their home town, they generally do not return to live there until they are middle aged and either wish to retire there or invest in business within their own town.

The 1962 population statistics cited earlier indicate an age distribution among the population as follows:

Figure 5⁴



This distribution shows that children under the age of 10 comprise about 43 percent of the population. This is strong evidence of the drastic change in the economic base which occurred during recent years because of the increasing importance of oil. Increased wealth has provided economic security, improvement in

living standards, and better health and educational programs. Therefore, people have had the means to support larger families and have had more children.

The Family

In Unyzah, as in all of Arabia, the family is the main element of the social structure. The well-being of the whole family and the maintenance of cultural norms are valued more highly than the fulfilling of individual desires, and each member builds his personality in terms of the group. Family members have very strong feelings of love and commitment to one another, and each one strives to create the family's good image in relation to the rest of society. Usually the father is shown respect by every member of the family and is considered the absolute head of the family. The mother ranks second in importance, and the others follow according to their ages. Grandparents are highly respected by all the family and their relatives. They are often a resource for entertainment and wisdom and help to raise children with the aid of their long experience. This respect for elders is common in Arabian social life as a whole.

Unyzah society has several family types. One is the simple family, which is composed of only the parents and their children. The joint family is composed of the parents and their married sons or daughters and their spouses, or of two brothers and their wives and children.

The general population of Unyzah and vicinity can be divided

into two groups, based upon the historical roots of the inhabitants. The first group is the Bedouins who are nomads who have only recently settled down in the Unyzah region. They live in tents and raise camels and sheep. The second group is the Hadher, descendants of the original agricultural and artisan inhabitants, who maintain permanent homes in Unyzah.

The population can also be divided into four socio-economic classes, and both the Bedouins and Hadher are represented throughout all four classes. The first class is composed of businessmen involved in exporting and importing, and of high government officials. The second class consists of merchants, lesser government employees and teachers. Craftsmen, farmers, and masons make up a third class. Finally, the fourth class includes the unskilled workers.

Chapter I

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Riyadh University. P.63
- 2 Ibid. P.67
- 3 Ibid. P.183
- 4 Ibid. P.188

Chapter II

FIELD RESEARCH FINDINGS

History of Planning and Urban Organization

The layout of the city of Unyzah reflects its long history of about 750 years. The first settlement, called "Aljanah," eventually clustered into four villages called "Aldhabit," "Al-khunizah," "Almuleha" and "Alukhailya." The last three villages and some of the outlying farms were surrounded by a mud wall which was built to protect them during tribal wars over land and natural resources. Population increases gradually led to the expansion of the settlements and these four villages extended toward each other and toward the wall. Finally, it became necessary to tear down the first wall and build another one which enclosed more land for farming. The second wall was about 12 kilometers long, 5-6 meters high and about 2.5 meters thick at the bottom. At approximately 50 meter intervals there were watch towers. The second wall was finally torn down when the danger of territorial disputes was eliminated by the unification of the Arabian Peninsula under Al Saud's control in 1932.

The expansion of Unyzah was a result of situational needs met by individual efforts without the benefit of formal or unified plan-

ning. Consequently, none of the standard city models can be applied to the planning of Unyzah.

The Districts

In Unyzah, there are four major districts (Figure 6): Aldhabit, Aljanah, Alhialeh, and the Hospital District. Aldhabit District is in the north section of the town. It was the site of the first settlement in the Ar'rimah Valley, which is one of the richest spots for farming in Unyzah. Aldhabit was originally physically separated from the rest of the town, but now is expanding to join it.

Aljanah District is south of the Aldhabit District, partially separated from it by wooded areas.

Alhialeh is a relatively new district in the southwest part of the city. It was originally the site of the Bedouin settlement, but was separated from the rest of the town because the Bedouin people wanted to be independent from city lifestyles. They wanted to keep the freedom of the nomadic life to which they were accustomed and, at the same time, they needed to be close to the town for easy access to health care, education and productive work.

The Hospital District evolved when the Unyzah hospital was built in the southeast portion of the town. The core of this development was new houses and concrete villas built for hospital employees. The district drew more people, expanding toward the

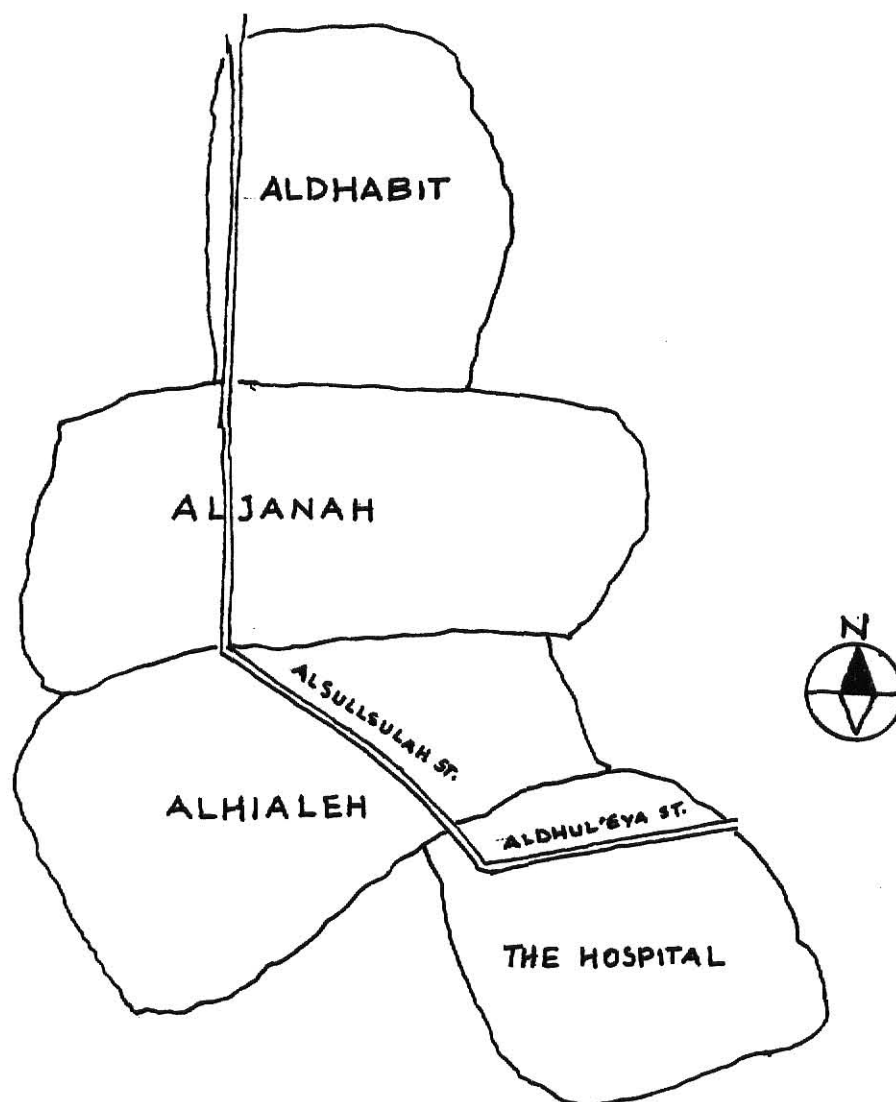


Figure 6. A very rough sketch to show the location of the four major districts in relation to Alsullsulah Street and Aldhul'eya Street.

Alhillah District, and these two districts are now connected.

Neighborhoods

The four major districts contain about 35 neighborhoods. These neighborhoods were originally formed around separate farms for which they were named.

Sections

Unyzah City can also be divided into two main sections: the old and the new. The sections are separated by a main street Alsullsulah Street, which starts from the end of Aldhul'Eya Street at the southeast end of the town and runs toward the northwest and the north.

The old section of Unyzah is located west of Alsullsulah Street. In the middle of this section is the Main Market, which is the heart of the town. Also, one of the oldest and largest Friday mosques in town is located at the center of this section on the side of the Main Market (Figure 7). The streets in the old section are narrow and covered in some parts, and the houses are crowded tightly together (Figures 8, 9 and 10). Urban renewal in the old section was begun around 1962, when the Town Planning Office enlarged and modernized Alsullsulah Street to about 10 meters and added more street surface. Some deteriorated buildings were torn down and the sites have been used for new construction or reserved for open parks planned for environmental preservation and for aesthetic purposes. A great number of very old traditional houses in the middle of the town were also torn down to make

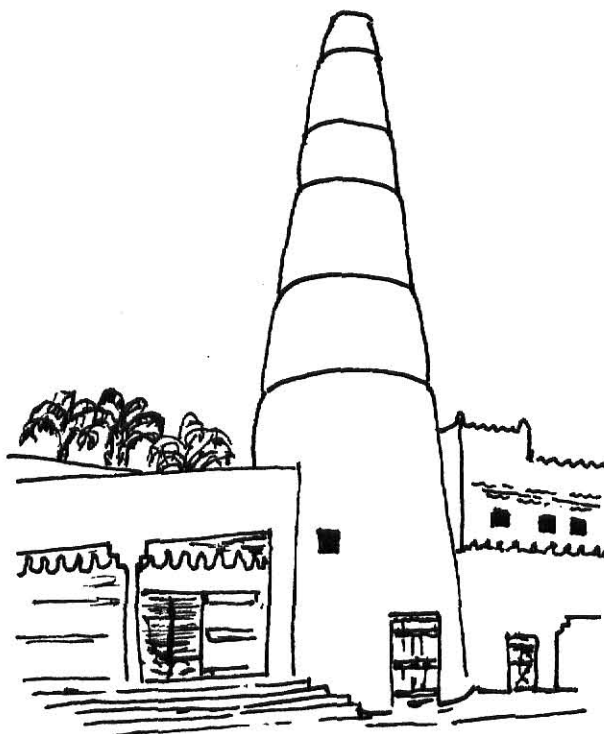


Figure 7. Friday Mosque



Figure 8. An example of rounded street corner

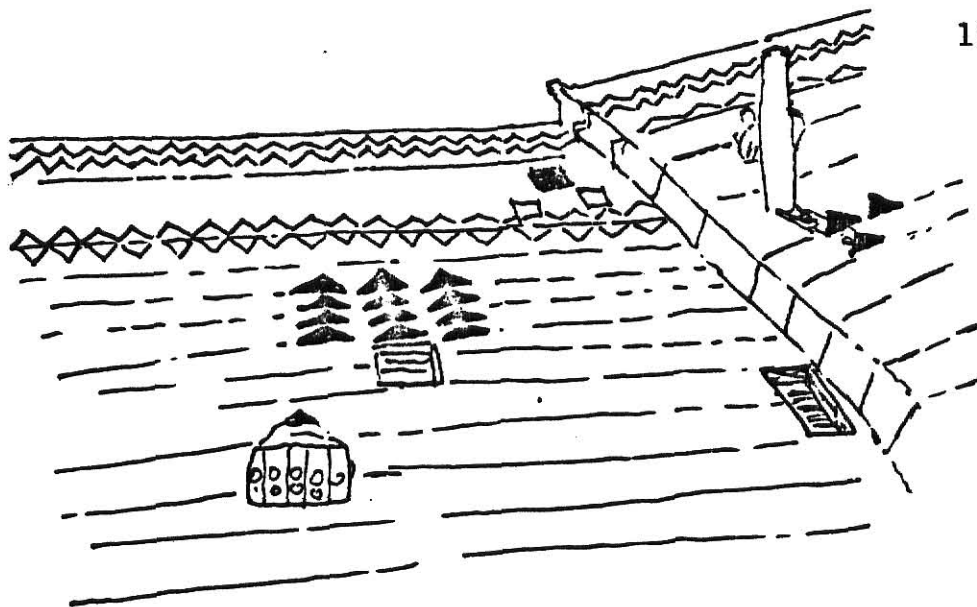


Figure 9. Groups of small openings as a feature of the old houses

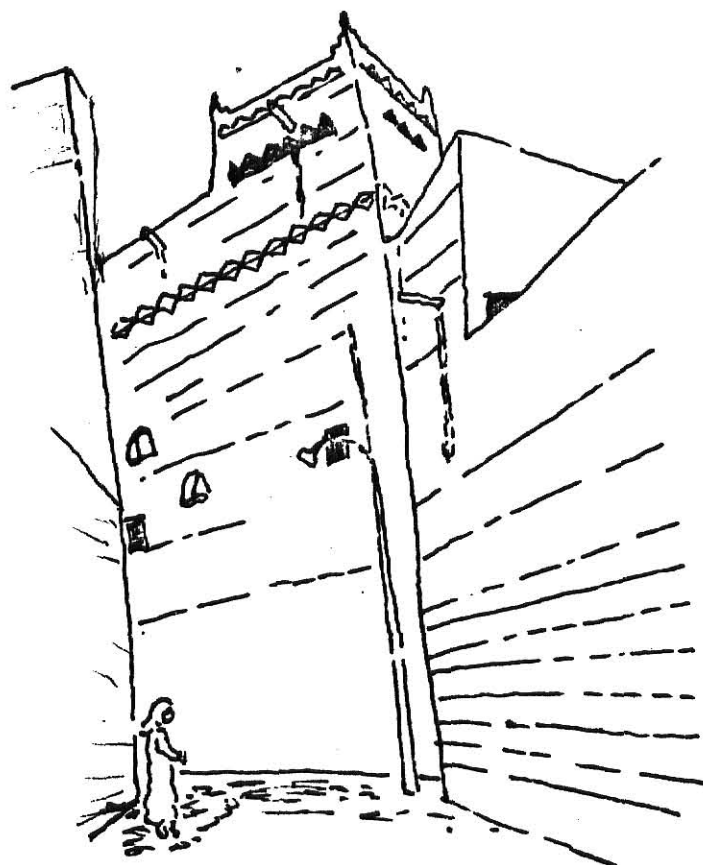


Figure 10. A typical street in old downtown

room for a large new market project. Since the first revisions, the Town Planning Office has continued to enlarge existing streets, open new streets and develop other public places.

The new section of town is located east of Alsullulah Street. Almost all of the buildings in this section are built from mud materials. The remaining few are built from concrete with improvements in design. The greatest expansion has occurred in the east area of town during the last 15 years as a result of the oil impact on the economy. Recent expansion of the town amounts to about half of the city area, but at a lower density.

Recently, the Town Planning Office adopted a new master plan which includes better streets, more public places, and beautification of the entire town.

History of Housing Design

Houses in any geographical area generally reflect the resources of the surrounding environment. For example, people from wooded areas build their homes from wood, people from rocky areas build their houses from rocks, those from icy areas build their houses from ice, and in the sandy and muddy areas, houses are built from mud. The selection of building materials, determined by climate and geology, affects the final design and form of each type of housing.

Materials

Unyzah is surrounded by sand dunes, muddy places, and rocky

areas. All these natural materials, acquired directly from the local environment, are used for different purposes in construction. Mud is the most suitable material for the construction of walls in most of the houses. Rock is used for building foundations, columns and fencing but it is not used extensively for other purposes because of the high labor cost involved and because it is a poor insulator against heat compared to mud. Nature has given this land unlimited numbers of tamarisk and palm trees which work well for roofing and doors and window frames. So all the old buildings, and some of the recent ones, are built with stone foundations and columns, mud walls, and with roofs, windows and doors of tamarisk tree trunks and palm tree reeds.

Mud Material

Mud material is made from the soil which is usually brought from nearby sites. These sites, where the rains leach out salts, are called "kian." The non-salty soil from kian is stronger than ordinary mud, which makes it suitable for use as the main material in making mud bricks, or mortar.

The process of utilizing mud to make aurg, bricks, mortar, or roof Atmam is simple. Local soil is wetted and puddled by shovel. After it is mixed well, quantities of straw and water are added until it becomes plastic enough to be handled comfortably and flexible enough to be shaped into the desired forms. Usually the mixture is one quantity of straw to five quantities of mud, the ideal proportions to strengthen the plastic puddle of mud.

The Sun-Dried Brick

The mud mixed for brick-making is moved to a flat surface.

The mud is poured into wooden rectangular molds to make sun-dried bricks (Figure 11).

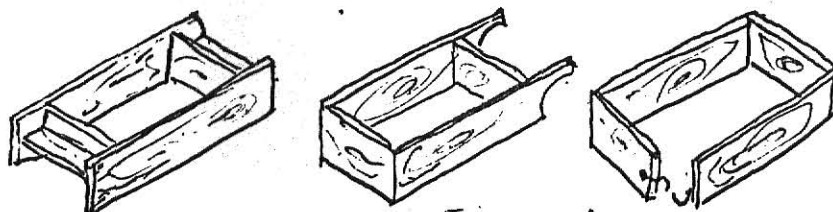


Figure 11

These bricks must be left in the sun to dry for approximately two days, during which time they must be turned to dry both sides. After the initial drying, they are usually left to be baked in the sun for about 20 days in order to "cure" them. The sizes of the mud bricks made on the Arabian Peninsula vary from one place to another, depending upon the size of the building. In the Unyzah area, the average size is approximately 10 cm x 25 cm x 44 cm.

Construction Methods

The master builder begins a traditional house by transferring the intended design of the house directly onto the building site. Drawings are not used but an understanding will have been reached between builder and owner as to the nature of the house. The foundation lines are then drawn on the ground with strings coated with joss (white, powdered gypsum) which are hung from supporters. After the guidelines are drawn, trenches about $1\frac{1}{4}$ meters deep are dug following the outline. The foundation is then constructed from local stones of various sizes which are cut with square edges. The stones are secured in place either with mud or joss mortar for the old technique or with cement for the newer technique. The stone

foundation is continued to about $\frac{1}{2}$ meter above the ground. The foundation, besides carrying the load of the building, protects it from dampness when it rains.

On the top of the stone foundation, a layer of mud called "demam" (made the same way as the mud for bricks or mortar) is built to a thickness of about 30 cm. The demam layer makes a level surface for the rest of the wall construction.

Traditionally, the aurg system was used for the construction of the remainder of the wall. More recently mud bricks, or a combination of mud bricks and the aurg system have been used (Figure 12). In the older aurg system, a layer of mud about .3 meters high was added on top of the demam layer in a continuous course. This layer was molded by hand, by masons. The aurg process takes a longer time than the dried bricks system because it is necessary to wait three or four hours for it to dry before laying the next section of the wall. However, this system produces very strong walls which last a long time. Still, during the past 15 to 20 years, the use of the aurg system has been discontinued because of the labor costs associated with the time-consuming process. Sun-dried bricks have been used recently to replace the aurg system for the construction of the rest of the walls on the top of the foundation and the demam layer. The sun-dried bricks are laid in a staggered design and mortared with mud, almost in the same way that regular concrete bricks are laid.

Wooden frames for the doors are constructed as the building progresses, and the window frames are included when the walls reach the desired height for window openings.

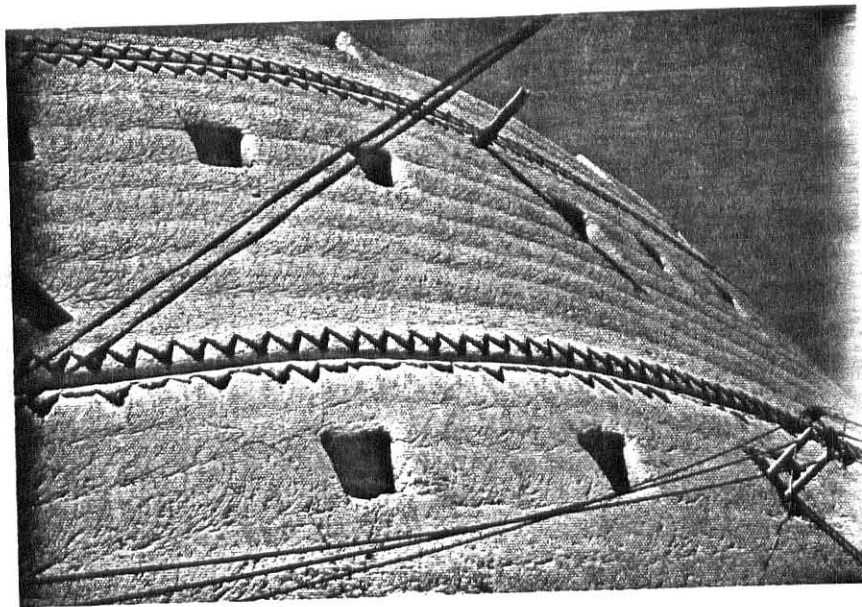


Figure 12. The aurq system shows in this house

When the walls reach the right height for rooms, the roof is begun. Poles of tamarisk tree trunks are lined up on top of the walls at 30 cm intervals. (Recently some imported straight manufactured wood panels have been used for the supports instead of the natural shaped tamarisk trunks.) Then the workers lay palm tree branches on the top of the tamarisk trunks perpendicular to the poles and packed close together. On top of this layer, palm tree reeds are added. A layer of pure mud is then placed on top of the palm reeds (Figure 14). At this point, a wall is constructed to extend about 2 to 3 meters above the roof. The wall has some ornaments on top and some holes are left at the bottom to drain rain from the building with the help of wooden or steel cantilevers. Following this step is the Altan'eal operation, which is a process of spreading a layer of mud mixed with wheat straw and plenty of water onto the roof. This mud mixture is piled on the roof and compressed by foot and with shovels by mason's who usually sing while doing this work. This last layer dries very hard and is impervious to water. An additional step can also be included which is to spread a very thin layer of cement on the roof, floors of the rooms, and on each wall surface to a height of about one meter.

Stone columns are usually constructed to support some of the loads of the structure. These columns are built from rounded stones which were fixed in place with mud or juss mortar in the past, and with cement in more recent times. The mud brick walls require about two months to dry out, and then a layer of mud called "waga" is applied to the exterior wall surfaces to protect them

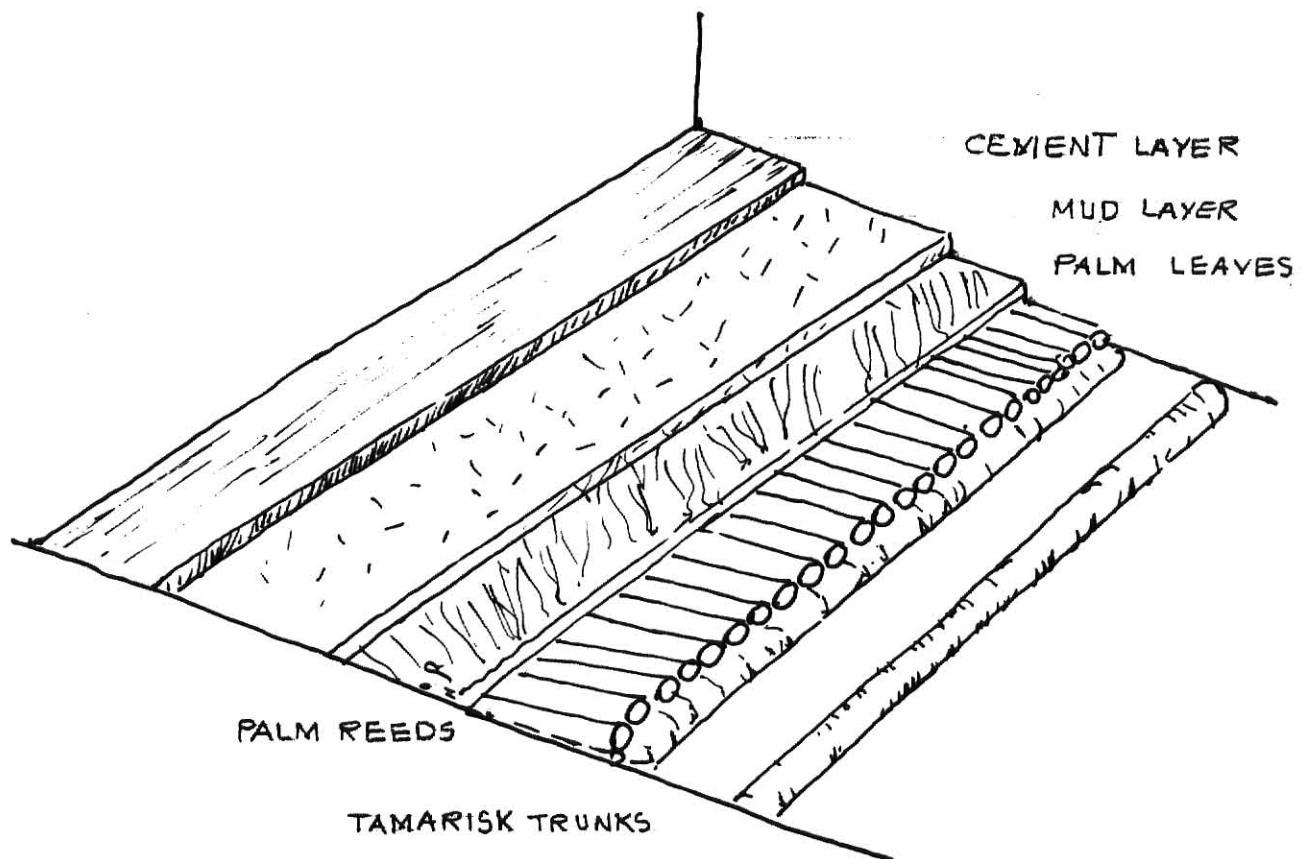


Figure 14. The roof layers

weathering.

Sometimes, in addition to the waga layer, another layer of mud called "ash'shiba" is applied to the exterior walls and roof for additional protection from the sun, winds and rain. Ash'shiba is a mixture of pure mud (called "free mud" because it does not have any salt or sand in it), straw and water. Usually it is mixed and prepared in water pools under the sun's heat with a method different from that of the waga coat. The mud is mixed with straw and plenty of water. Then it is left to sit, and water is added to it periodically. After about a week or ten days, more water and straw is added and mixed. This process continues for about 45 days, and, all the while, a consistency of plastic is maintained. When the mud is ready for rendering, it has a dark color and sour odor. It is then applied to the exterior walls and roof to a thickness of about 2 cm.

About one year after the house is finished, the dampness of the building has evaporated. At this time, some of the wall surfaces, or sometimes all the interior and exterior surfaces, are covered with juss(Arabian gypsum). Juss has been used since the early times as mortar for foundations and columns, and also for covering the wall surfaces for decorative purposes. The juss material is gathered and brought from nearby mountains, burned in special ovens, and beaten with sticks until it becomes white powder. Water is added to the powder to make it a spreading consistency, and then it is applied as desired to the wall surfaces. After it dries, it can be engraved with decorative designs or painted.

Builders

Mud houses are built either by the owners themselves, or by a master builder, called an "Estad," and his assistants. The choice is determined by the owner's income, since a poor man cannot afford the services of a master builder. An owner who builds his own house usually receives help from some of his relatives, neighbors and friends.

House Orientation

The best orientations for a house anywhere in Saudi Arabia are northwest, north or northeast, so most houses are built facing one of those directions. In these positions, the northwest summer breezes can flow through the courtyards, and then into the rooms through their windows and doors. In the winter, the northern exposures provide sunshine and warmth. The backs of the houses usually have few windows in order to protect the inside of the house from the cold southeast wind.

House Design

The way in which houses are designed varies from one geographical area to another, depending upon the specialized functions necessary for comfortable, convenient and affordable living. The mud houses in Saudi Arabia have distinctive characteristics which are influenced by the differences in climate. In the northern part of the country, houses are built in a tower shape with some of the walls tilted inward a little to form a strong base. In the south-

western area, where rainfall is greater than elsewhere in the country, the mud walls are protected by horizontal lines of slate or wooden slats placed perpendicular to the wall about .3 meters apart. In Unyzah, the mud houses are typical of the Najid area in the Quaseem region. They express the influence of the dry climate with their one or more courtyards, used to capture cool air, and with few windows to the outside (Figure 15). A typical Arab house also usually includes accommodations for animals as well as human occupants, and storage for goods such as wheat, corn, dates and hay. Some houses also have a workshop.

Inside the Arabian house some of the rooms are designed for flexibility and can be used for several purposes. For example, one room can function as a living room, as well as a dining room and a bedroom. In the summer, people spend a large part of the day on the first floor, and at night they move to the second floor, the roof, or the courtyard, where they can sleep in the cool, fresh air. Their privacy on the roof is protected by high walls. The summer living quarters are the most elaborate and varied, including such luxuries as the courtyard, Almusbah Arrawiashen and Alseeb, while winter living is more simple and uses less of the house.

Two main types of house designs are generally seen: the old house and the recent house, which appeared about thirty years ago. The recent houses are different from modern housing which are all concrete. Both old and recent houses are designed without architects.

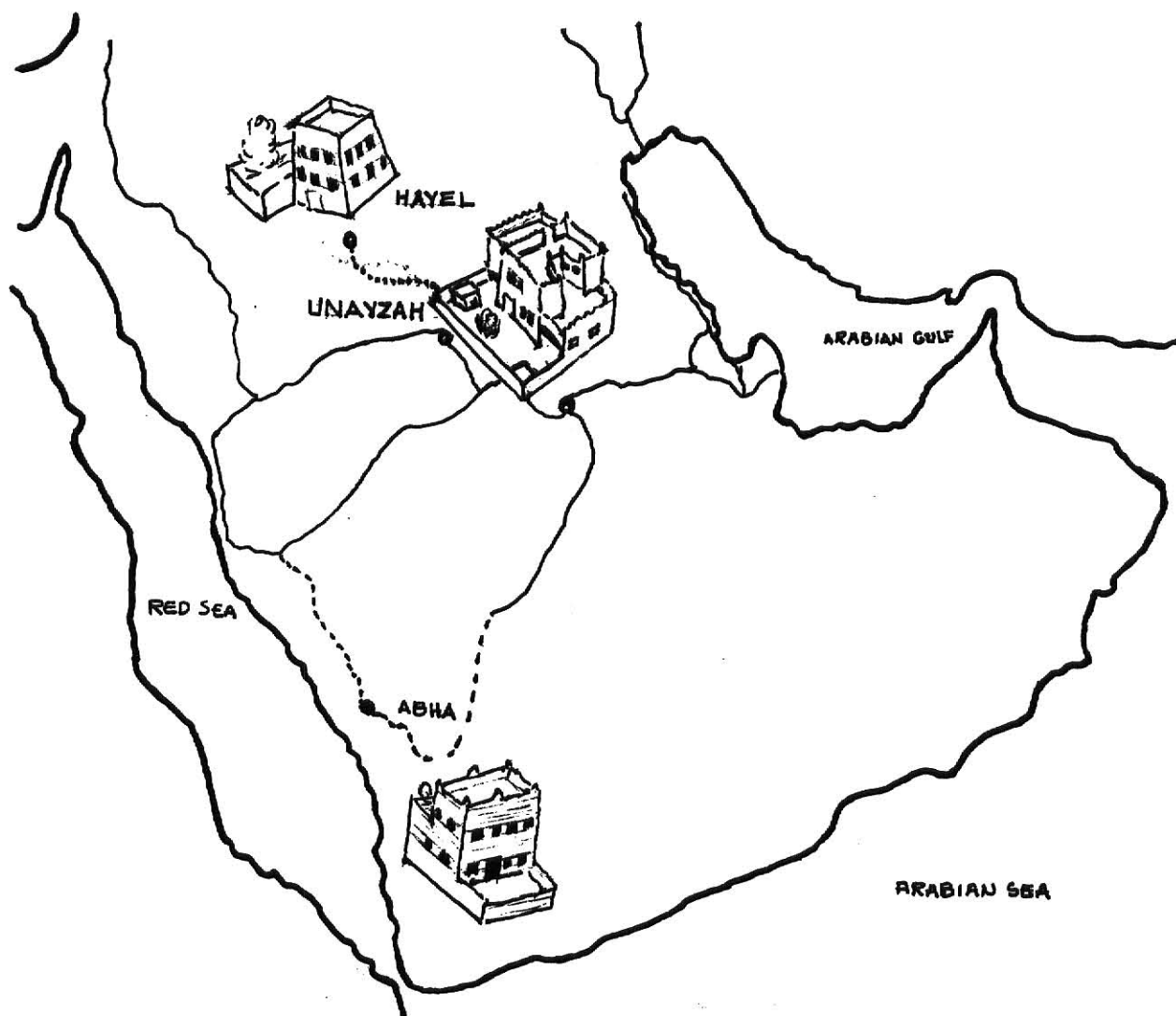


Figure 15. Mud houses in the north, middle and southwest of the Arabian Peninsula vary in design according to the specialized needs of the people.



Old House Design

The old house has few openings to the street because of both climatic and economic reasons (see Figure 16). Most of these homes were built during very poor economic conditions (before the oil era) when people could not afford fuel or even sufficient clothing. Consequently, they designed their houses with few openings to conserve the warmth inside. Most of the old houses are vertically designed with usable space on two floors and the roof because they are built on small plots of land and are packed together to resist winds and provide shade.

The land not covered by the house is used for courtyards. The Albaha (courtyard) and Alkubah (family living space) are the centers for social gatherings. Courtyards, commonly rectangular but sometimes rounded on one or two sides, are located either in the center of the house or off the northern part of the house where the main entrance can open into them. Some houses have two or three courtyards which are different sizes and serve different purposes. One might be located by the main entrance and living room for guest use. Another could be located in the middle of the house to be used for family functions, and a third might be found in the back of the house where it could be divided into a backyard for vegetables, palm and fruit trees and an outside workshop and sitting space.

The courtyard is a very functional aspect of Arabian house design, because it fulfills requirements relating to climatic factors as well as the occupants' activities. It acts as a thermal regulator, holding the fresh breeze accumulated at night while the air

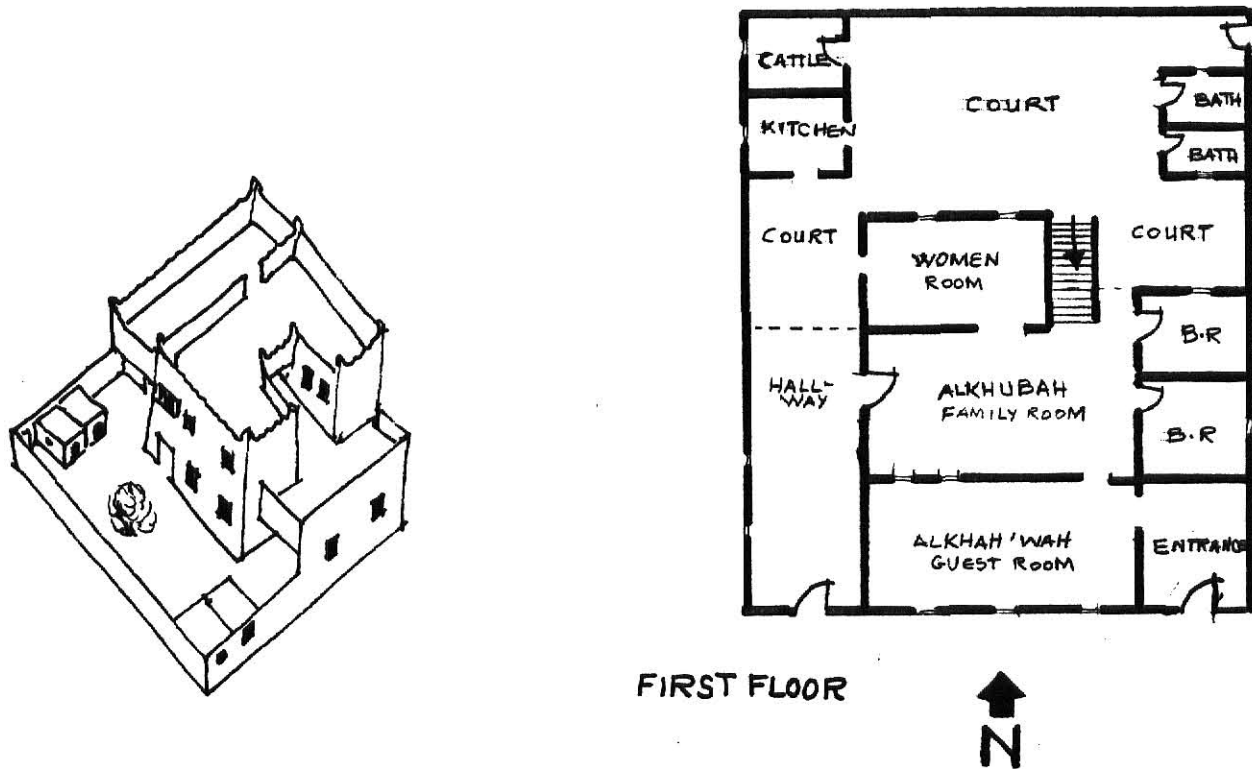


Figure 16. A typical old mud house

gradually flows through the atrium and seeps through the rooms of the house. It acts as a reservoir of coolness until late in the day. Because few windows open to the street, most windows and some doors open into the courtyard(s). Usually rooms bordering the courtyard have numerous larger windows which provide them with natural light, a breeze and a view of blue sky or vegetation, if there is any. Courtyards provide a safe playground where children play under the direct supervision of the mother. Also, they are used as evening sitting places and for occasions such as religious celebrations, wedding parties and other social events.

The ground level of the traditional house design includes the courtyard, Alkhubah (family room), Alkhah'wah (guest living room), the kitchen, some bedrooms, bathrooms, food storage, a section for cattle and pets, and Almajahab, which is a small garden or atrium. The second floor includes the Musbah (similar to Alseeb on the first floor), the Arrawiashen (sleeping quarters), studying spaces and some storage areas (Figure 17). From the second floor, stairs usually lead to the roof or to the third floor, if there is one.

Room measurements for an average house are provided in the following table:

Table II

Typical Room Dimensions of an Arab House in Unyzah

Room	Dimensions	Room	Dimensions
living room	7m x 3.5m	bedroom	5-6m x 3.5-4m
dining room	5.5m x 3m	hall	4.5m x 3m
kitchen	4.5m x 3m	room between	
bathroom	2.5m x 1.5m	dining and	
storage	5m x 4 m	living rooms	4.5m x 3m
halls between		stairs	1.25m wide
rooms	2m wide		

One of the most important rooms on the first floor is the Alkhubah, a large rectangular room about 7m x 3.5 to 5 m, used mostly as a family room. Usually it opens to a covered hallway and two or three other doors lead to other rooms of the house such as bedrooms, storage areas, and the women's living room. Stairs often connect the Alkubah to the second floor and continue on to other floors.

Alkhah'wah is another important space in terms of receiving guests and making them feel warmly welcomed (Figure 18). (Hospitality is one of the strongest Arab traditions.) Usually this room is connected to the outside door by an entry hall called "Addeh-leeze." The room is normally a rectangular shape with a very high ceiling (about 5.5 meters), which reaches the height of two floors. It has two rows of windows aligned for easy airflow: one very low (about .5 meters above the ground) and one very high (about 1 meter below the ceiling). The lower ones are large enough to admit light and cool air from the courtyard, and the high ones allow the warm air and smoke to escape. The window frames are made of wood and are engraved with different designs and then painted in beautiful colors. Interior walls are decorated with engraved designs on the gypsum surfaces. Usually this room has two doors, one connecting to the entry hall; the other to the rest of the house. At the narrow end of the room, there is a fireplace about 1.5 meters x .5 meters, previously built from stone and gypsum but more recently from cement. A small, hand-operated bellows is fixed to the fireplace to fan the fire. This fireplace is used by the father or his sons to make coffee and tea for informal gatherings of close friends

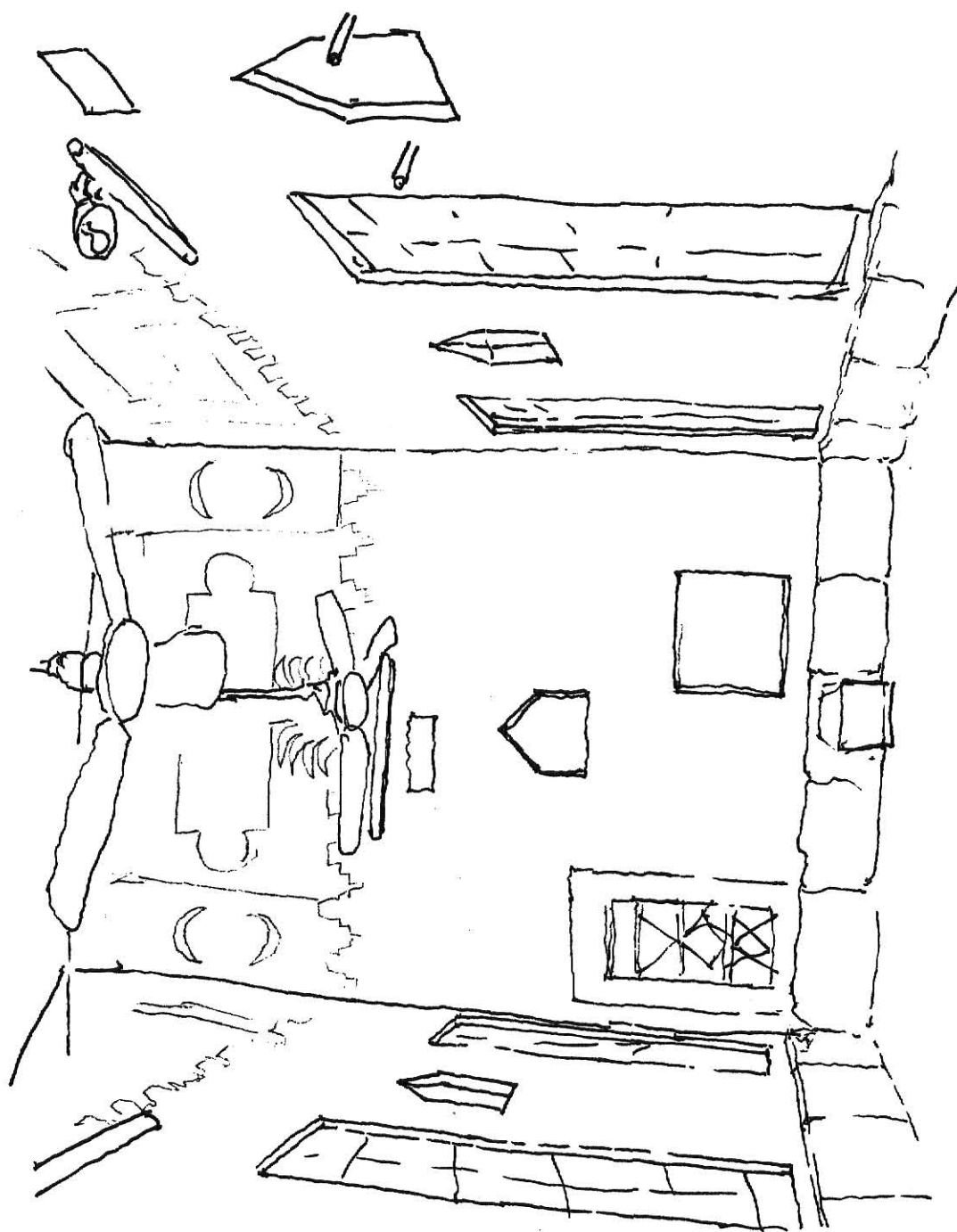


Figure 18. Alkhah'wah

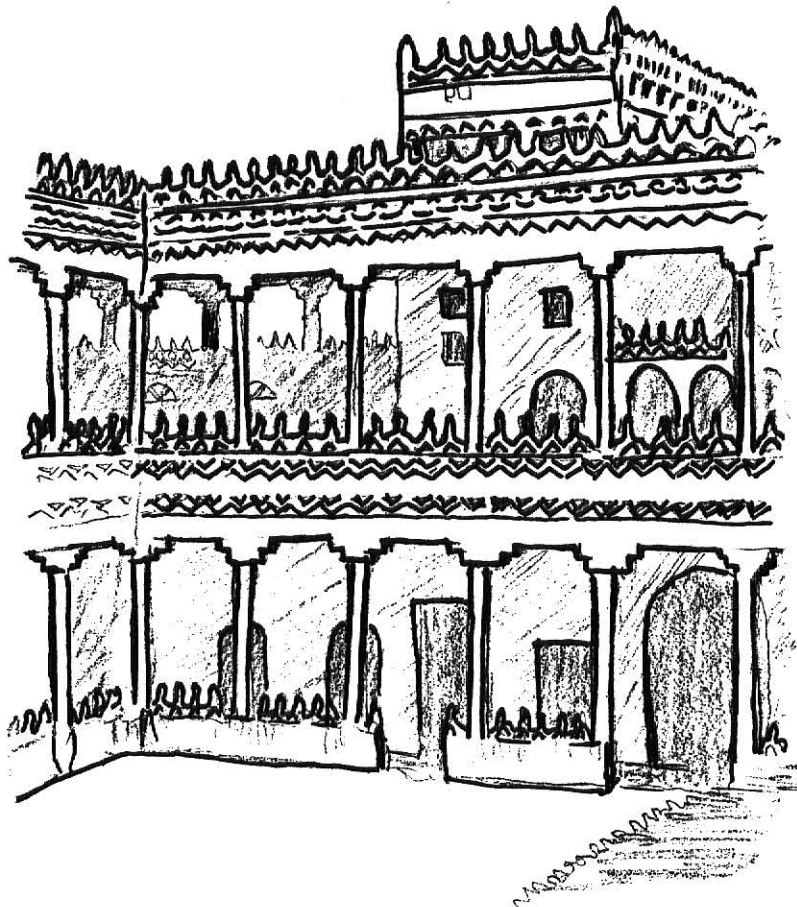


Figure 17. This sketch shows parts of the courtyard and alseeb in the first floor, and almusbah and arraw'ashen on the second floor

and relatives. The fireplace has a very elaborately designed and decorated shelving unit called "Kamar" which is made of wood and gypsum. The shelving may be pre-cast outdoors and then set into the wall above the fireplace, or it may be designed and built directly on the wall (Figure 19). The shelves are used to display coffee pots, tea pots and cups of many sizes and varieties in order to demonstrate hospitality and create an atmosphere of warmth and invitation. The shiny copper pots are especially warm and beautiful. Outside on the back wall by the fireplace, there is also a storage area for fuels.

The kitchen is frequently located far from the living space, and is sometimes even separated from the rest of the house by a courtyard, because of the intense heat given off by the fireplace and small, wood burning ovens used for cooking.

From the bathroom, a pipe runs to a square or rectangular hole outside in the street which measures about 3.5m x 2.25m and about 1.5 to 2 meters deep for each house. Stone walls are constructed to line the hole and then the top is covered with strong tamarisk tree trunks and palm tree branches. Recently, however, tops have been constructed of concrete. There is no sewerage system to transport the waste material away; it decomposes within the underground containers in a manner similar to the Western cesspool or septic tank system.

In the past, the water supply to the house consisted of wells which were dug by hand. Some of these wells can still be seen in old houses, mosques and other public places. However, about twenty years ago artesian wells were introduced, and now one well serves

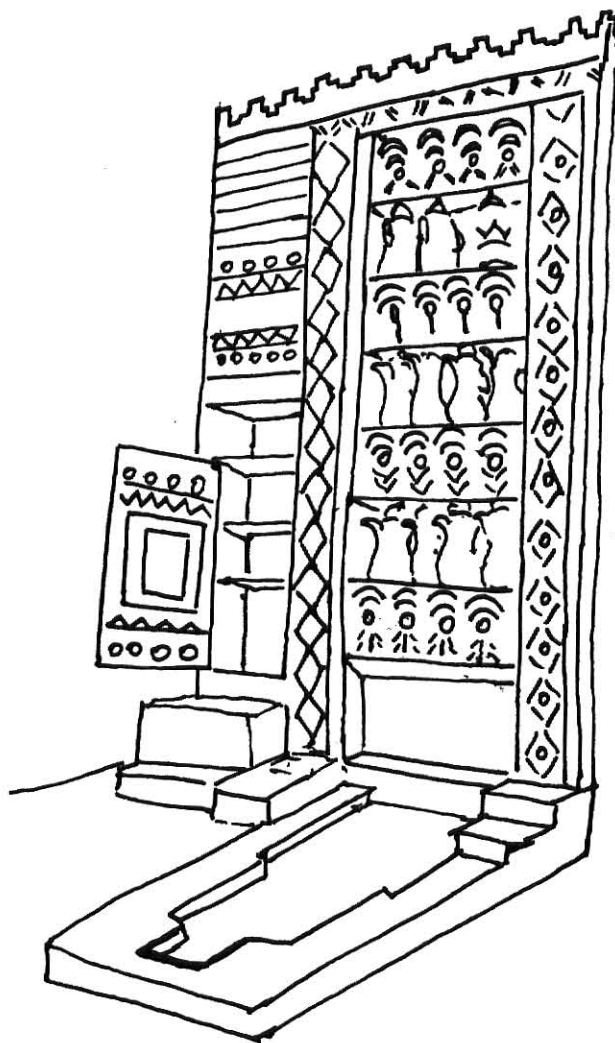


Figure 19. The Kamar juss ornamentation
in the guest living room

a whole district, or even a whole city.

In the very back of the house, animals' quarters are usually located. The most commonly kept animals are cows, sheep, chickens, rabbits, pigeons and other birds.

The second floor is laid out in a pattern very similar to the first floor (Figure 17). Stairs lead from Alkubah to another large room in the center of the second floor called "Almusbah." This room is similar to Alkhubah in size, but is open on one whole side to catch the high flow of fresh air. Most of the rooms on the second floor are positioned around it. One kind of room found near Almusbah is the Ayyawshen, used as sleeping space. The sleeping spaces normally face the southwest, south or the west so they avoid the glare of the morning sun and the northeast winter wind. In addition to sleeping space, some storage spaces for food, clothing and books are provided. Because of the openings into Almusbah and several other rooms of the second floor, it is lighter and more ventilated than the first floor, and is a very pleasant part of the house.

Few houses have three stories. However, whenever a third story exists, the stairs continue to the third floor connecting to Sunwah, the central room which is surrounded with more rooms in a design similar to the second floor.

The stairs connect either the first, second or third floor to the roof. The roof is divided into several spaces by walls about 1.75 meters high, almost in the same way as the floor below it. The roof is used as sleeping quarters in the summer, and some houses even have a guest space. A partially roofed room stores the

sleeping mattresses during the day. Another part of the roof is used to lay out some annual crops, such as dates and wheat, to dry in the sun. And the roof can also be used to dry the laundry.

Alkhal'weh is a large room (about 7m x 3.5m) which is built under the living room and partially underground. It rests about 3 meters below the ground surface, extending 1 meter or less above the ground to provide space for windows which will admit light and air to the room. Its windows usually open into the courtyard. The stairs lead to it either from the courtyard or from Alkhubah. It is a comfortable place for summer afternoon naps or for living and sleeping during the very cold winter nights.

An interesting feature in the old houses is a very small, covered space above the main entrance that has small holes through which a person can peer. It is called "Altermah," and its function is similar to that of the hole in modern Western doors used to inspect a visitor before opening the door. Originally, the Altermah was used during tribal wars to view safely any action in the streets.

The Recent House

This kind of mud house, which can be called the recent style, first appeared about 30 years ago. The main reason for the emergence of a new kind of house was an awareness of the health, environmental and social issues which accompany a higher standard of living, made possible in Arabia by the increase in national wealth due to oil revenues. Most of the recent mud houses are one story high, besides the walled roof (Figure 20). A major reason for limiting the modern house to one story is to save today's high cost of labor for moving materials to the second floor.

The recent house design is an improvement over the traditional house in several respects. Air circulation has been improved by having more courtyards and more and larger windows and doors.

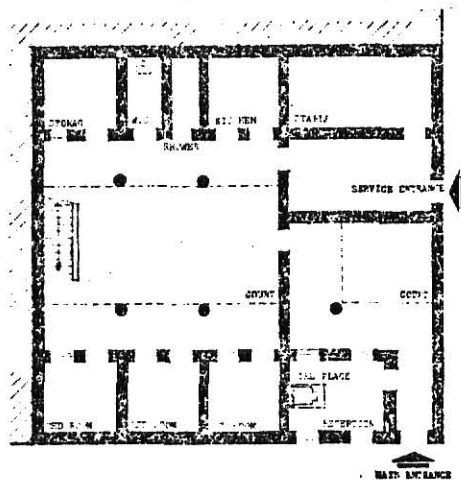


Figure 20. A typical recent mud house

The courtyard system has also been rearranged in relation to other parts of the house. One courtyard is located between the entrance and the guest living room and is used for socializing with evening visitors; another courtyard is located between the guest living room and the dining room and is also used for entertaining guests or serving dinner; and another courtyard is located in the center of the house between the rooms to be used for family functions.

Another space, called "Alseeb" (a living space), has replaced the Alkhubah of the older style. Alseeb is very similar to Alkhubah in size and location. It is open on one side to the courtyard and sometimes the back door of the room opens into the courtyard, which makes a pleasant open place for the family to sit and dine.

Kitchen facilities have been improved, also, and gas is now used in place of wood for fuel. New conveniences such as refrigerators, sinks and other smaller electric appliances have been intro-

duced. The kitchen in some newer houses is closer to the living spaces than before because new stoves and air conditioners have decreased the heat problem. Kitchens in the recent houses also have added storage and counter space.

Alma'ash is a new room recently added for guest dining. (In the old houses, guests dined in the living room.) It is located close to the guest living room and is about $\frac{1}{2}$ meter higher than the ground.

Alkhah'wah (the guest living space) has been improved in that it is more elaborately decorated; the fireplace has been kept as a decorative element, but gas is now used for functional purposes such as preparation of coffee and tea.

Almost all the floors and about $\frac{1}{2}$ meter of walls are now covered with cement, as are some or all the exterior surfaces.

The tamarisk beams of the old style ceilings have been either covered with plain or decorated material or replaced by manufactured straight wooden beams.

Water wells also disappeared with the arrival of the recent house, because all houses are now connected to the city water supply. Consequently, the water wells in the old houses have been converted to drainage systems.

We can summarize the major improvements of the recent house as follows:

- 1) A better drainage system is in use.
- 2) A better water supply is now available.
- 3) The house is protected from intruders by grilled horizontal bars, and from flies and bugs by very fine screens. Also, some windows have been covered with latticework grills or with shutters to break down the sun's glare and provide a view of the street.

- 4) More wood is used in the construction of the house and the furniture.
- 5) Ceilings are covered with finishing materials or straight manufactured wooden beams are used.
- 6) New rooms have been added to the house, such as Alseeb, the library and the workshop.
- 7) The courtyard system has been enlarged and rearranged.
- 8) Wall surfaces are more elaborately decorated.
- 9) Modern sinks and fixtures have been introduced.
- 10) Electric fans, heaters and air conditioning have been introduced.

Ornamentation and Decoration of the Mud House

Different materials, such as juss or wood, are used as surfaces in which to carve beautiful designs on interior and exterior walls. Juss is more commonly used, and is also often seen on the tops of the exterior walls as a trim. Then the engraved designs are carved below, usually in the form of a repeated pattern (Figure 21). In the rooms themselves, ornamentation is added by different shapes of openings in latticework, by shelves, windows and doors, and by continuous designs on the walls (Figure 22). Ornamental work is either precast and then built in, as in the Kamar (Figure 19), or engraved directly on the surface of the walls and doors by special masons and craftsmen.

The doors and windows are handsomely decorated by engraved arabesque designs and are harmonized with beautiful colors, such as red, black, blue, yellow and brown. The art work on wood is highly valued because of the scarcity of wood (Figure 23). Also, the door lock, called "Al mezlaj", adds uniqueness to the appear-

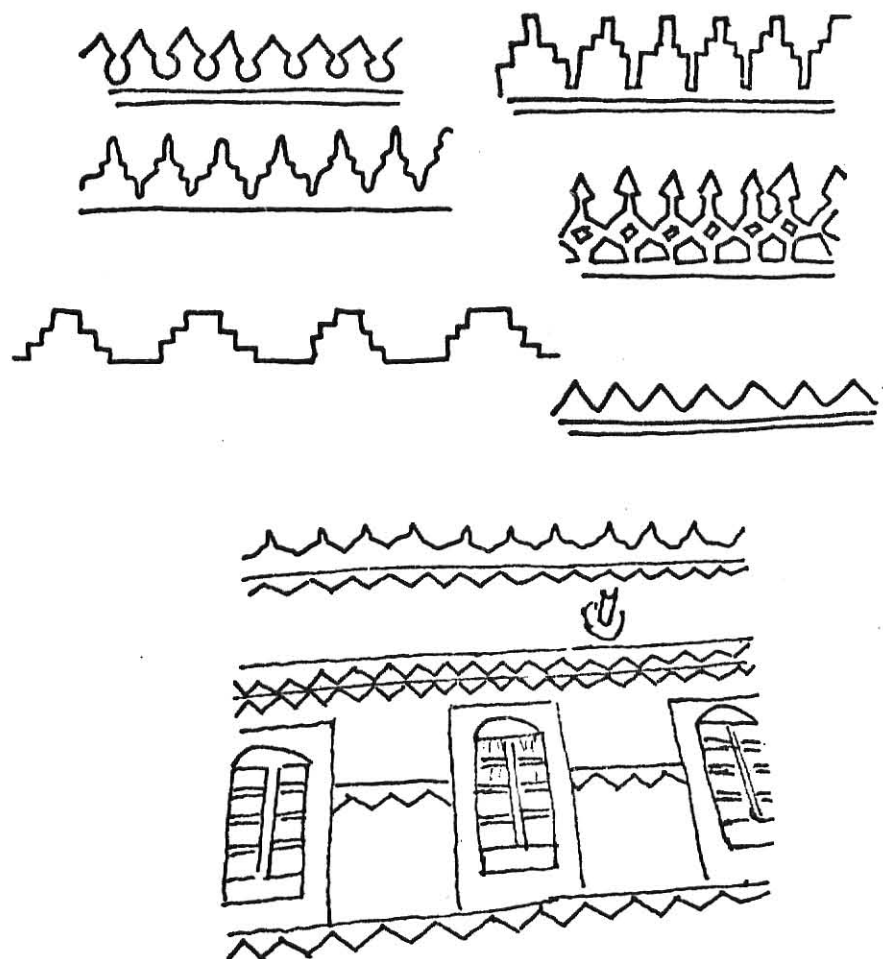


Figure 21. Some exterior mud and gypsum ornamentations

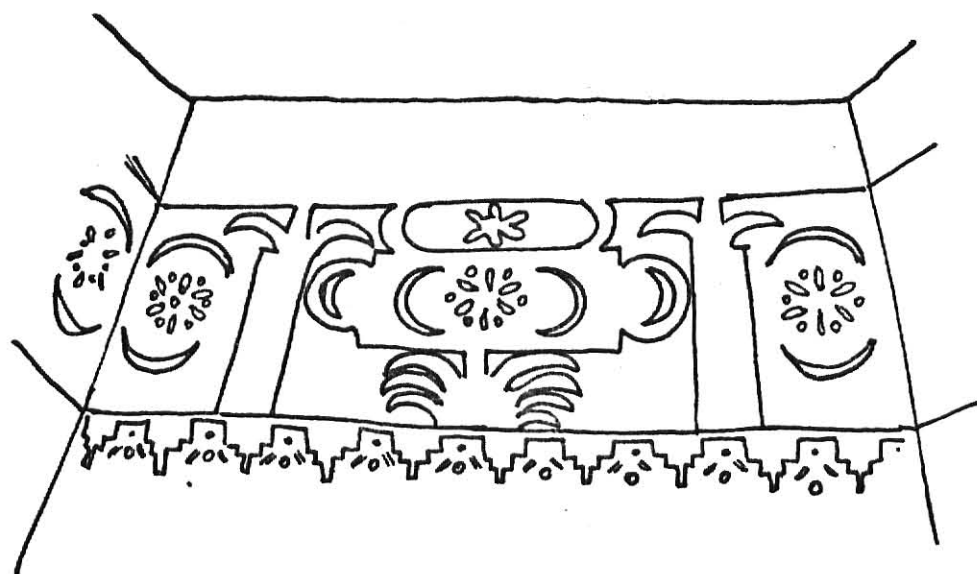


Figure 22. Some gypsum engraved designs in the interior walls

ance of the door. Ornamental designs reflect the local people's taste for a variety of geometrical shapes and, in some houses, the ornamental and decorative features form a whole art exhibit.



Figure 23. Arabesque designs on mud house doors and windows

Chapter IV

ACADEMIC RESEARCH FINDINGS

Urban Organization and House Orientation

Architecture in all parts of the world demonstrates the builders' attempts to create structures which will be durable and protective in the local climates. On the Arabian Peninsula, the major climatic considerations are temperature extremes and winds. The major architectural concerns are building mass and external appearance.

Although careful urban planning has not been executed in much of Arabia, the need for it has long been recognized. Ibn Khaldun, an Arab urban sociologist who died about 610 years ago, stated in his introduction to urban planning:

In connection with the protection of towns against harm that might arise from atmospheric phenomena, one should see to it that the air where the town is [to be situated] is good, in order to be safe from illness. When the air is stagnant and bad, or close to corrupt waters or putrid pools or swamps, it is speedily affected by putrescence as to result of being near these things and it is unavoidable that [all] living beings who are there will speedily be affected by illness.¹

Ibn Khaldun goes on to state:

The founder [of a town] sometimes fails to make a good natural selection or he sees only what seems most important to him or his people and does not think of the need of others. The Arabs

did that at the beginning of Islam when they founded towns in Iraq, the Hyjaz and Ifrigiah.²

Because of the harsh climate, house orientation on the Arabian Peninsula has developed in a much more consistent fashion than the overall urban planning. Houses have been arranged horizontally close to each other in such a way as to reduce the surface area that will be exposed to the sun. However, this also reduces the desirability of having openings in the outside walls because of lack of privacy; this is why open air courtyards are located in the center of the houses.

The streets are deep and sinuous, which decreases the amount of time the sun shines on building walls and creates pockets which prevent the escape of cool air that has accumulated at night. The coverings make it possible to build the upstairs (or second story) rooms more regularly or larger to overhang the street, which does not need to be as large at that height. This practice has the added advantage of shading the street. Sometimes a passage or an entire room is built over the street (Figure 24). In the old section, the whole street is covered with houses, with just a little space left for the air and light to come through.

Thus, for the traditional Arabic habitat, town planning and architectural design depend upon thermal protection and it is difficult to delineate where the one ends and the other starts.

Thermal Regulation and Design

Human comfort is affected by several climatic factors such as air temperature, humidity, radiation (including light), air

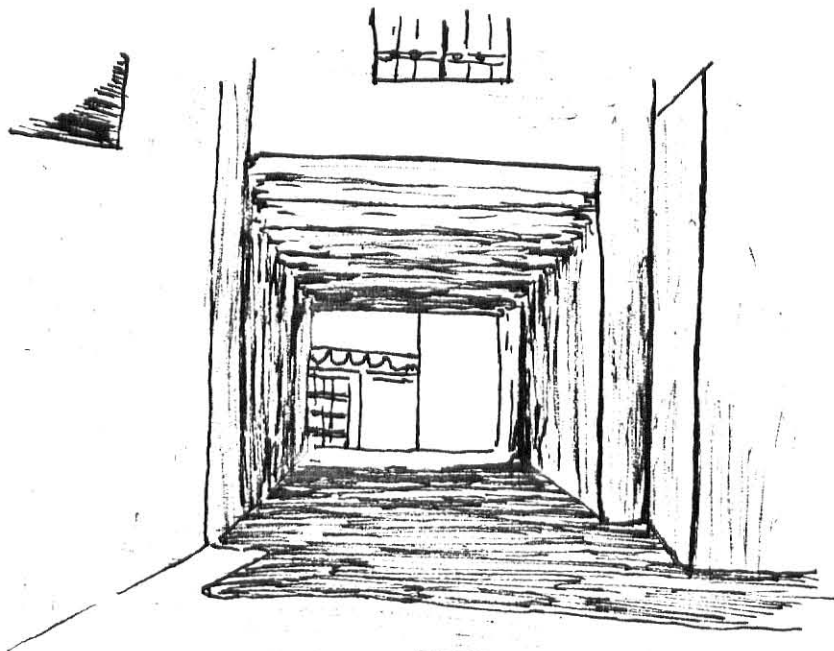
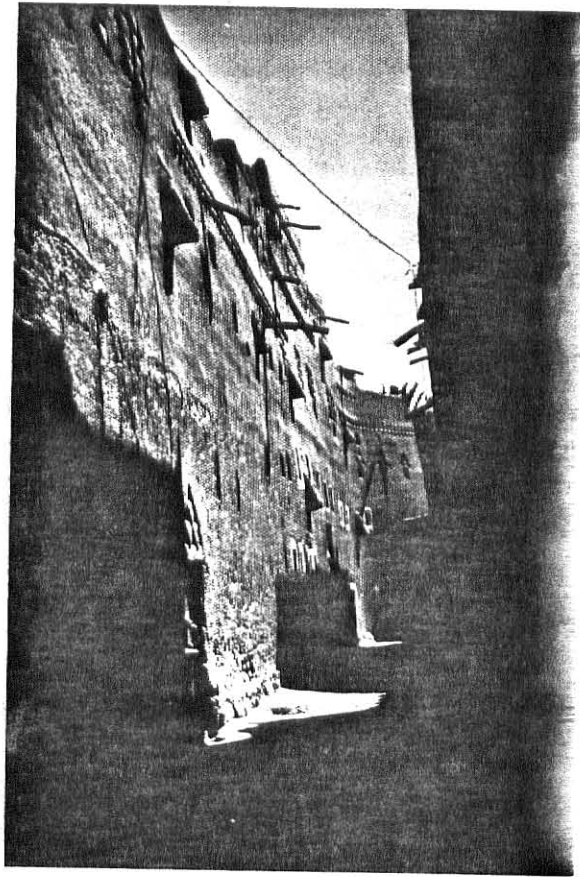


Figure 24. Some examples of the deep, sinuous and covered streets in the old section of Unyazh

movement, and precipitation. These factors must be properly balanced for the body to maintain its normal temperature. Therefore, a house must be built to guard against extremes of heat, cold, radiation, and wind. Hot areas such as Unyzah are characterized by large differences in temperature between summer and winter, and day and night. During most of the summer season, the cloud screen disappears so that the ground receives a great amount of solar radiation by day, and radiates the heat back to the sky at night. This thermal exchange is best moderated by delaying the entry of the extreme daytime heat to the house while, at the same time, storing enough to keep warm during cool nights. Fortunately, sun dried brick is one of the poorest conductors of heat, partly because of its very low natural conductivity (.22 calories per minute/cm²/unit thickness for bricks with 20 percent fine sand, .32 calories per minute/cm²/unit thickness for bricks with 80 percent coarse sand, as against .48 for bricks and .8 for hollow concrete blocks) and partly because mud is weak and necessitates thick walls.

Although the mud wall is a poor heat conductor, it stores heat for a long time. So during the daytime, it collects and stores the heat that falls on its surface and, in that way, it keeps the interior of the house cool, while at night it acts as a source of heat. To avoid the extreme heat of the summer, the people of Unyzah stay downstairs during the daytime and in the courtyard or on the roof during the evening and night time.

Fathy³ analyzed the air flow effect in the following formula: the rate of the air flow (in cubic feet per hour) equals 3,150 (area of inlets in square feet). This formula works when the wind

is from a right angle to the plane of the wall. If the areas of outlet and inlet are the same size, then:

$$\frac{\text{area of outlet}}{\text{area of inlet}} = 1 \quad \frac{\text{value}}{3,150}$$

If the outlet is larger than the inlet, then:

$$\frac{\text{area of outlet}}{\text{area of inlet}} = 2 \quad \frac{\text{value}}{4,000}$$

If the outlet is smaller than the inlet, then:

$$\frac{\text{area of outlet}}{\text{area of inlet}} = \frac{1}{2} \quad \frac{\text{value}}{2,000}$$

These figures show that the greater the ratio of outlet area to inlet area, the greater the airflow through the building.⁴

Once the excess heat to the building has been cut down by decreasing the exterior surfaces exposed to the sun, and by the placement of rooms and courtyards, a number of other measures can still be taken to further improve thermal protection. If we recall the climatic factors that influence comfort, as they have been scientifically determined, we find that they are: the temperature, the sunlight, the humidity, and ventilation.

Ventilation is an important element for comfort inside the house. Hot air rises and its replacement by cool air creates a draught even if there is no wind outside. In most houses in Unyza and some other places on the Arabian Peninsula, this process of ventilation is commonly used to create a draught through high and low openings in walls in high-ceilinged rooms and through other openings, such as doors and windows. Because of the high ceilings, one-story rooms can have the appearance of being two-storied. A type of opening that is seen in most of the buildings in the Middle

East is called the Mashrabiya window or opening (Figure 25). It is a window covered with a wooden latticework of different designs which breaks down the sun's glare into reasonable light and permits those inside to see out but preserves their privacy.

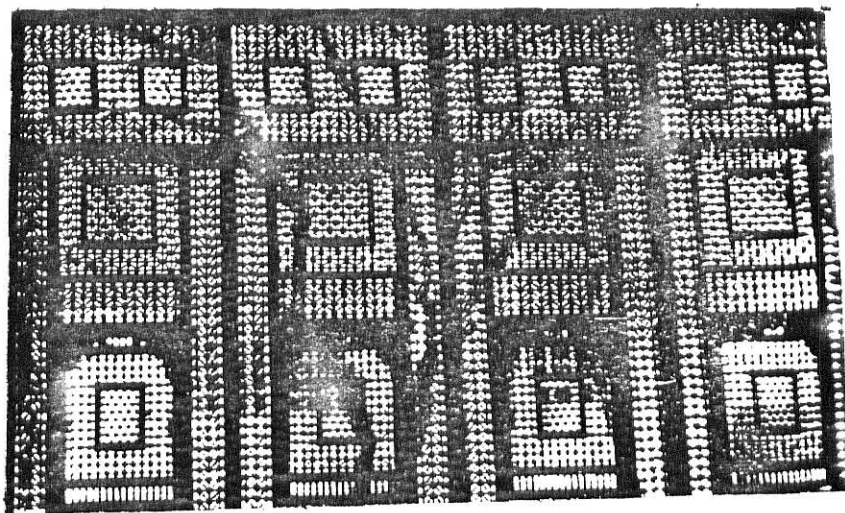


Figure 25. The Mashrabiya (window)

In Europe and America, a window usually serves three purposes: to let light in, to let air in, and to provide a view. But in arid desert areas such as the Middle East, the windows of some indigenous houses are used for letting light and air in without giving attention to the view.

House orientation is influenced by sun and wind directions. The best orientation with respect to the sun is with the long axis of the building lying east-west. Also, it is best for the wind to blow onto a large area and go through the house to cool it.

Humidity, the final climatic consideration for comfort, is not a problem in Unyazah.

Construction Materials

Mud materials of the arid regions can be found in several forms, such as rammed earth, puddled earth, fine gravel, and mud bricks. The basic materials used in mud buildings in Unyzah are the sun-dried brick and mud mortar. These are materials usually available in hot arid areas such as the Middle East, Africa and Southwestern United States. It is interesting to note that the adobe system of house building was introduced to Spain by the Arabs, and then brought to the United States by the Spaniards. The Spanish word "adobe" was derived from the Arabian word "al toba" which means "the brick."⁵

Techniques for preparation of mud require that some soil be cleaned or separated from gravel to purify it before using it to make mud bricks in order to prevent breakage or shrinkage of the bricks. The mixture made of pure soil also resists water and abrasion. Straw is used to strengthen the mud brick or the mortar structurally by joining the parts together. Some sandy soils do not have enough strength to prevent crumbling so, in addition to the straw, they have to be mixed with an appropriate amount of clay to provide the required strength.

One of the advantages of mud is that it has the properties of being plastic when wet. It can be molded in different ways by hand, similar to making a piece of ceramic. Amos Rappaport says:

use of high heat capacity materials such as adobe or pease, mud, stone and various combinations of these provides [a heat sink which absorbs] heat during₆ the day and re-radiates it during the night.

The mud material can be easily applied and has the advantages of

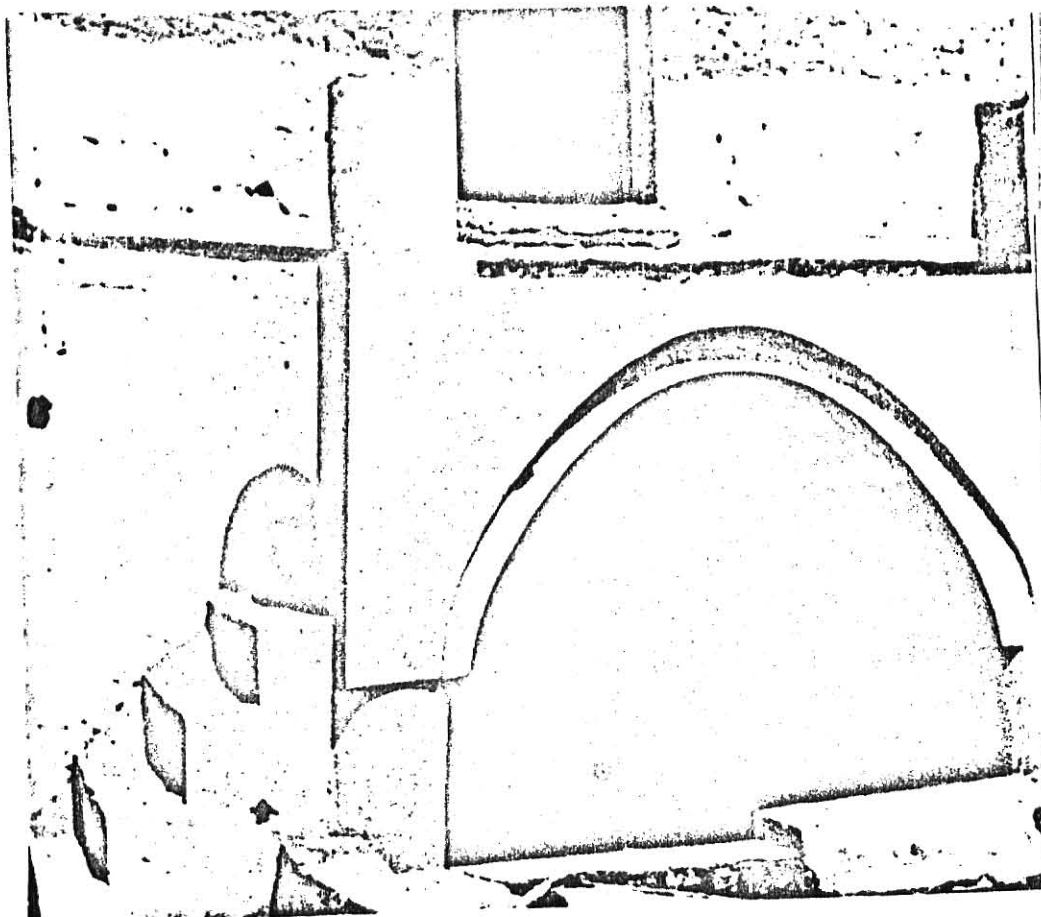
availability and low cost. It can be handled by both unskilled and semi-skilled laborers. According to Fathy, a team of men can make 2000 or 3000 bricks a day by using the rectangular wooden mold. Mud is versatile; regular mud material or the upgraded kind works for public buildings as well as for domestic ones. Mud buildings which Fathy found in his studies are examples which show the durability of mud materials. The buildings are long, vaulted storehouses in Luxor, built about 3,400 years ago of mud bricks, and they are still in good condition. In Tonna El Gebel, he found 3,000 year-old mud vaults supporting an excellent staircase (Figure 26).⁷

Social and Cultural Impacts on House Design

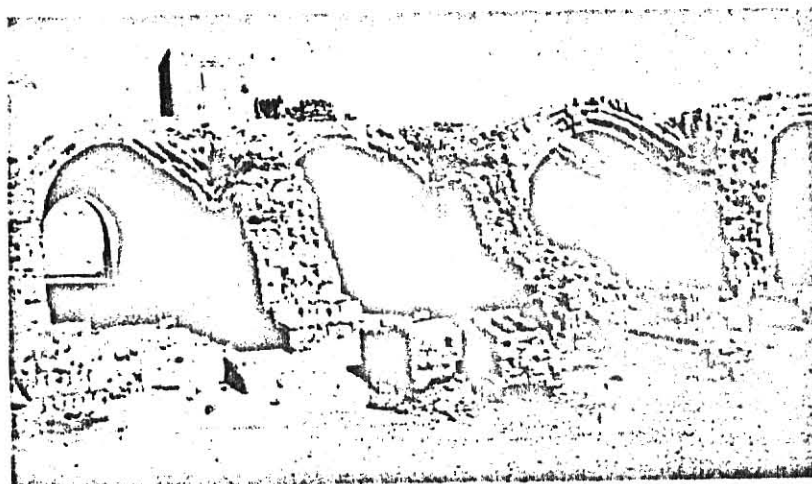
Culture springs from the root
 And, seeping through to all the shoots
 To leaf and flower and bud
 From cell to cell like green blood,
 Is released by rain showers
 As fragrance from the well flowers
 To feel the rain.
 But culture that is poured on men
 From up above, congeals them
 Like damp sugar, so they become
 Like sugar dolls, and wehn some
 Life-giving shower wets them through,
 They disappear, and melt into
 A sticky mess.⁸

Traditions play a strong role in design and form. Rappaport discusses the fact that "...the link between the culture and the form in any society never disappears and the house and its use still tells the young much about life and attitudes expected of them, such as formality, informality and neatness."

Rappoport also stated that "because building a house is a cultural phenomenon, its form and organization are greatly influ-



Vault supporting a staircase in Touna el Gabal, Ptolemaic period



Granaries of the Ramesseum in Old Gourni, nineteenth dynasty

Figure 26. Old and durable mud buildings

enced by the cultural milieu to which it belongs." Many socio-cultural forces are reflected by the home environment created, such as religious beliefs, the family and social structure, and other social aspects. The different forms and details of traditional mud houses reflect the beliefs and the feelings of the people. In discussing reasons for the forms of house and settlement, Rappaport states that "...it may be useful to think of them as a physical embodiment of [a culture's] ideal environment."

As Fathy mentioned, the Arabs call the house "sakan" which is derived from the Arabic word "sakinah" meaning peaceful and holy. This name for the house is in itself a reflection of cultural values.

Handmade products appeal to Arabians more than machine products because they reflect the mood of the craftsman. For example, most mud houses express the relationship or involvement of the mason and the material. The patterns and small details reflect his moods of hesitation and humors in the building process, which makes the whole thing valuable in its harmony with its surroundings.

The courtyard, as discussed in the field work section, is one of the strongest features of the Arabian house. Most of the time, the house interior doors and windows open into the courtyard. In the courtyard, the owner has a direct visual contact with the sky, where he feels the part he can see is his private part. The advantage of the courtyard is also recognized in other places, such as Greece, Italy, Egypt, and Iraq. A fountain, when it is found in the courtyard, gives great reflection of the blue sky, which provides the feeling of calm and peace by bringing the sky to the water.

The architectural forms that have evolved from the traditional influence of the Arabian culture are as important to its people as its language, dress or folklore.

Al-Dareeya Model House

Hassan Fathy has researched the indigenous housing in Al-dareeya village in Saudia Arabia, about 18 km. from the capital, Riyadh, as a base for improved Al-Dareeya housing models. These models are directed to meet special requirements, such as modern living standards, improvement of design and construction, use of local materials, preservation of the indigenous architecture, and improvement of the air circulation for a more comfortable temperature. One of the main purposes of this project is to help low-income people to own a house. The general improvements in this project can be analyzed according to the following factors, as in the drawings shown in Figure 27.

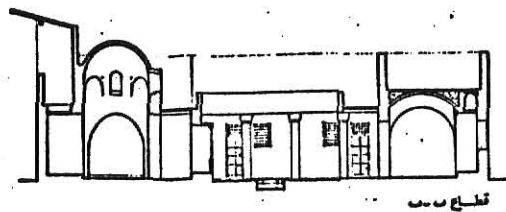
- 1) Building materials used are the local materials of stone and earth, which fulfills one requirement of the new model construction. The foundations and up to about 40 percent of the walls were built from stone and clay mortar; the rest was completed by sun-dried earth bricks.
- 2) The courtyard is designed to maintain its traditional functions but with some improvements in the arrangement of other spaces around it. Simple methods used by the local people were the basic methods employed for arranging rooms and pillars which surround the courtyard. Also, the level of the courtyard was lowered slightly, to prevent the seeping of rain into the rooms.
- 3) Alkhah, wah (guest living room) can be found in nearly every Arabian traditional house on the Arabian Peninsula and is likewise included in the Al-dareeya model. As usual, it is located close to the main entrance with a bathroom adjacent to it. It is a rather large room, with a high ceiling and two rows of high and low windows.

- 4) A system of wind-catch for air intake has been applied. It is located high in the walls facing the north and northwest winds, and on the other side of the rooms are some windows to facilitate air circulation.
- 5) The old fireplace, used in the old houses, has been replaced by a more practical fireplace. This kind, also developed by Hassan Fathy, is modeled after the ordinary international fireplace. It is used for heating in the winter, in addition to its use for preparing tea and coffee. The smoke and combustion byproducts are taken directly outside by a chimney. Part of the room near the fireplace has a sunken floor to provide spacious sitting places, which is also a common Arabian feature.
- 6) Bedrooms are built with clothes and linen closets in the wall instead of the old wooden movable units. Platforms are built for beds in the winter, to avoid the ground air currents. Also, the breeze-catch can be used for a group of two or three rooms.
- 7) The bathroom in the old design lacks the proper design for sufficient sanitary functions. The newly developed one is derived from the bathroom common to the urban areas of the Middle East. It consists of two parts: the first bath and the second bath. The first bath is used for changing clothes and for a short rest after taking a bath in the second bath. The second bath has a small basin with two taps: one to supply the cold water from a tank on the top of the house, directly from the water pipeline, and the other to supply the hot water from a heater which is fixed outside the bathroom. The heater usually is located outside in an open space to make it easier to handle the wood used for fuel. The smoke escapes through a chimney. The second bath becomes what is called the Turkish bath, where steam seeps through a pipe into the bathroom. Inside the bathroom, the hot and cold water is mixed in a basin to a comfortable temperature, and then is taken from the basin by means of a dipper to wash the body.
- 8) The old kitchen lacks convenient cooking facilities and storage. The newly developed kitchen includes storage space for fuel, a chimney, sinks, shelves for dishes and pans, and storage areas for food goods.
- 9) The roof is usually used for sleeping during the summer season, in addition to its other uses. In these models, the roof has been designed with different levels to make more shade.

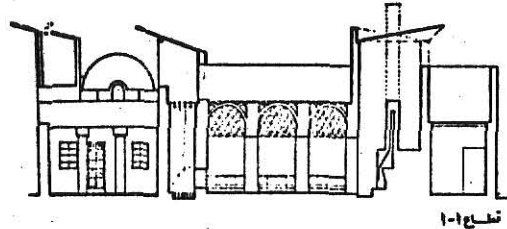
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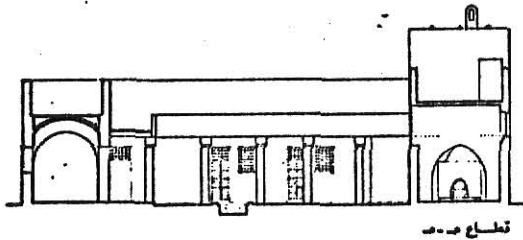
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تصميم ١-١



تصميم ١-٢



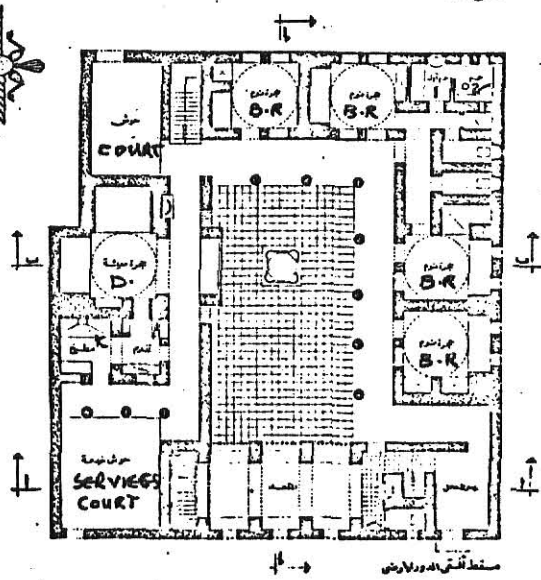
تصميم ١-٣

قرية الدرعية
تخطيط تخطيطي لقرية الدرعية

مقياس
١:١٠٠
١٠٠م



١:١٠٠



مخطط التوزيع والارض



Making bricks



Wall construction



Roofs and stairs are constructed from tamarisk trunks and branches

Completed house



Comparison of Indigenous Housing and
Imported Western Style Buildings

Because of the thickness of a mud wall and its low thermal conductivity, rooms built from mud in hot areas are known to be much cooler than those built from other materials. To prove that, some tests were carried out on indigenous mud brick buildings in Egypt and Oman and similar modern concrete buildings in the same location. These tests, conducted by three researchers named Allen Cain, Farroukh Afshar and John Norton, compare the response of indigenous buildings and modern concrete buildings to the climate (Figure 28).

Solar radiation rapidly heats up the surfaces of concrete walls and roofs. Because the concrete walls are usually thin with low heat resistance, the heat is quickly conducted into the house soon after it falls on the outside surfaces. A mud wall and roof heats up during the day to a lesser degree and its light color reflects more radiation than concrete walls. This is the distinct advantage of mud material over concrete in hot climates.

The greatest shortcoming of mud brick buildings is their need for maintenance. Every few years exterior walls need resurfacing, especially if they are exposed to weathering or rain. There are several experiments being done to find ways to strengthen the mud material's resistance to wear, so the mud brick may now be stabilized by using small quantities of cement or bitumen.

Mud material is probably the most widely used building material in the developing countries today. Yet in modern architecture, the mud brick has been replaced by the modern concrete brick

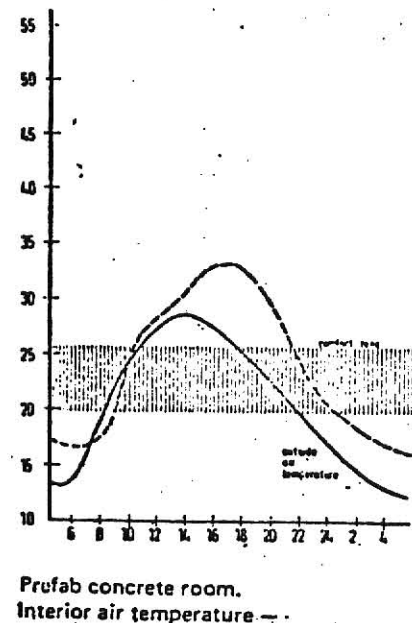
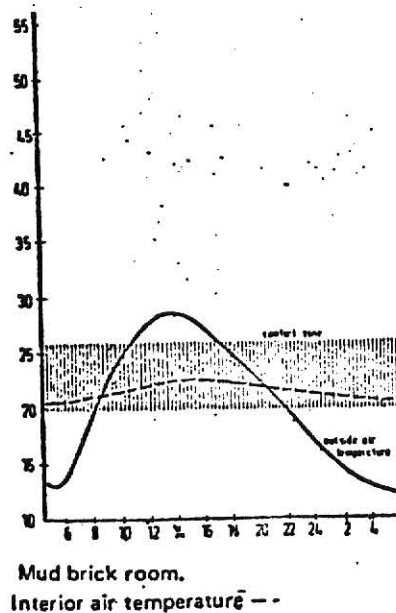
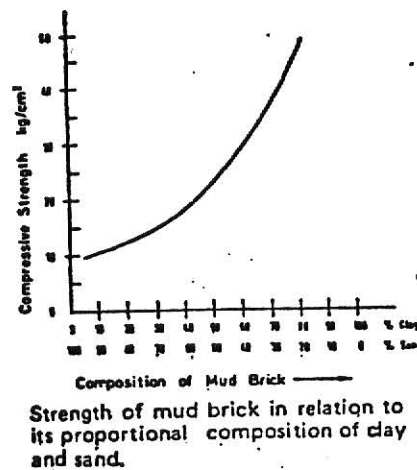


Figure 28* Comparison of the response of indigenous and modern buildings

*Allen Cain, Farroukh and John Norton, "Indigenous Building and The Third World, Architecture Design, April, 1975.

as a basic element in the indigenous architecture. Along with the rest of the indigenous materials, mud brick has been dismissed without environmental or scientific proof as to whether the imported concrete and steel style of architecture is the right substitute for the mud brick.

The kinds of habitats which have been developed in the Arabian Peninsula and throughout the developing countries have now been directed in favor of European style apartment buildings or houses. The use of traditional material and technique is shrinking to give way to imported materials and techniques because it goes against the ideas held by national or international experts in architecture and planning, who prefer to use European or so-called International styles. This modernist ideology has been propagandized to local people to the extent that some have considered replacing their traditional houses with one of the imported Occidental models. These people, in different places in the Third World, have lost their confidence in their indigenous housing systems and think the European system is superior to theirs.

The moral influence of European style is visible, especially among the wealthier social classes, who want to imitate the Western lifestyle in living in the same type of house. Once they started this, those people who did not follow were discredited and would sometimes even be socially devalued.

As the problem of housing shortage increases, along with the population increase, the architects and planners have not found a way to solve the problem other than with large isolated apartment buildings or individual one-story separated houses. This is a bad

solution, lacking imagination in relation to the climate and cost. Most developing countries are subjected to warm climates and an increasing shortage of housing, and the European design models and materials are costly in their construction and respond poorly to the climatic conditions.

Amos Rappaport comments on the application of the Western system in the Third World countries:

There is a danger in applying Western concepts which represent only one choice among the many possible to the problems of the other areas, instead of looking at them in terms of local way⁹ of life, specific needs and ways of doing things.

In a meeting for the architects of the hot climate countries in London, in 1953, some architects expressed their opinions in the following translated statements. N. T. Saran said:

The architectural programs in the University of Bombay have been planned by The Royal Institute for the English architects, which is unbelievable. The result is for the architectural education to follow the steps of the School of Arts in Paris, rather than relating them to the real life of the people in India today. And as long as the textbooks for the architectural education are Mitcheal, Gagers, and Dori books, then the₁₀ local material will not gain any encouragement.

The architect Farafia stated what can be translated as, "The programs of architectural schools in India follow the Western system which results in less attention to the Eastern subjects."

In addition, Fathy says regarding architects:

The architects, each of whom will be in charge of a succession of village projects, will have to be specially trained beforehand. Unfortunately, the training provided in our architectural schools today does not even begin to help the architect who tackles rural problems. This training, based on that offered in European schools, is aimed at the needs of the town: the building of offices,

flats, banks, garages, cinemas and other large edifices; but completely ignores the needs of the countryside....In Egypt, where 90 percent of the population lives on the land and 90 percent of the wealth comes from the land, to pay no attention whatsoever to the needs of the countryside is surely rather irresponsible in an architectural school.¹¹

Professor Hassan Fathy was one of the first modern architects to employ the indigenous architectural design and materials. In the 1940s, he built an entire village, called "Gourna," near Luxor, Egypt, from mud brick and with the design drawn from traditional concepts. He also tried to encourage an economic and organizational base in the village so the community would be self-sufficient.

John Turner is another authority who believes that a house should not be treated simply as a product, as in the modern housing systems in the Third World. Instead, he says it should be processed like the indigenous systems found in the Third World from which there are deductions to be drawn

Amos Rappaport, in his book, House Form and Culture, states that:

All housing needs to achieve four objectives in order to be successful:

1. It needs to be socially and culturally valid. (Here traditional housing possibly works best.)
2. It should be sufficiently economical to ensure that the greatest number of people can afford it. (In primitive contexts most, if not all, people have houses.)
3. It should ensure the maintenance of the health of the occupants. (In relation to climate, traditional housing succeeds; in relation to sanitation and parasites, it usually fails.)
4. There should be a minimum of maintenance over the life of the building.¹²

If we use Rappaport's criteria as a guide, traditional housing

may be much more acceptable, if not in fact, more desirable than has been assumed and attitudes toward housing, perhaps, should be adjusted accordingly.

Chapter IV

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- ¹⁰N.T. Saran, cited in Fathy, Model Houses for El-Dareeya, Saudi Arabia, 1965.
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Chapter V

RECOMMENDATIONS AND CONCLUSIONS

The housing conditions in Unyzah have a great need for improvement. Unyzah's housing situation is typical for almost all of Saudi Arabia and the other Third World countries, where the contrast between the indigenous architecture and the imported architecture can be seen everywhere. Most of the time, imported materials and constructions techniques are implemented without any attention to a culture's roots and uniqueness, and without attention to site or climate. Thus, these imported buildings (especially the houses observed in this case study) are deficient culturally, economically, technologically, and architecturally. Given the world's energy, population and economic problems, it is time for people to become more aware of their own environment and the value of their indigenous architecture that has been passed down from one generation to another. This research suggests that indigenous architecture should be used as a base for a more functional and pleasing environment. A similar view is held by other professionals in the field of architecture with whom I have talked.

A comprehensive plan is needed to help solve the problem of the housing situation and people's perception of it, especially in small towns, villages and the sections of middle and low income neighborhoods. The objective of this plan should be to contri-

bute to the socio-economic and psychological needs of the majority of the people.

The housing plan will require a great effort in terms of conducting research and experiments and heightening people's awareness of their environmental needs. A research center is of primary importance in initiating treatment of the housing problem. This research center should be staffed with a team of professionals in architecture and other related fields such as psychology, sociology and economics. The professionals should be well versed in all the major issues of their professions, so that they can attack the housing problem from different directions and gradually arrive at a thoroughly planned, comprehensive solution. To facilitate proper research, the institute will have to be furnished with or at least have access to up-to-date, efficient equipment.

The research team should study what has been done all over the world in the treatment of indigenous architecture, and thus try to benefit from other successful work. The team should analyze the local indigenous architecture. It should experiment with different possibilities for improvements. The findings of the research team from different resources such as literature, experiments, interviews with local people and experts in indigenous architecture, and direct contacts through fieldwork with the people can be applied to the professional field and the attitudes of people in the mainstream of the community. The application of knowledge, both in the profession and in the community, will be the hardest task in the process. To begin, an essential and important step is required, and that is to make people aware of their

housing status through a comprehensive campaign, using different media, direct contact, and all other possible means.

The mainstream people are propagandized to want detached concrete houses. During the field research for this study, I visited people in concrete and mud houses and found that neither are satisfied. People in mud houses complain that their houses do not meet the standards of modern life style and they do not have as many conveniences as the concrete houses do; however, they cannot afford to own a detached concrete house. People in standard or average concrete houses always complain about being uncomfortable, and I commonly heard these comments: "Oh...this house is just like an oven in the summer and like a refrigerator in the winter."..."Mud houses were more comfortable." So from observations such as these, and from my own experience in both kinds of houses, I find that people in Arabia do not know any better possible solution than what they have. They have been influenced to think that detached concrete houses are the only substitute for the indigenous houses, and they consider them as important because they are the modern style without being aware of how their functional features operate in their arid desert climate. Also, some people do not know that mud houses are found desirable in other areas of the world, i.e., along the equator starting from India, passing by the Middle East, Africa, and reaching the Southwest United States.

So the need for a public awareness campaign by all possible means is obvious. Such a campaign would emphasize the criteria of both the indigenous houses and the detached houses and make

the function of both more clear so people can have a better understanding of their housing priorities. They also should be exposed to the possibilities of deriving important lessons from the old traditional houses. These lessons can be successfully applied in developing new architectural designs which combine the indigenous functional features and the requirements of the modern lifestyle. Then, when people have reached a certain level of environmental understanding, they should be introduced to some examples of traditional concepts used successfully in other places similar to their own environment. An awareness of the value of traditional architecture would help people to appreciate it more and use it with pride and dignity.

The next sections of this chapter will explore some suggestions for improvements in traditional uses of material and design. Some improvements have already been developed and could be borrowed from other cultures similar to Unyzah's.

Improvements in Material and Design

Quality of earth materials varies from one place to another in arid climates. The usual kind of materials used (such as clay, sand, silt and other minerals like ferrous oxide, lime and magnesia), and the proportions of each, depends mostly on the specific climate requirements. Also binding materials such as cement, juss (gypsum) and straw, are used in a variety of ways for construction purposes. On the Arabian Peninsula, ordinary local mud material is brought from some nearby site and simply mixed with straw. However, a small amount of cement could be added to the mud as it

is in other locations with the same climate. This improvement would strengthen the earth brick and prevent the usual need for periodic maintenance of the mud walls because of weathering.

The single mud-brick mold technique could be improved to increase the number of bricks made, with less energy and time. One way would be to develop a mold for two or three bricks which could be handled by one person, or a mold for six or eight bricks that could be handled by two persons. The inside of the molds could be finished with smooth metal to make the removal of the bricks easier.

To speed up the process of making bricks, we can introduce the technique Hassan Fathy used for the Gournah project construction. As he stated:

To make bricks quickly, mix the mud and sand in a mechanical cement mixer with a carefully controlled amount of steam. Steam would penetrate the lumps of earth much better than the water could, thus achieving the right proportions of earth and water without the need to make very wet mud and then have to wait for it to dry...We found that this steam wetted mixture, if made into bricks in a mechanical press under the same pressure a winnet machine produces - eight atmospheres - could be used in building immediately. We have samples of the local earth analyzed in the laboratories of the Engineering Department of Cairo University, where it was found that a quantity of sand had to be added to improve the granular graduation. When this was done, the bricks would take a compression of 40 kg/sq. cm. It should be stressed here, though, that this use of machinery was proposed only because of the villagers' urgent need for housing.¹

Ventilation Systems

The harshness of the desert climate has forced the people who live there to attempt different solutions to the problem of

ventilation, a most important aspect of housing design. As discussed previously, Unyzah houses have responded to that need with different types of ventilation systems, such as the organization of courtyards, Alseeb, Alra'washen and some high windows and other openings that bring the breeze down into the different rooms of the house. However, in other similar climates, different methods have been used to enhance air currents. One method is the Al-Malkaf (or the wind catch) in Egypt (Figure 29) and another is the Ba'dkeer in Bahrain, Iraq and Iran (Figures 30,31). Because of the similarity of climate between Unyzah and Egypt, Iraq and Iran, the Al-Malkaf and the Ba'dkeer seem to be good approaches which could be applied to Unyzah housing designs.

Al-Malkaf (the wind catch) is an Egyptian device used in the old indigenous houses to catch the wind from up high where it is strong and clean. The room is specially designed with a very high center, so the cool air enters in a downward flow, and the hot air leaves, flowing upward through the courtyard and other openings. Hassan Fathy has developed this concept of ventilation into a chimney-like air passage placed high in the building with a large opening that faces the prevailing wind. Fathy used his design in his school in the Gournia project in Egypt. Inside the air passage, Fathy installed a sloping metal tray filled with charcoal that would be wetted by a tap. The air flowed over this baffle and was thus cooled before entering the room. At Gournia school, the wind-catch produced a drop in temperature inside the classroom of 10°C . This system could be easily and directly applied to the Unyzah housing system.²

Two types of Ba'dkeer systems are used in most of the housing designs in countries around the Arabian Gulf. These are the air tower type and the open wall type.

The air tower type is usually built higher than the roof. It is a tall, square tower with two walls intersecting in the middle. It is completely open to catch the breeze from any direction and then lead it down into the inside of the house. This system might need some adjustment to be applied to houses in Unyzah. One possibility would be to close the northeast side of the tower to prevent the winter northeast wind from entering the house.

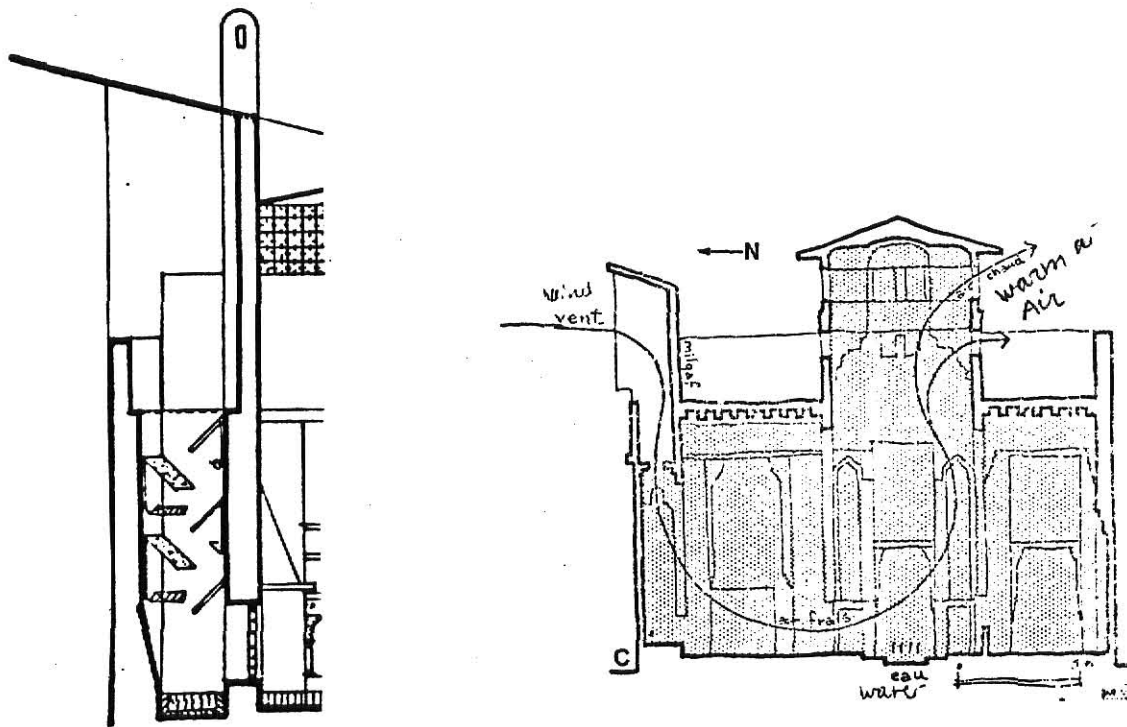
The open wall type is designed to channel the breeze through some openings facing the direction of the summer breeze, and lead it down to cool the rooms. It is composed of two walls: a low wall about $1\frac{1}{2}$ meters high and a higher wall. The walls are built with an air passage of about $\frac{1}{3}$ meter between the end of one wall and the beginning of the other.³

These ventilation devices, Al-Malkaf and Ba'dkeer, and other kinds of ventilation systems might be good subjects for fruitful research. They could be developed to be controlled according to different seasons and wind directions. They would have to be capable of being wide open in the summer and closed against the winds in the winter.

Energy Resources

Another possible future resource to adopt for different purposes such as cooling, heating and cooking would be solar

Figure 29.



(1) The developed malkaf

(2) The old malkaf

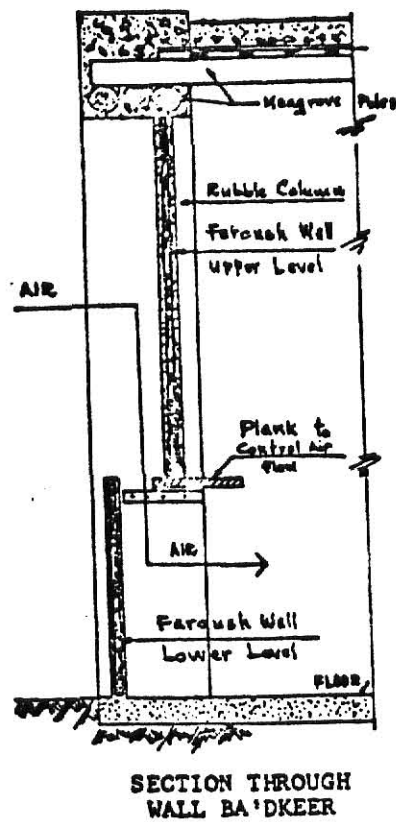
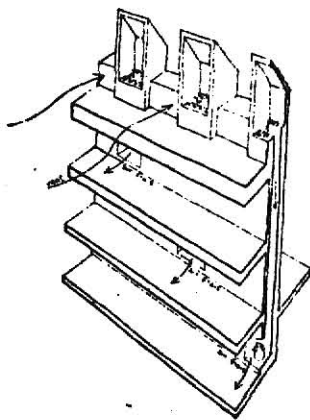
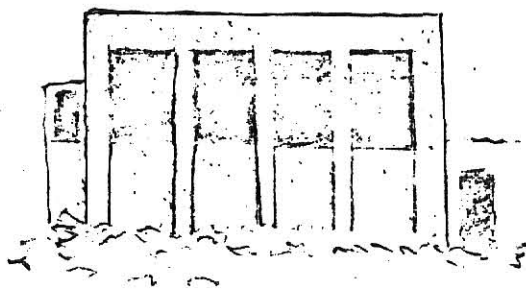


Figure 30. Wall Ba'dkeer

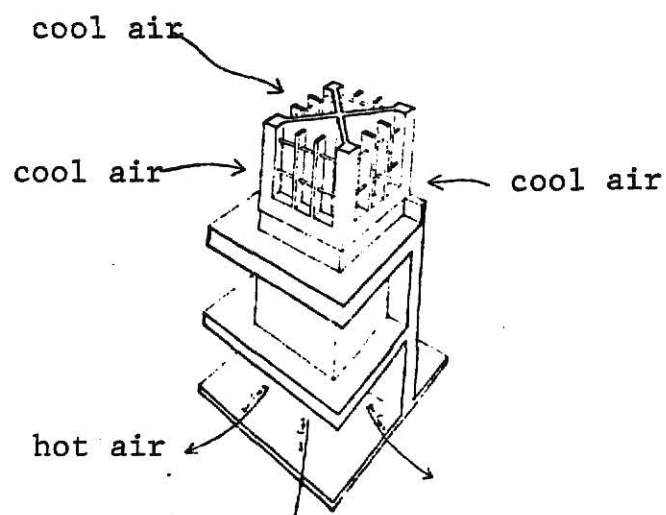


Figure 31. Air tower Ba'dkeer

energy. According to Dr. George C. Szegois' article published in National Geographic, "The solar energy that falls upon the Arabian Peninsula in one year is greater than twice the oil reserves of this entire globe."⁴ That fact should be taken advantage of as soon as possible. The potential for solar energy is tremendous for many uses. However, the most immediate and important use would be for ventilation and cooling of the houses.

Conclusion

The main purpose of this thesis study is to try to help solve the problem of the housing quality and quantity in Unyazah and other small towns and villages in Saudi Arabia. According to the previous analysis of the existing housing situation, the future solutions must respond to the climatic factors and the traditional and social functions as well as the needs of the modern lifestyle. Building materials and construction techniques should be practical and easily handled by local people. House design and ornamentation should reflect the tastes and heritage of the culture. Housing should help create a healthier, safer and more aesthetically pleasing environment and the research in this field indicates that the best base from which to work is indigenous architecture.

Chapter V

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INDIGENOUS ARCHITECTURE OF UNYZAH
AS BASE FOR FUTURE
TRADITIONAL AND LOW-COST HOUSING

by

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A MASTER'S ABSTRACT

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ABSTRACT

At the present time, many people in the world are suffering because of a lack of adequate housing and an ignorance about the traditional architecture, especially in the Third World countries. In this study, research was concentrated on the indigenous architecture in Unyzah, Saudi Arabia, and the traditional architecture in similar environments. Many houses in Unyzah, as well as other places in Saudi Arabia and the developing countries, fall below an acceptable standard for maintaining the health and safety of the occupants. Very few improvements have been made in housing for long periods of time, because most architects and engineers have thought the indigenous houses did not need professional designs but should be replaced by Western style structures. This kind of thinking has overlooked the consequences that follow when the needs arising from climate and culture are ignored.

This study details some of the evolutionary processes of traditional architecture in Unyzah. Different architectural forms have evolved from different kinds of human settlements and these forms reflect its people's character as much as their language, dress and folklore. There are distinctive styles of architecture varying from one part of the world to another as a result of the imagination of the people and the demands of the environment.

Through a report of the author's findings, first in field research and then in academic research, this paper establishes the value of indigenous houses and recognizes them as an appropriate base for a solution to the housing design problems in Unyzah, a typical town in the Arabian Peninsula. The conclusions include a proposal for development of both the physical and cultural aspects of restoration of value and use of traditional architectural forms and techniques.